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Offering new hope to Australia's
threatened wildlife

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In memory of Wayne Lawler, long-term photographer for Australian Wildlife Conservancy. You can view a gallery of Wayne's iconic images here



For references see online articles
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Cover image:
The critically endangered Yaminon or Northern Hairy-nosed Wombat. Warren Clarke

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The mission of Australian Wildlife Conservancy (AWC) is the effective conservation of all Australian animal species and the habitats in which they live.

To achieve this mission our actions are focused on:

- Establishing a network of sanctuaries which protect threatened wildlife and ecosystems. AWC now owns, manages or works in partnership across more than 6.5 million hectares (16.1 million acres).
- Implementing practical, on-ground conservation programs to protect wildlife. These programs include feral animal control, fire management, weed eradication and the translocation of threatened species.
- Conducting (either alone or in collaboration with other organisations) scientific research that will help address the key threats to our native wildlife.
- Hosting visitor programs at our sanctuaries for the purposes of education and promoting awareness about the plight of Australia's wildlife.

About AWC

AWC is an independent, not-for-profit organisation with its head office in Perth, Western Australia. Donations to AWC are tax deductible.

Over the last 10 years, around 86 per cent of AWC's total expenditure was incurred on conservation programs, including land acquisition, while only 14 per cent was allocated to development (fundraising) and administration combined.



CEO MESSAGE

The call to action to address Australia's extinction crisis has never been louder. AWC is responding by scaling up our conservation efforts, investing in science, innovating and establishing new collaborative partnerships to better protect Australia's unique biodiversity.

For two of Australia's most endangered mammals, partnerships offer a beacon of hope, which is why I am also pleased to announce a new collaboration with the Queensland Department of Environment and Science to protect the critically endangered Northern Hairy-nosed Wombat, of which just 315 individuals survive in the wild. Additionally, AWC is collaborating with Western Yalanji Aboriginal Corporation and Queensland Parks and Wildlife Service to monitor one of only two remaining populations of Northern Bettong.

This is an important year for AWC, not only because of these additional collaborations and impressive achievements accomplished by the team. This year AWC is celebrating thirty years of effective conservation – August 2021 marked three decades since AWC Founder, Martin Copley AM, purchased Karakamia Wildlife Sanctuary. Highlights that spring to mind during my tenure at AWC include constructing the feral predator-proof fence at Mt Gibson in Western Australia's Wheatbelt, witnessing the vast wilderness of Kalamurina on the northern shores of Kati Thanda–Lake Eyre, and the pristine coastline of Pungalina–Seven Emu in the remote Gulf of Carpentaria. It's a privilege to be part of the AWC story and I feel very proud to announce AWC's anniversary book in this edition of Wildlife Matters.

Looking to the future, AWC is sharpening its focus, refining our model and using every tool at our disposal to generate better outcomes for Australia's biodiversity.

We are actively pursuing exciting new partnerships in the pastoral sector and I look forward to reporting more on this very soon. In addition, we are exploring alternative finance models to support our conservation efforts, such as biodiversity impact bonds, impact investing and biodiversity credit schemes. Technological innovations provide opportunities to gain efficiencies in the field. Crucially, AWC's investment in science continues to inform our approach, enabling us to deliver dividends for biodiversity and to influence legislative and regulatory reforms for conservation.

Of course, AWC's past and future achievements are only made possible with the help, commitment and dedication of our supporters, staff, volunteers and partners. I hope you feel as proud of AWC – and as inspired about the future – as I do.

On behalf of the AWC team across the country, best wishes for the festive season and thank you for your generous support.

Tim Allard
Chief Executive

PS: If you are looking for a gift idea that offers hope – and will arrive on time this Christmas – please consider making an online donation to AWC and sending a personalised eCard to a friend or loved one.



New lifeline for critically endangered Northern Hairy-nosed Wombat

Joey Clarke, Senior Science Communicator

Considering the gloomy state of the world in 2021, burrowing into the ground might seem like an appealing option. After all, for animals as diverse as pardalotes and polar bears, burrows provide a safe refuge from external threats, a stable environment where they can raise their families, and a base from which to make forays into the wider world. Australia's largest burrowing animal is called *Yaminon*, the Northern Hairy-Nosed Wombat (*Lasiorhinus krefftii*), and it needs all the safe refuge it can get. The wild population of this critically endangered species numbers about 315 individuals. Australian Wildlife Conservancy will be joining the efforts of Queensland Department of Environment and Science (DES) to help save this remarkable burrowing marsupial.

Australia has three species of wombat: the Common Wombat or Bare-nosed Wombat (*Vombatus ursinus*) which is the familiar species found throughout the Granite Belt in southern Queensland, eastern NSW, Victoria and Tasmania; the Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*), the smallest species, found in semi-arid country from the Nullarbor Plain in Western Australia and patchily through southern South Australia (including at AWC's Yookamurra and Dakalanta Wildlife Sanctuaries); and the rare Northern Hairy-nosed Wombat. At the time of European colonisation, the northern species was recorded in the Brigalow Belt of central and southern Queensland, from near Clermont to around St George, with a separate population in the NSW Riverina.

Northern Hairy-nosed Wombats have a distinctive appearance with a broad nose, pointy ears, soft greyish fur and faint black eye patches a bit like a panda. A metre long and weighing up to 30 kilograms, they are serious earthmovers: one mapped burrow system included over 90 metres of tunnel and six entrances. They can live to at least 30 years, spending most of their time underground and emerging at night to feed on grasses and sedges. The only recorded Indigenous name for the wombat is 'Yaminon,' a word originating in the district around St George in southern Queensland.

The species has not fared well over the past 200 years. Early pastoralists cleared vast tracts of their preferred open eucalypt woodland habitat for grazing, and the

wombats also faced competition with livestock and rabbits, as well as direct persecution – in 1884, more than a thousand were shot on a single property. By the 1980s just one population clung to survival in an island of remnant bush at Epping Forest National Park. When numbers dropped to just 35 individuals, the Queensland Parks and Wildlife Service intervened, and a dedicated program to protect the Epping Forest wombats has been in place ever since. The population has steadily recovered, aided by a 20-kilometre fence excluding Dingoes and wild dogs from the park, constructed by DES in 2002.

In 2009 a second colony was established at Richard Underwood Nature Refuge near the town of St George in southern Queensland in a bid to reduce the risk of fire, flood and/or disease from wiping out the last remaining population. Covering 130 hectares, the refuge is leased by the Queensland Government from private landholders and is currently managed through a volunteer program. It is surrounded by a fence which excludes Dingoes and wild dogs and deters foxes and cats. Successful breeding over the past few years means there are now 15 wombats at the site. The Queensland Government, AWC Chief Executive, Tim Allard, and Chief Scientist, Dr John Kanowski, visited the Richard Underwood Nature Refuge in May this year.

Now the Queensland Government has invited AWC to join the Recovery Team and to partner to help conserve the species by working on conservation efforts at the established population sites and helping to scope out further sites for reintroduction. With the involvement of AWC expertise, the Queensland Government hopes to establish a population at a third site in coming years. To secure the long-term future of the species, AWC is also exploring opportunities to create a further suitable site for the Northern Hairy-nosed Wombat in NSW or Queensland.

Partnering to help manage one of Australia's most highly threatened species is a unique privilege. AWC is proud to be involved and to work alongside DES on this critical conservation project to save the Northern Hairy-nosed Wombat from extinction.



AWC is partnering with the Queensland Government to help conserve the critically endangered Yaminon or Northern Hairy-nosed Wombat. Queensland Government

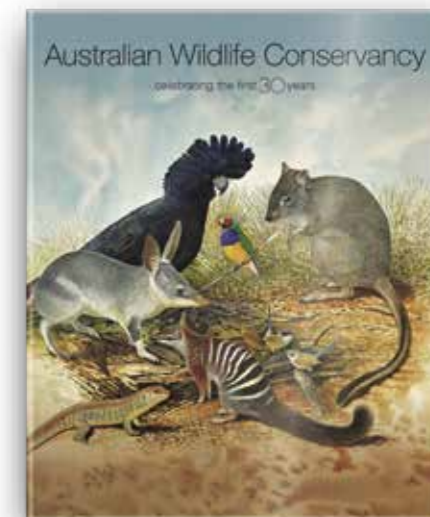
Inset: Yaminon mother and joey. Queensland Government



Today AWC's reserves ... are looked after by teams of Australians who on occasion have to endure extremely harsh conditions. Sometimes they have to deal with very real dangers from fire, from predators and from many other crises. But they have shown us all, repeatedly and dramatically, that if we take care of nature, nature will take care of us. Long may AWC flourish!

Sir David Attenborough, Foreword

The iconic Fitzroy Bluff at Mornington Wildlife Sanctuary in the Kimberley. *Wayne Lawler/AWC*



Australian Wildlife Conservancy: celebrating the first thirty years

Dr Hannah Sheppard Brennand, AWC Writer and book Editor

Australia is home to some of the most unique wildlife in the world, from the improbable Bilby with its enormous ears, to the Purple-crowned Fairywren with its loyal partnerships, to the highly social Great Desert Skink. But this wildlife is in crisis. In just over two centuries, over 100 plant and animal species have become extinct and every year Australia's threatened species list continues to grow. AWC's mission is to turn back this decline – to effectively conserve all Australian animal species and the habitats in which they live.

