

WA'S PARKS, WILDLIFE AND CONSERVATION MAGAZINE

LANDSCOPE

Volume 36 Number 1
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FIT FOR A QUEEN

Botanic breakthrough
for WA's iconic orchid

Yoshi's journey

A determined loggerhead turtle

Embracing biophilia

Nature providing relief
in a pandemic

Kids and canopies

Active young environmentalists



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Department of Biodiversity,
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ON THE COVER

Front cover Queen of Sheba orchid in full bloom.

Photo – David Bettini

Back cover Banksia woodland habitat.

Photo – Russell Miller/DBCA

Teeming with bird and plant life, Kings Park and Botanic Garden is an iconic urban sanctuary and Western Australia’s most visited destination. With almost six million visitors each year, it is cherished by the community for its beautiful gardens, bushland and parkland precincts, with stunning views across Perth city and the Swan and Canning Rivers.

The conservation and research work undertaken by a team of expert scientists and horticulturalists behind the scenes extends well beyond park boundaries and is recognised both nationally and internationally.

The multi-disciplinary DBCA science team based at Kings Park undertakes State-wide conservation science to build on and share knowledge of WA’s unique and world-renowned biodiversity. Encompassing key research areas of restoration ecology, seed science, conservation genetics, biotechnology and orchid conservation; there’s a strong focus on extension to practitioners in the field, strategic alliances with industry and regional land managers. The Botanic Gardens and Parks Authority’s (BGPA) long-term collaborations with local and international universities and critical funding partners including the Friends of Kings Park. These partnerships provide researchers and post graduate students from around the world with an opportunity to engage in cutting edge research and in applied science and conservation work that is contributing to saving flora across the state.

Working with DBCA’s nine other science programs within Biodiversity Conservation Science provides the State with enviable access to one of the largest biodiversity research groups nationally.

Closer to home, research conducted by the team feeds into the bushland areas of Kings Park and Bold Park as well as the Western Australian Botanic Garden, a ‘living museum’ displaying more than a quarter of the State’s flora. Kings Park and Botanic Garden is a community jewel, acting as a springboard for wildflower and environmental tourism across WA and helps to enhance our appreciation of the natural environment through an immersing experience, education and outreach activities.

When you leave a beautiful place like Kings Park you carry it with you wherever you go.



Alan Barrett, Executive Director

Botanic Gardens and Parks Authority

Contributing

Janine Guenther is a dedicated naturalist as well as a passionate photographer and writer based in Denham. She has authored many publications about Australia, not only in English but also in her mother language German. She also runs a tour company, Naturetime Tours, that

conducts day tours within the Shark Bay World Heritage Area and customised multi-week tours all over Australia.



Dr Ben Miller is a principal research scientist, and program leader, with DBCA’s Fire Science program. Based at Kings Park since 2007, he has been researching fire ecology and plant conservation for over 25 years. His work focusses on understanding of ecological processes to help improve planning and management – in land management, conservation of species and communities and ecosystem restoration.



Joselyn Juraszek is a passionate environmental scientist and educator with a background in scientific research. Joselyn has worked in various areas across DBCA (Swan River Trust) including science, wetland ecology and graceful sun moth research, as well as education. In her current role, Joselyn is working with schools and stakeholders to connect youth to their local environment and develop action-based projects to preserve and protect their local patch.



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This page Central lookout, Stirling Range National Park.

Photo – Ann Storrie



Department of Biodiversity, Conservation and Attractions

Features

- 8 **Parks for People: Monkey Mia Conservation Park**
Home to WA's friendly bottlenose dolphins.
- 12 **Embracing biophilia: Prescribing nature in a pandemic**
Finding relief in nature during lockdown.
- 19 **Yoshi's journey: One turtle, two countries, thousands of kilometres**
A determined loggerhead turtle breaking records.
- 22 **Fit for a queen: A botanical breakthrough**
Cultivating the Queen of Sheba orchid.
- 28 **Recovering from bushfire in a biodiversity hotspot**
Multi-year process of recovery in the Stirling Range.
- 34 **Adventure out: Bungle Bungle Range**
Exploring Piccaninny Gorge in Purnululu National Park.
- 41 **Dry season dreaming: Snubfin census**
Searching for an elusive dolphin in Yawuru sea country.
- 45 **Adding fuel to the fire: invasive grass management and fire**
Exploring grassy weeds to reduce bushfire risk.
- 50 **Kids and canopies cooling the planet**
Young people examining environmental issues.

Regulars

- 3 **From the desk of Alan Barrett**
A foreword from Executive Director, Botanic Gardens and Parks Authority.
- 6 **Bush telegraph**
Short stories from around the State, letter to the editor and a guest word.
- 11 **In review**
A collection of books, applications and websites.
- 27 **Discovered: New subspecies of beloved bird**
Red-tailed black cockatoo.
- 53 **Kaleidoscope**
Connecting kids with nature.
- 54 **Nature's pin-up**
Scarlet banksia (*Banksia coccinea*).



mailbox

Dear editor

In the article 'A Sacred Partnership - Managing Matuwa and Kurrara Kurrara' from *LANDSCOPE* magazine Vol 32 Number 1 Summer 2015–16, under the heading European Settlement, it states that "It wasn't until some 60 years later, in the 1930s, that Lorna Glen and Earahedy (as they were otherwise known) became working pastoral stations." I would like to point out that in relation to Lorna Glen that this statement is incorrect.

I have been researching the life of pastoralist Arthur Cranbrook Ashwin, my wife's great grandfather, and have amongst a host of other information about his life as a prospector, miner and pastoralist in the north eastern goldfields, he in fact worked the parcel of land known as Lorna Glen well before 1930. AC Ashwin's main pastoral interest at that time was centred

at Yelma Station, south east of Lorna Glen, and in fact he did lease land around Lorna Glen and Lindsay Gordon Lagoon well before 1930. According to an Original State Series 300 Chain Plan 1917–1926 Arthur Cranbrook Ashwin leased the parcel of land known as Lorna Glen, lease number 3252/97. This information has been obtained from Landgate as part of my research. On the Original State Series 300 Chain Plan 1926–1932 Arthur Cranbrook Ashwin is still noted as being the "owner" of lease 3252/97 Lorna Glen. Arthur Cranbrook Ashwin died in late 1930.

It is therefore correct, and I think historically important, to set the records straight and to acknowledge the fact that the pastoral property known as Lorna Glen, was established by Arthur Cranbrook Ashwin sometime between 1917 and 1926, well before the 1930's. AC Ashwin worked Lorna Glen in concert with Yelma Station until his death.

Cheers Jeffrey W Oates

Ed: *LANDSCOPE would like to thank Jeffrey for his letter and acknowledge that Lorna Glen was a working pastoral station prior to 1930, and was established by Arthur Cranbrook Ashwin.*



Above A cropped area of the Easter Division Original State Series 300 Chain Plans No 61/300 1917–1926 and 61/400 on which Lorna Glen is identified along with the 'owner's' name, being AC Ashwin.

Please send your emails to landscape@dbca.wa.gov.au to be considered for publication. They should be no longer than 150 words and may be edited for readability and length.



Adventure continues in Collie

Works are continuing on the Collie Adventure Trails project. Twelve kilometres of new mountain bike trails in Arklow forest brings the total length of new and upgraded mountain bike trails in the Arklow forest to almost 30 kilometres.

Visitors can now also enjoy a picturesque drive along the Collie River, following the recent completion of upgrades to Collie Scenic Drive by the Department of Biodiversity, Conservation and Attractions, Main Roads WA and the Shire of Collie. Further sealing of this road will be completed by the end of 2020.

The sealing of Wellington Forest Road in Wellington National Park in early 2020 is another scenic drive that visitors can enjoy in the region.

Above Mountain bike trail in Arklow forest.
Photo – Stuart Harrison/DBCA

Murujuga Art Viewing Trail project underway

To assist in protecting and showcasing some of Murujuga's most easily accessible rock art, in 2019, DBCA and Murujuga Aboriginal Corporation commenced the Ngajarli Art Viewing Trail project. The site, formally known as 'Deep Gorge' was renamed to Ngajarli (pronounced Nah-jar-li) meaning 'secret/sacred place' in the local language.

This is the first recreation site to be developed within the Murujuga National Park comprising the installation of a carpark that holds 19 car bays and two long vehicle bays. Stage two, which has now commenced, includes the construction of approximately 45 metres of raised boardwalks. A cultural walk trail will protect the rock art while showcasing its significance and the values a World Heritage nomination is seeking to have recognised.

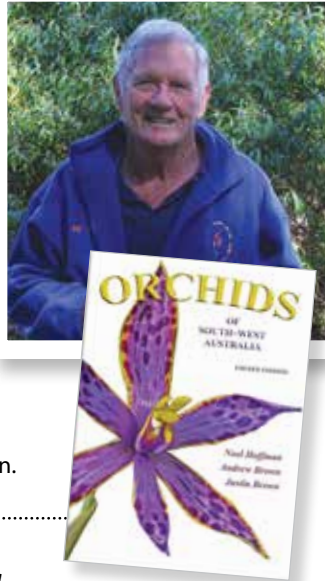
Orchid enthusiast receives Queen's honours

Noel Hoffman has dedicated his life to orchids and was recently awarded a Medal of the Order of Australia for his 'service to the conservation of native orchids' in the Queen's 2020 Birthday Honours list.

Mr Hoffman has written about, photographed and documented so many orchids he even has an orchid species, *Caladenia hoffmanii*, named after him.

The book '*Orchids of South-West Australia*', which he co-authored, is now in its fourth edition and contains many photographs taken by Mr Hoffman and features the elusive Queen of Sheba (see 'Fit for a Queen' page 22) on the cover.

Noel published the first edition of the book in 1984 after researching orchids with Western Australian Herbarium orchid curator Andrew Brown.



Above Noel Hoffman with his acclaimed publication *Orchids of South-West Australia*.
Photo – West Travel Club

'Best Worst Reviews' of WA parks

Have you ever wondered what people say about Western Australia's national parks?

The majority of the reviews are great! People love Western Australia's amazing parks but occasionally the team at Explore Parks WA come across a bad review and rather than feeling sad and disappointed, they've turned these one-star reviews into a fun promotion. Eight 'Best Worst Reviews' have been shared on the Explore Parks WA Facebook page.

The reviews are genuine. They had to have one-star rating with a comment about the park that criticises what most people enjoy about visiting the park. Based on the response and comments it is clear people got the joke and took the chance to share why they think the review is wrong.

You can check out the reviews at facebook.com/ExploreParksWA.



Guest column



Maryke Musson
CEO, Two Oceans Aquarium Education Foundation, Cape Town, South Africa

We never thought we would call a sea turtle a 'GOAT', but Yoshi, a female loggerhead sea turtle, is most certainly the 'Greatest of All Time' when it comes to a satellite tracked journey. We also could not be happier with the outcome, a journey from Africa all the way to Australia, a world first for this species, and we absolutely love the incredible interest and enthusiasm from the amazing scientists at the Department of Biodiversity, Conservation and Attractions (DBCA).

Yoshi has been a true inspiration; she is a fantastic ocean ambassador and it has been incredible to see the excitement worldwide around her travels. She also highlights the important relationship that scientists have around the world who collaborate to ensure the conservation of these important ocean citizens.

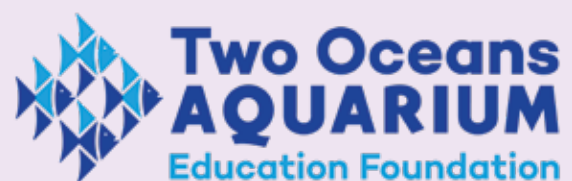
What bonds us is our shared passion for conservation and the journey of this ambitious turtle has nurtured a professional working relationship across the globe from South Africa all the way to Australia.

We prepared Yoshi for life back in the ocean through a strict exercise regime and when we knew she was strong, healthy and fit enough for release, it was a bittersweet affair with a lot of tears.

She is a legend and world record holder and we are all hoping that DBCA's Dr Scott Whiting and his team will be able to retag her so that we can continue to follow her remarkable journey and keep in touch with like-minded scientists on the other side of the world.

Yoshi's journey has also highlighted the dangers turtles face in the ocean, from plastic pollution to ghost fishing gear and avoiding large vessels. Hopefully she will continue to inspire the world to take better care of the ocean, and who knows, she might very well still travel to Japan to go and look for her rescuers.

Read all about Yoshi's journey on page 19.





Monkey Mia ... still magic

Getting up close to friendly bottlenose dolphins at Monkey Mia Conservation Park on the shores of Shark Bay Marine Park is a much-loved memory of many Western Australians and continues to be a magical experience for thousands of visitors each year.

Shark Bay is located on the coast of Western Australia, 850 kilometres north of Perth by road. The area was inscribed on the World Heritage List in 1991, being one of only 21 locations worldwide to satisfy all four of the World Heritage natural criteria.

The area has some of the most spectacular scenery and unique animals found nowhere else in the world, but it's the Monkey Mia dolphins that have been the major drawcard to the region for more than 50 years.

Monkey Mia, located on the east coast of Peron Peninsula, is a popular tourist destination, world renowned for a small

group of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) that visit regularly to be hand fed fish by tourists.

A LONG HISTORY

Monkey Mia is one of the few areas in Shark Bay that has deep water close to the shoreline, which makes it a perfect area for dolphins to forage for fish. The dolphins of Red Cliff Bay have been utilising this habitat long before fishers and tourists started frequenting the area. The local Aboriginal people, Malgana, tell of dolphins and people working together many years ago to bring in big schools of fish. The dolphins were rewarded by snapping up fish that escaped.

In the 1960s, fishers and dolphins fished the same areas and learnt to coexist with each other around the shores of Monkey Mia. Due to this coexistence, the dolphins became accustomed to the presence of humans and in 1964 a local fisherwoman enticed one of the dolphins to take a fish out of her hand.

By the 1970s Monkey Mia was becoming internationally renowned for the friendly dolphins who visited the shores to be hand fed and interact with humans.

During the 1980s thousands of tourists were visiting Monkey Mia to experience this unique interaction. This also provided an opportunity for dolphin researchers



to gather behavioural and genetic data on both the beach and offshore dolphin populations. This research has contributed a great deal to the current understanding of dolphins and informs management of the Monkey Mia dolphin experiences.

THE DOLPHIN EXPERIENCE

Visitors who had an experience with the dolphins at Monkey Mia more than twenty years ago will notice many changes in the way the dolphin experiences are run today. Dolphins are only fed under strict supervision of Parks and Wildlife Service officers and each dolphin is only fed a small amount of fish so that they continue to behave and hunt naturally and teach their young calves important survival skills.

There are no set times for dolphin experiences as they depend on if and when the dolphins visit the beach from 7.45am to 12pm. Only a select few of the female dolphins can be offered fish the first three times they visit during the morning. If the dolphins visit more than three times or after 12pm they will not be fed. It is best

to arrive early as dolphin experiences may finish well before 12pm.

When the dolphins arrive at the beach, Parks and Wildlife Service officers invite visitors to enter the waters of the Dolphin Experience Area to ankle depth. An interpretive talk is then conducted while volunteers are busy defrosting and weighing the locally caught fish. At the conclusion of the talk, visitors are asked to stand back on the shoreline and the volunteers carry the buckets of fish down to the beach.

Volunteers are assigned a beach feeding dolphin, and invite visitors, randomly selected one at a time, to come into the water and assist them with feeding the dolphins. Visitors are handed a fish and asked to place it into the water so the dolphin may take it from their hand. At the conclusion of the feed the buckets are rinsed out in front of the dolphins as a cue to them that the feed has concluded, at which point the dolphins will move offshore.

