

WA'S PARKS, WILDLIFE AND CONSERVATION MAGAZINE

LANDSCOPE

Volume 39 Number 1
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**GEOLOGICAL
WONDER**
Purnululu
National Park

**Rising
from the
ashes**
Flora and
fire

**En route to
Taronga**
Interstate chuditch
translocation

Biodiversity hotspot
WA's spectacular south coast



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ON THE COVER

Front cover Sticky kurrajong (*Brachychiton viscidulus*).

Back cover Purnululu domes, Purnululu National Park.
Photos – David Bettini

LANDSCOPE is produced and printed on Whadjuk Noongar Boodjar, the traditional lands of the Whadjuk people of the Noongar Nation. We pay respects to them, their Elders past and present and to all Aboriginal people and acknowledge their continuing connection to lands across Western Australia.

Western Australia is blessed with huge diversity in its conservation estate—from the towering forests in the south-west to the ancient gorges of the Kimberley and the staggering marine life in coastal reserves and marine parks.

As *LANDSCOPE* goes to print, a significant milestone is about to be reached in the Plan for Our Parks initiative, with 2.5 million hectares of new national and marine parks and conservation reserves created across WA since 2019, marking the initiative’s 50 per cent milestone.

We’re on track to reach the Plan for Our Parks five-million-hectare target in early 2024, meaning there are busy times ahead for the department and our many stakeholders and partners who have a role in creating and managing these new parks.

In this issue of *LANDSCOPE* you will read about three new marine parks in the Kimberley’s Buccaneer Archipelago, created in partnership with their Traditional Owners—the Bardi, Jawi, Mayala and Dambeemangarddee people with whom the parks are jointly vested and managed (see ‘*Protecting Saltwater Country*’ on page 12).

Purnululu National Park in the Kimberley’s east and its new discovery centre are profiled on page 8, and the richness of biodiversity on WA’s south coast in the area under consideration for the proposed South Coast Marine Park is showcased in ‘*Ancient ancestral beauty: WA’s south coast*’ on page 48.

You can also read about the impressive new bridge across the Murray River in Lane Poole Reserve (see ‘*Building Bridges*’ on page 34).

Creating new parks and new park infrastructure, like everything the department does, involves working closely with stakeholders and the community including joint management, and seeking stakeholder and community engagement and input into new projects and initiatives.

Engagement is a crucial part of any planning process, as is reliance on the best available science. While stakeholders may not always agree with an ultimate decision, you can rest assured that open dialogue and engagement are an essential part of the process and vital to informed decision-making.

Stuart Smith, Director General

Department of Biodiversity, Conservation and Attractions.



Contributing

Robert Davis has been an Identification Botanist for the Western Australian Herbarium for the past 30 years. He currently identifies priority and threatened flora, as well as other plants. His responsibilities include taxonomy, where he has described several new native Western Australian plant species. Rob

edits flora content and contributes photographs for *LANDSCOPE* magazine and other departmental publications and websites.



Ivy James is a Communications Officer with DBCA and has previously worked as a regional journalist and media coordinator. She looks forward to telling her grandchildren how she once drove chuditch from Collie to Perth to support an interstate translocation. She still hasn’t

got over the death of Steve Irwin, who she says inspired her as a child to be brave and value nature and wildlife.



Megan Dilly is a passionate ‘plant nerd’ who loves exploring nature and studying the incredible botanical diversity of WA. She is now based on WA’s south coast where her Master’s project first sparked her interest in fire ecology. Megan currently works as a Technical Officer for DBCA on a casual basis, documenting Threatened Flora species’ response and recovery after fire.





Features

- 8 Parks for people: Purnululu National Park**
Experience the exceptional natural beauty of the Bungle Bungle Range
- 12 Protecting saltwater Country**
Three new marine parks in the Buccaneer Archipelago
- 18 Live fast, die young**
Fire ephemerals and their conservation management
- 24 Adventure out: Orienteering in Julimar State Forest**
Navigating between checkpoints on a sunny Sunday
- 28 Operation chuditch translocation**
New home for a vulnerable species
- 34 Building bridges**
Final element of Dwellingup Adventure Trails completed
- 42 Touched by nature: 25 years of Mondays**
Andrew Paul has led Mount Lawley Senior High School's Bush Ranger cadets since 1998
- 48 Ancient ancestral beauty: WA's south coast**
Continued cultural connections and coastal splendour

Regulars

- 3 From the desk of Stuart Smith**
A foreword from the Director General, Department of Biodiversity, Conservation and Attractions.
- 6 Bush telegraph**
Short stories from around the State, reader's poem and a guest word.
- 33 In review**
A collection of books and applications.
- 41 Discovered**
Lamington stilt bug (*Arideneides cocosdiaspora*).
- 53 Kaleidoscope**
Connecting kids with nature.
- 54 Nature's pin-up**
Oblong turtle (*Chelodina oblonga*).

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This page Murray River, Lane Poole Reserve.
Photo – David Bettini



Department of Biodiversity, Conservation and Attractions

Poets
Corner



Nature's Philosophy

Nocturnal birds in sibilant causerie
Forest creatures in distant revelry
While nature's blanket dims their rivalry
And stills the air to peaceful reverie

How brief is this tranquillity
As hostile meetings in darkened shrubbery
Remind, if only momentarily
That man alone enjoys in camaraderie

Above left Tawny frogmouth.
Photo – Adobe Stock

READER'S POEM

By Victor Timmons

"I was inspired to write my poem 'Nature's Philosophy' after reading a book about a distinguished naturalist who is a friend to the indigenous animals of the forest. While I don't reside in Australia, I love *LANDSCOPE's* focus on biodiversity and conservation and thought your readers might be interested in my poem, even if it's all the way from England."

This issue of *LANDSCOPE* features a reader's poem in place of the regular reader's pic, which will return next issue. If you've got a fantastic nature photograph you would like to see published, send it along with a 100-word description of the species or where you took the shot to landscape@dbca.wa.gov.au



New funding round open for Aboriginal Ranger Program

Round 7 of the Aboriginal Ranger Program (ARP) is now open, with up to \$13 million available from the Development Fund to support new and emerging ranger programs.

The Development Fund is targeted at groups with aspirations to start a ranger program, or those that are in the early stages of operating a ranger program. Small grants of up to \$150,000 are available for planning and development, and large grants of more than \$150,000 for ranger operations.

ARP round 7 is the final allocation of funding from the Development Fund, with the first \$10 million allocated through ARP round 5.

This new round of funding is part of an \$83 million State Government investment, which to date has created more than 650 Aboriginal ranger jobs on Country.

Eligible Aboriginal organisations have until 9 October 2023 to apply. For more information visit dbca.wa.gov.au/aboriginalrangerprogram

Above Bardi Jawi Oorany Rangers.
Photo – DBCA

LANDSCOPE welcomes new DBCA Director General

Stuart Smith has been appointed Director General of the Department of Biodiversity, Conservation and Attractions, commencing in the role on 10 July 2023. He has also been appointed Chief Executive Officer of the Botanic Gardens and Parks Authority, Rottnest Island Authority and Zoological Parks Authority.

With three decades in State and Commonwealth public service roles, Stuart Smith brings extensive experience to the position, including eight years as the chief executive of Australia's offshore energy regulator and six years as Director General of the former Western Australian Department of Fisheries.

He replaced Mark Webb PSM who retired at the end of 2022 after four decades of public service.



Above Stuart Smith addresses DBCA staff.
Photo – Shem Bisluk/DBCA

Guest column

Dean Unsworth

*Chief Executive Officer
Shire of Murray*



Just over an hour's drive from Perth, Dwellingup is home to incredible natural landscapes; from spectacular national parks to thriving river trails and towering old-growth forests.

The town of Dwellingup is a unique place to retreat from the hustle of city living and enjoy nature-inspired adventures. It is also home to a small but thriving community, local farms, small businesses and talented artists and artisans who live and draw inspiration from the spectacular and peaceful surroundings.


Located within the Shire of Murray, the area contains important assets with significant environmental, lifestyle, ecotourism, heritage and recreation values. Various partners work together to maximise these, and ensure Dwellingup has a long and prosperous future.

The economic transformation of Dwellingup was initiated more than 10 years ago. The community's vision was voiced through the delivery of a concept plan through a multi-industry enterprise. Since then, Dwellingup has become a must-visit adventure destination and was recently crowned Western Australia's Top Tiny Tourism Town for 2023.

This success is based on its growing economy in ecotourism, trails, Aboriginal cultural tours, and heritage rail. We are seeing a significant increase in visitors through the door at the award-winning Dwellingup Trails and Visitor Centre, growth in repeat visitation and increased passing trade. These achievements have been made possible thanks to support from various partners along the way.

The recently opened Dwaarlindjirraap Bridge, the most recently completed infrastructure in the \$8.4 million Dwellingup Adventure Trails project (see 'Building Bridges' on page 34), was jointly funded by the Australian and Western Australian governments and the Shire of Murray. It is an amazing drawcard to Lane Poole Reserve and will enhance the growth of tourism in Dwellingup.

The bridge is just one in a long list of outcomes for Dwellingup in recent years. There has also been the introduction of a 35-kilometre Murray Valley Mountain Bike Trail network on the southern bank of the river, a 16-kilometre Dwellingup Mountain Bike Trail network around Dwellingup townsite, and new canoe launching facilities at Island Pool.



Scientists fly high to survey dugongs

Aerial surveys of dugongs (*Dugong dugon*) commenced in June over Gutharraguda (Shark Bay), Nynggulu (Ningaloo) and Exmouth.

The surveys occur every five years in partnership with James Cook University's Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER).

The Department of Biodiversity, Conservation and Attractions leads the aerial surveys, which help scientists understand distribution, numbers and trends over time in these globally significant locations for dugong populations.

Onboard observations and plane mounted camera images contribute data safely and efficiently.

With the help of Malgana and Baiyungu rangers and Traditional Owners, this research is helping scientists better understand these endearing marine animals and will support future conservation and joint management.

The project is supported by the Australian Government's National Environmental Science Program.

Above Surveying dugongs (*Dugong dugon*) within transect markers.
Photo – Holly Raudino/DBCA

Australian-first strategy to manage feral cats

A new, five-year strategy has been released to expand efforts to manage feral cats in Western Australia. Feral cats are the most destructive single species in Australia and pose a significant threat to WA's native wildlife and biodiversity.

Backed by a \$7.6 million investment through the 2023–24 WA State Budget, the *Western Australian Feral Cat Strategy 2023–2028* aims to conserve populations of threatened native fauna species through effective, adaptive and humane actions to manage feral cats.

Immediate management efforts will focus on priority native species and habitats. Feral cat management will be expanded across areas of high conservation value, through stakeholder co-design and collaboration.

The strategy was developed by the Department of Biodiversity, Conservation and Attractions, the Department of Primary Industries and Regional Development and a range of key stakeholders.

The strategy is available at dbca.wa.gov.au/management/threat-management





Purnululu National Park

The towering rocky domes of the Bungle Bungle Range in Purnululu National Park have enchanted humans with their majestic beauty for tens of thousands of years.

Jaru, Gija and Malngin people of the East Kimberley were recognised as native title holders during an on-Country ceremony in May 2023. They have lived near and among the soaring rock formations for thousands of years, thriving in the surrounding plains and living as one with the ancient landscape.

It wasn't until as recently as the 1980s that this now well-known icon of the outback shot to national fame with its first significant media coverage. This coverage sparked an avalanche of interest—where was this remarkable landform, people asked, and just how did Mother Nature come up with its stunning design?

Main Bungle Bungle Range, Purnululu National Park.

Photo – David Bettini

GEOLOGICAL ATTRACTION

Today, about 30,000 people travel to this remote part of Australia every year to experience the national park's astounding natural beauty. They are drawn by the wild assortment of gorges, canyons and towering rocky domes.

Still more people visit the area on a scenic flight from within the park, or from Kununurra or Warmun. From the air, you can truly appreciate the beauty and vastness of the range. The beehive-shaped domes soar more than 250 metres into the air and reach up to the horizon in an intricate maze of rusty red rocks. The towering domes change colour, from brown to red, orange and gold, as the sun progresses across the sky. All around, majestic palms grow in striking green contrast to the deep orange of the range's rocks.

The sandstone, which makes up the range's rocky domes, was deposited some 360 million years ago. Over the past 20 million years, the natural forces of rain and

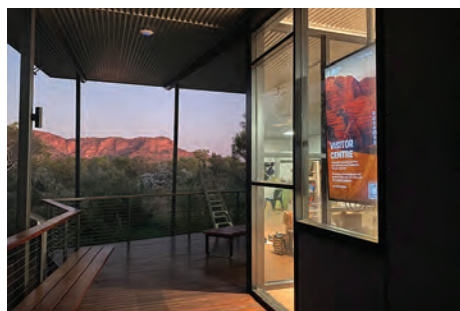
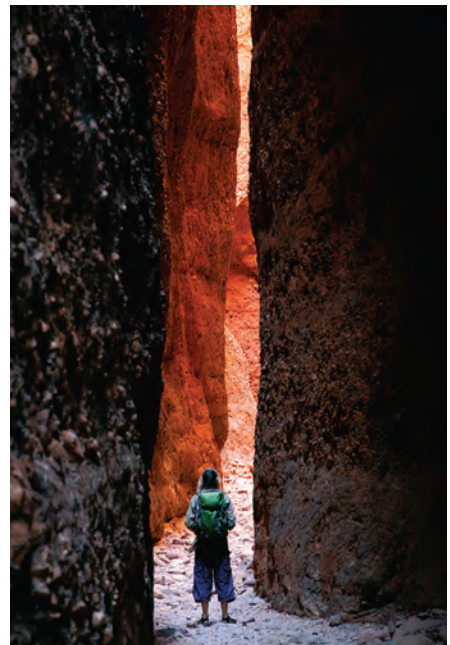
water sculpted the range to the intricate network of domes seen today.

The banded nature of the rocks came about thanks to bacteria known as cyanobacteria or blue-green algae. This dark 'algae' grows on layers of sandstone where moisture accumulates. The orange bands of colour come from different layers of rock, which dry out too quickly for the cyanobacteria to grow.

WORLD HERITAGE

Purnululu National Park was inscribed on the UNESCO World Heritage List in 2003, meaning 2023 marks 20 years since it was elevated to this distinguished list. Purnululu was listed for its exceptional natural beauty and scientific importance.

The Bungle Bungle beehive-shaped towers are unrivalled in their scale, extent, grandeur and diversity anywhere in the world. The intricate maze of towers is accentuated by sinuous, narrow, sheer-sided gorges lined with majestic *Livistona* palms (*Livistona victoriae*).



Discover more about Purnululu National Park

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

The diversity of landforms and ecosystems throughout the park is representative of the semi-arid landscape and provide a beautiful visual buffer for the Bungle Bungle Range.

