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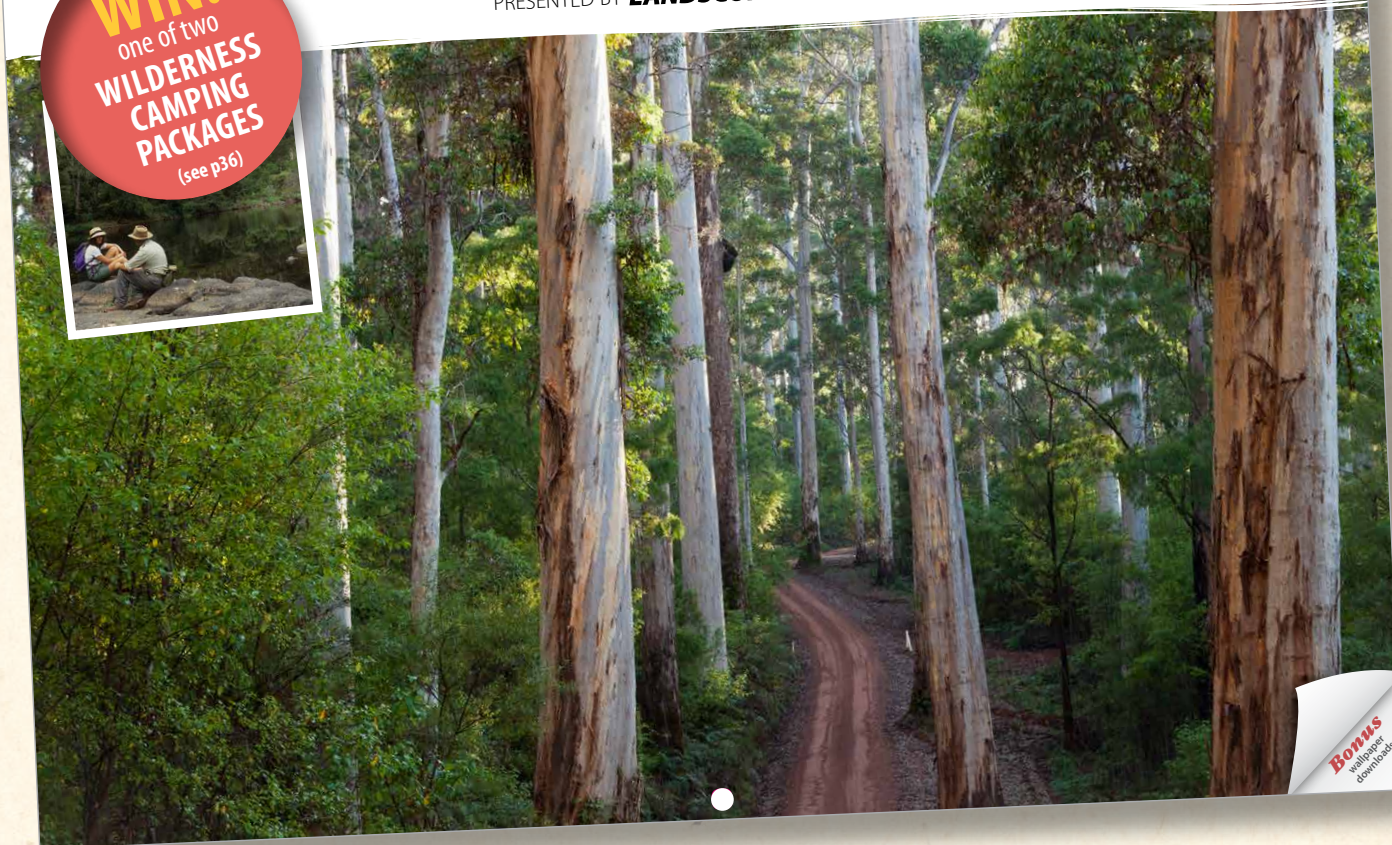
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Department of
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Explore WA's parks on us



ON THE COVER

Front cover Oxer Lookout provides a spectacular view across where Weano, Hancock, Red and Knox gorges converge in Karijini National Park. This is one of the magnificent national parks you can visit with the Free Park Pass voucher on page 26.
Photo – Pierre Destribats

Back cover Brush-tailed mulgara (*Dasyercus blythi*), occurs in Karijini National Park and is one of the species protected under *Western Shield*.
Photo – Jiri Lochman



Conserving plants, animals and ecological communities in a State as vast and diverse as Western Australia, with its high diversity and iconic species, engaging natural features, numerous land uses and varied climate, is both challenging and exciting. It presents opportunities to create and deliver world-leading initiatives at a landscape level as well as targeted and focused projects and new discoveries at a local level.

In this issue of *LANDSCOPE* we examine two major projects – a whole-of-country management approach to conservation on Yawuru country as part of the *Kimberley Science and Conservation*

Strategy (see 'Sharing the vision' on page 28) and *Western Shield* (see 'Western Shield: securing our wildlife' on page 20).

The *Kimberley Science and Conservation Strategy* is working to safeguard the magnificent wilderness that houses a wealth of native plants and animals as we work with Aboriginal communities to look after country through traditional and scientific knowledge and understanding of its values. Meanwhile, ongoing scientific advances are enabling *Western Shield* to continue to deliver large-scale feral cat and fox control to ensure recovery of populations of native animals throughout the State.

In an example of a smaller-scale, more targeted project, fencing is providing protection for white-flowered philotheca from rabbits and shows what can be achieved on a local level (see 'Fluffy assassins: curse of the Wheatbelt rabbit' on page 44). We also look at how discoveries about our animals and plants are still being made by keen observation and scientific analysis with traditional and molecular methods in 'Discovered' on page 11.

These projects cannot be carried out successfully without strong and cooperative partnerships with other government agencies and non-government organisations, as well as a resilient and dedicated workforce and volunteer base. Our capacity to successfully engage with partners will be enhanced from 1 July this year, when the Swan River Trust will be amalgamated with the Department of Parks and Wildlife incorporating the management of the Swan Canning Riverpark with other protected areas. It will bring together the expertise of scientists, conservation and ecosystem management experts, planners and project managers in an integrated approach to conservation and management of our natural places (you can read more on page 12).

We hope you will enjoy the read.

Dr Margaret Byrne, Director of Science and Conservation
Department of Parks and Wildlife

Contributing

Chris Nutt is a Parks and Wildlife marine park planning officer based in Perth. After starting with the department in 2007 he has contributed to a number of marine park planning and science projects and is currently leading the planning process for the proposed Yawuru Nagulagun / Roebuck Bay Marine Park. Taking his passion and interest in marine conservation further, Chris is currently working towards a Master of Protected Area Management with Murdoch University.



Juanita Renwick started with the department in 2005 and has worked in a range of areas including fauna conservation, policy and land management and, most recently, as a Parks and Wildlife *Western Shield* zoologist. Since joining the *Western Shield* team in 2010, Juanita has contributed to a review of the program and is working with district and regional staff to manage fauna monitoring. She loves getting out of the office and into the field with a particular highlight being mammal monitoring at Hermite Island.



Jennifer Eliot has been the media manager for the Swan River Trust since 2013. She enjoys sharing the wonders of the Swan and Canning rivers with the public and helping the community to learn how to protect this iconic estuary into the future. She is excited about expanding her professional horizons as the Swan River Trust amalgamates with Parks and Wildlife and increasing her contribution to conservation beyond the river to the rest of the State. She loves the great outdoors and travels around WA camping and taking pictures when she can.



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This page Mt Henry Jetty, Canning River.
Photo – Boon Leong Tay



Department of
Parks and Wildlife



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and
PEOPLE**

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Snap
shot



READERS' PIC

Grand spider orchid (*Caladenia huegelii*)

Photo by Eddy Wajon, words by Pawel Waryszak

"This picture was taken in Ken Hurst Park, 20km south of the Swan River. The enthusiasm of Friends of Ken Hurst Park and financial support from Parks and Wildlife have been instrumental in ensuring that this precious bit of metro bushland is still protected. Perth Banksia Woodland Community Restoration Grant, from Parks and Wildlife, provided much-needed assistance in on-ground works that aim to enhance the natural habitat for many local plant, wildlife and fungi species. This winter we will be out there rehabilitating the most degraded parts of the park. Feel free to email me (p.waryszak@murdoch.edu.au)."

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

Visiting Breaksea Island Nature Reserve

Steeped in history, Breaksea Island Nature Reserve, located 12km south-east of Albany, was the last link to Australia for the first Gallipoli-bound soldiers in 1914. Now, more than 100 years on, visitors can access the island by helicopter.

Parks and Wildlife has licensed Skyhook Helicopters to fly to the island to meet increased demand for cultural, adventure and eco-tourism experiences on the south coast. Until now, viewing the island and its impressive plants and animals, and rugged coastline has been limited because it is difficult to access safely by boat.

The tours give visitors a bird's eye view of the class 'A' nature reserve before landing on the island to access the heritage-listed lighthouse and keepers' cottages, which have been the subject of a \$1.5 million State and Australian government-funded upgrade over the past 10 years.

The lighthouse played an important role at the outbreak of World War I, as it was the last communication point with Australia for troops departing from Albany. The Breaksea Island 'lighthouse girl' Fay Howe signalled to the departing fleet in morse code, and was the last human contact many of the young soldiers had with Australia.

The story of the Gallipoli-bound troops and Fay Howe was part of the inspiration for the Perth International Arts Festival street parade 'The Giants' that was held in February and seen by hundreds of thousands of people.

Below Breaksea cottage.

Photo – Parks and Wildlife



Volunteer view: Marg and John Blaney-Murphy

The rich red earth and an insatiable desire to restore Goongarrie Station back to its former glory keep Campground Host volunteers Marg and John Blaney-Murphy coming back year after year:

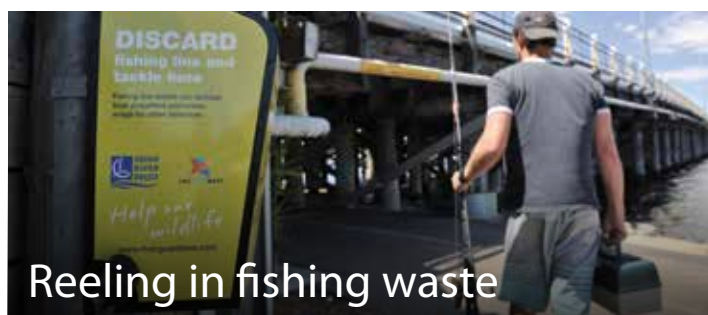
"We keep going back to Goongarrie because we are fascinated by the rich red earth and the diverse plant life, being on the edge of semi-arid to arid."

"There is always so much to do and the main goal we have set ourselves, after greeting visitors, is to take down the internal fence-lines and pull out the fence posts, helping to bring Goongarrie back to its natural state and saving animals from being caught in the wire."

"In the years we have been at Goongarrie we have weeded double-gees and prickly melons, pruned along the tracks, dug up soak wells, fixed toilets, mended leaking water pipes, made signs for various tracks, brought in great lengths of poly pipe for recycling and many other jobs which we have thoroughly enjoyed."

Parks and Wildlife's Campground Host volunteers are people who volunteer their time in some of Western Australia's most beautiful spots and carry out a variety of roles associated with park management and visitor services throughout the year. For more information contact Parks and Wildlife's Community Involvement Unit on (08) 9334 0279 or email community.involvement@dpaw.wa.gov.au.





Reeling in fishing waste

Photo – Stewart Allen

Perth fishers have taken advantage of 25 bins designed to help reduce the impact of discarded fishing line and tackle on dolphins, waterbirds and other animals. The bins have been installed at popular jetties, fishing platforms, traffic bridges and boat ramps.

In just nine months, the *Reel It In* fishing line bin project has resulted in 8788m of fishing line, 1743 hooks and sinkers, 1508 bait bags and 254 items such as lures and tackle packets collected, which may otherwise have entered the Swan and Canning river system.

The initiative has involved seven riverfront local governments, Recfishwest, the Fremantle Port Authority and the City of Cockburn. The fishing line bins are emptied and audited fortnightly by Native Animal Rescue wildlife volunteers including disadvantaged youth.

The bin trial will soon be expanded thanks to a further \$20,000 investment from the State Government which will provide an additional 20 fishing line bins installed and maintained. It is hoped the bins will remove up to 20km of fishing line per year.

mailbox

Dear editor

"Can I obtain a list/book which has good illustrations of WA's small mammals, together with pictures of their footprints for the purpose of identification? I have just read 'Western Australia's mammals: ensuring their future' in the Autumn issue of *LANDSCOPE* and think you would get greater public interest if we were supplied with identification tools, could report on what we see and perhaps contribute toward conservation."

- name and email address supplied

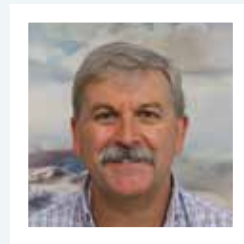
Editor: Parks and Wildlife has more than 30 Bush Book titles and those that focus on native animals contain information about appearance, distribution, habitat and breeding habit. The books contain photos of species and in some cases include pictures of their tracks. They are available from our online shop (shop.dpaw.wa.gov.au) and from visitor centres and bookshops.

Parks and Wildlife also has a selection of 'species profiles' available on the 'Plants and Animals' section of our website (www.dpaw.wa.gov.au/plants-and-animals). Here you can also find information about how to report a sighting.

*Conservation relies on the input of everyone to help create a picture of the conservation status of our precious native plants and animals. We also welcome your feedback to *LANDSCOPE* magazine.*

Dr Tom Hatton – Guest columnist

Marine Parks and Reserves Authority Chair



Western Australia's 13,000km of coastal waters is home to an unrivalled wealth of natural and cultural heritage. So much of our way of life as Western Australians is built upon these coastal waters and estuaries that it is difficult to overstate their value.

To bring a higher level of conservation and management to some of our most ecologically significant marine environments, we have since 1987 been progressively establishing marine parks and reserves along our coast. These places are vested in the Marine Parks and Reserves Authority with the aim to provide places for people to forever enjoy and appreciate the marine life of Western Australia as well as our cultural connections to the sea.

Our marine parks include such iconic places as Ningaloo, Jurien Bay, Rowley Shoals, Shoalwater Bay, Shark Bay, the south-west Capes, Eighty Mile Beach, and Camden Sound. The government is also committed to establishing new marine parks at Roebuck Bay, Horizontal Falls and the northern Kimberley. These new parks will nearly double the 2.5 million hectares of state waters currently in parks and reserves. Their management is a joint effort by government, traditional owners, industry and the wider community.

Establishing and managing our marine parks and reserves reflects a balance between protecting places of incredible natural and cultural heritage, and maintaining opportunities for people to use and enjoy them. The greater part of each of our parks is open to a wide variety of recreational and commercial uses, under careful monitoring and management. Most of our parks also have areas with such high conservation value that we have excluded some activities like fishing or mineral exploration. We work hard to ensure this balance is based on the best available science as well as a consideration of the diverse values and needs of our community.

The Authority audits and reports on the state of our parks every year, supported with monitoring by the departments of Parks and Wildlife and Fisheries. This work shows we are doing a good overall job in protecting our marine parks, but it also gives us a chance to see where we need to do more work.

With the ongoing support of government, traditional owners, and the wider community, I am confident that these unique and spectacular marine environments will continue to provide wonder and enjoyment for future generations.





Dryandra Woodland

A new campground in the Dryandra Woodland has been named Gnaala Mia, which is Noongar for “Our Home”. When it opens in June it will provide a home-away-from-home for people who come to the area. The best thing about this place is that it’s a comfortable two-hour drive from Perth. So with an early start on Saturday morning, you can stay the weekend and be back at work on Monday feeling recharged having spent a night in the bush.

As the sun streams through the mallet woodlands and hits the brown bark of the trees, the Dryandra Woodland shimmers and sparkles. Come spring, the landscape erupts in colour as flowers of as many as 800 native plant species bloom.