Although the feeds only happen in the morning, many visitors who take the time

Discover more about
Monkey Mia

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

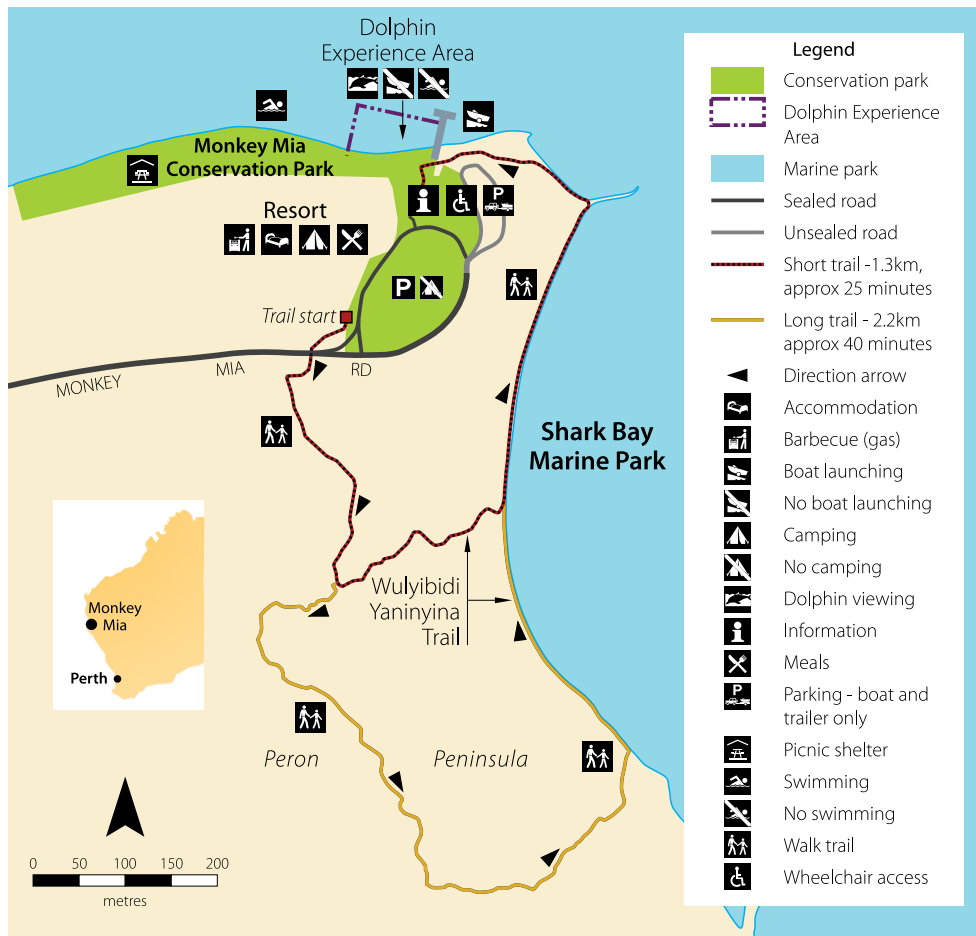
to enjoy Monkey Mia in the afternoons are rewarded with exciting displays of foraging by the dolphins in the shallow water along the beach.

Opposite page

Main Feeding time at Monkey Mia Dolphin Experience.

Photo – Tourism WA

Anticlockwise from left to right Monkey Mia Dolphin Resort by RAC Parks and Resorts. *Photo – Shark Bay World Heritage Discovery and Visitor Centre; Tamala rose. Photo – Jiri Lochman; Francois Peron National Park - Gregories. Photo – Marie Lochman; Wedge-tailed eagle. Photo – Jiri Lochman; Everlastings. Photo – Ian Anderson; Monkey Mia dolphin 'Charlie' in 1965. Photo – DBCA*



Above Dwarf bearded dragon.
Photo – Jiri Lochman

SHARK BAY MARINE PARK

Monkey Mia is not just about dolphins. The waters adjoining Monkey Mia are protected by the vast Shark Bay Marine Park and Hamelin Pool Marine Nature Reserve. These marine protected areas consist mainly of shallow sheltered bays that host over 10,000 dugongs, the world's largest seagrass beds, and stromatolites representative of the earth's oldest lifeforms.

The jetty alongside the Dolphin Experience Area is perfect for photographing dolphin interactions. From here, visitors can head out on a tour and visit the densest population of dugongs in the world, or venture into nearby Francois Peron National Park and meet some of the most unique and interesting fauna the region has to offer such as bearded dragons, western grasswrens, wedge-tailed eagles and even woma pythons

A MASTER PLAN

After so many years of excited visitors enjoying Monkey Mia, it was decided

in 2017 that it was time for an upgrade to enhance the visitor experience and complement the recent \$20 million upgrade and expansion of the Monkey Mia Dolphin Resort by RAC Parks and Resorts.

Stage one of the master plan was completed in July 2020 with the construction of a new ranger station to house staff, volunteers and researchers, and fish preparation facilities.

Funding from a Commonwealth Australian Heritage Grant will be put towards Stage two of the master plan, which will include tiered seating on the beach adjacent to the dolphin experience, a landscaped plaza at the interface with the resort and the beginnings of a World Heritage interpretive garden.

Future works, subject to funding, include refurbishment of the existing visitor centre, upgrading of the four-kilometre Wulyibidi Yaninyina Walk Trail and development of an elevated viewing deck.

The master plan also identifies opportunities for a 350-metre promenade

along the beachfront and an overwater viewing platform adjacent to the dolphin interaction area.

Do it yourself

Where is it? 850 kilometres north of Perth

What to do? Swimming, fishing, boating, camping, diving, snorkeling, dolphin experience

Facilities: Boat ramp, campgrounds, toilets, accommodation, parking, restaurant

Nearest Parks and Wildlife Service office: Shark Bay District office 63 Knight Terrace, Denham WA 6537 (08) 9948 2226

Entry fees apply

Park passes do not apply to Monkey Mia Conservation Park

Ask a Parks and Wildlife Service officer about volunteering at Monkey Mia or email monkeymiavolunteers@westnet.com.au



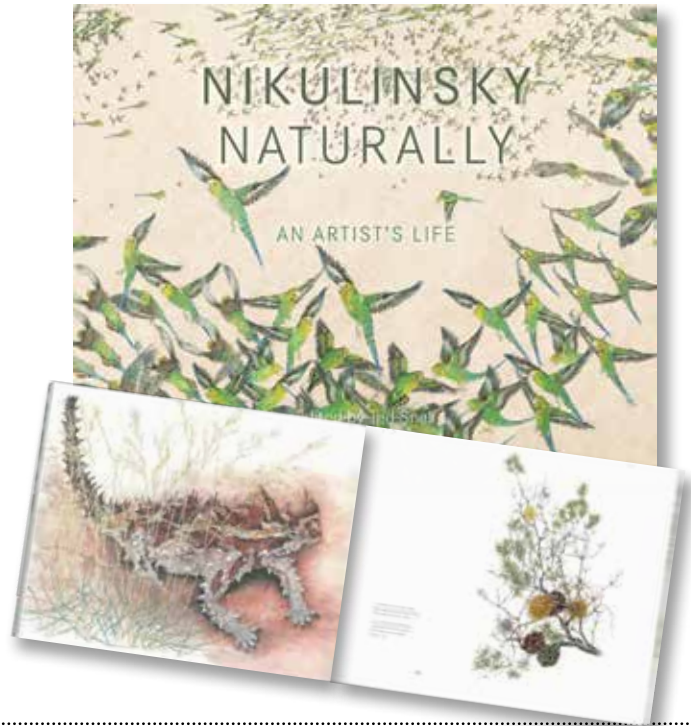
NIKULINSKY NATURALLY: AN ARTIST'S LIFE

The life and career of botanical artist and former *LANDSCOPE* cover illustrator (1990–2012) Philippa Nikulinsky, has been celebrated in a large format full-colour illustrated books of works.

Philippa's incredible attention to detail is showcased in the pages of magnificent illustrations of flora and fauna in the arid lands of Western Australia. The book tells the story of Philippa as 'That Girl From the Bush' whose love for drawing and discovery was cultivated in her childhood near Kalgoorlie, entering local art competitions from the age of 10 with a simple HB pencil and watercolours.

Philippa is not only a talented artist, but a highly regarded researcher who is a well-informed advocate for the State's unique and diverse flora. Her works have been published in a significant number of books over her career so it is timely to document her extraordinary body of work and the fascinating journey of personal and professional growth.

Nikulinsky Naturally: An Artist's Life is published by Fremantle Press and is available for \$39.95 from fremantlepress.com.au



INDIGENOUS WEATHER KNOWLEDGE

The *Indigenous Weather Knowledge* website was developed as a joint partnership between the Bureau of Meteorology, the Aboriginal and Torres Strait Islander Commission (ATSIC) and Monash University's Centre for Indigenous Studies. The website is a formal recognition of traditional weather and climate knowledge that has been developed and passed down through countless generations by Aboriginal and Torres Strait Islander people.

The website allows visitors to select an Aboriginal community from a map to view their seasonal calendar. Calendars range from two to six distinct seasons as well as observational changes in how plants and animals respond to the weather around them to determine seasonal expectations.

Beyond weather and seasons, the website provides comprehensive information on the history of Indigenous environmental knowledge across Australia, cultural practices, beliefs and languages. The online space is an informative resource that respects the deep spiritual connection that Aboriginal people have with the environment.

Visit the *Indigenous Weather Knowledge* website at bom.gov.au/iwk/



BIRDS OF PREY OF AUSTRALIA: A FIELD GUIDE

The third edition of the popular field guide *Birds of Prey of Australia* has been updated to complement and serve as a companion to Richard Seaton's *Australian Birds of Prey in Flight: A Photographic Guide* (CSIRO Publishing, 2019). Raptors are difficult birds to identify and new research papers have now been published on most species, prompting award-winning author Dr Stephen Debus to revise the guide after five years.

The field guide is beautifully presented, separated into two parts: a field guide with distribution maps, detailed illustrations and information on identifications; and a handbook that includes an overview of the current knowledge about raptors including their biology, ecology and behaviour.

The detailed information presented in the guide is reflective of the author's obvious passion for raptors and his ongoing dedication to their study as part of his role as a founding member of Birdlife Australia's Raptor Group.

The illustrations by lifelong birder, ornithological artist and illustrator Jeff Davies are incredibly detailed and life-like, showing the birds as adults and juveniles, males and females, as well as perched and in flight for easy identification of each incredible species.

Birds of Prey of Australia is published by CSIRO Publishing and is available for \$44.99 from publish.csiro.au







Embracing biophilia

Prescribing nature in a pandemic

As the world was urged to remain indoors to control the spread of a deadly virus, our desire to be outdoors grew with intensity. Forced into lockdown, humankind's innate biological connection with nature brought relief in the height of a global pandemic.

by Lauren Cabrera

When the threat of COVID-19, a respiratory illness caused by a novel coronavirus, reached Australian shores in early 2020 we were told to keep our distance from each other, stay inside and only venture out for essential activities like groceries, medical treatment and exercise.

After international, interstate and eventually regional boundaries closed, campsite bookings at Parks and Wildlife Service campgrounds were suspended and key attractions, facilities and tours with high visitor numbers were also closed.

Easter holidays came and went, with beloved campgrounds remaining uncharacteristically quiet and popular Rottneest Island kept those returning from interstate and overseas safe in quarantine before returning home to their loved ones.

Among the stress and uncertainty, national and regional parks, reserves and State forests remained open to be used to help maintain physical and mental health.

As the world came to a standstill, the rhythms of nature continued. The sun



still rose and set, and plants and animals maintained their cycles of growth and decay as the quiet predictability and simplicity of nature soothed our worries and calmed our minds.

GETTING OUT

Being forced to remain isolated indoors gave rise to a quantifiable yearning to be outdoors and permission to go outside for exercise became a moment of optimism, escapism and a much-needed mental health break.

A simple walk became an adventure for the whole family and soon local, regional and national parks were filled with returning visitors and eager new explorers.

Whether alone or abiding by the strict two-person minimum, Western

Australians took to the trails and popular parks reached capacity.

John Forrest National Park saw a 43.4 per cent increase in visitation between March and June compared with the previous year as people enjoyed Eagle View Walk Trail and the shorter Glen Brook Trail. The carpark regularly reached capacity and visitors pushed the limits of the 1.5-metre social distancing guidelines through the Old Swan View Tunnel.

While the shelters along the Bibbulmun Track were temporarily closed, walkers spent the day completing shorter sections of the track such as the popular Hills Forest to Golden View and South Ledge or took on the challenge of Mount Vincent to Mount Cuthbert. For those staying at home, the Bibbulmun

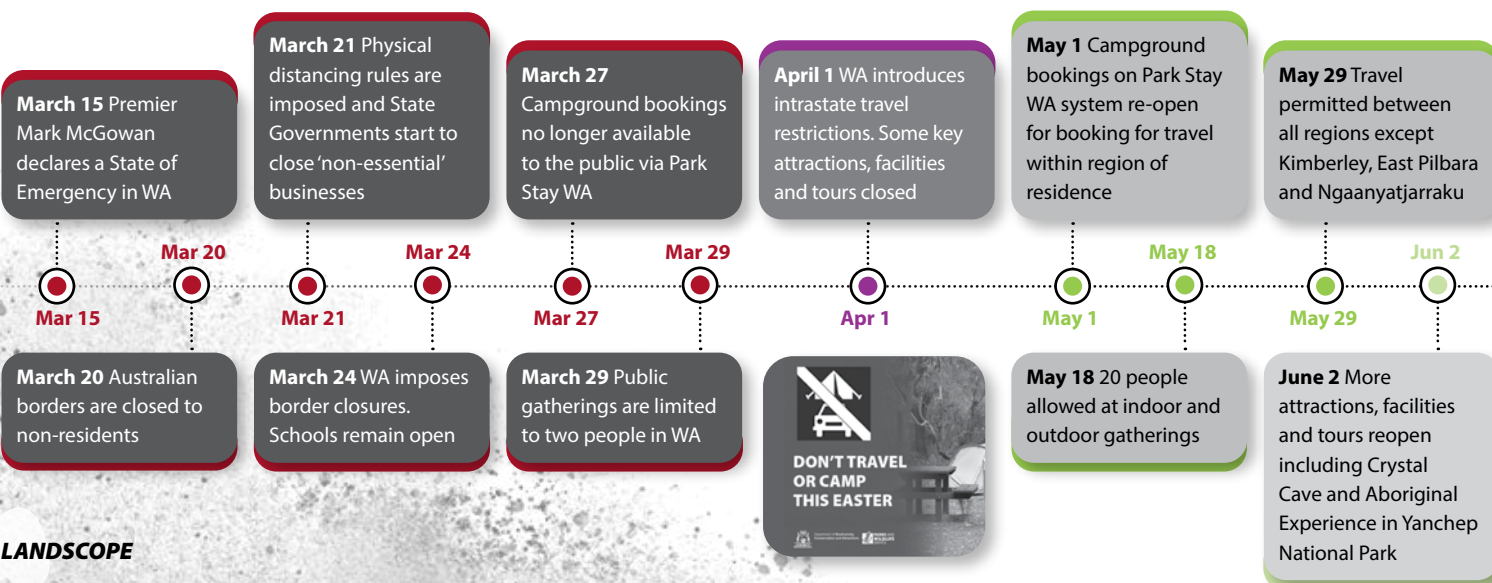
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Main People flocked to Kings Park as restrictions eased.

Photo – Keane Bourke/ABC

Above Mount Vincent Bibbulmun Track.

