

WA'S PARKS, WILDLIFE AND CONSERVATION MAGAZINE

LANDSCOPE

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CAUGHT IN THE ACT

Poaching and
smuggling



River Journeys

Linking culture

Surprise rediscovery

Elusive rock-wallabies

Tracking turtles

Long-term volunteering

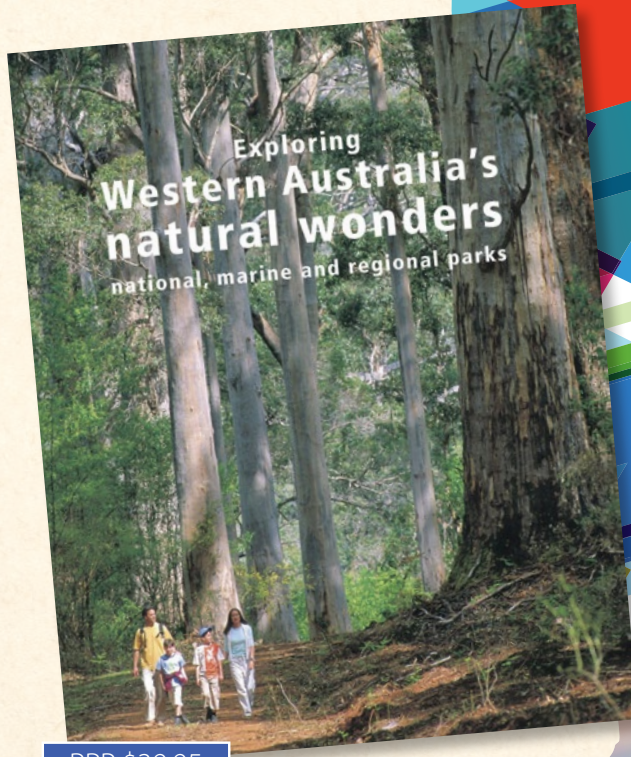


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ON THE COVER

Front cover The magnificent frilled lizard (*Chlamydosaurus kingii*) occurs in Western Australia's Kimberley region and east around the 'top end' to eastern Queensland. They deploy their distinctive 'frill' when threatened and often retreat on their hind legs to a nearby tree. They spend much of their time in trees as high as 2–3m where they seek refuge from predators and survey the surrounds for insects to eat. Frilled lizards are one of the species afforded protection against illegal exporting/importing and possession under the *Wildlife Conservation Act 1950* (see 'A scaly tale' on page 16).

Photo – David Bettini

Back cover The mouth of King George River in the Kimberley is encompassed by the proposed North Kimberley Marine Park. Photo – Chris Nutt/Parks and Wildlife



The Waroona bushfire of January this year that claimed two lives and destroyed the town of Yarloop is a horrifying reminder that we live in a bushfire prone region of the world and that bushfires are very dangerous. In the south-west of Western Australia, the climate is becoming warmer and drier, increasing the bushfire threat. The bush is well adapted to fire but unless we are well prepared, our communities are vulnerable. As promoted, being prepared for bushfire is a "shared responsibility", meaning all levels of government and individual land holders

must play their part. Prescribed burning to reduce the accumulation of flammable vegetation is a critical part of this preparation. As explained in 'Fighting fire with fire' in this edition, bushfires derive their power from the combustion of live and dead vegetation – combustion is a physical and chemical process, so bushfires are without intent. The relationship with vegetation is simple – the more vegetation that burns, the more powerful the bushfire, the more damaging and difficult it is to suppress. Vegetation converts solar energy into fuel for a bushfire so when it burns, decades of solar energy is released as heat energy in a matter of minutes so it is not surprising that high intensity fires burning in heavy fuels are unstoppable. On the other hand, when a bushfire encounters an area that has been recently burnt, it loses power and there is an opportunity for firefighters to safely put it out.

Prescribed burning at the appropriate intervals and scales benefits the bush and is fundamental to reducing the bushfire risk to the community. Without adequate levels of prescribed burning of our bushland, communities and the environment will be placed at greater risk and bushfire suppression efforts will be costly, dangerous and less effective.

Dr Neil Burrows, Senior Principal Research Scientist
Department of Parks and Wildlife

Contributing

Matt Swan joined the former Department of Conservation and Land Management in 1999 as a casual employee at Yanchep National Park while completing his Bachelor of Science at Edith Cowan University. He joined the department's Graduate Development Program in 2003 and has worked as a wildlife officer for the past 10 years. As a wildlife officer he works in a variety of roles within the Nature Protection Branch and plays a key role in protecting Western Australia's unique plants and animals from unlawful activity.



Ben Ansell is the Riverpark project officer for Parks and Wildlife's Swan Region. Ben has been with the department for a number of years, starting his career in the department's Graduate Development Program in 2008. Ben developed a passion for cultural heritage and Aboriginal engagement while working in the West Kimberley District, and has since brought his passion for cultural heritage to the Swan Region, working closely with the Whadjuk Noongar community on a number of recreation and trail projects around the *Derbal Yerrigan* and *Djarlgarro Beelias* (Swan and Canning rivers).












Ian Radford is Parks and Wildlife's Kimberley Region fire ecologist. After starting with the department in 2005 he has undertaken research and monitoring projects on effects of fire and other threatening processes on savanna mammals and other fauna and flora. Ian is currently leading the monitoring team for the *Kimberley Science and Conservation Strategy* to provide feedback on the department's performance in conservation management in the Kimberley.







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This page Nature's Window Trail, Kalbarri National Park.

Photo – Rory Chapple/Parks and Wildlife



Department of
Parks and Wildlife



Bush telegraph



Dear LANDSCOPE,

Thank you for your letter telling me that I had won first prize in the [Parks and Campgrounds of Western Australia 2016 Calendar] competition for a 'glamping' weekend in the Warren National Park.

With family members, I have returned from our camping weekend, after a thoroughly enjoyable experience, which I would recommend to anyone.

Toni and Graeme Dearle [from WA Wilderness] had done a tremendous job in setting up the camp at Drafty's Campground and we were able to settle in at once on our arrival in the late afternoon with time to explore the surroundings before the evening meal. We found that absolutely every need had been foreseen, even down to mosquito coils and a coffee plunger! Plenty of chairs and very comfortable beds.

Showers were provided but some of us found a swim in the river even more inviting!

Our grandchildren, Phoebe and Robbie, thought that the highlight of the weekend was the 4WD Discovery Tour over the Yeagarup Dunes to the beach at the Warren estuary! Full marks to the Pemberton Discovery Centre!

We always buy the LANDSCOPE Calendar and send some overseas to family members who appreciate the excellent photography of the WA scene. Thank you again for giving us the opportunity to win such a splendid experience!

Martin Mathew and family



WA WILDERNESS 



'Extinct' species rediscovered

Two species of critically endangered sea snakes have been discovered off Western Australia's coast.

Two short-nosed sea snakes (*Aipysurus apraefrontalis*), presumed to be extinct, were photographed by Parks and Wildlife officer Grant Griffin in Ningaloo Marine Park and identified by scientists at James Cook University.

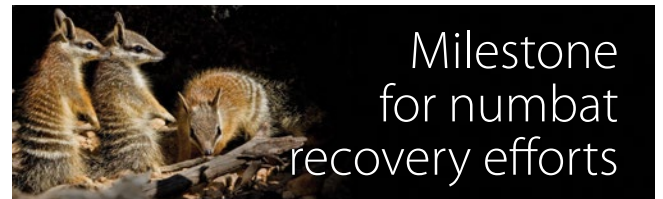
The species was last recorded 17 years ago almost 2000km away at Ashmore Reef in the Timor Sea, and has never been recorded at Ningaloo before. The pair spotted were courting at the time, indicating they could be part of a breeding population.

A separate discovery at Shark Bay Marine Park, of the leaf-scaled sea snake (*Aipysurus foliosquama*), has revealed a marked increase in the species' range. It was previously only thought to live in coral reef habitats much further north.

A paper detailing the findings was published in *Biological Conservation* and can be viewed at www.sciencedirect.com.

Below Short-nosed sea snakes.

Photo – Grant Griffin/Parks and Wildlife



Milestone for numbat recovery efforts

The release of 15 numbats into Dryandra Woodland late last year has brought the total number of captive-bred numbats released into the wild to more than 200.

The captive breeding program, run by Parks and Wildlife and Perth Zoo, is helping to boost numbers and genetic diversity of wild populations, where numbers are now estimated to be as low as 1000.

The 10 juvenile and five adult numbats released in November and December at Dryandra have joined one of the last original wild numbat populations. The numbats are being tracked with radio collars funded by the Project Numbat community action group.

Translocations as well as baiting for foxes and feral cats under the department's *Western Shield* wildlife recovery program, are important components of the national numbat recovery plan.



Above Numbats in Dryandra Woodland.

Photo – John Lawson

Above right Hear about the success of and opportunities for Parks and Wildlife's *Western Shield* program.

Video – Parks and Wildlife

Guest column

Mountain bike trail opened near Margaret River

A short but technically difficult mountain bike trail has opened in Bramley National Park, near Margaret River. The 600m trail targets advanced and highly skilled riders, and is already proving popular with tourists and locals keen to experience one of the world's fastest growing sports.

It's just the start of a planned network of trails that will wind through scenic karri forest, and cater to a range of mountain biking abilities from beginners to advanced riders.

The new section was unveiled in late 2015 at the launch of the *South West Mountain Bike Master Plan*, which identified Margaret River, Collie and Pemberton as ideal locations for the development of new mountain bike trails on Parks and Wildlife-managed land.

The south-west master plan followed the release of the wider *WA Mountain Bike Strategy* in June 2015. Both documents set the scene for the development of more high-quality and cohesive trails to make WA a more attractive destination for mountain biking. This will add to a number of experiences already available, including the world's longest continuous cycle trail, the 1000km Munda Biddi Trail.

The Bramley National Park development will continue, with further planning and new trail construction due to start this autumn.

For a copy of both mountain biking plans, visit www.westcycle.org.au.

Above See how mountain bike enthusiasts are taking up a range of opportunities in this increasingly popular sport.
Video – WestCycle



Victoria Laurie

An award-winning journalist, feature writer and author of The Kimberley: Australia's Last Great Wilderness and The Southwest: Australia's Biodiversity Hotspot (both published by UWA Publishing).

I used to embarrass my young daughters with my incurable enthusiasm for the bush and all that dwells in it. A particular low point in their eyes was when I turned up to their primary school with fresh roadkill to display at their assembly.

They were mortified that their eccentric mother stood there, showing all their friends a perfect specimen of a southern brown bandicoot, or quenda, and then another of a brush-tailed possum. I hasten to explain that these creatures had been skittled on the road earlier that morning and not died at my hand. And they were not bloodied messes, but completely intact – a fatal bump to the head had miraculously left each animal otherwise unscathed on the roadside. So I picked them up.

Unlike my daughters, whom I suspect wanted the earth to open up and swallow me, the kids surged around me and stroked the gleaming golden coat of the quenda, and fluffed up the soft pelt of the pale grey possum. They were fascinated, since few had ever seen or been close to the native animals with whom they shared their bushy Perth hills neighbourhood.

I vowed to capitalise on that interest, and so the quenda campaign unfolded in every classroom, during almost every subject lesson. The kids wrote poems about quenda, they made mathematical measurements of the stuffed model I borrowed from the WA Museum (my fresh roadkill had by then gone stiff in the staffroom freezer, and was not considered sanitary for kids to handle).

They drew gorgeous ink drawings of quenda, which we then converted into three metal sculptures erected at the entrance to the school – of Daddy, Mummy and baby Brenda the Quenda.

Most importantly, the kids learned that this creature was our very own, a Western Australian native who was thriving in a way their threatened bandicoot cousins in other parts of the continent were not.

I had deliberately chosen the quenda as our iconic animal for that very uplifting reason – once threatened, the southern brown bandicoot had come back from the brink.

For once, the kids could learn that our native mammals can survive if given a chance. Almost imperceptibly they were understanding the need – from the quenda's perspective at least – to keep some of the bush at their backdoors and keep the family cat inside.

By the end of that year, no child in our school came away without recognising a quenda. One boy Ben was even able to explain to his distressed parent that 'no Mum, it's not a rat, don't kill it', when a quenda entered their house one day through the cat flap.

As for me, I survived my children's ire; as young adults, they've even thanked me for providing amusing childhood anecdotes. But a couple of years later, I received a call from the school. Could I please, the caller asked in a suitably frosty tone, remove my quenda from the staffroom freezer?



Proposed Credo Conservation Park

The proposed Credo Conservation Park is steeped in Aboriginal heritage and European pastoral and mining history and provides an important environment for waterbirds. Nowadays the area also offers a place for people to visit and connect with nature, and a new campground gives travellers a spot to stop and rest their heads.

Set about 100km north-west from Kalgoorlie and 65km north-west of Coolgardie in the heart of the Goldfields, the proposed 212,126ha Credo Conservation Park operated as a pastoral lease from the early 1900s. It is believed 'Credo' was named by a Benedictine monk from New Norcia and is a Latin verb meaning 'I believe' or 'I trust'. In 2007, the State Government purchased the area for its conservation value and as an important water catchment area for Rowles Lagoon.

NEW CAMPING OPTIONS

More recently, \$250,000 from the State Government's Royalties for Regions program has funded a new campground under the \$21.05 million *Parks for People* initiative. As part of the development, 16 new camp sites have been created to accommodate caravans, camper trailers and tents 800m north of the Credo Homestead complex – accessible by a new road. Each site is 12 by 7m wide and offers campers space to enjoy the bush. Each site is fitted

with a picnic table and a campfire ring, and the campground has a double toilet block. The development also includes upgrades to the homestead, shearers' quarters and other facilities at the site including signage. The new development is already proving popular among visitors.

NATURAL BEAUTY

The beauty of the area strikes you as you enter the campground and pass the gimlet trees which light up and shimmer at sunset and sunrise – definitely worth getting up early for. As you move into the campground, which is elevated in the landscape, you're treated to sweeping views of the salt bush shrublands and woodlands of giant mallee (*Eucalyptus oleosa* subsp. *covina*), yorrel (*Eucalyptus yilgarnensis*) and Victoria Desert mallee (*Eucalyptus concinna*).

Kangaroos abound in the area and bobtails and a number of gecko species can also be spotted. And it's not uncommon to see bats that take to the night skies. But it's the birds that are drawn to the water of

Rowles Lagoon Conservation Park, which is encompassed in Credo, that make this area really special. Thousands of aquatic waterbirds flock to the area including the rare freckled duck, malleefowl, Australian shelduck, blue-billed duck as well as cormorants, ibis, herons, grebes and bronzewings.

FUN TO BE HAD

There are many opportunities for visitors to explore the area on one of the many bushwalking or 4WD tracks. Sites

Above left Rowles Lagoon is a haven for waterbirds.
Photo – Vanessa Jackson/Parks and Wildlife

Top Credo Homestead and field study centre.
Photo – Mike Bream/Parks and Wildlife

Above The new campground facilities at the proposed Credo Conservation Park are already proving popular among visitors.
Photo – Vicky Winfield

on Credo are part of the Golden Quest Discovery Trail – the primary mining history self-drive trail which takes in Rowles Lagoon and Ullaring Rock and many of the ghost towns and mines that dot the landscape. In particular, it's worth visiting mining towns such as Ora Banda with the Ora Banda Hotel, and abandoned town sites of Callion, Siberia and Davyhurst with the remnants of old buildings and cemeteries that give clues into the life of yesteryear.