Above Gnaala Mia is a perfect spot to relax in the bush.

Photo – Sallyanne Cousans

Above right Bush stone-curlew.

Photo – Jiri Lochman

Opposite page

Top A kangaroo in the tranquil mallet woodlands at Dryandra Woodland.

Photo – Sallyanne Cousans

Left Kawana Trail is an easy 3.3km walk.

Right A numbat, WA’s mammal emblem.

Photos – Parks and Wildlife

If they’re in the area, it’s hard not to notice the Carnaby’s cockatoos, which screech through the sky in flocks. Or you may spot the more elusive bush stone-curlew and the rufous tree creeper or another of the 100 bird species found in the area. On a clear night, the open woodlands offer an uninterrupted view to the glistening stars above. If you’re really lucky, you might see the State’s mammal emblem – the numbat – foraging for termites, or some of the other remarkable nocturnal animals including red-tailed phascogales, woylies, tamar wallabies or possums. Whatever piques your interest, or grabs your attention, it really is a beautiful part of the world.

TRACKS AND TRAILS

The area can be explored on one of the many walk trails that range in length from one to 12.5km, or an easy 40-minute stroll

to a more challenging four-hour hike. The walks take in a number of recreation and cultural sites, including dams, rail sidings, telegraph lines and Aboriginal cultural sites. They are marked with signage to offer information along the way.

For those travelling by car, the 23km Darwinia Drive Trail uses interpretive signage to explain complex natural relationships such as those between woylies and sandalwood. A slow daytime drive through the established tracks may be enhanced by a chance spotting of an echidna.

CAMPING AND ACCOMMODATION

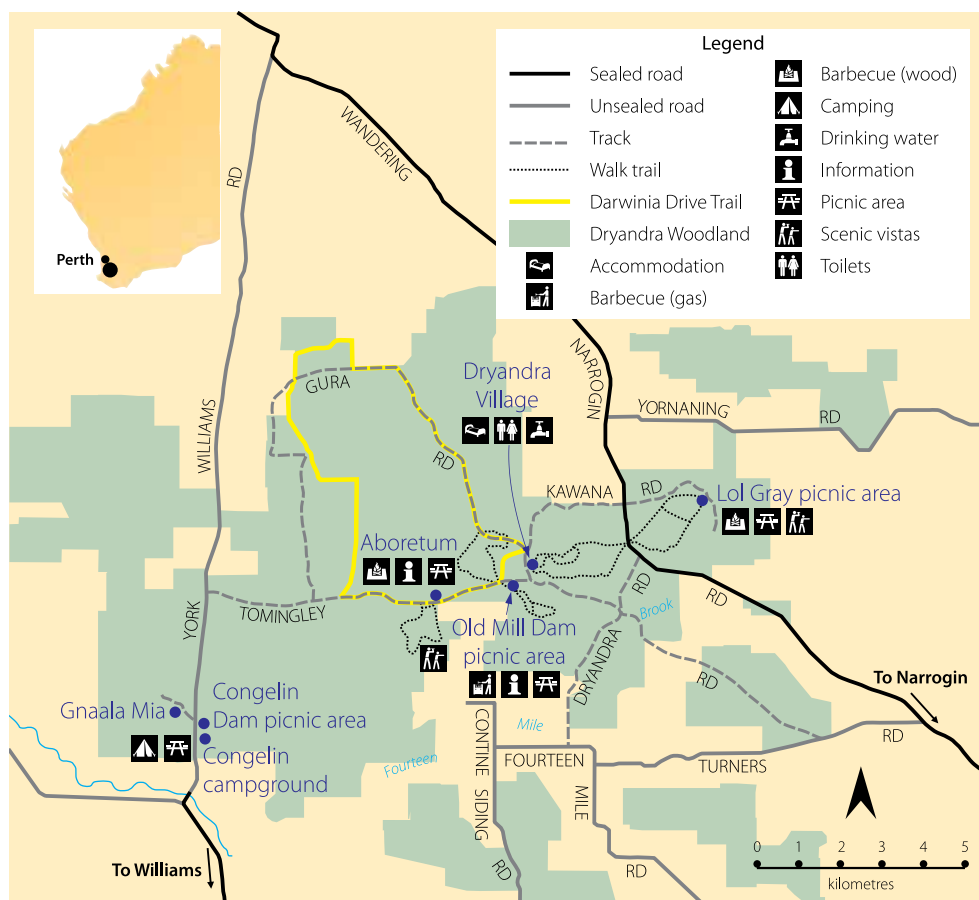
Dryandra Woodland has long been popular for camping among people who are drawn to the area for a quick, weekend getaway or as part of an extended trip through the Wheatbelt. As part of the \$21.05



"On a clear night, the open woodlands offer an uninterrupted view to the glistening stars above. If you're really lucky, you might see the State's mammal emblem – the numbat – foraging for termites ..."



Parks for People Dryandra Woodland



million *Parks for People* initiative, which provides a range of affordable camping and caravan options to ensure people have access to enjoy and experience WA's natural and iconic areas, visitors will have another accommodation option.

Chosen in partnership with the local Noongar elders, the new campground is separated into two 'loops' and will be constructed in two phases. The first loop will open in June 2015 and the second is expected to be completed by July 2016. When finished, the campground will provide 17 caravan sites, 12 tent sites, four toilets and two camp kitchens.

What's really special about the new campground is that it takes advantage of the open woodlands with each camp site separated by about 20m. This gives campers the feeling of isolation while still having the convenience of nearby facilities.

If camping is not your style then the Dryandra Village is the place to stay. Run as a not-for-profit business, the Lion's International host several different

accommodation packages for individuals through to large family groups at budget prices. Bookings can be made by contacting the caretaker on (08) 9884 5231.

BARNA MIA

About 20 minutes' drive away from the Gnaala Mia campground is Parks and Wildlife's Barna Mia animal sanctuary – an introduced predator-proof animal sanctuary with a difference, and a 'must-do' while you're here. Visitors can discover threatened native animals such as the bilby, boodie, woylie, quenda and marla during tours that are held after dark using special red spotlights. Tour guides enthusiastically share information about these special animals, giving visitors a unique and memorable experience. Schools and special interest groups can also arrange tours.

So, if you're in Perth and looking for a quick weekend escape where you're sure to enjoy getting up-close to some of Western Australia's most endearing native animals, then Dryandra Woodland is just a short drive away.

Top A group tour at Barna Mia animal sanctuary.

Photo – Michael James/Parks and Wildlife

Above *Conospermum*.

Photo – Parks and Wildlife

Do it yourself

Where is it? 164km south-east of Perth and 22km north-west of Narrogin.

What to do: Picnicking, scenic driving, camping, bushwalking, a visit to Barna Mia animal sanctuary, group educational activities.

Facilities: Interpretive centre and animal sanctuary, toilets, picnic tables, barbecues, walk trails, drive trails, camping.

Nearest Parks and Wildlife office: Great Southern District Office, Hough Street, Narrogin, phone (08) 9881 9200.

parks.dpaw.wa.gov.au



Seadragons are quintessential Australian animals and are found only along our southern coast. There are two recognised species, the leafy seadragon (*Phycodurus eques*) and the common seadragon (*Phyllopteryx taeniolatus*). Despite their evocative name, seadragons are members of the seahorse and pipefish family Syngnathidae which includes a wide variety of bizarrely modified fish, some with prehensile tails. The leafy seadragon is known from South Australia and southern Western Australia, but the common seadragon is more widely distributed from Geraldton to Port Stephens in New South Wales, including Tasmania.

Their bodies are modified with various leaf-like appendages that help to camouflage the animal as it gently swims or floats among seaweed or seagrass. They move using their thin, translucent fins which quickly rotate providing propulsion. Like their seahorse and pipefish cousins, seadragon males care for the eggs in a brood pouch on his tail. They are perennial favourites in aquaria around the world, and are keenly sought by scuba divers for quiet observation or photography.

The current taxonomy of seadragons has been in place for several decades, with two species, each placed in separate genera. Each species, however, has junior synonyms – taxa that were thought to represent distinct species by their describer but which have since been shown to represent the same species as the original name. Previous research using DNA data confirmed that the two Australian seadragons are each other's closest relatives and diverged from their most recent common ancestor about 8.3 million years ago.

While studying a seadragon collected from deep water in the Recherche Archipelago off Western Australia's south coast, researchers found that its genetic signature was vastly different to those of other seadragons. They also noticed that its bright red colouration contrasted with that of its closest relative, the common seadragon, which is more yellow with purple patches. Furthermore, it was trawled from 51m, which is much deeper than most other seadragon records. Intrigued

by these results, Josefin Stiller and Greg Rouse from the Scripps Institution of Oceanography, California, and Nerida Wilson from the Western Australian Museum, examined records of common seadragons from deeper waters stored in Australian museums, hoping to locate more specimens. Their hunch paid off, as they located three more specimens that closely matched the morphology of the Recherche Archipelago seadragon, but which had been classified by museum staff as common seadragons. Two were collected from west of Garden Island in 1956 and lodged in the CSIRO Marine and Atmospheric Research collection in Hobart, and the other was washed up on Cottesloe Beach in 1919 and stored in the Western Australian Museum. These three specimens were too old or improperly preserved to extract DNA, but their morphology clinched the deal, confirming that the Recherche Archipelago specimen was not an aberration. And so, a previously unknown species was discovered, raising the world's seadragon fauna from two species to three.

While writing up the results of their study for publication in a scientific journal – which is the only way that new species can be formally recognised – the authors decided to name the species *Phyllopteryx dewysea*, dedicating it to Mary 'Dewy' White, co-founder of the Lowe Family Foundation

which supported the research, "for her love of the sea and her support of seadragon conservation and research".

The other two seadragon species are considered by the International Union for Conservation of Nature (IUCN) to be Near Threatened due to habitat loss or habitat degradation, but the status of the ruby seadragon is unknown. With so few collecting sites known – two at depths of 72m and 51m (the Cottesloe specimen was washed onto shore, so no depth can be inferred) – the habitat requirements of this enigmatic species remain to be discovered. Are they truly restricted to deeper waters than the common seadragon? Is their reproductive biology the same? Are they more widely distributed?

The scientific paper reporting the discovery was recently published in the prestigious journal *Royal Society Open Science*, and we can now celebrate the latest addition to the Australian fish fauna. We can also be thankful that museum and herbarium collections are available for ongoing biodiversity work and that biodiversity collections are not static entities but enduring storehouses of our biological heritage.

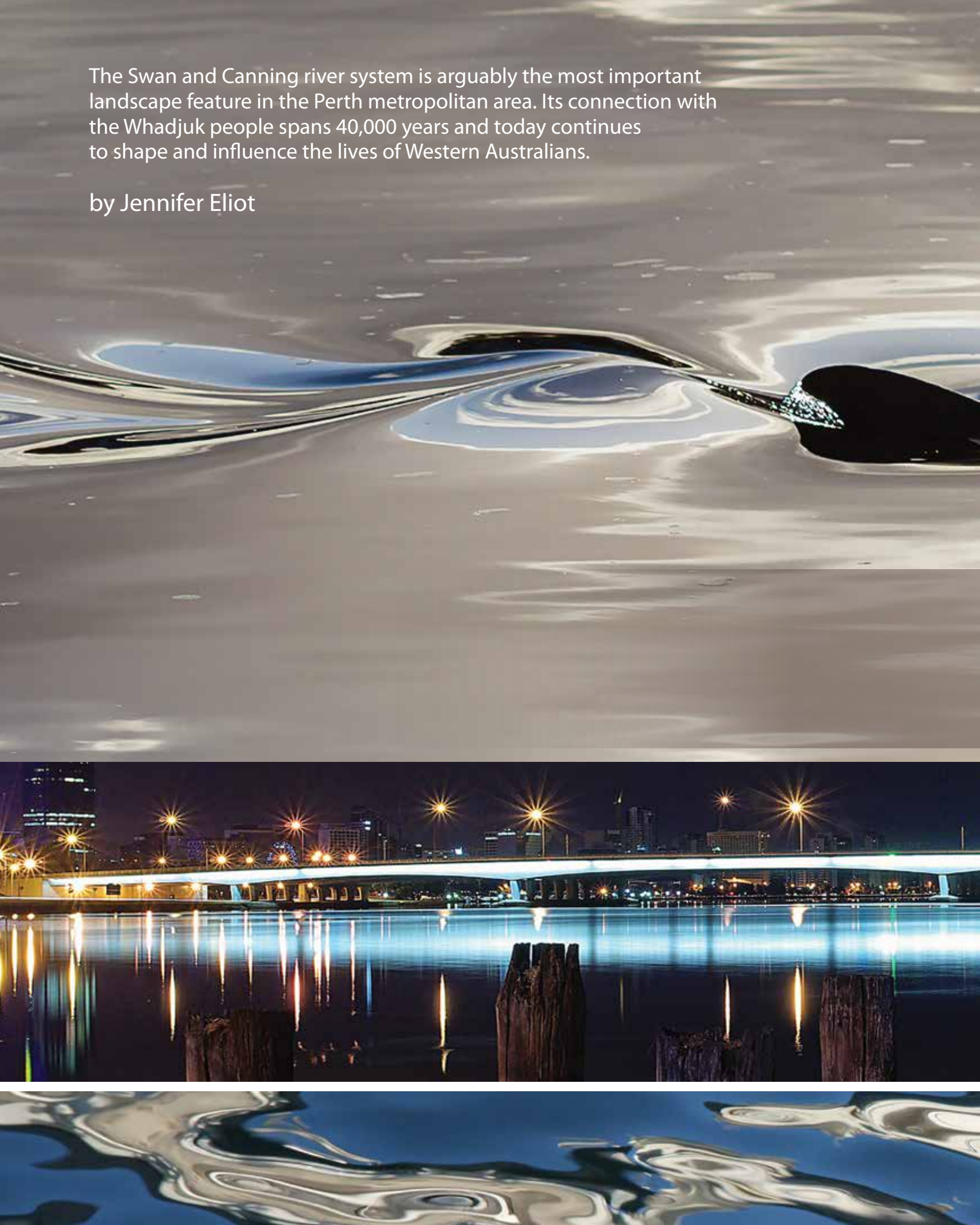


Ruby seadragon

Above Ruby seadragon.
Photo – Zoe Della Vedova

The Swan and Canning river system is arguably the most important landscape feature in the Perth metropolitan area. Its connection with the Whadjuk people spans 40,000 years and today continues to shape and influence the lives of Western Australians.

by Jennifer Eliot





***a city**
playground*



The Swan Canning Riverpark and the iconic rivers at its heart are the centrepiece of Perth.

It's a resilient ecosystem, facing similar pressures as other urban waterways in Australia, a recreational playground and a source of vibrant commercial and tourism activity which takes in significant cultural sites, river reserves, national parks, conservations areas and busy recreation zones.

It starts with the Swan River, which begins as the Avon River at Wickepin in the Wheatbelt and twists its way 280km to the ocean at Fremantle, being joined along the way by its most significant tributary, the Canning River at Melville Water. These rivers and their tributaries drain a catchment of 2090km² and the combined Swan Canning Catchment and Avon Catchment are approximately 125,000km². Sitting within the Riverpark, is the Swan Estuary Marine Park, which provides special protection for three areas – Alfred Cove, Pelican Point and Milyu.

WHADJUK HISTORY

The Swan and Canning rivers and their tributaries are intrinsically linked to the fabric of Whadjuk people and culture. The rivers and waterways have continuing cultural importance related to past and contemporary Whadjuk culture. To Whadjuk people, *Derbal Yerrigan* (the Swan River) and *Djarlgarra* (Canning River) were created by the *Waugal*; a powerful dreaming serpent and the creator of all rivers, lakes, valleys and other landforms on its journey to the ocean. Whadjuk people consider *Derbal Yerrigan* and *Djarlgarra* sacred due to stories associated with the *Waugal* and its continued presence in the area.