The sandstone formations of Purnululu National Park are of great scientific importance as they display, to an exceptional degree, evidence of geomorphic processes of dissolution, weathering and erosion of landforms under a savannah climatic regime.

EXPERIENCING THE WONDERS

Flying above the range in a plane or helicopter provides a unique perspective of the range's size and beauty.

Alternatively, setting out on foot on one of the park's many hiking trails provides the chance to spot some elusive animal life.

Charming western ring-tailed dragons (*Ctenophorus caudicinctus*) regularly sunbake along the trails and northern nailtail wallabies (*Onychogalea unguifera*) may bound across the rocks. Ghost bats (*Macroderma gigas*) and rockhole frogs (*Litoria meiriana*) are often seen hiding deep within crevices in the rocks.

There is a wide variety of bird life—more than 130 bird species occur here, including rainbow bee-eaters (*Merops ornatus*) and flocks of budgerigars (*Melopsittacus undulatus*).

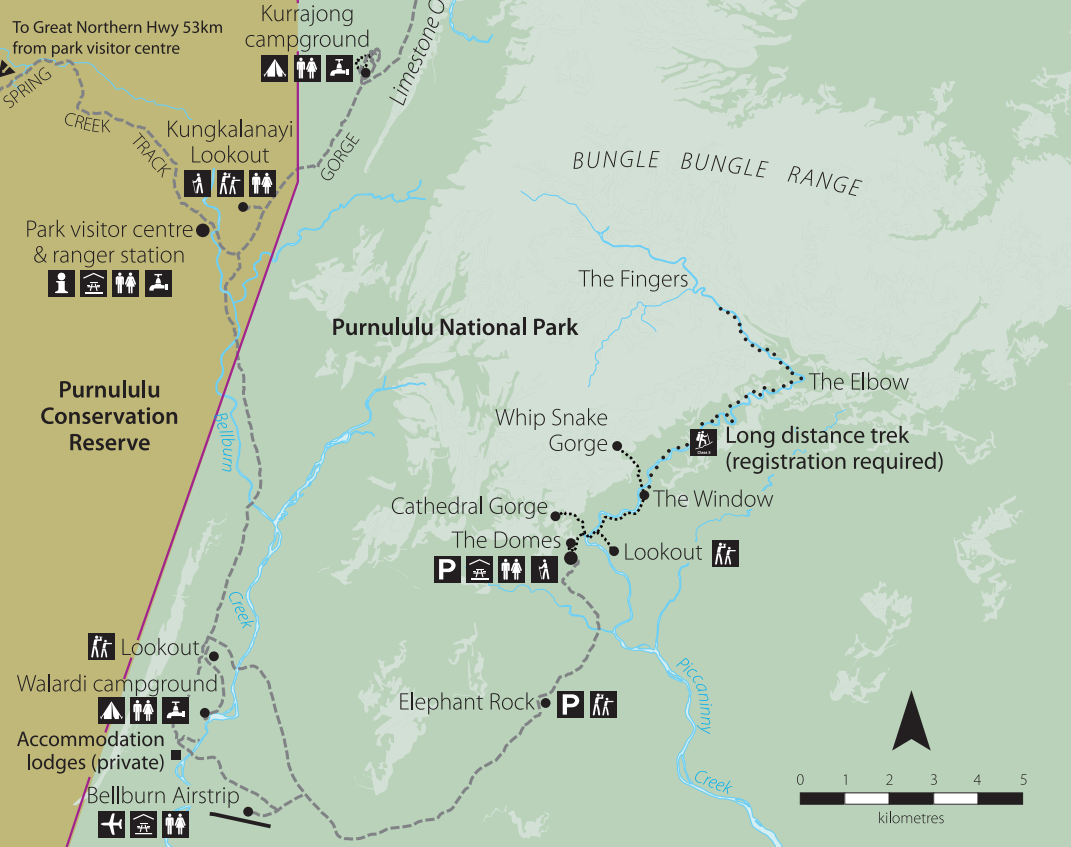
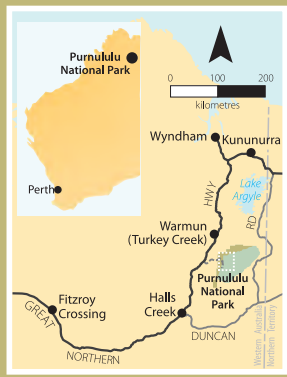
Top left Star gazing, Purnululu National Park. Photo – Tourism WA

Top right Mini Palms Gorge. Photo – Cliff Winfield

Above Walking in Echidna Chasm. Photo – Janine Guenther

Centre (clockwise from top left) Purnululu helicopter tours. Photo – HeliSpirit; Guests at the Purnululu Visitor Centre opening. Purnululu Visitor Centre at dusk. Photos – DBCA; Northern nailtail wallaby (*Onychogalea unguifera*). Photo – Marie Lochman; Rainbow bee-eater (*Merops ornatus*). Photo – Sallyanne Cousans

Parks for people Purnululu National Park



Legend

- | | | | |
|-------------------------|------------------------|--------------|----------------------------|
| Bungle Bungle Range | Four wheel drive track | Airstrip | Sheltered picnic area |
| National park | Walk path | Parking area | Toilets |
| Conservation reserve | Negotiable route | Bore water | Walk trail |
| World Heritage boundary | Visitor centre | Camping area | Long distance trek class 5 |
| | | Lookout | |

Right Kurrajong Campground.
Photo – Roxanne Pendreigh/DBCA

Opposite page
Main Hikers in Purnululu National Park.
Photo – Janine Guenther
Far right Walking at Echidna Chasm.
Photo – Ann Storie



When visiting by vehicle, it's important to take into account the vastness of the landscape and travel times on unsealed roads. It's recommended to stay at least one night in order to travel safely and truly soak up the spirit of this enchanting place. There are two public campgrounds and some private lodges to stay at within the park, though booking ahead is a necessity.

In April 2023, a new state-of-the-art visitor centre was opened thanks to WA and Australian government funding.

The new, larger building was constructed to accommodate growing visitation. It includes a tropical verandah and large, east-facing windows that showcase the spectacular view to the Bungle Bungle Range.

The new visitor centre features innovative ways of interacting and learning about the park, including augmented reality where animals come to life out of artwork and an interactive touchscreen to delve into topics that interest the visitor, like the fauna, flora, geology or history of Purnululu.

Do it yourself

Where is it? The turn-off to the park is 250 kilometres south of Kununurra or 109 kilometres north of Halls Creek.

Access via a 53-kilometre, unsealed track. High clearance four-wheel drive vehicles and single axle caravans/campers only.

Open only between April and November (weather permitting—always check during shoulder seasons).

Total area 239,723 hectares of national park and 79,602 hectares of conservation reserve.

What to do Hiking, photography, camping, nature observation, scenic flights.

Must see sights Cathedral Gorge, Echidna Chasm.

Facilities Camping at Walardi or Kurrajong camps (both sites have toilets). Fuel and supplies available from Warmun, on Great Northern Highway.

Nearest Parks and Wildlife Service office Ivanhoe Road, Kununurra (08) 9168 4200.

For your safety

- Walk in the early morning or late afternoon to avoid the hottest part of the day.
- Wear a hat, long-sleeved shirt, loose clothing, sturdy footwear and apply sunscreen.
- Sip plenty of water—one litre per person, per hour is a good guide.
- Take regular rest stops in the shade to cool down.
- Do not wave at helicopters unless there is an emergency.
- Drones are not permitted in the park.



Purnululu National Park is blessed with an abundance of amazing walk trails that range from short Class 2 walks to more difficult Class 5 trails. Here's a sample of what's on offer.

For more information and to help plan your adventure, visit exploreparcs.dbca.wa.gov.au

Northern walks

Stonehenge

Class 2, 520 metres return. Allow 15 minutes.

A short, leisurely trail over a natural surface with stunning views of the Bungle Bungle Range in the distance. This walk introduces the traditional Aboriginal use of trees, shrubs and grasses.

Mini Palms

Class 5, 4.4 kilometres return. Allow 2 hours.

A moderately challenging walk that follows the Escarpment Trail for one kilometre to the Mini Palms junction. The trail continues with steep slopes, narrow edges and large boulders to climb under, over or squeeze between. Climb the stairs to reach two viewing platforms that are surrounded by Livistona palms and the soaring cliff face of the gorge.

Echidna Chasm

Class 4/5, 2 kilometres return. Allow 1 hour.

The start of the walk is exposed to the sun, along an uneven, dry creek bed lined with Livistona palms. Within the shaded chasm, the gorge walls extend up to 200 metres high and contain narrow sections barely a metre wide in some places. Between 11am and 1pm, Echidna Chasm lights up in brilliant shades of oranges and reds, creating the perfect photo opportunity. Once you reach the boulders, which require three points of contact to scramble over, the trail becomes a Class 5.

Southern walks

The Domes

Class 3, 700 metre loop. Allow 30 minutes.

This short, uneven loop takes you up close among the beehive domes, where you can clearly see the different layers of the sediment and the protective banding of the (orange-red) iron oxide and (dark grey) cyanobacteria. The trail is ideal for people who are not keen hikers but want to get an insight into this unique landscape.

Cathedral Gorge

Class 4, 2 kilometres return. Allow over an hour.

Follow this meandering, sandy creek bed amongst the towering beehive domes and honeycomb rocks to the iconic natural amphitheatre, Cathedral Gorge. There are some steep steps, a ladder and narrow ledges along the trail.

The Window

Class 4, 6 kilometres return. Allow 2 hours.

Walk along the creek bed amongst the beehive domes and large potholes made by the tumbling stones in the fast-flowing flood waters to a natural window in a sandstone structure, which provides another interesting feature of the Bungle Bungle Range. **Be aware:** the trail is uneven, eroded and exposed to the sun. Please do not climb on the fragile window structure.





Protecting **SALTWATER COUNTRY**

The co-creation of three new marine parks in the culturally-rich Kimberley

Bardi, Jawi, Mayala and Dambeemangarddee people and the State Government have come together to declare three new marine parks in the Kimberley's Buccaneer Archipelago.

The parks are jointly vested in and managed by their Traditional Owners, who have partnered in their creation.

*by Samille Mitchell, Roanna Goater and Michael Higgins
with support from Rowena Mouda, Janella Isaac, Rosanna
Angus, Kevin George, Leah Umbagi and Kristy Burgu*



The sun is beginning to rise above turquoise seas on a wild and rugged Kimberley island as Mayala man Alec Isaac strolls across the island interior.

Bathed in golden early morning light, he stops at a bush, drops to the ground and begins to dig out its roots. These roots aren't for eating, but for crushing and putting into tidal ponds. The roots, he says, deoxygenate the water, leaving fish starved of oxygen and easier to catch and eat.

Alec's Mayala ancestors learned of the roots' trait and passed on the secret and other cultural stories to their children.

This rich Indigenous culture has remained strong through countless generations, handed down through stories shared around campfires, while riding surging tides to hunt sea creatures and while camping here, on Country, under star-strewn night skies.

Such rich Indigenous heritage and traditional know-how is now earning better recognition and protection thanks to this area's recent creation as a marine park.

Mayala Marine Park is one of three new marine parks that Traditional Owners and the State Government have created in the Kimberley's Buccaneer Archipelago. Together, Bardi Jawi Gaarra, Mayala and Maiyalam marine parks protect 660,000 hectares of island-studded seas.

The area's Traditional Owners jointly manage the parks with Department of Biodiversity, Conservation and Attractions staff, helping them to fulfill a cultural obligation to care for Country and do what Traditional Owners have done for tens of thousands of years—coexist sustainably with nature.



Previous page

Top Mayala Marine Park.

Photo – Peter Nicholas/DBCA

Centre Maiyalam Marine Park.

Photo – Michael Higgins/DBCA

Below Bardi Jawi Gaarra Marine Park.

Photo – Peter Nicholas/DBCA

Background Waves of the sea.

Photo – Andrey Armyagov/Adobe

Above right Mayala man Alec Isaac.

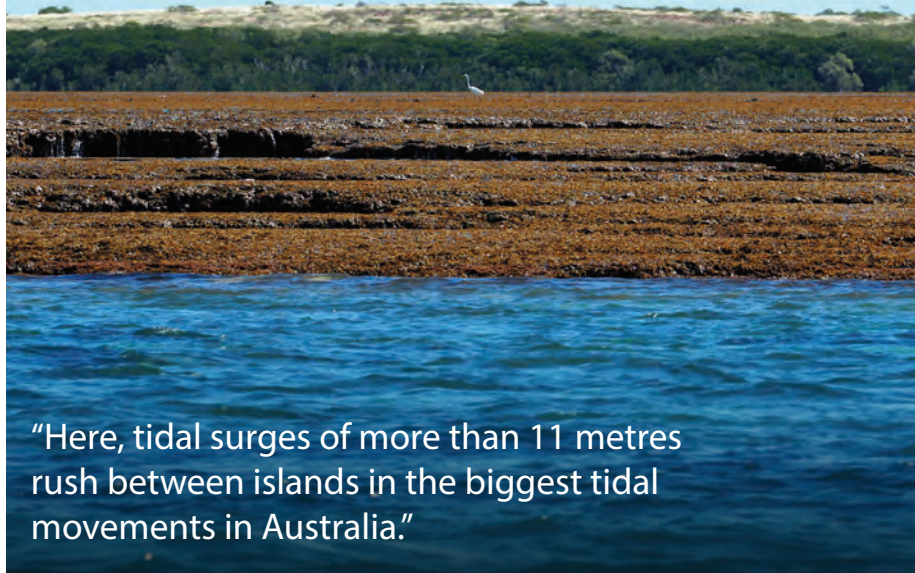
Photo – Samille Mitchell/DBCA

NATURAL BOUNTY

The Buccaneer Archipelago boasts hundreds of rocky isles rising above turquoise seas.

They tower above the ocean in clusters of red rock, embracing white sandy beaches, verdant green mangrove stands, mudflats and rocky cliff faces. In the wet season, mighty waterfalls tumble from the cliffs into the sea.





“Here, tidal surges of more than 11 metres rush between islands in the biggest tidal movements in Australia.”

Fringing reefs have formed around many of the islands, hosting plants and animals that have evolved to tolerate the vast tidal movements. Unlike corals in other areas, the corals here can withstand exposure above the water line during low tides.

Closer to the islands, intertidal reef platforms nurture a myriad of invertebrate life, important cultural resources that Aboriginal people continue to harvest by hand at low tide.

Mangrove-lined creeks and seagrass meadows provide important nurseries for young sea life, including turtles, fish and birds. During different seasons, mammals including dugongs (*Dugong dugon*), Australian humpback dolphins (*Sousa sahalensis*), Australian snubfin dolphins (*Orcaella heinsohni*) and humpback whales (*Megaptera novaeangliae*) traverse the open seas.

HIGHWAYS ON THE TIDES

If there's one natural element that characterises this region, it's the tides. Here, tidal surges of more than 11 metres rush between islands in the biggest tidal movements in Australia. The movement between narrow passages creates tidal streams of up to 10 knots, as well as swirling masses of backwater currents and dangerous whirlpools and tidal overflows.