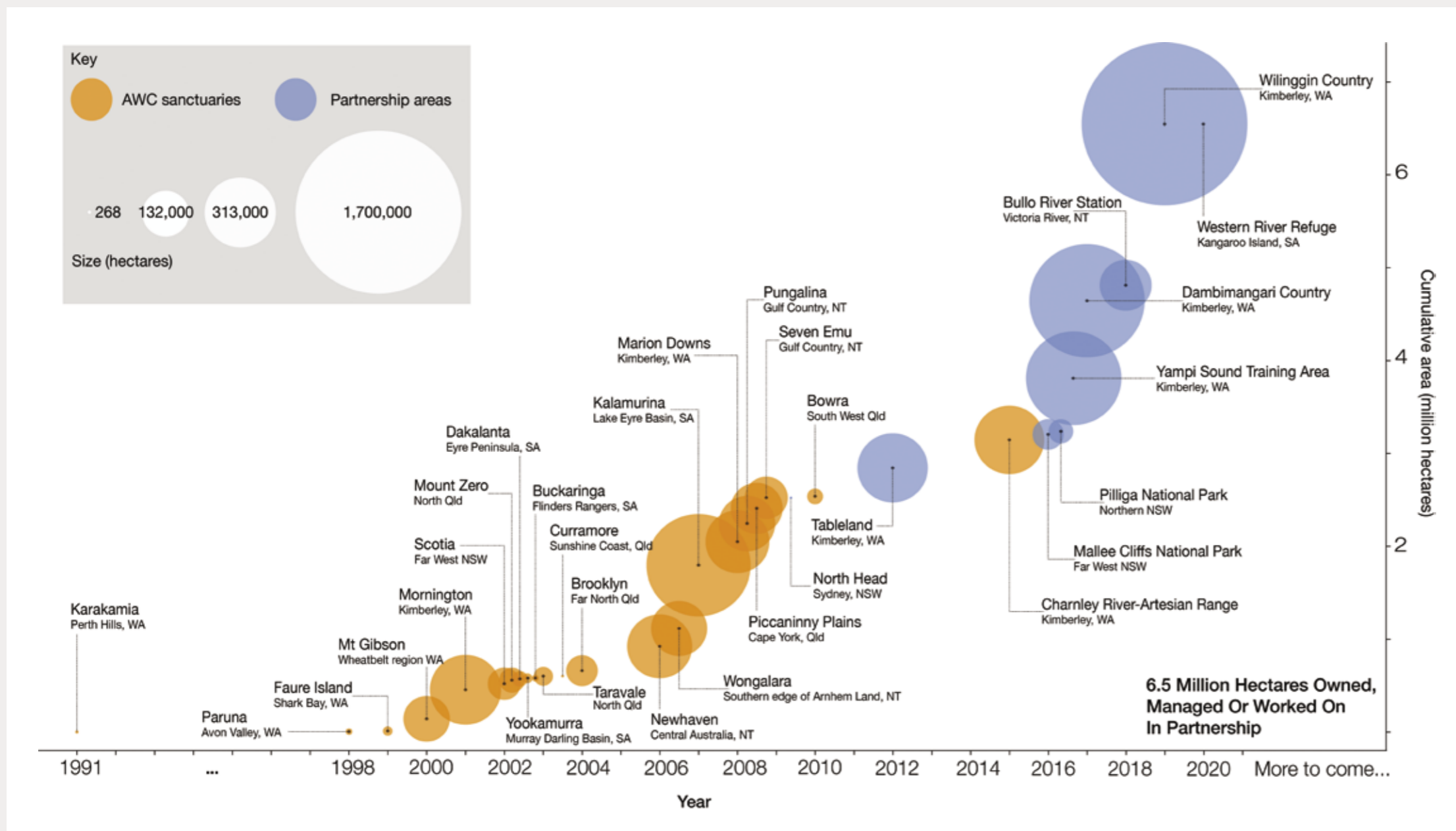
The story of AWC began on 2 August, 1991, when AWC Founder Martin Copley AM purchased Karakamia Wildlife Sanctuary in Western Australia. Through the incredible dedication of scientists, land managers, office staff, supporters, volunteers and conservation partners, thirty years later AWC is one of the largest private owners of land for conservation in Australia and works alone or in partnership from the Kimberley to Cape York and from the Coral Coast to the Eyre Peninsula and Sunshine Coast.

To commemorate this major milestone – three decades of effective conservation – AWC is releasing a special book. Featuring 40 stories from over 60 authors, including Professors Tim Flannery, Sarah Legge, Thomas Lovejoy, John Woinarski and many others, this book gives evidence of the commitment and passion of all those involved with the organisation, both past and present.

AWC's 30th anniversary book will be available in early 2022.



Register to be among the first to know when the book is available.



Page 11: The book cover features a special illustration – *An Unexpected Gathering* by Peter Schouten AM – created especially for AWC. The artwork features seven species important to AWC’s story. *Julie Slavin*

Top: An endangered Mala. AWC has reintroduced the species to Newhaven Wildlife Sanctuary. *Wayne Lawler/AWC*

Left: Starting with only 268 hectares in 1991, through land acquisition and partnerships AWC continues to scale up conservation across Australia.

Here is a sneak peek into the book’s pages.

Building a New Model for Conservation
Atticus Fleming, Inaugural AWC CEO (2002-2018)

In November 2001, while still based in Canberra, I called Martin Copley about a job. Tim Flannery had told me about this English businessman who was passionate about saving Australia’s endangered mammals (to be fair, Tim may have described it as an obsession). Martin’s passion had driven him to set up a non-profit conservation organisation, and he was now on the lookout for its first chief executive.

To those who knew him well, it will come as no surprise that Martin was on the tennis court when I called. We spoke for a while about wildlife and business and some of his frustrations with government. This phone call spurred me to travel over to Perth, where what started as a job interview rapidly turned into a strategy session in which we mapped out the next steps in building a non-profit model for conservation that could help turn back the tide of extinctions.

That night I visited Karakamia, and marvelled at what Martin and his small team had achieved already. Entering the property was like stepping back in time – as the sun set, the fox- and cat-free woodlands came alive with Woylies, Quenda and other small mammals. I recall thinking, ‘This is what the Australian bush should be like.’

Newhaven Wildlife Sanctuary: It takes a community
Danae Moore, AWC National Science Team member; Josef Schofield, AWC Regional Operations Manager

It’s hard to explain in words the feeling we had when the first Mala, or Rufous Hare-wallaby, was released into its new home at Newhaven. A moment in time. A little creature seen in the soft dusty torchlight, nose twitching as it tentatively glanced around, before bounding into the blackness of the spinifex at night. All the years of dedicated relentless work, the wins, the losses and learnings, the commitment we’d all made to each other and to this special bit of country. Such a simple and natural moment, yet loaded with so many layers of meaning and emotion.

The Mala is one of Australia’s most endangered mammals. Once widespread across central and western Australia, there are now no naturally occurring wild populations on mainland Australia. The Mala was once particularly abundant in central Australia, including in the region around Newhaven. By the 1950s, however, its range had contracted as a result of wildfire and feral predators to a small population in the Tanami Desert. For Ngalia Warlpiri people there are many important connections between Mala and the Newhaven region.

Recovery After Fire: caring for people, place and the Kangaroo Island Dunnart

Dr Eridani Mulder, AWC Senior Wildlife Ecologist

Over the years I’ve managed to visit almost every AWC sanctuary and partnership site (except for Dakalanta and Yampi Sound Training Area—still!), with many wondrous, challenging and downright amusing situations, including putting Northern Quolls in temporary detention to prevent trap saturation. The organisation has fostered a collective can-do mindset, tethered by the common

goal of conserving Australia’s plants and animals and the habitats in which they live. We care about wildlife and wild places, and I am grateful to be able to witness people demonstrating that care every day. It has never been just a job, but always a rare privilege and an inordinate adventure.

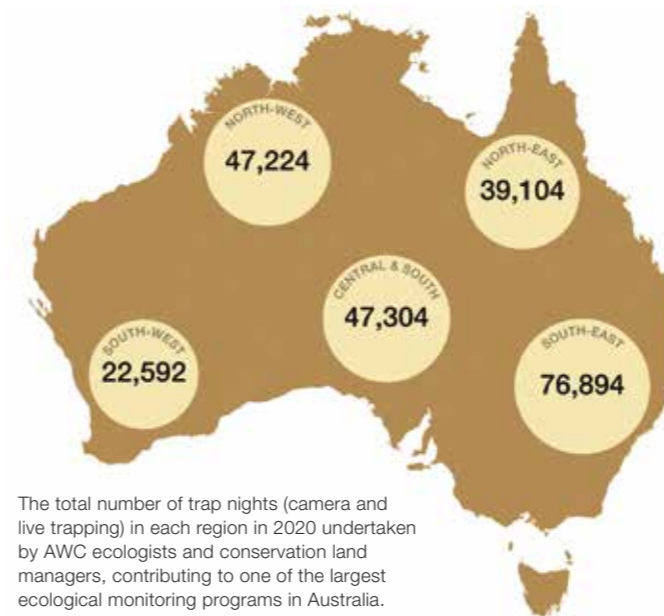
AWC’s Mission: A legacy for the future
Tim Allard, AWC Chief Executive

Ultimately, conservation is nothing without people. Our excellence is the excellence of a team of committed people: from our ecologists and land managers living and working in often challenging conditions, to those who work in the back office making sure the business of AWC operates efficiently. From our volunteers who are incredibly generous with their time, to our supporters who enable AWC to deliver conservation action. And from our Science Advisory Network to our board, whose knowledge and experience forge our path. It truly requires a family unit to deliver the success that we have had at AWC over the past thirty years, and the AWC family will continue to deliver and leave an effective and inspiring legacy for many decades to come.



Measuring what counts: taking an outcomes-focused approach to conservation

Dr Catherine Hayes, Wildlife Ecologist
Mareshell Wauchope, Senior Field Ecologist
Dr Liana Joseph, National Science Manager
Dr John Kanowski, Chief Science Officer



The total number of trap nights (camera and live trapping) in each region in 2020 undertaken by AWC ecologists and conservation land managers, contributing to one of the largest ecological monitoring programs in Australia.

Tracking the status of focal species

A particular focus of the Ecohealth Program involves threatened species. Indicator species include animals and plants, both cryptic (e.g., the Cobar Greenhood Orchid) and 'common' (e.g., the Woylie), from a range of guilds including herbivores (e.g., Sharman's Rock-wallaby) and predators (e.g., Northern Quoll).