Walyunga National Park, which is 72km from the mouth of the Swan, is also a significant site for the Whadjuk people. It is the place where the Avon River meets the Brockman River and becomes the Swan River. The park is one of the largest known Aboriginal camp sites in the vicinity of Perth, and today Walyunga continues to hold great cultural importance to Whadjuk people. The Aboriginal Heritage



Trail, an easy 1.2km return hike, provides an excellent insight into Whadjuk cultural heritage and values.

Today Whadjuk people continue to access the Swan Canning Riverpark for sustenance, knowledge, spiritual renewal and to practise distinct cultural activities.

RIVERPARK TRAILS

The Swan and Canning rivers have a combined shoreline of 358km and there is currently 170km of established tracks and paths suitable for cycling, running, walking and hiking in the Riverpark. During the week, Perth's commuters take full advantage of this shared network, swapping traffic for river views. These pathways also form the basis of a 50km circuit which can be used as a whole or in 12 separate sections. In its entirety, the ride takes in Perth Water, Matilda Bay Reserve, Point Resolution Reserve, Rocky Bay, Point Walter, Lucky Bay, Deep Water Point, the Shelley Rossmoyne Foreshore, the Canning River Regional Park, Tranby House and Garvey Park. Popular routes in this circuit include Canning Bridge to Mt Henry Bridge and return and Fremantle to Point Walter rides.

The Canning River trip is pleasant with much of the path shaded with native trees. From the Raffles Hotel, it continues to Deep Water Point, a popular waterskiing area, and the Esplanade which is a hive of activity with its swimming and waterskiing areas, jetty, playground and café. The Mt Henry Bridge has excellent views of the Canning River, with Kings



Previous page

Main One of the Indo-Pacific dolphins that call the Swan Canning Riverpark home.

Photo – Matt Kleczkowski

Inset top The Narrows Bridge links the north and south sides of the city.

Photo – Robert Davis

Inset bottom Reflections on the Riverpark.

Photo – Matt Kleczkowski

Top Fishing at dusk from the jetty at Taylor Reserve.

Photo – Reanne Archer

Above Ingrid Cumming at the Festival of the Black Swan.

Photo – Mark Thornley

Park and Perth city as a picturesque backdrop.

The Fremantle to Point Walter route offers equally spectacular views. There are plenty of points of interest along the way



Top left Calm shallow waters are a perfect playground for families.
Photo – Megan Lewis

Above Kent Street Weir.
Photo – Douglas Lim

Far left One of the many places to rest along the Riverpark.
Photo – Megan Lewis

Left Red-necked avocet are one of 100 bird species that visit the Riverpark.
Photo – Rob Drummond/Lochman Transparencies

including the Bicentennial Falls, Leeuwin Army Barracks, the Swan River Yacht Club and the Aquarama Marina. A winding path from Blackwall Reach Parade, through natural bushland offers excellent views across the Swan River.

DESTINATIONS

There are 40 parks and reserves on the banks of the Swan and Canning rivers which are popular for Perth locals and visitors wanting to enjoy time with family and friends or engage in activities on the rivers. The sheltered waters and established barbecue areas at Point Walter Reserve make it an ideal place for people with small children, stand-up paddle boarders and people learning how to kitesurf. The 20ha reserve is most notable for the sandbar that extends more than 1km into the river and the sheer 10m cliffs

at Blackwall Reach to the south-west of the spit. The deep waters at Blackwall Reach and its proximity to the ocean make it a great fishing spot and anglers are known to catch black bream, mulloway, flathead, blue swimmer crabs and the occasional crayfish or large pink snapper. It is also a significant site for the Whadjuk people. This area is known as *Jennalup* to Whadjuk people, and is a place for women and children.

The Canning River Regional Park is the drawcard on the Canning River. The park extends 6km on either side of the river and includes large areas of parkland for public recreation and extensive wetlands. The best way to experience the park is by canoe and there are designated canoe launching facilities at Mason's Landing, Kent Street Weir, Riverton Jetty Park and Woodloes Park. The Canning

Canoe Trail Project runs the length of the river, and the stage which passes through the park should take two to three hours one way, or a full day if you plan on returning to your start point. There are no rapids or adrenalin-pumping sections in this stretch. Instead, it is a relaxing float down the river with some spectacular views of natural vegetation and excellent birdwatching opportunities.

The park has both freshwater and estuarine areas and includes two tidal lagoons, a constructed wetland, parkland and remnant bush, providing habitat for more than 100 bird species. The birds are more active in the morning and keen birdwatchers in canoes or on designated tracks in the park can see waders, gulls, terns, reed warblers, swans, ducks, geese, grebes, cormorants, darters, herons, egrets, ibises, spoonbills, cranes and rails.



" Black bream are abundant in the Swan and Canning rivers and during the last two years the rivers have produced bumper blue swimmer crab seasons. This prawn season is one of the best in recent years."



Far left The Riverpark provides a wealth of opportunity for discovery.

Photo – Carol Siedel

Above Night prawning in the river is fun for all the family.

Photo – Stewart Allen

Left The Australia Day Skyworks is a well-known and much-loved event.

Photo – Jiri Lochman

EVENTS

The Riverpark plays host to many events and is a popular destination to celebrate and come together. The Swan River becomes the centre of Australia Day celebrations each year when the City of Perth presents Skyworks. It is the largest annual fireworks display in Western Australia and attracts more than 300,000 people. There are many great locations to watch Skyworks in the Riverpark and the majority of people gather at family-friendly events at Langley Park in the city and Sir James Mitchell Park on the South Perth foreshore. Matilda Bay, Garvey Park and Kings Park are also popular vantage points as well as two designated boat zones – one east of the Narrows and another west of Heirisson Island – where boat owners can anchor and watch the sky above the river explode with colour.

Perth is also one of the few capital cities in the world where people can see dolphins in the heart of the city.

Dolphin Watch Day celebrates the 40 Indo-Pacific dolphins living in and visiting the Riverpark. The event provides an opportunity to recognise *Dolphin Watch* volunteers monitoring dolphins in the Riverpark and to share the data collected as part of the citizen science program. The event concludes with a river cruise which is a popular option for Riverpark visitors to relax and enjoy the rivers while also providing the perfect opportunity to dolphin watch. Dolphin sightings are common in the Swan and Canning rivers and since the program began in 2009, *Dolphin Watch* volunteers, now numbering more than 890, have logged more than 13,000 sightings and observations. Scientists now know that dolphins travel as far up river as Guildford on the Swan River and up to the Kent Street Weir on the Canning River. The Fremantle Port, Perth Waters, Matilda Bay and the Applecross and Shelley foreshores are dolphin spotting hotspots.

VOLUNTEERING

Dolphin Watch volunteers are part of a growing number of community members volunteering their time to help protect the Riverpark. Community groups such as local landcare groups, dive clubs and fishing advocates often hold clean-up days, clinics, planting days and workshops in the Riverpark and catchment. A significant focus of the volunteering effort centres on recreation and conservation. The Swan River Trust and Alcoa Landcare Program (SALP) – a partnership between government, industry and community – has seen landcare volunteers invest 154,000 hours in 1210 sites in the Swan Canning Catchment since the project began in 1999. It's a conservation effort that has seen more than 2.2 million trees planted and 1800ha of degraded bushland revegetated through water quality improvement projects that also include dieback management, fencing, weed control, creating native animal habitat and feral pest management.



Above left Environmental officer Kim Sylvia carrying out water sampling.

Photo – Miranda Holker

Above Kitesurfing is growing in popularity.

Photo – Matt Kleczkowski

Left 'Biscuiting' on the Riverpark.

Photo – Chelsea Bates

Bannister Creek is a classic example of works funded by SALP and undertaken by committed volunteers. The creek was once a beautiful tributary of the Canning River but time and development were not kind to the waterway and by the late 1990s it was reduced to a struggling weed-infested trickle. Families living nearby avoided it and the native animals had long since moved on. Today, it is a functional living stream. The turtles, birds, fish and native animals have returned and families are back using the area, their presence helping to secure Bannister Creek for future generations to enjoy a slice of nature in the heart of our bustling city while ensuring that the quality of water flowing into the Canning River will continue to be improved.

ENVIRONMENTAL HEALTH

The Swan and Canning rivers are a resilient ecosystem but like all major urban waterways, these rivers are under

pressure from climate change, population growth, development pressures and land and water use practices. Historically, the system has been significantly changed with vast areas in the catchment cleared for development and agriculture and this combined with the river's industrial legacy – which saw many low-lying areas used as landfill sites and heavy industry established on Riverpark banks – has resulted in sediment, nutrients and other contaminants entering the waterway.

Ongoing challenges include reducing nutrient and organic inputs from the Swan Canning and Avon catchments and managing a drying climate. A reduction in rainfall has resulted in lower stream-flows and has increased the system's vulnerability to oxygenation depletion. To address this, the Swan and Canning rivers are managed with a 'catchment to coast' approach, which is focused on reducing contaminants from catchments, intercepting pollutants from tributaries

and drains, and applying river intervention techniques such as oxygenation to improve water quality.

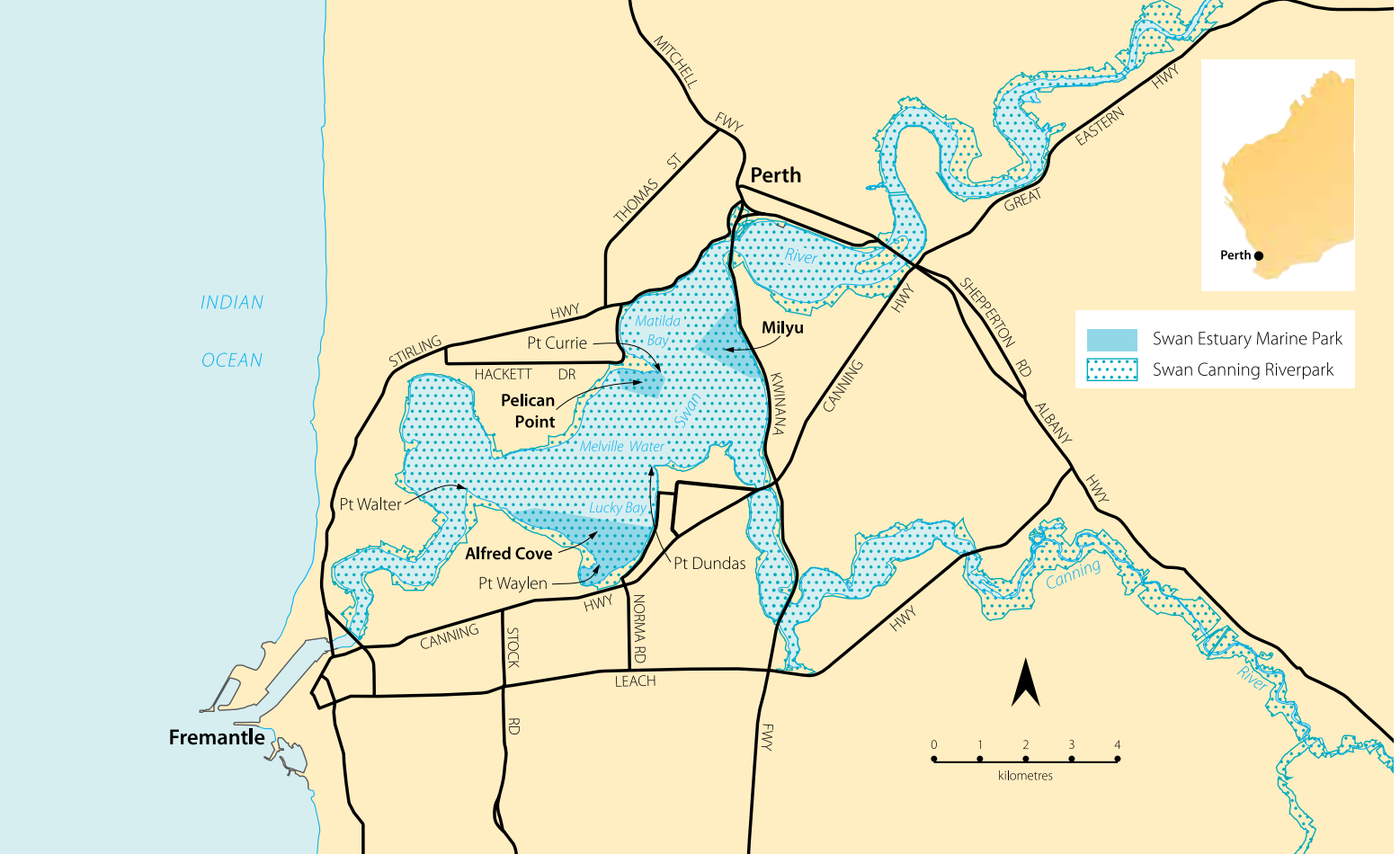
Oxygenation plants on the Swan and Canning rivers are positioned in the upper reaches where low oxygen conditions can persist throughout spring and summer once fresh water flows from the catchment diminish and the salt water wedge pushes upstream. The oxygenation plants are capable of providing relief to more than 10km of the Swan River and 4.5km of the Canning River.

Despite pressures facing the Riverpark, there is evidence suggesting fish communities have actually improved in the past five years. Black bream are abundant in the Swan and Canning rivers and during the past two years the rivers have produced bumper blue swimmer crab seasons. This prawn season is one of the best in recent years. There is also anecdotal evidence that cobbler are returning to the river system.

WATERSPORTS

The way Western Australians use the Swan and Canning rivers has changed dramatically over the years and today it has become an aquatic playground above and below the water. The Riverpark's location in the heart of WA's capital city makes it a popular place for Perth's residents to enjoy watersports.

There are 12 yacht clubs and marinas, 18 boat ramps and 43 jetties located around the Riverpark and this infrastructure supports a number of rowing, kayaking, dragon boat and canoeing clubs. The more traditional pursuits of sailing and rowing continue to be popular, however, in recent years a number of new sports have established on the rivers. It is now a common sight to see people stand-up paddle boarding, kitesurfing, waterskiing and jetskiing in the Riverpark. To manage potential conflicts, there is a dedicated jetski zone in Melville Water and five dedicated public waterskiing zones in Freshwater Bay, Point Walter and Point Heathcote on the Swan River. The largest zone on the Canning begins just south of the Canning Bridge, taking in Deep Water Point and stretching to Aquinas Bay. This access is balanced with a number of exclusion zones and jetskis are restricted at Alfred Cove, Pelican Point and Milyu in the Swan Estuary Marine Park.



Above Kayaking and rowing are popular on the Riverpark.
Photo – Sophie Huisman

Right Yellow seahorse in North Fremantle seagrass beds.
Photo – Matt Kleczkowski

Another sport gaining in popularity in the Riverpark is scuba diving. There is an underwater explorers' dive club based on the Swan River, with many people taking advantage of the underwater wonderland in the Swan Canning Estuary in night and day dives. The downstream reaches from Mosman Bay to the mouth have a number of excellent dives and in the right conditions fish, prawns and seahorses can be prolific on the drop-offs around Bicton Baths and Mosman Bay. In this zone, divers can see estuarine fish such as black bream, silver bream, cobbler, flathead, mullet and marine and coastal species such as skipjack trevally, tailor, herring, whiting, butterfish, king wrasse, brown spotted wrasse, samson fish, pink snapper and the banded toadfish or blowie.

MANAGEMENT

The management of the Swan and Canning rivers will shift to the Department of Parks and Wildlife in July 2015 following the amalgamation of the Swan River Trust into the department. The move is part of a commitment to create a dedicated agency to help manage and enhance WA's national parks and conservation estates. The new

joint workforce will bring together scientists, conservation and ecosystem management experts and planners as well as project managers with expertise in delivering significant capital works. The amalgamation of the Trust and Parks and Wildlife will increase and streamline conservation efforts in the Swan Canning Riverpark.



