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LANDSCOPE

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ON THE COVER

Front cover The brush-tailed mulgara (*Dasyercus blythi*) are carnivorous marsupials that are found throughout Australia's arid centre, including at Matuwa. They are well-equipped for living in Australia's outback – they hunt for large invertebrates and small animals, and can survive on the water they obtain from their food. They are larger than a mouse, with a maximum head and body length of about 220 millimetres and the males are usually larger than females.

Photo – Jiri Lochman

Back cover The stunning colours of the Matuwa encapsulate the essence of the Australian outback.

Photo – Simon Cherriman

Engaging and involving young people in conservation and land management in a State as vast and diverse as ours is essential. Climbing trees, hiking gorges, examining plants and searching for animals develops gross and fine-motor skills, problem-solving skills and a range of other useful attributes. However, these activities also develop a love for the natural environment and an appreciation for why it's important to conserve it, creating conscious, well-informed adult decision-makers.



In 'Lighting the spark: 20 years of *Bush Rangers WA*' (page 12) we look at the outstanding success of a program that is giving young people a multitude of opportunities to experience and enjoy nature through hands-on activities. Since the program's inception, more than 19,000 students have contributed a staggering 2.2 million volunteer hours – a boon for the environment, the community and the cadets themselves.

In this issue we also venture to Yanchep National Park where 5000 adults and children gathered to build cubby houses at an event hosted by DBCA and Nature Play WA (see 'Adventure out; creating memories' on page 40). This event, and others held across our conservation estate, including at Kings Park, the Perth Zoo and on Rottnest Island, encourage members of the community to spend time in our natural areas and enjoy what they have to offer.

But, of course, we don't need large-scale events or programs to engage with nature or make a meaningful contribution – 80 loggerhead turtles that were rescued by members of the public along south-west beaches and released back into the ocean after they were rehabilitated are testament to that (see 'Getting turtles back on track' on page 24). And the natural environment at Matuwa and Two Peoples Bay are benefitting from community engagement programs (see 'Monitoring Matuwa and Kurrara Kurrara' on page 48 and 'Conservation and community connections' on page 43).

I hope you enjoy the read.

Mark Webb, Director General

Department of Biodiversity, Conservation and Attractions

Contributing

Frank Batini joined the Forests Department in 1963 where he led a small team responsible for forest inventory and mapping from aerial photos. He then became involved in researching dieback disease, then agroforestry and hydrology. Following a year at Oxford University, he was seconded to the Premier's Department to examine land use in the Darling Range. He then moved to the Department of Conservation and Land Management to work on abating a range of threatening processes. Since 2001 he has consulted to government agencies, private companies, Indigenous corporations and groups.



Bruce Greatwich is a DBCA operations officer based in Broome. After eight years in the environmental consultancy industry he started with the department in 2016 and has contributed to various nature conservation projects in the West Kimberley District such as threatened flora and fauna surveys, weed control and feral species control. Bruce has a passion for working with vertebrate fauna and in particular birds, and is working towards completing a post-graduate diploma in ornithology at Charles Sturt University.



Saul Cowen is a DBCA research scientist based at the Woodvale Wildlife Research Centre in Perth. Since he began with the department in 2008, he has spent much of his time working on threatened fauna and feral cats in the South Coast Region. After completing his PhD on the genetics of the noisy scrub-bird at Curtin University in 2015, he took up his current role with the Dirk Hartog Island National Park Ecological Restoration Project in July 2017.





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This page White-plumed honeyeater (*Lichenostomus penicillatus*).

Photo – Sallyanne Cousins



Department of **Biodiversity, Conservation and Attractions**

READERS' PICS

Here's a showcase of some of the photos we've received from readers, who have been travelling the State, camera in hand, to capture the beauty of our plants, animals and landscapes.



Left "This picture was taken in Wireless Hill. It looked like a picture of Australia in all her glory." *Lawreen McIver*

Below "This shot of the white heron was taken in June 2017 at Lake Richmond. Lake Richmond is a 40-hectare lake four kilometres from the ocean and four kilometres from the City of Rockingham – a photographer's paradise. Everyday there's another bird to photograph." *Ron Carter*



Above "I found these three male blue-banded bees (*Amegilla cingulata*) roosting on a local grass (*Meeboldina* species) near Albany. The males with five bands and females with four. The males tend to roost on grasses during the night and the females in burrows in the soft soil. These are solitary little bees with the female making a burrow in dried river banks, between bricks or soft sandstone. The end of the tunnel is a cell with one egg and pollen/nectar mixture for larval food. They do tend to be seen more on blue flowers in the home garden." *Michelle Barnes*

Below "Nowadays not many people pay attention to nature. Have a look at these beautiful creatures. There are so many different little details, they are amazing. Please take care of nature and it will amaze you. Don't leave your rubbish on the beaches or anywhere you are, don't kill these creatures! This picture was taken in Jarrahdale forest." *Julia Ivasenko*



Left "We spent some time on Tamala Station recently and came across this mature male Australian bustard, commonly referred to as a bush turkey, displaying. The display finished in a pose with the bird's neck stretching upwards and his bill pointing skywards. He was alone on a saltbush flat, but there were seven other adult bustards in the general area. It is a little unusual to be able to get close to these birds and even more unusual to have one displaying." *David Mell*

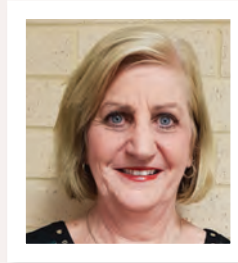
Below left "I was really happy to see this male blue-billed duck (*Oxyura australis*) recently at North Lake (near Bibra Lake) with its mate. It spent a lot of time ducking and diving and generally looking very relaxed while the female was a lot more demure and tended to stay near the rushes." *Christina Curtis*



Right "In September I spent a week at Waychinicup National Park after having been to the Eyre Bird Observatory. I was fortunate enough to photograph many of the species I had hoped to see ... However, a highlight was to capture this shy reared firetail whose bright highlights contrasted with the brown and green surroundings." *Mark Davidson*

Guest column

Carleen Edwards
Bush Rangers WA unit leader, teacher



I have been honoured and privileged to be involved in the *Bush Rangers WA* program from its early beginnings at John Septimus

Roe Anglican Community School. This program has successfully evolved over the past 20 years, going from strength to strength, and has become a shining example of engaging our youth within the community and connecting them to our natural environment.

Our *Bush Rangers* cadets have had the opportunity to be actively involved in the development and implementation of a variety of environmentally focused programs. These help to develop a greater understanding of the natural world and encourage students to be active in efforts to rehabilitate, preserve and maintain our environment not only locally but in the wider community.

Our cadets have enjoyed invaluable opportunities to work with conservation and land management specialists, including at Yanchep National Park and Rottnest Island, and the Friends of Boyup Brook.

This program also provides opportunities for cadets to develop important life skills, such as leadership skills, as they work with the community and other cadets in the program. The camaraderie, respect and support for each other develops with each year a student participates in *Bush Rangers*. It culminates, I believe, in well-rounded, respectful young people who will go onto be positive contributors to our society, step up to leadership roles and who are willing to 'give back' where they can. We often have cadets who offer to return as instructors once they have left school, thereby completing the circle!

At John Septimus Roe Anglican Community School, we also have the *River Ranger* program, which engages younger students. *River Rangers* is also an environment-focused program where cadets develop an understanding of the importance of looking after their environment and how they can make a difference, starting at school and the surrounding bushland.



WA scientist aids eastern states quolls

Above Eastern quolls were translocated from Tasmania to NSW. Photo – Judy Dunlop/DBCA

In April, 20 eastern quolls (*Dasyurus viverrinus*) – a species that has been extinct on mainland Australia since the 1960s, were flown from Tasmania and released into Booderee National Park in New South Wales.

It was the first reintroduction of wild eastern quolls onto the mainland.

Formerly distributed across the New South Wales coast, Victoria and the eastern half of South Australia, eastern quolls declined to extinction after the arrival of the European red fox.

However, in Tasmania eastern quolls remain abundant, foraging in dense forest and venturing into farmland to eat small skinks, mammals and insects.

DBCA research scientist Judy Dunlop assisted with the historic reintroduction by providing advice, assisting with fitting GPS collars and

helping radiotrack the animals to monitor their survival.

Judy was invited to assist due to her previous experience with chuditch and northern quoll ecology in Western Australia as well as her involvement with several mammal reintroduction projects, including the bilby, brushtail possum, golden bandicoot, boodie, and mala releases in the arid zone of WA.

The project is a National Environmental Science Program (NESP) – Threatened Species Recovery Hub collaboration between ANU, Parks Australia, Rewilding Australia, Wreck Bay Aboriginal Community Council (WBACC), Taronga Conservation Society, WWF-Australia, and Quoll Conservation Breeding Program sanctuaries Devils@Cradle and Trowunna Wildlife Sanctuary in Tasmania.

Have you got a fantastic nature photograph you would like to see published in **LANDSCOPE**?

Send it, along with a 100-word description of the species or how and where you took the shot, to landscape@dbca.wa.gov.au.





Mirima National Park

Located on the edge of Kununurra, Mirima National Park is an outdoor museum of rock formations, which has long been culturally significant to the Miriwoong people, and continues to delight visitors today.

Covering more than 2000 hectares, Mirima National Park is on the fringe of Kununurra township. For thousands of years, the area has been significant for the Miriwoong people, who sought shelter from the sun and the wet season rains. Caves located in the park served as ideal places for overnight stays and made Mirima a significant camping area for seasonal movements. Thanks to permanent water sources, Mirima was also an important area for hunting echidnas and kangaroos. People also gathered a variety of plants for bush medicine there. Traditional

Above The expansive ranges of Mirima National Park.

Photo – Andrew McInnes

Above right Visitors are attracted to the park from nearby Kununurra and further abroad.

Photo – Ben Brody/DBCA

tools included shovel head spears (*lamang*) that were launched using spear throwers (*ngawaleng*). The usage of tools is evident in engravings, flakes and stone tool-making sites that are still visible in the park.

NATURAL ATTRACTIONS

The park boasts spectacular rock formations, which were formed from sediments deposited by creeks and windblown sand about 300 million years ago during the Devonian period. This process has created the horizontal layers reminiscent of the Bungle Bungle Range in Purnululu National Park. These formations are protected by a thin layer of black-grey algae and lichens that resist the weathering of the fragile orange sandstone by torrential rains. These rains have also carved out the chasms and valleys that are part of the spectacular landscape.

The park is dominated by spinifex grasslands and woodland savannas, which

feature eucalypts, boabs and yellow-flowered kapok bushes. This environment supports rich birdlife with more than 110 species recorded, including waterbirds that are attracted to the permanent water source of the Ord River irrigation area. Pied butcherbirds and yellow-throated miners are permanent residents of Mirima National Park, as are the stunningly coloured variegated fairy-wrens, red-tailed black cockatoos, red-winged parrots and rainbow lorikeets.

An abundance of frogs occurs in the area but are primarily nocturnal to avoid the heat of the day, so are seldom seen. However, after dusk, the calls of ornate burrowing, long-footed and splendid tree frogs are deafening. The park is also home to a variety of snakes, including the children's, black-headed and olive pythons. A variety of skinks and other lizards also occur there, including the elusive chameleon dragon.



Top The park's spectacular rock formations were formed in the Devonian period.

Above right Horizontal layers are protected by a thin layer of blue-green algae.
Photos – Andrew McInnes

Right The park boasts a range of plants, including the woolbutt.
Photo – Brian Carter

Far right. The ornate burrowing frog is one species that occurs in the park.
Photo – David Bettini

Many of the park's mammals are also nocturnal, so are not often seen during the day. But, short-eared rock wallabies frequent the steep-sided gorges while wallaroos prefer the wider valley floors where they graze on spinifex. Agile wallabies and the northern nailtail wallabies are occasionally seen on the grassy sandplains, while small carnivorous marsupials, such as the long-tailed planigale, Ningbing antechinus and stripe-faced dunnart emerge from under spinifex and rock ledges at night.



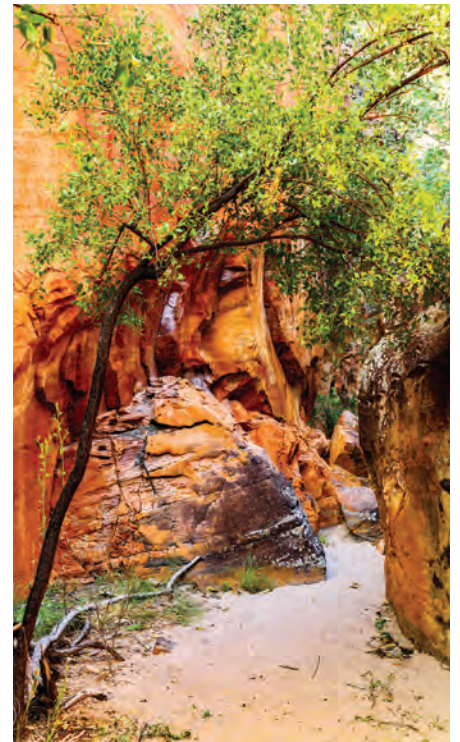
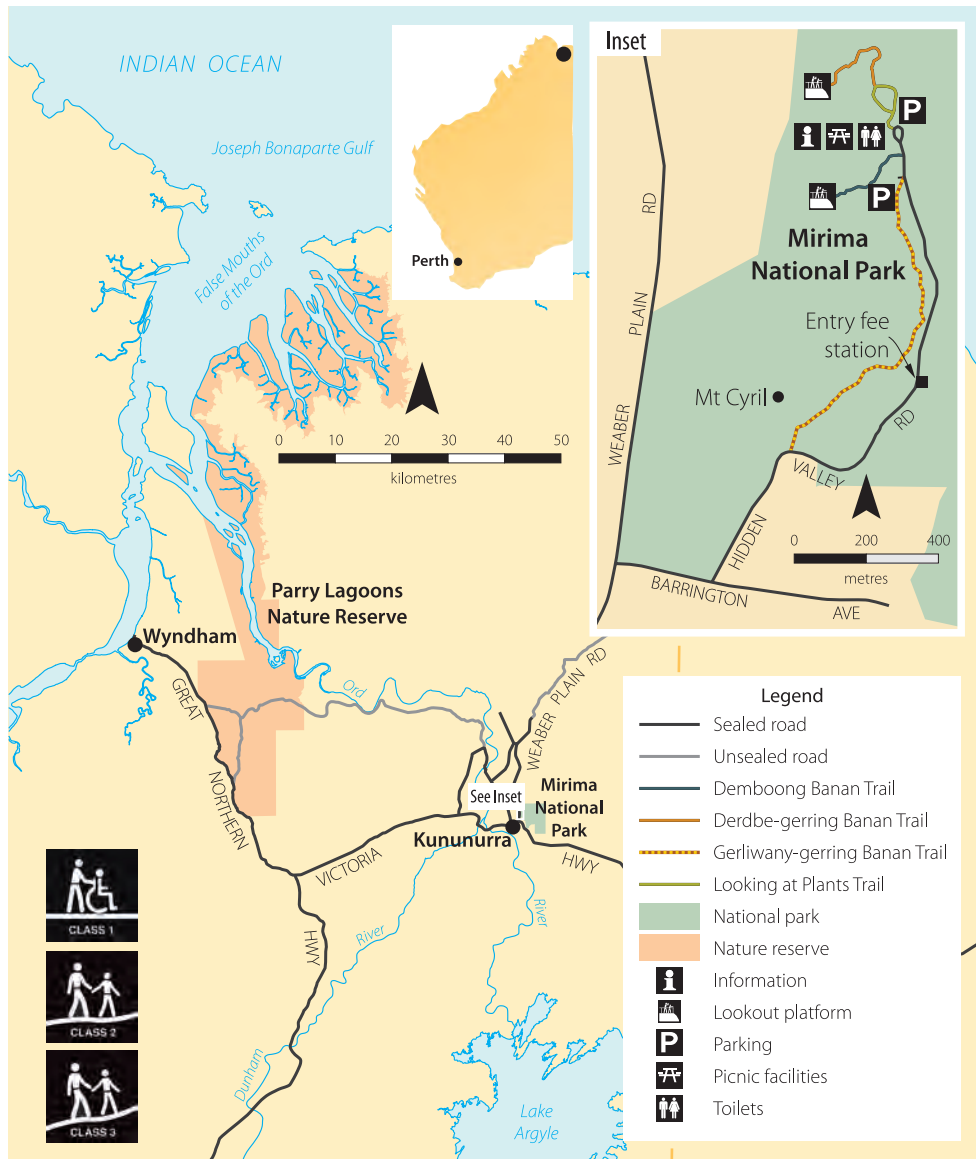
Discover more about Mirima National Park