One threatened species monitored across multiple AWC properties is the threatened Malleefowl, an ecosystem engineer that shifts large volumes of soil and leaf litter when constructing its breeding mounds. In south-west NSW, in partnership with the NSW Department of Planning Industry and Environment, AWC is managing a project funded by the NSW Government's *Saving our Species* program to map Malleefowl mounds using aircraft-mounted LiDAR (laser beams). These mapped 'mounds' are then ground-truthed by AWC ecologists. During the latest Ecohealth surveys, 123 verified mounds were surveyed on Mallee Cliffs National Park. Of these, seven mounds were active, five of which were inside the fenced feral predator-free area – the highest number of active mounds in a decade. At Scotia, surveys of historical and new LiDAR-identified sites revealed 12 active mounds, eight of which are inside the fenced area – the highest number to date. Malleefowl are also monitored at Mt Gibson and Yookamurra Wildlife Sanctuaries. Data from these surveys highlight the value of fenced areas for Malleefowl and other ground-active birds vulnerable to introduced predators.

Tracking faunal assemblages

The Ecohealth Program extends to surveillance monitoring of broad faunal groups. Small to medium-sized mammals, a group particularly vulnerable to introduced predators, are a focus of Ecohealth surveys across all AWC's properties. Survey techniques vary with the target guild and logistical factors such as substrate. Pitfall traps (i.e., in-ground buckets) and/or box trapping are widely used, both resource-intensive survey methods, while camera traps are relied on for hard-to-reach (or 'hard-to-dig') locations such as remote rocky outcrops. Tracking mammal populations through time allows us to understand the status of the wildlife on the properties we manage and provides important insights into their ecology, their response to weather conditions and the impacts of AWC's management activities.

AWC's Ecohealth Program 2020

The results are in for the AWC Ecohealth Program 2020! Every year, we undertake a large monitoring program, known as 'Ecohealth', to assess the status of wildlife and threats across AWC's sanctuaries and partnership sites. You can read more about Ecohealth in earlier editions of *Wildlife Matters* (in editions 37 and 41). In brief, the program involves targeted surveys of focal species, surveillance monitoring of animal assemblages (e.g., small mammals, reptiles, birds), studies of vegetation and ecological processes and the monitoring of key threats.

The Ecohealth Program is a major component of AWC's Science Program involving a huge investment in planning, field work, data management, statistical analysis and report writing. The field work component is particularly impressive with AWC's ecologists, interns and volunteers spending many days and nights in remote locations across the continent. In 2020, the Ecohealth Program consisted of 136 surveys across 26 properties, the total effort exceeding 230,000 trap nights (camera and live trapping) and 1,400 bird surveys, amongst other work. As an example, surveys at Buckaringa Wildlife Sanctuary in 2020 comprised 2,160 live trap nights (for small-medium mammals and reptiles), 43 kilometres of survey transects for large herbivores, 62 kilometres of survey transects for feral predators and 54 bird surveys.



At Bowra Wildlife Sanctuary, in south-west Queensland, surveys have documented a steadily increasing richness of small mammals. Over this period, AWC has greatly reduced grazing pressure on the sanctuary, with sustained control of feral animals and fence repairs to contain wandering stock. Rainfall also improved in 2020, after three years of drought. Both climate and land management are likely to have contributed to the recovery of small mammals on the property.

Tracking the status of threats

AWC also monitors fire regimes, introduced species and other threats to wildlife and their habitats. In relation to fire, we are particularly concerned about the incidence and extent of wildfires. In northern Australia, fire management strategies include prescribed burning (typically in the early dry season) and where feasible, the suppression of wildfires. On some properties, 'storm burns' (i.e., fires lit after the first rains) are used to manage woody thickening. On one of our northern properties, Piccaninny Plains Wildlife Sanctuary in Far North Queensland, results for 2020 show all key fire metrics have improved since AWC management. In the decade to 2009, on average 76 per cent of the property was burnt annually, mostly by 'hot' fires in the late dry season. In contrast, by 2020, just 44 per cent of the property was burnt, mostly by 'cooler' prescribed fires. This changed fire regime has helped retain ground cover and protect fire-sensitive habitats on the property.

Going forward

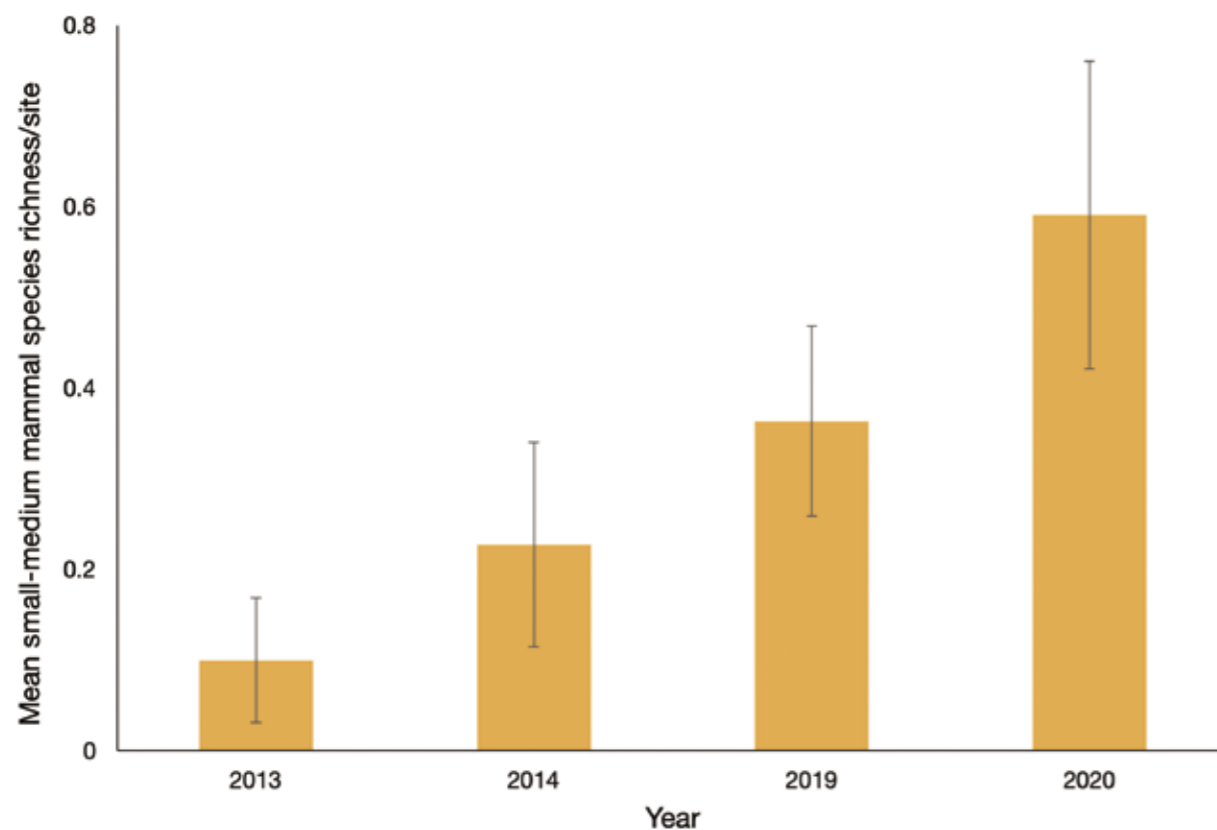
AWC's large investment in ecological field work enables us to understand the status of the wildlife we conserve and threats we manage. Without these data, we would have little idea of the successes or failures in conserving wildlife on our properties. Quite simply, these data – together with our research program – enable us to measure the ecological 'return' on our investment in conservation and determine whether our actions are effectively restoring and protecting Australia's precious natural values.

We continue to refine the program, using new technology when available. In 2020, for example, we conducted a census of Southern Hairy-nosed Wombats at Yookamurra Wildlife Sanctuary (using Google Earth technology) for the first time. Over the last decade, AWC's field work has become highly reliant on the use of remote cameras and we are increasingly incorporating acoustic monitors into our surveys of birds, frogs, bats and other vocalising mammals. We continue to incorporate advances in applied statistical analysis in our evaluation of monitoring data and we are working at better communicating the results of our surveys. These developments are all intended to help us robustly address the fundamental question relevant to AWC's mission: 'how well are we conserving Australia's animal species and the habitats in which they live?'

Recent Ecohealth data demonstrates how strongly small-medium mammal assemblages across Australia respond to drought and flooding rain. In the Kimberley, for example, small mammal populations declined through the severe drought of 2018–2019, with a modest recovery following a return to average conditions in 2020. At Charnley River–Artesian Range Wildlife Sanctuary small mammal abundance dropped from around five individuals to one per 100 trap nights from 2016 to 2019; while species richness fell from 1.4 to 0.6 species per site on average in that period. Both metrics improved slightly in 2020, mainly due to more mammal captures in riparian habitats, a vital refuge in dry conditions.

At AWC's Mornington Wildlife Sanctuary, monitoring has revealed several 'boom and bust' cycles of small mammals since 2004. Importantly, monitoring has shown small mammal numbers are consistently higher in destocked than grazed areas, providing support for AWC's feral herbivore management program.

Across the Kimberley, following an exceptional wet season at the start of 2021, preliminary results from current field work indicate a substantial recovery in small mammal populations. This information will be reported in AWC's 2021 Ecohealth data.



Images

Top: AWC Senior Field Ecologist Felicity L'Hotellier deploys a camera trap at Mount Zero-Taravale Wildlife Sanctuary. Brad Leue/AWC

Figure: At Bowra Wildlife Sanctuary, the average number (\pm standard error) of small-medium mammal species per site is steadily increasing, likely due to a combination of climate and the effectiveness of AWC's conservation land management efforts. These surveys are planned for every 3-5 years.