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NATURE PLAY WA Online resource

With the terrifying prediction that one in three Australian kids will be obese by 2025 it is imperative that families, schools and members of the wider community encourage young people away from screens and outside for some good old-fashioned dirty outdoor fun. As well as improving overall health and fitness, unstructured play into the outside in natural areas helps young people mature their gross-motor skills and develop independence, problem-solving skills and an appreciation for nature – all good things.

The Nature Play WA website is a treasure trove of information and contains a wealth of dynamic and handy resources for families and teachers. With checklists such as '51 things to do before you're 12' and charts for families to keep track of screen time, the website provides practical and engaging tools that can be freely accessed. There are even toolkits for setting up family and community nature clubs and articles about establishing gardens for kids.

This website should be a staple in anyone's internet bookmark list who is looking for fun and creative ways to correct the worrying trend of young people becoming increasingly sedentary.

Nature Play WA's website can be found at www.natureplaywa.org.au. You can also 'like' the Nature Play WA Facebook page and follow @natureplaywa on Twitter.



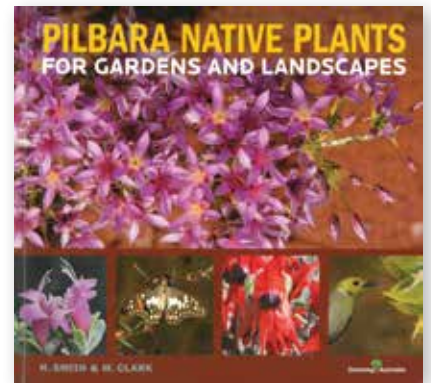
PILBARA NATIVE PLANTS FOR GARDENS AND LANDSCAPES Gardening book

At a landscape level, the Pilbara is steeped in beauty and rich cultural history. Its rich red earth contrasts with vast blue skies and the horizon is dotted with fascinating geological features such as inland mountain ranges and deep gorges. At a species level, it is one of Australia's 15 National Biological Hotspots and plays host to a raft of native plants and animals.

Developed by Greening WA, the easy-to-read *Pilbara Native Plants for Gardens and Landscapes* provides information intended to support native gardening in the Pilbara, honouring the area's beauty in landscaped areas. It is aimed at home gardeners, landscapers, nursery owners, community groups, Aboriginal organisations, ranger groups, government departments, schools and tertiary institutions, resource companies and councils, and advises what, where and when to plant in the Pilbara.

Pilbara Native Plants for Gardens and Landscapes features profiles on 240 Pilbara native species and, where possible, includes photos of the flowers, seeds and bark. These illustrate species and depict the beauty of the Pilbara landscape. The book also contains helpful gardening tips and covers topics such as attracting lizards, seed collecting and propagating, pruning, fertilising and pest management.

Pilbara Native Plants for Gardens and Landscapes is available for \$66 from the Greening Australia website (www.greeningaustralia.org.au).



COMMON BIRDS IN THE BACKYARD Guide book

The latest edition of one of Parks and Wildlife's best-loved Bush Book titles – *Common birds in the backyard* – is hot off the press. This handy guide helps identify 46 bird species that can be spotted in backyards and bushland in and around Perth. Some species, like the magpie, are an unmistakable part of our urban landscape (especially in spring when they are immersed in their breeding season and can live up a morning walk!) while others, like the Australian kestrel, you might need to look a bit closer for. Whatever you're hoping to spot, *Common birds in the backyard* is the perfect size to keep in your pocket or glove box for when you're heading out for a stroll around the neighbourhood, or on the bookshelf at home to help identify what birds visit your garden.

Like all Bush Books, Common birds in the backyard is available for \$6.95 from Parks and Wildlife offices or from its online shop at shop.dpaw.wa.gov.au. Bush Books are also available from good bookshops and visitor centres.





western shield

securing our wildlife

In 1996 the then Department of Conservation and Land Management embarked on an ambitious wildlife recovery program that focused on broad-scale baiting for introduced predators and the reintroduction of native animals to areas where they once existed. Now in its 18th year, the program is going from strength to strength.

by Juanita Renwick,
Rhianna King and Mitzi Vance



Western Australia is renowned for being rich in native plants and animals and is home to 141 of Australia's 207 mammal species, of which 25 occur nowhere else in the world. Unfortunately, over the past 100 years, Australia has experienced the greatest extinction and decline of native animals seen anywhere in the world (see 'Western Australia's mammals: ensuring their future', *LANDSCOPE*, Winter 2015). Predation by introduced foxes and feral cats has played a key role in this decline and has contributed to the extinction of 11 species of native mammals in WA and forced dozens more mammals, as well as other fauna such as ground-nesting birds, pythons and other reptiles, to fight for survival.

In 1996, the then Department of Conservation and Land Management went on the offensive and launched a major campaign against introduced predators. Named 'Western Shield', it was launched with multiple objectives, including ensuring the sustainable recovery of extant populations of native animals and improving the conservation status of threatened native animals at a landscape scale within selected areas of WA.

The program was ambitious, but has since been credited with significant achievements in protecting and conserving our native wildlife. It continues to be one of the world's most comprehensive and innovative wildlife conservation programs.

AFFECTING THE CAUSE

In the 1980s and 1990s, pioneering research indicated that fox and feral cat control was required to recover a range

Main Juvenile woylie.
Photo – Sabrina Trochini

Inset left Western ground parrot.
Photo – Brent Barrett/Parks and Wildlife

Inset right Numbat.
Photo – Doug Coughran/Parks and Wildlife



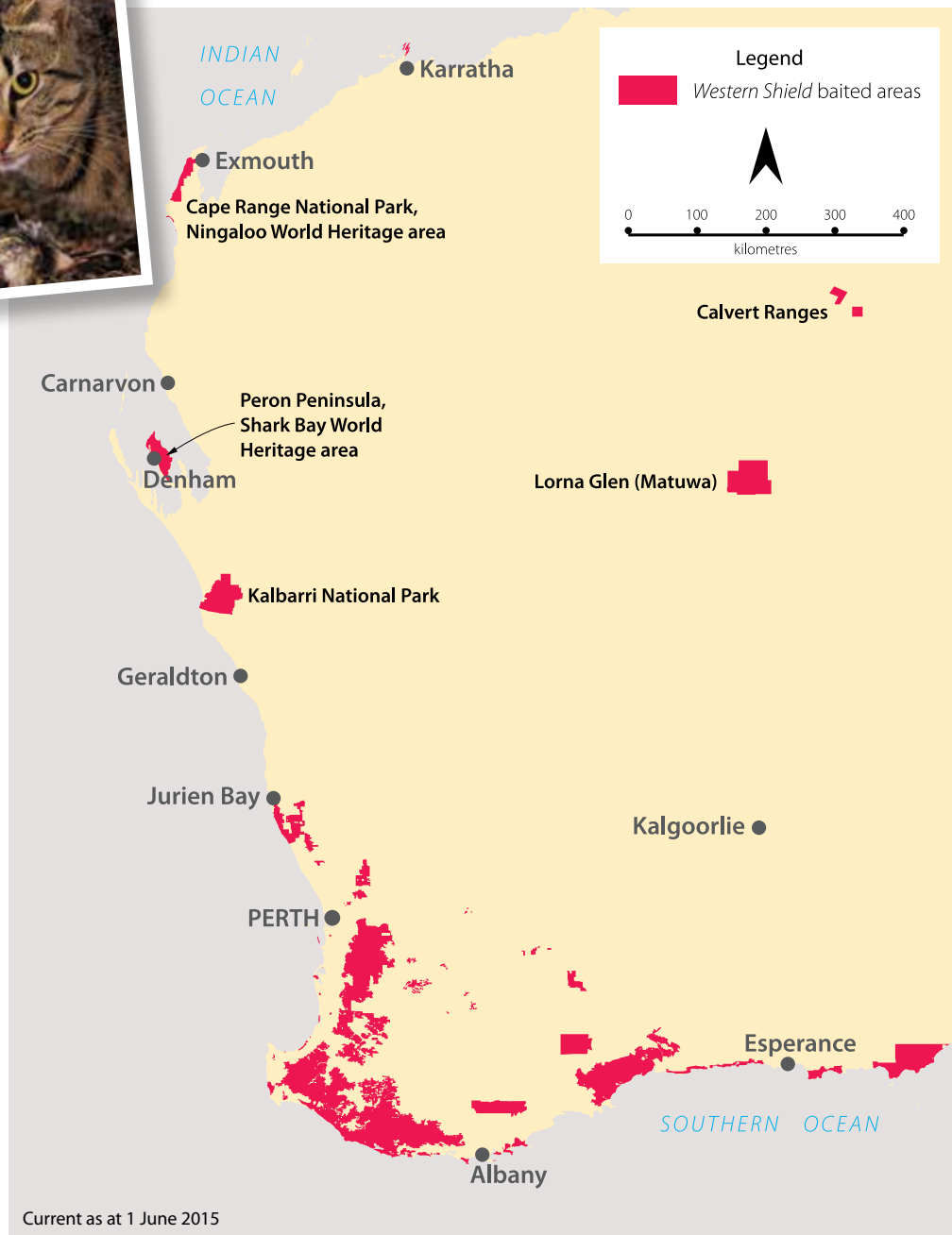
of native species, particularly mammals. Nowadays this notion is unanimously accepted and baiting constitutes a major component of the program.

Each year about one million baits (mostly fox baits) are laid across more than three million hectares of Parks and Wildlife-managed lands from as far north as the Pilbara, through the forests of the south-west, to areas east of Esperance on the south coast. About 380,000ha of this baiting is carried out in the rangelands for feral cat control. The baiting is carried out through on-ground distribution as well as aerial delivery with baits that contain the poison 1080 (sodium fluoroacetate), which is found in the native plant genus *Gastrolobium*. Most native animals have a high tolerance to the poison but it is toxic to introduced predators.

A new feral cat bait, *Eradicat*®, has been developed by Parks and Wildlife and successfully trialled in WA's arid, semi-arid and south coast regions (see '*Eradicat*®' on page 24). It has been registered for operational use and is paving the way for landscape-scale feral cat control in targeted areas across the State for the first time.

When the program was first launched, it was hoped that about 30 native species would be 'significantly more abundant and widespread' thanks to fox and feral cat control. The program has since been credited with reducing fox numbers

by at least 55 per cent in south-west baited areas, and protecting populations of 53 threatened mammal, bird and reptile species in *Western Shield* baited areas. At least 29 of these species show improvements in population size and distribution. Also of note, there has been a dramatic increase in population and distribution of priority species including the quokka, western brush-wallaby and chuditch. Populations of the quenda and tammar wallaby have also recovered and both species have been removed from the threatened species list.



RECOVERY ACTIONS

Another component of the program has been to improve the conservation status of native animal populations through their reintroduction to selected baited areas within their former range. Since 1996, 140 translocations have been carried out for 27 native species, including 20 mammal species, five bird and two reptile species.

Two captive breeding centres – one at Dryandra Woodland (see '*Parks for People: Dryandra Woodland*' on page 10) and the other at Francois Peron National



"In some species, populations have recovered to such an extent that WA populations are being used to re-populate other parts of Australia."

Park – have produced more than 2000 individuals of 14 threatened fauna species for translocations. This has also resulted in advancements in knowledge of husbandry techniques, disease management and pre-release behavioural training.

In some species, populations have recovered to such an extent that WA animals are being used to re-populate other parts of Australia. In one example, Western Australian chuditch have been translocated to South Australia (see 'Postcards to home', *LANDSCOPE*, Summer 2014–15) in 2014.



Previous page

Far left A photo of a fox captured by a camera trap.

Photo – Parks and Wildlife

Inset A feral cat devouring a bird.

Photo – Jiri Lochman

Left Carpet pythons are being protected under *Western Shield*.

Photo – Sallyanne Cousins

Above Installing a predator-proof fence at Perup Nature Reserve.

Photo – Peter Nicholas/Parks and Wildlife

MONITORING

Over the duration of the program, *Western Shield* has elicited long-term data that has been used to help guide management planning and species recovery. Thirty-six sites have been the subject of ongoing monitoring and the information gleaned has helped with population management planning for a range of threatened species including critically endangered woylies in the south-west and black-flanked rock wallabies in the Wheatbelt. *Western Shield* monitoring is also supporting the Woylie Disease Outbreak Investigation – a collaboration between the Australian Wildlife Conservancy, WWF, Parks and Wildlife, James Cook University and the Department of Environment, Water and Natural Resources in South Australia. Monitoring has played a role in determining source populations for translocations including the chuditch translocation to South Australia and of animals to the Dryandra Woodlands. The data collected has also supported changes in listing for threatened and priority species.

Species protected under the *Western Shield* program

Common name	Scientific name
<i>Mammals</i>	
bilby	<i>Macrotis lagotis</i>
black-flanked rock-wallaby	<i>Petrogale lateralis lateralis</i>
brush-tailed mulgara	<i>Dasycercus blythi</i>
brush-tailed phascogale	<i>Phascogale tapoatafa</i>
chuditch	<i>Dasyurus geoffroii</i>
dibbler	<i>Parantechinus apicalis</i>
Gilbert's potoroo	<i>Potorous gilbertii</i>
golden bandicoot	<i>Isodon auratus</i>
heath mouse, dayang	<i>Pseudomys shortridgei</i>
malleefowl	<i>Leipoa ocellata</i>
northern quoll	<i>Dasyurus hallucatus</i>
numbat	<i>Myrmecobius fasciatus</i>
quenda	<i>Isodon obesulus fusciventer</i>
quokka	<i>Setonix brachyurus</i>
tammar wallaby	<i>Macropus eugenii derbianus</i>
water rat, rakali	<i>Hydromys chrysogaster</i>
western brush-wallaby	<i>Macropus irma</i>
western mouse	<i>Pseudomys occidentalis</i>
western ringtail possum	<i>Pseudocheirus occidentalis</i>
woylie	<i>Bettongia penicillata ogilbyi</i>
<i>Birds</i>	
Australian bustard	<i>Ardeotis australis</i>
bush stone-curlew	<i>Burhinus grallarius</i>
fairy tern	<i>Sterna nereis nereis</i>
hooded plover	<i>Charadrius rubricollis</i>
noisy scrub-bird	<i>Atrichornis clamosus</i>
southern emu-wren	<i>Stipiturus malachurus hartogi</i>
western bristlebird	<i>Dasyornis longirostris</i>
western ground parrot	<i>Pezoporus flaviventris</i>
<i>Reptiles and turtles</i>	
carpet python	<i>Morelia spilota imbricata</i>
flatback turtle	<i>Natator depressus</i>
green turtle	<i>Chelonia mydas</i>
hawksbill turtle	<i>Eretmochelys imbricata bissa</i>
loggerhead turtle	<i>Caretta caretta</i>



A TEAM EFFORT

The success of *Western Shield* is due in part to the partnerships Parks and Wildlife, and its predecessors, has forged with industry, community and 'friends' groups, tertiary and research institutions and other local and interstate government agencies. The program has been supported by sponsors such as Alcoa, BHP Billiton Worsley Alumina (Worsley) and Tronox. Previous sponsors have included Cable Sands, Westralia Sands/Iluka, BHP Billiton (Ravensthorpe Nickel Operations), Tectonics Resources and First Quantum Minerals.

More than 108,000 students have directly taken part in *Western Shield* activities through the use of a free classroom resource and field nature conservation experiences and camps run by the department.

FORWARD MOTION

A review of *Western Shield* has guided the way forward for the program and helped redefine its priorities. Until now, monitoring – via cage traps and cameras as well as with radio-collars – has been geared towards collecting data about numbers of native animals and building profiles of their population distribution. However, Parks and Wildlife is broadening its monitoring program to collect information on foxes and feral cats. This will help build a holistic profile of the landscape and help tailor management strategies.

The approval in early 2015 of *Eradicat*® for use in broad-scale predator control across the State will complement the broad-scale fox control currently being undertaken and see *Western Shield* enter a new phase.

These measures, together with the ongoing support and input from industry and the community, will ensure *Western Shield* continues to help reverse the effects of long-term predation by foxes and feral cats and ensure WA's precious native wildlife is protected for the future.