Other attractions in the area that are worth visiting include the historic woodlines in the south and to the west of Credo, Goongarrie National Park and Lake Goongarrie. The area's large rocky outcrops give variation to the landscape and there are several dams in which yabbies can be collected. There are also beautiful wildflowers in season and photography enthusiasts will find plenty of inspiration.

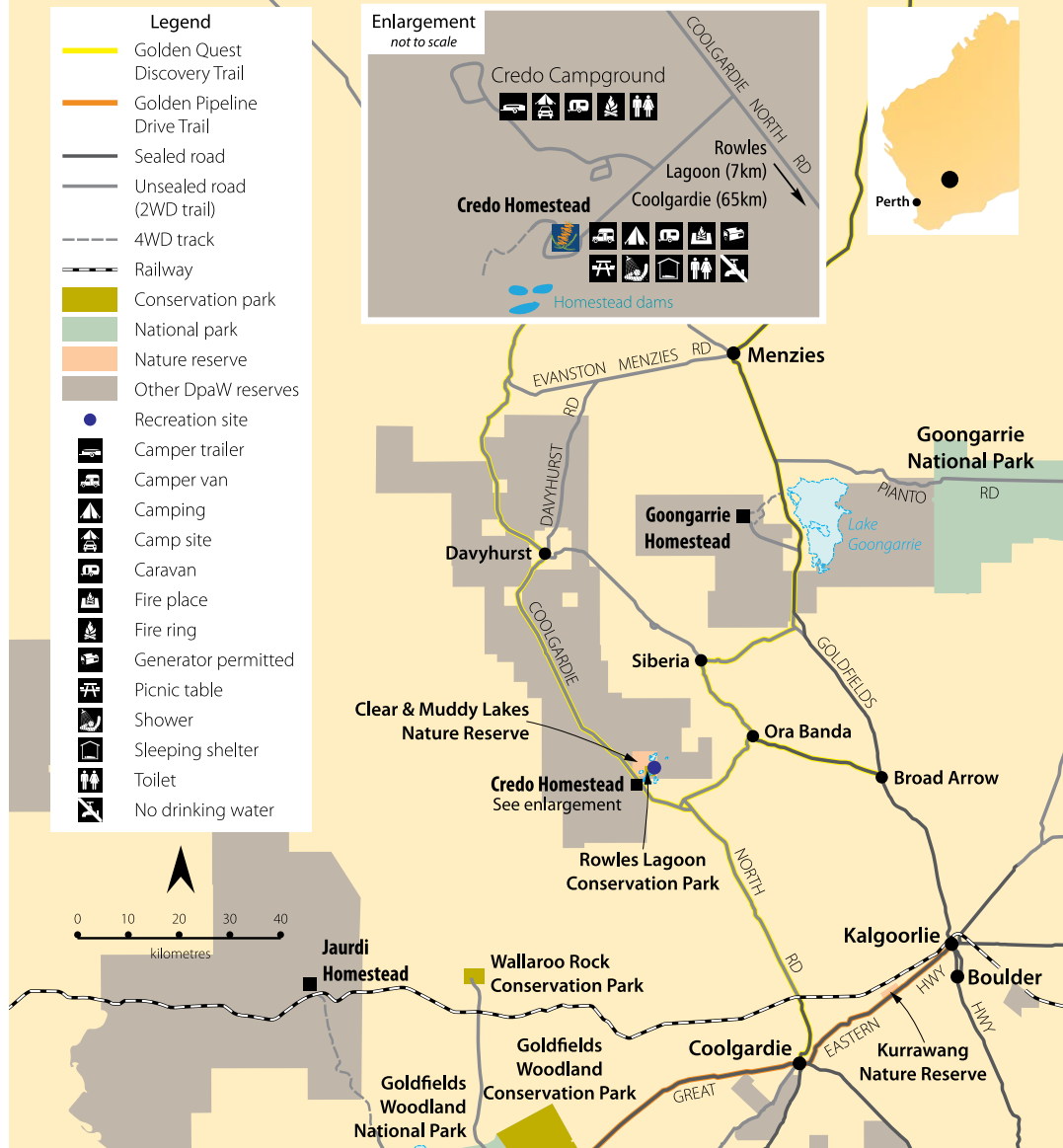
PARTNERSHIPS

The area is important for local Aboriginal people. The lagoon is a significant area for Aboriginal people who worked on the station and whose ancestors camped at Rowles. Parks and Wildlife actively engages with local Aboriginal people directly through the Goldfields Land and Sea Council including organising cultural trips and monitoring, and maintaining significant sites.

Credo is also host to an exciting science partnership between Parks and Wildlife and CSIRO with a new multi-purpose field study centre established there for educators and scientists working on environmental research programs and the Terrestrial Ecosystem Research Network (TERN) supersite.

Visiting this area helps Western Australians get an appreciation of the State's cultural and natural heritage, while making new memories of their own. And multiple uses of the area are creating a vibrancy that benefits the local economy.

Right Emu tree (*Hakea francisiana*).
Photo – Ann Storrie



Do it yourself

Where is it?: The homestead is 65km north-west of Coolgardie along Coolgardie North Road. Most of the tracks on the former pastoral property are for 4WD vehicles only, however access to Rowles Lagoon and Credo Homestead complex is open to all vehicles during dry soil conditions.

What to do: Camping, birdwatching, four-wheel driving, bushwalking, photography.

Facilities: Camp sites; fire rings; shearers' quarters with kitchen, toilets and showers and field study centre; signage, Campground Host volunteers, Credo Homestead complex.

Nearest Parks and Wildlife office:
32 Brockman St, Kalgoorlie, (08) 9080 5555
or email kalgoorlie@dpaw.wa.gov.au.



A photograph of two firefighters in a forest. The firefighters are wearing yellow jackets and white helmets. They are standing on a path covered with fallen branches and debris. In the background, there are bare trees and a large plume of white smoke rising into the sky. The right side of the image is overlaid with a semi-transparent orange gradient.

Fighting fire with
FIRE

by Mitzi Vance and Leanne O'Rourkes



For up to 60,000 years, Aboriginal people used fire to their advantage in the Australian landscape. European settlers learnt much from these practices and have continued and refined the use of prescribed burning to mitigate the severity and impact of bushfires, maintain biodiversity and to rehabilitate vegetation. The 2015–16 prescribed burning season has been one of the most successful so far in recent years thanks to favourable weather conditions and an additional \$20 million over four years from Royalties for Regions, which has significantly enhanced the program.

Fire is a natural part of the Australian landscape. In fact, many plant species, and the communities they support, have evolved to not only survive fire, but rely on it to germinate seed and encourage new growth. Today, however, the effect of fire extends well beyond environmental impacts and has many social and economic implications. Raging bushfires can have catastrophic impacts on lives and infrastructure and as our towns and cities continue to grow and more people seek to live in regional areas, and our climate continues to change, fire preparedness is more important than ever.

A FIRE FRONT FOOT

The severity of a bushfire depends on a range of factors including weather conditions, the topography of the area and the type and condition of the vegetation or 'fuel' in the area. There's little that people can do about the first two factors but land managers can reduce fuel loads made up of forest litter, small shrubs and scrub, trees, bark and logs and other decomposing matter. And that's where prescribed burning comes in.

Aboriginal people have used fire in the landscape for thousands of years. It is understood they used fire throughout the year to create low-intensity burns that resulted in a fine-grained mosaic of different vegetation structure and fuel ages across the landscape. As a result, large intense bushfires were thought to be uncommon.

Prescribed burning was introduced as a key part of Western Australia's forest management in the mid 1950s and expanded significantly in scale following the 1961 Dwellingup and Karridale bushfires. This was assisted greatly by the development of reliable methods for aerial ignition. Nowadays, prescribed burning is tackled as a shared responsibility between Parks and Wildlife, the Department of Fire and Emergency Services (DFES), local governments, industries and other landholders including traditional owner groups. It is underpinned by lessons learnt from traditional burning as well as scientific research that has been carried out over many years and is implemented using a stringent process to ensure community safety. The program is also designed to provide benefits to Western Australia's plants and animals through a landscape-scale management approach.

WHEN AND WHERE

In south-west Western Australia, prescribed burning usually begins in spring, when forest fuel is still moist from winter rains. This means the fires are mild and slow-moving with low flame height and intensity. This approach achieves a mosaic effect, which provides unburnt refuges for plants and animals.

Some burning is also carried out during autumn when conditions are favourable, especially in areas where boggy ground conditions limit access in spring. When possible, autumn burns are carried out



Previous page

Main Crews use drip torches to ignite vegetation during a prescribed burn.
Photo – Leigh Sage/Parks and Wildlife

Top Aerial burning in Warren Region.
Photo – Parks and Wildlife

Above centre Fire is an important part of the Australian landscape and encourages regrowth.
Photo – Sally Bostwick/Parks and Wildlife

Above Planning and briefings are a key component to a prescribed burn.
Photo – Leigh Sage/Parks and Wildlife

3-year-old fuel

- Small flames and slow moving; low intensity at the head of the fire (less than 500 kilowatts per metre*)
- Quickly and safely suppressed
- Low environmental damage
- Most trees unscorched

6-year-old fuel

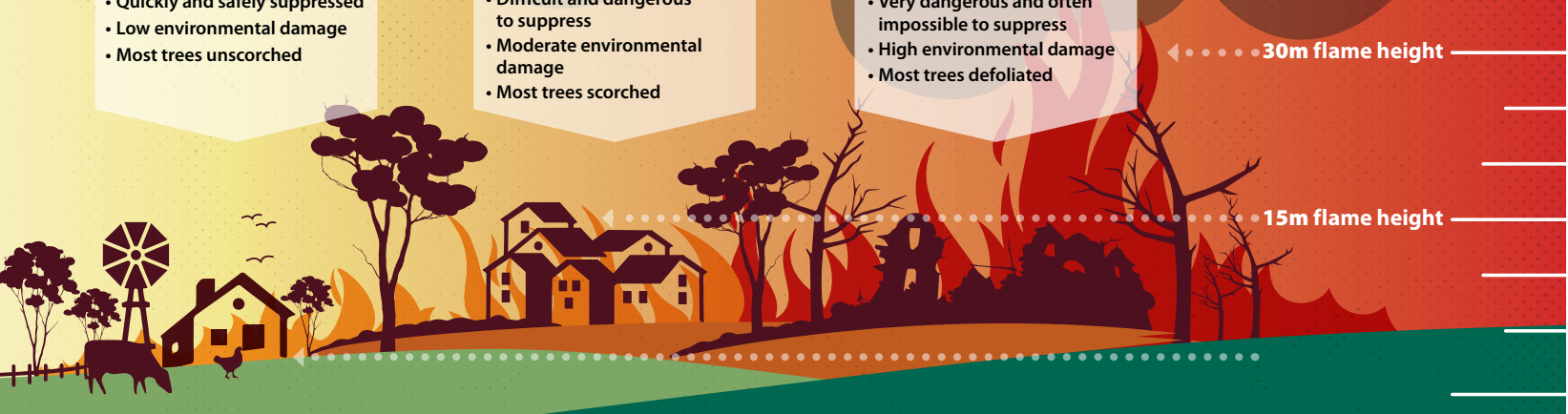
- High flames and fast moving; high intensity at the head of the fire (5000-10,000 kilowatts per metre*)
- Difficult and dangerous to suppress
- Moderate environmental damage
- Most trees scorched

20-year-old fuel

- Very high flames and very fast moving; very high intensity at the head of the fire (more than 20,000 kilowatts per metre*)
- Very dangerous and often impossible to suppress
- High environmental damage
- Most trees defoliated

Consequences when a bushfire strikes

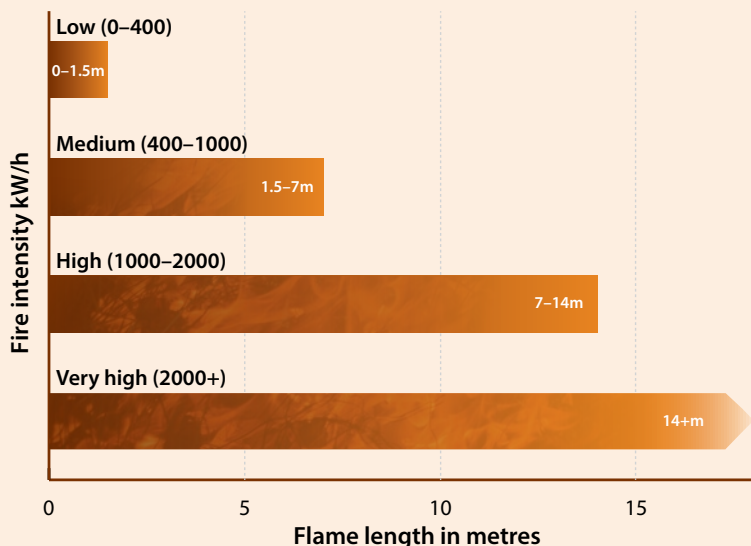
* Calculations based on a typical jarrah forest, in peak summer/severe fire danger conditions.



Fuel loads and fire intensity

Fuel is highly variable and can be characterised by amount, size, quantity, moisture content and how it's arranged. Fuel particles bigger than 6mm wide don't impact directly on the rate of spread or flame height, but do add substantially to the total amount of heat and intensity of the fire. However, the arrangement of the fuel can affect fire behavior – tightly packed fuel is less likely to burn and will smoulder, whereas loosely arranged fuel will burn more intensely due to more air flow. The moisture content of the fuel plays a major role in the ignition and intensity of the fire, and is determined by factors such as weather conditions, the type of vegetation and whether the material is living or dead.

Through natural processes, jarrah forests can accumulate 1–2 tonnes of litter and understorey fuel per hectare each year to a maximum of about 20 tonnes per hectare in 20 years. Fuel in karri forest accumulates at 3–4 tonnes per hectare each year, to a maximum of about 60 tonnes per hectare in 20 years. So what does this mean for firefighting? Fire intensity is measured by kilowatts per metre (kW/m). Fires that are less than 800kW/m can be tackled by hand tools and water support, while fires less than 2000kW/m can be fought using machines, tankers and water bombers. Fires with a intensity greater than 3000kW/m are significantly more challenging to suppress. In extreme fire cases, like the Victorian Black Saturday bushfire, fires can generate intensities in excess of 100,000kW/m.



Above Parks and Wildlife's 'Prescribed burning protects WA communities' display provides an interactive look at fuel accumulation and prescribed burning.
Video – Parks and Wildlife

after the first seasonal rains and the moisture content of the fuel increases. The outcomes of these burns are slightly different to those carried out in spring as larger fuels such as logs and limbs can smoulder for days and the burn may result in fewer unburnt patches. This type of burn tends to promote regeneration and resprouting of vegetation, the release of nutrients and reinvigoration of local habitats. In the successful season of 2014–15, favourable autumn conditions meant that burning could be carried out over around 147,000ha across Parks and Wildlife's south-west forest regions.

In the northern part of WA, where the seasons are 'wet' and 'dry', burning is carried out early in the dry season when winds are predictable and the fires tend to be lower in intensity, and more patchy and limited in extent.



Top See how we “work with nature” to manage bushfire risks.
Video – Parks and Wildlife

Above Bunuba rangers take part in prescribed burning along the Gibb River Road.

Above right A range of vehicles are used during a prescribed burn.
Photo – Leigh Sage/Parks and Wildlife

PLANNING THE PRESCRIPTION

‘Prescribed burns’ are so-called because they follow a ‘prescription’ and have a number of conditions that must be met. The process of carrying out a prescribed burn involves careful planning, consultation and monitoring.