A Northern Masked Owl branchling. Patrick Webster/UQ

Strategic research key to conservation success

Dr John Kanowski, Chief Science Officer

AWC's model for effective conservation is founded on an evidence-based framework – using research to inform and refine our conservation actions. Collaboration is important to AWC's Science Program, both for data and knowledge sharing and for improving conservation practices. AWC staff work with researchers, students, volunteers, universities, and other conservation organisations, and have published, collaborated on or hosted more than 350 research projects across a spectrum of conservation issues. More than 400 peer reviewed journal articles, books and book chapters have been published by AWC scientists and collaborators working on AWC properties. Here we highlight a few of the projects currently underway.

1. **Examining ecosystem interactions:** The impacts of introduced predators, feral herbivores and altered fire regimes are driving significant declines of Australia's small to medium-sized mammals. Managing these threats and reintroducing locally extinct species within their former range are critical steps for ensuring the future of this country's wildlife. AWC's reintroduction program provides scientists with the opportunity to examine the effects of reintroduced species on the habitats in which they live.

a) **Effects of reintroductions on vegetation:** *How does vegetation change after the reintroduction of locally extinct species?* AWC scientists, led by Jeanette Kemp and Rigel Jensen, are monitoring changes in vegetation associated with reintroductions at Karakamia, Mt Gibson, Mount Zero–Taravale, Newhaven, Scotia and Yookamurra Wildlife Sanctuaries, on Faure Island, and at Mallee

Cliffs and Pilliga National Parks. Research released this year supports the assertion that small to medium-sized Australian mammals such as Bilbies (*Macrotis lagotis*) and Burrowing Bettongs (*Bettongia lesueur*) strongly influence the structure and composition of vegetation in the ecosystems of which they are a part (Kemp et al. 2021).

b) **Effects of reintroductions on soil and invertebrates:** *Does reintroducing locally extinct digging mammals impact soil functions such as nutrient cycling and water maintenance? What are the impacts of these reintroduced mammals on their invertebrate prey?* Researchers from La Trobe University led by Dr Heloise Gibb are investigating these complex questions with assistance from AWC and hosted on AWC sanctuaries. Published findings indicate that mammal reintroductions can mitigate decline in soil function, particularly in arid Australia (Decker et al. 2019). These mammals also affect invertebrate abundance and composition where they are reintroduced (Gibb et al. 2021), highlighting the multitude of factors to be considered during reintroductions including the carrying capacity of safe havens and managing population growth.

2. **Feral Predator Ecology Project:** At Mt Gibson Wildlife Sanctuary, AWC is developing strategies to effectively manage cats and foxes in open (unfenced) landscapes. In 2020, aerial baiting was conducted over a 20,000-hectare treatment area and, in 2021, over an 80,000-hectare treatment area. Targeted cat trapping was undertaken in 2020 and 2021 as well as ground baiting to complement the aerial baiting. Control

activities took place in winter to maximise bait longevity and reduce uptake by non-target species. Preliminary results from camera traps in the treatment area in 2020 indicate a decline in cat activity after baiting, followed by a slight increase in activity and the reverse in a comparison site. This research is vital for AWC's plans to reintroduce locally extinct species outside the fence at Mt Gibson, starting with the Brushtail Possum (*Trichosurus vulpecula*) which was reintroduced in 2021, and progressing to the Chuditch (Western Quoll, *Dasyurus geoffroii*) in coming years. Cat and fox control should also help protect extant wildlife.

3. **The Australian Acoustic Observatory (A2O) – the world's first continental-scale terrestrial acoustic observatory:** Hundreds of solar-powered acoustic sensors are being deployed across the country for a five-year period, providing an open access database of continuous acoustic recordings across different ecosystems (Roe et al. 2021). The A2O is collecting big data that can be used for biodiversity inventory and monitoring, and for measuring response to environmental perturbations such as floods and fire.

The project is led by Dr Paul Roe from the Queensland University of Technology Ecoacoustics Research Group and involves collaboration with Birdlife Australia, multiple universities, National Parks and government bodies, TERN, Traditional Owners, landholders and private conservation organisations including AWC. The sites have been chosen to cover a wide range of habitat types, natural and agricultural areas, and riverine and dry areas. AWC is a major contributor to this collaborative monitoring effort, hosting, maintaining and uploading data from recorders on Piccaninny

Plains, Wongalara, Newhaven, Bowra, Kalamurina and Pungalina–Seven Emu Wildlife Sanctuaries and Bullo River Station.

4. **Detecting the elusive Northern Masked Owl:** Nigel Jackett, a PhD student from the University of Queensland, is undertaking research to improve conservation of the Northern Masked Owl (*Tyto novaehollandiae kimberli*), a rarely seen, threatened species known to or likely to occur on at least nine AWC sanctuaries and partnership areas across northern Australia. This project aims to optimise detection techniques using arrays of remote sound recorders (the owls' screeching call is an unmistakable sound), reveal the secrets of the owls' diet, determine habitat and landscape use and examine the impacts of fire and feral herbivores on the nocturnal hunter. With the assistance of AWC ecologists, this research is being carried out at Piccaninny Plains, Brooklyn, Mount Zero–Taravale, Pungalina–Seven Emu, Mornington–Marion Downs and Charnley River–Artesian Range Wildlife Sanctuaries, on Dambimangari Country and at Yampi Sound Training Area.

5. **AWC and planetary science – Desert Fireball Network:** Very occasionally, AWC hosts research that is unrelated to conservation, but nevertheless good for science. A network of more than 50 digital observatories monitor one third of Australia's night sky every night, capturing the path of meteorites and fireballs. Led by Curtin University's Space Science and Technology Centre, this research is looking to answer questions on the formation of the solar system. AWC's Kalamurina Wildlife Sanctuary hosts one of the autonomous digital observatories, leading to the recovery of at least six meteorites including the Murrili meteorite that fell on Kati Thanda–Lake Eyre (Sansom et al. 2020).



AWC Botanist Rigel Jensen and Vegetation Ecologist Jeanette Kemp undertake vegetation monitoring. Wayne Lawler/AWC



Managing fire in the boom-bust environment of Central Australia

Josef Schofield, Regional Operations Manager
Danae Moore, National Science Team member
Henry Brink, Newhaven Sanctuary Manager
Joey Clarke, Senior Science Communicator

It's a late afternoon in August at AWC's Newhaven Wildlife Sanctuary in Central Australia, and a light easterly breeze provides perfect conditions for burning. Clumps of spinifex crackle gently as they are ignited by a handheld drip torch along the edge of a sandy track, grasshoppers jumping ahead of the flames.

Fire in a boom and bust landscape

In Central Australia, dramatic cycles of boom and bust are driven by patterns in rainfall over long periods of time. The tempo in the desert is slower and less regular than the annual wet season that dominates in the tropical savanna up north. Here, a series of dry years (sometimes stretching more than a decade) is interrupted at intervals by years of dramatically higher rainfall, triggering a flush of new growth that ripples up the food chain. Insects multiply, burrowing frogs emerge from underground, Woodswallows and Budgerigars form huge, wheeling flocks. Water birds arrive to feed in the ephemeral lakes that appear, and the number of small mammals in our traps can increase by orders of magnitude.

Fire follows the same boom and bust pattern, with wetter years usually followed by years of widespread fire. The part of Central Australia around Newhaven – on Ngalia-Warlpiri and Luritja Country – was subject to a traditional Aboriginal fire management regime until the 1930s; a tight mosaic of numerous, mostly small-scale burns lit deliberately for a range of purposes. Fire is still a big part of life in the desert, but the displacement and disruption of European colonisation caused fire regimes to change. Following periods of above average rainfall, fire now sweeps across large areas of Central Australia, removing vegetation cover and food resources over vast areas and razing fire-sensitive vegetation communities. This changed fire regime is ecologically damaging, and compounds the threat posed by introduced predators to native animal species.

Objectives and planning

At Newhaven, the goal of AWC's fire management is to re-establish appropriate fire regimes that conserve species and ecosystems, and that restore ecological processes. It's a formidable job. AWC's small field-based team is tasked with managing the 262,000-hectare

sanctuary in a landscape that is highly flammable, while taking into account the needs of different vegetation types, the vagaries of climate from year to year, and the legacy of complex, multi-year fire histories. To succeed in meeting its objectives, our program of prescribed burning must be led by strategic planning, informed by science, mapping and years of experience on the ground.

A lot of work goes into developing a detailed plan for prescribed burning activities each year. By analysing satellite imagery going back three decades, we're able to compile fire history maps which show the age of vegetation across different parts of the sanctuary. In spinifex-dominated vegetation communities, targets have been set for the proportion or area that should fall within particular age brackets (e.g., 3-10 years since last burnt, and so on). Critically, using fire history maps we can work out where to burn to break up larger, homogeneous patches into smaller areas of differently aged vegetation. Over the 2020–2021 summer, Newhaven recorded 300mm of rain, which set up good conditions to carry out planned burns later in the year.

Applying fire to support a rewilding project

A particular focus for the 2021 prescribed burning program is Newhaven's feral predator-free fenced area. At 9,450 hectares, it is the second largest safe-haven project on mainland Australia and is now home to a growing reintroduced population of Mala, as well as Red-tailed Phascogales and Brush-tailed Bettongs or Pututjurrus, released in August. All are nationally threatened species, and at least eight other species are slated for reintroduction to the site. AWC is working to establish and maintain a fine-scale mosaic of vegetation of different ages within the reintroduction area, firstly to minimise the risk of any large-scale unplanned fires and secondly to increase the diversity of available habitat and resources for reintroduced mammals.

Careful fire management at Newhaven over the past 12 years has achieved great results – protecting fire-sensitive stands of mulga woodland and desert oaks, establishing a finer-scale mosaic of spinifex, and improving habitat for threatened wildlife. Thoughtfully applied, fire is an essential and positive part of conservation land management in Central Australia.

Securing the future: the genetics of reintroductions

Dr Jennifer Pierson, Senior Ecologist



What do you think of when you hear the word biodiversity? For most of us, we see biological communities full of different plants and animals, areas teeming with life. But we often forget about the building blocks of that vision of biodiversity – the genes behind the scenes of life.