Despite the tide's often treacherous nature, Aboriginal people have used tides and currents as highways with

great care and skill for millennia. Guided by an intimate knowledge of the tides, currents, seasons and stars, they would ride the tides on double log rafts, between different islands and hunting and harvesting grounds. Different rafts served different purposes—some served best for hunting, others for long ocean journeys in which they'd carry fresh water in baler shells.

BARDI JAWI GAARRA MARINE PARK

Bardi Jawi Gaarra Marine Park embraces the northern stretches of the Dampier Peninsula, north of Broome, and the western islands of the Buccaneer Archipelago. It is home to Bardi and Jawi people, known as gaarra, or saltwater people.

The Bardi and Jawi people have held native title over their traditional lands and seas since 2005. One year later, the Bardi Jawi Rangers group was established to support management of their land and sea Country, Traditional Owners' livelihoods and connection to Country. The creation of the jointly-managed marine park builds on their success by providing a marine park management framework, resources, opportunity, and the benefits of partnership with the State Government.

Bardi and Jawi people share traditional stories explaining the creation of the sea, islands, reefs and certain sea creatures.

Bardi and Jawi people

“We have used, relied on, enjoyed and protected Country over thousands of years and continue to do so today. Bardi and Jawi sea Country has always been, and continues to be, an essential part of Bardi and Jawi spiritual, social and physical existence. The Lore created religiously significant features in the sea that the madjamadjin [lore bosses] are required to protect. Traditional stories explain the creation of the saltwater and certain sea creatures.

Supernatural sea creatures such as the loolooloo [shark] have always existed to protect Bardi and Jawi people in their sea faring life. Bardi and Jawi people have always engaged in, and continue to engage in, shore fishing, collecting sea food from the intertidal zone, hunting odorr [dugong] and goorlil [turtle] in the shallows and from rafts with the goorlil [turtle] and odorr [dugong] being shared in accordance with traditional lore. Pearl shell is also collected and used as a resource for ceremony and trade.”



Above left Bardi Jawi Gaarra Marine Park. Photo – Matt Frances/DBCA

Above Kooljaman, Bardi Jawi Gaarra Marine Park. Photo – Michael Higgins/DBCA

Inset Bardi Jawi Cultural Dancers. Photo – Gabrielle Timmins/Kimberley Land Council

Discover more about the new marine parks

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



Through the actions of ancestral beings in the creation period, rai [spirit beings] were placed through Country. Bardi and Jawi people believe that, before birth, they existed as rai. Rai are regarded as good or natural spirits but can cause trouble for strangers who visit or camp in the wrong place or visit areas without being properly introduced.

Bardi Jawi Elder Bugujul, whose Western name is Kevin George, says protecting this culture and Country is not just a personal desire but a cultural obligation.

“The [marine parks] help us Traditional Owners to continue our life in a traditional customary way as well to look after the resources that looked after us, to look after the environment that looked out for us,” he said.

“We have a duty of care and obligation to look after our Country that has been passed on—we have to do this. It has been the wishes of our Elders who have left us, and have left us with this Country. We need to keep that healthy for our future generations.”

MAYALA MARINE PARK

The 315,000-hectare Mayala Marine Park comprises an extensive network of hundreds of islands, submerged lands, seabeds and saltwater about 200 kilometres north-east of Broome.



The Mayala people’s native title over their land and sea Country was recognised in 2018, 20 years after their claim was lodged with the Federal Court. Like the Bardi, Jawi and Dambeemangarddee people, Mayala’s decision to include all of their sea Country within a marine park is significant for their community.

The Mayala people believe the power and creative energy of ancestral beings shaped their Country and these ancestral beings continue to reside within special places, along with the stories and evidence of their deeds and the spirits of their unborn children.

Mayala woman Maagkin, or Janella Isaac, says the new park helps her people maintain their connection to Country.

“The sea means everything to us, the sea is our home, it’s got our resources,” she said.

“We have so much connection to the sea, what’s above the sea and what’s below. That’s why the marine park is very, very important to us as a people, as traditional people.”

MAIYALAM MARINE PARK

Maiyalam Marine Park adds a further 47,000 hectares to the Kimberley marine reserves. It borders the existing Lalang-gaddam Marine Park in the east of the Buccaneer Archipelago and is managed under the same management plan as Lalang-gaddam.

Maiyalam Marine Park is so named for the word ‘maiylam’, which means ‘between islands’ or ‘a gap through’ in reference to the sea passages between particularly dramatic and rugged clusters of islands.

The park protects culturally and naturally important areas including the Oobeeyal Special Purpose Zone, which is rich in cultural stories and has long served

Mayala people

“Mayala are saltwater people. We have a unique island culture and deep knowledge of the complex currents and tides to navigate between our islands and across our sea Country. This knowledge comes from our long association and living relationship with Country as it has changed over thousands of years. Our name comes from the spinifex grass that grows on the islands—we used this on top of our ngirray [shelters] to protect us from the rain and keep us warm.

Living on small islands with little game and few large mammals or freshwater sources, our people lived primarily off the sea, adapting tools and technology to harvest sea resources for survival, using the loo [currents] tides and stars to navigate through Country. Our Lore has kept our Country and our people alive since milonjoon [from long ago] and we are here because of our ancestors and their care for Mayala Country. We follow our own cultural governance structures and kinship systems.”



Above Gararr (Mermaid Island), Mayala Marine Park.

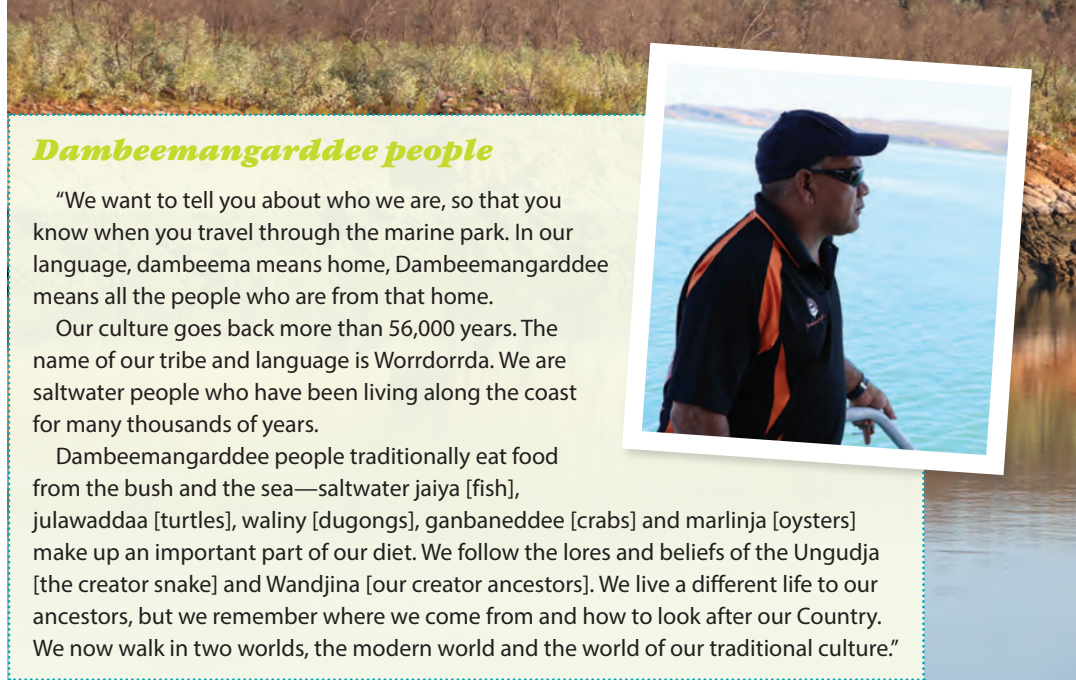
Photo – Samille Mitchell/DBCA

Left Mayala Marine Park.

Photo – Gina Lincoln/DBCA

Inset Mayala woman Alexis Vincent examines a reef exposed by the tide.

Photo – Peter Nicholas/DBCA



Dambeemangarddee people

“We want to tell you about who we are, so that you know when you travel through the marine park. In our language, dambeema means home, Dambeemangarddee means all the people who are from that home.

Our culture goes back more than 56,000 years. The name of our tribe and language is Worrorra. We are saltwater people who have been living along the coast for many thousands of years.

Dambeemangarddee people traditionally eat food from the bush and the sea—saltwater jaiya [fish], julawaddaa [turtles], waliny [dugongs], ganbaneddee [crabs] and marlinja [oysters] make up an important part of our diet. We follow the lores and beliefs of the Ungudja [the creator snake] and Wandjina [our creator ancestors]. We live a different life to our ancestors, but we remember where we come from and how to look after our Country. We now walk in two worlds, the modern world and the world of our traditional culture.”

as a site for traditional fishing and hunting. It’s particularly revered for its culturally important waddaroo [reefs] and jindirm [mangroves] which provide nursery areas for jaiya [fish] and serve as sites for customary activities.

Nearby Garngarngaddaj (Strickland Bay) and Duddgoo (Graveyards) special purpose zones also project sites rich in cultural significance.

Deputy Chair of the Dambimangari Aboriginal Corporation and Dambeemangarddee Traditional Owner Leah Umbagi says being on Country is key to keeping such stories alive.

“When we are on our own Country we feel connected, we feel powerful, we feel rich because everything is around us,” she said.

“The marine park has given us protection of the Country, which is good, and we’re really grateful that we get that protection and our rights and our say on what’s important to the Country.”

CARING FOR COUNTRY—NOW AND IN THE FUTURE

For the Traditional Owners, the new marine parks don’t just protect the natural environment but also cultural history.

They support Traditional Owners to co-exist with the land and sea in the way of their forefathers—hunting traditional food, protecting sacred sites and conducting on-Country ceremonies.

This provides opportunity to pass such traditions on to their children, helping to maintain cultural practices and traditions.

Traditional Owners also hope to ensure a brighter future for their people, with new opportunities for culturally and environmentally sensitive tourism, ranger programs and the ability to share this special part of the world with visitors.

With such plans, you get the impression the ancestors would approve.

With the sun rising higher in the morning sky, Mayala man Alec Isaac says

it’s being here on Country that helps him best connect to the spirit of his ancestors.

“I feel closer to them here,” Alec said, patting his heart.

“They’re always in my heart and, for some reason, being here, you can feel them, their presence.

“[The marine park] will help us keep this area preserved... that’s what they [the ancestors] have been doing for thousands of years.”

Top left Yalgoon, Maiyalam Marine Park.
Photo – Peter Nicholas/DBCA

Above right Maiyalam Marine Park.

Above inset Dambeemangarddee man Geoff Nevill.
Photos – Gina Lincoln/DBCA

Below Bardi, Jawi, Mayala and government representatives at Ooloogijii (Lachlan Island).
Photo – Michael Higgins/DBCA



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Live fast DIE YOUNG

Fire ephemerals and their
conservation management

by Dr Carl Gosper, Bree Phillips, Megan Dilly and Dr Tanya Llorens





Careful observers of the Australian bush may have noticed that, following fires, there are often more plant species present in the live vegetation than there were beforehand. Some of these newly appeared species recruit from seeds stored in the soil and can initially be abundant, yet disappear after a few years, only to reappear later after another fire. These species are known as fire ephemerals.

Fire ephemerals thrive in the post-fire environment and persist as seeds in the soil for decades to centuries between fires. These specific adaptations create unique opportunities and challenges for their conservation management.

Most terrestrial plant species in Western Australia have traits that allow them to persist through fires, either as individuals or populations. These traits have been shaped by evolution in a landscape with recurrent fires over millions of years.

Fire ephemerals are plant species whose germination is strongly driven by fire, often germinating after fires en masse, and which then rapidly grow and complete their life cycle of flowering and setting seed in one to a few years after fire. They then disappear from the above-ground vegetation for the bulk of the period between fires, existing as a long-lived soil-stored seed bank.

This fire response strategy allows fire ephemerals to take advantage of lower competition with other plants for light, water and nutrients shortly after fires.

Adaptations for the fire ephemeral strategy include a highly persistent, soil-stored seed bank that potentially retains viability over decades to centuries between fires; seed dormancy mechanisms that are broken by fire cues (usually heat and/or smoke, often in combination with in situ weathering in the soil) allowing germination to be timed to post-fire conditions; rapid growth; and early flowering and seeding.

Fire ephemerals occur in many ecosystems across WA, from deserts to woodlands, heathlands and forests. They are often most noticed in ecosystems and locations that burn infrequently, either due to natural features or anthropogenic landscape changes.

Opposite page

Top Glandular raspwort (*Haloragodendron glandulosum*).

Photo – Rob Davis/DBCA

Inset far left Prescribed burn at Mollerin Nature Reserve.

Photo – Laurent Marsol/DBCA

Inset left Newly-germinated net-veined Gyrostemon (*Gyrostemon reticulatus*) after a prescribed burn at Mollerin Nature Reserve.

Photo – Bree Phillips/DBCA

Background Soil; bushfire flames.

Photos – Klikk; Sebastian/Adobe

Inset above Fire ephemerals recorded after the Two Peoples Bay Nature Reserve bushfire. The Vulnerable Northcliff *Kennedia glabrata*.

Photo – Megan Dilly

Above right and opposite page far left *Gyrostemon reticulatus* seeds.

Photo – Andrew Crawford/DBCA

Fire ephemerals

Fire ephemerals range in growth form from herbs, grasses and groundcovers to shrubs and small trees, and occur across diverse plant lineages. Examples include:

Family	Species	Common name
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>	Native poplar
Solanaceae	<i>Anthocercis littorea</i>	Yellow tailflower
Macarthuriaceae	<i>Macarthuria keigheryi</i>	
Araliaceae	<i>Hydrocotyle phoenix</i>	Fire pennywort
Apiaceae	<i>Actinotus leucocephalus</i>	Flannel flower
Poaceae	<i>Austrostipa compressa</i>	Speargrass
Malvaceae	<i>Alyogyne hakeifolia</i>	Native hibiscus



Top *Macarthuria australis*.
Photo – Eddy Wajon/Sallyanne Cousins
Photography

Top right Post-fire flush of flowering of
annuals and fire ephemerals after a prescribed
burn in Mollerin Nature Reserve.
Photo – Bree Phillips

Above Native grass *Austrostipa compressa*
flourishing after a recent fire.
Photo – Eddy Wajon/Sallyanne Cousins
Photography

Opposite page

Left DBCA Wheatbelt staff using a
flamethrower to ignite a prescribed burn at
Mollerin Nature Reserve that led to substantial
recruitment of the Critically Endangered fire
ephemeral *Gyrostemon reticulatus*.
Photo – Laurent Marsol/DBCA

Far right Critically Endangered *Gyrostemon*
reticulatus that germinated en masse after a
prescribed burn in Mollerin Nature Reserve.
Photo – Bree Phillips/DBCA

Inset right *Gyrostemon reticulatus*.
Photo – Andrew Crawford/DBCA

OPPORTUNITIES AND CHALLENGES IN CONSERVATION MANAGEMENT

The unique ecology of fire ephemerals offers opportunities and challenges for their conservation management in the context of fire events, primarily through their limited lifespan as mature plants but long persistence, often undetected or unquantified, in the soil-stored seed bank.