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



“For thousands of years, the area has been significant for the Miriwoong people, who sought shelter from the sun and the wet season rains in the many caves and rock overhangs.”

Parks for people Mirima National Park



Top Rains have carved out the chasms and valleys that are part of the spectacular landscape.

Photo – Andrew McInnes

Above Interpretation along the walk trails provides visitors with information about the area's natural and cultural history.

Photo – Ben Brody/DBCA

EXPLORING THE PARK

Mirima National Park has several walk trails that lead visitors through the area. The 400-metre Class 1 'Looking at Plants' trail has recently been upgraded to provide wheelchair access on a raised boardwalk and concrete path and includes an environmentally friendly hybrid toilet. The signage along the walk provides information about the plants and how the Miriwoong Aboriginal people used them. Bilingual signage helps maintain the endangered Miriwoong language and keeps it in active use for present and future generations.

Demboong Banan Trail is a Class 3, 500-metre-return walk that journeys through a gap in the range and takes in a spectacular view over Kununurra. The

surface is uneven over rocky and sandy parts, but the view is worth the effort.

For a more challenging experience, the Derdbe-gerring Banan Trail provides an 800-metre journey that leads walkers up steep slopes to a lookout that takes in the Ord Valley and the sandstone range of Mirima. A new staircase and handrails provides improved visitor safety. Those looking for a longer walk can take the Gerliwany-gerring Banan Trail, which takes about an hour and gets its name from the Miriwoong words for "for walking" and "trail". Walkers are encouraged to keep their eyes peeled for wallabies, wallaroos and agile wallabies during the early morning and late afternoon as they traverse this beautiful and ancient landscape.

Do it yourself

Where is it? East of Kununurra, adjacent to the townsite

Total area: 2,068 hectares

Facilities: Picnic tables, toilets, interpretation

What to do: Walking, photography, nature observation

Park entry fees apply: \$13 per vehicle with up to 12 legally seated occupants.

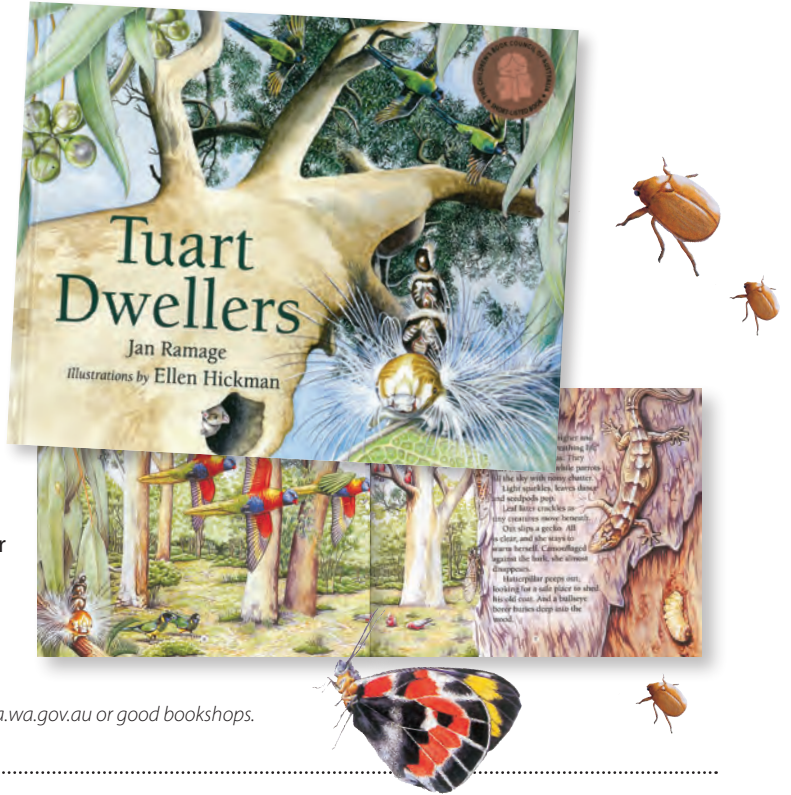
TUART DWELLERS



I think some things are best left to the experts, so I asked my kids to review *Tuart Dwellers* – the stunning children’s book by Jan Ramage. And they loved it. My five-year-old daughter poured over the magnificent illustrations by Ellen Hickman, which are bursting with detail. Every page is packed with charming depictions of the characters of our bush, including the birdlife, insects and reptiles. There’s something to discover on every corner of every page and something new to look at each time you read the book, which is a good thing because the book is sure to become a favourite. Meanwhile, my seven-year-old son hung on the words, reading parts of it himself. He was especially interested in the encyclopedia of information at the back of the book that details the species that are featured in the story and that we’ve seen on our own travels.

This delightful hard-covered book would make an excellent gift or addition to any bookshelf. It is suited to young children who delight in the illustrations and older ones who enjoy learning more about creatures that live in our bush. Its lovely rhythmic flow makes it an enjoyable read for adults too.

Tuart Dwellers has recently been reprinted and is available for \$26.95 from shop.dbca.wa.gov.au or good bookshops.



NATURE PLAY WA



Nature Play WA has taken an ‘if you can’t beat them join them’ approach to technology and has developed a fantastic app to be used to aid and encourage young people to get outdoors. The app features a number of suggested walk trails, which you can download to your phone; information about upcoming Nature Play events; Aboriginal culture; and details about a raft of locations to explore. But, for me, the highlight of the app is a game of ‘Nature Play bingo’ where you look for a range of items such as things that are slimy, creepy crawly and rough. Kids collect photos of the things they’ve found so there’s no need to disturb the environment and tick them off as they go along. This app is a great solution to balancing screen time with time spent outdoors.

The *Nature Play WA* app is available for free from the Apple iTunes store or Google Play Store.



AUSTRALASIAN EAGLES AND EAGLE-LIKE BIRDS



Dr Stephen Debus’s *Australasian eagles and eagle-like birds* is the culmination of more than a decades’ work. What started as a study into wedge-tailed eagles broadened to include eight other species and is now a comprehensive companion to the *Handbook of Australian, New Zealand and Antarctic Birds*. The book describes their distribution, details the species’ population status and the threats they face, and suggests what needs to be done to protect them. There are fascinating descriptions of the birds’ social organisations, voices, breeding habits and diets, and photos illustrate the birds engaging in typical and unusual behaviours.

These features make it an excellent resource for anyone who is interested in birds, including biologists, birdwatchers, wildlife rescuers and carers, raptor rehabilitators and zookeepers.

Australasian eagles and eagle-like birds is 192 pages and is available for \$49.95 from publish.csiro.au.

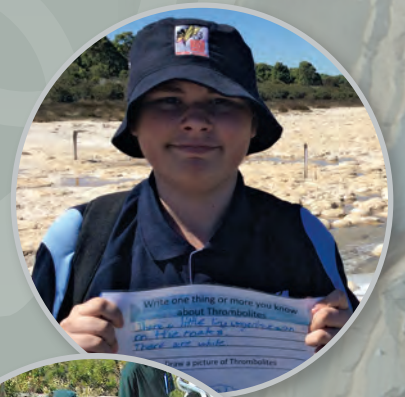


Lighting the spark

20 YEARS of Bush Rangers WA

Twenty years ago *Bush Rangers WA* was launched to give high school students the opportunity to spend time outside while learning about conservation and land management through practical and hands-on activities. Since then, more than 19,000 students have been involved in the program and have volunteered 2.2 million hours, delivering a range of benefits to the community, the natural environment and the cadets themselves.

by Karla Graham





It's 6am and already the camp is buzzing with activity; a group of 60 teenagers are out of bed and preparing for another day outdoors in one of Western Australia's most remote and special places. They've woken up to the sun throwing morning light on the rich-orange cliffs of Cape Range National Park, while the pristine turquoise waters of the Indian Ocean stretch as far as the eye can see to the west. The chorus of bird calls intensifies with each passing minute as, like the *Bush Rangers* cadets, the birds ready themselves for a busy day.

The cadets, aged between 12 and 17 years, spent the previous day building fences around the national park. Today's highlight will be the chance to swim with whale sharks in the clear waters of the Ningaloo Coast World Heritage Area. But first, they are due at the ranger's station by 8am to help Parks and Wildlife Service staff check traps for threatened wildlife as part of a monitoring program.

For many of these cadets, this camp is a once-in-a-lifetime experience. But this camp is just one of the many opportunities that are offered to Western Australia's young people through *Bush Rangers WA* – a community development and environmental education program that recently celebrated its 20th anniversary.

GROWING STRONG

Established in 1998 by the then Department of Conservation and Land Management (CALM) and Office of Youth Affairs, *Bush Rangers WA* joined the ranks of Army Cadets, Emergency Services Cadets and Police Rangers as part of the wider Cadets WA program, which today is coordinated by the Department of Communities. The program set out with a simple aim: to empower young people to play an active role in conservation through practical and hands-on experiences in the environment. Students meet regularly at their schools and also have the opportunity to attend camps, where they complete tasks such as planting, fencing and weeding. But it's not all hard work; cadets have the chance to take part in a range of adventurous





Discover more about
Bush Rangers WA



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

activities including abseiling, swimming with whale sharks and rock climbing.

The first school to officially join the program was John Septimus Roe Anglican Community School in Mirrabooka. Set up by the ever-passionate Carleen Edwards, the unit fast became popular with students. Carleen has continued to lead the unit and was also a pioneer for the *River Rangers* and Emergency Services cadets programs at the school (see also 'Bush telegraph' on page 6–7). Later that year, Mount Lawley Senior High School's chaplain Andrew Paul set up a unit that has become one of the biggest *Bush Rangers* units in the State, with 175 students enrolled, and a waiting list for others to join.

The program expanded quickly to other schools and gained support from school and community groups, local councils and department offices throughout the State. In fact, in the 20 years following the program's inception, more than 19,000 people have taken part, together contributing over

Previous page (all)
Bush Rangers cadets have the opportunity to take part in a range of activities.
Photos – DBCA

Above left Cadet units are located throughout the State and visit some of WA's most spectacular areas.
Photo – Mount Lawley Senior High School

Above Cadets learn about WA's plants and animals through hands-on experiences.
Photo – DBCA

2.2 million volunteer hours to conservation and community projects. And today, a staggering 3273 secondary school students, from 67 units spanning from Kununurra to Esperance, are taking part in and benefiting from the program.

WINNING BACK WILDLIFE

A key focus for the program has been to build young peoples' appreciation of, and love for, WA's natural environment. The *Bush Rangers* program has been developed in conjunction with *Western Shield*, the department's wildlife recovery program, to expose students to real-world conservation projects and to help combat the threat of introduced predators on native animals.

Last year, 15 *Bush Rangers* cadets played a crucial role in reintroducing black-flanked rock wallabies to Kalbarri National



Park. Kalbarri District High School *Bush Rangers* cadets helped carry the rock wallabies down into the park's rocky gorges in their backpacks and helped Parks and Wildlife Service staff radio-track them over the following weeks. Black-flanked rock wallabies were believed to be locally extinct until one was spotted in the park in 2015, so animals were translocated from Wheatbelt reserves to bolster the tiny local population.

These kinds of up-close interactions with WA's most threatened animals give meaning to the concepts of conservation that young people learn about in classrooms. For 14-year-old Brearley, carrying the wallabies safely into the gorges in a simulated pouch was an "inspirational experience".

Kalbarri National Park senior ranger Mike Paxman, who has worked with the local cadet unit since he moved to Kalbarri in 1999, said the benefits of the *Bush Rangers* program were multi-dimensional.

"On the one hand, experiences like these help the students understand the importance of fauna monitoring and habitat protection, and they see first-hand the impact of introduced species," he said.

"But the activities also light a spark in the cadets where they develop a genuine affinity for their local natural environment

and a passion for conservation that will hopefully stay with them forever."

CARING FOR COUNTRY

One of the program's greatest strengths has been its expansion into remote and regional areas. This has provided opportunities for Aboriginal students to gain practical nature conservation skills, which they are able to combine with their traditional knowledge to care for Country. In fact, 28 per cent of cadets are Aboriginal and *Bush Rangers WA* has the highest participation rate for Aboriginal students of any of the Cadets WA programs.