Genetic diversity is the foundation of all biodiversity. Evolution has led to the incredible diversity of species and communities we have here in Australia, so many of which can be found nowhere else on the planet. Evolution is a genetic process, whereby four main mechanisms drive patterns of diversity: 1) **Mutation** – random mistakes that lead to new genes; 2) **Drift** – random changes in gene frequencies due to chance; 3) **Migration** – the movement of genes through dispersal followed by mating; 4) **Selection** – the differential survival and reproductive output of individuals based on heritable traits (i.e., genotypes or gene complexes).

AWC's mission to reverse the biodiversity decline in Australia includes actions to conserve and manage the precious genetic diversity that remains. Many of Australia's threatened species, such as the Bilby, Woylie and Mala once occupied vast areas of the continent in considerable numbers. Large populations are reservoirs for genetic variation and species whose ranges extend across varied environments have different frequencies of genes. These differences are of benefit under varied conditions and increase the capacity of a species to adapt to environmental change.

Australia's diminishing diversity

The massive declines in population numbers, combined with the fragmentation of remaining habitats has disrupted evolutionary processes such as migration and has resulted in dramatic declines in the genetic diversity in many species.

Small populations continue to lose diversity much more quickly than large populations, due to the influence of genetic drift, where random changes in gene frequencies occur due to chance. Small populations are also more at risk from what is called inbreeding depression, or lower survival and reproductive rates due to the expression of rare deleterious alleles (genes). If genetic diversity is not managed in these small populations, even as they grow larger due to restoration efforts, the adaptive capacity, or ability for selection to drive genetic variation, is limited as selective forces can only act on the genetic variation present.

Managing population genetics

AWC is managing the genetic diversity of reintroduced populations closely. There are a number of actions AWC scientists undertake to give reintroduced species the best chance at recovery. Firstly, when new populations are founded, we ensure the number of individuals used to start the population is large enough to avoid negative outcomes such as inbreeding depression. The tricky part of genetic management is that not all founders are lucky

enough to reproduce and without mating genes are not shared and passed on. So, we need to make sure we have more founders than simply the minimum needed to avoid inbreeding. The other aspect is making sure individuals are not too genetically similar, as even large numbers of individuals that are genetically very similar can lead to negative fitness consequences.

Secondly, we aim to create a 'genetic mix' of remaining genetic diversity and maximise the genetic variation of these newly established populations. This provides insurance for conserving the valuable diversity left in a species and provides the basis for populations to adapt to varying environmental conditions. Australia's ecosystems are known for their extremes and climate change will likely exacerbate conditions. As such, having the maximum diversity possible gives species a fighting chance to adapt to the uncertain future conditions they may face.

Achieving better outcomes through collaboration

In order to achieve the best outcomes, AWC has partnered with the Australasian Wildlife Genomics Group (AWGG) at the University of Sydney to obtain high quality genetic data using the newest sequencing technologies. For example, AWC scientists established a Red-tailed Phascogale captive breeding program to support our recent reintroduction to Newhaven and planned reintroduction for Mallee Cliffs. AWC worked closely with AWGG, along with Alice Springs Desert Park and Zoos South Australia to optimise the genetic mix of the founder populations. Wild populations were targeted to source the founder individuals and the field team were able to get genetic data quickly to determine whether the captive population genetic mixing worked and identify where to target in the second round of sampling for more wild founders.

Woylies provide another great example of the benefits of working in close collaboration with AWGG to achieve the best genetic outcomes. When Woylies were reintroduced to Mt Gibson, three different source populations were used to try to attain a good genetic mix representing diversity from different areas. Recent genetic analysis has shown that Mt Gibson has no genetic inbreeding, and good levels of diversity. This meant we could test how well a genetically mixed population could serve as a single source population. Woylies from Mt Gibson were translocated to Newhaven in early August 2021 and small tissue samples were sent directly to AWC's university partners for genetic analysis. The results will dictate whether the new Newhaven population will need to be supplemented or if our 'lucky dip' of Woylies from Mt Gibson provided a sufficient amount of initial diversity.

These are just a few of the examples of AWC's commitment to conserving and managing the genetic diversity of Australia's threatened wildlife. In the end, it is all connected. Wherever an animal goes, it takes its genes with it...

A National Strategy for Weeds

Dr Richard Seaton, Senior Ecologist and National Science Team member
Dr John Kanowski, Chief Science Officer

Australia supports over half a million species of plants, animals, fungi and other organisms. Reflecting our long isolation as an island continent, the great majority of these species are found nowhere else in the world. Nevertheless, in ancient times, a number of species successfully made the journey to Australia and established here. However, the pace of introductions from overseas stepped up dramatically with European colonisation, as a result of deliberate and inadvertent importation of exotic species to Australia.

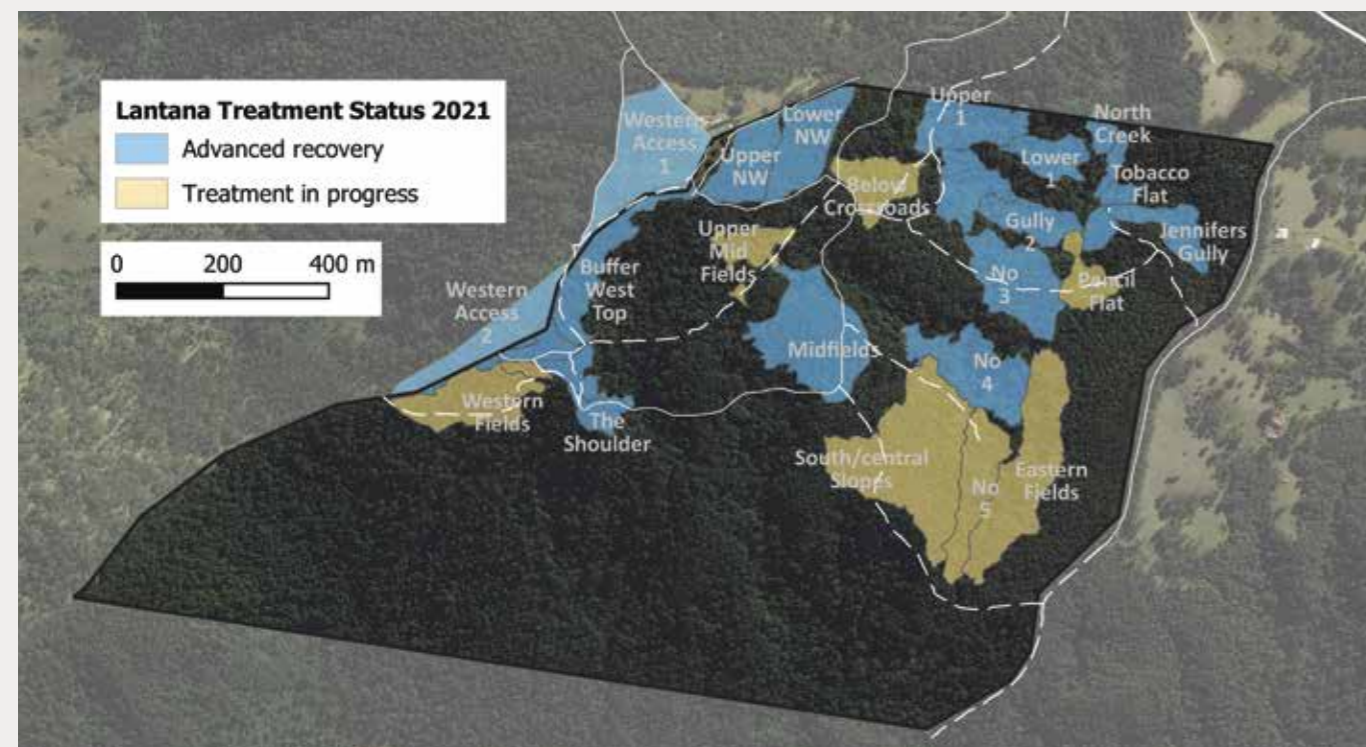
An estimated 30,000 plant species have now been introduced to the country, of which some 10 per cent have become naturalised (i.e., established self-sustaining populations). Around 500 taxa (species and genera) have been declared noxious or are under some form of regulatory control because of their impacts on agriculture or the environment. Nearly all the 32 Weeds of National Significance (WoNS) – such as Gamba grass, lantana and rubber vine – have significant environmental impacts.

Many AWC properties are former cattle and sheep stations, which bear a legacy of weeds introduced during pastoral management. Even the most remote and pristine country managed by AWC is at risk of weed invasion as weeds can be transported long distances by wind, water, animals and human activity. For these reasons, weed management is a routine part of AWC's conservation work.

Recently, AWC has developed a National Weed Management Strategy to help focus our weed control efforts on weeds having the greatest impact on our mission. National Strategies are a tool for integrating science and land management and for finding the best solution to the problem at hand. On a national scale, prioritisation of weed species is necessary because not all weeds can be eradicated from all AWC properties, and we want to direct our efforts to controlling weeds that have the greatest detrimental impacts on conservation values. Further, weed management uses resources that could be directed to other threat management and conservation activities, such as feral animal control; so, it's important to allocate resources to the highest priority threats.