The transient nature of adult plants presents a time-limited opportunity for conservation actions involving live plants. Monitoring of population size and extent, ecological study or observation, or conservation seed collection (such as for banking at the Western Australian Seed Centre) is only practical within a few years post-fire before the species retreats to the soil-stored seed bank.

Seed banks with putatively considerable longevity and strong responses to fire stimuli provide opportunities for the use of prescribed burns to recover live plant populations of fire ephemerals, even where mature plants have long been absent. Therefore, prescribed burns and bushfires can lead to unexpected discoveries of fire ephemerals.

Nevertheless, conservation managers face complex decisions over where, when and how frequently it may be desirable to use fire to stimulate recruitment in fire ephemerals, compounded by gaps in knowledge of the seed bank ecology of many species.

CONSERVATION ASSESSMENT OF FIRE EPHEMERALS

Listing a species of conservation concern as threatened under the *Biodiversity Conservation Act 2016* provides greater legislative protection and a focus for conservation management.

To qualify for listing, however, it first must be established that the species has been adequately surveyed. The global standard IUCN (International Union for Conservation of Nature) Red List criteria are then used to quantify scientific metrics relating to population size reduction, restricted geographic range and small population size and decline.

Compiling this information can be particularly difficult for fire ephemerals that occur in landscapes with very low fire frequencies, most notably WA's Wheatbelt, where countless species-rich but highly fragmented vegetation



“Seed banks with putatively considerable longevity and strong responses to fire stimuli provide opportunities for the use of prescribed burns to recover live plant populations of fire ephemerals, even where mature plants have long been absent.”



Planned population recovery of *Gyrostemon reticulatus* through prescribed burning

Gyrostemon is a genus of fire ephemerals with 14 species in Western Australia. Four of these are recognised by the Department of Biodiversity, Conservation and Attractions (DBCA) as data deficient, meaning they have insufficient population information to robustly assess their conservation status. A further species, net-veined *Gyrostemon* (*Gyrostemon reticulatus*) is Critically Endangered.

Historically known from less than 10 scattered locations across the northern Wheatbelt, *G. reticulatus* was once thought extinct, having not been recorded between 1938 and 1990. However, even if this species was not present in the above-ground vegetation over this period (although that cannot be known), it clearly remained extant as persistent seeds in the seed bank, from which above-ground plants intermittently emerged after fire.

Gyrostemon reticulatus is threatened because of extensive vegetation clearance for agriculture leading to fragmentation of populations across its small range, and continuing decline in habitat quality.

The rarity of fire in Wheatbelt remnants over recent decades, due to disrupted patterns of fire ignition and spread combined with fire suppression efforts, has likely contributed to the paucity of recent records.

In 1999, a single collection of *G. reticulatus* was made by Greg Keighery in Mollerin Nature Reserve in the northern Wheatbelt and lodged with the Western Australian Herbarium, yet no plants had subsequently been recorded at this site. The herbarium record suggested that the area had burnt shortly prior to collection.

In autumn 2019, DBCA Wheatbelt Region planned a small, 12-hectare burn within the vicinity of the population that aimed to stimulate recruitment from soil-stored seed and determine the accuracy of the population location.

Scrub rolling was used as a tool to increase fuel availability in the burn area to ensure the heat pulse from the burn was high enough to trigger germination. Interestingly, the scrub rolling resulted in some germination of *G. reticulatus* prior to the burn.

The germination requirements of this species are complex and poorly understood, however it is thought that seed dormancy is physiological with seasonal dormancy cycling and requires an after-ripening period.

The burn was delayed due to the germination, however the plants followed the typical ‘live fast, die young’ strategy of fire ephemerals by growing quickly, reproducing and senescing within a few years of germination. As a result, part of the burn was successfully undertaken in autumn 2022.

The burn resulted in the mass germination of *G. reticulatus*, with the population currently estimated as approximately 50,000 mature and 11,000 juvenile individuals, replenishing the soil-stored seed bank through survival of plants through to reproductive maturity.

This outcome was a great success in itself, but it also allowed DBCA to survey the population, map the boundary, and collect seed for long-term storage at the Western Australian Seed Centre in Kensington, potentially for use in future conservation actions.

The successful burn paved the way for further burns to be undertaken in adjacent suitable habitat in Mollerin Nature Reserve and possibly other areas of remnant vegetation to determine the true extent of distribution of this species.

More broadly, DBCA is undertaking prescribed burns across a range of Wheatbelt nature reserves to address vegetation senescence arising through the widespread long-term absence of fire. These burns are initiating recruitment of fire ephemerals and other plant species and in doing so are contributing to maintaining the Wheatbelt’s extraordinary plant diversity.





Surprise discovery of a new *Hydrocotyle* species after bushfire

In 2015, bushfires caused by dry thunderstorms affected all of Megan Dilly's Master's research sites.

While she considered the consequences for her research, she explored the freshly burnt areas with her supervisors, Professor Steve Hopper (UWA) and Sarah Barrett (Conservation Officer - Flora, Albany District DBCA), to document the flora.

A site at Two Peoples Bay Nature Reserve had been actively managed to exclude fire for the conservation of threatened fauna and had not burned in the 70 plus years records had been kept, other than a few previous lightning

ignitions that were contained to small areas. Along with the post-fire flush of flowering expected after a fire and a profusion of annuals, the group also recorded several interesting fire ephemerals, such as the Northcliffe Kennedia (*Kennedia glabrata*), a Vulnerable (threatened) species, almost 100 kilometres east of its previously known range.

They also discovered an unusual pennywort (*Hydrocotyle*) species none of the three recognised that had germinated in only two very localised areas in gullies, one in Torndirrup National Park and the other in Two Peoples Bay. It did not match any published material, nor did it match any specimens at the Western Australian Herbarium.

Neither consultant botanist Libby Sandiford nor Mike Hislop of the Western Australian Herbarium could identify it, confirming it was something unknown. They sent the specimen to the Araliaceae expert Andrew Perkins at the Western Australian Herbarium who declared it to be an undescribed *Hydrocotyle* species (later named as *H. serendipita*).

The genus *Hydrocotyle* is mostly perennial but includes some annual species. All 35 annual species occur in Australia with 28 occurring in the south-west of Western Australia. Many of these annual species are ephemeral, growing for a few months of the year following good rains.

However, no fire ephemeral species had been known to occur in *Hydrocotyle* until the year before this new discovery, when in 2014 an undescribed species was discovered by Rob Davis of the Western Australia Herbarium in recently-burnt forests near Northcliffe.

This species was named as *H. phoenix*, as it rose from the ashes and appeared to be closely related to *H. serendipita*. Both *H. phoenix* and *H. serendipita* are regarded as data deficient by DBCA.

Both these fire ephemeral *Hydrocotyle* are very short-lived and appear very restricted in range, so their chance discovery was indeed lucky. With only a short timeframe to document and assess *H. serendipita*, in another stroke of luck, Dr Anne Cochrane from the Western Australian Seed Centre in Kensington was present when *H. serendipita* was discovered at Two Peoples Bay and was able to collect seed before it disappeared from the above-ground flora back into the seedbank.



Inset above Fire ephemerals recorded after the Two Peoples Bay Nature Reserve bushfire—the previously unknown *Hydrocotyle serendipita*, now regarded as data deficient.

Left Green shoots of resprouting plants emerging after a bushfire swept through the heathland of Two Peoples Bay Nature Reserve.
Photos – Megan Dilly

Top Megan Dilly conducting fieldwork at Two Peoples Bay Nature Reserve.
Photo – Sarah Barrett/DBCA

Above Yellow tailflower (*Anthocercis littorea*).
Photo – Marie Lochman





remnants have remained unburnt for many decades.

Some challenges can include conducting a census of the number of mature individuals and decline over time if the presence of live plants is highly unsynchronised across populations; distinguishing population declines driven by threats from natural fluctuations; determining whether a long-unseen population can be considered extinct; assessing geographic range; and assessing threats to live plants when the plants are rarely seen.

Similar challenges are encountered when assessing whether a fire ephemeral species is eligible for listing as extinct under the Biodiversity Conservation Act—how long is it reasonable to wait after the plant was last seen?

Similarly, fire ephemerals listed as threatened or listed by the Department of Biodiversity, Conservation and Attractions (DBCA) as priority flora can require special consideration during the Environmental Impact Assessment process when identifying risks posed to the species by a proposed development or action.

Field surveys and existing records can often not be relied upon to reveal a fire

ephemeral's presence at a long-unburnt site, and knowledge of its biology and ecology may be lacking. It is therefore necessary to use the precautionary principle, take a case-by-case approach and carefully weigh the best scientific information available to assess the likelihood that the species is present at a site, the population's probable size and extent, and how important the population is to the species as a whole.

If a fire ephemeral is thought to possess long-lived seeds and has previously been recorded at a site, it is usually assumed that the population still persists within the soil seedbank. This is true even if it has not been seen for decades, providing the habitat has not been significantly altered or degraded through too-frequent fire or disturbance.

If a fire ephemeral has not been recorded previously from a long-unburnt site, knowledge of its geographic distribution and habitat preferences are key. Occurrence can be more easily and accurately predicted for species that are restricted, both geographically and to a specialised habitat type, compared with those with a less specific (or unknown) habitat preference, which pose additional challenges.

Above left Flannel flowers (*Actinotus leucocephalus*).

Photo – Simon Cherriman

Above Lilac hibiscus (*Alygone huegelii*).

Photo – Sallyanne Cousins

Inset above *Androcalva adenothalia*.

Photo – Rob Davis/DBCA

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Orienteering

in Julimar State Forest

by Conor Doherty

Always keen to try something new, Conor Doherty recruited a trusty friend and headed off on a sunny autumn morning to Orienteering WA's second bush event of the 2023 season: Spice Brook.



In orienteering, competitors navigate a course from point to point, in a specific order, using a map and compass. Courses can take up to a few hours to complete, ranging in physical and mental difficulty.

I was eager to give it a go but had no idea how to use a compass and wasn't keen on getting lost. Most orienteers compete as individuals, but as you can also enter as a team I figured two heads (and compasses) might be better than one and asked around amongst my friends in the hope of finding a willing accomplice.

Luckily, my friend Jean-Charles was keen and had previously done some rogaining—a cross-country sport similar to orienteering where teams race to locate as many checkpoints as they can, in any order, in a set time period—and we set off for Julimar State Forest.

SELECTING A COURSE

There were eight courses on offer at Spice Brook, one each rated 'very easy', 'easy' and 'moderate' navigational difficulty, and five courses of differing lengths rated 'hard'.

After discussing our options with Carol, one of the friendly volunteer event hosts, Jean-Charles and I settled on the moderate course, which was 3.8 kilometres in length and involved 120 metres of climbing.

Carol helped us register as casual participants for the day and showed us how to clear our e-tags and use them to check in at each control point.

Then, after a quick lesson from Jean-Charles on how to set my compass, we set off to the start point to collect our maps and control description sheets and start our adventure.

.....
Main Julimar State Forest.
Photo – Conor Doherty/DBCA

Inset left Spice Brook participant map.

Inset centre Participants pre-start.

Inset right Ready, set, go!
Photos – Ken Post



ORIENTEERING

We had to navigate through bushland, scrub and dry creeks to find most of our control points, which were a few hundred metres apart.

On our course, being of moderate navigational difficulty, most of our control points aligned with geographical features on the map such as gullies or tracks. This meant if we went off-line, we could usually locate our control point by following the gully or track, once we hit it, in the direction we thought the checkpoint probably was.

As a first-time orienteer, tackling the course as part of a pair meant I had the reassurance of being able to set my direction on my own, but then check

with Jean-Charles that we agreed on the direction we should go before heading in search of the next control point.

On at least one occasion I would have walked 180 degrees in the wrong direction had I not had Jean-Charles to cross reference with. He graciously assured me this occasionally happens to everyone.

It was a beautiful morning and we were in no great rush, eventually completing our course in one hour and 40 minutes, having successfully found all 15 control points, and finishing fifth in our category.

GETTING HOOKED

The experienced orienteers mostly seemed to know each other and we were quickly recognised as newcomers, but warmly welcomed.

After finishing our course, I chatted with Hadrien and Ellie, who orienteer most weekends, and with Jan, who's been orienteering for more than 40 years and is Vice President of Orienteering WA. Their love for the sport was clearly evident and their enthusiasm for it infectious.

Hadrien coordinates Orienteering WA's mountain bike events, held about once a month over winter, and explained



to me how the clubs go about setting courses and how the navigational difficulty is determined by the location of control points in relation to the area's geographical features.

Jan told me how she came across the sport fortuitously in Canada when she picked up a pamphlet for an orienteering event being held the next day. After heading along, she said she was "hooked straight away".

"I like being out in the bush and like that it's a combination of the physical and mental challenge. It requires you to understand how your body and mind respond to physical pressure," Jan said.

"But what I love most about it is that it's a sport for life. People of all ages are involved."

Above left Orienteering participants pre-event start.
Photo – Ken Post

Above right Out on the course.
Photo – Conor Doherty/DBCA



Top Ready to tag at the control point.

Above Tagged!

Above right Course done.

Right Spice Brook Orienteering Course.

Far right What a great day.
Photos – Conor Doherty/DBCA

This was certainly evident at the Spice Brook event. I was overtaken at one point by a boy of about 12 (who clearly wasn't orienteering solo for the first time!), and saw people ranging in age from teenagers through to their 70s and 80s.

GETTING LOST? NOT LIKELY

While most orienteers seemed quite serious, the vibe was convivial and I have no doubt anyone in attendance would have stopped to assist another orienteer needing help.

For all courses at Spice Brook, had you become lost or encountered difficulties, heading due north would have taken you straight to a main track from where you could have easily found the way back to the assembly area.

Do it yourself

Who can orienteer? Most people—very easy courses are only 2–3 kilometres long and can be navigated without a compass. Some events even have short string courses that can be attempted by very young children and toddlers.

When is it? Check Orienteering WA's website for upcoming events. Bush and mountain biking events are held over the winter months and events are held in urban, metropolitan settings over summer.

What do I take? Water and a compass, if you have one, or you can borrow a compass on the day. If you haven't pre-registered make sure you take cash as many locations don't have reception to enable card payments.

Wear long pants as it's scratchy, running or hiking shoes, and sun protection.