Objectives are set for each burn. Consideration is given to assets and values in the area, what vegetation needs to be burnt and which should remain unburnt, the moisture content of the fuels, the history of fire activity in the area, the weather conditions and



“While based on a simple concept, prescribed burning relies on a number of complex variables.”

the best time of day and pattern for ignition. Deliberation is also given to the potential impact on vulnerable plants and animals, the potential impact of smoke on communities and land users in the burn proximity and the prescription may then be modified where necessary. Once the burn is completed, a review is undertaken to determine how successful it was and to glean lessons to improve future operations. The process followed by the department has been endorsed by the Office of Bushfire Risk Management, established in 2012 to facilitate bushfire risk management and coordinate the activities of the agencies responsible.

While based on a simple concept, prescribed burning relies on a number of complex variables. With each burn there is an element of risk that it will not go to plan, and implementing prescribed burning does not mean large bushfires will never occur. However, scientific research shows that prescribed burning is very effective in making large, damaging bushfires less likely, and it plays an invaluable role in firefighting efforts by providing low-fuel ‘buffers’, making it easier to suppress many bushfires.

CHANGES IN THE AIR

In recognition of the key role prescribed burning plays in bushfire management, the State Government committed an extra \$20 million over four years through its Royalties for Regions program to boost Parks and Wildlife’s capacity to safely undertake planned burns when conditions allow. Since 1 July 2015, the department has prescribed burnt more than 131,000ha of land it manages in the south-west forest regions, significantly more than for the same period in recent years, with autumn burning yet to come.

These funds are in addition to the department’s annual prescribed burning budget of \$10 million and have provided for some extra positions and extended employment contracts for seasonal staff, additional contractor support and increased mobility of departmental staff. An added benefit will be the flow-on effect to regional communities through employment and the supply of goods and services while these operations are being carried out.

Another change to Parks and Wildlife’s prescribed burning program last year was adjustments to its performance and reporting measures. For the past



A close call

A Parks and Wildlife prescribed burn that was completed in 2011 saved homes in 2015, when a bushfire in Beeliar Regional Park in Perth's southern suburbs was stopped after running into the burnt area.

The fast-moving bushfire was running at 1km/h burning in a westerly direction and was out of control when it entered the previously burnt area, which drastically changed its behaviour.

Thanks to the prescribed burn, the fuel in the area was less than five years old and the head fire could be stopped before it reached the suburbs of Beeliar and Yangebup on the west side. Crews were then able to consolidate containment lines and more quickly extinguish it. This highlights the importance of carefully planned and controlled prescribed burning in suburban interface areas in the metropolitan area.

two decades, the department and its predecessors have reported against a notional prescribed burning target of 200,000ha across the Swan, South-West and Warren forest regions, which include the majority of the south-west forests. However, on its own, this single

reporting measure does not reflect the distribution of burns, indicate the amount of fuel across the landscape or represent bushfire risk to populated areas. To better reflect these, three additional measures have been introduced. The first measure separates the south-west prescribed burning area into three zones – A, B and C – and allocates an annual prescribed burning target for each. The second measure captures the proportion of the landscape with a fuel age less than six years, which currently sits at 35 per cent of department-managed lands with a target of 45 per cent. The third measure is the ratio of area affected by bushfire to area of prescribed burning.

FORWARD MOTION

Fire preparedness and bushfire suppression is and will continue to be a whole-of-community effort that relies

on the cooperation of many local and State government agencies, community groups and landholders. With each bushfire season, the distribution of people throughout the State changes somewhat and the climate fluctuates a little more, with drier conditions in the south-west inevitably increasing the risk and impact of bushfires. The way the land is used, and the resulting management responsibilities are changing – critical infrastructure such as pipelines and electricity transmission grids are being established on land managed by Parks and Wildlife and the area of forest rehabilitated after mining for bauxite, coal and other materials is increasing. However, land and emergency managers are better equipped than ever to deal with the eventuality of bushfires and are continually building on the knowledge base and resources necessary to prepare for them.

For more information about prescribed burns

Visit www.dpaw.wa.gov.au.

Parks and Wildlife updates its website every morning with the prescribed burns planned for each day. The webpage dpaw.wa.gov.au/todaysburns provides details on where the burns will occur, the size and reasons for undertaking them. The webpage also provides health messages and links for people who may be affected by smoke.



Mitzi Vance and Leanne O'Rourke are Parks and Wildlife project coordinators. They can be contacted on (08) 9219 9999 or by email (mitzi.vance@dpaw.wa.gov.au or leanne.o'rourke@dpaw.wa.gov.au).

The chance discovery of a male spider belonging to the family Migidae in the collection of the Western Australian Museum over 25 years ago started a project that culminated last December highlighting how valuable museum and herbarium collections are to biodiversity science. Avid collectors Stewart Peck and Jamila Kukalova-Peck visited south Western Australia in 1980 to collect insects – mainly beetles. They used a malaise trap, which resembles a two-person tent that is open on all sides to allow flying and crawling insects inside, where they meet their doom – a bottle of preservative. When Stewart and Jamila brought their samples back to Perth to sort, they allowed the curatorial staff of the Museum to look through the samples to pick out arachnids and myriapods. One of these spiders was identified as a migid spider in 1989 by Dr Valerie Todd-Davies, former Curator of Arachnids at the Queensland Museum and shown to Dr Barbara York Main, Western Australia's doyen of trapdoor spiders. Initially Barbara was amazed that a male migid had been collected in this way, and with her husband Bert, rushed down to the tingle forest where they located active populations on the trunks of tingle trees and in the soil.

Migid trapdoor spiders have a classic Gondwanan distribution, with species occurring in eastern Australia, New Zealand, New Caledonia, temperate South America, Madagascar and sub-Saharan Africa. Barbara identified the south-western species as a member of the genus *Moggridgea*, which was widespread in the African region, with many named species. She published her paper describing the species – which she named *Moggridgea tingle* after her beloved tingle forests in the Walpole region. In the same paper she described *Moggridgea australis* from Kangaroo Island, South Australia, based on specimens in the South Australian Museum.

Barbara and Bert quickly located further populations of *Moggridgea* in Stirling Range National Park, and staff from the Western Australian Museum found some in Porongurup National Park. During the 1990s, Barbara nominated *Moggridgea*



Pygmy trapdoor spiders – *Bertmainius*

tingle and the undescribed species from the Stirlings as threatened species due to their extremely small ranges and threats from bushfires.

Surveys to locate the extent of the populations of both listed species to help ascertain their conservation status located numerous new populations over the high-rainfall zone of south-western Australia. But it was quickly becoming obvious that there were more than two species involved. Samples collected from these surveys were sent to Dr Steven Cooper at the South Australian Museum, who used molecular sequence data to help sort out how many species were involved and their relationships. This study – along with the morphology of the few adult males that had been collected – showed that there were seven distinct species in Western Australia. Wow, what a result.

Another surprise was the relationships of the WA species, which were compared with DNA samples of *Moggridgea australis* from Kangaroo Island and several species of 'real' *Moggridgea* from South Africa. The seven WA species were found to be on a very separate evolutionary path to the African and Kangaroo Island species. Indeed, this matched the morphology of both males and females, and eventually

Above A male *Bertmainius monachus* – one of seven *Bertmainius* species.
Photo – Mark Harvey

concluded that the WA species should be placed in a new genus. The paper, written by myself, Barbara York Main, Mike Rix and Steve Cooper, was published in December 2015 in the journal *Invertebrate Systematics*, and the new genus was named *Bertmainius*, after Barbara's late husband Albert (Bert) Russell Main (1919–2009) in recognition of his remarkable contributions to science and the conservation of the Australian biota.

Conservation assessments of each of the seven species of *Bertmainius* have concluded that all are most likely threatened, especially those that have very small distributions. For example, *Bertmainius pandus* is currently known from a single gully in the Stirling Ranges, and needs all the conservation help it can get. Indeed, Parks and Wildlife staff have previously managed fires in the Stirling Range National Park to try to avoid *Bertmainius* habitat, possibly making this the only place in the world where fire management has been used to conserve a spider. Bert would have been proud of this.

A scaly tale

For many people, keeping reptiles and amphibians (known as herpetofauna) as pets is a fascinating and fulfilling hobby. However, there is a sinister side to the global pet reptile trade with the alarming trend of poaching and smuggling of Western Australia's unique reptiles increasing each year. Parks and Wildlife officers work closely with their counterparts in other states, the Australian Border Force, Australia Post and WA Police to stop this cruel trade and bring those who offend to justice. Also crucial to this battle are the keen observations and input of community members.



by Matt Swan and Rhianna King



With masking tape wound around their bodies, from their noses to the tips of their tails, two bobtails are stuffed inside the body of an otherwise innocuous child's teddy bear. A Hong Kong national and self-proclaimed 'conservationist' reinserts the wadding into the bear, all but smothering the two reptiles. He carefully stitches the bear back together to hide its contents. The bear is packed in an Australia Post box and littered with toy soldiers in an effort to obstruct the bobtails from X-ray images. The parcel, bound for Hong Kong, is taken to an Australia Post office in Perth and handed over to an officer who, oblivious to the package's precious (and illegal) contents, diligently weighs and processes it and sends it on a journey which, sadly, is a well-travelled route for some of Australia's most unique reptiles.

On their gruelling journey, the bobtails are subjected to conditions akin to torture.

As an ectotherm, bobtails, like other reptiles, rely on the outside temperature to regulate their metabolic system. It's anyone's guess what temperature they might have reached inside the package, especially when being transported in hot, enclosed vehicles. This extreme heat would have been in stark contrast to the near-freezing temperatures they would have endured in the freight hold of an aircraft. The animals are denied food and water in the days leading up to their journey so the smell of their waste doesn't

give them away. And one can only imagine the aerobatics they would have endured at the hands of the baggage handlers and mail processors. The reasons for the masking tape are now obvious, to stop them from scratching and struggling in a vain attempt to free themselves.

Fortunately for these two animals, they were detected as they passed through an X-ray machine at the Perth International Mail Centre and survived their ordeal. Tony Ngai – who is known on Facebook as 'Tiliqua Tony' most likely after the scientific name for bobtails (*Tiliqua rugosa*) – was the subject of an extensive, multi-agency operation which found a further 26 bobtails, a sand swimmer skink and six crevice skinks all destined for the international black market. He was charged, convicted and sentenced to six months in prison. He claimed throughout the proceedings that he didn't believe he was doing anything wrong and his practices were not cruel. Tiliqua Tony still operates in Hong Kong trading in exotic reptiles including Australian bobtails.

.....
Previous page

Main Western shield spiny-tailed gecko (*Strophurus wellingtonae*) – one of Western Australia's endearing reptiles – is found in arid parts of WA.

Photo – Parks and Wildlife

Inset left Endangered Rottneest Island bobtails destined for Japan.

Photo – Rick Dawson/Parks and Wildlife

Inset right A bobtail was bound in masking tape from nose to tail.

Left, below and opposite page

1 Two bobtail lizards were stuffed inside a teddy bear destined for Hong Kong.

2 Toy soldiers were scattered over the teddy in an attempt to obstruct the bobtails from being seen on X-ray machines.

3 Wadding was reinserted back into the teddy, all but smothering the bobtails.

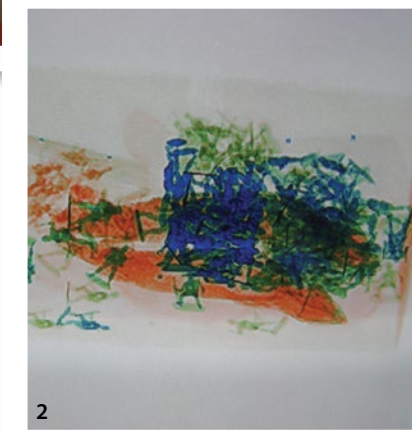
4 The bobtails were bound with masking tape to prevent them moving.

5 Fortunately these animals were detected at the Perth International Mail Centre.

Photos – Matt Swan/Parks and Wildlife

TRADE SHOW

No-one will ever know how many of the animals subjected to this kind of cruelty die, but there's little doubt that any animal that is transported in this way suffers. And they're victims of an illegal trade that is expanding as the popularity of reptile keeping increases around the world. TRAFFIC, the wildlife trade monitoring network, estimates that the



Right A Russian national was convicted for concealing these striped-tailed monitors, and others, in hollowed-out books in an attempt to smuggle them out of Australia.

Photo – Matt Swan/Parks and Wildlife

value of global wildlife smuggling could be as high as hundreds of millions of dollars, making it a major illegal trade alongside drugs, human trafficking and counterfeit products. In Western Australia alone there were 389 reptiles seized by wildlife officers in 2014–15. While the price of the reptiles is dependent on supply and demand, it is not uncommon for reptiles such as bobtails to fetch as much as AU\$4000 each in Hong Kong and as much as AU\$1000 each for particular subspecies or colour forms in New South Wales. Some of the rarer species of gecko or goanna can fetch more than AU\$5000 per individual.

Smuggling syndicates are becoming increasingly sophisticated thanks to smartphones and access to instant messaging and other forms of social media. Smugglers are using increasingly creative ways to conceal the animals for transport on their bodies or in their luggage, and ways to package the animals for post. Many reptiles are cruelly packed into small spaces.

The profiles of those involved in this illegal trade can be as varied as the species being poached and smuggled – recently a Russian national who manages a museum collection, was caught poaching and attempting to smuggle reptiles out of



Australia through the post with three other men. The reptiles were concealed in hollowed-out books. Some of the reptiles he collected were also euthanised and preserved in the field in a process known as ‘vouchering’. This was done presumably for ‘research purposes’ and the recognition that comes with making scientific discoveries. He and his associates were sentenced to 12 months in prison for their actions.

One the worst cases of cruelty occurred when a large number of bobtails were posted to an address in Germany but not collected and were subsequently returned to addresses in Australia. Fortunately most were intercepted quickly, but one bobtail (later nicknamed ‘Lucky’) was sent back from Germany to an address in Rockingham. After it went to and from Germany twice, the person at the address in WA finally opened the parcel to find a bobtail with its legs tightly taped inside. It was established that the animal had been in the parcel for 130 days. Wildlife officers nursed it back to health by feeding it baby food and exercising its legs until it was able to walk and eat properly again. But it was never well enough to be released to the wild.

POACHING AND SMUGGLING: WHAT’S THE DIFFERENCE?

Wildlife smuggling and poaching are two different acts although often committed by the same person or group of people.

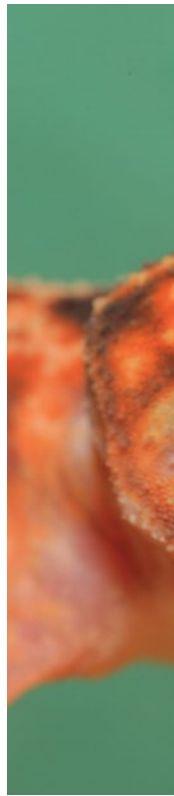
‘Wildlife poaching’ is the act of illegally catching the individual animal in its habitat and then not returning it to that habitat. Once an animal has been poached it is lost to the wild. These animals no longer have the ability to compete or contribute to the survival of the species. Poachers are ruthless in their pursuit of reptiles and will use an array of tools such as hammers, crow bars, pneumatic jacks and motor vehicles to tear apart habitats such as ancient rocky outcrops.

‘Wildlife smuggling’ or trafficking is the illegal gathering, transporting and distribution of animals. The targeted species are hidden in all variety of ways to avoid detection and often posted or ‘body packed’ on ‘mules’ who then carry them out of the country.