According to Wiluna Remote Community School's former cadet unit leader Debbie Kiwi, when it comes to working on Martu Country, the students become the teachers.

"They just blossom; because they are hosting. They're proud of their Country. They're proud to teach us everything. They giggle and laugh at us because we don't know a lot of stuff ... but it's a pleasure to them to actually teach us."

For some *Bush Rangers* cadets, the program becomes the foundation for careers in conservation and land management, and a number of cadets have gone on to work for government departments and other organisations dedicated to caring for WA's environment.

Top left *Bush Rangers* was a finalist in the 2008 Premier's Awards. Then coordinator Alison Hansen (left) and Strategic Development and Corporate Affairs Director and program pioneer Ron Kawalilak received a certificate from then Environment Minister Donna Faragher.

Top centre Senior ranger Mike Paxman with Kalbarri District High School cadets, preparing to translocate rock wallabies into Four Ways Gorge in Kalbarri National Park.

Above left Students from John Septimus Roe Anglican Community School at the launch of the program in 1998.

Above More than 19,000 students have taken part in the program since its inception.
Photos - DBCA

Last year, Kalumburu Remote Community School celebrated its first graduate who went on to secure a trainee ranger position with the Wunambal Gaambera Rangers in the far north Kimberley.

Parks and Wildlife Service operations manager Chris Stewart's interest in the natural environment was nurtured during his time as a cadet at Rossmoyne Senior High School. Chris now works to ensure operational work is delivered across the 800 reserves in the Wheatbelt and assists with burning, landscape conservation and recreation projects. Chris said the

★ **Bush Rangers cadet units**

"What I love most about the *Bush Rangers* program is the outdoor component; getting out on Country, especially living in the Kimberley we get to experience things that you'd never get to do in the city ... I couldn't think of a better place to do it ... That freedom to go out and care for something that you don't get in a normal school program."
Grant Capes, unit leader, Fitzroy Valley District High School

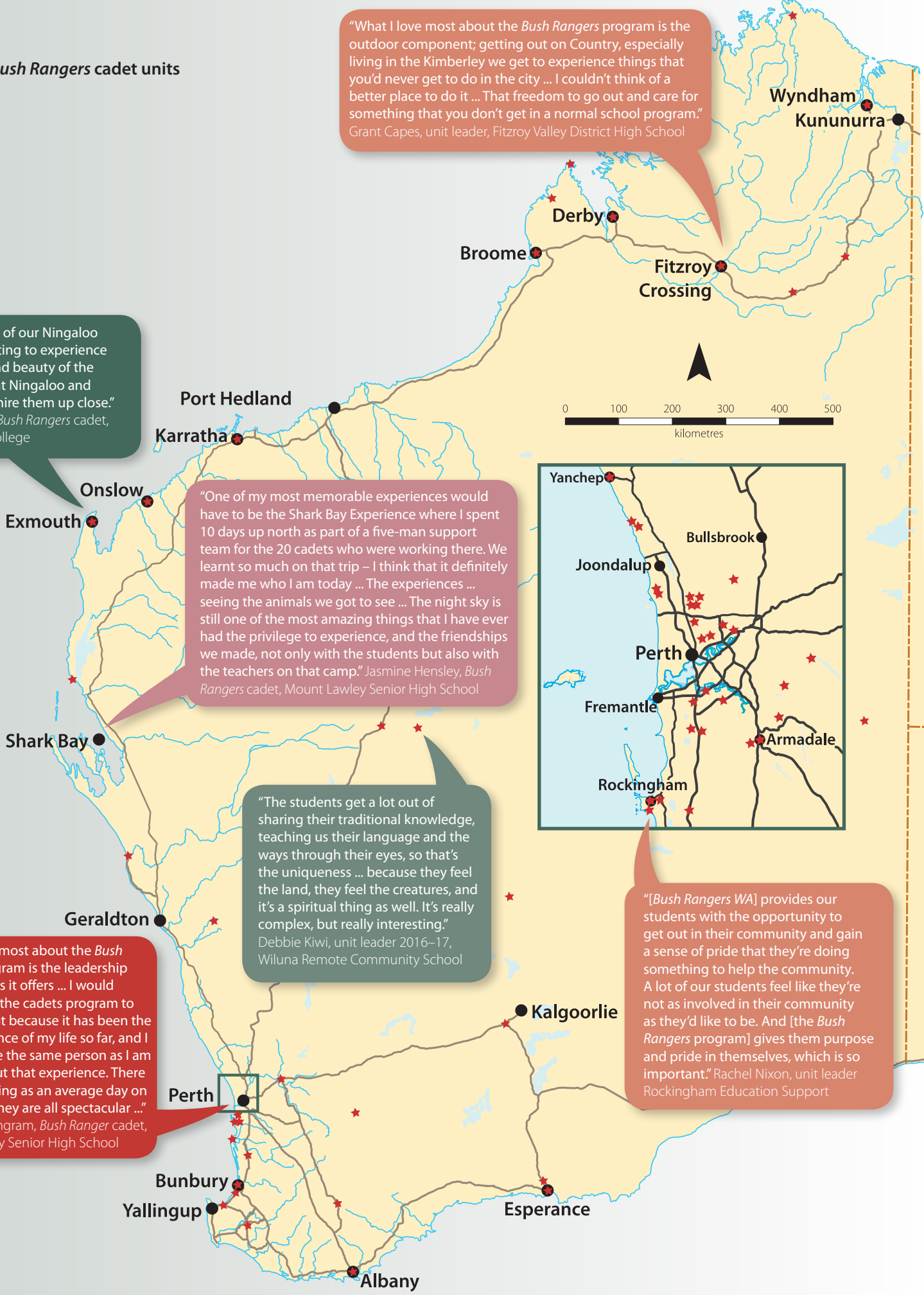
"The highlight of our Ningaloo camp was getting to experience the wonder and beauty of the whale sharks at Ningaloo and getting to admire them up close."
Abigail Smith, *Bush Rangers* cadet, John Tonkin College

"One of my most memorable experiences would have to be the Shark Bay Experience where I spent 10 days up north as part of a five-man support team for the 20 cadets who were working there. We learnt so much on that trip – I think that it definitely made me who I am today ... The experiences ... seeing the animals we got to see ... The night sky is still one of the most amazing things that I have ever had the privilege to experience, and the friendships we made, not only with the students but also with the teachers on that camp."
Jasmine Hensley, *Bush Rangers* cadet, Mount Lawley Senior High School

"The students get a lot out of sharing their traditional knowledge, teaching us their language and the ways through their eyes, so that's the uniqueness ... because they feel the land, they feel the creatures, and it's a spiritual thing as well. It's really complex, but really interesting."
Debbie Kiwi, unit leader 2016–17, Wiluna Remote Community School

"What I love most about the *Bush Rangers* program is the leadership opportunities it offers ... I would recommend the cadets program to every student because it has been the best experience of my life so far, and I would not be the same person as I am today without that experience. There is no such thing as an average day on our camps; they are all spectacular ..."
Ethan Betts-Ingram, *Bush Ranger* cadet, Mount Lawley Senior High School

"[*Bush Rangers* WA] provides our students with the opportunity to get out in their community and gain a sense of pride that they're doing something to help the community. A lot of our students feel like they're not as involved in their community as they'd like to be. And [the *Bush Rangers* program] gives them purpose and pride in themselves, which is so important."
Rachel Nixon, unit leader, Rockingham Education Support





Above left The *Bush Rangers* program offers a range of opportunities to students of all ages and abilities.

Above Unit leaders exploring Rio Tinto Naturescape Kings Park during their annual conference.
Photos – DBCA

opportunities he had through the *Bush Rangers* program helped him understand the department's role and gave him the opportunity to visit regional areas and meet department staff.

For Tina Bowers, her hands-on connection to the *Bush Rangers* program didn't end when she left school. Tina attended John Septimus Roe Anglican Community School and returned as a unit instructor after she finished school. Tina went on to complete a Bachelor of Science in Biological Sciences from Edith Cowan University before joining the former Swan River Trust as a graduate Indigenous officer under the Riverbank program. Tina is now a DBCA project officer and works on the department's *Reconciliation Action Plan*. Tina says she draws on the leadership skills and confidence that she gained through the program in her work.

ACCESS FOR ALL

Another key strength of the program is the way it provides for the 28 per cent of cadets who have a disability. The *Bush Rangers* program offers tailored experiences for students with a range of abilities to give them, and their carers, the opportunity to visit natural areas, take part in hands-on nature-based activities throughout the State and learn new skills.

For the 60 students who make up the Rockingham Education Support School *Bush Rangers* unit and have varying disabilities, the program gives them the chance to spend time outside, get involved in their local community and learn about the environment.

Unit leader Rachel Nixon said for some students, taking part in activities represented an enormous milestone.

"We had one student who had an intense fear of water, but managed to walk over a boardwalk at Lake Clifton to view ancient stromatolites, while another student saw a cuttlefish on a beach for the first time and learnt what it was. By the end of the year, this student was able to explain the difference between microplastics and large plastics, and the often-fatal impact of microplastics being ingested by marine creatures," she said.

An overnight bush camp near Nannup was monumental for one student who, while looking at the moon through a telescope for the first time, spoke her first-ever words outside her home. These case studies epitomise the *Bush Rangers* program's aim of how the simple act of spending time in nature and exploring its wonder can have lasting effects on people of all ages, backgrounds and abilities.

IT TAKES A VILLAGE

The program's emphasis on volunteering and community involvement is at the heart of its success and it simply could not operate without the dedication of the teachers who run it. In 2017, 350 school teachers who led the 67 cadet units gave more than 52,000 hours of time to the program, most of it voluntary and in addition to their normal teaching or assisting duties at school.

Meanwhile, the 3273 cadets together contributed 320,000 hours, of which 43,000 was spent on community service projects that ranged from revegetation to rubbish collection. Many of these projects deliver tangible benefits to the community. However, the benefits of the program extend well beyond what

you can measure. The opportunities that the cadets are given will, in many cases, stay with them for their lifetime. Some cadets will go on to pursue a career in conservation and work to protect the natural environment, while others will simply have a greater appreciation for our plants and animals. Meanwhile, some cadets will acquire practical skills that may assist with their employment opportunities, while others may just get a sense of satisfaction from pushing themselves outside of their comfort zone, thereby improving self-confidence. The benefits of the program are undeniable, and the future of WA's natural environment is sure to be brighter because of it.

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KIMBERLEY GEMS:
purple-crowned
fairy-wrens

by Bruce Greatwich, Tracy Sonneman
and Allan Burbidge



A survey to detect numbers of purple-crowned fairy-wrens has given cause for optimism that the population of this enigmatic and attractive little bird is increasing. And, thanks to a collaboration between DBCA, World Wildlife Fund and traditional owners, their future is looking brighter than ever.



The humidity is high and, even though it's only mid-morning, everyone is sweating profusely. We are stumbling over rocks and a tangle of roots, pushing through soft sand and thrusting our way past the serrated and spiky leaves of various plants adjacent to a slowly flowing stream fringed with dense pandanus plants. We strain to hear over the cacophony of bird calls. Then, as we push forward, an explosion of noise comes as something large splashes into the water and we immediately jump backwards; another unseen freshwater crocodile that had been basking in the sun makes a dash for the water. We push on, further upstream. In the distance we hear a faint but clear rollicking *tcheip-tcheip-tcheip-tcheip-tcheip*. Our hearts race as we continue forward and the call grows louder – it is the unmistakable song of the purple-crowned fairy-wren (*Malurus coronatus*).

A FIRST ENCOUNTER

Soon, the female purple-crowned fairy-wren spots us – intruders in her habitat – and she advances to check us out. She is small – just 10 grams – and has white and cinnamon colours, a long tail strikingly deep turquoise blue, steely grey cap and deep chestnut ear patches. We are

in the heart of her territory, which she will fearlessly defend, and she's determined to let us know it with her terse *tcheip-tcheip-tcheip-tcheip-tcheip*! Soon, another female joins her, then another, and another. Then, the real star of the show arrives – the breeding male. We watch in awe as the sunlight illuminates his brilliantly bright lilac-purple crown, which is contrasted by a black stripe through his eye and along the back of his neck. The group flits among the lime green pandanus leaves this species relies so heavily on. Barely staying still for even a second, the birds approach us to within a metre and dance around us. Our disturbance is temporary; after we observe and count all the individuals present, we push on in search of the next family group of these enigmatic birds.

Back at Silent Grove campsite in King Leopold Ranges Conservation Park, the group of researchers – made up of ornithologists, DBCA nature conservation staff and traditional owners – excitedly discuss the day's events. For some of us, today has been our first unforgettable encounter with a purple-crowned fairy-wren. We enjoy a well-earned cold drink and rest our weary feet around the campfire, dwarfed by the 300 million-year-old King Leopold Ranges.

We will do it all again tomorrow, as we did the day before – walking up to 10 kilometres a day through the densely vegetated streamside habitat this species calls home. Despite the hard work, we know it will be worth it, as this multifaceted team has one thing in common: a passion for the conservation of this threatened species in the face of ever-increasing threats.

Left Purple-crowned fairy-wren.
Photo – David Bettini

Inset above Female purple-crowned fairy-wren with nest.
Photo – Bruce Greatwich/DBCA

PRECIOUS GEM

The western subspecies of the purple-crowned fairy-wren (*Malurus coronatus coronatus*) is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Endangered under the Western Australian *Wildlife Conservation Act 1950*. It is restricted to the Kimberley region and the Victoria River system in the Northern Territory, with a total estimated population of 7000 breeding individuals in the Kimberley region. The species is strictly confined to riparian habitat (vegetation directly associated with creeks and rivers), which is threatened by degradation by feral herbivores and intense bushfires. Programs already carried out in the Kimberley, together with those planned for the future, aim to address these threats through improved fire management practices and the removal of cattle and other feral animals such as donkeys and pigs.

SEARCHING FOR SCIENCE

Previous surveys have shown that a population of purple-crowned fairy-wrens, estimated at possibly less than 100 individuals, occurred within King Leopold Ranges Conservation Park along Bell Creek and Isdell River. However, the actual population size and distribution of individuals along the rivers was unknown. We implemented a targeted survey for the species, aiming to gather better data on the numbers and distribution of individuals in this catchment population. This information will assist with evaluating past management actions, and informing future decisions. The targeted survey was completed thanks to a strong collaboration between field staff from DBCA's West Kimberley District and Perth-based science staff who worked with traditional owners and the World Wildlife Fund.