Information about orienteering including how to get started, upcoming events, frequently asked questions and information about 'Anytime Orienteering' can be found on Orienteering WA's website:
wa.orienteering.asn.au



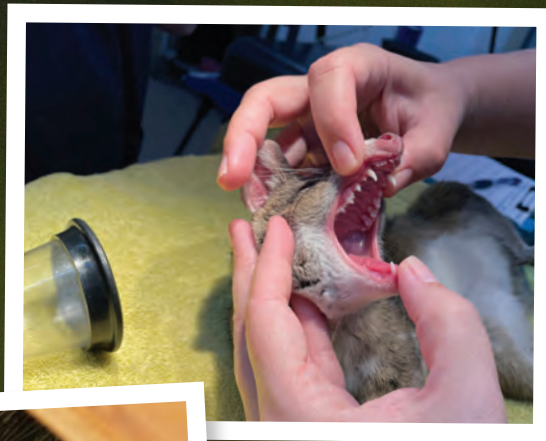
Orienteering
Western Australia

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The author would like to thank Hadrien Devillepoix, Ellie Sansom and Jan Fletcher for explaining the principles of orienteering, answering her many questions, and sharing their love and passion for the sport.

Operation **chuditch** **translocation**

by Ivy James





The chuditch, also known as the western quoll (*Dasyurus geoffroii*), was once found across 70 per cent of the Australian continent—from Western Australia across to Queensland, New South Wales and Victoria. Today, the distribution of wild chuditch is just five per cent of its former range; restricted only to the south-west of Western Australia.



The chuditch was once relatively abundant right across Australia, occurring in every mainland State and Territory, until European settlement when population numbers drastically declined.

Today, the species is among the top 20 priority mammals for conservation under the *National Threatened Species Strategy 2021–2031*.

Apart from translocated populations, the chuditch is restricted to WA's south-west, with the largest populations occurring in Wheatbelt reserves and the northern and southern jarrah forest.

Protection and recovery of chuditch from feral cats, foxes and bushfires across WA's south-west has been a focus of

“The process of discovery is exciting and rewarding, especially when the word ‘chuditch’ is exclaimed.”

conservation efforts by the Department of Biodiversity, Conservation and Attractions' (DBCA) *Western Shield* program since 1996.

In March 2022, DBCA partnered with Taronga Western Plains Zoo in New South Wales, translocating chuditch to enable their new critical conservation breeding program to commence.

Taronga's conservation breeding program has been designed to act as a source population capable of supplying large numbers of genetically and behaviourally robust chuditch to rewilding sites in NSW and across mainland Australia.

Six founding chuditch from Tone-Perup Nature Reserve in WA and an additional two founder chuditch from South Australia were translocated to the Taronga Sanctuary at Dubbo to form four breeding pairs.

Within the first year of the program, 17 offspring were born and 15 individuals were released into the wild at South Australia's Vulkathunha-Gammon Ranges National Park.

After a successful first year, the capacity of the breeding program was doubled in 2023.

Officers from Taronga Western Plains Zoo recently returned to WA's south-west to secure additional founders, this time venturing into the Batalling forest block in Muja State Forest, a 40-minute drive from the town of Collie, supported by a team of DBCA *Western Shield* ecologists and skilled volunteers.

THE MISSION: CATCHING CHUDITCH

It's no easy feat strategically setting up and then checking 100 traps across 50 kilometres within the Batalling forest block. The work is methodical, repetitive and cyclical.

Three young healthy females and one robust male from WA were needed to complete their 2023 breeding cohort.

The four-day mission was led by Dr Michelle Drew, *Western Shield's* zoologist. She mapped out targeted areas for capture by using data collected from monitoring deployed activities throughout the landscape for more than a decade.

Stops are made every 500 metres on a given trail and the work is divided between two teams who find a suitable spot to set the trap, bait it with a piece of chicken, record the site on a GPS and

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Previous page

Main Chuditch (*Dasyurus geoffroii*).

Photo – Jiri Lochman

Inset left Chuditch in a new nesting box.

Inset right Health checks are conducted on arrival.

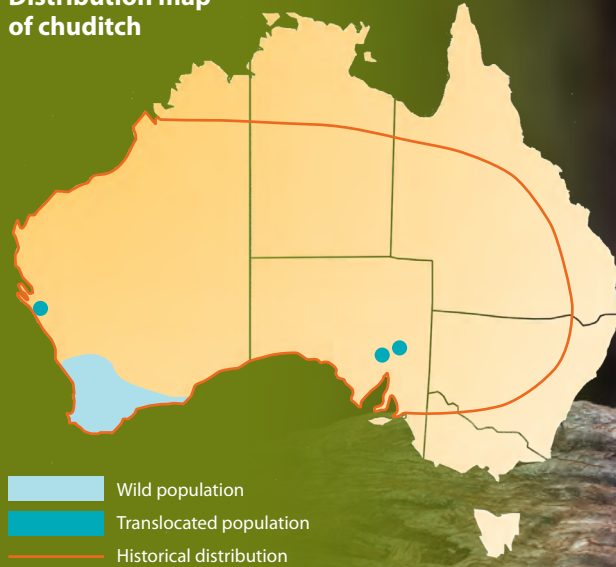
Photos – Taronga Conservation Society Australia

Above left Health check by Taronga Western Plains Zoo veterinarian.

Above right Chuditch health check.

Photos – Taronga Conservation Society Australia

Distribution map of chuditch



■ Wild population
■ Translocated population
— Historical distribution



tie tape around a nearby tree to serve as a marker. The hope is to return the following morning to find the trap closed with chuditch inside.

Armed with a head torch and clipboard, each team locates their traps and records whether they're found open or shut, whether bait is present or not, and checks that ants haven't taken over the bait.

The process of discovery is exciting and rewarding, especially when the word 'chuditch' is exclaimed.

Once a chuditch is caught, it's carefully extracted from the trap and the team checks if it has been microchipped previously and its sex, weight and other measurements are recorded. A little snippet from their ear is tubed for DNA testing and their teeth are also checked.

New captures are microchipped and bring much joy to the team.

Once the most appropriate candidates are selected for the breeding program, the individuals are placed in custom-made translocation carriers to await transport to their new home. The others are released back into the forest.

'MARRIED' AT FIRST SIGHT

Migration and 'marriage' await WA's chuditch cohort who first must make the long journey over east.

The chuditch are driven from Collie to a 'chuditch hotel' run by Native Animal Rescue in Perth where they rest for a few days before commencing the journey to Taronga Western Plains Zoo.

Upon arrival, they undergo a quarantine period and health checks before being moved into specialised breeding enclosures where they are introduced to their carefully selected mating partner.

Wildlife monitoring cameras allow Taronga staff to employ a hands-off approach and let the pairs breed with minimal disturbance. Breeding season commences in May, with birthing expected between May and September.

An interesting fact—chuditch have a short gestation of only 17 to 18 days and are supernumerary breeders producing up to 50 foetuses, of which only up to six can survive.

A VALUABLE PARTNERSHIP

The development of the interstate translocation strategy draws on the knowledge of a range of experts in chuditch ecology, capture, transport, ex-situ management and biosecurity, as well as veterinary expertise.

Extensive approvals and permits are required, and thorough risk analysis and planning is undertaken to ensure the



Above left Distribution map of chuditch in Australia.

Above right Chuditch in Dryandra Woodland. Photo – David Bettini

Left Chuditch health check. Photo – Taronga Conservation Society Australia



Chuditch facts and stats

- The chuditch is the largest carnivorous marsupial in WA, with a relatively short life-span of three to four years.
- They are one of four species of quolls in Australia and are related to the Tasmanian devil.
- The chuditch has mostly brown fur with distinctive white spots. It has large, rounded ears; a pointed pink muzzle; and a mostly black, bushy tail about three-quarters the length of its head and body.
- Head and body length: 26–40 centimetres.
- Tail length: 21–35 centimetres.
- Weight: 1.3kg (male) and 0.9kg (female).



success of the translocation and anticipate and overcome logistical challenges.

Taronga’s Wildlife Conservation Officer Rachael Schildkraut said the collaborative effort across State borders continues to enable the sharing of knowledge and expertise.

“The collaboration between Taronga and the DBCA *Western Shield* program has been integral to achieving positive conservation outcomes for chuditch. We’re looking forward to continuing to work with DBCA to build our program and its capacity to support reintroduction efforts,” Rachael said.

“The wildlife monitoring cameras we use in our conservation breeding program have increased our knowledge base by giving us an up-close and intricate look into the personal lives of the chuditch.

“We’re proud to bring that knowledge to the table and share it with experts in WA.”

WINS ALL ROUND

Monitoring conducted at Batalling forest block confirms the site is home to a healthy chuditch population and the team hopes to continue to see this upward trend.

A healthy chuditch population is symbolic of a healthy ecosystem, and improved predator management also has significant benefits for other species.

Under the *Western Shield* program, DBCA officers carry out baiting on a

network of sites across WA to control and reduce introduced animal predation on threatened native fauna.

“The fauna trapping undertaken at Batalling forest block over four nights in March resulted in the capture of 49 chuditch, that’s 12 more than the previous year,” Dr Michelle Drew said.

“Of the 49 captured this year, 37 were new animals and 12 were recaptures from previous years.

“Most of all, we’re delighted to have a strong selection of robust male and young female chuditch to pick from, to support and expand Taronga’s conservation breeding program for the second year in a row.

“We wish the Taronga team every success as they continue their important work.”

Above left Chuditch.

Photo – Jiri Lochman

Top right 100 traps were set up over 50km within Batalling forest block to support annual monitoring and harvesting.

Above right Western Shield Zoologist Dr Michelle Drew and Taronga Wildlife Conservation Officer Rachael Schildkraut.
Photos – Ivy James/DBCA

Right Chuditch young at nest.

Photo – Jiri Lochman



Ivy James is a Communications Officer with DBCA and has previously worked as a regional journalist and media coordinator. Ivy can be contacted at (08) 9219 9924 or ivy.james@dbca.wa.gov.au

AUSTRALIAN DESERTS: ECOLOGY AND LANDSCAPES



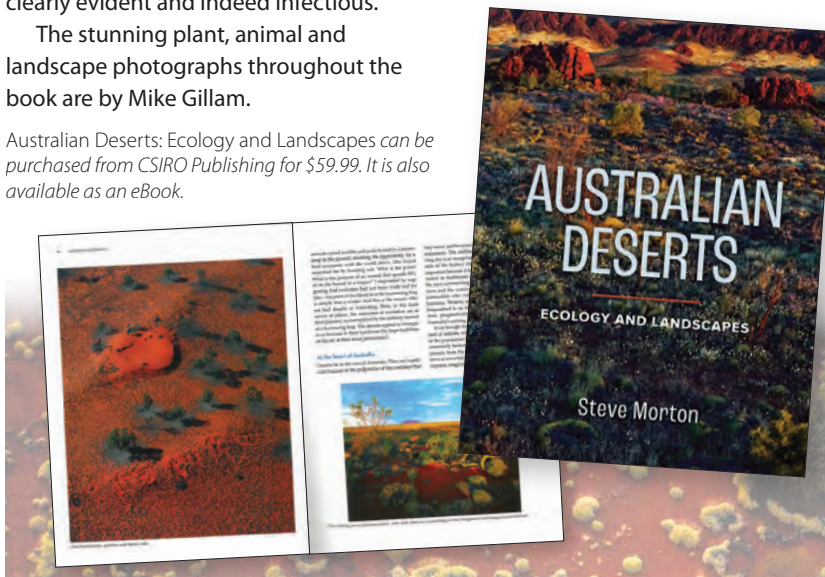
Three quarters of Australia's landmass is desert. However, few Australians experience more than a fleeting visit to inland Australia and perceptions of our deserts' plant and animal life are often driven by myth and imagined as immense and windblown sandy plains.

Written in narrative rather than scientific style, *Australian Deserts* guides readers through the ecological diversity across Australia's five million square kilometres of desert landscape. To the surprise of many, they're not all treeless, sandy plains. Rather, due to the 'boom and bust' pattern of rainfall, Australian deserts are in fact mainly shrublands, grasslands or even woodlands inhabited by plants and animals that can withstand the unpredictable and harsh conditions.

Dr Steve Morton is an Honorary Professorial Fellow with Charles Darwin University and a former CSIRO ecologist who spent much of his working life living in Alice Springs—the heart of inland Australia. His passion for desert inlands is clearly evident and indeed infectious.

The stunning plant, animal and landscape photographs throughout the book are by Mike Gillam.

Australian Deserts: Ecology and Landscapes can be purchased from CSIRO Publishing for \$59.99. It is also available as an eBook.



SUNSMART GLOBAL UV



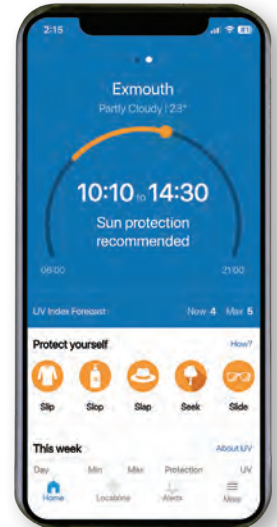
You now have the knowledge to protect yourself from the sun, not just at home but wherever you might be living or travelling around the world, thanks to the *Sunsmart Global UV* app.

The app provides daily UV alerts and sun protection times for pre-selected locations, a five-day UV and weather forecast, forecast UV levels, and times when it's recommended to use sun protection for any location around the world.

Sunsmart Global UV was developed by the Cancer Council and uses forecast information from the Bureau of Meteorology and live UV data from the Australian Radiation Protection and Nuclear Safety Agency to provide sun protection times across Australia and the world. The data are translated into simple health advice regarding sun protection.

A very useful app, particularly as the weather begins to heat up here in Western Australia.

Sunsmart Global UV is free to download from the App Store and Google Play.



STAR WALK 2



As a small child growing up in the country with little light pollution, I loved laying on the back lawn on a clear night and exploring the blanket of stars above.

Today's kids, and eager adults alike, now have the technology to know exactly what they're looking at using apps like *Star Walk 2*. This free app helps easily identify planets, stars and clusters in the sky, even when the view is blocked.

Its features include details on constellations, planets and positions of stars, 3D visualisations, factual data on stars, and the option to receive notifications about upcoming astronomical events. It is easy to use and relatively intuitive to navigate.

If you want more, for a one-off \$4.49 or \$1.49/month you can purchase a bundle that includes ad-free access and additional information about constellations, deep sky objects and the extended solar system.

The ideal app for amateur stargazers!

Star Walk 2 is free to download from the App Store and Google Play.