Photo – Rory Cabrera

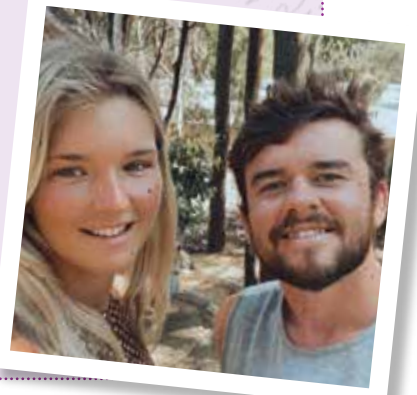




Thank you

In Yanchep National Park, a travelling British couple found sanctuary among the koalas after being stranded in the national park due to the restrictions. The couple were so grateful to the Parks and Wildlife Service staff who helped them, they expressed their thanks in a card saying "Yanchep has become a home to us – a very special place we will never forget. It's probably a good thing our flight isn't cancelled or else we'd never leave!".

Inset Jade and Zico.
Photo – Jade Evans



Track Foundation used their social media presence to take followers on 'virtual hikes' through some of the popular sections of the track.

ON YOUR BIKE

With gyms closed and fewer people on the roads, cycling had an unprecedented surge in popularity, with bicycle shops across the State reporting to be 'busier than Christmas'.

Coming out of summer, cyclists were keen to get riding and many were seen along the banks of the Swan and Canning rivers and enjoying shorter day rides in national and regional parks within regional boundaries.

The topography and landscape of the Collie region in the south-west of

WA makes the area a big drawcard for mountain bikers. Although there were fewer visitors travelling through the town on the Munda Biddi Trail, local trails became popular as word spread of progress of the new Collie Adventure Trail network (see 'Bush Telegraph' page 6).

As soon as regional boundaries were lifted, local bike shops were once again providing advice for those planning an end-to-end of the Munda Biddi Trail and cyclists hit the trails.

EXPLORING THE BACKYARD

After a long, hot summer Exmouth is usually bursting with tourists hoping to swim with whale sharks or snorkel in the waters of the Ningaloo Reef. Instead, the town and the marine park were



Above left Murray Bridge Munda Biddi Trail.
Photo – Judy Dunlop

Above Grace (age 6) enjoying John Forrest National Park.
Photo – Stuart Harrison

Below Shannon National Park.
Photo – Cliff Winfield

June 5 All regional boundary restrictions lifted

Continued vigilance of good hygiene and physical distancing

June 27 Gathering limits removed. All events permitted. Removal of restrictions at restaurants, pubs and gyms

While using this toilet please remember to cover coughs and sneezes with a tissue or use your inner elbow.

Please disinfect your hands with hand sanitiser when finished using toilet.



*Current situation at time of publication

“... they could not recall the last time they stood alone on the beach at Turquoise Bay over an Easter long weekend.”



deserted. While the tourists stayed away, the locals indulged in the peace of the empty waves at popular surfing spots like Wobiri Beach and Dunes, and as restrictions eased prior to intrastate boundaries being lifted, they enjoyed the emptiness of their favourite camping spots during the best weather of the year. Locals exclaimed they could not recall the last time they stood alone on the beach at Turquoise Bay over an Easter long weekend.

The Valley of the Giants Tree Top Walk near Walpole remained eerily quiet at what is usually the busiest time of year and instead people spread out on the beaches of D'Entrecasteaux National Park

as soon as the salmon started to run, or day-tripped to Parry Beach in William Bay National Park.

At the mouth of the Murchison River in the State's Midwest, locals walked the Gabba Gabba Yinna and Mushroom Rock trails and watched from Kalbarri National Park's spectacular coastal cliffs as the humpback whales made their way north. Visitation to the area dropped 97 per cent and residents flocked to the boardwalk between Natural Bridge and Island Rock, while Parks and Wildlife Service staff made preparations for the opening of the Kalbarri Skywalk (see 'Kaju Yotka: take a walk on the wild side' *LANDSCOPE* Autumn 2020).

FOR THE KIDS

As restrictions tightened, parents were asked to keep their children home from school and outdoor environmental education activities around the State were forced to put their excursion programs on hold and close their venues.

While screen time is ordinarily something that is closely monitored, children were able to learn online and the internet was used as a tool to encourage exploring the outdoors and learning from nature (see 'Kids and canopies cooling the planet' page 50).

Social media played an important role in environmental education as followers of Perth Zoo's Facebook page enjoyed live streams of animals and zookeepers. Kings Park developed a 'home delivery' service that posted nature-based activity packs directly to homes and Parks and Wildlife Service's popular *Nearer to Nature* program encouraged kids to explore their own backyards (see 'Kaleidoscope' page 53) and adapted environmental activities into online learning modules to fulfil curriculum requirements for secondary students.

OPENING UP

As restrictions eased and social gatherings outdoors were increased from two people to 10, a mosaic of picnic blankets carpeted the open spaces of regional parks as locals enjoyed the last of the autumn sunshine.

On 1 May, campsites were again able to be booked. The Park Stay WA campground booking system received so much traffic in the first hour of opening, the system crashed. With one booking received every four seconds, the website required an increase of 400 per cent capacity to deal with the volume of traffic.



Above "It normally it looks like Bondi Beach and you are jostling to find space to spread out your towel!"; Turquoise Bay, Easter 2020. Photo – Brooke Halkyard

Above right Physical distancing at Yeagarup Beach. Photo – Tim Foley

Left Perth Zoo Facebook live cam.

Below Kings Park 'home delivery' packs.





Campground bookings increased 30 per cent from the same time the previous year and people turned out in droves, booking out and immediately filling Parks and Wildlife Service campgrounds in the Perth and Peel region for the first two weekends after reopening.

As restrictions continued to ease, national and regional parks in the Perth and Peel region were packed to such an extent that some national parks were at capacity before 10am. Traffic to the Trails WA website increased by 137 per cent from the previous year with people researching regional trails and 113 per cent for people looking for mountain bike trails, quantifying our love for nature.

WHAT NOW

It is almost impossible to say that life will return to normal despite restrictions easing and borders reopening. Such an abrupt disruption to our way of life has forced us all to look at what's important to us, what we enjoy and what we need to make us happy.

Being required to remain inside our man-made confines has fanned the flames of our biophilia; that innate connection with nature and a primal urge to connect with earth and sea. Western Australia's size and proximity from the rest of the country not only provided a natural barrier that kept us safe, its unique biodiversity and natural assets also protected our wellbeing by simply being able to experience them.

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Above A peaceful moment at Helena-Aurora Range Conservation Park.
 Photo – Shem Bisluk/DBCA

COVID-19 Wake up call – Nature at the heart of recovery

Western Australia is undoubtedly one of the best places in the world to be right now. While the past few months have been an enormous challenge for many reasons, in the background, something marvellous has been unfolding. Throughout the State, people have been rediscovering a passion for our natural places and relevant attractions.

Initially, staying home included not just the walls of our houses, but the most spectacular backyard – our State. Western Australians are spoilt by some of the most incredible national parks and reserves in the world and for many, it's taken the current State of Emergency to remind them of that.

Regional restrictions saw people exploring and getting to know their own patches of nature. I heard so many families and individuals say they had never appreciated a daily walk so much, and I couldn't agree more. We discovered small nature reserves within our neighbourhoods, took notice of unique flora species and got excited over native animal sightings.

The discoveries didn't stop when the regional borders reopened, instead, Western Australians have embraced intrastate travel, exploring every inch of our brilliant State. From the highly anticipated new Kalbarri Skywalk in the Midwest, to the reconstructed Bluff Knoll walk trail in the South West, we've seen record visitor numbers as people challenge themselves to 'Wander out Yonder'.

The benefits of nature to our mental health and wellbeing have long since been documented, but right now, we're witnessing them first hand. The environment has been our lifeline throughout COVID-19, quite literally, a breath of fresh air.

What we have to remember, is WA's environment needs us just as much as we need it. We are nature's custodians. For many, that stewardship started at a very young age and will continue to persist for life. For others, that connection and love of parks has only recently been discovered.

The conservation of our parks is in the hands of Western Australians. By fostering and building a sense of ownership and close appreciation of our parks, we are ensuring their future.

For all of these reasons, we remain committed to creating more opportunities for people to enjoy and connect with Western Australia's national parks, reserves and forests. Last year, the McGowan Government announced a bold plan to establish five million hectares of new national and marine parks and reserves by February 2024 – increasing Western Australia's conservation estate by 20 per cent.

This is about creating a lasting, positive environmental legacy for current and future generations. So far, we are making good progress.

Already, we have created the Houtman Abrolhos Islands National Park in the Midwest and added land to Murrumbidgee National Park in the Pilbara. In the future, we will see new and expanded parks, from the Kimberley in the north, across the Rangelands, through population centres in Perth and Bunbury, to our south-west forests and along our southern coastline.

When we get back to basics and explore nature at its finest, quite often we are experiencing the richness of traditional Aboriginal culture. Across the globe, people are fascinated by our history and eager to experience authentic Australia.

It's easy to take our unique and ancient landscape for granted, when we should in fact be embracing it. We're acknowledging that desire by celebrating one of the State's greatest cultural assets, with steady progress being made on a nomination to include Murrumbidgee on the World Heritage List. The listing would see Murrumbidgee's values, including its iconic rock art, recognised globally as one of the world's best.

I know many people are eager for remaining border restrictions to be lifted so they can get out and explore the rest of the country and world. But when that happens, try not to forget about the special places in our shared backyard. We are nature's custodians. We need to appreciate what we have, celebrate it and make sure we look after it for generations to come.

Words from Director General, Department of Biodiversity, Conservation and Attractions, Mark Webb






Avoid the crowds at these lesser known walk trails near Perth

Yanchep National Park - Yanchep Rose Trail

60km north of Perth, 14km partial loop

Starting at the McNess House Visitor Centre, this trail meanders through the coastal plain vegetation, offering panoramic views from the sea to the scarp and passing by historic bunkers from World War II. The limestone outcrops punctuate the extensive wildflower displays in spring. Kangaroo sightings are almost a certainty in the early morning and evening.

The trail marker can be easily identified with the native Yanchep rose emblem. It passes by Cabaret Cave and then crosses Wanneroo Road to offer a circular route. The track is limestone and sand and can become heavy underfoot as summer progresses. It is best suited to winter and spring as there is little tree cover. For more information visit trails.wa.com.au/trails/yanchep-rose-trail

 **Ranger's tip** From August to September, the Yanchep rose and the parrot bush are in full flower. Be careful when approaching the edge of the lookout and please stay on the path to preserve the unique Yanchep rose that fringes the trail.

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Above Yanchep Rose Trail.
Inset right The Spectacles.
Inset far right Cliffs of Blackwall Reach.
 Photos – DBCA




Beeliar National Park

The Spectacles, Beeliar Regional Park - Aboriginal Heritage Trail

35km south of Perth, 5km loop

This trail loops around the northernmost 'big eye' wetland. The wetlands were important camping, and ceremonial areas providing food for Aboriginal people. The Medina Aboriginal Cultural Group installed interpretation panels around the trail to explain the story of traditional life as told by a Noongar elder. The prolific birdlife can be viewed from the hide and throughout the park, including wrens, honeyeaters and wattlebirds.

The Beeliar Regional Park consists of two chains of wetlands comprised of 26 lakes and numerous wetlands stretching 25km along the coast and covering an area of approximately 3400 hectares. The Spectacles are a wetland in the eastern chain comprised of two lake bodies. For more information visit trails.wa.com.au/trails/spectacles-aboriginal-heritage-trail

 **Ranger's tip** Dogs on leads are welcome but care needs to be taken to watch for snakes which are occasionally seen on the path.




Blackwall Reach Reserve

Blackwall Reach Reserve/Point Walter - Jenna Biddi Yorga

Bicton, 2km one way

The Jenna Biddi Yorga, meaning 'women's feet walking on the path' in Whadjuk Noongar language, follows along the Kwoppa Kepa (Bicton foreshore). We invite both women and men to walk this path, however we ask all the men who do so to respectfully acknowledge Jennalup (Blackwall Reach) as a women's area in the past, and encourage the men to continue this acknowledgement into the future.

This is one of the dreaming trails traversing along the Swan and Canning rivers. This dreaming trail on the southern side of the river is the yorga biddi (women's trail) and the men's trail is found on the northern side. The sand spit (Djoondalup), connects these two trails. To the Whadjuk people Jennalup was traditionally a place for women and children and carries the story of Djunda the Charnock woman. For more information visit trails.wa.com.au/trails/jenna-biddi-yorga

 **Ranger's tip** Audio recordings of Whadjuk Elders sharing stories about the area are available on the Geotourists app and Explore Parks website.

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YOSHI'S JOURNEY

one turtle, two countries, thousands of kilometres

Swimming thousands of kilometres of ocean is not uncommon for marine turtles, but the migration of one loggerhead turtle sparked interest around the world, after she travelled from the waters of South Africa before crossing the Indian Ocean to the north-west Australian coast over a two-year period. It is not known exactly why she made the journey, but her story has highlighted what can be achieved when researchers from different countries team up in the name of science and conservation.

by Kendall O'Connor, Sabrina Fossette-Halot and Hannah Hampson



A loggerhead turtle named Yoshi was released with a satellite tag on her back from Two Oceans Aquarium in Cape Town, South Africa, twenty years after she was found by a Japanese fishing vessel with an injury to her carapace.

When she was given to the aquarium in 1997 she was a juvenile, about the size of a dinner plate. The vessel's captain named her Yoshi after their on-board cook, Yoshitaro, who was also small in stature.

In the first year after her release she travelled more than 8600 kilometres up and back down the west coast of Africa, before swimming around the cape and heading for Australia.

LENDING A HAND

In early 2020, scientists at the Department of Biodiversity, Conservation and Attractions (DBCA) were alerted by the aquarium and the South African Department of Environment, Forestry and Fisheries that Yoshi was making her way to Western Australian waters off the Pilbara coast.

Yoshi had already provided some insights into the survivorship of a rehabilitated turtle, but there were many more questions to answer, such as where was she going to settle, could she navigate to a nesting beach after so long in captivity and was she going to reproduce.

After reaching the Pilbara coast, Yoshi stayed close to shore near the seaside town of Point Samson for a couple of weeks and DBCA's principal scientist Scott Whiting hoped his team could track her down in the remote and turbid coastal waters and replace the satellite tag before the battery ran out.

Once in Karratha, Scott, along with research scientist Sabrina Fossette-Halot, boarded a Fisheries vessel and were joined by Alan Dick and Lewis Robertson from the Department of Primary Industries and Regional Development (DPIRD) and local Ngarluma ranger, Tiras Walker.

Yoshi's satellite location focussed the team on an area north-east of Depuche Island, between Ronsard Island and Reef



Previous page

Main Loggerhead sea turtle.

Photo – Gary Bell/Oceanwide Images

Above Yoshi at Two Oceans Aquarium.

Left Yoshi ready for release.

Photos – Geoff Spilby

Island, which lies between Karratha and Port Hedland. The team used a hand-held receiver to pick up the beeps emitted from the tag each time she surfaced.

After searching for several hours, the team finally started spotting turtles at the surface and was soon surrounded by a dozen loggerhead turtles. It looks like they had discovered a feeding ground, which was not previously known. Loggerhead turtles are wary of boats, so it was difficult to get close to them when they surfaced and sadly, Yoshi was never identified among the group.

HOMeward BOUND?

Turtles spend their life swimming in the ocean so the fact that Yoshi has swum thousands of kilometres is not a surprise, but an Indian Ocean crossing for an adult loggerhead had never been recorded. Yoshi may be returning to foraging grounds closer to where she was born, after 20 years in captivity. This type of migration is called the 'developmental' migration.