The northern half of King Leopold Ranges Conservation Park sits within the Wanjina – Wunggurr Wilinggin native title area, Country that still has strong cultural ties for the traditional owners. The survey was undertaken with assistance from Wunggurr rangers and Wilinggin



Above The group camped under the stars while conducting surveys in remote areas of King Leopold Ranges Conservation Park. Photo – Bruce Greatwich/DBCA

Aboriginal Corporation staff members as a capacity-building project. These team members provided valuable cultural insight, such as pointing out dragon trees (*Sesbania formosa*) and identifying their medicinal uses. Through the program, the traditional owners gained the skills and experience to survey for purple-crowned fairy-wrens in other areas of their Country.

The group carried out the survey by walking along the riparian zone until they encountered likely purple-crowned fairy-wren habitat. Within the Isdell River catchment (which includes Bell Creek and Isdell River), the species occurs in areas of dense pandanus (*Pandanus aquaticus*) and cane grass (*Mnesithea rottboellioides*). Where this habitat was encountered, a call playback survey was completed by broadcasting a recording of the purple-crowned fairy-wren call to illicit a vocal or visual response. Approval was obtained from the department's Animal Ethics Committee to undertake call playback surveys, a method that isn't encouraged outside of licensed research and monitoring



due to possible disturbance to the species.

Much of the Kimberley is inaccessible by vehicle, so helicopters are the only means of travelling to large areas of remote country. As part of this project, they were used to survey remote sections on the lower Isdell River and for deployment and collection of staff who hiked upstream along remote parts of the Isdell River over a four-day period.

THE RESULTS ARE IN

More than 92 kilometres of riparian habitat was surveyed on foot, with numerous blisters collected along the way. A total of 499 call playback surveys were carried out, and purple-crowned fairy-wrens were observed at 69 of these sites. From the 69 sites, or 14 per cent, 170 individual birds were recorded; 107 from Isdell River and 63 from Bell Creek. These results have significantly improved the level of knowledge about the purple-crowned



“While caution should be applied in determining a trend, it would suggest the population has been stable and may have increased in the last 10 years.”

Above Helicopters were used to access remote areas of the survey site.
Photo – Allan Burbidge/DBCA

Above right Bowerbirds are also known to occur in the area.
Photo – Karen Bettink/DBCA

Right Unmanaged cattle degrade riparian habitat.
Photo – Bruce Greatwich/DBCA

fairy-wren within King Leopold Ranges Conservation Park and more broadly for the Isdell River catchment population. Previous population estimates provided for the Isdell River catchment by Anja Skroblin, who conducted field surveys as part of a PhD project on the species across the Kimberley (from 2007 to 2009), suggested an Isdell River catchment population of 85 to 147 individuals. It is therefore highly encouraging that 170 individuals were recorded within the conservation park alone.

The actual population located within the conservation park is likely to be higher, given not all areas of suitable riparian habitat were surveyed. A comparison of population trends can be made with surveys conducted in 2007 along Bell Creek, where approximately 17.5 kilometres of riparian habitat was surveyed and repeated during this project. In 2007, nine family groups consisting of

21 individuals were recorded. But in the current survey we saw 12 family groups and 31 individuals along this same stretch of habitat. While caution should be applied in determining a trend, it would suggest the population has been stable and may have increased in the last 10 years.

WHAT IT ALL MEANS

For the past decade, a greater focus has been made on landscape-scale approaches to managing bushfires across the Kimberley. Traditional Aboriginal burning methods, which consisted of many early dry season bushfires (March to July), reduced the fuel load and prevented landscape-scale damaging, late dry season bushfires. The cessation of Aboriginal burning methods following European settlement shifted the fire regime in the Kimberley, with less early dry season bushfires and more damaging late dry season bushfires (August to December).

Prescribed burning implemented in recent years aims to replicate traditional burning regimes.

To achieve this, aircraft are used to drop capsules that ignite upon landing. With a strategic approach, a mosaic pattern of burnt and unburnt country results, meaning each late dry-season bushfire will be restricted to a smaller area and ideally extinguish itself once it hits prescribed burn areas achieved early in the dry season. Reducing late dry season bushfires is critical for the survival of the purple-crowned fairy-wren. The riparian habitat where the species lives can be highly flammable under certain conditions. And, as they are small and have a

Right Traditional owners played an important role in the survey and enjoyed the opportunity to reconnect with Country. Here, Sherwin Nulgit and Bruce Greatwich conduct a call playback survey in typical purple-crowned fairy-wren habitat.

Below Singing purple-crowned fairy-wren.
 Photos – Karen Bettink/DBCA



relatively poor flight capability, the species has limited dispersal potential.

Feral herbivores such as unmanaged cattle, donkeys and feral pigs also degrade riparian habitat. Soil substrate becomes weakened through trampling and digging, resulting in pandanus washing away during wet season floods. Grasses such as cane grass are eaten, leaving exposed riverbanks, reducing the amount of available habitat. Increased funding during the past five years led to more than 8000 unmanaged cattle, donkeys and pigs being removed from King Leopold Ranges Conservation Park through a combination of mustering, fencing and aerial culling.

Threat management programs undertaken by DBCA include a monitoring and evaluation program to ascertain the effectiveness of feral herbivore, weed and fire management. Monitoring of threatened and iconic small mammals across the Kimberley during the past six years has demonstrated a robust trend of increased mammal species abundance and stability, correlated with increased patchy early dry season burning and reduced impacts from feral herbivores. These results, together with the positive results from this survey, suggest the investment in fire and feral animal management strategies is now paying dividends for mammals, purple-crowned fairy-wrens and biodiversity in general within King Leopold Ranges Conservation Park and more broadly across the Kimberley.

LOOKING FORWARD

We are now transitioning into a new phase of management in the Kimberley. During the past few years, an unprecedented level of funding was invested for the creation of marine and

terrestrial parks, making a real difference in protecting the region’s incredible natural landscapes and diversity by managing the key threats of bushfires, introduced animals and weeds.

Ten Indigenous Land Use Agreements have been entered into in recent years, resulting in joint management with nine traditional owner groups over terrestrial and marine parks across the Kimberley region. This has resulted in direct employment and fee-for-service opportunities for traditional owner groups, managing and protecting their traditional country which holds great cultural and natural value. DBCA is now continuing to work with its joint management partners across the Kimberley to protect the area’s precious biodiversity assets, including purple-crowned fairy-wrens, and to ensure the longevity of nature conservation initiatives and a better way for management into the future.

Johnny Divilli, a young Wilonggin man and DBCA employee reflects on his role in the surveys and what it means for his Country:

“It’s really good to go out and see how many fairy-wrens are left on our Country. This helps us know they are safe, as they are important in looking after Country as part of our culture and lore. We really enjoyed walking the long distances looking for the fairy-wrens, we don’t often do this anymore but it helps us reconnect and spend time on our land. By walking and spending time on Country, we see things we don’t usually see when driving around all the time. The purple-crowned fairy-wren isn’t a culturally significant species, but it was good to learn about it and how to look for it and why it is endangered. We can now work together to help protect it.”



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Australia, New Guinea and some nearby islands are home to the vast majority of living marsupials, a group of mammals that separated from other mammals in the Mesozoic, about 160 million years ago. Elsewhere, marsupials are only known from the Americas, although fossils have been found in Asia and Europe. Many Australian marsupials have become iconic and are much-loved symbols of our nation. Sadly, many are imperilled by land clearing and threats from introduced predators.

One of the most distinctive (and perhaps cute) marsupial groups comprises the bandicoots and bilbies which are classified in their own order, the Peramelemorphia. They have long ears and snout, and enlarged front legs. There are only about 22 living species of bandicoots and they are only found in the Australo-Papuan region. Their size and relatively placid nature has made them vulnerable to land-clearing and introduced predators such as feral cats and foxes, and many species now have a greatly restricted range. Even worse, several others are now extinct. Much work is being done to conserve bilbies and bandicoots, through programs such as *Western Shield*, but a robust species-level taxonomic framework is required to bolster efforts.

A recent scientific publication by Dr Kenny Travouillon from the Western Australian Museum and Dr Matthew Phillips from the Queensland University of Technology in the journal *Zootaxa* examined the taxonomy of bandicoots and bilbies by comparing features and using DNA data. They examined a wide array of species, including all modern species and several extinct species known only from fossils. They found that the bilbies (*Macrotis* spp.) and the pig-footed bandicoot (*Chaeropus ecaudatus*) formed a distinct group, which corroborates previous research as members of two separate families, Thylacomyidae and Chaeropodidae, respectively. The four genera of Papuan bandicoots also formed a distinct group, and this in turn was the sister-group to the Australian *Isoodon* and *Perameles*.

They delved deeper into the status of the quenda, which is endemic to south-western Australia. It has usually been considered as a subspecies known as *Isoodon obesulus fusciventer*, with the other subspecies found in south-eastern Australia. However, Kenny and Matthew raised it to a full species, finding consistent differences in the shape of some of the teeth and some previously published molecular data. This species is now known as *Isoodon fusciventer*.

They then turned their attention to the other genus, *Perameles*. Previous classifications recognised only a few modern species, including the long-nosed bandicoot (*P. nasuta*) from eastern Australia, the eastern barred bandicoot (*P. gunnii*) from south-eastern Australia, the western barred bandicoot (*P. bougainville*) from WA, and the extinct desert bandicoot (*P. eremiana*) from central Australia. Their study found that the taxonomic situation is more complex than this classification depicts. The south-western populations of the western barred bandicoot were found to be quite distinct from other populations, which they recognised as a distinct species. This species was last recorded in 1907 and is only known from old museum specimens and sub-fossil material. Following the international rules for classifying species, the oldest name, *Perameles myosuroides*, has been applied to this species.

They then found something truly remarkable – a species that had not been previously recognised. Among various museum collections were several skins and skulls that did not fit definitions of any of the named species. The rump was adorned with conspicuous butterfly-shaped stripes which provided the inspiration for the scientific name they selected, *Perameles papillon*. All of the museum specimens came from the Nullarbor Plain, and the species hasn't been seen alive since 1928.



Discovering marsupials

Above A western barred bandicoot.
Photo – Jiri Lochman

These exciting discoveries help paint a more detailed picture of the wonderful diversity of Australia's native mammal fauna prior to European settlement. But, more poignantly, they highlight what we have lost.

We already knew that several species of *Perameles* became extinct during the 19th and early 20th century, and the addition of *Perameles papillon* and *Perameles myosuroides* to this list is even sadder. The only species of the *Perameles bougainville* group that survived the onslaught of introduced predators such as foxes and cats, land clearing and altered fire regimes, was the western barred bandicoot on two Western Australian off-shore islands. Attempts to introduce the western barred bandicoot into feral-free habitats will help establish further populations.

It's clear that without access to the rich resources that are available in museums and their collections, the new species would never have been discovered. While it's sad to learn of the demise of *Perameles papillon*, it is a sobering reminder that we must treasure what we have while it is here, and protect biodiversity for future generations.



Getting turtles BACK ON TRACK

Thirty-two loggerhead turtles that fell off course last year and were rescued on south-west beaches have been relocated to the State's north-west. They have begun a journey that is being followed by the dedicated team who worked to ensure their safe return to the ocean.

by Rhianna King

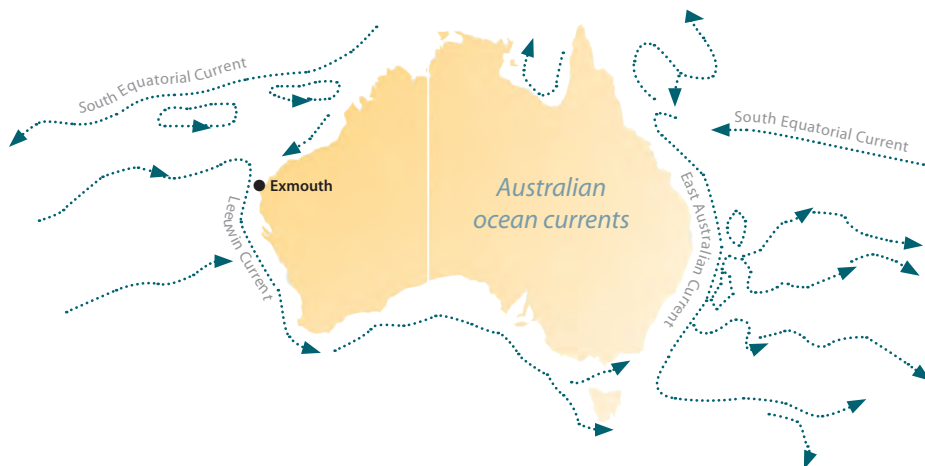


In 2017 a high number of juvenile turtles were found along WA's south-west beaches, having been pushed out of the Leeuwin current – the warm ocean current that flows south along the west coast. It is not uncommon for juvenile turtles to lose their way when the Leeuwin current meets the opposing current that runs along the southern part of Australia in summer. But storm activity last year, combined with an increased vigilance by members of the public who reported them, resulted in a higher-than-normal number of juvenile loggerhead turtles being rescued on WA beaches – 80 in total. Like those that presented before them, the animals found in 2017 were in poor condition. Some were missing flippers; others suffering from disease; and, in most cases, they were suffering from exhaustion. Almost all the turtles also presented with what's known as 'cold-water stunning', caused by the drop in temperature of the waters outside the Leeuwin current.

RESCUE OPERATION

The beached turtles have the south-west community to thank for their rescue. Beach goers found the turtles on beaches and reported them to Parks and Wildlife Service or local wildlife carers. Typically, once Parks and Wildlife Service receives a report of a sick or injured turtle through the Wildcare Helpline, wildlife officers pick up the animal and transport it to Perth Zoo, where vets assess it for its health and rehabilitation potential. Those believed to be capable of recovering are then sent to an appropriate rehabilitation centre. In this case, the turtles were sent to AQWA in Perth and the Dolphin Discovery Centre in Bunbury where they were quarantined and treated for their ailments. They spent the next few months in the specialist facilities at the centres where they were rehabilitated before being considered fit and healthy enough to be released.

The juvenile turtles rehabilitated in 2017 were found during a two-month period from mid-July. Forty-six were assessed by Perth Zoo of which 38 were rehabilitated. Upon release, these animals



ranged in weight from 1.040 to 2.365 kilograms, and in length, from 17 to 24 centimetres, and were about 10 months old.