In Western Australia, certain species of snakes and lizards can be kept as pets but owners must obtain the necessary licences and adhere to certain conditions.

“No-one will ever know how many of the animals subjected to this kind of cruelty die, but there’s little doubt that any animal that is transported in this way suffers.”





Did you know?

The maximum penalties for offences under the Federal *Environment Protection and Biodiversity Conservation Act 1999* are 10 years imprisonment or a fine of \$110,000, or both.

The maximum penalty for illegally exporting/importing and possessing wildlife under WA's *Wildlife Conservation Act 1950* is \$4000 or \$10,000 for specially protected species.

The State Government is aiming to increase these fines through the new Biodiversity Conservation Bill introduced into Parliament late last year. Important changes include the increase of maximum penalties for killing or smuggling critically endangered species from \$10,000 to \$500,000, and from \$4,000 to \$50,000 for non-threatened species, providing a real deterrent to those considering serious wildlife crimes.

For more information about keeping reptiles

Visit www.dpaw.wa.gov.au.

Pet reptiles brought to WA must be licensed here, even if they've been licensed in another state. Not doing so constitutes 'illegal keeping'. In other cases people have taken the reptile from its natural environment and decided to keep it in an enclosure or terrarium in their house. Still

Above Western bearded dragon.
Photo – Matt Swan/Parks and Wildlife

Above right These green tree frogs were detected in a foiled poaching attempt.

Below Oblong turtles contained and concealed in socks.
Photos – Rick Dawson/Parks and Wildlife



others have purchased a pet on Gumtree contrary to requirements of their licence, only to find the 'seller' had now disappeared and they have been scammed.

Pythons are well-known to be carriers of diseases such as Sunshine Virus, Ferlavirus (previously OPMV) and Inclusion Body Disease (IBD). Although these diseases are not common, they pose a huge risk to WA pythons, should they be introduced to this State. For this reason, pythons are not permitted to be imported into WA. When imported pythons are detected, attempts are made to re-home these animals in another state either with a licensed keeper or an educational wildlife facility such as a zoo or wildlife park. If these options are not available then euthanasia is used as a last resort. This outcome is unfortunate but necessary to protect our precious native wildlife from fatal introduced diseases. It is also necessary to ensure introduced exotic species do not escape and establish populations in the wild.

Local animals are also illegally sourced and kept from within WA via the domestic black market. Unscrupulous poachers are known to take reptiles and then sell

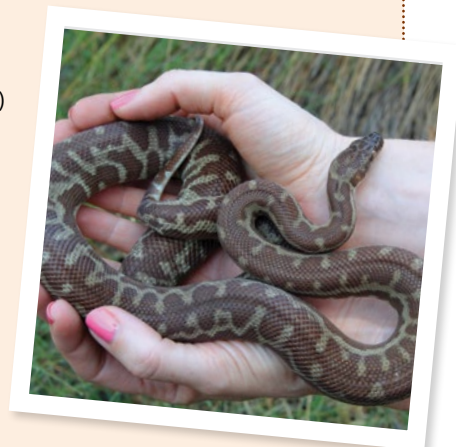


Choosing a pet

Like any other pet, keeping reptiles and amphibians as pets, requires commitment. Reptiles and amphibians have very specific needs, including temperature control and feeding regimes. Their vivariums can be expensive to purchase and set up, and can require ongoing maintenance. However, once correctly set up, most pet reptiles will generally settle well.

The following species are common for beginners:

- Northern green tree frog (*Litoria caerulea*)
- Motorbike frog (*Litoria moorei*)
- Bynoe's gecko (*Heteronotia binoei*)
- Northern spiny-tailed gecko (*Strophurus ciliaris*)
- South-west spiny-tailed gecko (*Strophurus spinigerus*)
- Variegated or tree dtella (*Gehyra variegata*)
- Western bearded dragon (*Pogona minor minor*)
- South-western crevice egeria (*Egernia napoleonis*)
- Centralian bluetongue (*Tiliqua multifasciata*)
- Western bluetongue (*Tiliqua occipitalis*)
- Bobtail (*Tiliqua rugosa*)
- Stimson's python (*Antaresia stimsoni stimsoni*)



them through trading posts and via word-of-mouth. These animals can be up to two-thirds cheaper than those purchased through reputable licensed retailers but cannot be kept legally and if detected will be seized.

SEE SOMETHING? SAY SOMETHING

Members of the community play a vital role in reporting and investigating smuggling and poaching. People who see something they think might be out of the ordinary are encouraged to report it to Parks and Wildlife, the WA Police, Crime Stoppers, the Australian Border Force or the Wildcare Helpline. Some things might just seem a bit odd – like an atypical tourist who treks out into the bush and returns with suspicious-looking containers or pillow cases. While other observations – like the presence of reptiles in hotel rooms – can offer more solid evidence of poaching and smuggling. Either way, every bit of information can help build cases that bring perpetrators to justice.

LICENSED TO KEEP

In 2002, legislation was passed enabling Western Australians to obtain

licences to keep reptiles and amphibians as pets and in 2014–15 Parks and Wildlife had 4575 people licensed for this purpose. Would-be pet owners lodge an application with Parks and Wildlife which is assessed and, subject to the applicant meeting certain criteria, they are granted a licence. Licensed reptile dealers are not permitted to sell reptiles to people who do not hold the necessary licences.

Managing the pet reptile and amphibian hobby through licensing plays an important role in ensuring the health and conservation of Western Australian native animals. Introduced exotic species can bring with them disease, and can disrupt the ecology of our natural areas if they escape and establish populations in the wild. It also enables enthusiasts in this

growing hobby to have the opportunity to acquire and keep a wide ranging variety of reptiles or amphibians as pets in a legal and humane way. Continued work to detect and prevent the illegal smuggling trade will ensure animals are not subjected to inhumane journeys for the sake of people overseas and locally making money and having the bragging rights over an exotic pet.



Above left Knob-tailed geckos are one of WA's precious reptile species.

Above right Stimson's pythons are a popular species among beginner herpetologists.

Right Sandplain geckos.
Photos – Matt Swan/Parks and Wildlife

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RIVER JOURNEYS

The Swan and Canning rivers are central to Perth's identity and provide a playground which contributes to the vibrant city community. A project to link key areas along the Swan River's southern foreshore, delivered through a range of media, is capturing the river's natural and cultural heritage while enriching visitors' experiences and encouraging custodianship of the area.

by Ben Ansell





The Swan Canning Riverpark covers 72.1km² of river reserve and adjoining public lands, and supports a diverse range of plant and animal life, of which some are endemic to the region. The Swan River, or *Derbal Yerrigan* as it's known in the Noongar language, is 72km long and the intersecting Canning River (*Djarlgarro Beeliar*) is 110km long. Together, these two rivers and their tributaries drain a catchment area of 2090km², stretching and snaking their way from Wickiepin in the Wheatbelt to the Indian Ocean at Fremantle.

This area has significant historical, natural and cultural values. A project to celebrate these values, and enhance visitor experiences along the Riverpark foreshore has begun. It aims to improve riverfront access and facilities, while increasing the community's awareness of the natural and cultural heritage of the Swan Canning Riverpark. It has three key themes – cultural, environmental and historical – and has been designed to encourage visitors to take 'River Journeys' to reflect on the river's unique history and stories. Various forms of interpretation have been brought together to deliver the experience, including information, pause points or interpretation nodes, virtual trail guides, and short audio clips, enabling visitors to engage with Aboriginal culture through oral history, connecting emotionally with the storyteller.

A VISION FOR THE RIVERPARK

The River Journeys project has been in the making for a number of years and is part of a greater vision for a Riverpark Trail, to create a continuous recreation network through the Swan Canning Riverpark from Fremantle to Guildford on both the northern and southern shores of the Swan and Canning rivers. The network of trails seeks to improve visitors' connection with the rivers and enhance understanding and enjoyment of the Riverpark. This ambitious project includes a range of recreational opportunities including short- and long-distance walking and cycling circuits, and improved access to the river edge. It includes interpretation



nodes at key visitor locations along the path to communicate the Riverpark's natural and cultural values.

The project has been developed as part of the draft *Riverpark Trail Masterplan* and the *Marli Riverpark Interpretation Plan* (*marli* refers to the 'black swan' in Noongar). Integral to developing the *Marli Riverpark Interpretation Plan*, was the establishment of a Noongar Advisory Panel to integrate cultural heritage information and provide advice for the plan. The panel includes members of the Whadjuk Noongar community, the traditional owners of the Perth region, who speak for country in the Swan Canning Riverpark area. The panel guided how messages about Whadjuk Noongar cultural heritage values of the rivers should be told, and identified important themes, stories, and key locations to ensure heritage values are upheld and protected.

The Riverpark Trail vision was realised in 2015 when the first phase was rolled out, linking key areas along the Swan River's southern foreshore. The first section is in the City of Melville with three interpretation nodes, and two trail guides implemented. This section of the Riverpark was an ideal location for the pilot project, as the foreshore area is easily accessible and receives high visitation all year round. In total, 19 interpretation nodes have been identified along the Swan and Canning

Previous page

Main The stunning Blackwall Reach, otherwise known in Noongar as *Jennalup* – the place of feet.

Photo – Marc Russo

Background The 'Nyungah Dreaming along the Swan' painting by Noongar artist Charmaine Cole has been used throughout the interpretive material.

Above Engraved quotes tell a unique story about each site.

Opposite page

Far right Interpretive nodes have been designed to complement the landscape.

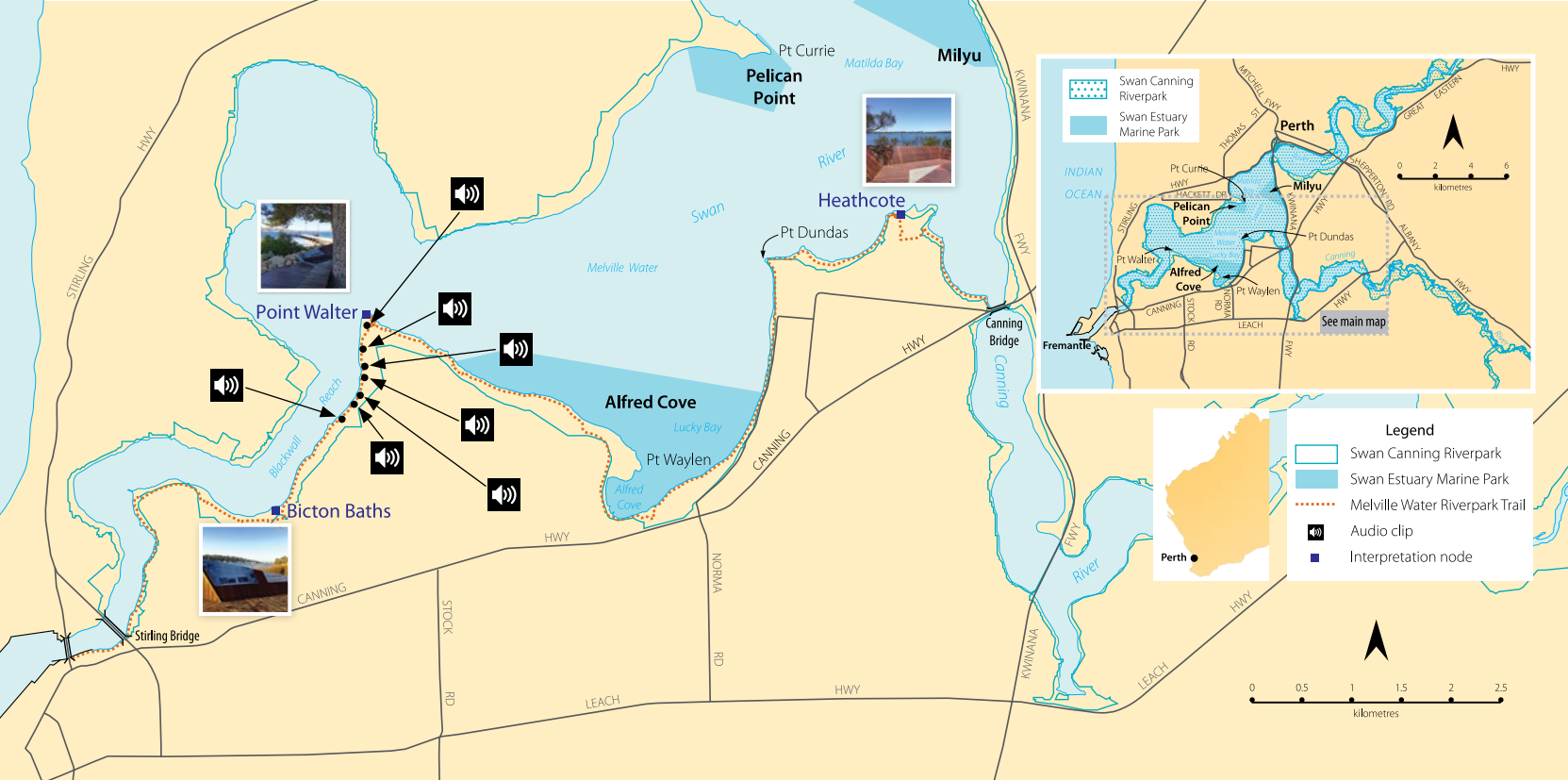
Photos – Ben Ansell/Parks and Wildlife

rivers, with an additional five nodes selected by the Noongar Advisory Panel, due to their cultural significance to the Whadjuk community. Heathcote, in Applecross, was one of these areas due to the area's cultural significance as a men's ceremonial site. The aim is for this project to become an impetus to roll out more interpretation nodes and trail guides across the Riverpark.

ENVIRONMENTAL, CULTURAL AND HISTORICAL SIGNIFICANCE

The three new interpretation nodes installed over summer 2015–16 are at sites at Bicton Baths, Point Walter and Heathcote. Designed and installed in partnership between Parks and Wildlife and the City of Melville, these nodes are designed in a shape and style that provides minimal visual impact while enticing users to a focal point, drawing their attention to information. The interpretation nodes are wooden deck structures that link into existing pathways, and are shaped to create a multi-use space providing seating, interpretation and improved foreshore access. The nodes meet universal access standards, increasing recreational opportunities for a range of people.

The interpretation draws on visual, audio and artistic elements to help visitors engage in a variety of ways. Engraved quotes run along the aluminium frames telling a unique story about each site and

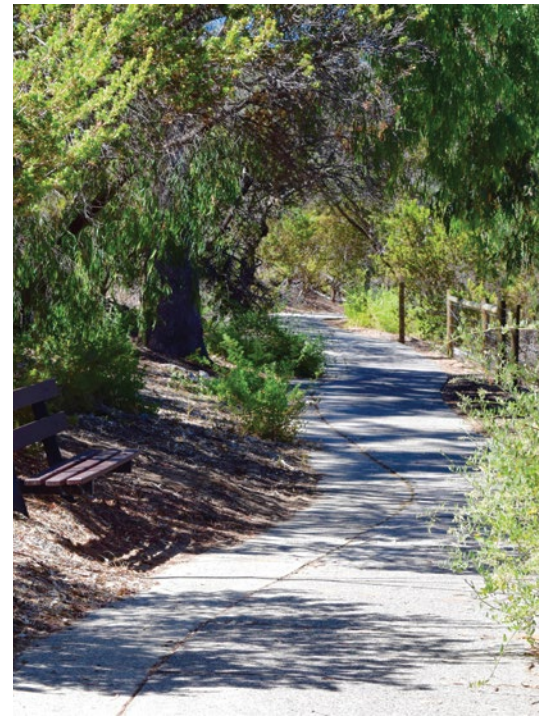


“Engraved quotes run along the aluminium frames telling a unique story about each site and welcome visitors to the Riverpark.”

welcome visitors to the Riverpark, while interpretation panels filled with images and stories of historical events build a picture of the area. The information is presented in Noongar and English to help acknowledge the past, present and future connections to the area. The panels also prompt visitors to download various apps to access trail guides and audio stories shared by Whadjuk elders about the cultural heritage of the river.