"Having swum an almost direct route from South Africa to Western Australia

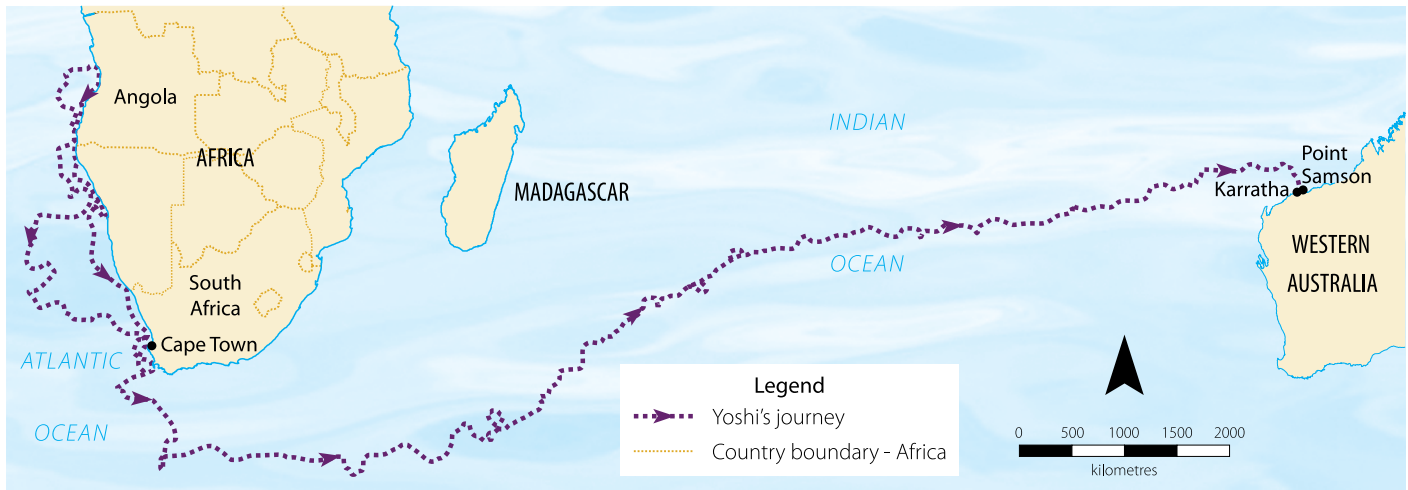
without stopping, and probably with limited food, is impressive," said Dr Scott Whiting.

"And the fact that she directly found a good foraging area and the company of other loggerhead turtles is even more impressive."

Yoshi's track shows she has followed almost the same route, but in the opposite direction, as post-hatchling loggerhead turtles that have been satellite tracked from WA rookeries in areas such as Shark Bay and Ningaloo.

"It is likely Yoshi behaved the same way as loggerhead turtles that hatch in WA, leaving their natal beach as hatchlings following currents across the Indian Ocean, first towards Madagascar, and then probably around the Indian Ocean for many years until they reach sub-adult age, and return to foraging grounds close to where they were born" said Scott.

"It's suspected they are decades old before they enter coastal waters that will become their home and their base to embark on reproductive migrations to their natal beach."



“Yoshi appears to be searching for a foraging area to call home.”

Loggerhead turtles are listed as endangered, populations are severely depleted around the world and in the Indian Ocean, and there remain many knowledge gaps for Indian Ocean loggerheads including post-hatchling dispersal, locations of foraging grounds and survival rates.

Although Yoshi’s satellite tag will likely stop transmitting soon, the efforts to learn more about her highlight the importance of researchers and governments around the world collaborating in the name of conservation.



Where you from, Yoshi?

It is still not known if Yoshi was indeed born in WA.

One theory is that she hatched in WA, and that’s why she crossed the Indian Ocean but was caught before she could come back to Australian waters as a sub-adult. This theory is being tested with a genetic study.

Loggerhead rookeries are also found on the east coast of Australia as well as South Africa and Oman in the Middle East so there is also a chance that she is lost and simply following the coastline until she finds the ‘right’ place.

Above Loggerhead turtle hatchling.

Above right Adult loggerhead turtle.
Photos – David Bettini

Right Loggerhead turtle.
Illustration – DBCA

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FIT FOR A QUEEN

*A botanic breakthrough
for WA's most iconic orchid*

The Queen of Sheba orchid has been successfully grown in cultivation thanks to a partnership between researchers in Western Australia and Victoria.

by Karla Forrest

Beloved by orchid enthusiasts, the Queen of Sheba (*Theylymitra variegata*) is one of Australia's most beautiful and threatened native orchids. It is endemic to Western Australia and exists in just two locations in the State's south-west. In 2019, interstate interest in the species prompted a fruitful pairing between scientists from WA's own Kings Park and the Royal Botanic Gardens Victoria. By early 2020, the teams had each managed to grow hundreds of Queen of Sheba seedlings in purpose-built propagation facilities, sparking renewed hopes for conservation of the species in the wild.

ANSWERING THE CALL

For DBCA research scientist Dr Belinda Davis, the story began 11 years ago, when the City of Bunbury approached the Botanic Gardens and Parks Authority with concerns for the local Queen of Sheba population near Bunbury. Belinda set about gathering seeds and fungi from the area in order to safeguard the species.

The Priority 2-listed Queen of Sheba grows in banksia woodland habitat near Bunbury and Albany. Known for its

.....
Previous page

Main The Queen of Sheba orchid is known for its distinctive pinky-purple blotched flowers, spiral leaf and ornate column.

Photo – Ann Storr

Above Dr Belinda Davis is dedicated to growing the orchid in cultivation.

Photo – Peter Nicholas/DBCA

Inset top Magnified image of the early stages of germination (called a protocorm). The protocorm will go on to develop a leaf and tuber.

Inset above A scanning electron magnification image of orchid root tissue showing fungal coils. These fungal coils will be cut off from contact with the soil by the orchid and digested and the nutrients will be absorbed across the orchid cell walls. Once digested the cell will be reinfected by the fungi and the process begins again. This is the way the orchid obtains nutrients from the soil.
Photos – Belinda Davis/DBCA



eye-catching flowers featuring blotchy pink, purple and orange colourations, the Queen of Sheba is one of nine species in the spiral-leaved sun orchid complex. The aptly named group all feature a narrow, spirally-twisted leaf and only open their flowers on warm, sunny days. They grow between 100 to 350 millimetres tall.

Like all orchids, the Queen of Sheba requires a soil fungal partner, or mycorrhizal fungi, to grow. The fungi provide essential nutrients to the orchid, and the orchid provides photosynthetically derived carbohydrates. As such, orchids are a particularly challenging species to grow outside their usual habitat in the wild, due to these complex and highly specialised symbiotic relationships. Scientists must look beyond the plant and into the rest of the ecosystem to see if all the pieces are there.

The material Belinda had collected from Bunbury was kept at the WA Seed Centre for long-term seed storage, with some kept aside for cultivation. She and her team tried various methods to replicate these relationships in order to grow the orchid in the Kings Park laboratory, but finding the right combination of nutrients and conditions



Discover more about the Queen of Sheba

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



proved difficult, and it was seven long years until they saw even a flower.

PRECISION PROPAGATION

In 2019, a chance meeting with fellow researcher Dr Noushka Reiter at an orchid workshop prompted Belinda to revisit the Queen of Sheba propagation program. As the research scientist leading the Orchid Conservation Program for the Royal Botanic Gardens Victoria, Noushka works on threatened flora ecology, mycorrhizal associations and reintroductions into the wild. She had been studying two other nationally endangered orchids in the Queen of Sheba complex; the spiral sun orchid (*T. mathewsii*) and the brilliant sun orchid



● Known distribution of Queen of Sheba orchid



(*T. mackibbinii*); and had successfully grown both species.

While the Queen of Sheba is endemic to WA, some of its relatives in the spiral-leaved sun orchid complex occur in Victoria, so collaboration on the project seemed mutually beneficial.

Using seed and fungi samples collected near Albany this time, Belinda, Noushka and their teams began new attempts, working from their own laboratories in WA and Victoria, but sharing methods and findings. They knew success was all about getting the right mix of nutrients on the petri plate, where the collected seed and the fungi would be introduced to each other. When this mix is wrong, the fungi consumes the seed.

Work continued for 18 months, before eventually – a breakthrough. The latest nutrient mix allowed a multitude of protocorms to develop, the very beginnings of a new plant. Over time, the teams carried out several careful transfers to ensure continued growth of the winning ‘batch’. The developing orchids were moved from sterile petri dishes into ‘humidicribs’ in a laboratory – small closed containers to ensure a humid environment – before being moved into fogging units.

Once strong enough, the seedlings were taken from the laboratory and planted into soil-filled pots in Kings Park’s glasshouse, where hundreds are now cared for and thriving.

Top left Potted seedlings in the early stages of flowering already showing a unique spotted pattern and the beginnings of its eye-catching pink, purple and orange flowers.

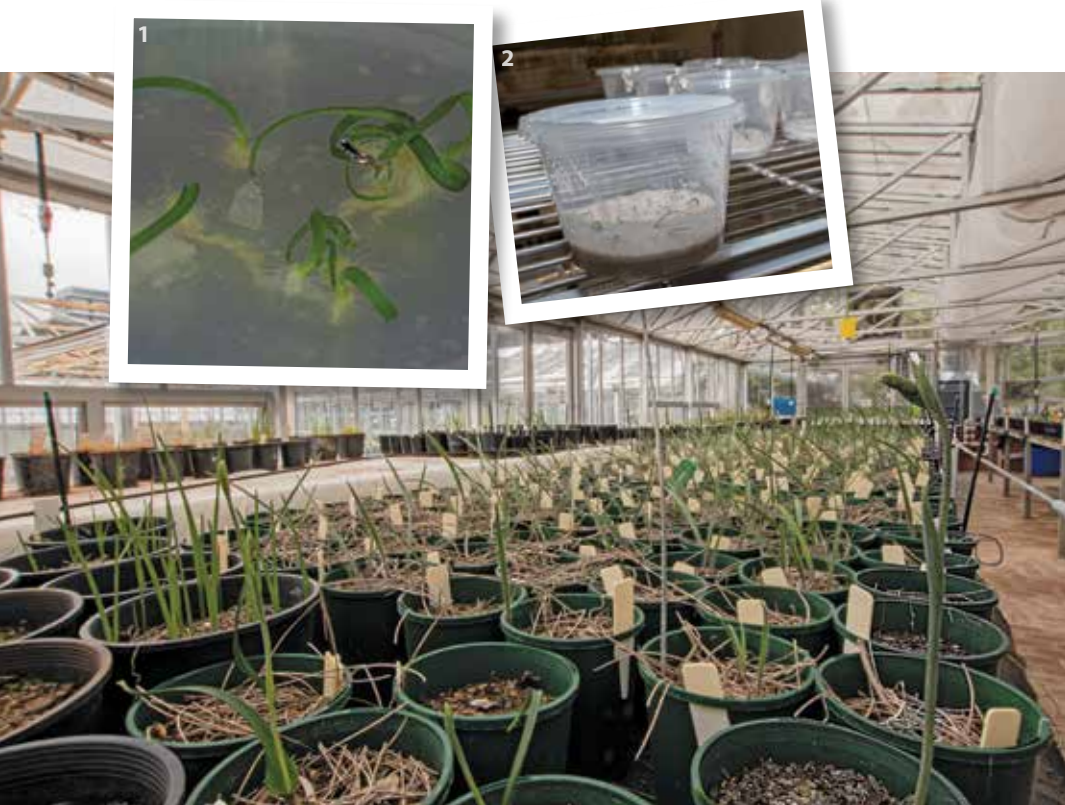
Photo – Peter Nicholas/DBCA

Top There are several variations of the Queen of Sheba orchid. The focus of this research is on arguably the most iconic, the Queen of Sheba (*T. variegata*), as opposed to its relatives the northern Queen of Sheba (*T. pulcherrima*) and the eastern Queen of Sheba (*T. speciosa*).

Photo – Mark Brundrett

Above The Queen of Sheba orchid is almost impossible to see when not in flower, blending into its banksia woodland habitat, making it easy to accidentally step on the rare plant when bushwalking.

Photo – Sarah Barrett/DBCA



Left Following several acclimatisation steps to adapt to a lower humidity environment, the plants move to the glasshouse, joining *ex situ* orchid living collection. Here they will form a conservation seed orchard for future propagation and translocations.

Insets left 1) The petri plate on which the seed and fungi are introduced to each other. Getting the nutrient mix right on the petri plate is key to success. If wrong, the fungi will parasitise the seed and consume it. **2)** Orchid 'humidicrib' in which seedlings are moved to once they outgrow the petri dish. The sand and agar medium encourages early tuberisation which is key to surviving their first summer dormancy.

Above Seedlings are kept and grown in a sterile, temperature, humidity and light-controlled room until large enough to make the transition to glasshouse and soil.
Photos – Peter Nicholas/DBCA

Below The Queen of Sheba orchid in full bloom.
Photo – Keith Smith



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The author would like to acknowledge Dr Belinda Davis, DBCA Biodiversity and Conservation Science and Dr Noushka Reiter, Royal Botanic Gardens Victoria.

Information for this article was also drawn from the Field Guide to the Orchids of Western Australia: the definitive guide to the native orchids of Western Australia (2013) by A Brown, K Dixon, C French and G Brockman.

“With its striking appearance and intriguing name, the Queen of Sheba has been impacted by picking, trampling and habitat decline since European settlement in WA. The orchid once grew in the heart of what is now metropolitan Perth – making Kings Park a fitting location for its ‘rebirth.’ ”

Belinda is hopeful that in time, the plants will be robust and plentiful enough to begin reintroductions into the wild, as well as being placed on display in the public spaces of Kings Park for more people to enjoy.

The plants at the Royal Botanic Gardens Victoria will be used for seed orcharding, with staff there sending genetically diverse seed material back to Kings Park for propagation into the future.

BRIGHT FUTURE FOR SUN GODDESS

The establishment of insurance populations at both botanic gardens is an exciting achievement for a species that came close to being ‘loved to death’. With its striking appearance and intriguing name, the Queen of Sheba has been impacted by picking, trampling and habitat decline since European settlement in WA. The orchid once grew naturally in the

heart of what is now metropolitan Perth – making Kings Park a fitting location for its ‘rebirth’.

Native orchids hold a special place in the hearts of plant enthusiasts. For members of the WA Native Orchid Study and Conservation Group, the chance to survey and record wild occurrences of the Queen of Sheba is a privilege, not a chore. Indeed, the orchid is so loved that its image graces the covers of many reference books.

In the far south of WA, local tour operators offer like-minded individuals guided walks to see the Queen of Sheba during its flowering months from June to September. Over the years, the Queen has even attracted international visitors eager to make a rare sighting, many of whom go home with no such luck. But this latest breakthrough, coupled with broader land conservation works, could mean their chances will be better next time they return.

I have a confession to make – I love Australia's black cockatoos. Whenever I see them careen and roll above me, I get a frisson of joy. They seem to move effortlessly on gently pounding wings, calling to other members of their flock in sonorous delight. Their feeding can quickly produce a carpet of discarded gum nuts and other debris that have been torn apart in search of tiny seeds that they ingest. It's not often that I become lyrical about nature, but these birds are wonderful and I feel privileged to witness their antics.

Apart from the very different palm cockatoo, the five species of black cockatoos are placed in the genus *Calyptorhynchus*, but three species, the yellow-tailed black cockatoo in eastern Australia and two others, Baudin's cockatoo and Carnaby's cockatoo, which occur only in south-western Australia, are sometimes placed in the genus *Zanda*. Eastern Australia's glossy black cockatoo is *C. lathami*.

However, the most widespread species is the red-tailed black cockatoo (*C. banksii*), which ranges over much of Australia although it is largely absent from wetter south-eastern Australia and Tasmania. Due to differences in size and morphology (particularly in the shades and patterning of colour in females), it has been divided into five subspecies: *C. b. banksii* and *C. b. macrorhynchus* in northern Australia, *C. b. graptogyne* in south-eastern Australia, *C. b. naso* in south-western Australia, and *C. b. samueli* in arid Australia.

A recent study has been published by Dr Kyle Ewart from the Australian Museum and the University of Sydney, and his co-authors in the journal *Heredity*, used single-nucleotide polymorphisms (SNPs or 'snips') and mitochondrial DNA from over 100 birds across Australia. These techniques are remarkably powerful for discerning population structure and provide insights into how these populations have evolved over time, much like tracing the genealogy of a family tree. Detailed analysis of the sequence data found some surprising results.