BACK TO THE SEA

Thirty-two of the 38 loggerhead turtles were considered fit enough to return to the ocean in April 2018 (the others will hopefully be released later), so Parks and Wildlife Service wildlife officers, scientists and regional staff, and Perth Zoo vets began the involved and intricate process of planning the turtles' journey north for their release near Exmouth.

Before they were released, 14 of the turtles were fitted with radio-trackers, so their progress and whereabouts could be monitored. It is hoped this will help shed some light on the 'lost years' – the period from when turtles hatch to when they reappear to nest up to 15 years later (see also 'Tracking tides of turtles', *LANDSCOPE*, Autumn 2016). As well as being useful for scientists, these data can also be accessed by interested members

Previous page

Main Eighty turtles were rescued in 2017 and assessed through Perth Zoo.

Photo – Jan Tierney

Background Thirty-two juvenile turtles were released off Exmouth in April.

Photo – Peter Nicholas/DBCA

Inset left The turtles were fitted with radio-trackers before they were released.

Inset right Members of the local community, including students from Exmouth District High School, had the opportunity to view the turtles up-close.

Above Adhesive was used to secure the radio-trackers.

Photos – Jan Tierney

of the public through www.seaturtle.org and any sponsorship funds raised through the website are distributed back to care facilities.

On 11 and 12 April, after months of rehabilitation and planning, the turtles were loaded into specially designed containers and carefully placed in the cargo hold of a



Above The turtles were flown from Perth to Exmouth, in specially designed containers, courtesy of QANTAS.

Photo – Corrine Douglas/DBCA

Above right Radio-trackers will provide information about the turtles' movements.

Photo – Dani Rob/DBCA

Right The turtles can be followed at www.seaturtle.org.

Below right Loggerhead turtles come to the beach to nest.

Photo – Triston Simpson

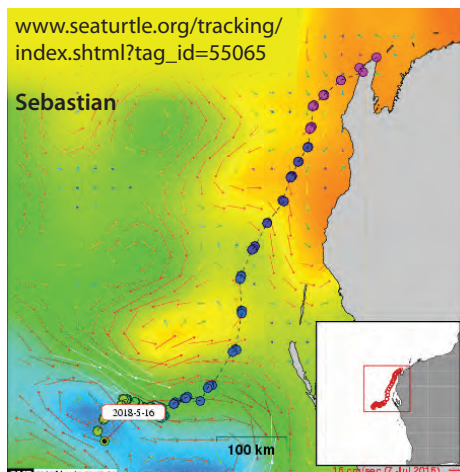
plane and flown, courtesy of QANTAS, from Perth to Exmouth. The release of the turtles generated a buzz around Exmouth, and Parks and Wildlife Service staff took the opportunity to visit Exmouth District High School to talk to the students about the health of our ocean and in particular the threat of plastics to our marine creatures.

At 10am on 12 April, officers of Parks and Wildlife Service, Bunbury Dolphin Discovery Centre and AQWA; Exmouth vet Jane Giliam; Ningaloo Turtle Program volunteers; and Exmouth District High School students and teacher boarded *Mahi Mahi* – Exmouth Dive Centre's whale shark vessel – with the turtles. They travelled 20 nautical miles offshore, where the deeper water provided the turtles the best chance for survival. The conditions were not great – a 2.2-metre swell with 18 knot south-easterly winds made moving around the boat difficult and impacted visibility in the water. Despite this, one after the other,



Discover more about the release

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



the turtles were held in the water for a moment so they could orientate themselves and then released to swim away, much to the elation of those on board the boat.

A FIGHTING CHANCE

The life of a turtle is fraught with dangerous challenges. Only one in every 1000 hatchlings will ever reach adulthood, but the 32 juveniles who were destined for a certain death now have a second chance at life and an opportunity to contribute to future generations of turtles. The data collected through programs such as this provides much-needed insight into their lives, so we can better understand their biology, and more efficiently and effectively protect them. And, with the continued support of, and interest from, the community, especially those who find and report turtles that have washed ashore, and the dedicated volunteers who help to rehabilitate them, WA's precious turtles may have a brighter future.

Loggerhead turtles

Loggerhead turtles (*Caretta caretta*) are one of six species of marine turtles that can be found in WA waters. The species is listed as Critically Endangered under the *Biodiversity Conservation Act 2016* and ranks, along with olive ridley and leatherback turtles.

It is estimated that between 1500 and 2000 female loggerheads nest in WA each year, predominately in a narrow band in the approximately 400 kilometres between Dirk Hartog Island and the Muiron Islands. Females nest between November and February and lay clutches of between 100 and 150 eggs. Females do not necessarily nest each year and often skip several years before returning to the same site.

Hatchlings emerge between January and April when they are about 10 centimetres long. Adults grow up to a metre and weigh up to 150 kilograms. Their shell is heart shaped and is usually dark above and lighter below.



Rhianna King is a LANDSCOPE editor. She can be contacted by email (rhianna.king@dbca.wa.gov.au). If you encounter lost or injured wildlife, contact the Wildcare Helpline on (08) 9474 9055.





Welcoming
wallabies
to Wirruwana

More than 400 years ago, Dirk Hartog and his crew landed on WA's largest island. Since then it has been used for a variety of purposes, which have severely impacted the island's native mammals. The Return to 1616 project aims to restore the island to its pre-colonial glory and is giving two species of bare wallaby, and other threatened mammals, a fighting chance.

*by Kelly Rayner, Saul Cowen, Colleen Sims,
Sean Garretson, John Angus and Keith Morris*

Dirk Hartog, Western Australia's largest island, lies at the very western-most boundary of the Australian continent. For thousands of years, the island has been well-known to the local Malgana people, who call it *Wirruwana*. And it was here that in 1616 the island's Dutch namesake landed and left an inscribed pewter plate, marking the first record of European visitation to Western Australia.

The island Dirk Hartog and his crew encountered in 1616, where a number of native mammals roamed free, would have been quite different to that of today. During the intervening centuries, the island has had a varied history, culminating in a range of legacies – in the 1860s it became a pastoral lease where sheep were grazed; in the early 1900s it was a home to lighthouse keepers who introduced goats as a source of food; and it later became an environment where feral cats roamed as the top terrestrial predator. Consequently, Dirk Hartog Island slowly had its populations of vertebrate fauna eroded, with at least 10 mammal species and one bird succumbing to local extinction on the island. By the time the island was gazetted as a national park, just three small mammals remained (two rodents and a dunnart) and the island's vegetation was severely degraded.

A NEW BEGINNING

In 1995 the tide began to change for the island's biodiversity when the pastoral lessees, the Wardle family, prepared an environmental management plan to rid the island of feral mammals and replace them with native ones. Destocking of sheep and goats began in 2007 and, when the island was gazetted as a national park in 2009, the then Department of Environment and Conservation (a predecessor of DBCA) carried out an aerial eradication program that was completed in late 2017. Analysis of satellite imagery at the end of this process revealed that the vegetation cover in some areas of the island had increased by more than 50 per cent in response to the removal of grazing pressure. A baiting and trapping program to eradicate feral



Learn more about the translocations

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



cats was also started in 2014 and there have been no signs of feral cats on the island since October 2016. While cat monitoring will continue until September 2018, DBCA staff who are working on the island are confident that cats have been eradicated from Dirk Hartog Island, the largest island in the world on which this has been achieved. The success of the invasive species eradication program has now paved the way for the return of some of the island's rightful inhabitants.

Trial translocations involving a small number of banded hare-wallabies (*Lagostrophus fasciatus*) and rufous hare-wallabies (*Lagorchestes hirsutus*) were undertaken in mid-2017, to provide us with information about capturing,

Previous page

Main Looking back at Steep Point from the rugged west coast of Dirk Hartog Island.

Photo – Saul Cowen/DBCA

Inset Banded hare wallabies were one of two species released on Dirk Hartog Island last year.

Photo – Richard Manning

Above One of the earliest depictions of the banded hare-wallaby encountered during the Baudin expedition in 1803.

Illustration – Nicolas-Martin Petit /Museum d'histoire naturelle, Le Havre

transport and monitoring techniques for these threatened species. This pilot study built knowledge and experience that will help prepare us for when we translocate larger numbers of these species to Dirk Hartog Island in 2018. As special as these first translocations to Dirk Hartog Island were, there is still something of a mystery surrounding the presence of these species on the island in recent history.

Banded and rufous hare-wallabies still occur on Bernier and Dorre islands – 25 kilometres north of Dirk Hartog Island, and persisted on the nearby mainland in the Gascoyne area into early pastoral times. Subfossil records have also been recovered from Edel Land and Peron Peninsula on the mainland immediately to



“The success of the invasive species eradication program has now paved the way for the return of some of the island’s rightful inhabitants.”

the south and east of Dirk Hartog Island. Anecdotal reports of animals that seem to most resemble banded hare-wallabies exist from the early explorers who visited the island; William Dampier noted ‘a sort of raccoon’ in 1699, while Peron, the naturalist who became responsible for writing up the joint French voyage in 1803 of *Le Geographe* and *Le Naturaliste*, described this species as occurring in ‘swarms’ over the three islands – Bernier, Dorre and Dirk Hartog. However, no specimens or subfossil remains have ever been collected of either species from Dirk Hartog Island. While the history of these species on the island is still uncertain, their successful establishment here will greatly benefit the conservation outlook for both. They now occur naturally only on Bernier and Dorre islands, with additional translocated populations of the banded hare-wallaby having previously been established at just two other locations: Faure Island in Shark Bay undertaken by the Australian Wildlife Conservancy (AWC), and Wadderin Sanctuary, a fenced enclosure in the eastern Wheatbelt, managed by the local community in the Shire of Narembeen. Since the historic release of these species to Dirk Hartog Island in August 2017 by

DBCA, another new translocation of banded hare-wallabies has been carried out by AWC to their Mt Gibson fenced reserve in the western woodlands.

SAILING TO A NEW LAND

On the morning of 29 August 2017, the first hare-wallabies (six banded and six rufous) from Bernier Island were delivered to Dirk Hartog Island. The collection of these animals was the final task for the boat-based team, who had spent the previous weeks battling strong winds

Above left The Cape Inscription Lighthouse built between 1908 and 1910, where Dirk Hartog landed and left his pewter plate. Photo – Saul Cowen/DBCA

Above The first group of hare wallabies on their way to Dirk Hartog island. Photo – Claudia Buters

Inset below Banded hare-wallaby. Photo – Jiri Lochman

and rough seas in order to confirm that the source populations were sufficiently abundant enough to withstand the harvest of animals for translocation. The new arrivals were held for the day, while staff completed health checks on the animals

Banded hare-wallaby (Lagostrophus fasciatus)

The banded hare-wallaby was one of the earliest Australian species to be described by Europeans, with one individual spending time aboard *Le Geographe* in the 1803 expedition. While bearing the same name and a similar disposition to the rufous hare-wallabies, banded hare-wallabies are actually quite distinct. They are the only members of the Lagostrophinae lineage and are thought to be more closely related to the extinct subfamily to which the giant browsing kangaroos belonged, than they are to any living macropods. Unfortunately, this species is highly susceptible to predation from introduced carnivores and as a result became extinct on the mainland early in the 20th century with the last record coming from South Australia in 1927.





and fitted them with radio-collars. After a final check at dusk, the hare-wallabies were loaded into vehicles and transported to their new home at the southern end of the island. A small crowd of excited onlookers accompanied DBCA staff for the historic event – the first release in Australia’s largest ecological restoration program. An additional 12 hare-wallabies from Dorre Island arrived the next day and were released later that night by staff and a small group of community members from nearby Denham. These banded and rufous hare-wallabies are now roaming an island that had lacked

native medium-sized mammals for more than a century.

Careful monitoring of these animals was extremely important for fulfilling the aims of the trial translocation. An attempt was made to radio-track all individuals every day for the three months after release, with extreme care taken not to disturb animals during this process. Hare-wallabies are known to be vulnerable to predation by birds of prey so ensuring the animals weren’t exposed to this threat was vital to success. This intensity of monitoring was undertaken as a key element of the trial was to confirm

if the animals survived after they were released and, if not, what caused their death – a task that is made more difficult with each day that passes after mortality. Unfortunately, one rufous hare-wallaby was found freshly dead a few days after release. Vets at Murdoch University confirmed its mortality was likely due to capture myopathy: a stress-related syndrome that rufous hare-wallabies can be particularly vulnerable to. Fortunately, thanks to the efforts of the capture team to minimise stress on these animals in transit, no other deaths have occurred since the release – an extremely good outcome for a translocation of medium-sized mammals.

Radio-tracking was supported with surveys for tracks and scats, as well as images taken from remote cameras, providing additional information regarding movement and habitat usage that will inform future releases for these species.

Rufous hare-wallaby (*Lagorchestes hirsutus*)

Weighing less than two kilograms, this species very much reflects the source of its latin name – shaggy or hairy hare dancer. Describing both the physical appearance but also its typical behaviour when alarmed, these delicate animals can look deceptively rotund in their long coats while darting away from you through the spinifex. The Shark Bay rufous hare-wallaby is distinct from the previously more broadly distributed mainland subspecies, the ‘mala’. Having been separated since the last ice age more than 8000 years ago, the island animals have become larger and developed a coat colour that is more grizzly brown as opposed to the bright rufous of the mala. The rufous hare-wallaby is one of only two *Lagorchestes* species that still exists (the other being the spectacled hare-wallaby (*Lagorchestes conspicillatus*)). The central hare-wallaby (*Lagorchestes asomatus*) and eastern hare-wallaby (*Lagorchestes leporides*) became extinct following European settlement.



Above left A rufous hare-wallaby being released.
Photo – Claudia Buters

Above Keith Morris and Claudia Buters releasing the first banded hare-wallabies onto Dirk Hartog Island.
Photo – Richard Manning

Left Rufous hare-wallaby.
Photo – Jiri Lochman

Right Lei Zhang listening for a signal from a radio-collared rufous hare-wallaby.

Centre left Volunteers Jessica Wilkinson and Jordan Sprylan recording bearings of radio-collared hare-wallabies.

Photos – Saul Cowen/DBCA

Centre right A rufous hare-wallaby captured on remote camera by the cat monitoring team.

Photo – Michael Johnston/DBCA

Below Kelly Rayner, Colleen Sims and Saul Cowen radio-collaring hare-wallabies prior to release.