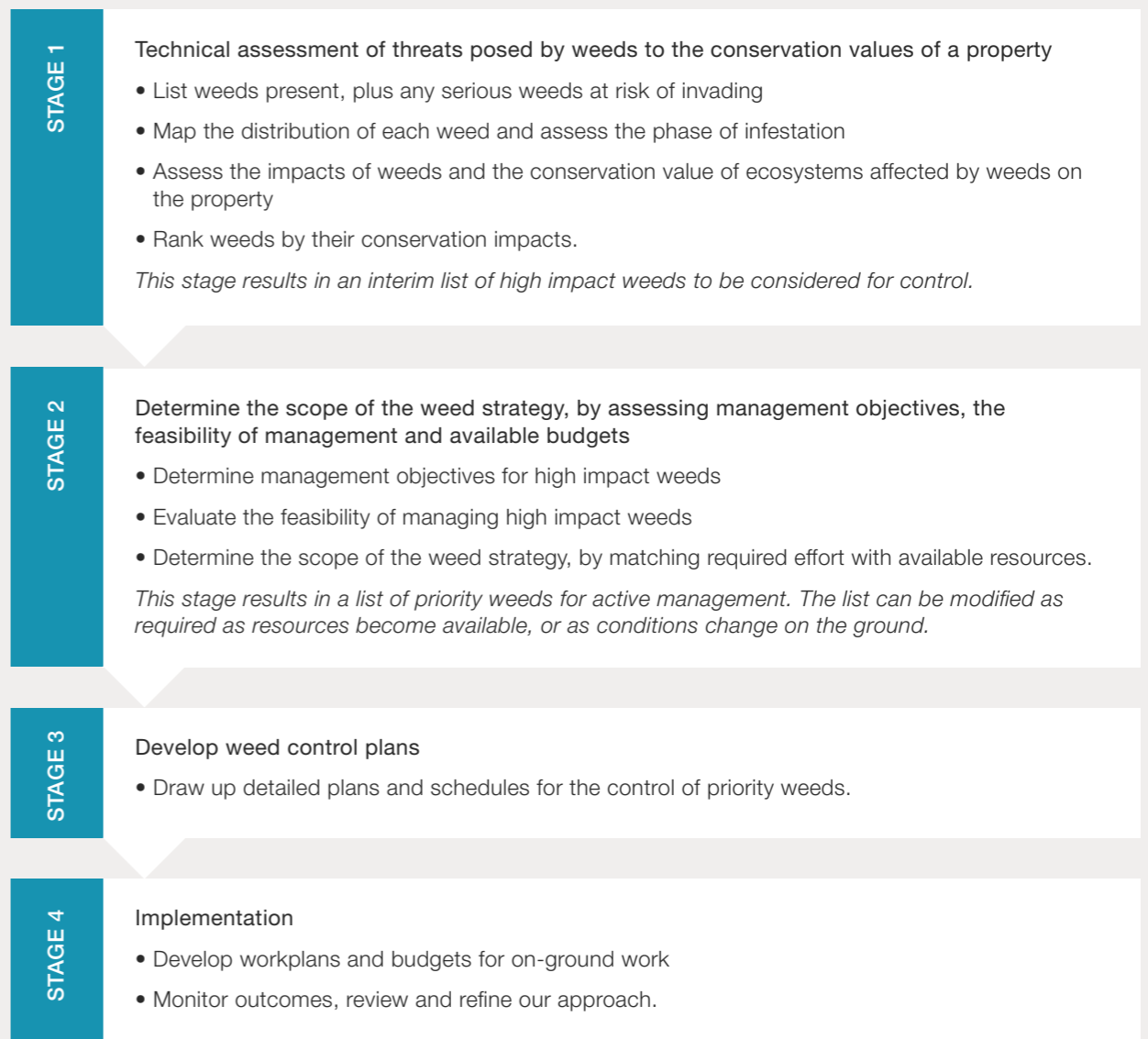
The specific objectives of AWC's National Weed Strategy are that:

- Weeds with major impacts on ecosystems of high conservation value are prioritised for control on AWC properties;
- Allocation of resources to weed control within and between AWC properties is optimised, based on impacts of weeds on conservation values, and the feasibility of control; and
- New weeds with major environmental impacts do not become established on AWC properties.



Curramore Wildlife Sanctuary is a showcase for effective and systematic lantana control that is successfully restoring habitat for threatened wildlife.

The key stages in developing weed strategies for properties managed by AWC are as follows:



Management of lantana

Lantana (*Lantana camara*) is a thicket-forming, fast-growing scratchy shrub introduced to Australia from South America as a garden plant with pretty flowers. Its fruits are dispersed by birds, and in the absence of regular fire, lantana can form dense, impenetrable thickets in the understorey of eucalypt forests and in disturbed parts of rainforest. These thickets prevent regular, cool fires but also support intense wildfires that carry fire into the canopy of sensitive vegetation. They also degrade important habitat, suffocating plants like *Parastolochia praevenosa*, an Australian vine on which the threatened Richmond Birdwing Butterfly (*Ornithoptera richmondia*) depends for survival.

Lantana is distributed across subtropical and tropical eastern Australia and is a problem weed on parts of AWC's Curramore, Mount Zero–Taravale, Brooklyn and Piccaninny Plains Wildlife Sanctuaries.

On Curramore, in the areas of lantana infestation targeted by AWC's land managers and volunteers, using a combination of manual removal and herbicide, around 31 hectares are in advanced stages of recovery and treatment is in progress on 18 hectares (see map). This has resulted in the mass recruitment of native trees, shrubs and vines, restoring the ecosystem to its natural condition. Curramore now stands out as a showcase for lantana control in the region and highlights the effectiveness of AWC's weed management strategy.

Mount Zero–Taravale is a much larger property than Curramore and, at acquisition, around 2,400 hectares of the property were infested with lantana. Here, infestations of lantana have been reduced by at least 50 per cent by deliberate use of targeted hot fire in areas protected by surrounding early season burns and complemented by strategic use of herbicide to open up some of the denser patches.



Bilby population at Mallee Cliffs National Park reaches exciting new milestone

Dr Laurence Berry, Senior Wildlife Ecologist

The recent release of 62 Greater Bilbies (*Macrotis lagotis*) from the 480-hectare breeding area into a massive 9,570-hectare feral predator-free fenced area at Mallee Cliffs National Park marks a key milestone in AWC's partnership with the NSW Government. The successful establishment of the population demonstrates the effectiveness of AWC's applied conservation approach with management actions informed by high quality monitoring data and best practice science.

A total of 50 Bilbies were released at Mallee Cliffs in October 2019 funded by the Government's *Saving our Species* program. Founders were sourced from two reintroduced wild populations at Scotia Sanctuary in far western NSW and Thistle Island, near Port Lincoln, South Australia, and from captive breeding programs. The initial release of founders into a smaller 'breeding area' was to encourage the mixing of genetics from different sources throughout the new population prior to release of individuals into the larger fenced area.

The first few weeks following release are critical for the success of a reintroduction, as during this period newly translocated animals lack familiarity with the host environment and may have heightened exposure to native predators. The stresses associated with translocation may also exacerbate any pre-existing health conditions in translocated animals.

Following each reintroduction, AWC implements an extensive program of monitoring to measure survival rates, health and body condition, population size and recruitment. This monitoring allows AWC to evaluate the outcomes of each reintroduction and provides feedback allowing us to refine our reintroduction practice.

To monitor Bilby survival rates at Mallee Cliffs, we fitted a subset of 31 founders (62 per cent) with tail-mounted radio-transmitters. Survival was tracked for four months following release. The survival rate across all cohorts was 90.3 per cent, meaning that around 45 of the 50 founders released survived the initial period after translocation.

To monitor individual health and body condition of the reintroduced population, we undertook 400 live-trapping nights within the breeding area at 3-month intervals within the first year of release. Our results showed that, over an 18-month period, all founding groups increased or maintained mean body weight from that recorded at release. Individuals from captive breeding programs (reared on supplementary food) had significantly higher

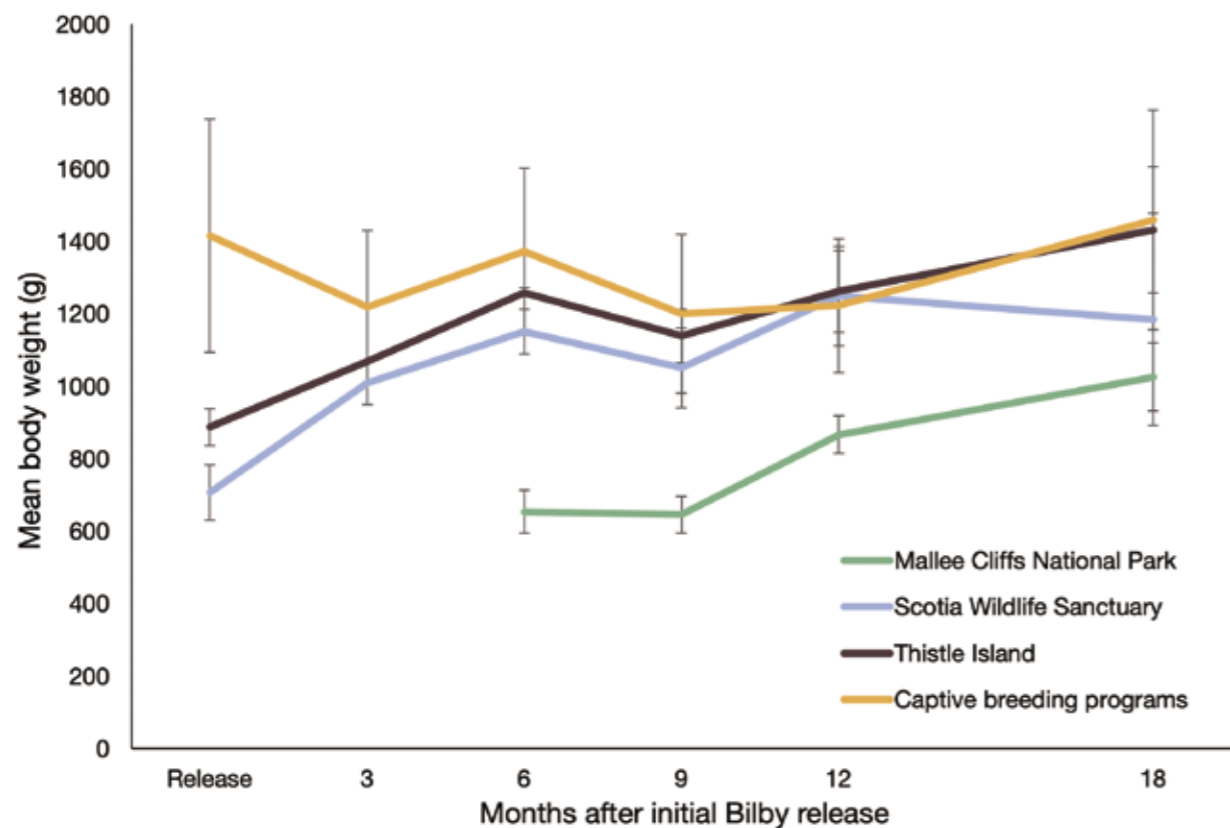
mean body weight than those sourced from wild populations, and this advantage was maintained over the course of the following year. The trapping results also track the increase in body weight in the new cohort of Bilbies born at Mallee Cliffs as new individuals survive and reach maturity. No signs of disease were observed in the reintroduced population, and mean body condition scores for individuals from different sources were all within an optimal range.