Above left Parks and Wildlife's Juanita Renwick and Tracy Sonneman carrying out field experiments.

Photo – Ashley Millar/Parks and Wildlife

Above Parks and Wildlife's *Western Shield* excursion for schools at the Perth Hills Discovery Centre.

Photo – Jennifer Eliot

Right Loading baited sausages onto the plane for aerial drops to control foxes and feral cats.

Photo – Peter Nicholas/Parks and Wildlife

Below *Gastrolobium* is a native plant that contains the poison 1080.

Photo – Parks and Wildlife

Eradicat®

The armoury in the fight against foxes and feral cats has been boosted thanks to the approval of *Eradicat*® for use in predator control across the State. Parks and Wildlife scientists developed *Eradicat*®, which has been used successfully in trials to control feral cats on Faure Island in Shark Bay, Cape Arid National Park on the south coast and at Lorna Glen (Matuwa) in the northern Goldfields. The *Eradicat*® baits will complement broad-scale fox control undertaken in *Western Shield*.



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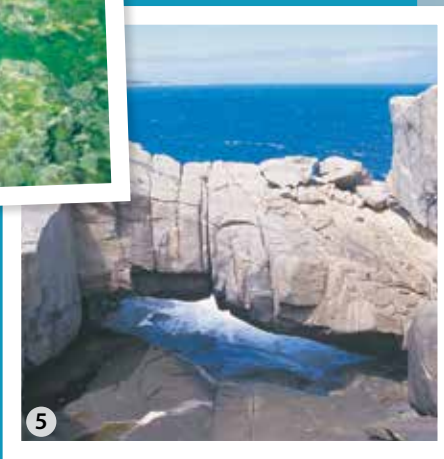
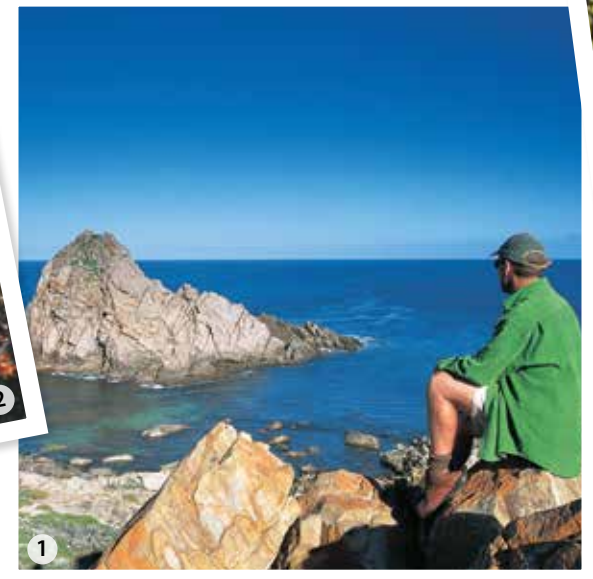
Western Australia's top

10 most visited parks*

On behalf of the people of Western Australia, Parks and Wildlife manages the State's national parks, marine parks and other reserves, which cover more than 27 million hectares – an area roughly the size of Victoria and Tasmania combined.

WA has 100 national parks and 13 marine parks with a diverse array of landscapes and seascapes, from coral reefs and tall forests to deep gorges and open plains of wildflowers. In 2013/14 these areas received 16 million visits from visitors and locals who were spoiled for choice for places to visit and enjoy. *LANDSCOPE* magazine takes a closer look at Western Australia's top 10 most visited parks and what makes them special.





1. LEEUWIN-NATURALISTE NATIONAL PARK

Leeuwin-Naturaliste National Park attracts about 2.7 million visits each year from people who come to enjoy the stunning coastal scenery and beautiful beaches, fascinating geology and majestic karri forests. New camping facilities at Conto Campground cater to campers while the Cape to Cape Track and various walk trails play host to those who want to explore the park on foot.

2. MARMION MARINE PARK

The clear shallow lagoons, reefs and tiny islands of Marmion Marine Park (located offshore from Perth's northern suburbs between Trigg Island and Burns Beach) play host to a raft of marine mammals such as sea lions, bottlenose dolphins and humpback whales, when they're passing. People can experience these natural wonders at the many lookouts along the coast, aboard a boat or kayak, or underwater swimming, snorkelling or scuba diving.

3. MATILDA BAY RESERVE

Located a short drive, walk, run or bike ride, from Perth CBD, this popular parkland is an ideal place to picnic, sail, row, paddle and play, or simply sit back and enjoy stunning views of the Swan River, Perth city and Kings Park. Universally accessible pedestrian and cycle paths guide visitors through the reserve where they might be lucky enough to spot a range of waterbirds, or dolphins.

*Managed by Parks and Wildlife

Explore WA's parks on us

Simply present this voucher where you pay your entry fees or self-register at any national park or reserve where an entry fee is required. Or redeem its value (\$12) off an Annual All Parks Pass to visit WA's parks all year round. Redeemable online at shop.dpaw.wa.gov.au/park-passes using voucher code 'FVP15' or by phoning (08) 9219 9071 or (08) 9219 9072.

Note Restrictions apply. This pass is not valid for entry into special attractions (e.g. Tree Top Walk) tours or special events (e.g. Avon Descent).



Department of
Parks and Wildlife



PARKS
FOR
PEOPLE

Expires 1 December 2015



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Main Pinnacles Desert, Nambung National Park.

Photo – Andrew McInness



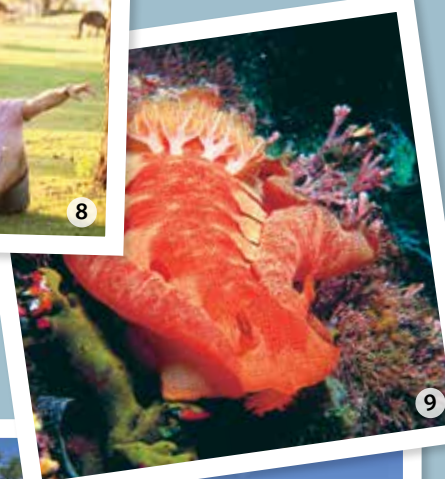
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4. SHOALWATER ISLANDS MARINE PARK

Located two kilometres west of Rockingham, Shoalwater Islands Marine Park is an incredibly rich and diverse marine environment where bottlenose dolphins and sea lions are common. The park also surrounds a chain of unique limestone islands, including Penguin Island. Visitors enjoy a range of water sports, including boating, kayaking, fishing, snorkelling, scuba diving and waterskiing.

5. TORNDIRRUP NATIONAL PARK

The powerful Southern Ocean has sculpted spectacular coastal features known as 'the Gap' and the 'Natural Bridge' along the park's buffeted coastline, while windswept banksia and coastal heathland lie inland from granite headlands, limestone cliffs, sandy slopes and beaches. Located 10km south of Albany, visitors to the park can make use of walk trails, including the Bibbulmun Track, to explore this rugged area.

6. WALPOLE-NORNALUP NATIONAL PARK

This beautiful national park boasts flowing rivers in winter, and a tranquil pool in summer as well as spectacular coastal scenery and recreation facilities, including the world-renowned Tree Top Walk (see also 'Adventuring out: Descending the giants' on page 50). The magnificent tingle forest occurs in Walpole-Nornalup National Park and nowhere else in the world, and is rich in plants and animals.

7. NAMBUNG NATIONAL PARK

Home to the Pinnacles Desert, where thousands of huge limestone pillars rise out of the shifting yellow sands, Nambung National Park is popular among people who are passing through as well as those making a daytrip from Perth. The Pinnacles Desert Discovery Centre provides a wealth of information about the processes that have shaped the unique and fascinating landscape over the past 500,000 years.

8. YANCHEP NATIONAL PARK

Located 50km north of Perth, Yanchep National Park delights visitors with an array of attractions including limestone caves, walk trails, wetlands, wild kangaroos, a koala colony, and seasonal displays of wildflowers. The park also offers cultural and cave tours as well as accommodation, a function centre, golf course and an on-site chocolate shop and cafe.

9. JURIE BAY MARINE PARK

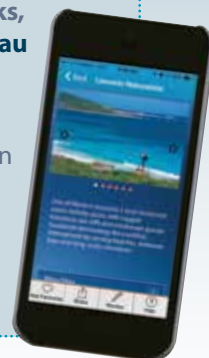
An extensive limestone reef system parallel to the shore has created a huge shallow lagoon that provides perfect habitat for Australian sea lions, dolphins and a myriad of juvenile fish. Extensive seagrass meadows inside the reef shelter armies of marine animals such as western rock lobsters, octopus and cuttlefish. Jurie Bay Marine Park is popular for a range of recreational activities including scuba diving, snorkelling, swimming, windsurfing, surfing and fishing.

10. KALBARRI NATIONAL PARK

Visitors to Kalbarri can marvel at nature's ability to carve the landscape, explore the depths and heights of the river gorges and sea cliffs, and discover the intriguing cultural history of the area. A magnificent wildflower display transforms the landscape from July to November. Hike trails guide visitors though the park or it can be explored by kayak.

For more information about Western Australia's national, regional and marine parks, visit parks.dpaw.wa.gov.au

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1 Sugarloaf Rock, Leeuwin-Naturaliste National Park. Photo – Tourism WA 2 Scuba diving at Marmion Marine Park. Photo – Ann Storrie 3 Black swans, Matilda Bay Reserve. Photo – Peter Nicholas/Parks and Wildlife 4 Snorkelling at Penguin Island, Shoalwater Islands Marine Park. Photo – Michael James/Parks and Wildlife 5 The Natural Bridge, Torndirrup National Park. Photo – Tourism WA 6 Tree Top Walk, Walpole-Nornalup National Park. Photo – Nic Duncan 7 Pinnacles Desert, Nambung National Park. Photo – Tourism WA 8 Yanchep National Park. Photo – Parks and Wildlife 9 Spanish dancer, Jurie Bay Marine Park. Photo – Ann Storrie 10 Canoeing on the Murchison River, Kalbarri National Park. Photo – Samille Mitchell



SHARING THE VI



PROTECTING THE YAWURU CONSERVATION ESTATE

Conservation reserve management in Western Australia is entering a new era, with exciting opportunities for partnerships with traditional owners and others under joint management arrangements. The Yawuru conservation estate – centred around Broome – is among the first of these new ventures and will be jointly managed with the Yawuru native title holders under four closely related management plans. Draft plans for two of the areas – the Yawuru Birragun Conservation Park and the Proposed Yawuru Nagulagun / Roebuck Bay Marine Park – will be released for public comment in the near future.

**by Chris Nutt, Terese Dimascia
and Kate Fitzgerald**

VISION



Previous page

Main The sun sets over the mangroves in Roebuck Bay.

Photo – Jan van de Kam

Above left Broome sandstone formations in Roebuck Bay.

Photo – Marie Lochman

Above The bay and plains surrounding Broome Bird Observatory.

Photo – Hazel Watson

For thousands of years *Yawuru ngarrungunil* (Yawuru people) have lived along the foreshores of Roebuck Bay, across the pindan plains, as far inland as the *Walan-garr* (the Edgar Ranges) and along the fringes of the Great Sandy Desert. *Yawuru buru* (Yawuru country) is land and sea moulded by the cycle of seasonal change. It is a living cultural landscape with which Yawuru people have a dynamic and enduring relationship and deep responsibility of care.

THE YAWURU AGREEMENTS

In April 2006, the Federal Court of Australia recognised Yawuru people as the native title holders of the lands and waters in and around Broome.

In February 2010, the Yawuru Registered Native Title Body Corporate (RNTBC), the State Government of Western Australia, the Shire of Broome and other relevant parties signed two Indigenous land use agreements referred to as the Yawuru Agreements. These agreements outline various reserve types and management arrangements and provide for the creation and joint management of the lands and waters which are collectively referred to as the Yawuru conservation estate. Four complementary management plans are being developed to cover the different areas of the Yawuru conservation estate.

These areas will be jointly managed by the Yawuru RNTBC and one or more of its joint management partners through the Yawuru Park Council. Made up of representatives from the Yawuru RNTBC, Parks and Wildlife and the Shire of Broome, the Yawuru Park Council was established to oversee the joint management of the estate.

The Yawuru Program Team, which includes a team of Yawuru Rangers, has been successfully engaged in on-ground joint management of the Yawuru conservation estate since 2010.

A WHOLE-OF-COUNTRY MANAGEMENT APPROACH

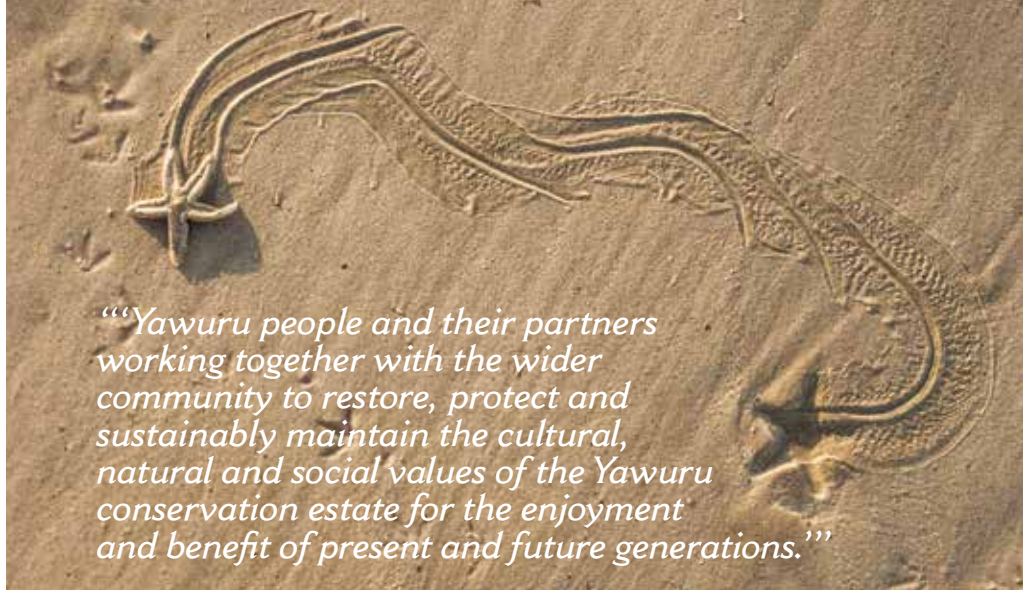
Following Yawuru traditions and in line with the State Government's *Kimberley Science and Conservation Strategy*, a whole-of-country (or landscape-scale) approach has been taken to managing the Yawuru conservation estate. The four management plans will ensure all areas, from the offshore waters to the hinterland, are managed as one interconnected ecological system within the living cultural land and seascape that is Yawuru country.

A Yawuru cultural management plan – developed by Yawuru RNTBC in 2011 – has been a foundation document for the development of the Yawuru conservation estate management plans. Ensuring that



Yawuru cultural values and aspirations are recognised, protected and respected is an important facet of all four management plans. Each plan works to realise the same vision for the Yawuru conservation estate:

'Yawuru people and their partners working together with the wider community to restore, protect and sustainably maintain the cultural, natural and social values of the Yawuru conservation estate for the enjoyment and benefit of present and future generations of Yawuru people and the wider population.'



“*Yawuru people and their partners working together with the wider community to restore, protect and sustainably maintain the cultural, natural and social values of the Yawuru conservation estate for the enjoyment and benefit of present and future generations.*”



Top A beached sea star makes its way back to the water.

Photo – Jan van de Kam

Above The green turtle is one of five threatened *gurlibil* (sea turtle) species found in Roebuck Bay.

Photo – Kandy Curran

AN ENDURING STORY

Yawuru buru has evolved over thousands of years of Aboriginal occupation, and is exceedingly rich in cultural, natural and social values. The Yawuru cultural management plan outlines that:

‘Yawuru cultural values stem from the relationships between Yawuru people and Yawuru country. Like the country itself, the cultural values arise from Bugarrigarra, which gave form to the land and seascape, determined law and gave Yawuru people the responsibility for looking after Yawuru country’.