Each interpretation node is unique and shares a variety of site-specific stories. For example, the Point Walter node shares the story of how *Djunda* the Charnock woman created the prominent white sand spit, while the Bicton Baths node showcases its diverse history as a one-time oyster farm, an animal quarantine station, and then the home of the Melville Amateur Water Polo Club.





Riverpark visitors can also discover the change in the Swan Estuary marine ecosystem moving further upstream to Heathcote, where seagrass habitat provides protection and food resources for an array of species, including western school prawns, blue-swimmer crabs, gobbleguts and seahorses.

“When you come here to Point Walter, to this white part, you are standing on the white hair of Djunda the Charnock woman, who left some of her hair here when she went back up to the milkyway.” – Whadjuk elder Marie Taylor, 2014

VIRTUAL TRAIL GUIDES

A key part of the project is the inclusion of two virtual trail guides that intersect and link the interpretation nodes. A virtual

trail guide is an online trip planner, which provides detailed maps, descriptions of trails and points of interest, that can be accessed via a smart phone or computer. Similar to the interpretation nodes, the long-term intent of the virtual trail guides is to develop multiple guides for segments and loops of the Riverpark, eventually covering the majority of its path network.

The virtual trail guides are hosted on various phone apps, such as the Geotourist app and the Trails WA app (see also ‘In review’ on page 34). Interpretive information on these apps are presented in the form of ‘points of interest’, which generally relate to the location identified on the trail map. The guides feed into the interpretation nodes, serving as an information portal, enabling people to access more information about the

ecological, historical, and Noongar cultural and heritage values of the local area.

Fremantle Traffic Bridge to Canning Bridge is one of the virtual trail guides that intersect the interpretation nodes. Titled ‘Melville Water Riverpark Trail’, this 16km trail stretches along some of Perth’s most precious southern foreshore reserves, boasting impressive views of the city’s skyline. The trail is walker and cycle-friendly, and can be enjoyed any time of the year. While not marked by directional signage, the trail does have a number of points of interest, that can be accessed on a mobile smart phone.

In addition, running along the limestone cliffs of Blackwall Reach Reserve (known as *Jennalup* to the Whadjuk people) is a second trail guide named *Jenna Bididi Yorga*, which translates

“The health of the river is very important. Before the pathways our rivers were the roadways of our life, we went up and down the river hunting, gathering and it was food provided for all and all came from the river.”



Above The Melville Water Riverpark Trail takes in beautiful views of the city.

Opposite page

Top left Seats along the way cater to those who want to stop and rest.

Far left Whadjuk elders Noel Morich and Marie Taylor were filmed in key areas along the foreshore to capture stories for use on the nodes and trails guides.

Photo – Theo Orr/Anthropos Australis Pty Ltd

Above right Paths guide walkers and cyclists on a journey of discovery.

Right Information along the way enriches the visitors' experience.

Photos – Ben Ansell/Parks and Wildlife

to “women’s feet walking on a path” in Noongar. This 1km trail guide focuses on the relationship the Whadjuk people have to this area of the river, being traditionally a place for women and children.

WHADJUK ELDER FILMING

A key strength of the project is the participation and engagement of Whadjuk Noongar people. Parks and Wildlife staff worked closely with Whadjuk Elders Marie Taylor and Noel Morich, who are both members of the Noongar Advisory Panel, to ensure the project connects

to cultural heritage and is implemented in a culturally sensitive way. In order to reflect the Noongar tradition of delivering stories and sharing information orally, four Whadjuk elders were filmed telling stories about the cultural significance of each site, creating a resource which benefits the Whadjuk elders and the wider community, by gathering stories that have not yet been recorded.

“The health of the river is very important. Before the pathways our rivers were the roadways of our life, we went up and down the river hunting, gathering and it was food provided for all and all came from the river.”

– Whadjuk elder Noel Morich, 2014

The filming was done at Heathcote, Point Walter and Bicton foreshore interpretation nodes, including Blackwall Reach. The film has been edited into 13 audio clips and one video trailer. They are available on the Explore Parks WA website, as well as on the Geotourist app.

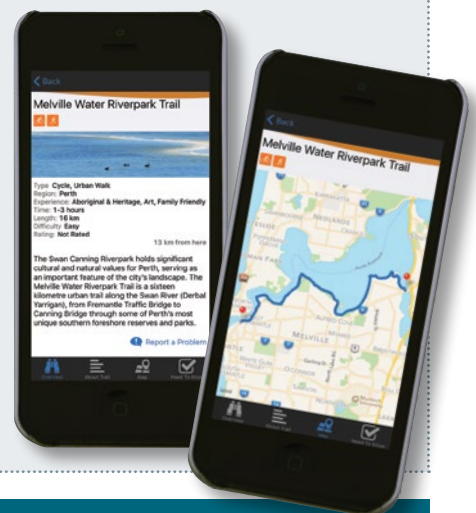
DISCOVER MORE

‘River Journeys’ is a first for the Riverpark and has provided an exciting opportunity for Parks and Wildlife and the City of Melville at a time when cycling and walking are growing in popularity. This has improved the connection and engagement with the Riverpark’s heritage, and

enhanced local infrastructure, increasing the aesthetic and amenity values along the southern foreshore. And the best part? It’s right on Perth’s doorstep.

Do it yourself

Trails WA and Geotourist apps are available for download from Google Play and Apple iTunes. Head to parks.dpaw.wa.gov.au/park/swan-canning-riverpark for more information.



Ben Ansell is Parks and Wildlife’s Riverpark project officer and can be contacted on (08) 9442 0300 or by email (ben.ansell@dpaw.wa.gov.au).



TRACKING TIDES OF TURTLES

by Rhianna King



Understanding the life cycles of long-lived animals can take decades, and often relies on the long-term commitment and dedication of agencies and individuals. An initiative to collect data on hawksbill turtles at Rosemary Island Nature Reserve in the Dampier Archipelago is part of the longest-running program of its kind in Western Australia and is an excellent example of what can be achieved when special people collaborate on remarkable projects.



Previous page

Main Hawksbill turtle.

*Photo – Michael Patrick O’Neill/
OceanwideImages.com*

Inset Anna measuring a hawksbill turtle on Rosemary Island.

Photo – Joanne King/Parks and Wildlife

Far left Anna with a nesting turtle on Rosemary Island in 1993.

Above left Anna’s ‘camp’ on Rosemary Island consisted of an umbrella and sleeping bag.
Photos – Anna Vitenbergs

In 1958, Fred and Ella Macleod packed up their home in northern Scotland and, together with their three sons and daughter Anna, set sail for Australia. When they arrived, the family discovered that Broome, Western Australia – with its red dirt and scorching sun – was about as different from the rolling hills, lochs and isles of northern Scotland as you could get. But for Anna it was love at first sight.

A self-confessed tomboy, Anna describes her childhood in Broome, and then later in Wyndham and Point Samson as ‘idyllic’. She fondly remembers spending her days fishing and exploring the area while lapping up the sunshine and fresh air. She developed a closeness with the children from a local Aboriginal community and two women, Mary and another lady whose name has been lost in the years, who took her under their wing and taught her about the native plants, animals and bush tucker.

A BURGEONING CONSERVATIONIST

Anna recalls the day she first came across a turtle, but it wasn’t as you might expect – it was being cooked over the fire and was destined to provide a protein-rich meal for Mary and her family. She confesses that she tried some, but can’t recall what it tasted like.

The next year, a Japanese pearl diver gave Anna two live hatchlings. She was unsuccessful in her bid to convince her parents to keep the turtles and they

insisted she release them back into the ocean. No-one could have known it would be the first of probably thousands of turtle releases she would carry out over the next three decades.

Like so many girls of her generation, Anna’s educational prospects were limited by the expectation that she would become a secretary, nurse or hairdresser. So, in 1965, at age 16, she left school after completing a secretarial course. It was in this year that she also met her childhood sweetheart, Rob Vitenbergs, who introduced her to Rosemary Island where he and his family travelled from Point Sampson for oyster picking and fishing. In later years, this pristine and magnificent environment became significant for reasons other than as a romantic setting for teenage courtship.

A LOVE AFFAIR

In the 1980s, Anna’s love for the natural environment and her passion for conservation motivated her to start volunteering with the then Department of Conservation and Land Management. She took part in a number of projects, including bird banding and monitoring. Then, in 1989, the Pilbara Region Island reserves officer Greg Oliver – who knew of Anna’s affinity with Rosemary Island – approached her for help with some turtle tagging work through the then Western Australian Marine Turtle Project. Despite feeling a little out of her depth, Anna accepted the offer and revelled in

the opportunity to return to Rosemary Island, which we now know supports one of the largest hawksbill rookeries in the Indo-Pacific. It was here that she met Bob Prince, with whom she formed a close working partnership, based on an insatiable thirst for research and a profound love of turtles. Bob worked for the department from 1969 to 2014 and is a renowned sea turtle specialist (as well as having a keen interest in kangaroos and dugongs). Bob continues to volunteer his time with Parks and Wildlife and is an integral part of the department’s turtle team. At the time of their meeting, Bob was building up the capacity of the Western Australian Marine Turtle Project and was looking to expand research into hawksbill turtles, which were known to occur on Rosemary Island.

For two years, Anna accompanied Greg and his team to the island to tag and monitor turtles until a shortage of funding threatened the longevity of the program.

It was suggested, since Anna was out on the boat anyway, that she carry out the monitoring on her own and feed the data back to Bob in Perth. So, with her own turtle tagging kit and complete access to the research library to supplement her



Above CALM's Greg Oliver was instrumental in engaging Anna in turtle monitoring.
Photo – Anna Vitenbergs

research, she ventured out to the island whenever time and weather permitted to carry out work (much of it self-funded), in conditions that would impress Bear Grylls.

LOGISTICS

There's no doubt that Anna is made from 'tough stuff'. Crippling sea sickness, which she says can be brought on by standing on wet lawn, wasn't enough to dampen her love of the ocean or prevent her from making the hour-long trip from her then home in Dampier to Rosemary Island countless times. In the early days, Anna took gloves and a snorkel, instead of ice or an esky, and sourced crayfish and fish from the sea to eat. And, before radios and satellite phones were available, she had only a flare to use on the island if she got into trouble. Depending on how long she was staying on the island, Anna's husband would check in to see how she was going and helicopters that were en route to the iron ore ships would fly over to make sure she was okay, sometimes stopping in for a cuppa and some welcome company, often in exchange for a fresh crayfish.

Often alone, Anna would listen to 'talking books' for entertainment, but her penchant for spy stories and

About hawksbill turtles

Hawksbill turtles (*Eretmochelys imbricata*) have a beak like a parrot and thick overlapping scales on their shell, which ranges in length from 72 to 100cm with the average length being 86.5cm (based on 4300 observations of adults at Rosemary Island). The thick overlapping scales on the turtles' shell (carapace) are readily apparent on juveniles and younger adults but can become blurred with age and wear. The rear margins of the shell are clearly serrated and there is often a very large notch between scales at the rear midline of younger sub-adult and adult turtles which can be lost with wear and age. Base colouring of the carapace scales can range from a lighter almost honey-light brown colour to dark brown with black or brown fleckings. Some larger turtles may even appear dark brown-black. They range in body weight from 45 to 75kg.

They live near coral and rocky reefs in the warm tropical waters of the Indian and Pacific oceans and the central Atlantic. In Western Australia they nest from Ningaloo Marine Park northwards, with a major colony on Rosemary Island. Nesting may occur all year round but in WA it peaks between October and January. They may take 20 to 30 years to reach sexual maturity and there are commonly three to six years between breeding attempts. But, within a breeding season, a turtle may lay up to six clutches of between 40 and 185 eggs (with an average of 112). The sex of the hatchlings depends on the temperature in the nest.

Hawksbill turtles may travel up to 2400km from their breeding to their feeding grounds, where they feed on sponges, sea squirts, soft corals, shellfish, seagrasses and seaweeds.

After hatching, the baby turtles swim out to sea for several days. They then spend the next five to 10 years drifting around in surface waters at the mercy of ocean currents, feeding mainly on plankton. They are often found in huge rafts of drifting *Sargassum* – a type of brown seaweed – where they are probably best able to hide from potential predators. Once they reach carapace lengths of 30 or 40cm they settle in one particular area around coral or rocky reef.

The hawksbill turtle is a threatened species classed as vulnerable in WA, but its international status is critically endangered and tortoiseshell is still traded in some parts of the world.

How you can protect the hawksbill turtle

If you find a turtle with a tag, note the number and contact the Department of Parks and Wildlife. The information that is collected is used to better manage and protect WA's populations of hawksbill turtles as well as other jurisdictions such as Indonesia and Cocos Keeling Islands. If you find a dead turtle you should also advise Parks and Wildlife.

For more information, email turtles@dpaw.wa.gov.au, call the Wildcare Helpline on (08) 9474 9055 or visit the 'Marine Parks WA' website at www.dpaw.wa.gov.au.

Above and right Hawksbill turtles come to a number of beaches on Rosemary Island to lay eggs.
Photos – Adam Williams and Heather Barnes/Parks and Wildlife





“... she ventured out to the island whenever time and weather permitted to carry out work (much of it self-funded), in conditions that would impress Bear Grylls.”



Top Hawksbill turtle.
Photo – Matt Kleczkowski

Above The www.seaturtle.org website enables people to log in and search for individual turtles (like ‘Anna’ – a Rosemary Island-nesting hawksbill turtle) to track their journeys.
Animated map – www.seaturtle.org

murder mysteries sometimes meant her imagination ran away with her at night and she got a bad case of the spooks. Anna says people often mistakenly think she enjoys working alone but, given the choice, she would have much preferred to share her experiences with others. When they could, Anna’s daughters and husband would join her on the island and help with tagging and, as often happens when dedicated individuals get involved in field research,

it became a family affair. Program founder and coordinator Bob Prince together with his two eldest daughters, joined her in January 1993, and long-term turtle volunteer Warren Richards and his family joined her numerous times between 1994 and 2001. However, over the years, she spent a lot of time perfecting being a ‘lone worker’.

For the first 15 or so years, Anna’s ‘accommodation’ on the island consisted of a sleeping bag sheltered by a beach umbrella, which proved useless in windy conditions. A shipping container was brought to the island later for shelter, which contained a kitchen and a storage area. This was generously provided by Woodside after Warren Richards, a company employee, convinced the organisation of the need for the facility for turtle monitoring. Anna says the structure was akin to Club Med in comparison to her sleeping bag and umbrella. Nowadays, the luxury has been stepped up even further thanks to a fridge and barbecue which make storing and cooking fresh food considerably easier.

ALL WORTH IT

The Rosemary Island turtle tagging program is part of the longest-running program of its kind in WA and Anna says

one of the things that keeps her interested is seeing tagged turtles returning to nest year after year. Some she remembers from distinctive scars or other distinguishing features and seeing the ‘old girls’ coming back still gives her a buzz. She says it’s fascinating to look on Parks and Wildlife’s marine turtle database to see who’s tagged the turtles and where. In the early days she copied her field data from her notebooks onto paper records, which Bob still has, and when computers were made available she entered records into databases which she sent to Bob on three-inch floppy disks.