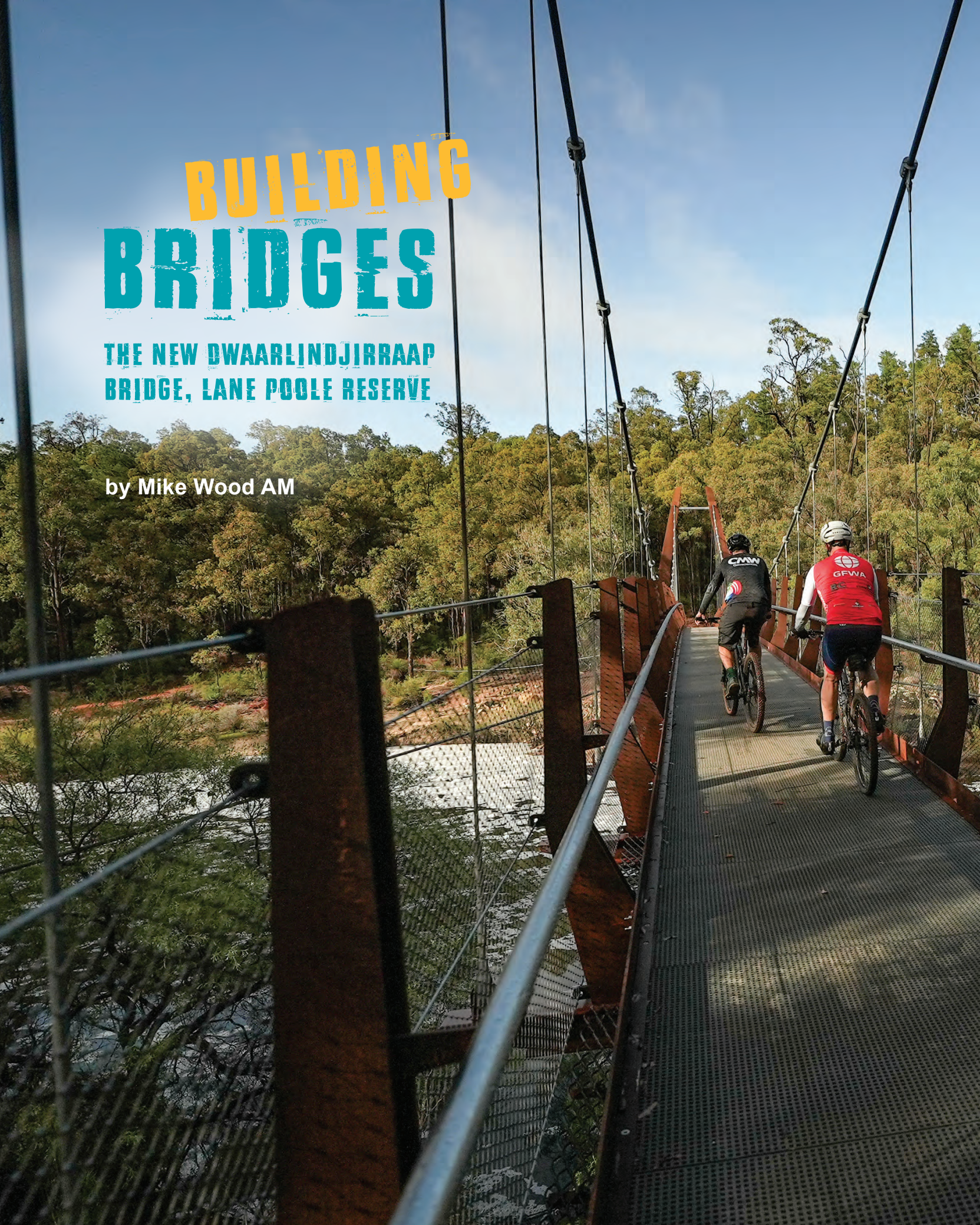


Night sky over Cape Le Grand National Park.
Photo – Aeyung Photography/Tourism WA

BUILDING BRIDGES

THE NEW DWAARLINDJIRRAAP
BRIDGE, LANE POOLE RESERVE

by Mike Wood AM





The new, 108-metre span suspension bridge across the Murray River at Dwaarlindjirraap, within Lane Poole Reserve, was a major component of the \$8.4 million Dwellingup Adventure Trails project.



From the start of the Dwellingup Adventure Trails project, planners from the Department of Biodiversity, Conservation and Attractions (DBCA) were aware that if they were going to utilise all the potential trail landscape in the area, they needed a safe way across the Murray River from the Dwaarlindjirraap day use area and Baden Powell campground. The idea for a walk and cycle bridge joining these popular locations to the Murray Valley mountain bike trails was born.

Completed in early 2023, the Dwaarlindjirraap bridge is an impressive and imposing steel and concrete structure that is proving popular with locals and visitors to the area.



Discover more about the Dwaarlindjirraap bridge's construction

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



FIRST GLIMPSE AT FIRST LIGHT

As the thick morning river mist starts to lift and clear, the towers of the Dwaarlindjirraap bridge begin to appear and take shape. The textured, weathered-steel blends in with the dull light, and the dappled shapes look like some giant industrial installation abandoned in the bush but still stretching to the sky.

Cloaked by the surrounding jarrah forest, even as the bridge starts to appear through the fog it can still be hard to see its full presence camouflaged by the trees.

As visitors approach the bridge through the forest, its shape changes from ethereal to solid as the mist starts to move and flow in an almost imperceptible breeze.

Stepping up to the bridge entrance it's now possible to comprehend the full size of the 108-metre span and the desire to get on the bridge platform and out into the middle of the bridge is strong.

The wet winter has lifted the Murray River, filling the river valley. The iconic rapids below the Baden Powell waterspout are roaring, but this bridge was built to withstand a once in 50-year flood, so the river passes easily below the bridge.



From the vantage point in the middle of the bridge, there is an uninterrupted vista, both upstream and downstream, where mesmerising, surging waters journey to the sea.

Not far downstream is the Nanga Road bridge that enables motorised vehicles to cross the Murray. It is a narrow, windy road that can be quite dangerous if cyclists and vehicles are on the road together. The Munda Biddi Trail has been realigned to cross the Dwaarlindjirraap suspension bridge to make crossing the Murray a much safer experience for cyclists on this iconic long-distance trail.

.....
Previous page

Main Two cyclists cross the Dwaarlindjirraap bridge.

Inset Dwaarlindjirraap bridge.

Inset below Trailhead, Murray Valley Adventure Trails.

Photos – Shem Bisluk/DBCA

Top Dwaarlindjirraap bridge.

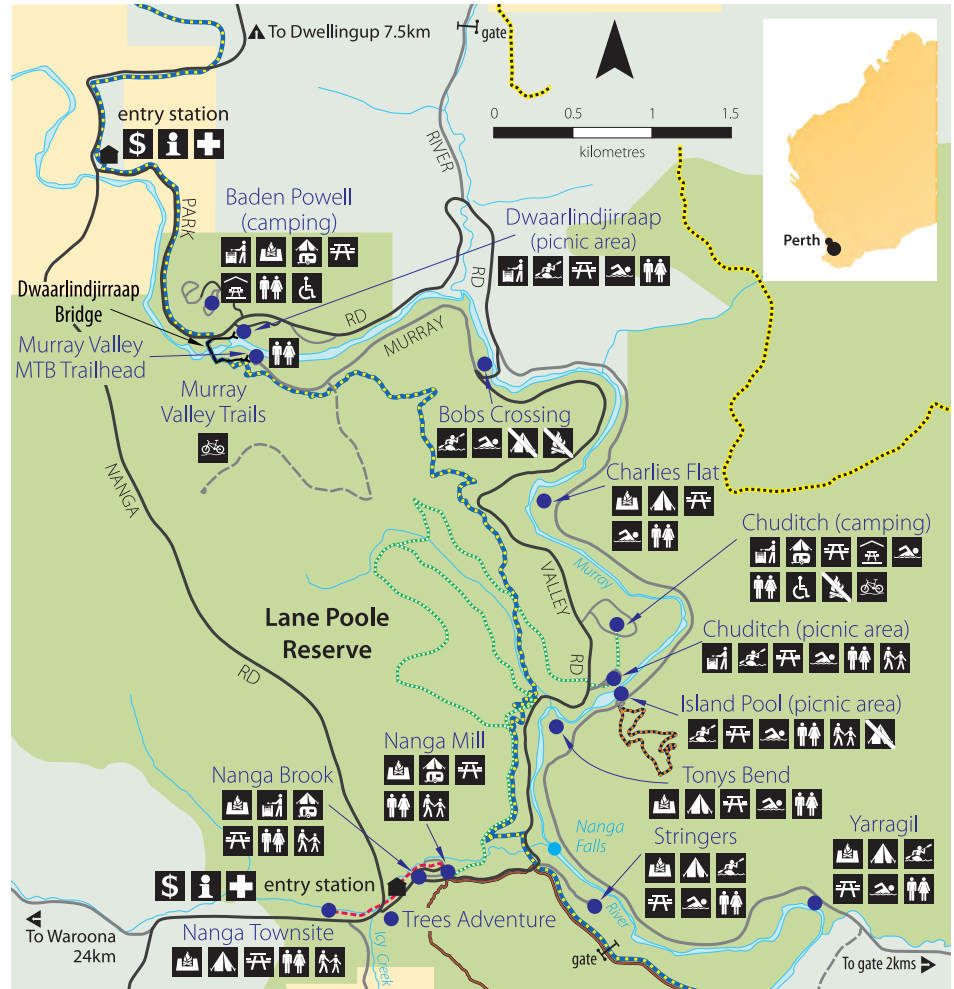
Photo – Peter Nicholas/DBCA

Top right The bridge during construction.

Photo – Emma West/DBCA

Above right A cyclist rides the Dwellingup Adventure Trails.

Photo – Rod Annear/DBCA



Legend			
	Sealed road		Chuditch Walk Trail
	Unsealed road		Island Pool Walk Trail
	Track		King Jarrah Walk
	Lane Poole Reserve		Nanga Brook Walk Trail
	State forest		Barbecue (gas)
	Bibbulmun Track		Camping
	Munda Biddi Trail		Camping & caravan area
	Canoe launch area		Sheltered picnic area
	Entry fee		Swimming
	Fireplace		Toilets
	First aid		Universal access
	Information		Walk trail
	Mountain biking		No camping
	Picnic area		No fires

CONNECTION TO COUNTRY

The Traditional Owners were integral at key stages of the project, which included heritage surveys to establish a suitable location for the bridge. Pinjarup Elders George Walley and Frank Nannup provided further insights into the cultural significance and importance of the area, and how their ancestors camped on the banks of the river gathering food and conducting family life.

“Dwaarlindjirraap is the Noongar name meaning ‘place of conversations’. Here is a place where we can be still and listen to nature, to relax and enjoy this place and to also show respect for this place,” George explained.

“In traditional Noongar society, the belief system saw the Woggaal Maadjit come this way, creating this pathway for water to flow. Maadjit is a name for snake. She came from the wardarn [ocean] and gave gabi [water] to the people, bringing the fresh water.”

The waterways are especially important and symbolic to Noongar people.

“Rivers are called bilya, which is the same name for umbilical cord, because the foods in the gabi and the gabi itself helped sustain life and the families who had their pathways and camps here.

“People would come up to the Kaada Moornda [Darling Range], where they

lived on foods from the bilya such as the marron, nyola [cobbler], gilgie and yaakan [oblong turtle].

“Also land animals such as yongka [kangaroo], weitj [emu], koomal [brush-tailed possum] and several types of lizards such as kaarda [sand goanna] and yoorna [bobtail].

Top left Dwaarlindjirraap bridge.
Photo – Peter Nicolas/DBCA

Above left Short-beaked echidna
(*Tachyglossus aculeatus*).
Photo – Simon Cherriman



“Dwaarlindjirraap is the Noongar name meaning ‘place of conversations’. Here is a place where we can be still and listen to nature, to relax and enjoy this place and to also show respect for this place.”

when we care for Country, we are caring for the ancestors,” George said.

VISITING DWAARLINDJIRRAAP BRIDGE

The bridge allows visitors to experience unique and ever-changing seasonal views of the river and gives bike riders direct access to the Murray Valley mountain bike trails on the southern side.

Future trail networks are planned in close proximity to the Baden Powell campground and Dwaarlindjirraap areas, including a new downhill mountain bike network called Toms Crossing. A kiosk will be constructed at Dwaarlindjirraap to provide equipment hire, beverages and food.

Building a bridge to cross the bilya, or river, is a physical manifestation of a cultural bridge, and perhaps a spiritual bridge between cultures, welcoming and encouraging each other to enjoy these special and important places.

Top left Cr David Bolt, Shire of Murray President; Robyn Clarke MLA, Member for Murray Wellington; and Maitland Hill, Traditional Owner, officially open the Dwaarlindjirraap bridge.
Photo – Shem Bisluk/DBCA

Top Bungarra or sand goanna (*Varanus gouldii*).

Above Oblong turtle (*Chelodina oblonga*).
Photos – Simon Cherriman

Left Dwaarlindjirraap bridge.
Photo – Peter Nicholas/DBCA

“The nyingarn [echidna] was a delicacy, as were various ducks.

“The boya [rocks] form an outcrop that stretches across the bilya. This outcrop is sacred and known to be millions of years old. This is a moorditj [wonderful] place.”

When the families visit here, they take the time to reflect on how the lands and waterways have sustained their health and spiritual wellbeing, and how vital it is that they maintain healthy natural systems now and into the future.

“The Noongar view is that the lands and waters, the rocks and trees, are all alive with the wirrin [spirit] of the ancestors, so

Mike Wood AM is a Communications and Community Engagement Officer within DBCA’s Parks and Wildlife Service. He is the former Chair of the Bibbulmun Track Foundation and a current board member of the foundation. He can be contacted at (08) 9219 8254 or mike.wood@dbca.wa.gov.au

The author acknowledges the Wilman and Pinjarup people of the Noongar nation as the Traditional Owners of the lands of the Dwellingup Adventure Trails.

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Insects represent the most diverse group of living organisms on the planet, with approximately one million named species. The total number of species that remain to be named is not known with certainty, but experts estimate that there might be as many as five million species.

This staggering diversity is under pressure from a variety of threats including habitat loss, climate change, pesticides and pollution.

While a few species are a nuisance—who hasn't cursed mosquitoes or bush flies?—the demise of these six-legged animals will have a flow-on effect in many other ecosystems. They provide innumerable ecosystem services including plant pollination, control of pests, removal of carrion, conversion of rotting plants into humus, water filtration and food for other animals.

With four million species yet to be described, entomologists continue to celebrate the diversity of the insect world and thousands of new forms of insects are described every year.

One of the most recent discoveries in Western Australia is a bug, and by 'bug' I mean a 'true bug'—the order Hemiptera. These insects are characterised by mouthparts that are modified into a stylet that is a long tube used to suck plant or animal fluids. Some of the more familiar hemipterans are cicadas, aphids, stink bugs and scale insects.

The newly-discovered Western Australian bug is a stilt bug, aptly named due to their extremely long, thread-like legs. They are members of the family Berytidae and are sometimes called thread-bugs. Most of the world's 200 species occur outside of Australia, and there were only seven described Australia species prior to 2022, and mostly from eastern Australia.