In this way *Yawuru buru* means much more than just the physical land to which the Yawuru people belong. *Buru* is the physical expression of *Bugarrigarra*, in which the features of *Yawuru buru* were formed. As *Bugarrigarra* beings created and named places, they endowed them with significance. The associated narratives and rituals recount their activities and link Yawuru people to particular areas of country for all time. These narratives ascribe metaphysical meaning to all aspects of physical reality: the landscape, under the ground, the sky, the water, and the diverse plants and animals, and ecosystems.

As such, looking after country and the enjoyment of customary practices are of critical importance to Yawuru people, and are recognised as important cultural values of the Yawuru conservation estate.

As the recognised native title holders of *Yawuru*, Yawuru people have the right to enjoy country and maintain their native title rights and customary practices. Examples of this include using the natural resources of country, passing on knowledge, and protecting and benefiting from country.

Like many Indigenous people across the globe, Yawuru people have a deep understanding of the plants, animals, landscape features, seasons and cycles that make up their country and changes that have occurred over time. Having used this knowledge to not only live off the land, but to sustain this lifestyle for thousands of years, there are a myriad of opportunities for traditional ecological knowledge to feed into and inform conservation science.

NATURAL WONDERLAND

Roebuck Bay is a wetland of international significance under the Ramsar Convention and a renowned destination for bird enthusiasts. The bay is one of the most important feeding grounds for migratory *gamirda-gamirda* (shorebirds) in Australia and has the greatest diversity of shorebird species on the planet.

Each year about 300,000 migratory shorebirds arrive here from their breeding grounds in the northern hemisphere to feed on some of the richest tropical intertidal flats in the world, teeming with small invertebrates like crabs, snails, worms and bivalves.

The intertidal flats, the extensive network of mangroves, meandering tidal creeks, *bundu* (saltmarshes) and salt pans are integral parts of an interconnected ecosystem.

Nagulagun buru (Yawuru sea country) is home to *jurrwayi* (sharks), *birndany* (rays), *wandanyjirr/yardanya* (sea snakes), tropical fish, heart urchins, snubfin dolphins and Indo-Pacific humpback dolphins, while *yari* (humpback whales) pass through on their annual migration. Roebuck Bay provides critical habitat for the specially protected *nganarr* (dugong), four threatened *yalwarr* (sawfish) species and five threatened *gurlibil* (marine turtle) species. The subtidal areas include seagrass and seaweed beds, sponge gardens, reefs, shoals and the Roebuck Deepes – remnants of an ancient drainage system scoured by tidal currents that reaches depths of up to 100m.

The *gundurung* (mangroves) fringing Dampier Creek, *Man-galagun* (Crab Creek) and Roebuck Bay provide valuable habitat for diverse and distinctive marine wildlife including nursery areas for *yalwarr* (sawfish), western king prawns and many fish species. The moist mud supports many species of crab, including flame fiddler and mud crabs, and bivalves such as mudwhelks and shipworms that eat away dead wood. The mangroves are home to bats and many mangrove-dependent bird species and provide high tide roosting sites for shorebirds.

Right Red fiddler crab (*Uca flammula*) and blue spotted mudskipper.
Photo – Dave and Fiona Harvey/Naturalist Volunteers

Below Visiting migratory birds in flight.
Photo – Jan van de Kam

Bottom Reef heron and ibis at Roebuck Bay.
Photo – Tourism WA



“Nagulagun buru (Yawuru sea country) is home to jurrwayi (sharks), birndany (rays), wandanyjirr/yardanya (sea snakes), tropical fish, heart urchins, snubfin dolphins and Indo-Pacific humpback dolphins, while yari (humpback whales) pass through on their annual migration.”



A range of *bilarra* (wetlands) in the Yawuru conservation estate have great cultural importance to Yawuru people, and support a wide range of native plants and animals. Saltmarsh floodplains and salt pans go through a dramatic seasonal transition, morphing from dry and barren to magnificent wetlands teeming with life.

The beaches between *Miriny* (Cape Villaret) and *Yinanamana-gada* (Jacks Creek) are important nesting areas for threatened flatback turtles. Other threatened animals that may occur in terrestrial parts of the Yawuru conservation estate include the bilby, Airlie Island ctenotus and 10 species of bird including the Australian painted snipe.

TOURISM AND PEARLING

Broome is an internationally renowned tourist destination and gateway for tourists to explore the wider Kimberley region. The Yawuru conservation estate's natural rugged beauty, semi-remote environments, spectacular turquoise waters and abundant wildlife offer a variety of attractions and opportunities for cultural and nature-based tourism. Visitors can enjoy a range of recreational pursuits including whale watching tours and other wildlife appreciation opportunities, kayaking, boating, fishing, picnicking, and beach and bushwalking. The Yawuru community will seek to develop new cultural heritage and eco-tourism businesses in the Yawuru conservation estate.

'The Bay', as it is known locally, is also a place of great value to the community of Broome for recreational activities such as fishing and boating. Increased benefits to recreational and customary fishing experiences are expected following the State Government's 2013 purchase and retirement of the two commercial gillnet fishing licences operating in Roebuck Bay.

Synonymous with pearling since the 1870s, Roebuck Bay was widely known as the pearling capital of the world. The seven remaining pearl farm leases will continue to operate in the proposed marine park. Other small-scale commercial fishing activities in the proposed marine park include the collection of hermit crabs and specimen shells.



Top Yawuru Rangers Jason Fong, Jason Richardson and Preston Manado collect benthic samples at *Man-galagun* to enter into a 20-year data set focused on understanding how and why the area's mudflats can support vast numbers of visiting shorebirds.
Photo – Jennifer Eliot

Above left Mangroves provide shelter for sawfish.
Photo – Stirling Peverell

Above A dugong with its calf.
Photo – Geoff Taylor/Lochman Transparencies



PLANNING FOR THE FUTURE

Draft management plans for the Yawuru Birragun Conservation Park and the Proposed Yawuru Nagulagun / Roebuck Bay Marine Park – the first two of the four plans to be developed – will soon be released for public comment. This represents an important opportunity for the broader community to have their say on how these areas will be managed into the future.

Yawuru birragun means ‘Yawuru bush country’. The Yawuru Birragun Conservation Park which covers about 19,125ha will be freehold land held by Yawuru RNTBC, but will be managed for the enjoyment and benefit of present and future generations. It will be managed for conservation, recreation, traditional and customary Aboriginal use and enjoyment, and for practising, sustaining and maintaining native title rights and interests.

Yawuru nagulagun means ‘Yawuru sea country’. The proposed marine park covers around 80,450ha from *Minyirr* (Gantheaume Point) in the north to *Miriny* (Cape Villaret) in the south, and includes subtidal and intertidal areas from the

high water mark to the seaward limit of Western Australian waters (three nautical miles from the territorial baseline).

The draft plans will describe proposed management for the next 10 years and focus on increasing awareness and understanding of Yawuru cultural values and native title rights, protecting critical habitats and species such as wetlands and snubfin dolphins, and improving access, facilities and services for recreation and tourism.

This will help Yawuru people to maintain their strong and vibrant culture and safeguard this special place for its intrinsic value and the enjoyment of all people.

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Kate Fitzgerald was previously a Parks and Wildlife marine conservation officer.

The authors would like to acknowledge and thank staff at Nyamba Buru Yawuru. In particular, they thank Sarah Yu, Julie Melbourne and Howard Pederson for their contribution.

Protecting the nature of the Kimberley

The Proposed Yawuru Nagulagun / Roebuck Bay Marine Park will contribute to fulfilling State Government commitments under its visionary *Kimberley Science and Conservation Strategy*. Released in 2011, a key part of this strategy is the Kimberley Wilderness Parks initiative. Proposed to cover about five million hectares, this initiative will create the State's largest interconnected system of marine and terrestrial reserves, including five marine parks at Camden Sound, Horizontal Falls, North Kimberley, Roebuck Bay and Eighty Mile Beach. These five marine parks will contribute to the representative system of multiple-use marine parks and reserves in WA. When it is created, the Yawuru Nagulagun / Roebuck Bay Marine Park will become the third marine park to be created under the strategy, with the Eighty Mile Beach Marine Park and the Lalang-garram / Camden Sound Marine Park created and planning for the proposed Horizontal Falls and North Kimberley marine parks well advanced.

Above A whiskered tern nest on Kidneybean Claypan.

Photo – Jan van de Kam



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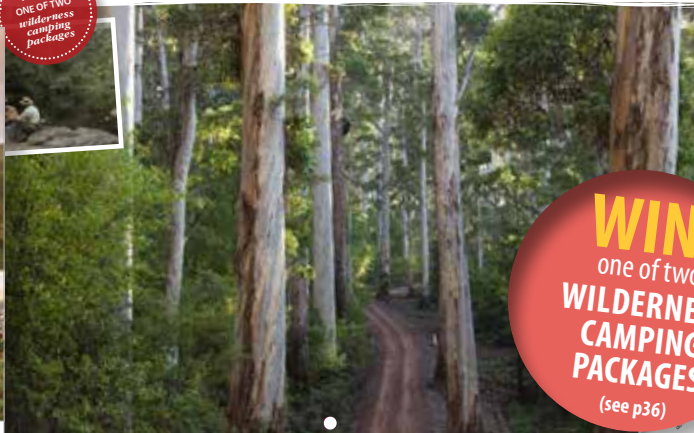
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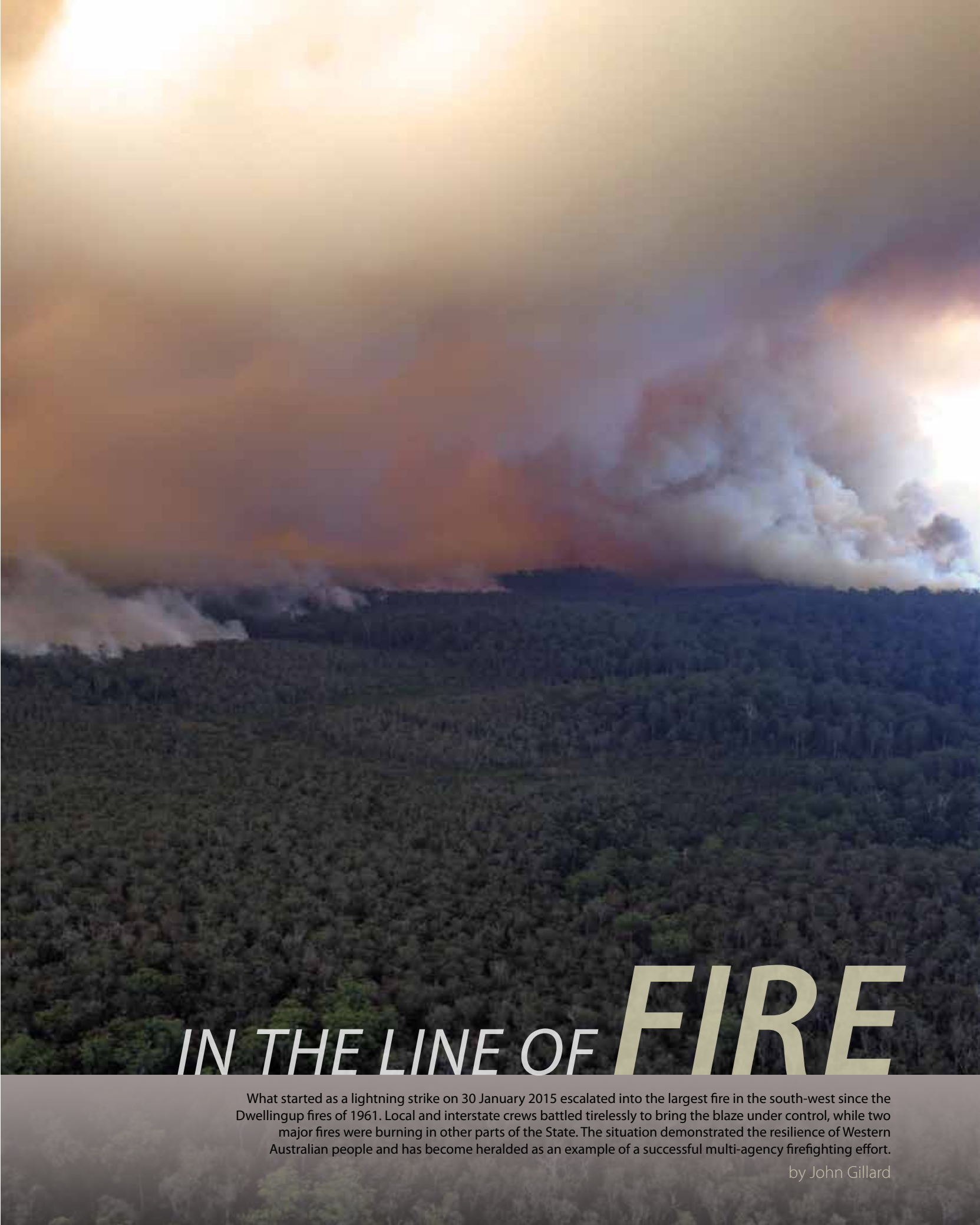


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IN THE LINE OF **FIRE**

What started as a lightning strike on 30 January 2015 escalated into the largest fire in the south-west since the Dwellingup fires of 1961. Local and interstate crews battled tirelessly to bring the blaze under control, while two major fires were burning in other parts of the State. The situation demonstrated the resilience of Western Australian people and has become heralded as an example of a successful multi-agency firefighting effort.

by John Gillard

At 9.55am on the morning of 30 January 2015, after two days of extreme lightning activity, Parks and Wildlife spotter pilot Jarrad Garrick looked out to the horizon in search of signs of fire. A shimmer of grey looked suspicious so the pilot altered course to investigate further. On approach, the situation became obvious – a fire was burning in Shannon National Park about one kilometre from the nearest track and about four kilometres from the nearest accessible road.

The pilot radioed in the fire location to the Parks and Wildlife Donnelly District office in Pemberton, estimating it had burnt through half a hectare of five-year-old fuel. The fire was given an ID name – Fire 19 ‘O’Sullivan’ – and crews sprang to action. Within five minutes of the report two fixed-wing water bombers, one bulldozer and two trucks had been deployed to the area. At 11.50am these resources were redeployed to another lightning-caused fire threatening Muir Highway and the adjoining farming communities in Tone State Forest, south-east of Manjimup, and more than a dozen other fires ignited by lightning across the Warren Region.

By 2.48pm the fire was estimated to have burnt through two hectares, by 5pm it had burnt through four hectares. By 11am the next day, after working into the night, fire crews had managed to track part of the fire. However, unfavourable winds, temperatures in the mid-30s and low humidity hampered efforts to contain it. By 2pm the fire had grown in size and intensity with flames up to three metres. By 7.45pm it was a whole different ball game – flames were up to 30m high and spot fires were occurring 200m ahead of the main fire. Fire management systems were elevated with Emergency Warnings being issued for Northcliffe and Windy Harbour as the fire behaviour escalated and the fire threatened the town sites.

For the next 10 days, staff from Parks and Wildlife worked closely with crews from the Department of Fire and Emergency Services, the Forest Products Commission, the State Emergency



“By 2pm the fire had grown in size and intensity with flames up to three metres. By 7.45pm it was a whole different ball game – flames were up to 30m high and spot fires were occurring 200m ahead of the main fire.”

Previous page

Main The fire had a perimeter of 295km.