Red-tailed black cockatoos

Notably, the two northern subspecies, *C. b. banksii* and *C. b. macrorhynchus*, could not be distinguished from each other, having remarkably similar SNP and DNA profiles.

The western population of the widespread arid Australian subspecies, *C. b. samueli*, was found to be genetically disparate from isolated populations in inland eastern, central and western parts of Australia. The authors suggest that these differences are sufficient to regard the western population as a distinct evolutionary unit, which they describe as a new subspecies, *C. b. escondidus*.

The name that they have chosen is derived from a Spanish and Portuguese word meaning 'hidden' and refers to this subspecies having been 'hidden in plain sight'. Indeed, the inclusion of the western population in *C. b. samueli* reflects convergence where different evolutionary units have evolved similar morphological traits, and only the use of molecular data finally resolved the puzzle.

Populations of the new subspecies are known from the Pilbara, Murchison and Wheatbelt districts. The removal of

these populations from *C. b. samueli* thus drastically reduces the known range of *C. b. samueli*, which occurs in the southern Northern Territory, and inland Queensland and New South Wales.

The discovery of a distinct subspecies in Western Australia raises significant conservation considerations due to land clearing impacting their food plants, including the double-gee widespread noxious weed that is regularly removed by landholders.

The research undertaken by Dr Ewart and his colleagues demonstrates the unique power of molecular data to unravel the evolutionary relationships of our precious biota. The discovery of a unique evolutionary lineage of cockatoos in mid-western Australia continues to shed light on the fauna of a fascinating region. Let's hope that they continue to careen and wheel in the sky, delighting all who see them.

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Above Red-tailed black cockatoos bask in the warm glow as morning breaks in the Central Wheatbelt.

Photo – Adrian Chesson/DBCA

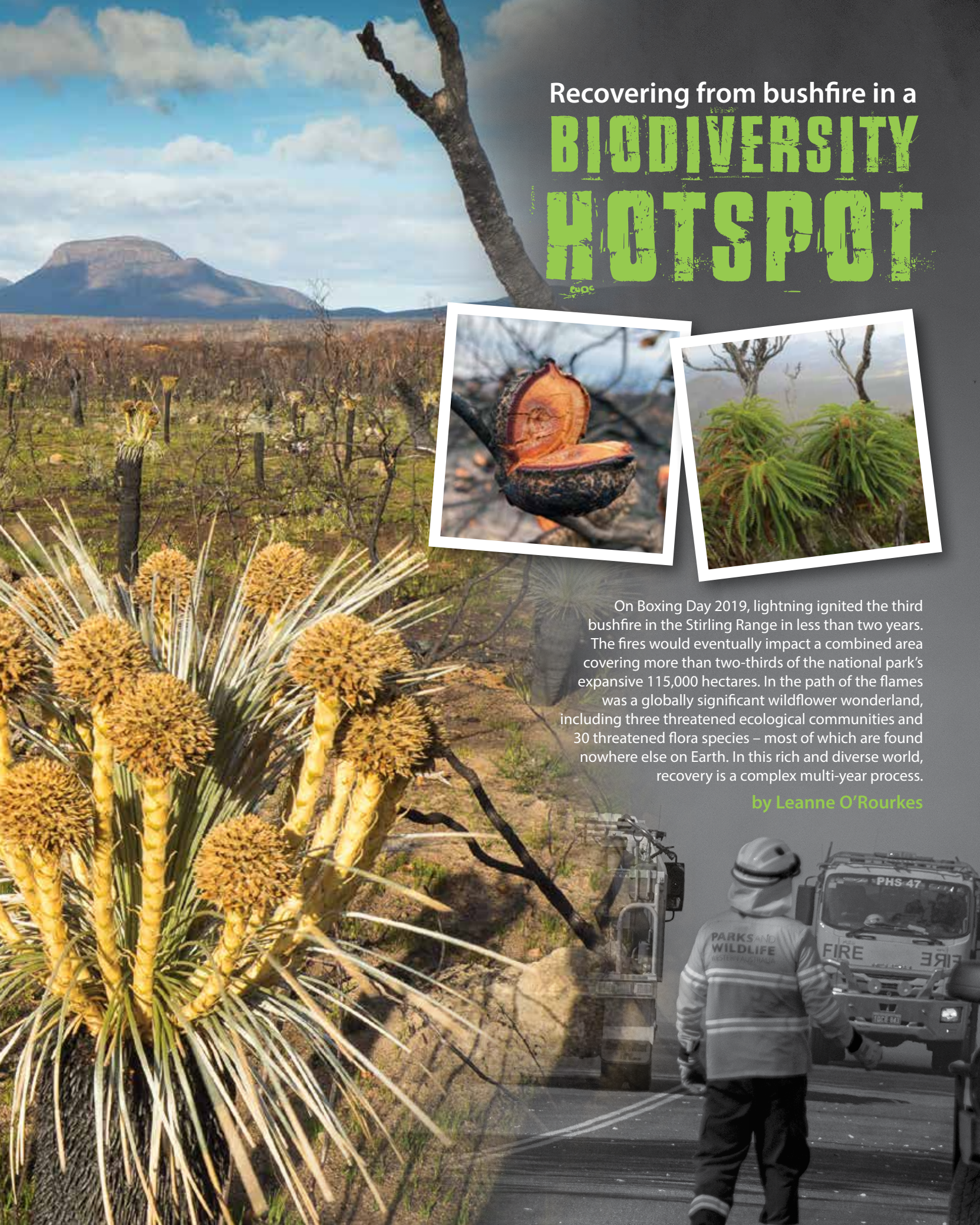


Recovering from bushfire in a **BIODIVERSITY HOTSPOT**



On Boxing Day 2019, lightning ignited the third bushfire in the Stirling Range in less than two years. The fires would eventually impact a combined area covering more than two-thirds of the national park's expansive 115,000 hectares. In the path of the flames was a globally significant wildflower wonderland, including three threatened ecological communities and 30 threatened flora species – most of which are found nowhere else on Earth. In this rich and diverse world, recovery is a complex multi-year process.

by Leanne O'Rourkes





Reaching the base of the Stirling Range is an extraordinary experience for tourists arriving by road who have become accustomed to the flat lands that surround these rugged peaks for seemingly endless kilometres. Rolling mountains seem to suddenly appear from the landscape, each with a unique character, such as the intriguing three separate peaks of Mount Trio, the steep point of Mount Toolbrunup or the sheer cliffs of popular Bluff Knoll, which is often shrouded in mysterious cloud and reflective of the Aboriginal name for the area – Koi Kyenunuruff or ‘mist rolling around the mountains’.

Even among the surreal moonscape of the recently forged fire scars, a drive through the area provides spectacular perspectives of the scenery. However, the park’s rare features are best appreciated up close. These unusual geological formations attract hikers, backpackers and nature enthusiasts from far and wide, keen to walk, climb or scramble up to some of the more challenging summits for 360-degree views or to enjoy a closer look at the incredible flora.

Devastatingly, the park experienced three major bushfires in 2018 and 2019. The third fire, which started on Boxing Day 2019, was brought under control in early 2020 thanks to an outstanding multi-agency effort by Volunteer Bush Fire Brigades, DBCA staff, volunteer firefighters,

SES, Department of Fire and Emergency Service personnel and countless support workers. While many Western Australians were recovering from post-holiday blues, locals were assessing the damage to 26 of the park’s threatened flora species – more than three quarters – including 16 critically endangered plants and turning their attention to a very different kind of recovery.

FOCUSSING ON FLORA

In a familiar tale about the remarkable resilience of the Australian bush,

many species are bouncing back with impenetrable tenacity, like the abundant grass trees (*Xanthorrhoea platyphylla*) whose blackened trunks only sprout flowers after a fire. Other species like the critically endangered late hammer-orchid (*Drakaea confluens*) and Drummond’s grass (*Deyeuxia drummondii*), which is listed as vulnerable under the *Biodiversity Conservation Act 2016*, are also likely to respond positively to fire.

However, many of the re-seeding species may not fare as well and will require

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Previous page

Main Recovery at Stirling Range National Park, June 2020.

Photo – Cliff Winfield

Right Crews work to manage the fire at Chester Pass Road in 2019.

Photo – Sally Treasure/DBCA

Inset left Fire causes plants such as hakea to release their seeds from woody fruits.

Photo – Leanne O’Rourke/DBCA

Inset right Critically endangered Stirling Range dryandra (*Banksia montana*).

Photo – Sarah Barrett/DBCA

Above Fire burns along Chester Pass Road.

Photo – Sally Treasure/DBCA

Above right Stirling Range dryandra (*Banksia montana*) burnt in the fire.

Photo – Sarah Barrett/DBCA

Right Clouds roll over Bluff Knoll.

Photo – Rob Neave/Sallyanne Cousans Photography



Discover more about
 Stirling Range National
 Park

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





Above left Vegetation near Mount Trio before the fire.

Photo – Marie Lochman

Top Late hammer-orchid.

Photo – Andrew Brown/DBCA

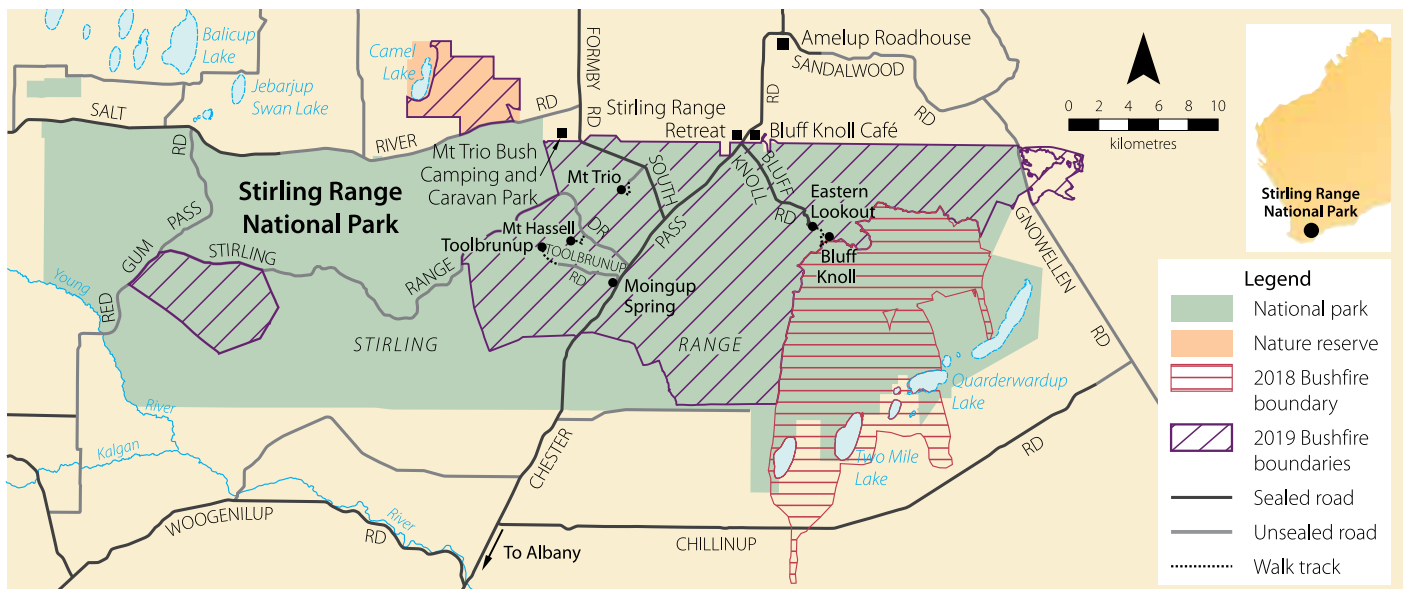
Above Drummond's grass.

Photo – Ellen Hickman

a focussed effort to ensure their survival. As a notable example, all remaining wild populations of the critically endangered Stirling Range dryandra (*Banksia montana*) were burnt. In a 2018 bushfire, 29 of 37 adult individuals were destroyed and the rest, along with some of the seedlings that germinated since 2018, were decimated in late 2019. It takes ten years for this species to grow from seedling to flowering plant, when bright earth-toned fingers project from the centre of the long leaves that spring from the trunks like fountains.

It takes even longer for this species to develop a seedbank that is adequate enough to support regeneration from future fires. Sadly, the cumulative impact of fires has taken a huge toll; a short interval between incidents in 1991 and 2000 meant the plants did not have long enough to reach maturity and produce seed and thus the species was starting from a poor position when bushfires again raged through the area.

But there is hope. Some adult plants persist outside the park in a small translocation and, along with seed



“The fragility and importance of these species and communities was recognised long before the recent fires threatened their very existence.”



collections at the WA Seed Centre and elsewhere, they may hold the key. Propagation and translocation first at other locations and eventually within the Stirling Range could provide a lifeline in conjunction with protection from other threats like disease and grazing. Fencing, spraying with the fungicide phosphite, completing comprehensive surveys and monitoring can be painstaking work. Although these efforts are largely hidden from view, the dedicated nature

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Above Montane thicket of the eastern Stirling Range.

Photo – Damon Annison

Top right Brendan Fox, Gavin Bayliss and Deon Grantham working to rebuild the lower reaches of Mount Trio walk trail.

Photo – Shem Bisluk/DBCA

Above right The fire closed Chester Pass Road.
 Photo – Leanne O'Rourke/DBCA

Above far right Threatened quokka.

Photo – Jiri Lochman

conservation team is passionate about giving these species a shot at survival.

CONSIDERING BROADER COMMUNITIES

A vital management strategy for distinct species relies on a holistic view that considers them as community members part of an intricately connected ecosystem. Stirling Range dryandra (*Banksia montana*) is a species within the critically endangered threatened ecological community (TEC), *Montane Thicket of the eastern Stirling Range*. Post-fire aerial intelligence and ground survey work suggest that the majority of the last unburnt patches of this community have been impacted by the most recent bushfire. Throw in other pressures like drought stress from a drying climate, and the challenges for conservation management are momentous. And this is not an isolated situation. Almost half of the priority *Montane Mallee Thicket of the Stirling Range* TEC was burnt in the last bushfire.

The TECs are not only important for the individual plants they are comprised

of, but also for the threatened fauna species that frequent them. In addition to providing habitat for threatened quokkas (*Setonix brachyurus*), a host of endemic short-range invertebrates are also affected, including the critically endangered shallow-burrowing Toolbrunup endemic trapdoor spiders and the *Banksia montana* mealybug (*Pseudococcus markharveyi*), which relies on its host plant to endure.

A LONG ROAD AHEAD

The fragility and importance of these species and communities was recognised long before the recent fires threatened their very existence. Through knowledge about fire recovery gathered from long-term quadrats and forward planning to prepare for risks such as fire, it is fortunate that not all was lost in the recent bushfires. The next few years are critical. Unlike the intense emphasis at the peak of the bushfires in a race to gain the upper hand and prevent further damage, progress in the environmental recovery space will be slow but essential for both the environment and its visitors.



A month after the last blaze was extinguished, the deafening roar of the December bushfire still lingered in the memory of the Stirling Range community. The area had returned to its usual state of quiet contemplation, but it was even quieter than usual. Ordinarily at the busiest time of the year, noisy cars stretch back as far as the eye can see, full of tourists keen to catch a glimpse of the infrequent snow on Bluff Knoll. In contrast, if you listened through the silence shortly after the fire trucks had moved on, you could hear the clicking and tapping of tools on bolts and slats as crews worked to rebuild trails for the safe return of visitors. By no means a small task, support was embraced from far and wide, including from DBCA staff and Aboriginal rangers from Albany, the Wheatbelt and further afield in the Kimberley. The prison services lent a hand and a helicopter was brought in to airlift over 50 tonnes of material. With the unexpected infrastructure repairs, comes room for improvement. Easier, more accessible trails are just some of the bonuses on the horizon.