Photo – Claudia Buters



These monitoring methods became particularly useful when animals moved beyond their expected area of occupation, making them difficult to locate using ground-based radio-telemetry. This was the case with one particular rufous hare-wallaby that often proved elusive, regularly disappearing for days at a time. The mystery was solved when the cat monitoring team arrived to complete their spring surveillance session and recovered an image of the wallaby in question, 20 kilometres north of the release area.

NEW ARRIVALS FILLING UP POUCHES

Three months after their release, the monitoring team turned its attention to recapturing animals to see how they were faring in their new home. Of particular interest was how collars were fitting and the overall condition of the animals. After a few initial hurdles (both literally and figuratively) in capture efforts, there were pleasing outcomes for the efforts. All the animals had gained weight since their release and the pouches of eight females were occupied by new young born on Dirk Hartog Island. The team is anticipating that there will be at least five new rufous and three new banded hare-wallabies exploring Dirk Hartog this year. This is very promising for the overall success of the hare-wallaby translocations, and a good indicator that both these species will have an excellent chance of continuing to thrive



Species to be translocated to Dirk Hartog island as part of Return to 1616

Common name	Scientific name
Banded hare-wallaby (v)	<i>Lagostrophus fasciatus</i>
Rufous hare-wallaby (v)	<i>Lagorchestes hirsutus</i>
Dibbler (e)	<i>Parantechinus apicalis</i>
Western barred bandicoot (e)	<i>Perameles bougainville</i>
Boodie (v)	<i>Bettongia lesueur</i>
Woylie (e)	<i>Bettongia penicillata</i>
Greater stick nest rat (v)	<i>Leporillus conditor</i>
Desert mouse (nl)	<i>Pseudomys desertor</i>
Shark Bay mouse (v)	<i>Pseudomys fieldi</i>
Heath mouse (e)	<i>Pseudomys shortridgei</i>
Chuditch (v)	<i>Dasyurus geoffroii</i>
Mulgara (nl)	<i>Dasyercus blythi</i>
Western grasswren (nl)	<i>Amytornis textilis</i>
(v) Vulnerable (e) Endangered (nl) Not listed	



there. Although collars had to be removed from six animals, as they were no longer fitting comfortably due to the weight gains, the majority of individuals kept their collars, enabling the continued tracking of their survival and movements over the summer – a crucial period that could determine the outcome of this translocation.

FUTURE

In the immediate future, DBCA staff will return to complete the final steps in the trial translocation, which will help determine future directions for the program. Hare-wallabies will be

recaptured in order to remove collars that will shortly be reaching the end of their expected battery life, while an assessment of the wallabies' condition after a dry summer with very little rainfall will also be a high priority. Should the outcomes from this work meet the translocation criteria for success, the team intends to move forward on a larger scale, translocating 40–50 individuals of each species in late 2018 and supplementing this with 30 more individuals in 2019. There are also plans to translocate three more of the 13 species identified for inclusion in the *Return to 1616* program in 2019: the boodie

or burrowing bettong (*Bettongia lesueur*), the dibbler (*Parantechinus apicalis*) and the western barred bandicoot (*Perameles bougainville*).

.....
Above A number of species are being released at Dirk Hartog Island as part of *Return to 1616*.

Photo – Saul Cowen/DBCA

Below Banded hare-wallabies are being offered a second chance at life on Dirk Hartog Island.

Photo – Richard Manning



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The Dirk Hartog Island Ecological Restoration Project is funded by the Gorgon Barrow Island Net Conservation Benefits Fund.

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Department of Biodiversity, Conservation and Attractions

A tale of **TWO BUSHFIRES**

The comparison of two bushfires in the Perth hills that occurred 13 years apart, demonstrates the benefits of prescribed burning and the need to consider the safety of our drinking water catchments.

by Frank Batini and Michael Pasotti

Many Perth residents would remember the afternoon of Saturday 15 January 2005 when smoke and ash from a bushfire burning in Perth's hills blanketed much of the metropolitan area. The fire was started by an arsonist who lit separate fires in dense bush, which were fuelled by strong easterly winds. By the time crews arrived, the fire was burning through the tree crowns, causing total defoliation, and embers were spotting well ahead of the headfire. Under these conditions, attack on the headfire was too dangerous and aerial suppression was ineffective. On 18 January lightning struck to the east of the main fire starting another one. Then, on 19 January, the two fires joined and threatened the Mundaring community. It also threatened Pickering Brook, Karragullen, Araluen, Roleystone and Darlington.

For five days, more than 1500 personnel from the former CALM, Forest Products Commission, and former FESA, volunteer bushfire brigades and contractors worked tirelessly to contain the bushfire. It was finally controlled once the headfire had reached 10 forest blocks where fuel loads had been reduced by prescribed burning in the three years prior, as part of CALM's prescribed burning program. By the time it was contained, the fire had burnt through 27,000 hectares of jarrah and wandoo forest on three water-supply catchments. Amazingly, and thanks to the location of recently prescribed burnt areas, no homes were lost, but several sheds and orchards sustained damage. And, while no lives were lost, a number of firefighters were injured. The smoke from the bushfire persisted over the city for seven days and the mop-up took another week.

Lessons learnt from bushfires in Sydney and Canberra indicated the potential for this bushfire to affect the quality of Perth's water supply. The potential impacts were identified as short-term increases in surface run off and yield; increased water cloudiness and colour; increased organic material leading to a decrease in oxygen; release of nutrients; and altered surface soil properties. In the



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Main A fire in the Perth hills in 2005 burnt through 27,000 hectares.

Photo – Ron D'Raine/DBCA

Above A fire in 2018 was contained to 4000 hectares when it reached formerly prescribed burnt areas.

Photo – DBCA

Right A plume of smoke blanketed Perth for several days in 2005.

Photo – Sally Treasure/DBCA



Mundaring Catchment, areas adjacent to the reservoir and a large area of steep land in the Darkin River sub-catchment were burnt by very high-intensity bushfire. As Mundaring is one of the main water sources to the Goldfields and agricultural region (and at that time water treatment was chlorination and fluoridation), minimising the impacts was important and land and water managers successfully implemented a range of remedial actions before winter rains to minimise any possible influence on water quality. The Water Corporation also funded data collection and research.

Data showed that waterflow doubled but also that 500 tonnes of soil were deposited in the streambed of the Little Darkin River, only one of many streams that feed into Mundaring Weir that were affected by the bushfire. Ash

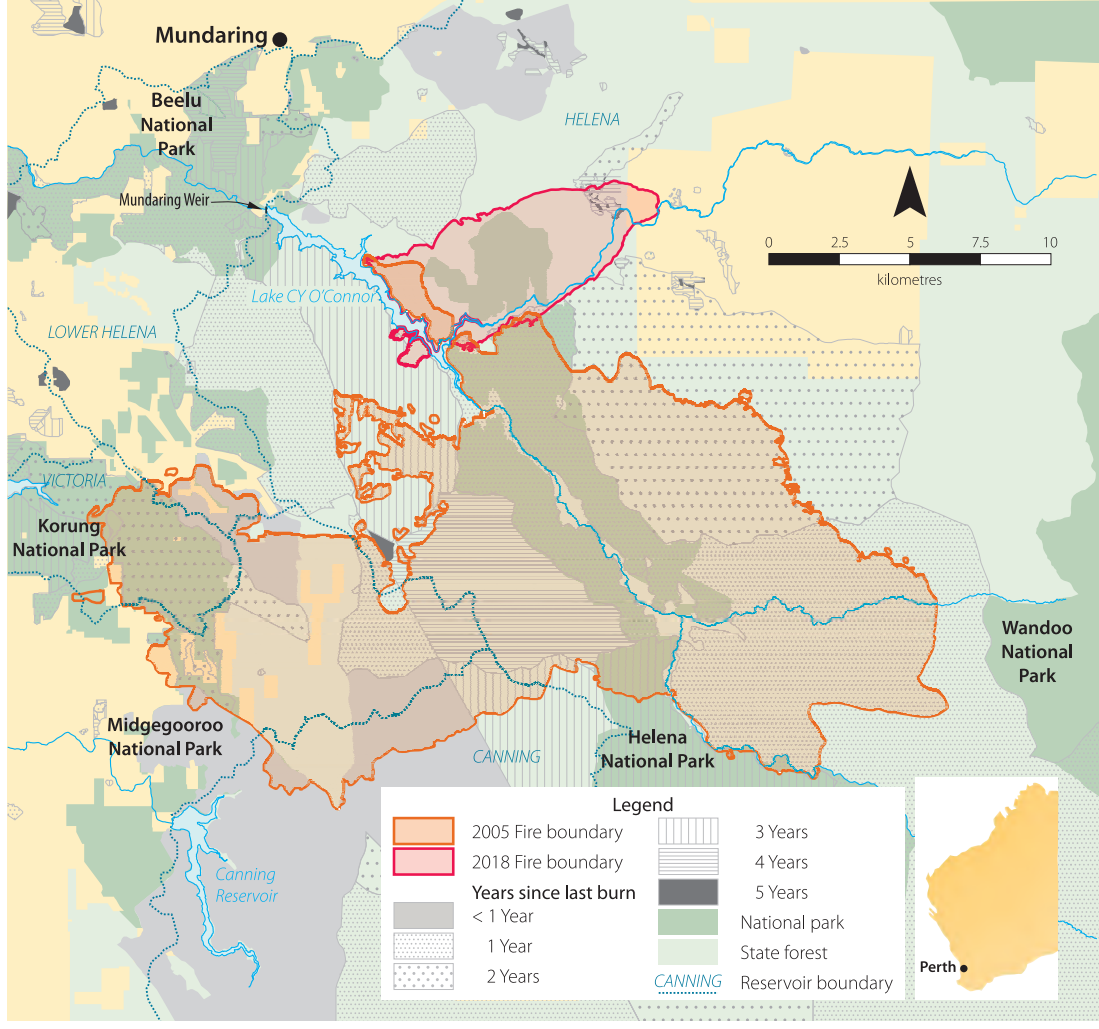
and silt can disrupt the effectiveness of chlorination treatment, which is essential for maintaining water quality. However, the turbidity plume was managed through in-stream dosing and so the water quality of Mundaring was unaffected. As a result, there was no influence on the treatment process or provision of safe drinking quality water to the Goldfields and agricultural water supply. Data also showed that terrestrial and aquatic biodiversity was significantly impaired and between 1.5 and 2.3 million trees were killed, many of which were large fauna habitat trees.

A STEP IN TIME

Fast forward 13 years and history appeared to be repeating itself. On Sunday 14 January 2018 Perth residents

Learn more about prescribed burning

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

experienced what some described as 'apocalyptic' conditions as a bushfire that was burning from two ignition points in the hills blanketed the city in smoke. An arsonist had struck again, and the bushfire was burning in heavy fuel loads and was being exacerbated by strong easterly winds.

Since 2005, there has been a substantial increase in areas that have been prescribed burnt in this catchment – since 2013 approximately 60,000 hectares has been prescribed burned. Thanks to a number of these strategically located areas of reduced fuel age, the bushfire was contained to 4000 hectares when the headfire and southern flank of the bushfire ran into bush burnt within the last three years. Once it reached there it stopped abruptly and was able to be easily contained by ground crews.

However, the challenges did not stop when the flames went out. The day after the fire, more than 100 millimetres of rain fell in the Perth hills as a low pressure system passed over Perth. The rain fell on bare soil, which fortunately did not cause any serious erosion and sediment to run

off into the streams and water bodies. Investigation is underway to assess and implement necessary mitigation measures in key areas before the winter rains.

While measures can be taken to remediate the effects of bushfire damage, these events highlight the invaluable role prescribed burning plays in containing hot, destructive bushfires in the first place. And in areas such as the Perth hills, where population numbers are ever-increasing and the water catchments are the lifeline to many other parts of the State, it is more important than ever.

Above left Parks and Wildlife Service carries out prescribed burning on land it manages in autumn and spring each year.
Photo – Jennifer Eliot/DBCA

Right Regrowth appearing in the months following the 2005 fire.
Photo – Colin Terry



Frank Batini is a consultant with an interest in the effects of forest management (such as bauxite mining, silviculture and fire) on water yield, quality, streams and forest health. From 1985 to 2001 Frank led CALM's Environmental Protection Branch. He can be contacted on 0419 932 242 or by email (fbatini@bigpond.net.au).

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Adventure out



Building CUBBIES

CREATING MEMORIES

One sunny Saturday in April a caper of kids and their families ventured to Yanchep National Park to try their hand at building cubby houses as part of Nature Play WA's second annual Cubby Town. The event – designed to encourage kids and their families to spend time in nature getting their hands and feet dirty – was a huge success.

by Rhianna King



I rarely need an excuse to venture up to Yanchep National Park. For me, it has everything you need for a great day out – bush to discover on a network of trails; beautiful grassed areas for picnics and barbecues; a riot of birdlife to spot; kangaroos and koalas to encounter up close; cultural activities to enjoy; caves to explore; Choc Drops tea rooms for coffees, drinks and sweet treats; and the Yanchep Inn for something more substantial to eat or a drink of a 'colder' nature. And, it's just 50 kilometres north of the CBD. So, when I heard Nature Play WA was hosting its second annual Cubby Town – a free community event – on Saturday 28 April, I happily deferred my usual Saturday morning chores until the afternoon so I could attend with my kids.



BUILD IT AND THEY WILL COME

The weather on the day couldn't have been any more perfect – a magnificent 28 degrees; not bad for the end of April. We arrived a little after the start time of 10am and already the Lakeside picnic area was heaving with activity. Kids were buzzing around collecting branches, boxes and other material off the ground to make their cubby houses. The branches they were using (often those used to feed the on-site koalas) had been collected by park rangers for six months ahead of the event. There was a surprising variety of shapes and sizes of cubby houses – some resembled a tee-pee while others took more of a box-like form. Some cubbies made use of trees as scaffolding, while others, impressively, were freestanding. One even resembled



● Yancheep National Park

a honeycomb shape, where its inventive builders had used cardboard boxes to create different rooms. Others even sported windows.

Some parents and caregivers reveled in the opportunity to unleash their inner child – scrambling on the ground with their kids to help position leaves and branches 'just so'. While others stood back, occasionally offering advice and suggestions.

Once the kids had perfected their cubby houses, they had the opportunity



Main Building cubby houses was popular among kids of all ages.

Photo – Rhianna King/DBCA

Insets (clockwise from top left) A raft of other activities entertained kids on the day.