A particular highlight was in November–December 2002 when Anna captured three hawksbill turtles for Kellie Pendoley, who was doing her PhD at the time, and assisted in fitting platform terminal transmitters (PTT). These were the first turtles to be fitted with transmitters on Rosemary Island and included one that Anna had first tagged and released in 1993. The turtles were named ‘Fran’ – after Parks and Wildlife’s Fran Stanley who was involved in the program between 1994 and 2006, ‘Vicki’ – after local botanist Vicki Long, and the one that had previously been seen was named ‘Anna’. ‘Anna’ returned to Rosemary Island four years after she was tagged, and then again in 2010 with the old PTT attached

Right Murujuga Rangers assist with tagging and monitoring at Rosemary Island.

Far right The flipper tags are used to identify individual turtles and these tags may also be recognised and reported on by third-party observers to help build the distribution and demographic profile that we need to manage populations.

Photos – Anna Vitenbergs

– providing an amazing 17-year history. Another name-sake that was fitted with a PTT at Rosemary Island by Parks and Wildlife principal scientist Scott Whiting during the 2015 season was tracked to Broome – a poignant journey to Anna’s one-time home.

But, of course, Anna’s contribution to the knowledge of individual turtles is not limited to those that share her name. Detailed records held by Bob Prince show that Anna and Rob first tagged and released a turtle on 12 September 1991 that managed to go unnoticed by anyone until Joanna King and others found her again on 26 October 2015. Another two turtles Anna tagged and released on Rosemary Island in 1991, including one she found during a project to better understand the DNA of hawksbill turtles with Damien Broderick, have been seen from time to time during the past 25 years. There were also a number of 23-year records made in October 2015 that have early connections with Anna. Original field records show there have been 3500 female hawksbill turtles documented from Rosemary Island, and Anna has personally seen more than half of those at least.

Marine turtles are slow to mature and have long breeding histories. From this project we know that turtles that Anna tagged in those early years are still breeding now. For example turtle WA 20788/WA 20787 was first tagged by Anna when she was camping alone in 1993 at Rosemary Island. This turtle was nesting again in 2014 and was fitted with a transmitter. It has now travelled north to a foraging ground offshore from Port Hedland (www.seaturtle.org).

Hawksbill turtle tagging project



The hawksbill turtle tagging project at Rosemary Island has been supported by many organisations over the years. In particular, support from the then Department of Conservation and Land Management and Australian National Parks and Wildlife Service, together with personal contributions from individuals such as Anna, were integral to the original Western Australian Marine Turtle Project. Previously, support was provided by Woodside. Currently the program is partly funded by Rio Tinto as part of a three-year agreement with Parks and Wildlife. The project aims to raise awareness about the importance of marine turtle conservation and provide crucial data on turtle populations in the area. In 2015, Parks and Wildlife staff and volunteers recorded 444 turtles over 14 nights from five beaches, including 134 turtles which had not previously been recorded. Tagging turtles is an invaluable way to identify individual animals and provides a way to record data about their mating, nesting

and eating habits as well as to track individuals’ life spans.

In recent years, the use of PTTs has enabled scientists and volunteers to get a greater profile of where hawksbill turtles live and feed than was possible with flipper tags. The PTTs reveal that none of the WA nesting tagged hawksbill turtles have left WA region waters, which is good news as they are afforded protection against being hunted for tortoiseshell under the Wildlife Conservation Act (see also ‘A scaly tale’ on page 16).

The project has been made possible by Parks and Wildlife staff and other partners, including Bob Prince, Fran Stanley, Greg Oliver, Marissa Speirs, Geoff Kregor, Joanne King and Rachael Marshall.

This year, the Murujuga Land and Sea Unit provided cultural training to the tagging program participants.

Anna’s unrelenting and insatiable quest for information is propelled by her realisation that “the more you know, the more you realise you don’t know”. Long-term projects are particularly important in long-lived animals like turtles as they have a complex life cycle and trends in population numbers can only be detected over decades. Anna says we have a long way to go to uncover all the secrets of turtles.

However, she is already looking forward to returning to Rosemary Island for the next nesting season from October

and vows to volunteer for as long as she’s able to. But she’s confident that the next generation of scientists, biologists and volunteers will continue the work and harness their passion and enthusiasm to research and monitor these precious and fascinating animals.

Rhianna King is a *LANDSCOPE* editor and can be contacted on (08) 9219 9903 or by email (rhianna.king@dpaw.wa.gov.au).

TRAILS WA



Many readers would be familiar with the Trails WA website which is now also available as a handy app for smart phones. A search function enables you to search by trail name and area and the app provides information about the location of the trail, length, time and difficulty so you can plan for your adventure before you leave home and keep on track once you're out. You can also view WA's top trails – those voted as the best of the best. The app also contains additional information – such as the history of the area and the best time to visit – to enrich the experience of walks, rides, paddles, snorkels or drives. The app also contains fire and other park alerts. Check out 'River Journeys' on page 22 to read about the Melville Water Riverpark Trail which is described on Trails WA.

Trails WA app is available for download from the Apple iTunes store and was developed in partnership between Trails WA and the Department of Parks and Wildlife with support from the Department of Sport and Recreation, Lotterywest and the State Government's Royalties for Regions program. An Android version is currently in planning.



THE KIMBERLEY – AUSTRALIA'S WILDERNESS

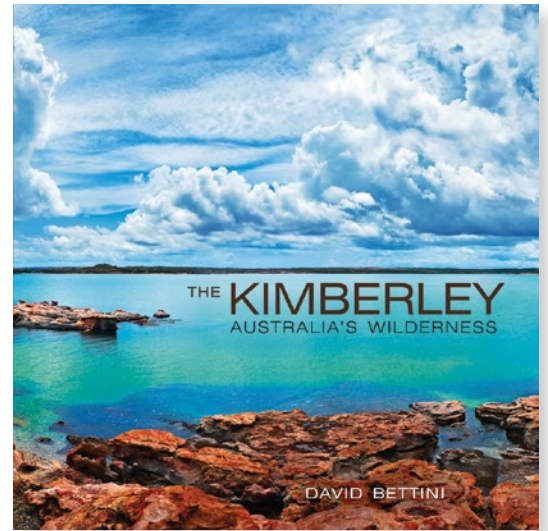


David Bettini's latest offering is utterly stunning. From the moody picture of Montague Sound on the cover to the open-mouthed frilled dragon on the back (which also features on the cover of this issue), every picture is spectacular. And while there is no doubt that it is a magnificent place, David's genuine love of the Kimberley and its amazing plants and animals, gives each photo a bit of extra magic.

David has taken the photos that adorn the book's pages over 11 years using film and digital cameras. He has clearly dedicated countless hours to capturing the beauty of the area and exercised patience beyond reason to get intimate portraits of wildlife.

David includes an introduction about 11 key places and offers insight into many of the places and species that he captures. These provide some interesting insights – if you can drag your eyes away from the beautiful photos long enough to read them.

The self-published The Kimberley – Australia's wilderness is available for \$70 by contacting David Bettini on 0427 938 739 or by emailing david@davidbettini.com.au.



LIGHTING UP THE CAPES – Naturaliste to Leeuwin



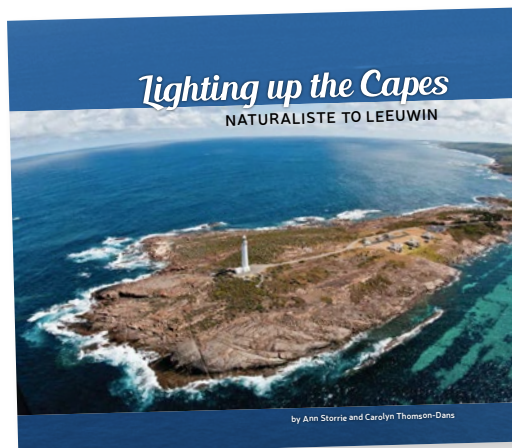
Long-time collaborators Ann Storrie and Carolyn Thomson-Dans have produced this magnificent book that showcases the spectacular Capes region, which holds a special place in the hearts of many Western Australians and serves as an important area for the plants and animals that live there.

With its engaging story-telling and beautiful photos, the book highlights the area's special features and its fascinating European, Aboriginal and maritime history and even provides the origins of the area's place names. It also details the intriguing features of the coast – including the abundance of marine life and the area's shipwrecks – and provides insight into the plants and animals that are found ashore. The book also offers

information about what recreation opportunities are in the area and the best places for swimming, sailing, kayaking, fishing, surfing, and abseiling and rock climbing.

This book is a beautiful addition to anyone's collection and makes a lovely gift or souvenir.

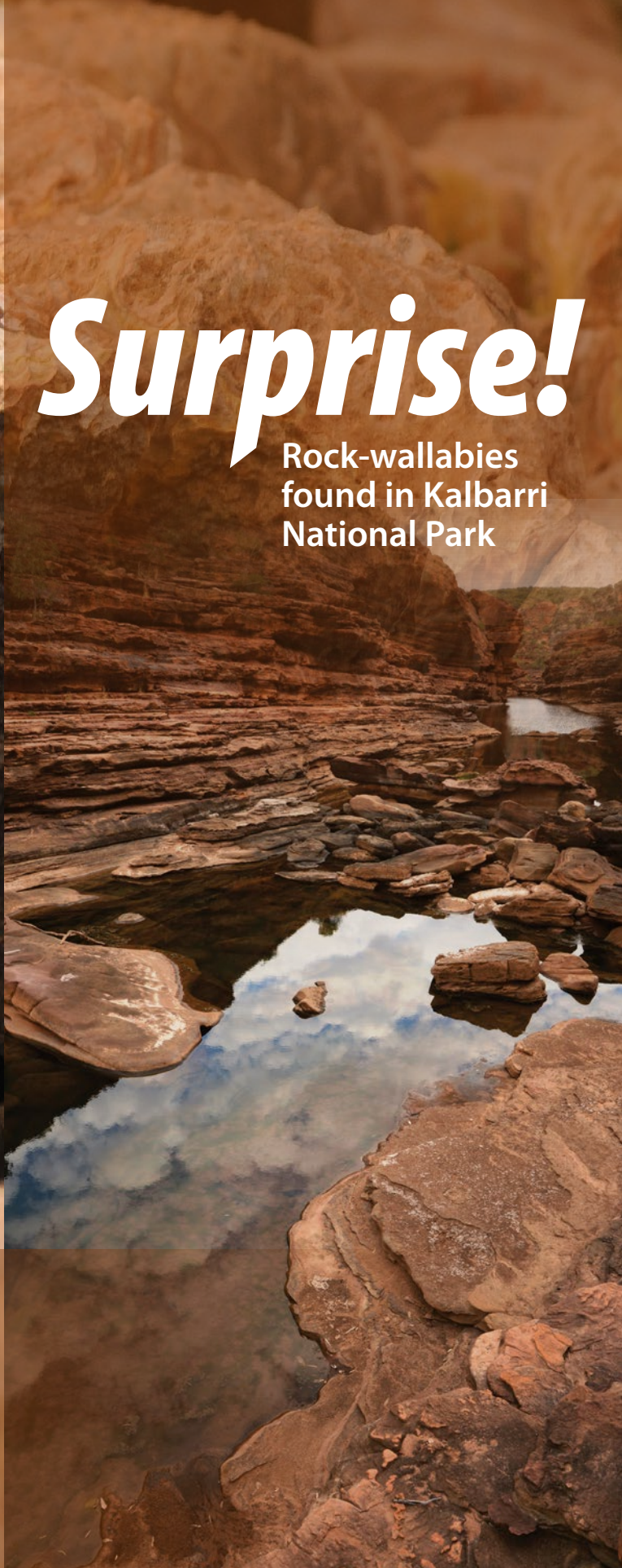
The 160-page, full colour Lighting up the Capes – Naturaliste to Leeuwin is available for \$34.95 from <http://simonnevill.com> and good bookshops and visitor centres.





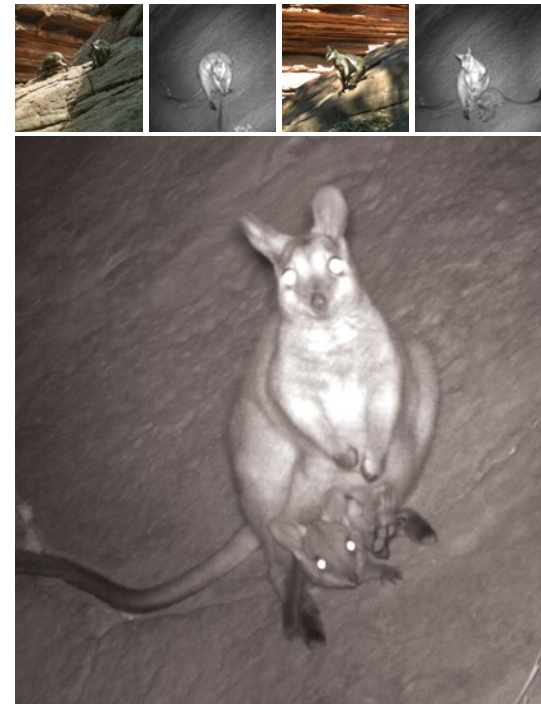
Surprise!

Rock-wallabies
found in Kalbarri
National Park



The unexpected rediscovery of black-flanked rock-wallabies in Kalbarri National Park has generated excitement and a conundrum for researchers and managers. How do we best recover this tiny population from the brink of extinction?

by **David Pearson**



It was certainly a memorable way to start a day of work. Back in August 2015, buried in a bundle of emails, was a little gem. Mike Paxman, the ranger-in-charge at Kalbarri National Park, sent me an email titled 'Rock-wallabies spotted in gorge' with two photos taken by rock climbers attached. I opened the first photo and it was a distant image of two feral goats in a massive red overhang. I enlarged and closely scanned the photo unable to find any sign of rock-wallabies. "Funny joke, Mike", I thought. Then I opened the second photo and instantly spotted not one but two (actually three, but read on) distinctive small grey wallabies with black and white stripes along the sides of their bodies and long black-tipped tails, staring at the camera. Unmistakably, they were black-flanked rock-wallabies (*Petrogale lateralis lateralis*), a listed threatened species whose populations have declined sharply and had not been seen in Kalbarri National Park for more than 20 years.

The rediscovery of the black-flanked rock-wallaby in Kalbarri National Park was probably not due to their arrival from another site as no other populations are known to exist within 300km. Those populations are separated by unfavourable habitat and many dangers. These rock-wallabies had escaped detection because they were surviving in a remote and

rugged section of the Murchison River gorge, visited only by rock climbers and intrepid canyoneers.

NOT CAMERA SHY

Following this exciting news, Mike clambered into the gorge and, with the assistance of rock climbers, located the site where the rock-wallabies were sighted. Here he set up a number of automated remote cameras that operate by detecting the movement of warm bodies (similar to most burglar alarm systems) which then triggers a quick burst of photographs. These cameras were attached to rocks and trees, and were left out over a number of weeks. What they revealed was astonishing – that this Kalbarri rock-wallaby 'population' appeared to be made up of just two adults and a small pouch young.

Rock-wallabies have some unusual genetic characteristics. Their strong preference for rocky habitats results in populations being isolated from one rock outcrop to the next one and over millennia this isolation has grown as the landscape has dried and more recently as native bush has been cleared. The presence of foxes and feral cats makes any attempt to re-establish ties with neighbouring rock-wallaby populations a very risky undertaking. Foxes are a serious predator



Previous page

Main A black-flanked rock-wallaby and her joey.