We used a capture-recapture statistical approach to estimate population size. Over an 18-month period, population size increased from 50 founders to an estimated 118 (± 28) individuals. This number exceeded the target of 110 individuals set as the trigger for releasing individuals into the fenced feral-free area at Mallee Cliffs.

Consequently, in June 2021, we captured 32 male and 30 female Greater Bilbies in the breeding area and released them into the larger fenced area. All individuals released were offspring of the original founders. We retained at least 50 individuals in the breeding area, including as many original founders as possible, to continue the process of genetic mixing.

We expect the Bilby population at Mallee Cliffs to grow to over 1,100 individuals. The reintroduction will contribute to rebuilding Mallee Cliffs' historical assemblage, helping restore lost ecosystem processes (Bilbies are prolific 'diggers'), and contributing to the maintenance of adaptive evolutionary potential in the Bilby by exposing populations to natural selection against environmental pressures that existed historically across its range.

Whilst extant Bilby populations persist in south-west Queensland, the Tanami, and Great Sandy Deserts, these are vulnerable to introduced predators. AWC's work at Mallee Cliffs demonstrates that with appropriate planning, monitoring and management, it is possible to establish and maintain viable Bilby populations. AWC currently manages established Bilby populations within five feral-free safe havens at Scotia, Mt Gibson, and Yookamurra Wildlife Sanctuaries and at Pilliga and Mallee Cliffs National Parks. Further Bilby reintroductions at AWC's Newhaven Sanctuary are also planned in 2022. It is estimated that AWC will protect a total of more than 5,000 Bilbies across these sites within the next decade, making a substantial contribution towards safeguarding the future of the species.



Images

Top: AWC Field Ecologist Hannah Thomas processes a Bilby during population monitoring surveys. Laurence Berry/AWC

Figure: Since the initial release of Bilbies at Mallee Cliffs National Park, the average weight (\pm confidence interval) of individual animals from different sources has remained consistent or increased.



Collaboration crucial for conserving endangered Northern Bettong population

*Dr Manuela Fischer, Wildlife Ecologist North-East Region
Johnny Murison, Western Yalanji Aboriginal Corporation*

In Far North Queensland, AWC scientists not only undertake monitoring and research on our sanctuaries but also collaborate with National Parks to help monitor and secure populations of endangered mammals. At Mount Lewis National Park, AWC has partnered with the Western Yalanji Aboriginal Corporation (WYAC) and Queensland Parks and Wildlife Services (QPWS) to monitor a small population of the endangered Northern Bettong (*Bettongia tropica*), a project that is partially funded by the Queensland Government under a Community Sustainability Action Grant.

The Northern Bettong is recognised as one of 20 Australian mammals most at risk of extinction. Once distributed from the Wet Tropics World Heritage Area to central Queensland, the Northern Bettong population collapsed after European colonisation and the marsupials now occur in only two known locations. The larger and better studied of the two populations occurs on the Lamb Range and is considered stable with approximately 730 individuals. The other, much smaller, population occurs on Kuku Yalanji Country at Mount Lewis National Park. Here, information on population size, distribution and habitat use is lacking and key threats are poorly understood.

The Traditional Owners of the land

Beneath the lush and breathtaking country of the Wet Tropics World Heritage Area beats the cultural heart and spirit of the Kuku Yalanji people for whom the region has been home for tens of thousands of years. Over this time, the Area has been actively managed by the Traditional Owners and their culture is built around a deep respect for nature. Since 2017, the Western Yalanji people, one of the Kuku Yalanji tribes, have partnered with AWC to monitor Northern Bettongs on Western Yalanji Country. AWC works hand in hand with WYAC Rangers and QPWS staff to achieve critical conservation goals and to build capacity within the ranger group to manage the project into the future.

Monitoring the status of Northern Bettongs at Mount Lewis National Park

Every six months, 98 motion cameras are deployed to gather data on the population size and distribution of the Northern Bettongs across different seasons. The cameras are placed on foot across the steep terrain of the National Park. We work with Western Yalanji Rangers, volunteers and QPWS staff to complete this challenging undertaking. The rangers teach us about traditional bush foods and medicine along the way.

Within the grid of sensor cameras, 50 cage traps are also deployed to capture individuals for a total of eight nights. Northern Bettongs are micro-chipped, and we assess their health and reproductive status. GPS collars are used to monitor spatial and temporal movements in relation to habitat use.

Understanding key threats

The open grassy understorey of the tall eucalyptus forest which provides crucial habitat for the Northern Bettong are invaded by lantana and degraded by cattle and inappropriate fire regimes. Predation by cats is also a key threat. Hence, AWC staff and WYAC Rangers deploy 60 cameras targeting cattle and cats. In addition, AWC botanists have established long-term vegetation monitoring sites and developed monitoring techniques that are culturally appropriate and applied by rangers.

Results to date

Capture-recapture analysis shows that approximately 50 Northern Bettongs remain – a worryingly small population. Sensor cameras reveal that Northern Bettongs avoid areas heavily utilised by cattle and some GPS-tracked individuals avoid lantana infested areas. When body condition and reproductive measures are compared to the larger Lamb Range population, a smaller proportion of females at Mount Lewis National Park carry pouch young and the overall body mass index is significantly lower. Given the low number of Northern Bettongs, their poor body condition and low breeding success, we anticipate this population may suffer from inbreeding depression (a consequence of small population size).

We are working with QPWS and WYAC to address key threats. WYAC Rangers have identified changes in current fire management strategies are required to control the invasion of rainforest into sclerophyll forest and, in consultation, QPWS have developed appropriate fire management plans. A cattle fence to stop further incursion of cattle into the National Park has been built and cattle within the park will be removed. In addition, methods to manage areas infested with lantana are being trialled. Supplementation of the smaller population with individuals from the Lamb Range is being considered to enhance genetic diversity and to increase population size. The future conservation of the Northern Bettong in Mount Lewis National Park is going to require extensive ongoing work to address key threats. A collaborative approach is central to success and we look forward to working with WYAC Rangers and QPWS staff to ensure that this small but important population is conserved.

A showcase for regional fire management

Tim White, Regional Operations Manager
 Andrew Francis, Brooklyn Sanctuary Manager
 Lizzy Crotty, Philanthropic Relationships Lead, FoAWC UK



more destructive, high-intensity wildfires occurring every 1-3 years. These fires cause cascading detrimental impacts on biodiversity and pastoral productivity.

Biodiversity Impacts: ground cover is lost when large areas are burnt frequently and intensely, destroying habitat and available shelter in which native animals can hide from predators.

Environmental and Pastoral Impacts: regular, extensive wildfires destroy feed for cattle, reduce pasture quality, damage infrastructure, exacerbate weeds and cause erosion.

Upper Mitchell River Catchment Fire Management Project

AWC is at the forefront of best-practice fire management in Australia and delivers the largest non-government fire management program in the country. AWC Sanctuary Manager for Brooklyn, Andrew Francis, has achieved exceptional results delivering ecologically friendly fire management across the 60,000-hectare property. Following a devastating season of wildfires which heavily impacted Brooklyn's neighbours in 2012, Andrew invited the local landholders to gather together and in 2013 the Upper Mitchell Project was born. The project is delivered across Brooklyn, six neighbouring pastoral properties and a large Indigenous property – in total covering around 600,000 hectares (1,482,000 acres) in an area of international conservation significance.

Coordinated out of Brooklyn, this was the first collaborative non-government fire management program in Queensland. The project has fostered a strong community spirit well beyond the delivery of fire management, with many partners meeting for the first time through this initiative.

Measuring outcomes

The Upper Mitchell Project is successfully reducing the percentage of country burnt by wildfires across the region. The average area burnt in late dry season wildfires prior to this program commencing was 13 per cent. This has now been reduced by nearly half, to an average area of 7 per cent over the last seven years. The reduction of destructive wildfires demonstrates the importance of taking a landscape-scale approach to prescribed burning.

The project provides a showcase for regional fire management – one that is generating exceptional outcomes for biodiversity, helping to restore and protect the complex ecosystems and natural assets of the region.

Since 2013, AWC has been successfully deploying best-practice fire management across the Upper Mitchell River Catchment Fire Management Area (Upper Mitchell Project) in north-east Queensland. Operating out of Brooklyn Wildlife Sanctuary, this collaborative project involves the delivery of prescribed burning across ten properties, covering 600,000 hectares (1,482,000 acres), and involving multiple tenures. The successful implementation of this project is helping to protect one of the most biodiverse regions of Australia, to safeguard Indigenous cultural sites and deliver benefits for landowners through improved productivity.