Photo – Parks and Wildlife

1 The intensity of the fire was among the worst that seasoned firefighters had experienced.

2 The fire started in Shannon National Park.
Photos – Department of Fire and Emergency Services

3 The fire reached the coast in the early hours of 4 February.

Photo – Ben Hennessy/Channel 9

4 A near-miss for firefighters highlighted risks to crews.

Photo – Tom Sawyer/Forest Products Commission

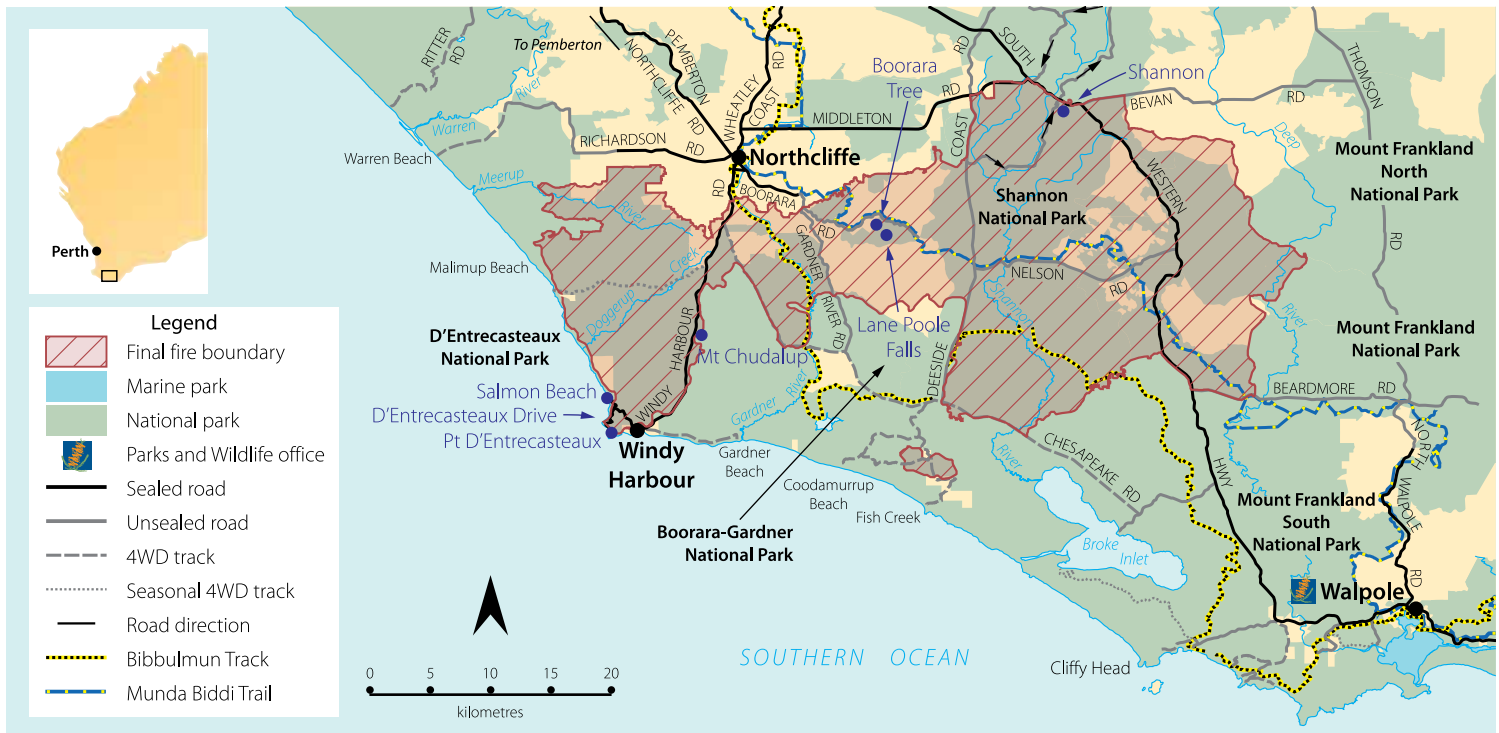
Services, local volunteer bushfire brigades, local government authorities, WA Police, Western Power, Main Roads WA, the Salvation Army, Australian Defence Force, St Johns Ambulance, departments of Health, Agriculture, Child Protection and Family Services and Education, the Water Corporation, Telstra and private contractors. Local teams were also supported by 264 interstate firefighters who formed three separate deployments from Victoria, New South Wales, the Australian Capital Territory, Queensland and the Northern Territory. They worked side-by-side on the frontline and behind the



scenes to battle this mammoth blaze that threatened lives, properties and townships while crews elsewhere were battling blazes in other parts of the state, including another major fire incident in Boddington.

Firefighters with more than 30 years' experience described the fire as the most intense they could recall. At its most extreme, the fire travelled at a rate of 2.5km per hour. For several days fire managers planned for the worst.

Thankfully, some favourable weather conditions on 4 February – four days after the fire started – gave the fire crews the break they were looking for and



they managed to gain some traction in containing the fire. It was contained on 10 February but the mop-up process went on until the end of March. Work on repairing trails, bridges and other infrastructure is expected to take up to two years.

By the time it was extinguished, the fire had burnt through 98,700ha and the fire zone had a perimeter of 295km, making it the largest fire in the south-west since the devastating Dwellingup fires in 1961. Battling it required a staggering contingent of resources, including 1670 people, 164 fire appliances, seven fixed-wing aircraft, three helicopters (including

one air crane) and two large aerial tankers. But what cannot be measured on a shift log or asset inventory, but was just as important, was the role community spirit and good working partnerships played in the operations. Crews received invaluable support from local community members and businesses in the form of offers of help, donations of food and products, and wishes of support. The notes of support and signs carrying messages of encouragement were elixirs to tiring fires. The work carried out by the Shire of Manjimup during and after the fire was outstanding.

The fire impacted forest resources, particularly regrowth stands of karri, which are important to future wood supply for the native forest timber industry. Mercifully, however, the losses to infrastructure were small considering the severity of this bushfire, which had the potential to cause extreme devastation. The outcome is a credit to the expertise of senior fire managers and strategists and the teamwork of the countless people involved across a number of agencies in a variety of capacities. This is the story of the fire in pictures ...



5



6



7

Fact file

The Northcliffe fire burnt through 98,700 hectares:

- 4470 hectares of private land
- 1000 hectares of other Crown land including road reserves
- 93,230 hectares of lands vested with the Conservation Commission

1670 people were involved, including:

- 326 Parks and Wildlife staff
- 250 staff from other government agencies
- 264 firefighters from the eastern states (380 firefighters travelled to WA to assist at the Northcliffe and other fires burning simultaneously)
- 600 volunteers
- 230 contractors

Machinery used:

- 164 fire appliances
- Seven fixed-wing aeroplanes
- Two helitacs
- One air crane
- Two large aerial tankers
- 86 pieces of machinery.

"Crews received invaluable support from local community members and businesses in the form of offers of help, donations of food and products and wishes of support. The notes of support and signs carrying messages of encouragement were elixirs to tiring fires."



8



9



Opposite page

5 Bull-dozers were used to create fire breaks ahead of the main fire.

Photo – Andrew McDonald/Parks and Wildlife

6 Western Australia's air crane was deployed to attack the fire from above.

Photo – Parks and Wildlife

7 Fighting the fire required a massive inter-agency effort.

Photo – Steve Bradford/Parks and Wildlife

8 The local community rallied behind firefighters with messages of support.

9 Community meetings were held to brief residents.

This page

10 Fighting the fire required the efforts of 1670 people.

11 Volunteer firefighters played a crucial role in supporting crews from Parks and Wildlife and the Department of Fire and Emergency Services.

12 Logistical support of food and accommodation was conducted on a scale never before seen in Western Australia.

13 Crews clock in and out to ensure everyone is accounted for at all times.

Photos – Jennifer Elliot/Swan River Trust



14 The fire burnt through parts of Shannon National Park and the adjoining D'Entrecasteaux National Park.
Photo – Cliff Winfield

15 Smoke across the road made driving conditions difficult.
Photo – Rod Annear/Parks and Wildlife

16 Volunteers helped with post-fire recovery, including repairing fences.
Photo – Cliff Winfield

17 Roads provided important firebreaks.
Photo – Michael Pez/Parks and Wildlife

“By the time it was extinguished, the fire had burnt through 98,700ha and the fire zone had a perimeter of 295km, making it the largest fire in the south-west since the devastating Dwellingup fires in 1961.”



18 Despite the intensity of the fire, some green remained.

Photo – Peter Nicholas/Parks and Wildlife

19 The historic Long Gully Bridge.

20 Where the Long Gully Bridge once stood.

Photos – The Bibbulmun Track Foundation

Rising from the ashes

*by Stuart Harrison, Parks and Wildlife
Recreation and Trails Unit Coordinator*

While three fires burnt simultaneously in February 2015 at Northcliffe, Helena Valley National Park and in Lane Poole Reserve, the cost to the Munda Biddi Trail and the Bibbulmun Track mounted. By the time the fires had been contained and mopped up, they had collectively burnt about 70km each of the Munda Biddi Trail and the Bibbulmun Track. Tragically, the historic 66-year-old, 128m Long Gully Bridge that crossed the Murray River between Dwellingup and Collie on the Bibbulmun Track was completely destroyed. Other losses included four shelters destroyed on the Bibbulmun Track and one shelter badly damaged on the Munda Biddi Trail.

As soon as the areas were deemed safe, Parks and Wildlife staff and insurance assessors began to visit and gauge the losses. Volunteer firefighters from Queensland worked alongside volunteers from the Bibbulmun Track Foundation to clean up and recover what little remained of the Long Gully Bridge. Meanwhile, plans were being developed for a temporary crossing over the Murray River until a more permanent solution can be built.

Planning is well underway for rebuilding the four Bibbulmun Track shelters at Brookton, Possum Springs, Gardner and Dog Pool, with rammed earth versions of the much-loved timber shelters. It is hoped both trails will be repaired and reopened within 12 to 18 months, through a combined effort from staff, contractors, community and foundation volunteers.

What has emerged from the situation is the overwhelming sense of community ownership of both trails. In the weeks and months after the fires, Parks and Wildlife and the Bibbulmun Track and Munda Biddi foundations received offers of assistance from businesses, private contractors and community organisations to assist in rebuilding and restoring the trails and their infrastructure. Many individuals have also come forward with their messages of hope that the trails will be restored so that users can continue to enjoy them long into the future.



John Gillard is Parks and Wildlife's Donnelly District Manager and has 37 years' experience in a range of fire management roles, including sector commander and incident controller. He can be contacted on (08) 9776 1207 or by email (john.gillard@dpaw.wa.gov.au).





Western Australia's Wheatbelt has become one of the most highly fragmented landscapes in the world, with as little as one to two per cent native vegetation remaining in some shires. Occasionally, however, a small fence can facilitate a big win, as has occurred with a little-known roadside population of white-flowered philotheca.

BY NATASHA MOORE

FLUFFY ASSASSIN

CURSE

*OF THE
WHEATBELT RABBIT*



Introduced rabbits have committed untold environmental damage to our country. Their impact is highly conspicuous, especially in sandy areas, but their effects can be subtle too – often it's the small things missing from the landscape that can indicate something insidious is happening.

A patch of bush in the central Wheatbelt with large established trees and a beautiful array of shrubs with a carpet of spring annuals may look healthy. However, without seedlings or young plants, it could indicate rabbits are feasting on the new growth and encouraging weeds – derailing the efforts of plants to repopulate. Either way, few people pay any attention when they see a rabbit in the wild, and it's not uncommon to see them bounding through paddocks or along roadsides. Perhaps this would be different if people realised the damage being inflicted on our unique Australian landscape. Thankfully, many plants of the central Wheatbelt, even those in isolated bush fragments living in an unpredictable climate, have regenerative powers to restore areas to their natural state if given time and protection from this furred assassin.

AN INNOCENT VICTIM

The white-flowered philotheca (*Philotheca basistyla*) is restricted to two small roadside populations between Kellerberrin and Trayning, in the central Wheatbelt. These plants can be found growing underneath or below other taller shrubs and trees in dense scrub heath vegetation on deep yellow sand. These areas were largely cleared for agriculture during the 1960s and are a favoured area for the burrowing rabbits. The philotheca has been slowly declining in number every year since its discovery in 1990. The total population in 2009 was thought to be just 20 mature plants from one roadside community, with many showing signs of senescence, and plants at another site presumed to have become extinct. Conservation officers estimated that at that rate of decline, and with no intervention, the species would be extinct in five to eight years.



In the five years earlier, conservation officers scoured nearly 40km of roadsides and more than 500ha of remnant vegetation in search of white-flowered philotheca plants. During the survey several sites were identified as potential habitat and, where possible, searches are still carried out in these areas – just in case a plant germinates.

While there is still a small amount of habitat left for this species on private remnants and a few roadsides, the plants seem to be unable to recruit seedlings under current conditions. In an effort to determine why this might be, conservation officers carried out small patch burns in autumn 2009 in an area adjacent to one of the populations. Slightly lower-than-average winter and spring rainfall led to a late germination of other seedlings in the plots but philothecas were not seen. Then in 2011 a burn was carried out in a location where they were known to have grown previously in the hope that seeds stored in the soil would still be viable and would germinate successfully and continue to maturity. Although there was good germination of other plant species, only one philotheca seedling eventually germinated in 2013. It struggled to thrive in the following unseasonal conditions but looks as though it might flower later this year.

A TWIST IN THE TALE

The defining moment in this story occurred in November 2010 when Commonwealth *Caring for Our*



Previous page

Main An ant on a white-flowered philotheca.

Photo – Hayden Cannon/Parks and Wildlife

Inset Rabbits are commonly seen throughout Australia.

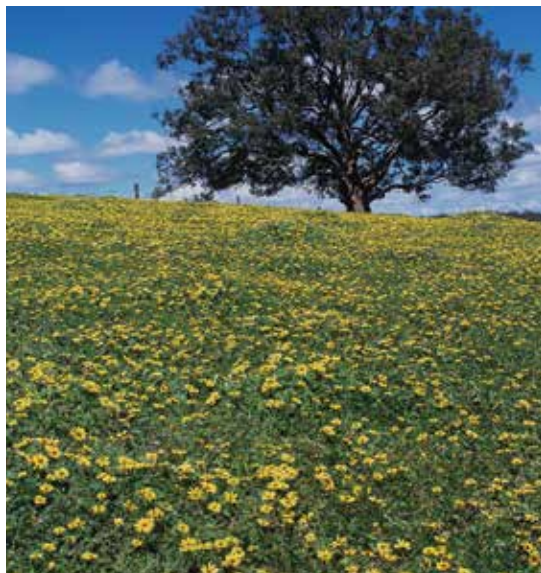
Photo – Sallyanne Cousans

Above The impact of rabbits can be seen across the landscape.

Photo – Jiri Lochman

Country funds were used to construct a rabbit-proof fence around the largest known remaining population of white-flowered philothecas. While the fenced conservation area is only 2ha, the fence has proven extremely worthwhile and has highlighted the amount of vegetation that rabbits can consume in our landscape.

Excluding rabbits from the site also enables the effective control of weeds in the area, mostly ice plant (*Mesembryanthemum crystallinum*) and



“Rabbit diggings and dung heaps contribute to new weed infestations in the bush as they create nutrient-rich sites that encourage germination of weeds.”

cape weed (*Arctotheca calendula*). Rabbit diggings and dung heaps contribute to new weed infestations in the bush as they create nutrient-rich sites that encourage germination of weeds. It is especially important to control ice plant in these sensitive sites since it accumulates salt throughout its short life, in a gradient from the roots to the shoots, with the highest concentration stored in epidermal bladder cells on its leaves – giving the plant its glistening appearance. The plant then releases salt into the soil when it

dies at the end of summer, creating an increasingly hostile environment that stunts or halts the growth of other, non-salt-tolerant species while enabling ice plant seeds to germinate.

A HAPPY ENDING?

In the four years since the fence was erected and weed control undertaken, many species have germinated from seed and grown steadily into mature plants. It wasn't until the fence had been up for two years that philotheca seedlings were

Top left Cape weed is one of the weed species that impacts most patches of remnant vegetation in the Wheatbelt.

Photo – Len Stewart/Lochman Transparencies

Top Clearing for agriculture has presented challenges for native species.