The new species was discovered and named by Dr Nikolai Tataric from the Western Australian Museum. A few specimens were found in the Cape Range area and a single specimen was later



Lamington stilt bug (*Arideneides cocosdiaspora*)

found at the summit of Mount Meharry in the Pilbara.

They range from 8.5 to 9 millimetres in body length, but their long legs and antennae give a larger overall length. Dr Tataric found that the new species couldn't be accommodated in any of the existing genera, and so he described a new genus that he called *Arideneides*, meaning a *Neides* (one of the original genera in this family) that lives in arid environments. The species was called *Arideneides cocosdiaspora*, meaning 'dispersed coconut' which is an allusion to the white setae against the brown body colouration that reminded him of a lamington, Australia's iconic and much-loved dessert.

Despite collecting trips in similar habitats in Western Australia, this lovely little lamington-coloured insect hasn't yet been found anywhere else. Nik collected the Cape Range specimens from a daisy bush of the genus *Olearia* that had woolly pubescence on the leaves and stems, and has glands that produce an aromatic exudate. It is not known how the bugs cope with the stickiness, but they may

Above *Arideneides cocosdiaspora* with left legs removed for DNA analysis.

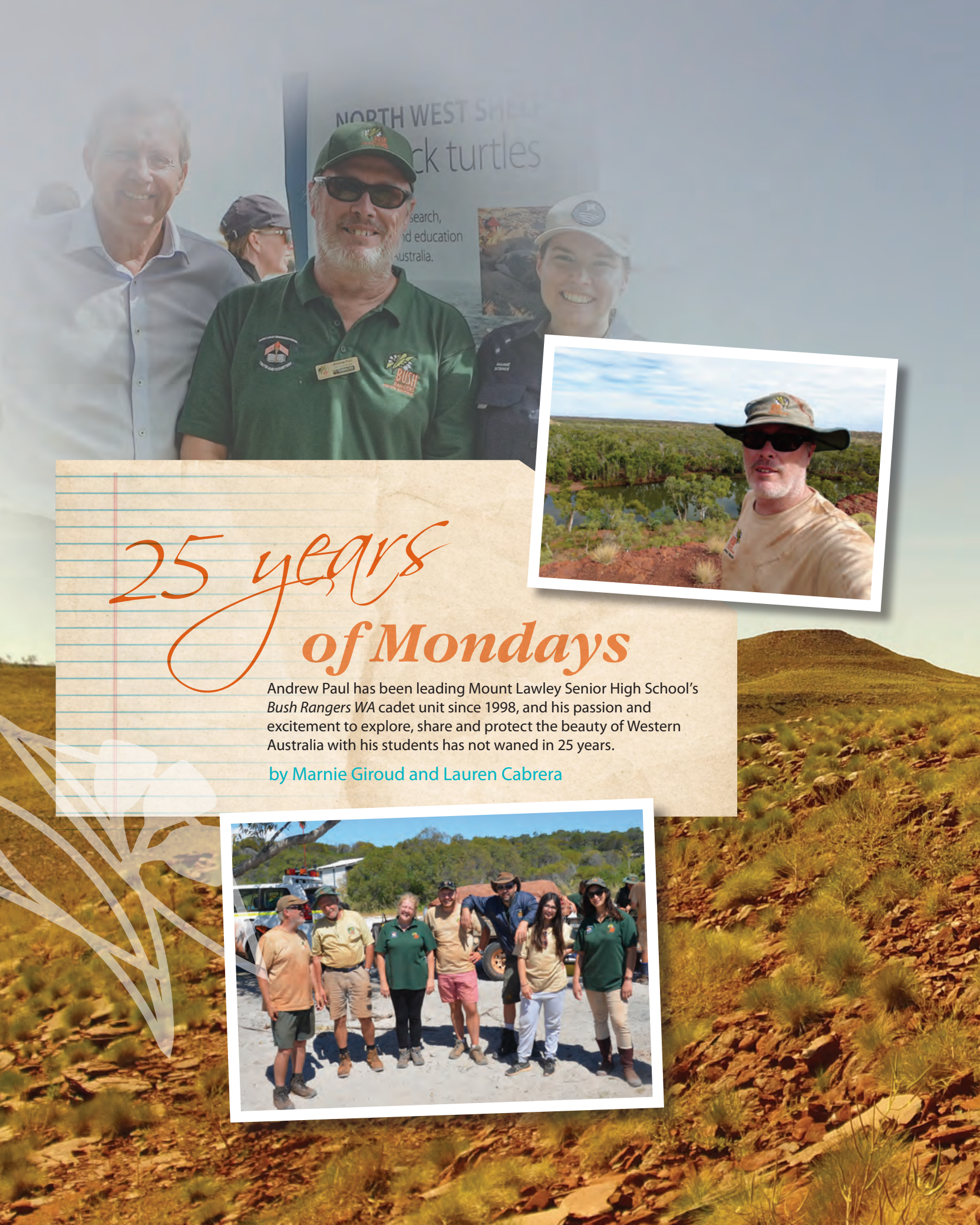
Photo – Nikolai Tataric/Western Australian Museum

use the plant to avoid predators such as spiders and carnivorous insects.

The eating habits of the lamington stilt bug are unknown, but it most likely feeds on plants like most other stilt bugs. Given that they were found on daisy bushes, it seems likely that they also feed on them, although this hasn't been proven.

The few specimens captured so far are micropterous, meaning that they have tiny non-functional wings. Related stilt bugs also have micropterous adults, but some also have brachypterous (short-winged) individuals in the same population. Neither life stage are able to fly, so their presence in Cape Range and Mount Meharry is peculiar.

The Western Australian insect fauna contains thousands of unique forms found nowhere else on earth. And thanks to Nik's painstaking research, there is now a lamington stilt bug.



25 years of Mondays

Andrew Paul has been leading Mount Lawley Senior High School's *Bush Rangers WA* cadet unit since 1998, and his passion and excitement to explore, share and protect the beauty of Western Australia with his students has not waned in 25 years.

by Marnie Giroud and Lauren Cabrera



Touched by nature



When Mount Lawley Senior High School Chaplain Andrew Paul caught wind of a new conservation cadet scheme for WA youth—*Bush Rangers WA*—he stopped the school principal halfway down the stairs to put his hand up to be the Cadet Unit Leader for the school.

Twenty-five years later, Andrew still proudly holds the position, and has grown the Mount Lawley *Bush Rangers WA* cadet unit from nine cadets to 125.

“What started as something that people didn’t understand has become a cadet unit with a fantastic and vibrant reputation within our school community,” Andrew said.

“Since 1998, we’ve been meeting every Monday after school for two hours to learn about camping and the environment, and to plan our next trip.”

The *Bush Rangers WA* cadet program is part of the wider *Cadets WA* program facilitated by the Department of Communities. The program is coordinated by the Department of Biodiversity, Conservation and Attractions (DBCA) and empowers young people in high school to explore and discover the importance of conserving Western Australia’s unique natural biodiversity.



Bush Rangers was established in 1998 alongside the Emergency Services Cadets, Police Rangers, Air Force Cadets, Army Cadets, Navy Cadets and Surf Life Saving Cadets. This year, Bush Rangers is proudly celebrating 25 years of empowering young people to play an active role in conserving WA’s natural environment, through practical hands-on experiences. Today, schoolteachers from more than 70 cadet units around the State dedicate time to the program, most of it voluntary, in addition to their regular teaching or assisting duties.

MAKING A DIFFERENCE

Cadets participate in a range of activities that develop leadership and life skills, and a sense of community responsibility and service, with tailored experiences for students with a range of abilities, giving them an opportunity to take part in conservation projects that make a real difference.

“The early days were tentative,” Andrew said. “The whole process was new. There was funding, so we started to buy some basic camping equipment—



.....
Previous page

Main Walking the Camel Trail in Millstream Chichester National Park, 2020.

Photo – Andrew Paul

Inset above background left to right

Environment Minister Reece Whitby, Andrew Paul and Clodagh Guildea at the 25th anniversary event, 2023.

Photo – Shem Bisluk/DBCA

Inset Camping at Millstream Chichester National Park.

Photo – Andrew Paul

Inset below A group of instructors returning from Millstream Chichester National Park, 2021.

Above Andrew with the first camp to have more than 100 attendees, Contos Beach, 2015.
Photos – Mount Lawley Bush Ranger Cadets

Left Ready to cover sandy dune areas with brush, Francois Peron National Park, 2022.
Photo – Andrew Paul



Hear more from Andrew Paul about cadets

Scan this QR code or visit Parks and Wildlife Service's podcast.



tents and rucksacks—and developed the start of our camping program.”

The benefits of the program go beyond conservation, by also making a positive contribution to the development of young community leaders.

“It is a chance for our senior cadets to practise their leadership skills, because they do most of the teaching,” he said.

“In preparation for the camps, senior cadets are in charge of the food, packing the equipment, organising our tents and making sure that everyone has a place to sleep at night. It means that they really do

get to practise leadership, and they pass on their roles to the new cadets before they leave.”

HANDS-ON CONSERVATION

Students complete tasks ranging from revegetation, rubbish collection, wildlife monitoring and fencing, both in their schools and in other areas.

“On the camps, cadets participate in a range of community service and conservation activities,” Andrew said.

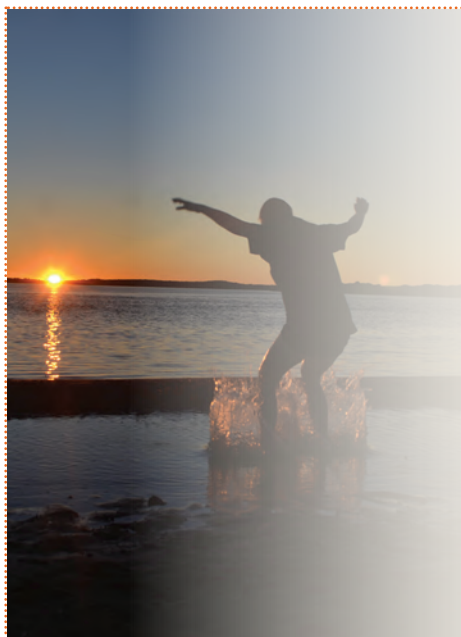
“We have brushed out tracks in Shark Bay, weeded in so many places I can’t

Above Finished! Sweeping debris from the Munda Biddi Trail near Pemberton, 2015.

Below Fun in a tidal pool at sunset, Big Lagoon in Shark Bay, 2017.
Photos – Andrew Paul

remember, helped to fix walking trails, cleaned marine debris from beaches, built new fences and removed old fences.

“We have worked in national parks as far afield as Francois Peron, Cape Range, Leeuwin-Naturaliste



Cadets WA

“The *Cadets WA* youth development program is funded and administered by the Department of Communities with goals to enhance the wellbeing of young people, plus develop a sense of community service and civic responsibility.

The program is delivered in partnership with host agencies that provide the curriculum, training and support to units operated by government and non-government schools.

Cadets participate in activities designed to develop self-confidence, knowledge, leadership, and life-skills to prepare them for the transition to adulthood. A recent program review confirmed that *Cadets WA* has a positive impact on the lives of young people involved and that it achieved most of its intended outcomes, such as community connection and personal development.

Through a strong and collaborative partnership between DBCA and Communities, Bush Rangers is the largest program type across all *Cadets WA* programs.

The success of Bush Rangers is evidenced by the fact it has the highest proportional levels of participation among female students, Aboriginal students, and students with a disability.”



Brad Cusworth – *Cadets WA*



“Personally, Bush Rangers has been a wonderful journey that has taken me all over the State.”

and D’Entrecasteaux national parks, learning about the areas and the specific environmental concerns.

“Through it all, the cadets have worked diligently, proud of the efforts they have made to help the environment.”

Cadet coordinators play a key role in supporting individual schools.

“It was the people who built our cadet unit,” he said. “It was the instructors, mostly teachers, who volunteered their time after school and at camps. They

encouraged and taught the cadets, which led them to see parts of Western Australia that they had never dreamed of.

“And it was the cadets as well, who quickly took a sense of ownership over the program and their part in it.”

SUPPORTING CADETS

A recent count showed there were nearly 2900 students supported by more than 320 unit leaders and instructors across WA. School teachers from cadet units volunteer their time to lead and support Bush Ranger cadets. These dedicated individuals give many hours to the program, most of it voluntary, in addition to their normal duties.

“I am indebted to the wonderful instructors who have helped me to build this wonderful cadet unit—people like

Vick, Kevin, Bill, Tanyuska, Sharon and Aimee. But best of all, we have been able to share it with the next generation, and to help them to appreciate and be inspired by our amazing environment,” Andrew said.

Bush Rangers WA still holds the title for the highest participation numbers from Aboriginal cadets, female cadets and students with disability across all the cadet programs in WA.

“Personally, Bush Rangers has been a wonderful journey that has taken me all over the State,” Andrew said.

“I have cleaned the weeds from Jindawurrunha Pool at Millstream, marvelled at the gorges of Karijini, swum with turtles at Turquoise Bay at Ningaloo, walked the beaches in the south-west, visited the enormous rocks of the Wheatbelt and looked across the stunning views from countless hilltops.”



Above Hauling marine rubbish in D’Entrecasteaux National Park, 2011.

Left A big day removing old station fencing in Francois Peron National Park, 2010.

Photos – Andrew Paul



BEYOND THE BUSH

River Rangers WA cadet program is also coordinated by DBCA and is aimed at primary aged students with an emphasis on understanding and helping rivers, estuaries and waterways.

“DBCA’s Parks and Wildlife Service has given the program a focus that has been nothing short of outstanding. The investment of their time in people influences the way that cadets see and enjoy the environment,” Andrew said.