Photos – Ewen MacGregor/DBCA (1, 2 and 3); Karla Graham/DBCA (4, 5 and 6)



Take a journey to
Cubby Town

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Service's 'LANDSCOPE'
playlist on YouTube.



to take part in a raft of other activities, such as mud play, bush craft and music activities hosted by local community and play groups. There was also a Nature Play WA scavenger hunt where clues on the Nature Play WA app (see also 'In review' on page 11) led kids around the park to learn more about the insects that can be found in the area.

Judging by the laughs and squeals of the kids, which even managed to drown out the raucous calls of the flocks of Carnaby cockatoos flying overhead, there was a lot of fun being had on the day.

MORE THAN JUST A GOOD TIME

But, of course, we know from the ever-increasing research that there was a lot more than just fun going on at the Cubby Town event. By engaging in unstructured nature play, kids develop their gross-motor, fine-motor and problem-solving skills. They improve their spatial awareness, develop their imagination and creativity, and have improved social skills and ability to collaborate. Symptoms of ADHD can be lessened and kids who regularly have contact with the natural world, including dirt and plant matter, have stronger immune systems than those who don't.

But, beyond that, kids who spend time in nature enjoying free, unstructured play also learn about the natural environment and get an insight into the role they play in protecting it. And these experiences can form life-long memories, which help shape their decision-making in later life and, hopefully, guide them to become advocates for the environment.

According to Parks and Wildlife Service's Parks and Visitor Services regional leader Ewen MacGregor, events like Cubby Town play an important role in encouraging kids outside.

"It's so important that we activate our natural spaces through events like these to provide opportunities for kids to come and enjoy time in nature," he said.

"We know this kind of event works, as evaluation of last year's event showed an excellent return rate of Cubby Town participants, who either returned to Yanchep National Park or visited other parks around the State," he said.

"After all, our kids are nature's advocates of tomorrow and it's critical that we engage them early so they can develop a love of the environment and experience all the benefits associated with spending time in it."

BACK TO BASICS

Once my kids had completed the construction of their cubby house, put it through a rigorous play test, checked off all the clues on the scavenger hunt, made a gumnut Cyclops with a pasta bowtie at the bush craft table and climbed a few trees, we packed up our picnic and made our way home; kids dirty and exhausted – just as they should be.

Clockwise from top left A scavenger hunt, music and bush craft provided a range of opportunities for fun.

Photos – Rhianna King/DBCA (1, 4 and 5); Ewen MacGregor (2); Karla Graham (3)

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

The Cubby Town event was held by Nature Play WA in partnership with DBCA and the Department of Sport and Recreation, with support from the City of Wanneroo. For more information about future Nature Play WA events visit www.natureplaywa.org.au. For more information about Yanchep National Park, visit parks.dpaw.wa.gov.au.





Conservation and Community connections

Two Peoples Bay Nature Reserve is one of Western Australia's conservation jewels. The reserve plays a vital role in the conservation of species like the Gilbert's potoroo and the noisy scrub-bird, and since 2014 many community members have been involved in a regular fauna trapping program, which was established to understand more about this amazing reserve. This program has provided an opportunity for people to gain an appreciation of the remarkable wildlife living in their backyard and learn more about the work being done to protect it.

by Charlene Dekker, Mark True,
Deon Utber, Jon Pridham and
Sarah Comer



Located 35 kilometres east of Albany on the south coast, Two Peoples Bay gleams its European name from a chance meeting in 1803 between French and American mariners. The pair named the bay *Baie des Deux Peuples* or 'Bay of Two Nations', which is literally translated as Two Peoples' Bay. The bay has a long history of use by Aboriginal people, maritime explorers, travellers, sealers, whalers and also attracts many visitors who enjoy spending time in the spectacular reserve. It was on the verge of becoming a town site when, in 1961, the noisy scrub-bird (*Atrichornis clamosus*) was re-discovered and the area was set aside to protect native species (see 'Back from the brink: 50 years of conservation at Two Peoples Bay', *LANDSCOPE*, Spring 2011). In 1967 the area was reserved as an 'A' Class Nature Reserve to protect the habitat of the noisy scrub-bird, and then, in 1994, the Gilbert's potoroo (*Potorous gilbertii*) was re-discovered after not being seen for 120 years (see 'Gilbert's potoroo: eight years on', *LANDSCOPE*, Winter 2003).

Two Peoples Bay is one of the State's conservation hotspots, in particular for mammals, birds, freshwater fish and invertebrates, with three threatened mammals, seven threatened birds, a threatened fish and three threatened invertebrates recorded in the nature reserve. Diverse vegetation communities, wetlands and rivers provide habitat for many of these fauna species and from the 1960s were managed to reduce the frequency of bushfires. From 1988 this management was complemented by fox control, delivered through the department's *Western Shield* program. A monthly fox baiting program, which covers the whole nature reserve, has been in place ever since. In 2014, the department included feral cat baiting using *Eradicat*® baits in the program for the reserve. These baits look like small chipolata sausages and are made of kangaroo mince, chicken fat and flavour enhancers that are highly attractive to feral cats. The sausages are dosed with sodium monofluoroacetate (compound 1080), which is toxic to feral



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Main Two Peoples Bay Nature Reserve.

Photo – Peter Nicholas/DBCA

Inset Gilbert's potoroos were presumed extinct in the area until the species was rediscovered in 1994.

Photo – Jiri Lochman

Above The stunning beaches of Two Peoples Bay Nature Reserve attract visitors year round.
Photo – Tourism WA

cats, to create the bait product known as *Eradicat*®.

STEP BACK IN TIME

Twenty years after it was gazetted as a nature reserve, significant effort has been made to understand the area's plants and animals, with a particular focus on rare species. One of the earlier studies was conducted in 1980–81 by Professor Stephen Hopper, from the then Department of Fisheries and Wildlife, who conducted a pit trap survey of small mammals, lizards and frogs. Ten pit lines were placed in different vegetation communities, landforms and soil types, covering areas from the western end of the reserve north of Moates Lake, to the north-western slopes of Mount Gardner, the dunes that are nestled to the west of Two Peoples Bay, and the coastal heath west of Little Beach. The primary purpose of the original sampling was to determine whether honey possums (*Tarsipes rostratus*) were present in the reserve

in numbers comparable to those found further east near Mt Manypeaks and Cheynes Beach. The secondary objective was to increase knowledge of the small vertebrates in the reserve.

In 2014, with help from Stephen, a number of the old fauna monitoring sites were relocated and Ecological Field Methods students from The University of Western Australia (UWA) re-established the sites as part of their field course. The students based themselves at the research quarters at Two Peoples Bay under the watchful eyes of course coordinator Dr Peter Speldewinde. Each of the sites had an identical setup, with pit traps on drift fences and Elliot, funnel and larger cage traps. The mixture of traps was deployed to try and maximise the diversity of different species caught, and with a wide range of frogs, mammals, reptiles and birds trapped so far, this combination has been a resounding success.

In subsequent years, students from the same UWA course have continued to



“... Twenty years after it was gazetted as a nature reserve, significant effort has been made to understand the area’s plants and animals, with a particular focus on rare species.”

run these traplines. In addition, DBCA’s South Coast Region spent a week during most months of between 2015 to 2017 surveying five of the original sites plus one new site. This new site was established in long unburnt vegetation that was on the prescribed burning program to create a reference site for the proposed burn. This effort is documenting the changes to the fauna following the introduction of cat baiting, and also helping to understand the seasonal patterns in native mammal and reptile activity.

The Integrated Fauna Recovery Project (IFRP) team has spent five years determining when the optimal time is to deliver feral cat baits. Understanding

when and if there is a period where the native prey activity is low will inform the optimal timing for baiting (see ‘Heeding Kyloring’s warning: south coast species under threat’, *LANDSCOPE*, Spring 2010). These data will help to answer this question, by painting a picture of when the biomass of available food in the landscape is highest, and how this relates

to drivers of productivity like rainfall and temperature. The monitoring also focuses on the longer-term survival of some of the animals known to be targeted by feral cats. All quenda, which are favoured prey items, are marked with microchips that provides insights into the survival of these animals, which have been found by the IFRP team to be a favoured prey item of the feral cat in South Coast reserves.

NATURE’S LABORATORY

Stephen’s interest in honey possums has been continued by one of his Honours students, Kirsty Vogel, who used the

Above Honey possums occur in the area.
Photo – Sallyanne Cousans

Above right This common scaly foot is a legless lizard caught in a pit trap following the 2015 fire on Mt Gardner.

Right The proximity of the reserve to Albany has made it possible for community members, including primary school children, to take part in the trapping surveys.
Photos – Sarah Comer/DBCA





Top Primary and high school students, the Young Naturalists Club, Indigenous trainees, neighbouring landowners, university students and other members of the community have been involved in the program.

Above Charlene Dekker, who helped start the monitoring program, processing a mardo.
Photos – Sarah Comer/DBCA

re-established trapping sites and data collected to look at the relationship between fire, habitat structure and honey possums. Interestingly, Kirsty's work found that the diverse sites across Two Peoples

Bay were all able to support honey possums, with these animals able to use the range of nectar resources available in the different vegetation associations.

The proximity of Two Peoples Bay Nature Reserve to Albany has also made it possible for local community members to take part in the trapping program; high school students, primary school students, the Young Naturalists Club, Indigenous trainees from South Coast NRM, neighbouring landowners, university students and other interested community members have been involved since 2014. More than 300 people have enjoyed the opportunity to view native animals and gain an appreciation for the variety of wildlife located close to town, not seen every day.

The Two Peoples Bay program is affiliated with the CSIRO STEM Professionals in Schools program, and the relationship with local high schools in particular has given students exposure to the role of science in conservation. By spreading trapping sites in different vegetation communities and fire ages, the students have gained insights into what makes habitat suitable for various species. Some of the rarer fauna of the reserve, like Gilbert's potoroo and the quokka, have only been trapped at long unburnt sites on the granite headland, while the remarkable square-nosed snake is only ever seen on the site fringing wetland areas. Threatened species recovery programs

and basic ecological principals, monitoring and wildlife management techniques are discussed during trapping sessions. Animal welfare is promoted through the program, with participants gaining an understanding of the challenges associated with working with wildlife and ethical considerations that need to be factored into trapping programs.

Community involvement in the Two Peoples Bay program has also encompassed a global community. Two students from the University of Bristol, supervised by UWA Albany, have completed Masters projects using data collected over the past three years and by collecting more information on the specific species they were studying. One of these students – Irune Martin – looked at the relationship between the carnivorous group of mammals found at Two Peoples Bay and food resources. This group of marsupials (the Dasyuridae) is represented by the dunnarts and mardo (*Antechinus flavipes*) at Two Peoples Bay, and Irune looked at rainfall and peaks in trap success for the two most commonly trapped dasyurids (the grey-bellied dunnart (*Sminthopsis griseoventer*) and mardo). Kayleigh Reid, also from Bristol, looked at scat samples from animals trapped while she was in Albany. From these, she completed a study of gastrointestinal parasites in the range of mammals caught over a four-month period. This work was important to help understand the general



Left To date, 46 species have been caught during 26 sampling sessions.

Above The moaning frog (*Heleioporus eyrei*) was one of two species of burrowing frogs frequently caught in pit traps.

Below The sun setting on Two Peoples Bay Nature Reserve.

Photos – Sarah Comer/DBCA

level of parasite burdens in mammal communities across the reserve, and also the diversity of parasites in comparison to mammalian diversity.

NEW FINDS

While it was generally thought that the fauna of Two Peoples Bay was well known, there have been some surprises in the traps. While the 1980–81 work was conducted over two short periods, the longer-term monitoring has revealed rarely seen, and even new species in the traps. A high proportion of the species recorded by Stephen have been recorded in the 2014–17 trapping session, but many additional species have also been seen. To date, 46 species have been caught during 26 sampling sessions over 12,000 trap nights.

Some exciting captures of animals not previously recorded, or with unconfirmed observations, included the pygmy possum (*Cercartetus concinnus*) and white-tailed dunnart (*Sminthopsis granulipes*). Other notable captures have been reptiles not previously recorded in the reserve, including the south-western orange-tailed slider (*Lerista distinguenda*), four-toed earless skink (*Hemiergis initialis*) and shrubland morethia skink (*Morethia obscura*), and the sand frog (*Heleioporus psammophilus*). A number of square-nosed snakes (*Rhinoplocephalus bicolor*) trapped near Moates Lake, created great excitement for both primary students and

their parents who had a great opportunity to look closely at this marvellous small elapid snake.

Ecosystem recovery following fire has also had some notable fauna captures. Eighteen months after the Black Cat Creek fire of October 2012, honey possums were captured in pits on one of the sites located in the burnt area. The recovery of the plants after the fire provided not only enough shelter for this unique animal to be living back in the area, but also enough flowering plants and therefore pollen. Kirsty also recorded that honey possums appeared within two years of the intense 2015 bushfires on Mt Gardner, demonstrating that the rapid resprouting flowering plants are able to support this unique nectarivorous marsupial. Similarly, the captures of the western crowned snake (*Elapognathus coronatus*), common scaly-foot (*Pygopus lepidopodus*) and the grey bellied dunnart (*Sminthopsis griseoventer*) in the six-month period following the lightning strike that burnt most of Mount Gardner in 2015 reflect the recovery of the area.

Other interesting captures included Gilbert's potooroos, noisy scrub-birds (caught in an Elliott trap), and a painted button quail. These species are rarely observed, so seeing them was a highlight.

INTO THE FUTURE

The Two Peoples Bay fauna monitoring program was established

with some clear goals, and to date many of these have been met. However, the opportunity to engage schools and the community in learning about our native wildlife is one that will continue. While the regularity of trapping is no longer as frequent as it was initially, there are still opportunities for schools, university students and other interested groups to take part in what we hope will remain a long-term monitoring program showcasing the remarkable wildlife of Two Peoples Bay Nature Reserve.



Charlene Dekker is a DBCA South Coast Region conservation employee.

Mark True is a DBCA Two Peoples Bay Nature Reserve ranger.


Deon Utber is the DBCA South Coast regional leader nature conservation.

Jon Pridham is a DBCA South Coast regional wildlife officer.

Sarah Comer is the DBCA South Coast regional ecologist.

Enquiries about the project can be directed to Sarah Comer, who can be contacted on (08) 9842 4513 or by email (sarah.comer@dbca.wa.gov.au).