Inset The stunning Kalbarri National Park gorges.

Photos – David Pearson/Parks and Wildlife

Above left The photo taken by rock climber Remi Vignals that first alerted Parks and Wildlife to rock-wallabies surviving in Kalbarri National Park.

Photo – Remi Vignals

Above Remote camera images are useful for monitoring these shy animals.

Photo – Parks and Wildlife

of rock-wallabies and have driven many populations to extinction. The impact of feral cats is not well known, but they are believed to be a threat to the smaller female rock-wallabies and their young.



“These rock-wallabies had escaped detection because they were surviving in a remote and rugged section of the Murchison River gorge...”



Above Searching the rugged Murchison River Gorge for rock-wallabies.

Left Kalbarri National Park ranger-in-charge Mike Paxman rebaiting a Thomas trap.
Photos – David Pearson/Parks and Wildlife

With isolation comes genetic drift as mutations and other genetic factors result in populations growing apart in their genetic make-up with no remixing between gene pools. Across the western

half of Australia, black-flanked rock-wallabies have evolved from a common ancestor into an interesting array of subspecies and genetic races. The first task for Parks and Wildlife researchers was to determine where the genetic affinities of the Kalbarri rock-wallabies lay. Were they most closely related to populations in Cape Range National Park near Exmouth, the Little Sandy Desert or perhaps the Wheatbelt region? A small (pinhead) piece of ear tissue from a rock-wallaby is usually all that is needed to answer this question.

RELUCTANCE TO COOPERATE AND TAKE THE BAIT

A team from Parks and Wildlife and WWF, and volunteers travelled to Kalbarri to trap the rock-wallabies to obtain some samples and to search for any other colonies that may be surviving in remote gorges. Thomas traps were carried into the gorge, at times lowered by rope down steep sections, and then set up around the area occupied by the rock-wallabies. These traps have soft fabric sides to prevent

jumping rock-wallabies hurting themselves and are baited with enticing apples. Once they stand on a treadle plate inside the trap, the door drops and the rock-wallaby is captured.

After checking the traps each morning, the team would divide up and examine other areas of the gorge. This was done on foot, with slow searching of suitable rocky habitat, looking for the distinctively shaped droppings of rock-wallabies. While old droppings were located at a number of sites, no other new rock-wallaby populations were found.

Despite a prolonged trapping effort, we were unable to catch any rock-wallabies. Frustratingly, they would watch



“Goats damage rock-wallaby habitat with their grazing and push rock-wallabies out of caves and other shelter sites.”

BOOSTING BAITING

The Australian Government under its new Threatened Species Strategy recently provided \$1.7 million in funding to support further integration of feral cat control with fox control under the State's wildlife recovery program *Western Shield*.

The funding will enable Parks and Wildlife to undertake feral cat baiting in the Perup Sanctuary near Manjimup, Dryandra Woodland near Narrogin, on the south coast and in Kalbarri National Park.

Species to benefit from the program include western ringtail possums, woylies, numbats, western ground parrots, Gilbert's potoroos and black-flanked rock-wallabies.

Further Australian Government funding of \$250,000 will enable Parks and Wildlife to trial a modified version of *Eradicat*®, known as Hisstory, in the Kimberley.



us bait the traps, but were not tempted to venture in. We altered the bait, trying pears, horse muesli, oats, peanut butter, but still had no luck.

Fortunately, sufficient DNA for genetic testing can sometimes be extracted from the mucus around fresh droppings. The team located some squishy fresh rock-wallaby poos and sent them to rock-wallaby genetic guru Dr Mark Eldridge at the Australian Museum in Sydney. He has assisted Parks and Wildlife over many years in analysing samples and was able to compare the Kalbarri samples with those collected from other populations. For this type of work the entire genome is not examined. Rather a selection of known variable genes are assessed and differences compared between individuals and populations.

DISTINCTIVE BEASTS

Mark found that the Kalbarri rock-wallabies were genetically different from all other rock-wallaby populations although closest to those in the Little Sandy Desert. Such differences result in some challenges for managers and a need for careful consideration of options.

If these three rock-wallabies are the last left in Kalbarri National Park then they are at great risk and the loss of any one of them could result in the end of the population and the loss of their unique genetic material. But we also know that rock-wallabies have a remarkable ability to recover from very low numbers after a population has suffered a crash (often termed a 'bottleneck'). They can tolerate high levels of inbreeding and manage to recover populations from just a few individuals, but with much less genetic variation.

The Kalbarri population could be supplemented with rock-wallabies from populations elsewhere to ensure their survival, but this may come at the cost of a loss or dilution of some unique Kalbarri genetic material. To decide on the best course of action in such instances, Parks and Wildlife staff consult with experts both within the department and outside, including the rock-wallaby recovery team established to provide advice on the conservation and management of rock-wallabies.

While that process is underway, feral predator control has been stepped up and



Opposite page

The other photo taken by Remi Vignals, which shows goats and rock-wallabies living alongside each other in Kalbarri National Park.

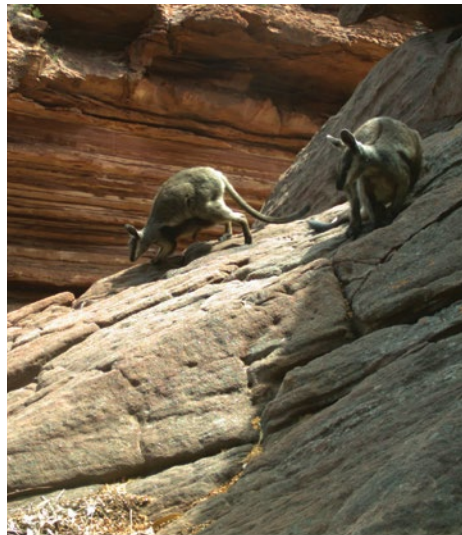
Photo – Remi Vignals

Above A rarity for Kalbarri National Park, Australia’s largest goanna was observed while searching for rock-wallabies.

Far right A black-flanked rock-wallaby.
Photos – David Pearson/Parks and Wildlife

Right Remote cameras in Kalbarri National Park have enabled land managers to monitor the activity patterns of this rock-wallaby population.

Photo – Parks and Wildlife



remote cameras will be positioned along the gorge to monitor its effectiveness. Kalbarri National Park has been identified as one of three sites in WA where the newly approved *Eradicat* bait will be used to control feral predators across a large area (see also ‘Boosting baiting’ on page 38). Annual control of goats will also continue using helicopter shooting. Goats damage rock-wallaby habitat with their grazing and push rock-wallabies out of caves and other shelter sites.

DECISIONS FOR THE FUTURE

Further searching of Kalbarri National Park for other remnant rock-wallaby populations is planned. If none are found, then a decision on how best to ensure the survival of the Kalbarri population will be urgently needed. As part of this process,

a ‘translocation plan’ will be developed which outlines possible options, risks and costs. This will then be reviewed by experts outside the department including geneticists to ensure that any decisions are based on sound science and effective management techniques.

To ensure that the rock climbers do not inadvertently disturb the Kalbarri rock-wallabies, rangers have been working with the rock climbers’ association to establish protocols around climbing and a new camping site away from the wallaby’s habitat has been established.

The expectation for the future is that visitors to Kalbarri National Park will again be able to see these remarkable wallabies bounding effortlessly around the boulder piles at lookouts at Hawk’s Head and Z Bend, as was the case several decades

ago. More generally, the return of rock-wallabies will help the survival of the species, as other populations are small and still face many challenges.



David Pearson is a Parks and Wildlife principal research scientist. He can be contacted on (08) 9405 5112 or by email (david.pearson@dpaw.wa.gov.au).

David thanks the Parks and Wildlife staff from the Midwest and Swan regions and Science and Conservation division who helped with survey work, especially Mike Paxman and Anthony Desmond as well as WWF’s Merril Halley and volunteers.



Battling the odds

With threats such as grazing by herbivores, the effects of dieback disease and two extreme fire events in recent years, an important threatened ecological community in the Stirling Range is facing long odds for survival. But a comprehensive and holistic approach to protect the species found there is providing hope that they will be safeguarded for the future.

by Damien Rathbone, Sarah Barrett,
Dylan Lehmann and Emily Harper



Nestled in the eastern part of the Stirling Range National Park, an important and diverse ecological community houses a treasure-trove of endemic and threatened flora species. Declared a threatened ecological community (TEC) and ranked critically endangered due to the extent and severity of *Phytophthora* dieback disease, the area carries an unassuming name – the ‘Montane Heath and Thicket of the eastern Stirling Range’ – but the plants that populate it make it a special place indeed. Many of the species found there are as interesting as they are rare, from the fascinating star-burst shaped flowers of the giant andersonia (*Andersonia axilliflora*), to the pretty pendulous flowers of the yellow mountain bell (*Darwinia collina*), and the fluffy-white flowers of the Stirling Range beard heath (*Leucopogon gnaphalioides*) as well as the mountain latrobea (*Latrobea colophona*), the mountain dryandra (*Banksia montana*) and the small-flowered snottygobble (*Persoonia micranthera*).

Devastating changes to the area have impacted this TEC and resulted in fewer than 14 per cent of the community remaining as a representation of the original suite of plant species that were once common; indeed many dieback-susceptible species have become locally extinct. During the past 50 years, fire frequency has also increased and almost three-quarters of the ecosystem has experienced fire in both 1991 and 2000 – a very short time between fires. As most mountain-top species rely on seed to regenerate and many are very slow to mature in the harsh environment, this has led to severe population declines. Climate change also threatens these mountain-top species that have literally nowhere to migrate in response to a warming and drying climate.

MORE THAN MEETS THE EYE

Monitoring of the critically endangered species in the aftermath of the 2000 fire revealed that, as well as being at risk from dieback, they were faced with another threat. Evidence showed grazing and



Previous page

Main Fenced areas were constructed at 10 sites, protecting 6250m² of heath.

Photo – Sarah Barrett/Parks and Wildlife

Insets Quokkas on Bluff Knoll.

Photo – Parks and Wildlife

Yellow mountain bell (*Darwinia collina*).

Above Mountain latrobea (*Latrobea colophona*).

Photos – Damien Rathbone/Parks and Wildlife

browsing by rabbits (*Oryctolagus cuniculus*) and quokkas (*Setonix brachyurus*). It was hoped that rabbit numbers would decline with time, and plants would eventually reach a natural equilibrium with browsing pressure from native herbivores. But, unfortunately, by the late 2000s it was evident that browsing impacts remained high and posed a threat to the long-term survival of the TEC.

Since then, a number of actions have been undertaken including the targeted eradication of rabbits using 1080 oats and the establishment of protective fencing for highly threatened flora species. Small individual fencing structures were initially built for species such as the mountain dryandra and the mountain latrobea. Monitoring indicated the significant impact of browsing across these populations and revealed that these small structures were highly effective at protecting individual plants. It also showed that if the growing tips were repeatedly browsed then the growth

necessary to enable flowering and setting seed would be prevented, placing the regenerative potential of these species at risk. This, combined with the effects of fire and disease, is a serious threat to the long-term viability of the ecosystem.

In 2013, the positive results of small-scale fencing motivated the expansion of browsing mitigation through the construction of larger fenced areas. A project was developed and funding sourced from the State Natural Resource Management organisation with the aim of protecting specific patches of threatened flora as well as the more common species that make up the TEC. Materials were transported by helicopter to selected sites at about 1000m above sea level. In 2014, eight 25 x 25m fenced areas were constructed on Bluff Knoll and in 2015 another two fencing structures were built on nearby mountain tops. While logistically challenging work due to the remote, exposed environment and the rocky steep terrain, the project

“... the area carries an unassuming name – the ‘Montane Heath and Thicket of the eastern Stirling Range’ – but the plants that populate it make it a special place.”



Above Signage has been installed to inform visitors about the project.

Top left Grazed mountain dryandra.

Far left An analysis of rabbit scats revealed sedge and grass species are a major component of a rabbit’s diet.

Photos – Sarah Barrett/Parks and Wildlife

Left A quokka browsing on Stirling Range beard heath.

Photo – Parks and Wildlife

has benefited from a team of dedicated Parks and Wildlife project officers working in partnership with volunteers. Signage has also been installed to inform curious tourists about the project and to discourage trampling of vegetation and track formation by the public near fenced sites.

After the fenced areas were built, detailed monitoring was established to compare growth inside and outside the fenced areas; within months the positive effects were evident. At the same time, remote infra-red photography was used to ascertain exactly which herbivores were the primary grazers of key threatened species. Footage in 2011 had captured quokkas and rabbits on camera with quokkas photographed ‘in the act’ of

browsing the Stirling Range beard heath. New footage taken in 2014 and 2015 again revealed that for the Stirling Range beard heath, giant andersonia and mountain latrobea, quokkas were the culprits, nibbling nightly on these threatened species. An analysis of camera footage from 2011–15 revealed that of the seven fauna species recorded, 75 per cent of the photographs were of quokkas, the only strictly herbivorous native species. Other species observed were mardo (*Antechinus flavipes*), bush rats (*Rattus fuscipes*), quenda (*Isoodon obesulus*), feral cats (*Felis catus*), dunnarts (*Sminthopsis griseoventer*) and more recently honey possums (*Tarsipes rostratus*).

In July 2015, Parks and Wildlife project officer Damien Rathbone sought to further

clarify the relative impact of quokkas and rabbits by analysing plant fragments in the scats of these species. The results of this dietary analysis revealed that sedge and grass species formed the major component of rabbit diet in this plant community. In contrast, quokka scats contained a wider variety of shrub species, in particular species from the myrtle and heath plant families. Fragments were identified from two threatened species – the yellow mountain bell and the Stirling Range beard heath as well as another two heath species of conservation significance.



In winter 2015, monitoring confirmed the positive effect of fencing with significant increases in plant volume and the number of flowers of fenced individuals of the Stirling Range beard heath, yellow mountain bell and mountain latrobea compared with those outside the closures.

THE FUTURE

Destruction caused through browsing by native herbivores suggests an imbalance in normal ecosystem processes due to multiple interacting threats. However, the results of this project so far are very promising, rapid recovery has occurred within the closures and many threatened species are already flowering and producing seed to replenish their soil seed banks. Browsing mitigation will also complement the investment made into other conservation activities in the montane TEC, such as the collection

and preservation of seed in Parks and Wildlife's Threatened Flora Seed Centre, the re-stocking of keystone montane species and the aerial application of the fungicide phosphite to tackle *Phytophthora* dieback. The first significant collection of seed from fenced mountain latrobea was made in February 2015; a species once close to local extinction. If a bushfire

should occur at some time in the future, these species should now be able to be regenerated and persist in their unique mountain environment. Hopefully, future generations will be able to enjoy mountain top vistas filled with an abundance of flowering species such as the mountain latrobea, yellow mountain bell, and Stirling Range beard heath.



.....
Above Eastern Stirling Range vista.

Above right and far right A 'before' and 'after' comparison of grazed mountain latrobea.
Photos – Damien Rathbone/Parks and Wildlife

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Dylan Lebmann and Emily Harper worked as technical officers with Parks and Wildlife.

The authors would like to thank the staff and volunteers who have helped with this project including Bianca Klein, Ross Remaj, Beau Cox, Kyle Wood and Parks and Wildlife Stirling Range National Park rangers John Abbott and Deon Grantham.