Photo – Marie Lochman

Above left Fencing against rabbits also prevented ice plant growing in the area.

Photo – Jiri Lochman

Above Rabbit burrows decimate areas of natural vegetation.

Photo – Ann Storrie



Above The tiny flower of the white-flowered philotheca.

Photo – Hayden Cannon/Parks and Wildlife

Above right Plants are being grown in a glasshouse in the hope they can be transplanted into the wild.

Photo – Eric Bunn

Right Recruitment burn trial.

Photo – Ben Lullfitz/Parks and Wildlife

Opposite page

Right The fence has provided protection from rabbits and reduced weed spread.

Photo – Sallyanne Cousans

observed and in an unexpected high density. So far, more than 90 seedlings have been counted and more are found with each visit. The population is now thought to number about 120 plants. Now, thanks to little more than the installation of a small fence and the removal of rabbits, this species is moving towards recovery and a sustainable population. This result suggests that philotheca plants were always recruiting new seedlings but the rabbits were eating them as fast as they appeared.

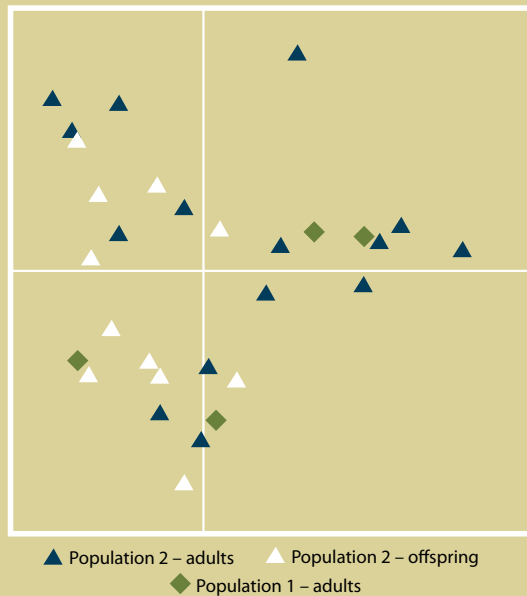
The other nearby population, thought to be extinct, has also experienced some good fortune. Although this area could not be fenced, routine rabbit control has been carried out in the adjoining private properties since 2009. It seems that this has been enough to enable the recruitment of five new philotheca plants in some of the thickest vegetation.



JOINING FORCES – A NEW PARTNERSHIP

In another development, in December 2010, the newly fenced population of philothecas appeared to be dying. The greenness had vanished from the leaves and they began to look parched and yellow. Concerned about losing the species, Dr Eric Bunn from the Botanic Gardens and Parks Authority was invited to collect small amounts of shoot material from all the remaining live plants. This material has formed the basis of a cryogenic-stored population that will be used for future restoration and translocation projects. Given the sharp decline in the health of the remaining live plants, very low seed set and poor season, this step was a critical safeguard for the species.

Genetic relatedness in white-flowered philotheca



Above figure This graph shows the pattern of genetic variability within and between populations of white-flowered philotheca. Each point on the graph represents an individual plant; plants plotted close together are genetically similar, while plants further apart on the graph are less closely related.

Produced by Janet Anthony

Current status

Understanding the genetics of rare plants is often an important part of their conservation. In the case of white-flowered philotheca, genetic fingerprinting studies have been conducted to assess the amount of genetic diversity in the adult plants and seedlings. These studies show that there is a high amount of genetic diversity among adults within each population, and little difference between the two populations, at least with the plants tested so far. Seedlings appear to be more closely related to each other than the adults are, probably because the populations have declined since the current adults were seedlings. One of the new seedlings germinated showed new genetic patterns not associated with the current adults, indicating that it is descended from parents that have since died. Seedlings like this one are particularly important to propagate via tissue culture, as they represent important genetic diversity for the species.

The relative lack of genetic diversity in the seedlings examined so far highlights a common problem with rare plants that have declined to small populations. As numbers of plants decline, inbreeding increases, potentially resulting in progressive reduction of genetic variability, fitness and vigour in each succeeding generation. To counter this, it is important that as many adult plants as possible play a part in seed production. In addition, it is important to capture as much of the existing genetic variation of adult and seedling plants as possible via tissue culture and cryopreservation while plants are still alive. Once the genetic fingerprinting of white-flowered philotheca is completed, the most diverse genotypes can be focused on for plant production and translocation to create new populations or seed orchards.

“... areas were largely cleared for agriculture during the 1960s and are a favoured area for the burrowing rabbits. The philotheca has been slowly declining in number every year. The total population in 2009 was thought to be just 20 mature plants from one roadside community ...”

Several collections have been made since this event and, to date, Eric has managed to grow eight plants from *in vitro* propagation through to the glasshouse. The *in vitro* rooting trials have continued to improve with up to half establishing roots in one experiment (up from 23 per cent in previous trials). But conserving philothecas in the glasshouse is proving difficult and only a few plants have made it to soil as they have not thrived in the available soil mixes or conditions. Root induction (the process of the micro propagules or cuttings forming their own root systems while in tissue culture, allowing them to be potted out to grow into mature plants) is still variable and takes a long time. It usually takes about eight weeks or longer to occur, but

further trials are underway to try to reduce the time taken to initiate roots and to improve rooting percentages. Currently micropropagated plantlets are being established in pots designed specifically for getting long-rooted plants to maximise survival under harsh conditions.

Even though these substantial steps have been taken to assist with the long-term survival of white-flowered philotheca, without continued research and investigations we may never fully understand its role in the ecosystem nor be able to effectively and efficiently recover this species in the wild. Well-managed targeted pest control programs are essential in protecting our native wildlife and for agricultural production.



Natasha Moore is the Parks and Wildlife Central Wheatbelt District flora and fauna conservation officer. She can be contacted on (08) 9041 6006 or by email (natasha.moore@dpaw.wa.gov.au).

To find out more about rabbit control and the conservation methods used to protect threatened species contact your nearest Parks and Wildlife office or visit www.pestsmart.org.au.

To find out more about Dr Bunn and the flora conservation work conducted at the Botanic Gardens and Parks Authority visit www.bgpa.wa.gov.au.

Adventure out

DESCENDING THE GIANTS

Recent visitors to the Tree Top Walk have been treated to an opportunity to experience the giant tingle trees and karri forest from a different perspective.

by Julie Ross



Harnessed up and with my safety helmet fitted, I take a deep breath and lift myself up over the railings. I'm nine metres high in the magnificent tingle forest at the Valley of the Giants and am about to abseil down to the forest floor. My hands are shaking and my heart is pumping, courtesy of the adrenalin 'hit' I'm experiencing. I've had a briefing and double checked my equipment, but I am still nervous. I realise I am as ready as I'll ever be, and am keen to get on with it before I lose my nerve and my colleagues discover I've chickened out!

So, I tackle my fear head on and go out on a limb – it is the forest, after all. Once I begin to lower myself down, I start to enjoy the experience. The feeling of 'falling' is exhilarating, but it's also reassuring knowing that I can control the speed at which I go. The smell of the karri and tingle trees and the sounds of the forest (including the cheers of those on the platform above) add to the experience. And it's amazing to get a different perspective of the tingle forest, which I have walked through so many times before.

After a few minutes my feet touch the soft forest floor. I'm glad to have reached the bottom and am quietly proud that I have done it.

Left At its height the Tree Top Walk platform is 40m above the forest floor.

Photo – Nic Duncan/Parks and Wildlife

Below Stephanie Crawford of Denmark on her first attempt at abseiling.

Photo – Parks and Wildlife



NEW TAKE ON AN OLD FAVOURITE

Located between Denmark and Walpole in Walpole-Nornalup National Park, in the heart of the Walpole Wilderness, the Tree Top Walk is an internationally renowned, award-winning nature-based attraction. Since opening in 1996, it has welcomed more than three million visitors who have been treated to breathtaking views across the wilderness along the stunning walkway which transverse through the forest canopy.

The 600m walk reaches 40m at its highest point in the tingle forest canopy and is fully accessible and suitable for children of all ages, wheelchairs and strollers. For some, being that high is adventure enough. But as the popularity of 'soft adventure' experiences grows, an opportunity to provide a more challenging way to experience the Tree Top Walk arose. In December 2014 a partnership began between Parks and Wildlife and Sven Borg from Spacechameleon Adventure Co to trial abseiling and tree climbing. It marks a new era of visitor experiences on and in Parks and Wildlife-managed lands and waters as the viability of adventure activities is explored.

The boardwalk leading visitors to the beginning of the walk was selected as the site for abseiling, guaranteeing safety for the abseilers and ensuring other users of the Tree Top Walk were not impacted. The location of the tree climb was chosen to minimise the environmental footprint of the activity and in response to the outcome of a health check by an arborist. A pulley system was erected alongside an ancient karri tree, which enabled people to 'climb' up as far as they wanted and down at their own speed. The 40m ascent is challenging, but has been mastered by people of all ages – including a five-year-old who made it look effortless. Even 'Spingle' the Tree Top Walk mascot spider has conquered it. The response from those who have completed the climb is that the views were well worth the effort.

"I begin to lower myself down, I start to enjoy the experience. The feeling of 'falling' is exhilarating, but it's also reassuring knowing that I can control the speed at which I go. The smell of the karri and tingle trees and the sounds of the forest (including the cheers of those on the platform above) add to the experience."



Above Tree Top Walk guide Charmaine Brown enjoying the ride.

Photo – Julie Ross/Parks and Wildlife

Right The magnificent karri trees offer the perfect backdrop for the Tree Top Walk.

Photo – Andrew McInnes





Above Sven Borg from Spacechameleon Adventure Co assists Julie Ross to descend.

Left 'Spingle' the spider expertly navigating the descent to the forest floor.

Photos – Parks and Wildlife

A WILD RIDE

A trial was held in December 2014 and March–April 2015 with resounding success. More than 675 people completed the abseil and 465 climbed up the karri tree, nearly two thirds of participants were children. The success of the trial indicates there is a definite market for experiences that cater to people who are looking for 'soft adventure' and regular visitors to the Tree Top Walk who enjoy an opportunity to do something a 'little different'. An expression of interest will now go out to interested operators to see

what opportunities can be progressed to deliver adventure activities at the Valley of the Giants. It may be ropes courses, tree climbing or climbing walls. Until then Parks and Wildlife will continue fulfilling visitor expectations at the Tree Top Walk. And I wonder what's next in store for this adrenalin junkie.

Julie Ross is the Tree Top Walk business manager. She can be contacted on (08) 9840 8263 or by email (julie.ross@dpaw.wa.gov.au).

Do it yourself

Where is it?: Valley of the Giants Tree Top Walk is located in the Walpole-Nornalup National Park, 18km drive from Walpole and 52km from Denmark.

What to do: Bushwalking, birdwatching, nature observation, guided tours, holiday programs and picnicking.

Facilities: Walk trails, Discovery Centre – featuring a great range of visitor information and displays, gift shop, bike racks, toilets, wheelchair and stroller hire, car park.

Natural attractions: Much of the plant life in this forest is unique to the south-west of WA and some have origins that can be traced back 65 million years to the super continent Gondwana when Australia was joined with what are now Africa, India, Antarctica and South America. The magnificent tingle trees that occur here are unique to the area and, together with the karri trees, play host to a raft of birds, mammals, frogs and insects.

Opening times: Daily 9am to 5pm (extended hours 26 December to 26 January 8am to 6pm). Closed Christmas day and during hazardous conditions.

Free guided tours: Plan your trip to include a fabulous guided walk of the Ancient Empire, guided walks are offered daily outside the school holidays. Guided walks are free of charge, but may be subject to weather conditions.

Holiday activity programs: Enrich your experience of the Tree Top Walk by joining in one of the many fun-filled activities held each school holiday period (excluding winter).

For schools: The Tree Top Walk offers an established ecoeducation program designed to engage students in nature while fulfilling outcomes of the curriculum. *Nearer to Nature* programs can be tailored to suit your school group requirements.

Admission fees apply.

Contact us:

Phone: (08) 9840 8263

Email: ttw@dpaw.wa.gov.au

Fax: (08) 9840 8132

Visit parks.dpaw.wa.gov.au

by Lauren Emmerson



Whose fin is that?

Left Aquinas College Year 7 students Luke Willard, Joel Wilkes and Oliver Warlters observing dolphins as part of Junior Dolphin Watch project. Photo – Linley Brown/Swan River Trust

Year 7 students from Aquinas College were on the lookout for bottlenose dolphins in the Swan and Canning rivers as part of the Swan River Trust's Junior Dolphin Watch project.

The students used their FinBook to help identify the fins of the dolphins they saw as well as document some of the dolphins' behaviour.

"The best thing about the program was learning about the different names of the dolphins and how to identify them. It's concerning that some dolphins are impacted by rubbish like fishing lines, but it's cool to know the public can look after them." Luke Willard, Year 7 student

Find out more about Junior Dolphin Watch at www.riverguardians.com/education/junior-dolphin-watch.

THE TREK OF PYGMY POSSUM BY JAN RAMAGE

Little possum hides away
Sleeping in the trees all day.
When night falls, he awakes
Whiskers twitch and branches shake.
He scampers down the flaky bark
from twig to twig, all in the dark.
He swings from branch, to twig, to leaf
To drop down to the ground beneath.
There he waits, keeping still
Before he takes off up the hill.
Down the path, along the track
He scurries on, not looking back.
Across the log and through the bush
Little creatures hear the whoosh.
Night owl hoots across the sky
As ghost bats flit and flash on by.
Along the path and down the track
To the valley, he won't look back
Through the field, across the stream
He scampers on to find his dream.
Moonlight shimmers. Whiskers twitch
He scurries on and over the ditch.
Scrambling up the flaky bark;
from twig to twig, all in the dark.
Stars bright, moon lit night
Dew drops glisten, shining white.
Petals fall, berries shine
The nectar sweet, and feast divine!



Did you know?

Records show the western pygmy possum (*Cercartetus concinnus*) treks more than 500m and back again during one night to feast on the sweet nectar of mallee tree blossoms.

That would be like a person running for 55km at night to pick up dinner. Sometimes these little possums are chased by other nocturnal predators (20 to 30 times their size). So that would be like a man running 55km to pick up dinner while being chased by huge hungry giants.

They also eat insects and small lizards, which they grasp with their front feet.

Check out Parks and Wildlife's Mammals of the South West Bush Book for more information. This and other titles are available online at shop.dpaw.wa.gov.au or from other good bookshops and visitors centres.

Above Pygmy possum searching out blossom nectar. Photo – Babs and Bert Wells/Parks and Wildlife



Mount Lawley Bush Rangers reach new heights

Bush Rangers from Mount Lawley Senior High School went on a 'Summit 2 Sea' camp recently where they climbed to the top of Bluff Knoll and then made their way to Mandalay Beach in D'Entrecasteaux National Park.

The students made a video about how much they love being a Bush Ranger cadet. You can view the video by scanning the QR code.



"You get to see so many amazing places! I never thought I'd get to go and see Mandalay Beach or a baby bilby in Dryandra. I'll never forget it." Stella Swindelis, Year 9 student

"I enjoy going to remote places you wouldn't usually go to even with your parents, and helping work with rangers in national parks." Henry Barwick, Year 10 student

LANDSCOPE'S KALEIDOSCOPE kids exploring nature page is an exciting regular feature for kids. Find out about our national and marine parks and reserves, and what kids are exploring out in nature.



Osprey (*Pandion haliaetus*)

Ospreys are medium-sized raptors that have a wing span of up to 1.5m. They are found around most of the Australian coast and can sometimes be seen fishing in the Swan River Estuary. Ospreys nest in huge structures that are often 2m high and can be used by several generations. An artificial 'nest' sculpted by local artist Tony Jones was erected at Pelican Point on Matilda Bay Reserve in March in the hope it will attract a nesting pair.

Illustration by Gooitzen van der Meer

Reference photo by Jiri Lochman



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