Monitoring Matuwa and Kurrara Kurrara: *a labour of love*

What started as a bird count at Matuwa 16 years ago, has developed into a multi-dimensional program that involves traditional owners, school students, *Bush Rangers* cadets, CSIRO Science pathway, DBCA scientists, Parks and Wildlife Service Goldfields staff and BirdLife WA. Run by a small group of dedicated volunteers and led by bird-lover Neil Hamilton, the project continues to deliver an array of environmental and social benefits, and opportunities to build and maintain relationships with neighbours.

by Rhianna King

Located in the heart of the Gascoyne Murchison, Matuwa is a 240,000-hectare former pastoral lease. Its red earth, dotted with mulga scrub, water holes, creeks, claypans, sand dunes and rocky country, give rise to expansive skies. At night, away from the light pollution found in townsites and near other infrastructure, the sky comes alive with the twinkling of millions of stars.

For more than 40,000 years, the area has been home to the Martu people, who recognise the songlines of the *pikuta* or euro, which created the creeks as it travelled around the landscape. In more recent years the area was used for pastoralism and was known as Lorna Glen and Earahedy, until the leases were purchased by the State Government in 2000. In 2015, an agreement was forged between the Commonwealth Government and the Tarlka Matuwa Piarku Aboriginal Corporation to dedicate Matuwa and the nearby Kurrara Kurrara as an Indigenous Protected Area (see 'A sacred partnership', *LANDSCOPE*, Summer 2015–16).

A LABOUR OF LOVE

DBCA senior technical officer Neil Hamilton first visited Matuwa in 2003. Neil travelled to the area as part of a project with principal research scientist David Algar and senior technical officers Mike Onus and John Angus, to trial baiting for feral cats and foxes as part of the department's *Western Shield* program. This program aimed to stop the carnage of the area's precious native animals to introduced predators (see 'Into the wild: restoring rangelands fauna', *LANDSCOPE*, Winter 2009), which faced a dire future.

While on this visit, Neil and others documented the numbers and species of birds they saw, to get an idea of the health of the area and to provide a baseline by which any changes in population brought by the baiting and trapping could be measured. The area is home to more than 154 bird species, in particular medium, low and ground-dwelling bird species, including malleefowl, bush stone-curlew, quail thrush, a couple of quail species, spinifex



Previous page

Main Matuwa enjoying 'boom time' brought by rain.

Photo – Neil Hamilton

Inset left White-plummed honeyeater.

Photo – Sallyanne Cousans

Inset right Neil Hamilton with Martu rangers Rita Cutter and Lena Long.

Photo – Marion Massam

Above Simon Cherriman measuring chicks at Lorna Glen.

Photo – Neil Hamilton

birds, wrens, hooded robins, red-capped robins and other song birds.

Since his first visit, Neil has travelled to the area in this own time three or four times a year. He has been accompanied by fellow collaborators Tegan Douglas, Aneta Creighton, Bruce Greatwich, Marion Massam and others, who, like Neil, have been motivated to participate by their dedication and passion.

Over the years, he has observed a change in the landscape, including the department's successful reintroduction of brushtail possums and bilbies to Matuwa, and the establishment of a 1100-hectare enclosure, which protects golden bandicoots, boodies and mala. Along with others, he has also observed a recovery of ground-dwelling and mid-dwelling birds and reptiles thanks to targeted baiting and trapping of feral cats and foxes. Species that occur close to the ground are easy targets for predators, so eliminating the threatening processes in the area is

necessary to secure their survival. Baiting and trapping have also led to an increased number of mulgara, bandicoots, brushtail possums and bilbies outside the enclosure.

Neil also describes that Matuwa has been in a state of 'boom time' since 2011, with an abundance of plants, plenty of feed and lots of water. This is a far cry from the landscape he witnessed during the drought years of 2003–05 where the hostile, barren environment challenged the survival of even the hardiest species until the rains of 2006.

COLLABORATIVE APPROACH

What started as a side project in 2003 has now been expanded to a collaborative partnership. In 2015, Neil was joined by consultant and founder of Inside Ornithology Simon Cherriman and long-time collaborator WA citizen science project coordinator Dr Tegan Douglas from BirdLife WA. Simon and Tegan were keen to work with Neil to realise



his vision of monitoring bird movements in the area. Since 2015, the trio has been supported by Parks and Wildlife Service Kalgoorlie Region staff, BirdLife WA, the Martu people, the community, pastoralists and as part of the Australian Bird and Bat banding scheme. This collaboration is multi-faceted and aims to contribute data about the health of the area's birds, carry out scientific research, engage students in conservation, partner with the local Martu people for two-way learning and encourage citizen science.

A highlight of the project was in October 2017 when Neil, Simon, Tegan

and other members of BirdLife WA travelled to Matuwa for two weeks. This built on a similar trip that was held in the previous October. In the first week of the 2017 trip, *Bush Rangers* cadets from Rossmoyne Senior High School travelled to the area. Cadets were given the opportunity to work alongside the local Martu rangers, who showed them the traditional land and taught them about plants and animals. The cadets, who ranged from 12 to 15 years old, were also shown how to effectively monitor birds, including how to use apparatus such as binoculars and mist netting.

According to *Bush Rangers* Coordinator Richard Olive, the experience was life-changing for a number of 'city kids' who have had never experienced the outback.

"They had the opportunity to experience culture in such a unique way – on Country and with traditional owners – and step right out of their comfort zones and extend themselves mentally and physically," he said.

"And it was also a great experience for the Martu people, who are incredibly proud of their culture and knowledge of the land and are keen to share it with others."



Top left The trees at Matuwa teem with birdlife, including zebra finches.

Above *Bush Rangers* cadets from Rossmoyne Senior High School at Matuwa.

Left Students from Wiluna Remote Community School with Tegan Douglas.
Photos – Neil Hamilton

Do it yourself

Matuwa is located 150 kilometres north-east of Wiluna. Accommodation is available in the Lorna Glen homestead, an ideal camping location with self-contained bunkhouse accommodation and facilities. For more information visit parks.dpaw.wa.gov.au.



The students took part in bird surveys, night-time spotlighting, introduced cactus removal, weeding and owl pellet analysis.

In the second week, the group was joined by students from Wiluna Remote Community School. The students took part in a camp where they spent time on country with Martu people, many of whom they were related to. For Neil, Tegan, Simon and others, it was uplifting to watch the connections that were being strengthened by this opportunity.

“It was amazing to see the kids engaging with their relatives, who in some cases are training to be rangers themselves,” he said.

“We all learnt from each other sharing things and understanding their Country.

“The students also learnt about bush tucker and medicine, and heard about what plants and animals occurred on the land when their relatives were kids.”

A highlight for this group was when they heard from Simon about his work researching birds of prey. Simon demonstrated how he examines nests and the students were dazzled when he deftly climbed a tree to check on a whistling kite’s nest to measure the brood it was housing. The students also had an opportunity to give Martu names to two wedge-tailed eagle chicks. They named the male ‘Djootabay’, which means ‘wild and free’ and the female ‘Karibatu’,



Above Neil Hamilton, Tegan Douglas and Martu rangers at Lorna Glen.

Photo – Bruce Greatwich

which means ‘hungry’. They also named a satellite tagged chick ‘Yapu’, which means ‘rock’ and another male they called ‘Kapiburror’, which means ‘rainy day’.

CONTINUING THE WORK

Neil is grateful to Tegan and Simon for their continued support and is pleased to provide the people of Wiluna school, the Martu community and other partners with a common project to come together on Country. In the meantime, he hopes that visitors from other parts of Australia and the world will make the long, but very worthwhile trek to Matuwa in order to appreciate true beauty of the Australian outback and engage with the Martu people and the Wiluna community.

Top and below The expansive beauty of Matuwa is quintessentially Australian ‘outback’.

Photos – Neil Hamilton



Rhianna King is a *LANDSCOPE* editor. She can be contacted by email (rhianna.king@dbca.wa.gov.au). Rhianna would like to thank Neil Hamilton for his assistance in preparing this article.

by Grace Milne

Turtley Awesome *Bush Rangers* cadets survey turtles

Spending time walking along the beaches of a remote island off the Pilbara coast guided only by the light of the moon while looking for turtles sounds like a daydream. But, for nine lucky *Bush Rangers* cadets from Onslow Primary School it was the focus of a reward camp.

The cadets travelled to Thevenard Island where they spent two nights assisting with the North West Shelf Flatback Turtle Conservation Program.

DBCA research scientist Sabrina Fossette-Halot and education officer Hannah Hampson led the cadets, who were joined by scientists and other volunteers.

The group started their monitoring at 4pm and after the sun set they worked without lights to avoid disturbing the turtles that were emerging from the water. Once they spotted a turtle, the group radioed their location and then remained silent and motionless while the turtles searched for suitable places to dig their egg chambers.

Onslow *Bush Rangers* unit leader Steve Flanigan said the *Bush Ranger* cadets thoroughly enjoyed the opportunity to contribute to meaningful research.

"The scientists and volunteers worked through the night on the first night and tagged 22 flatbacks. Our cadets only managed until 9:30pm but pushed through until 11:30pm on night two," he said.

"The cadets were taught how to measure the turtles, take DNA samples and enter data."

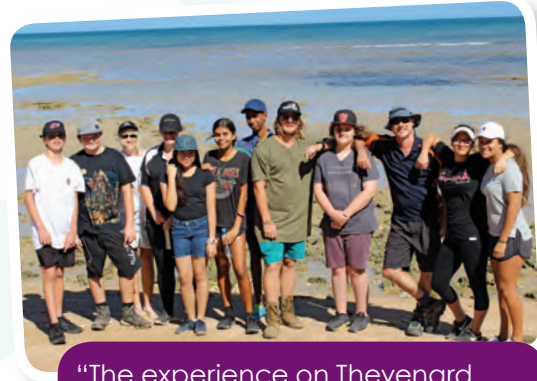
The cadets also watched a post mortem of a turtle found near Onslow, performed by vet Erina Young, who is researching the health of turtles in WA for her PhD. Erina found the turtle had died from a type of parasite known as a blood fluke.

They also watched a turtle being fitted with a satellite tracker, which will provide data that scientists will use to find out where the turtles go once they have finished laying their eggs (see also 'Getting turtles back on track' on page 24). The turtle – which the cadets called 'Turtley Awesome' – can be tracked at www.seaturtle.org.

Most of the turtles that were fitted with radio-trackers have travelled north from Thevenard Island to foraging grounds. However 'Turtley Awesome' has remained close to the island since her release.



"It was good to see the turtles and learn from the scientists."
Royden Elliott



"The experience on Thevenard was incredible. I learnt many things about turtle reproduction and their body systems." Leia Stratford



"Watching the turtle dig her egg chamber was amazing." Kiara Parker

"It was a privilege to be invited to be a part of this important environmental project and amazing to learn about these fascinating and beautiful turtles," Steve said.

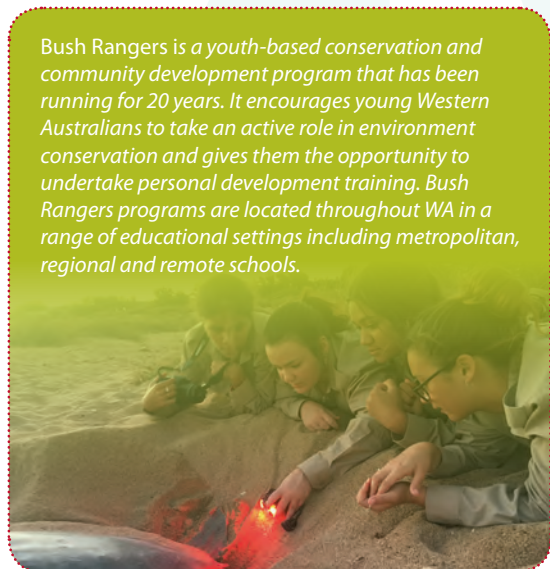
"We can't wait to be involved again this year."

.....
Top right Turtley Awesome heading back to the ocean.

Centre right *Bush Rangers* cadets and leaders from Onslow Primary School.

Right Counting eggs as they are laid.

Left Taking a skin biopsy.
Photos – Steve Flanigan



Bush Rangers is a youth-based conservation and community development program that has been running for 20 years. It encourages young Western Australians to take an active role in environment conservation and gives them the opportunity to undertake personal development training. Bush Rangers programs are located throughout WA in a range of educational settings including metropolitan, regional and remote schools.



Loggerhead turtles (*Caretta caretta*)

As many as 2000 female loggerhead turtles visit Western Australian beaches each year to nest, where they lay between 100 and 150 eggs in the sand. Hatchlings emerge between January and April, when they are about 10 centimetres long, before they voyage to the ocean. Little is known about where the turtles go during what is known as the 'lost years' until they emerge again up to 15 years later when they have reached sexual maturity.

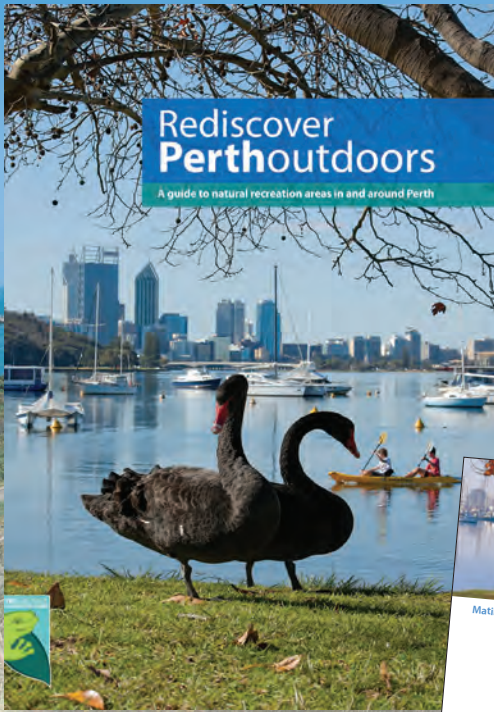
Illustration by Gooitzen van der Meer

Reference photo by Jiri Lochman

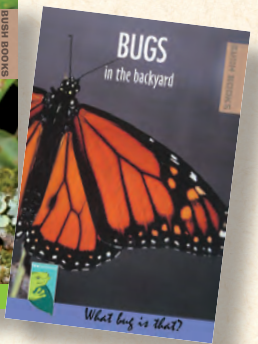
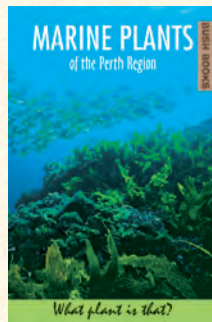
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