Adventure out

Nambung

NATIONAL PARK



In 2014–15 the Pinnacles Desert received nearly 300,000 visits from people who travelled there to marvel at its scenic and fascinating structures. Now, thanks to services offered in the park by two licensed tour operators, visitors can experience an entirely different perspective of this spectacular area.

BY RHIANNA KING

Nambung National Park is a popular destination for visitors to Western Australia as well as for locals. A two-hour drive from Perth, it's a comfortable day trip from the city or a welcome stop on a trip further north. The Pinnacles Desert is home to thousands of peculiar and spectacular limestone pillars that mark the landscape and captivate the imaginations of those who visit. The landscape is highly changeable; the time of day determines the shadow lengths cast by the varying-sized structures and the colour of the sky offers variation to the contrasting yellow sand. And while it's not known exactly how they were created, it's understood the likely processes occurred over the past half-million-years.

Until recently, there were only a few ways to explore the Pinnacles Desert – either by car or coaster bus and drive around the 4km one-way Pinnacles Desert Drive, stopping every now and then to get a closer look and take some photos. Or by foot around a 1.2km signed walk, which does a loop and guides those who would rather give their legs a good stretch and immerse themselves in the landscape. Visitors could do these by themselves or join a tour. Now, there's a third option, which gives visitors an entirely different perspective of the park and its surrounds.

UP, UP AND AWAY

For many, the rush of being in a helicopter is an adventure in itself, but visitors to Nambung National Park can now enjoy a birds' eye view of the park and surrounding area with Pinnacle Helicopter Flights. The company has been issued a commercial tour operator's licence from Parks and Wildlife permitting it to run tours from within the park. Licences such as these enable tour operators to

provide visitors with enriched experiences that are beyond what Parks and Wildlife can offer in its land management capacity.

Pinnacle Helicopter Flights operates a booth in the Pinnacles Desert Discovery centre and offers three flight paths, which vary in time in the air, cost and the distance travelled. All three paths leave from the helipad behind the discovery centre and take in the Pinnacles Desert as well as an exclusive look at the Painted Desert, which houses little mounds believed to have been created by a different process than the one that made the Pinnacles. The longer two flights travel along the coastline, which is enveloped by Jurien Bay Marine Park and protects an important and unique part of the Western Australian coastline. This precious area is where the distribution

Previous page

Main A birds' eye view of the Pinnacles Desert.
Bottom Helicopter rides offer an entirely different perspective of Nambung National Park.

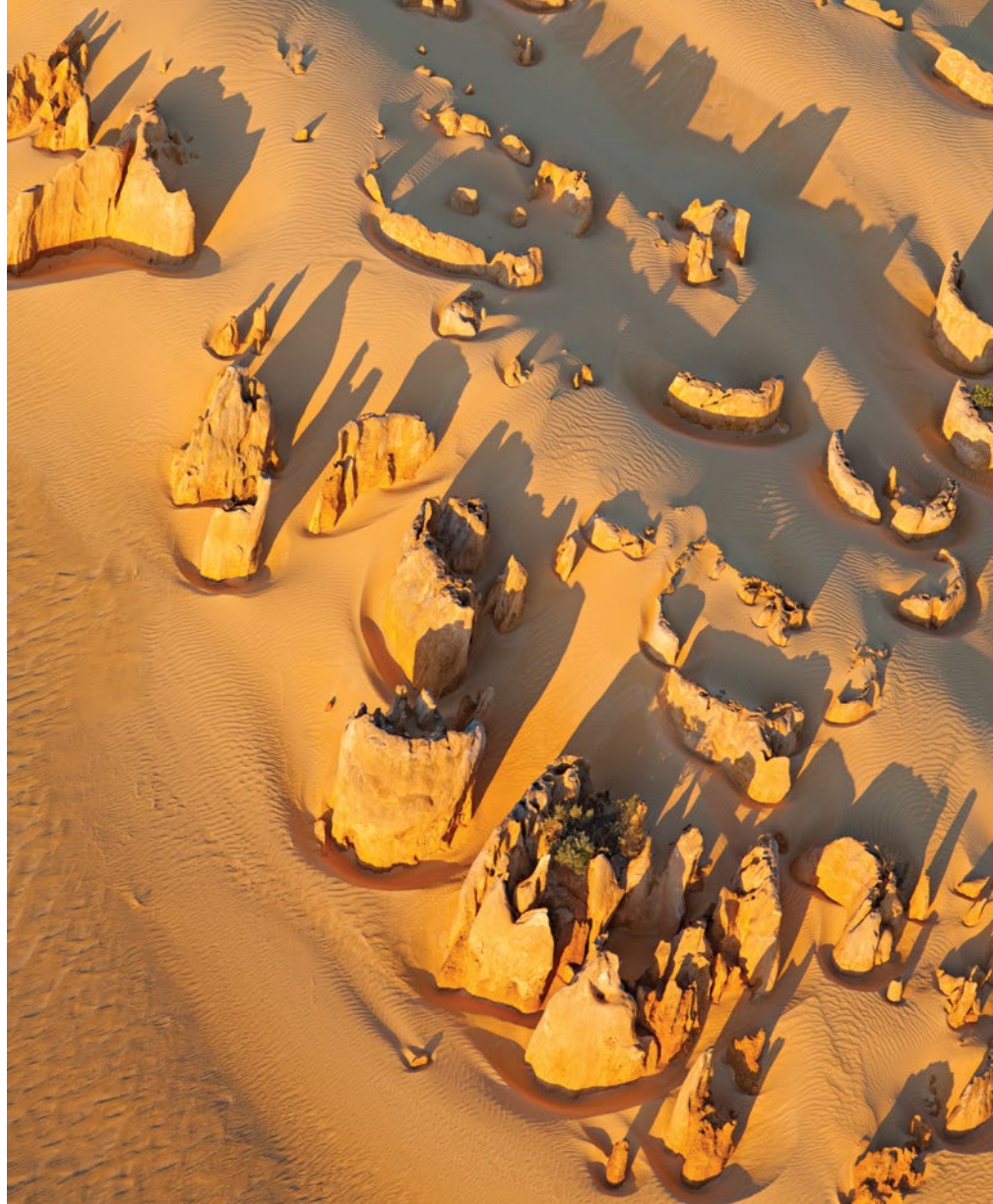
Above Visitors can witness the shifting sands of the Painted Desert.

Photos – Damon Annison

Above left Take a bird's-eye view over the fascinating Lake Thetis.

Video – Parks and Wildlife

of some species from the tropical north and the temperate south overlap, and it is home to Australian sea lions, dolphins and a myriad of fish. It also contains extensive seagrass meadows, which shelter western rock lobsters, octopuses and cuttlefish. And the extensive reef system that runs parallel to the coastline comprises colourful sponges, sea squirts, anemones and corals.





Do it yourself

Where is it? Nambung National Park is 200km north of Perth.

Facilities: Pinnacles Desert Discovery centre, toilets, barbecues, lookouts.

The state-of-the-art Pinnacles Desert Discovery centre provides award-winning interpretive information and sells a range of locally sourced arts and crafts, and other gifts and souvenirs. It also sells coffee, tea and other refreshments. The knowledgeable and friendly staff can also help with information about the area.

Helicopter rides: For more information on helicopter rides to, in and from Nambung National Park visit www.pinnaclehelicopterflights.com.au and www.rotorvation.com.au or visit your local tourist centre.



“The Pinnacles Desert is home to thousands of peculiar and spectacular limestone pillars that mark the landscape and captivate the imaginations of those who visit.”



Top Come on a 360° journey of the spectacular Pinnacles Desert.
Video – Parks and Wildlife

Above The Pinnacles Desert Discovery centre.
Photo – Jiri Lochman

Right Emus can be seen strutting around Nambung National Park.
Photo – Damon Annison

The longest flight takes in the stromatolites of Lake Thetis in the northern part of Nambung National Park.

Newcomer – Rotorvation – has recently started catering to tourists who want to visit the Pinnacles but don't have the time to drive there. The company arranges a door-to-door service from Perth hotels and other accommodation

to give people who might otherwise miss out due to time restraints the opportunity to see this magnificent part of Western Australia. The helicopter flights to the Pinnacles leave from Jandakot and stop at Yanchep National Park for a quick look at the caves, koalas and Aboriginal heritage. Visitors then land on a helipad in Nambung National Park where they are met by a vehicle that will guide them around the Pinnacles. Rotorvation also offers chartered flights, giving their clients the option to choose their own adventure.

There's no doubt that the Pinnacles and Painted deserts are spectacular when viewed from any angle, but observing them from the air, with the adrenaline rush that comes with being carried through the air by a rotor, and wearing a helicopter headset that make you feel a bit hardcore is an experience that's out of this world.

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Visit www.parks.dpaw.wa.gov.au



Biological surveys in Prince Regent National Park in August 2015 confirmed there were thriving groups of threatened mammals in the park, thanks to isolation and bushfire protection burns carried out under the *Kimberley Science and Conservation Strategy*.

by Ian Radford and Richard Fairman



MAMMALS THRIVING IN THE

PRINCE OF PARKS



Field trips to Prince Regent National Park provide a host of opportunities to gather vital information from a range of habitats. While the work is not all a walk in the park – with some logistical challenges – the spectacular scenery and opportunities for new discoveries more than make up for it.

SURVEY SITES

Mt Trafalgar and Cascade Creek were originally surveyed for mammals in 2003–04. Since monitoring under the *Kimberley Science and Conservation Strategy's* (KSCS's) Landscape Conservation Initiative started in 2011, Parks and Wildlife and its predecessors has resurveyed these sites three times – in August 2012, June 2014 and August 2015. For both the 2012 and 2014 surveys, department staff were joined by Dambimangari Rangers, the traditional owners of this magnificent country in the Kimberley. Parks and Wildlife and Dambimangari Aboriginal Corporation have collaborated on a number of Kimberley island and mainland biodiversity survey projects since the establishment of the KSCS.

Mt Trafalgar is a magnificent escarpment-bounded mountain at the northern coastal end of Prince Regent National Park, just north-east of the entrance to Prince Regent River. This sandstone cap overlies volcanic rocks, and is skirted by rainforest on the steep scree boulder slope at the base of the escarpment. The mountain provides a range of different types of habitat to look at threatened mammal abundance.

Main Prince Regent National Park.

Photo – Adrian Barrett/Parks and Wildlife

This page 1 to 4: 1 Sugar glider. 2 Northern quoll. *Photos – Jiri Lochman* 3 See the magnificent natural values of the Kimberley. *Video – Parks and Wildlife* 4 The only way of reaching the remote Mt Trafalgar is by helicopter. *Photo – Richard Fairman/Parks and Wildlife*



Left The colossal Mt Trafalgar looms out of the Kimberley landscape.

Photo – Adrian Barrett/Parks and Wildlife

Below Golden-backed tree rats were found at Cascade Creek.

Photo – David Bettini

“Given the importance of the area as a refuge for threatened mammals, introduction of a few smaller-scale prescribed fires would help protect the area against large-scale, high intensity damaging bushfires ...”

This part of the park can only be reached by helicopter, and is on a peninsula surrounded by sea or rugged sandstone which, along with active fire management by Parks and Wildlife, has kept this area almost entirely fire-free for eight years. Researchers believe it would be beneficial to maintain small patchy burns in the Trafalgar area (see also ‘Fighting fire with fire’ on page 10). Given the importance of the area as a refuge for threatened mammals, maintenance of a network of small-scale prescribed fires would help protect the area against large-scale, high intensity damaging bushfires in the late dry season that can result from human activities or lightning strikes.

The Cascade Creek survey sites are about 8km north-west of the famous Cascade Falls on Prince Regent River, perched on sandstone ridges and escarpment country above a rainforest-filled valley. Most Cascade Creek survey sites had been burnt earlier in 2015. The fires were patchy, with three of the eight sites (including the rainforest site) remaining unburnt. However, fire intensity ranged from moderate (2–5m scorch height) to high (complete canopy scorch) at the monitoring sites despite

being spatially patchy overall in this rocky landscape.

Despite below-average rainfall in the previous wet season, trap success rates at both sites were high, with the golden-backed tree rat, golden bandicoot, northern quoll (all three of these species are threatened), Kimberley rock rat, scaly-tailed possum and northern brown bandicoot all found at Cascade Creek, and the threatened brush-tailed rabbit-rat also captured at Mt Trafalgar.

There were also large numbers of common rock rats at Cascade and large numbers of pale field rats (*Rattus tunneyi*) at Trafalgar. Although common, these species are important indicators of ecosystem health, so the fact that they are present in high numbers is a good sign.

CANDID CAMERA

Parks and Wildlife researcher Richard Fairman intrepidly climbed down cliffs, up into trees and out into mangroves to set up remote cameras in some additional locations in an attempt to record animals that don’t usually enter traps.

The Kimberley sugar glider, a new animal for the park, was recorded by these cameras. According to the latest research

this is a new species which differs from both the eastern states sugar glider, and even from sugar gliders in the Northern Territory.

There are one or two mammals still missing from the species list within the KSCS monitoring program, most notably the black-footed tree-rat which has not been recorded in the Kimberley since 1987.

While we did not find a black-footed tree rat on this occasion, who knows what else will be uncovered using these camera traps in the future.



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by Lauren Emmerson

School holiday fun

Charlize Herrington and her sister Amberley love *Nearer to Nature* activities they say as they get to explore new places and be outside in nature. They recently went adventure caving at Yanchep National Park as part of the *Nearer to Nature* school holiday program.

"Learning about our environment in a fun way is awesome!" said Charlize. "My absolute favourite *Nearer to Nature* activity is adventure caving! We wore a helmet with a torch and crawled around on our bellies in the dark on the sandy surface of the spooky cave."

Charlize is excited to go camping in a tent for the very first time and hopes to practice some of the bush skills that she learnt in the Big Kids Campout activity, which was held at the Perth Hills Discovery Centre.

Above right See kids in action as part of Parks and Wildlife's *Nearer to Nature* caving adventure at Yanchep National Park.

Video – Parks and Wildlife

Right Charlize and Amberley make a new 'friend'.
Photo – Jeanette Herrington



"My absolute favourite *Nearer to Nature* activity is adventure caving! We wore a helmet with a torch and crawled around on our bellies in the dark on the sandy surface of the spooky cave."
Charlize Herrington

Onslow Bush Rangers lend a hand



"The boat ride across from Onslow was incredible, a picture-perfect day with humpback whales swimming around us!" *Bush Rangers* unit coordinator Joel Yates

The quick-spreading weed kapok on Thevenard Island was the target of an onslaught by Onslow High School *Bush Rangers*. They worked in teams to carefully cut the flowers and seeds off each bush and scoop up already fallen seeds to be bagged and removed from the island.



"The work we did was hard and it was a very hot day but it was for a great cause. Hopefully we have stopped the kapok from spreading any further." Year 8 student Aleesha Woods



Top left Team photo!

Above Unit coordinator Joel with some of the Onslow *Bush Rangers*.

Left Steve from Parks and Wildlife with *Bush Ranger* Mitch.
Photos – Joel Yates, Onslow Primary School

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



Bobtail (*Tiliqua rugosa*)

Four subspecies of bobtails (*Tiliqua rugosa*) occur in Australia of which three occur only in Western Australia. They can be found in a range of habitats and are slow moving so can be often spotted in the bush and when they wander into suburban and rural areas. The colour of the bobtails' scales varies significantly but they are commonly called 'blue-tongued lizards' due to their bright blue tongues. Breeding pairs are known to return to each other year after year and are thought to live for up to 30 years.

Illustration by Gooitzen van der Meer

Reference photo by Matt Swan



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