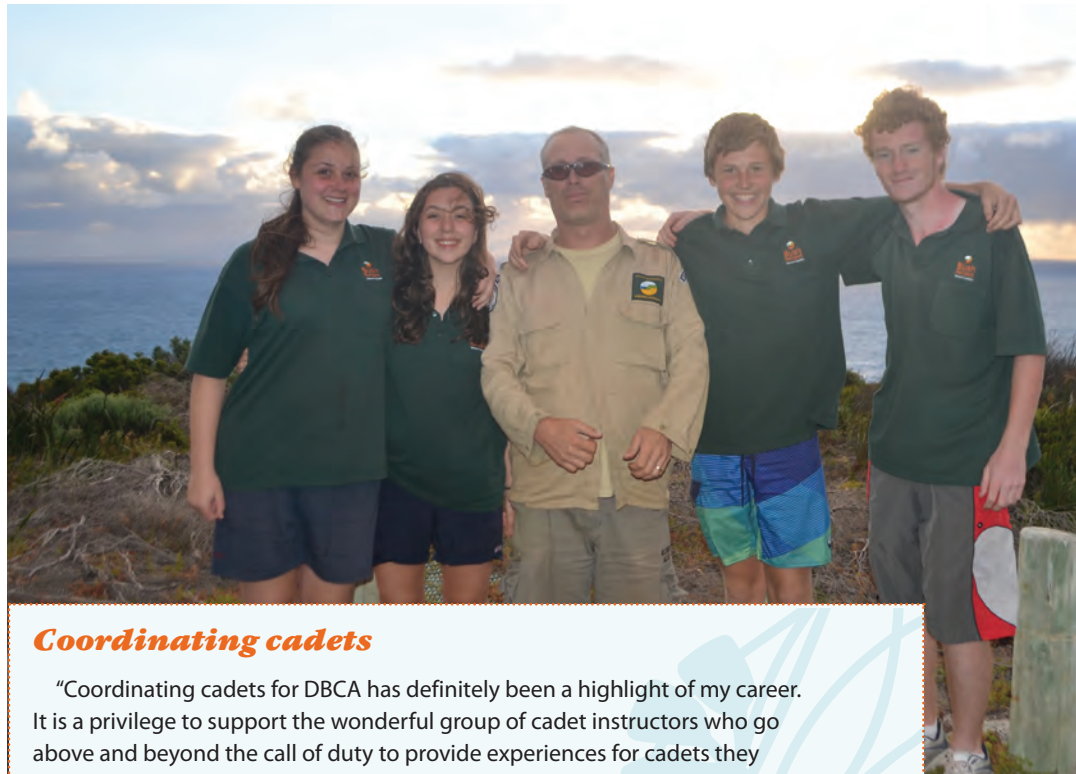
The program continues to help students understand how properly managing the natural environment can help ensure WA’s natural biodiversity assets are conserved and protected for future generations.

“It has been a busy 25 years, but extremely satisfying. We still meet up every Monday afternoon, and we still look forward to our next trip.”

.....
Top left Paddling on the Avon River, 2004.

Above right Andrew (centre) with year 12 students, D’Entrecasteaux National Park, 2013.
Photos – Mount Lawley Bush Ranger Cadets

Right Celebrating fun and friendship, Gladstone Lookout, Shark Bay, 2019.
Photo – Andrew Paul



Coordinating cadets

“Coordinating cadets for DBCA has definitely been a highlight of my career. It is a privilege to support the wonderful group of cadet instructors who go above and beyond the call of duty to provide experiences for cadets they would not otherwise have. I can’t think of a better way to inspire a life-long commitment to conservation in young people than the immersion that Bush Rangers provides through camps, exploring our wonderful landscapes and giving back to their communities and the environment.”

Richard Olive – DBCA Cadets Coordinator

“Bush Rangers and River Rangers cadets participate in some incredible on-ground conservation actions across WA including fauna monitoring, habitat restoration, clean ups and learning how to care for Country with Traditional Owners in their areas. The kids and teachers involved in these programs are inspirational and they support the department in our goal of ensuring that the natural assets of Western Australia are conserved, protected and valued. The future of WA’s natural environment is in good hands thanks to the Bush Rangers and River Rangers cadets programs.”

Marnie Giroud – DBCA Acting Cadets Coordinator



Marnie Giroud coordinates education programs through DBCA’s education and behaviour change team. She can be contacted at (08) 9295 2244 or marnie.giroud@dbca.wa.gov.au

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For more information on the Bush Rangers cadet program visit dbca.wa.gov.au. For information on DBCA’s Aboriginal Ranger Program, please visit dbca.wa.gov.au



Ancient ancestral beauty WA's south coast

Western Australia's south coast is stunningly beautiful, near-pristine and inspiring. With its expanses of white beaches, windswept headlands and waters teeming with marine life, the area makes a lasting impact on those who experience it.

by Lori-Ann Shibish and Dave Guilfoyle







The south coast of Western Australia is the ancestral lands and waters of around 3000 generations of Ganeang, Goreng, Minang, Kepa Kurl Wudjari, Ngadju and West Mirning people. There are many registered heritage sites along the south coast and continued connection to these places confirms the importance of the coastal and marine environment to Traditional Owners.

There are many songlines associated with the area that tell of the history and connectedness between people and nature, with all living things being interdependent. Traditional Owners care for Country to ensure that it remains healthy.

ISLAND HOME

The south coast is a biological hotspot of international significance and is currently under consideration for the creation of a marine park.

A jewel in the crown of the marine environment of WA's south coast is the Archipelago of the Recherche. The archipelago is a group of about 105 islands and more than 1200 rocks and reefs.

“The richness of biodiversity here includes many species that are found nowhere else on the planet such as the recently discovered ruby seadragon. They are a product of the dynamic forces of nature and isolation over millennia.”

The richness of biodiversity includes many species that are found nowhere else on the planet, such as the recently discovered ruby seadragon (*Phyllopteryx dewysea*). They are a product of the dynamic forces of nature and isolation over millennia.

The islands were once part of the mainland, and cultural leaders and archaeologists have recorded evidence of human occupation on the islands dating back thousands of years.

During the height of the last Ice Age (around 18,000 to 20,000 years ago), the polar ice sheets were large and global sea levels were much lower than today. At that time, the islands were all granite domes and headlands of these ancient coastlines.

With the end of the Ice Age, as the earth gradually warmed, the melting ice sheets and glaciers caused a long process of marine transgression, flooding the ancient coastal plain, wetlands, ridges, hills and rivers, and creating the spectacular coastline and islands.

Cultural features have been recorded on several islands, and the seafloor is being mapped showing water inundation

Previous page

Main Southern right whales (*Eubalaena australis*) use the coastline for birthing and nursing calves.

Photo – Birdseye Images

Above left Ancient inland wetland tree stump.
Photo – Tjaltjraak Native Title Aboriginal Corporation

Above Mosaic sea star amongst benthic marine life.

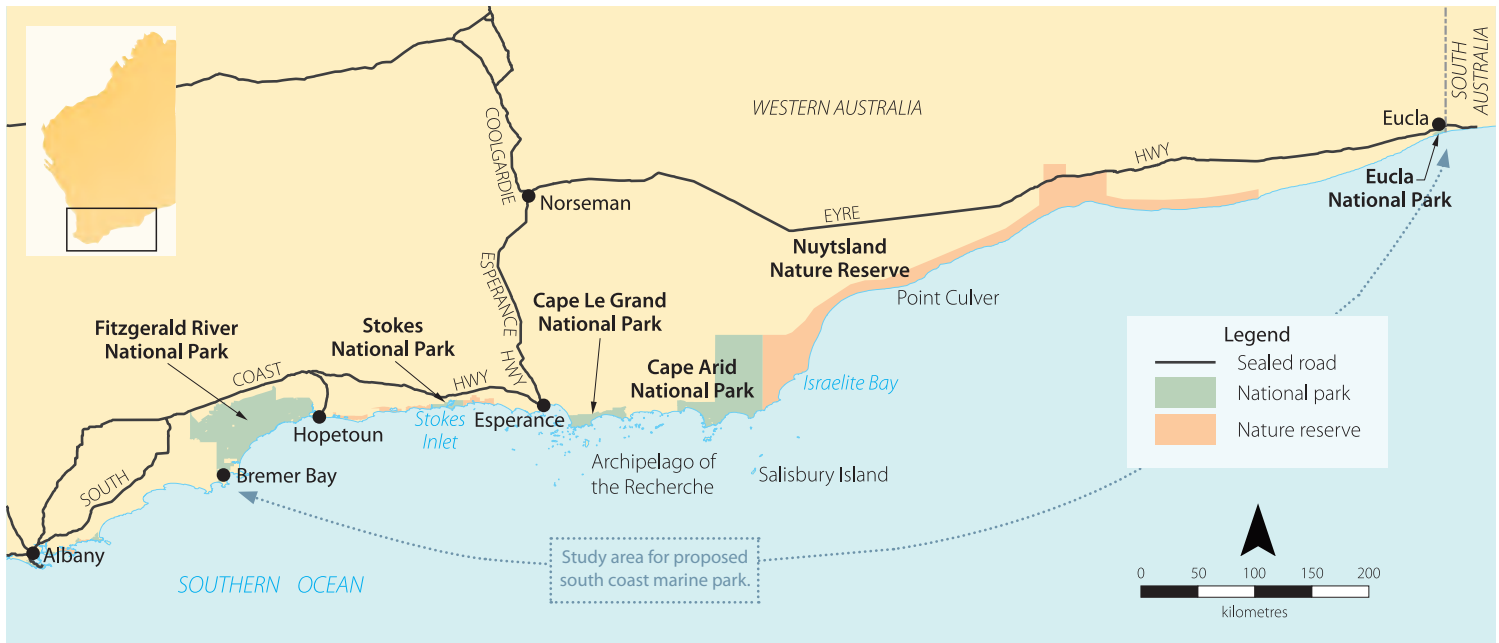
Photo – Peter Nicholas/DBCA

over time. The rising sea slowly reduced the roaming area of the ancestors of the Wudjari. Recently, Tjaltjraak Rangers made an exciting discovery of an ancient inland wetland buried under the sand dunes.

ABUNDANT LIFE

Besides being an area of high cultural significance to its Traditional Owners, the south coast environment is home to the Great Southern Reef, an ecological wonder. The reef's main feature is its extensive kelp seaweed forests, which is one of the most productive ecosystems on the planet.

Here, one can find fish, rays, crustacea, sponges, sea stars, sea urchins, cephalopods (squid, octopus, cuttlefish, nautilus) and many types of mollusc (snails, shellfish). There are three endemic species of seadragons living on the Great Southern Reef—the weedy (*Phyllopteryx*



Discover tales of saltwater country

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

Above Leafy seadragon (*Phycodurus eques*) with eggs.
 Photo – Ann Storrie

Right Cape Arid National Park coastline.
 Photo – Carolyn Thomson-Dans

Protecting the values of the south coast

Because of the south coast's importance as a global biodiversity hotspot, a process is underway to create a marine park to conserve the environment and cultural values and manage the area for sustainable use and enjoyment.

The Department of Biodiversity, Conservation and Attractions (DBCA) is working with Traditional Owners, and the Department of Primary Industries and Regional Development as well as seeking input from a wide range of stakeholder groups and the broader community during the marine park planning process. DBCA has been actively engaging the community and is midway through consultations on a draft marine park management plan, expected to be completed in 2024.

Community engagement is vital in any planning process as the locals hold important knowledge and can provide powerful insights into issues and aspirations, as well as share stories of their connection to the area.

The process to create a new marine park is a balancing act of ensuring the outcome meets the requirements of the *Conservation and Land Management Act 1984* to preserve and conserve ecological and cultural values. Consideration is also given to sustainable social and economic activities.

More information can be found at d BCA.wa.gov.au/parks-and-wildlife-service/plan-for-our-parks/south-coast-marine-park



taeniolatus), leafy (*Phycodurus eques*) and ruby (*Phyllopteryx dewysea*) seadragons.

The Southern Ocean is also home to many mammals such as the Australian sea lion (*Neophoca cinerea*), long-nosed fur seal (*Arctocephalus forsteri*), and the southern right whale (*Eubalaena australis*), which is slowly making a recovery from near extinction and uses this coastline for birthing and nursing its calves, born about three to four years apart (see

.....
Above Snorkelling Woody Island in the Archipelago of the Recherche.

Top right White-bellied sea eagle (*Haliaeetus leucogaster*).
 Photos – Tourism WA

Above right Giant cuttlefish (*Sepia apama*).
 Photo – Ann Storie

Below Fitzgerald River National Park.
 Photo – Cliff Winfield

‘Migrations mysteries’, *LANDSCOPE*, Summer 2022–23).

Completing the rich south coast ecosystem are the birds, notably, fairy terns (*Sternula nereis*), little penguins (*Eudyptula minor*), flesh-footed shearwaters (*Ardenna carneipes*), hooded plovers (*Thinornis cucullatus*), oyster catchers, gulls, terns, sea eagles, Cape Barren geese (*Cereopsis novaehollandiae*) and more. This coastal area is a bird watcher’s delight. Some of these species are listed on the International Union for Conservation of Nature’s Red List of Threatened Species as vulnerable or near threatened.

FAN FAVOURITE

Increasingly, visitors are seeking out starlit camping experiences. Visitors and locals enjoy the spectacular views, beach walks, and bird watching, respectfully leaving no trace of their visit or impact on the landscape.

The area is also important for commercial and recreational fishing, and tourism. Popular commercial fisheries include abalone, herring, salmon, shark, scallops, crabs and cephalopods.

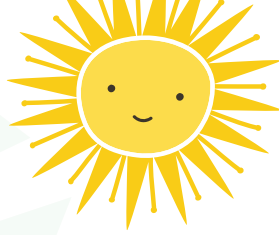
Sport and recreational fishing are popular along the coast, both shore-based and boat-based. Marine ecotourism activities, including dive charters and whale and dolphin watching, enable visitors to better appreciate and understand the region’s natural values.

Woody Island Nature Reserve in the Archipelago of the Recherche is a popular spot for visitors and only 15 kilometres (by boat) from the shore. It is the only island within the archipelago with visitor facilities (i.e. camping, food and a visitor centre). A ferry service operates seasonally, and once on the island, visitors can explore the acacias, orchids and eucalypts on three walking trails, snorkel the dive trail at Shearwater Bay or fish from the jetty.



Lori-Ann Shibish was a DBCA officer who was part of the team working on the proposed South Coast Marine Park project. **Dave Guilfoyle** is the Tjaltjraak Healthy Country Coordinator with the Esperance Tjaltjraak Native Title Aboriginal Corporation.

by Hannah Napier



Sense-ational Backyards

Our senses help us to understand our environment. They include sight, hearing, smell, taste and touch. Animals also use their senses to help them survive in the wild.



Butterflies taste with their feet! They have chemoreceptors on their legs that act like human taste buds.



Echidnas use smell to find food. The electroreceptors in their beaks help them sense vibrations made by their prey (termites).



Falcons can see a 10 centimetre object from 1.5 kilometres away! Their sight is 2.6 times sharper than humans.

Senses wheel

Explore your backyard or local park using the senses wheel to see what you can discover! Don't taste or touch anything without asking an adult first.

Tick the ones you complete.

Smell something sweet

Look for something spiky

Listen for birds calling

Look for something yellow

Touch something soft

Listen for birds calling

Draw something interesting that you found.





Oblong turtle (*Chelodina oblonga*)

The oblong turtle (*Chelodina oblonga*), also known as the south-western snake-necked turtle, is a semi-aquatic freshwater turtle characterised by a long neck of similar length to the shell that folds sideways under the shell. It can be found in higher rainfall parts of the south-west of Western Australia, living in a broad range of seasonal and permanent freshwater habitats including wetlands, lakes and rivers. It has a distinctive carapace (top shell) that narrows slightly at the front and is brown to black in colour. Males are generally smaller than females with longer tails and a slightly more curved plastron (under shell). The oblong turtle's diet predominantly consists of a broad range of macro-invertebrates.

Illustration by Gooitzen van der Meer

Reference photo by Sallyanne Cousans



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Splendid tree frog (*Litoria splendida*).
 Photo – Perth Zoo

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