Above Newly repaired walk trail at Bluff Knoll.
Photo – Cliff Winfield

Right Grass trees sprout flowers after a fire.
Photo – Damon Annison

A GLIMMER OF HOPE

As is the case in any bushfire affected community, the fire scars are not confined to the landscape. Businesses have struggled to get back on their feet, but the regeneration of the bush brings a glimmer of hope for them. The warm country welcome at the Bluff Knoll Café with its musical instruments, coffee, food and bar remains and both the Stirling Range Retreat and Mount Trio Bush Camp and Caravan Park are excellent options for resting after a day of hiking.

As time passes and the burnt ground recovers, flowering plants will regrow and pop colour into the landscape, high upon the mountains. One thing is certain: the monitoring team will be there in hope and full pursuit of signs that spring has triggered strong germination.



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Journey into the heart of the Bungle Bungle Range

photos and text by Janine Guenther



Adventure out

There are a few places in the world that are so charismatic, so unrivalled, so extraordinary and so hauntingly beautiful that words can't do justice to describe them – they simply take your breath away and one of these places is the Piccaninny Gorge in the Purnululu World Heritage Area.



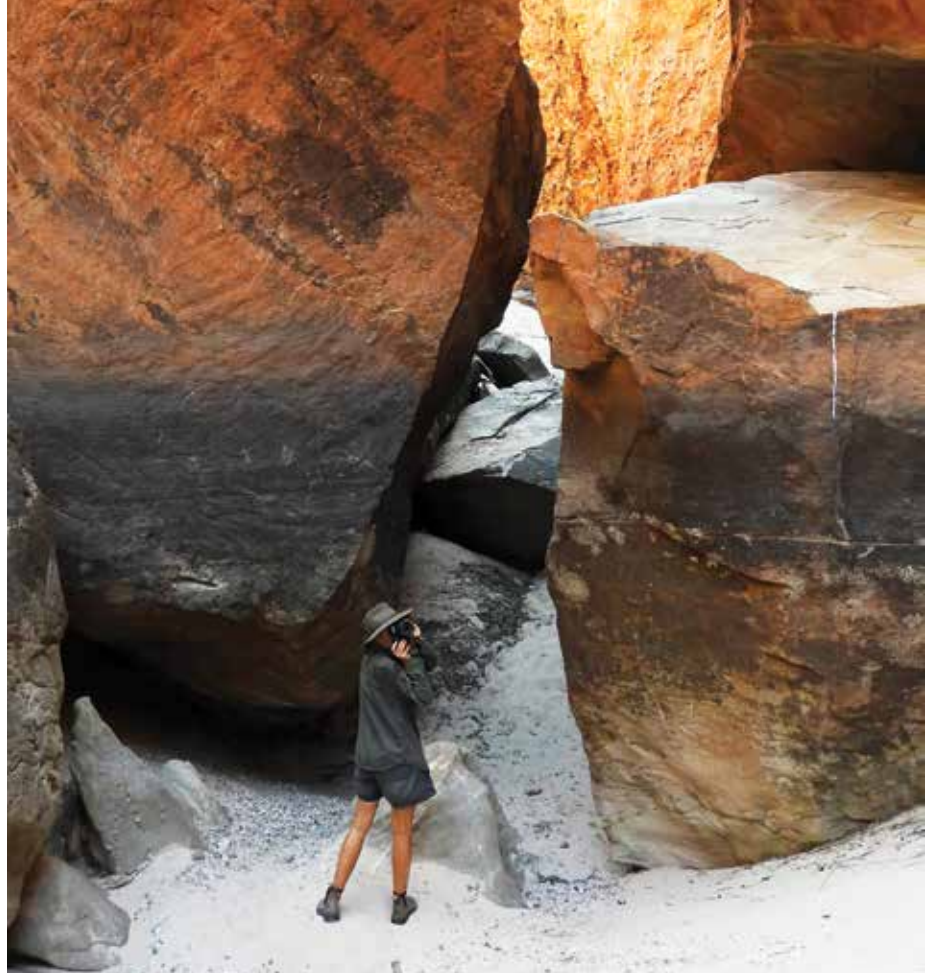
The majestic gorge, which leads into the heart of the Bungle Bungle Range, certainly took my breath away – quite literally – because the only way to explore the massive gorge system is on foot on the Class 5 Piccaninny Creek Trek, a hike over more than 40 kilometres.

Marching over the ancient rock, my breathing was certainly heavy. It was hot, my back was aching, and my neck muscles, not used to the constant pull of the heavy backpack, had started hurting three hours ago when I left the Piccaninny carpark – leaving behind a world, that in the face of nature’s imposing grandeur, soon vanished into insignificance.

Surprisingly, despite all my huffing and puffing, it was my uhing and ahing in awe and amazement that echoed from the otherwise silent rock walls – silent but not unforthcoming because inscribed in the walls is an amazing story that started more than 360 million years ago.

At that time sand and gravel, carried by ancient river systems, accumulated here, then got buried under younger sediments and compressed into sandstone and conglomerate. Thanks to some violent movements in the earth’s crust, resulting in a tectonic uplift, the Bungle Bungle Range was set free about 300 million years ago. Another uplift, occurring 20 million years ago, allowed weathering and erosion to apply their final touch and create today’s intricate maze of steep-sided gorges, beehive shaped towers and narrow chasms.

The Bungle Bungle Range is, no doubt, one of nature’s wonderlands – declared a World Heritage Site by the United Nations



Educational, Scientific and Cultural Organization (UNESCO) 17 years ago, gazetted as a national park 38 years ago and home to Aboriginal people for at least 50,000 years.

The imposing massif and the surrounding plains are the traditional homeland of the local Aboriginal people. Testimonials of their long connection with the land have survived to this day in many places in the park. Among these are shelters, rock art galleries and burial grounds.

Permanent water holes in rivers and creeks support a rich and diverse flora and fauna, which in turn provide abundant

bush tucker in the form of berries, seeds, yams, reptiles, fish and mammals of all sizes.

My menu for the next two days of hiking was looking quite meagre in comparison and was restricted to the food and water I was carrying on my back. As this amount was limited, I had the best intentions to keep a sensible balance between pressing forward to get to the end of the gorge and taking time to enjoy the scenery. Well, it didn’t take long for the ‘balance idea’ to be discarded.

There was no way I could close my eyes to nature’s splendor. The creek bed with its dramatic rock formations, sculptured cataracts and intriguing ‘pavements’ (from bizarre patterns to solidified chocolate) was as captivating as the monumental sandstone domes and walls bordering it. Stopping for photos or simply pausing in admiration became as compulsive as waving away the friendly flies and wiping off the sweat that persistently trickled down my forehead into my eyes.

By midday, I finally reached the entrance to the actual gorge known as the Elbow – aptly named because it is here



.....
Previous page

Main Massive sandstone domes and towering rock dwarf the hiker.

Inset Holes and crevices provide safe shelter for tree snakes.

Above Pitch black rock, white sand and a ‘glowing’ amber wall in the gorge.

Left Natural ‘pavement’ made from rocks in the Piccaninny Creek bed.

“Permanent water holes in rivers and creeks support a rich and diverse flora and fauna, which in turn provide abundant bush tucker in the form of berries, seeds, yams, reptiles, fish and mammals of all sizes.”



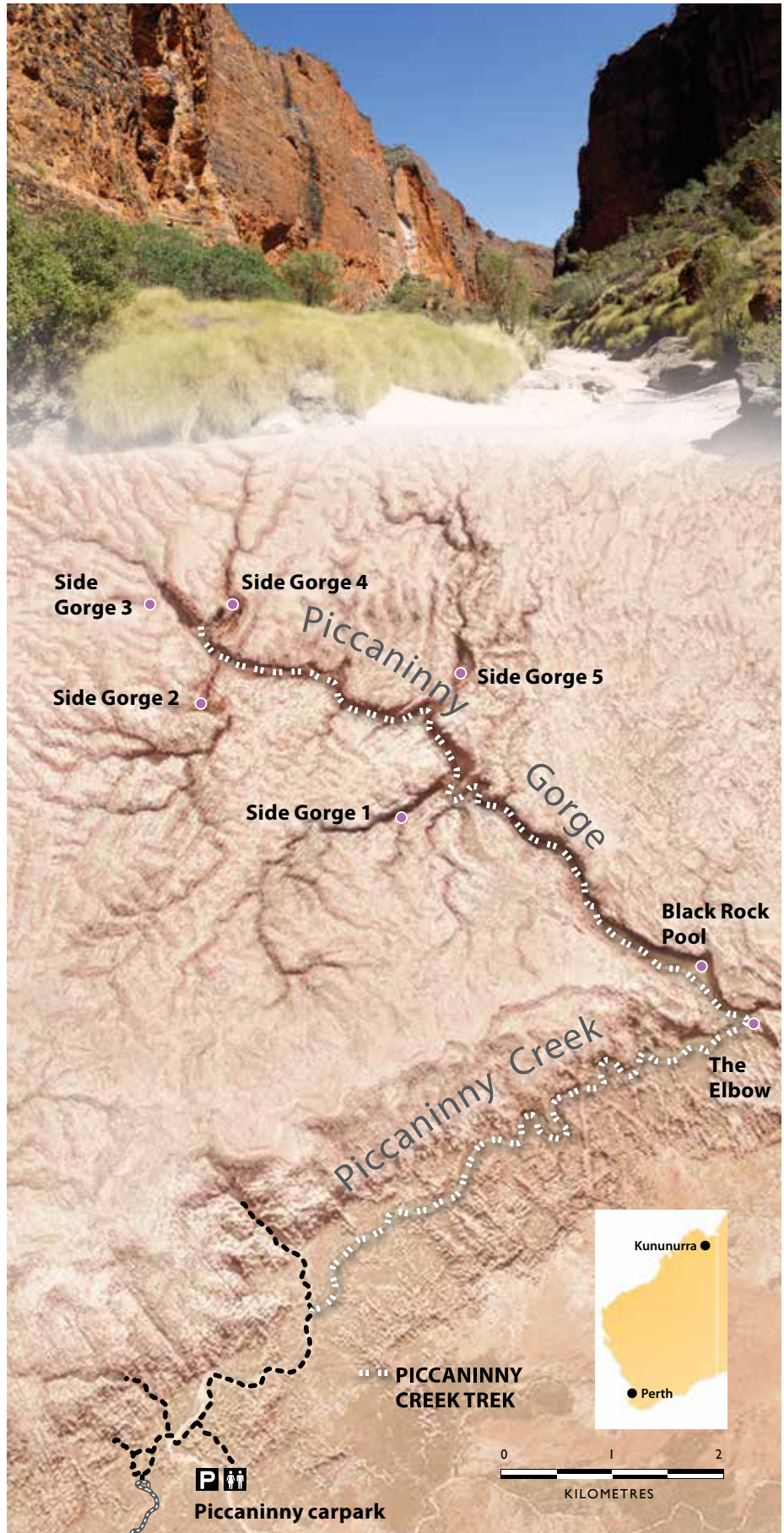
Above Dramatic colour contrasts in the gorge.

Above right The imposing mass of an ancient river system.

where the creek makes a 90 degree bend and instead of continuing along the edge of the range, heads right towards its heart.

For lunch, I had planned to reach the first water hole called Black Rock Pool. To get there turned out to be an adventure in its own right. Big rock boulders strewn along the creek that lead to the water hole, provided an almost insurmountable obstacle for a person carrying a heavy backpack which swayed from one side of my back to the other while clambering over and around the boulders.

Was it worth the effort? Yes, yes, and yes – embraced on three sides by towering rock walls and decorated with livistona palms (*Livistona victoriae*) and impressive rock boulders, this water hole was a jewel. It also featured a shady white beach onto which I enjoyed my lunch until I got interrupted by the sight of a tree snake (*Dendrelaphis punctulatus*).



“The biggest challenge in future will be to keep the balance between making some attractions accessible for tourists and preserving others, such as the Piccaninny Gorge. Only by limiting visitor numbers can these places be enjoyed in a respectful way.”



In fascination I watched the golden-coloured reptile climbing up a rock wall. The snake was not my only companion during lunch. A small flock of double-barred finches (*Taeniopygia bichenovii*) settled down for a drink only two metres away from me at the water's edge; a little friarbird (*Philemon citreogularis*) croaked from one of the palm trees and two crows (*Corvus orru*) arrived to check out my potential for leaving food scraps.

By the time I finished lunch and had a good look around, I had to discard another idea of mine, namely reaching the end of the main gorge that day. I could easily tell by the long shadows surrounding me that it was too late to continue.

For various reasons, I normally avoid camping right next to a waterhole but even that good intention got discarded because the sandy beach provided the only levelled area. So out came the tent and in complete silence I watched the gorge become engulfed in a warm blanket of darkness. A butcherbird (*Cracticus torquatus*) provided the icing on the cake of a perfect day by settling down in a tree nearby and raising its clear voice for the evening entertainment. I couldn't have asked for more.

In the morning, the crows impatiently saw me off, eager to scrutinise my campsite, but I had to disappoint them because I didn't leave anything but footprints.

Above Janine's exclusive camp on the white beach of Black Rock Pool.

Above right Impressive cataracts in the Piccaninny Creek bed.

After my return to the main gorge I dropped my backpack behind some rocks and swapped it for a small bag in which I put some water and lunch. Knowing I only had a few hours left on my trip, instead of turning left and back to the carpark I went right, further up the gorge to soak in the scenery and enjoy the peaceful harmony. It might sound selfish, but some places can't be shared with too many people; part of their attraction is that they are still reasonably untouched and can be enjoyed alone and in respectful silence.

Unfortunately, the sun didn't seem to share my enthusiasm and need for frequent stops. Instead it moved relentlessly across the dome of the sky and announced far too soon that it was time for me to turn around.

It was past sunset when I arrived back at the carpark. Opening the door of my Landcruiser, I re-entered a world that had fallen into pleasant oblivion during my hike while the rocky wonderland I just left behind, will, no doubt, always be in my memory.

Do it yourself

Piccaninny Gorge has no marked track and no defined endpoint so hikers must rely on their own navigational skills to complete the walk. The 20 kilometre return walk to the gorge entrance (the Elbow) from the carpark requires an overnight stop.

Exploring the entire gorge system can add up to more than 40 kilometres including the side gorges and 'fingers'.

Where is it? The Bungle Bungle Range in Purnululu National Park is 300 kilometres south of Kununurra

Getting there: The park can be accessed by plane, helicopter or high-clearance four-wheel drive vehicles with low-range gears, and only single-axle high-clearance camper trailers and caravans are permitted.

Staying safe: It is recommend to call ahead to Parks and Wildlife Service Kununurra office (08) 9168 4200 to confirm hikers are currently being permitted in the park. Hikers must register at the visitor centre before embarking on a hike through the gorge. Personal locator beacons are essential and available for hire from the visitor centre.

Janine Guenther is a dedicated and passionate photographer and owner/operator of Naturetime Tours based in Denham. She can be contacted on j.guenther@verlag360grad.com



Dry season dreaming

Snubfin census on Yawuru sea country

On the lookout for a lesser known dolphin with a roundish fin and no beak, DBCA and Nyamba Buru Yawuru rangers, scientists and volunteers covered 604 kilometres over three days, spending a total of 49 hours on the water searching for and photographing dolphins.

by Holly Raudino, Ellen D'Cruz, Kelly Waples, Jason Menzies,
Jesse Murdoch, Todd Quartermaine and Dean Mathews



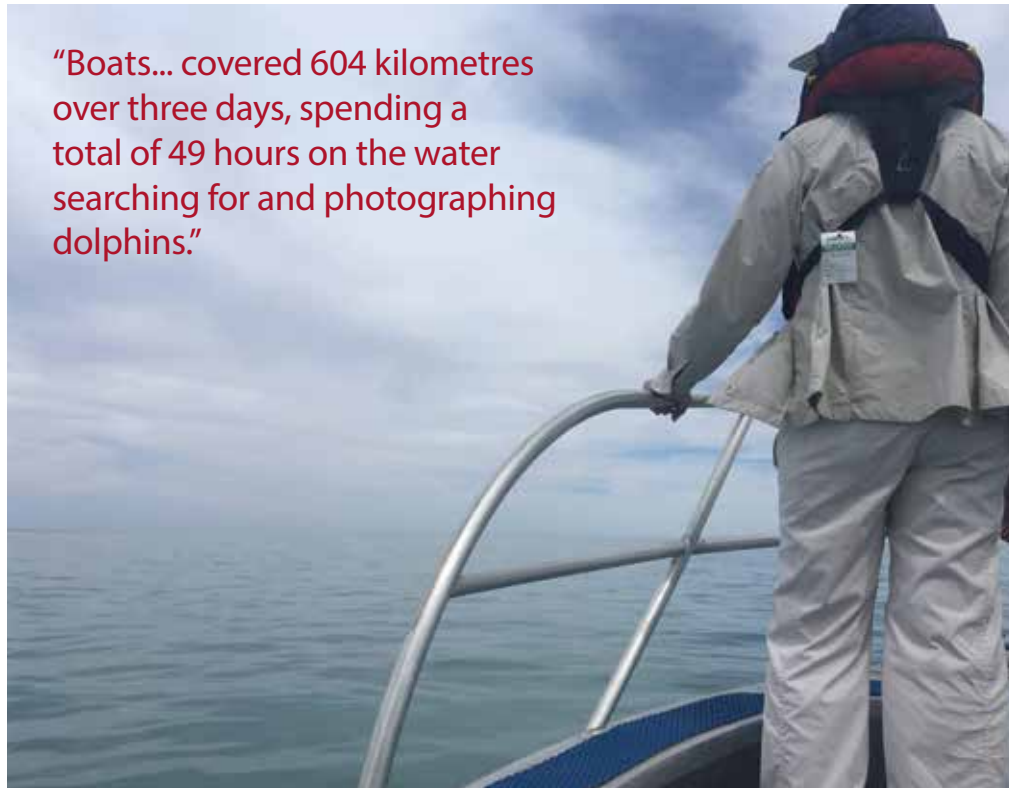


Have you ever sat on the red shoreline of Yawuru Nagulagun / Roebuck Bay Marine Park in Broome, gazing past the mangroves at the alluring aquamarine coloured water, and spotted a distant fin or round face breaking the sea surface? The idyllic scenery commonly associated with the Kimberley region of Western Australia is also home to the enigmatic Australian snubfin dolphin (*Orcaella heinsohni*).

This peculiar looking dolphin lacks the beak typical of most dolphin species and gets its common name from the small roundish fin on its back. Native to Australia, the snubfin dolphin was only formally described as a species in 2005. Although a surprise to western science, the snubfin was no secret to the Yawuru people who have lived and managed the sea country it calls home, alongside turtles and dugongs, for thousands of years.

Turtles (*Gurlibil*) and dugongs (*Nganarr*) have high cultural value to the Yawuru people and continue to be harvested for customary purposes. However, snubfins have never been hunted. Despite this fact, there are concerns that the species is declining across its range. This has attracted international concern and the snubfin dolphin is now listed on the IUCN redlist as 'vulnerable'.

Fortuitously, the largest known population of approximately 130 snubfins can be found in the Yawuru Nagulagun / Roebuck Bay Marine Park. Creation of the marine park in 2016 was good news for snubfins as commercial gill netting ceased and the other remaining pressures from interactions with humans such as disturbance, boat strike or entanglements



Previous page

Top The volunteers begin the census.

Below A curious snubfin investigates the boat.

Above left A snubfin dolphin spyhops while socialising with other snubfins.

Photos – Kevin Smith

Above On the lookout.

Right Briefing volunteers on Dolphin Big Day Out.

Photos – DBCA



with recreational fishing gear are now being jointly managed by the Nyamba Buru Yawuru (NBY) and Department of Biodiversity, Conservation and Attractions (DBCA).

These organisations are partnering to study the condition of the population by monitoring trends in its size over time and dolphin distribution across the bay.

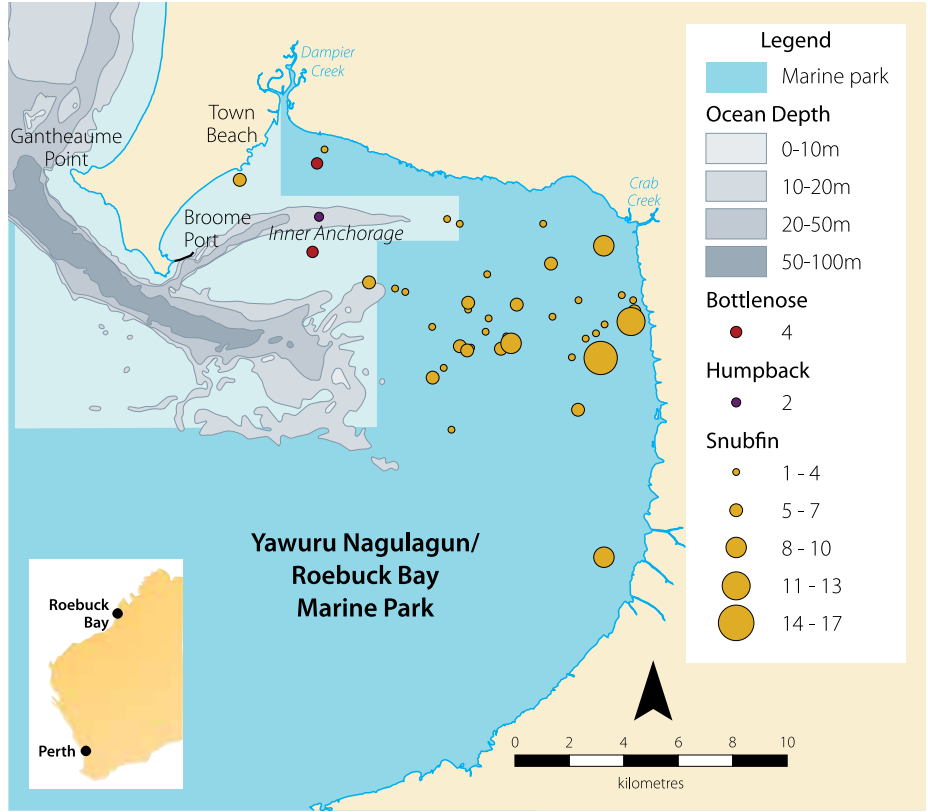
SEARCHING FOR SNUBFINS

Understanding the snubfin population in the marine park has become a real group effort with a rapid census method trialled in April 2019 that involved DBCA staff, NBY country managers, local tour operators

(Absolute Ocean Charters and Broome Whale Watching) and *Dolphin Watch* volunteers taking to the water to record dolphin sightings over a three-day period.

A cyclone brewing off the coast almost cancelled the census but instead brought ideal, calm conditions, perfect for spotting dolphins and other marine life. Boats manned by DBCA scientists and rangers, and NBY rangers, covered 604 kilometres over three days, spending a total of 49 hours on the water searching for and photographing dolphins.

Volunteers joined the census on the last day, 6 April, for Broome's inaugural 'Dolphin Big Day Out'.



Top Nyamba Buru Yawuru rangers and DBCA staff ready to survey for snubfins in ideal weather conditions.

Above Heading out of Roebuck Bay.

Right Grunge was identified by the damage to her fin.
Photos – DBCA

Inset *FinBook Roebuck Bay* helps to identify dolphins by their fins.



Dolphins can be individually identified by the dorsal fins on their backs and the many marks, nicks and notches they get over their lifetime. Most snubfin dorsal fins photographed in the census were marked, making the dolphins recognisable and suitable to be included in the dolphin catalogue.

These marks come from sharks, boat strikes, entanglement with fishing gear and from social interactions with one another. If individuals can be recognised using these marks (they do not change over time), then their life history can be tracked – an important tool when monitoring long-lived species like marine mammals.

The collective effort of the census recorded 96 individual snubfins, including 10 calves, in Roebuck Bay over the three-day period. Of the 96 individuals identified, about one third had been seen in previous surveys. One individual known to the community as ‘Grunge’ was first sighted and named on 8 May 2007 and has been seen repeatedly over the ensuing 12 years, most recently during this census, with a new calf.

IN GOOD COMPANY

The snubfin dolphin was the most common species sighted but Indo-Pacific bottlenose (*Tursiops aduncus*) and other

dolphins were also sighted in low numbers during the census. All bottlenose dolphins seen had been identified during previous surveys.

Excitingly, the *Dolphin Watch* volunteers on the tour boats recorded a sighting of Australian humpback dolphins (*Sousa sahulensis*), a mother and calf, making a valuable contribution to the census. This is a great example of how trained *Dolphin Watch* volunteers can contribute valuable sightings and information to monitoring programs by using the *Dolphin Watch* app (see ‘Dolphin Watch’, *LANDSCOPE* Autumn 2019).



Do it yourself

If you would like to become a *Dolphin Watch* volunteer check out the River Guardians website (riverguardians.com) and subscribe to receive the quarterly e-newsletter so that you can join upcoming training workshops and events. If you find yourself holidaying in Broome, have a coffee on town beach and you may be lucky enough to spot a snubfin dolphin passing by too.



The sightings recorded by volunteers, accompanied with high resolution dorsal fin photos, continue to complement surveys by scientists and country managers. For Roebuck Bay, it is important to continue to record the presence of all three species to ensure the target of species diversity within the marine park is maintained.

When the tide is right, Crab Creek is a fishing spot favoured by locals as it is abundant with fish. What the dolphins are feeding on is also of interest to scientists and managers, so that fish stocks can be managed in a way that dolphins and humans can both enjoy the food on offer.

JOB WELL DONE

The census trial proved to be a huge success and demonstrates that a rapid population survey with high intensity effort over a few days produced a high count of snubfins. This monitoring approach suits a discrete and highly resident animal population.

DBCA and NBY joint managers of the marine park intend to repeat the census regularly to ensure that any changes to the dolphin population can be detected and managed. The 'Dolphin Big Day Out' is a great example of how the community can work together with DBCA and NBY, as the local custodians of the area, to ensure the future survival of the snubfins.

Not only does this help empower the locals and engender a greater sense of ownership, it increases the monitoring capacity in the Yawuru Nagulagun / Roebuck Bay Marine Park and helps build a more complete picture of the dolphin population, so they can be protected and enjoyed for generations to come.

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Additional DBCA contributions **Ellen D'Cruz**, **Kelly Waples** and **Jason Menzies**.

LANDSCOPE would like to acknowledge photographer and longstanding Parks and Wildlife Service volunteer, Kevin Smith who sadly passed away this year. Kevin, who became known as the turtle whisperer, was a humble, kind and passionate man who put a generous amount of time and effort into environmental projects including; the Broome Seagrass Monitoring project and was volunteer coordinator of the Cable Beach Community Turtle Monitoring group and Dolphin Watch.

Above Snubfin dolphins at Roebuck Bay.

Photo – Patty Tse/Alamy

Above right Snubfin dolphins near Broome.

Photo – Kevin Smith

Right Roebuck Bay.

Photo – David Bettini





Adding fuel to the fire **invasive grass management and fire in urban fragments**

Fire, both planned and unplanned, is important for native species regeneration and fuel load reduction, but invasive grassy weeds are impacting bushfire hazard and biodiversity management in Kings Park.

A team of scientists and land managers set out to explore these impacts to identify the best mix of fire and weed management options to protect biodiversity while reducing bushfire risk in Western Australia's most popular tourist destination.

by Dr Ben Miller and Russell Miller



Like many terrestrial ecosystems around Australia, Perth's urban banksia woodlands are fire-prone. For land managers, including Kings Park's Botanic Gardens and Parks Authority (BGPA), managing fire risk in urban and urban fringe bushlands is a critical concern, and the presence of some invasive grassy weeds substantially adds to the challenge.

Scientists from DBCA's Biodiversity and Conservation Science have been collaborating with land and fire managers from the Parks and Wildlife Service's Swan Coastal District, BGPA, the

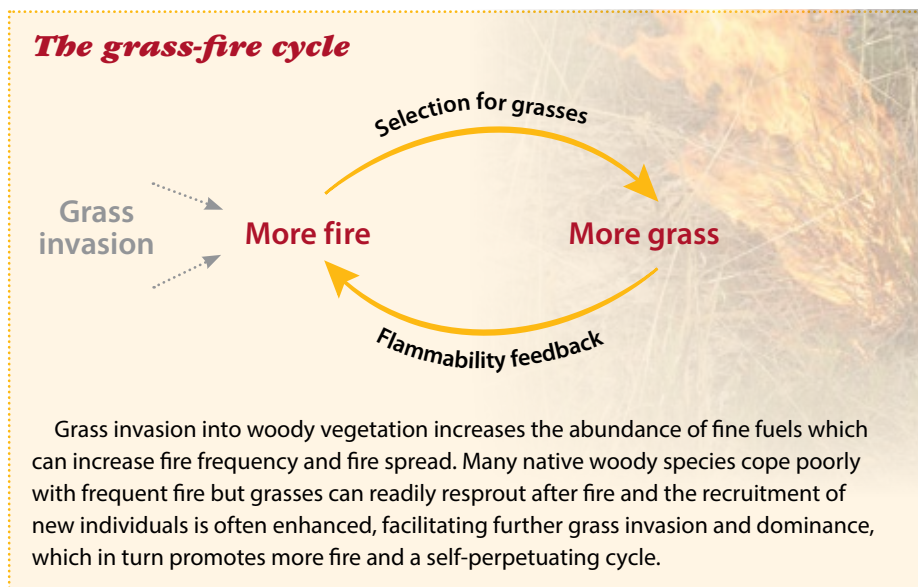
Department of Fire and Emergency Services (DFES) and local councils, to understand the positive and negative effects of prescribed burning in urban bushlands where the spread of grassy weeds is an unwanted fire hazard and conservation threat.

GRASS-FIRE CYCLE

In 1927, John Heath, the Kings Park superintendent, noted the ability of perennial veldt grass (*Ehrharta calycina*), accidentally introduced from South Africa, to grow densely in banksia woodland understorey. At the same time, he also

noted an increasing problem with bushfires in the park. The problem he identified is one we know today as the 'grass-fire cycle': the pattern of grass invasion promoting the spread of fire, and fire promoting the spread of grasses (see 'The grass-fire cycle' below).

About 75 species of native grasses occur in the wetter half of south-west Australia, but the ecosystems that they dominate, such as coastal dunes, are few and restricted. Where native grasses occur in south-west forests and woodlands, they contribute little to fuel structure and fire spread, however, this



Previous page

Main Grassy-weed-invaded urban banksia woodland.

Photo – Russell Miller/DBCA

Inset Annual grassy weeds in silhouette.

Photo – Sallyanne Cousins

Above left Typical banksia woodland with no grassy weeds present.

Above Curing grasses filling gaps 18 months after fire at the Kings Park experimental burn site in the non-weed managed treatment.

Photos – Russell Miller/DBCA



“Capturing nutrients released by fire, these weeds build their competitive capacity by reducing the nutrient pool available to native plant regeneration.”

Above left The experimental burn at Bold Park, strongly weed invaded in the foreground.

Top *Banksia attenuata* seedling emerging after fire in banksia woodlands.

Above Red and green kangaroo paws (*Anigozanthos manglesii*) flowering in the weed-managed treatment after fire in Kings Park.

Photos – Russell Miller/DBCA

situation changes when introduced grasses invade these systems.

Many European and South African grass species that have been introduced into Western Australia since European colonisation have become established as weeds in native vegetation. Now, we have more non-native than native grass species in the south-west of WA. Introduced annuals, such as annual veldt grass (*Ehrharta brevifolia*, *E. longiflora*), wild oats (*Avena* spp.), several *Aira* and *Briza* species may be very abundant in disturbed bushlands but are more transient in their impact. Perennial veldt grass (*Ehrharta calycina*) and African love grass (*Eragrostis curvula*) are among the most notorious bushland invaders, with a long-term presence and impact.

Grass invasion into woody vegetation increases the abundance of fine fuels which ignite and flame quickly when dry. Grasses also dry (or ‘cure’) rapidly, making them available to burn earlier in the day or in conditions when woody fuels may not ignite. Grasses also grow quickly, creating new fuel even after a recent fire, and can develop in dense or continuous arrangements so that, under the right conditions, they can promote the rapid spread of fire. Where fuels are dominated by grasses, bushfires are usually faster moving, and more frequent but lower intensity than in ecosystems where material from woody plants dominate.

In turn, more frequent fire enhances the spread of perennial veldt grass and other invasive grasses by promoting seed germination and seedling establishment. Many grasses can also resprout after fire and all take advantage of the soil nutrient pulse that occurs. Capturing nutrients released by fire, these weeds build their competitive capacity by reducing the nutrient pool available to native plant regeneration.

The distinction between dominant fuel types, and therefore fire regimes, may also filter the species that can persist. For example, many woody species in Mediterranean-climate forests, woodlands and shrublands of south-west WA rely on seedling regeneration to recover after fire and ensure long-term persistence, but seedlings may be sensitive to fire, and may take several years to mature and produce seeds. Such species may not be able to persist in ecosystems with grass dominated fuels that burn frequently.

THE EXPERIMENTS

Not only are invasive grassy weeds a fire hazard, they also negatively impact native species in many ways. Weed, fire and biodiversity management activities can have a direct positive or negative impact on this situation.

With help from Kings Park bushland managers, scientists commenced a series of experiments examining the effects of different prescribed burning rotations,



Top Bold Park burn site 18 months after fire. Note weed control treatment on left of image where native species dominate, compared to non-weed control-treatment on right of image where grassy weeds dominate.
Photo – Ben Miller/DBCA

Above BGPA Bushlands staff assisting with survey of plots one year after burning in Bold Park.
Photo – Russell Miller/DBCA

together with weed management, on native plant diversity and grassy weeds in urban bushlands.

The first experiment took place in Kings Park where, in six treatment blocks, native plant species abundance, fuel structure and weed cover were surveyed. Then, in May 2015, with staff and fire crews from DBCA's Swan Coastal District and several DFES brigades, a six-hectare experimental fire was implemented across four of the six treatment blocks, leaving two unburnt controls.

Bushland managers then implemented their standard grass and bulbous weed management regimes in two of the burnt blocks and one of the control blocks. Native species abundance, fuel structure and weed cover were remeasured in the subsequent years, with a plan to burn the area again in a 12- to 16-year rotation. It is also proposed to burn two of the blocks at half that time, so that the area would have unburnt, long, and short interval treatments, crossed with the presence and absence of weed management.

This experiment was followed up with a second site in Bold Park burnt in 2016. In partnership with the City of Canning, City of Cockburn, and City of Greater

Geraldton, three more sites have since been added to the experimental network.

THE RESULTS

Now, after five years, results from Bold Park and Kings Park experiments are coming in, and plans are underway for the next burn. Results show that fire indeed does enhance the spread and cover of introduced grasses, that weed management treatments are effective in reducing weed cover, and that burning leads to a decrease in litter fuels.

The experiment also confirmed the previous understanding that fire encourages the regeneration of native species. Many seedlings of native perennial species established post-fire, and several species that were not observed in pre-fire surveys emerged from seedbanks.

One benefit of replicating the experiment across multiple sites is that we can observe how sites with different starting conditions might respond to fire and weed management. The site chosen in Bold Park had high pre-fire weed cover, whereas the site in Kings Park had relatively low pre-fire weed cover.



In Kings Park, fire alone led to a tripling of introduced grass abundance (mostly perennial veldt grass) and increased grass fuel connectivity, and possibly the increase of fire hazard. However, fire plus weed management kept grasses at or below their previous levels.

After burning, native species recovery was greatest in sites receiving weed control, suggesting that competition from weeds after fire may depress native species regeneration. The herbicides used are specific to grasses or were targeted to bulbous weeds. If there was an off-target impact of these herbicides, it would have

been more than offset by the effect of reduced weed competition.

In Bold Park, in the absence of a control, weed regeneration was so strong that native species abundance declined after fire, but it more than doubled when weeds were managed. Fuel continuity attributed to grass cover dropped in the year after fire, but, if unmanaged, returned to the same high levels in the following years. When weed management was applied, fuel continuity dropped to very low levels.

While the long-term study is still in the early stages and there are other sites

to analyse, initial results highlight the fire hazard posed by grassy weeds in urban bushlands, and the role of fire in enhancing the problem. As these weeds suppress native species recovery, burning without weed management in urban reserves and at the edges of fragmented remnants may lead to increased hazard and degradation of ecological values. Weed management can help reduce one element of fire hazard in grass invaded bushlands, but an appropriate fire regime plus weed management can further reduce hazard, and enhance regeneration of degraded systems.

Top *Anthocercis ilicifolia*, a fire ephemeral usually observed for only for a few years after fire (here flowering in Kings Park).

Above BGPA Bushlands staff applying weed management treatments at the Bold Park experimental site.
Photos – Ben Miller/DBCA

Above right Recovery after a summer wildfire in banksia woodland.

Right Red and green kangaroo paws flowering in Kings Park, unburned control treatment.
Photos – Russell Miller/DBCA



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Perfect Pitcher
#lifeonland



Citizen Scientist
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Cultural Coder
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Hypothetical Hero
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Kids and canopies *cooling the planet*

by *Catrina Luz Aniere and Joselyn Juraszek*

When young people were asked what they thought the big environmental issues were, they said they were anxious about climate change and that our cities are heating up. So, they came up with a plan to help.

The effects of climate change are taught in schools. Children know about the urban heat island effect and that some native animals are facing extinction. They also know that some metropolitan councils have only 10 per cent tree canopy and 60 per cent hard surfaces such as carparks, driveways and roads.

Young members of the not-for-profit youth environmental organisation Millennium Kids conducted a survey asking more than 500 fellow young people across the Perth metropolitan area about what they thought should be done to combat these issues. With help from non-for-profit tree planting organisation Trillion Trees, their response was to cool the planet by increasing a love of trees, increasing the tree canopy and protecting the ecosystems they support. And so, Green Lab was born.

The Green Lab Action Plan involves encouraging kids to get outdoors to learn about their local environment by embracing nature as a classroom. The Green Lab Challenge involves completing a series of modules and environmental-focused activities that can be completed in their own environment.

AND SO, IT BEGINS

The first Green Lab event, held in 2019, was a pilot two-day workshop at Lightning Swamp in the Perth suburb of Noranda for 120 students from local primary schools. Millennium Kids partnered with Department of Biodiversity, Conservation and Attractions (DBCA) and the City of

Bayswater to guide students and teachers from Bassendean, Weld Square, Hillcrest and West Morley primary schools through a Green Lab experience.

They explored the bushland site alongside scientists, artists, Indigenous custodians and citizen science facilitators, looking at the habitat and the pressure from the built environment that was encroaching on the bushland. Students looked for birds, checked out tracks and scats, and built a robot, which analysed soil. They discussed their learning and developed project plans and at the end of the two days the students pitched their ideas to the Mayor of City of Bayswater, Cr Dan Bull.

“Students developed an impressive understanding of modern sustainability challenges,” said Cr Bull. “They acknowledged the need to build roads and infrastructure but wanted to see this balanced with revegetation and retain as many trees as possible.”

“I heard about ideas for sustainability education initiatives, changes they would like to see to rules and policy, and revegetation projects. These are the change-leaders of our future, and it’s really encouraging to see primary school aged children thinking at this level.”

Opposite page

Main Through Green Lab, students develop an action plan for local bushland with support from mentors and the DBCA team.

Photos – DBCA/Millennium Kids



“They go on a journey of self-discovery, design solutions to real world problems, research, seek guidance and manage their project from conception to completion.”

After the two-day Millennium Kids event, the students developed their own Green Lab initiative in a local green space near their school to help the community understand the importance of canopy and the need to increase, protect and monitor tree cover in their local area.

The students were supported through the program by Millennium Kids and their citizen science team using the ‘Skills for Life’ approach, which allows mentors to support young people to explore, identify and address environmental issues and influence their communities through local, regional and international partnerships. They go on a journey of self-discovery, design solutions to real world problems, research, seek guidance and manage their project from conception to completion.

The Green Lab pilot was commended by the Public Health Advocacy Institute of Western Australia, winning a Local Government Policy Award.

THE GREEN WEB

As the threat of a novel coronavirus reached Australian shores in early 2020, a timely opportunity arrived from Curtin University which had an existing platform that would be a perfect fit to house the Green Lab Challenge online and continue

to build the vision of a cool city with tree-lined streets where wildlife has a place and bushland is truly protected.

The interactive online platform was launched by Professor Lyn Beazley in May 2020 and promoted to schools on World Environment Day in June.

The online portal is a central hub where young people complete modules created by Millennium Kids and stakeholders and features five projects developed by young members.

Participants learn about the big issues from citizen scientists, artists, historians, community stakeholders and cultural leaders and are inspired to make change using a series of citizen science and Humanities and Social Science (HASS) skill building activities, earning badges as they complete tasks.

GET INVOLVED

Green Labs are currently being developed in City of South Perth, Town of Victoria Park, City of Kalamunda and in the City of Melville with a three-year plan to create a connected corridor of Green Labs across the Perth metropolitan area.

To start a Green Lab or for more information visit millenniumkids.com.au.

Top left COVID-19 brought with it many opportunities for change. On World Environment Day, Green Lab Patron, Prof Lyn Beazley, launched an online partnership with Curtin University, taking Green Lab to the classroom through online resources and tutorials.
Photo – Rae Fallon

Top The Millennium Kids Youth Board surveyed 500 young people who stated loss of urban canopy and deforestation were one of their major concerns in the Perth metropolitan area.
Photo – Wayne O’Sullivan

Above Millennium Kids online.

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Green Lab is a Millennium Kids Citizen Science program, funded by the Western Australian Government’s State Natural Resource Management Program and supported by the Department of Biodiversity, Conservation and Attractions.

by Rebecca Warner

Explore your backyard

Get the whole family into your garden and getting creative to bring some of our amazing wildlife right to your doorstep.

There are some great ideas for bird baths, frog ponds and lizard lounges in the photos below and all of them can be made using old objects and materials laying around your house which you have been 'meaning to throw away'. This is a great way to repurpose materials and have a garden full of birds, frogs and lizards.

You can enjoy more fun activities like these as part of the *Nearer to Nature Sunlit Spring* program www.dbca.wa.gov.au/nearertonature and click on 'Community'.



kaleidoscope

kids exploring nature



@NearertoNature



A few common bird species are:

- New Holland honeyeater
- Willie wagtail
- Silveryeye
- Australian magpie

Bird Friendly Gardens

Birds add colour and life to your garden. They have beautiful calls and when splashing about in a bird bath can be quite funny to watch!

Bath

Bird baths are fun, cute and very easy to create. You have a few options, you can go and buy a brand new bird bath OR you can use some items which may have been sitting around the house for years, waiting for that perfect project.

You could use:

- buckets/pots cut to be shallow
- old sinks
- trays
- bowls



What type of bird?

It is a good idea to research what type of birds you would like in your garden.

Head to Birdlife Australia and search for common birds in your area. Research if they eat insects so you can plant insect attracting plants or if they are nectivorous which means you may need a particular species of flower.

Location

Birds need good cover and a part-sun to shady position. Most birds will come to the bath in the early morning or in the evening.

Choose a spot where you will be able to enjoy it.

Frog Friendly Gardens

Frogs are a good indicator for having a healthy pond and garden as they have sensitive skin. They are also a great way to keep down mosquitos and flies around your house!

A few common species are:

- Motorbike frog
- Slender tree frog
- Squelching froglet
- Quacking frog

What type of frog?

It is important to research what type of native frogs you would like in your garden as this will determine the area you create.

Use the FrogID app created by the Australian Museum to search for the common frogs in your area. You can then research these species to find what their ideal habitat would be!

Plants

Rushes, sedges and other plants are great to have around your pond for shelter and they will help keep your pond clean and oxygenated.

Native plants are the best for your frog pond as they will attract insects and often require less water than introduced species.

Tips

- Do not use chemicals as frogs are super sensitive.
- Native fish are great to control mosquito larvae.

Above right New Holland honeyeater.

Photo – Ann Storrie

Above left Motorbike frog.

Photo – Jiri Lochman

LANDSCOPE's Kaleidoscope kids exploring nature page is an exciting regular feature for kids.



Scarlet banksia (*Banksia coccinea*)

Banksia coccinea is a member of the family Proteaceae, and is known as the Waddib by the Noongar people of south-west Western Australia. The plant is endemic to WA and grows naturally in shrub and low woodland from Denmark to the Young River in Stokes National Park, and north to the Stirling Range. The honey possum (*Tarsipes rostratus*) is also endemic to the south-west of WA and a totem animal for some of the Noongar traditional owners of the region.

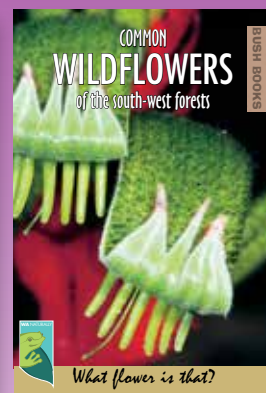
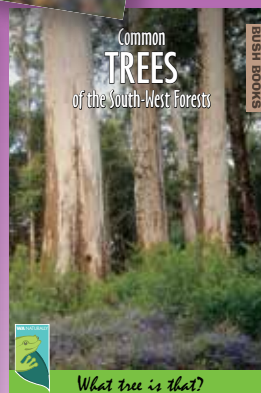
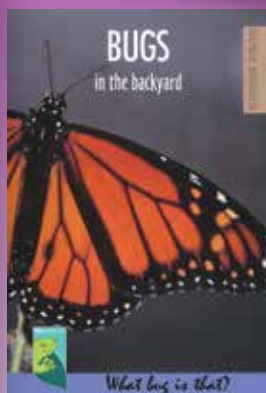
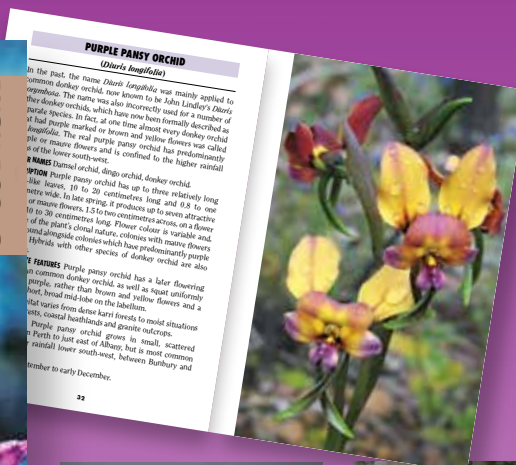
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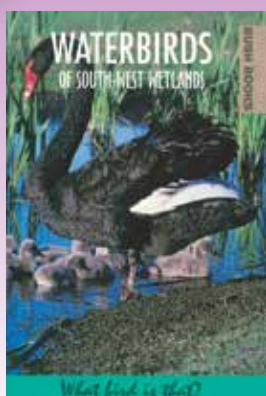


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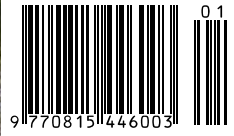
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