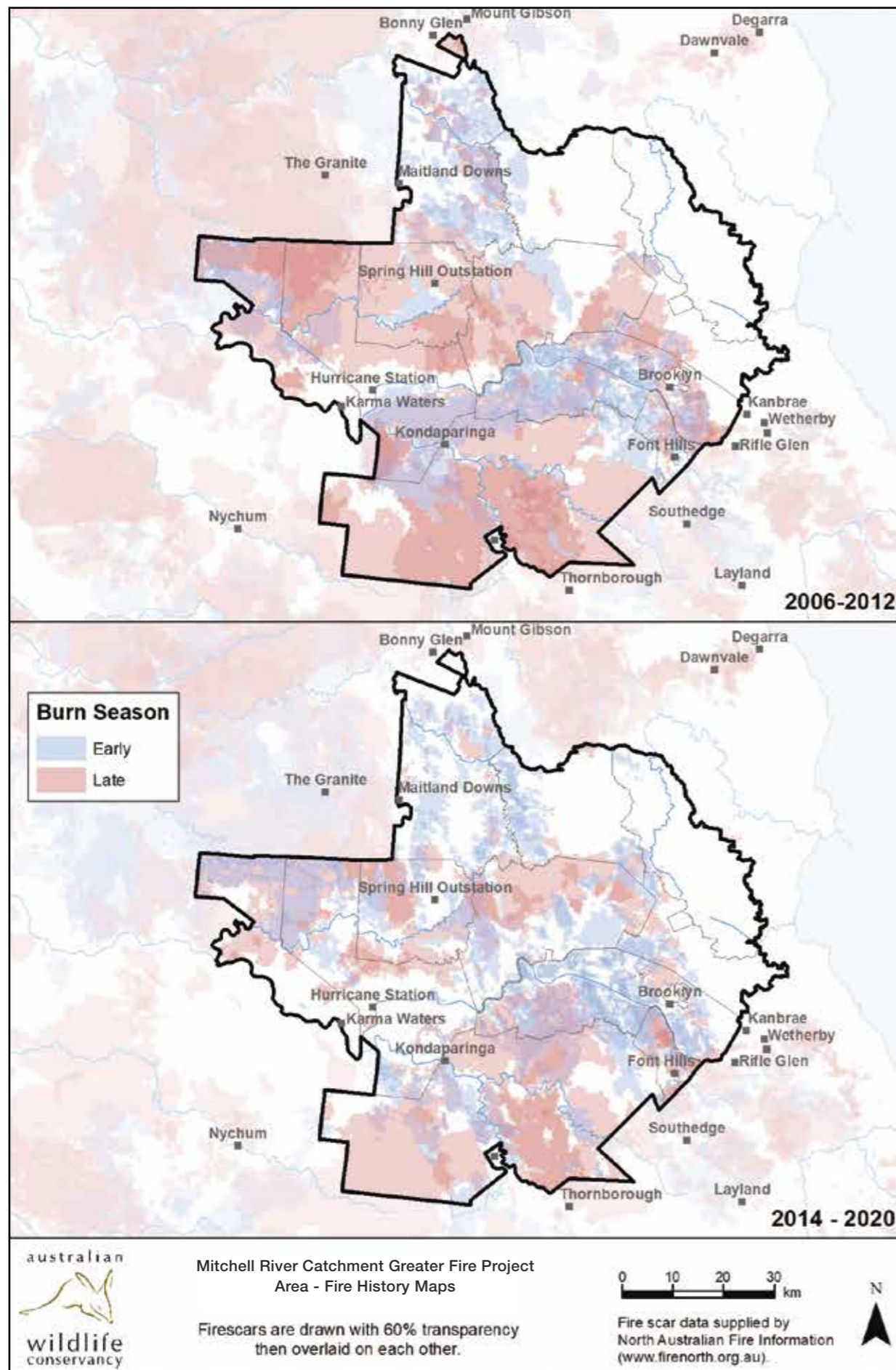
Conservation values

The 750-kilometre-long Mitchell River is vitally important for a wide array of species, originating at a unique intersection between the Wet Tropics and Einasleigh Uplands bioregions. This river runs for more than 40 kilometres through Brooklyn Wildlife Sanctuary. Around 4,000 hectares of Brooklyn are part of the Wet Tropics World Heritage Area – the largest privately owned world heritage listed area on mainland Australia. The property hosts a stunning diversity of species: 40 per cent of Australia's bird species and 30 per cent of Australia's mammal species can be found here.

The impacts of unmanaged fire

Prior to acquisition by AWC in 2004, Brooklyn was a cattle station with little prescribed burning, resulting in intense, late dry season wildfires across large parts of the sanctuary and invasion of rubber vine. A lack of regular fire in tall eucalypt forests on the margins of rainforest led to woody thickening, invasion of rainforest plants and loss of grassy understorey.

The disruption of traditional burning practices across much of northern Australia has resulted in a regime of



The extent of destructive wildfires across the Project Area has been reduced by 46 per cent since the Upper Mitchell Project has been implemented.

AWC Internship Program surpasses 100 graduates

*Nahrain John, Communications Associate
Fiona Tran, HR Advisor*

AWC is committed to the long-term delivery of science-based conservation. Part of achieving this is ensuring the next generation of ecologists receive the practical, hands-on field experience they need to take today's conservation efforts far into the future.

In 2008, thanks to a donation from long-time supporter Ross Knowles, AWC established its comprehensive Conservation and Ecology Internship Program. Launching with a single intern, the program has since expanded to an average of 13 interns per year. This year has seen the largest intake of interns on record, 15, a significant increase after a reduced intake in 2020 due to Covid-19. Earlier this year a second major milestone was reached, with the graduation of AWC's 100th intern.

The milestone was welcomed by AWC's Chief Science Officer, Dr John Kanowski, who said "The intern program has become the primary way AWC selects entry-level ecologists for our science program. During their internship, the interns get to figure out whether applied

conservation science is what they want to do, and we get to know each intern and their compatibility with our business."

Recognised nationwide, the program provides talented conservation scientists with valuable field experience and opportunities to tackle real-world conservation challenges. During a three-to-six-month internship, interns are supervised and mentored by AWC's experienced ecologists and participate in various projects from studying feral cat ecology, conducting biodiversity surveys, GPS-tracking wildlife and animal handling.

Looking forward, we have a long-term strong advocate in AWC supporter, Jim Phillipson, Director of Rendere Trust, Environmental Funders, who says "AWC has established this exciting template for world-class conservation internships. It's a model I'm seeing replicated across the environmental sector. I encourage everyone – especially corporate Australia – to support it."

Among the 100 graduating interns is Aiden Wright from North Head Sanctuary. After wrapping up his internship in July 2021, Aiden joined the 62 per cent of interns who secure a permanent or contract role with AWC (18 graduate interns are currently employed by AWC). Now an AWC Field Ecologist, Aiden said the internship equipped him with the knowledge, confidence and practical skills to make meaningful contributions to Australia's conservation landscape.

"Going into my internship, I didn't expect my daily experiences to be so varied – no two weeks ended up being the same," Aiden said. *"One week I was at North Head checking nest boxes for Eastern Pygmy Possums and the next I was at Scotia spotlighting for Bilbies and Burrowing Bettongs."*

Not only was I able to get amongst some unique Australian environments but knowing that the actions you are undertaking are for the benefit of biodiversity is extremely rewarding. I enjoyed how much there was to learn; from handling animals to gaining the confidence to lead survey teams, while continually developing the ability to identify unique Australian fauna and flora."

The looming threat of a changing climate and a rolling tide of species extinctions can be disheartening for someone looking to enter a career in conservation. However, my internship with AWC reinforced the fact that if we act with urgency, we can truly make a difference."



In applying for an AWC internship, a big drawcard for Aiden Wright was knowing the important contributions that AWC has made to Australia's conservation landscape. *Joey Clarke/AWC*



Former AWC intern, now Field Ecologist, Amelia Catterick-Stoll releases a Pututjuru (Brush-tailed Bettong) at Newhaven in Central Australia, watched on by Warlpiri Rangers, AWC staff and their families. *Brad Leue/AWC*



For Christine Mauer, a highlight of her internship so far has been assisting with surveys at Pungalina–Seven Emu Wildlife Sanctuary in the Northern Territory. *Kirsten Skinner/AWC*

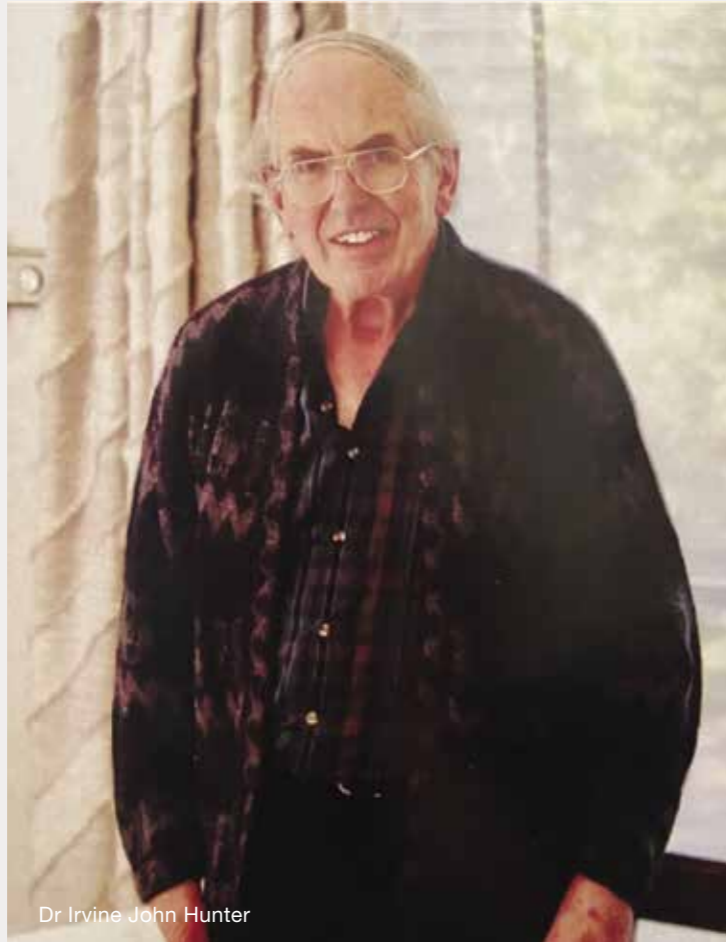
For young ecologist and current AWC intern, Christine Mauer, the program has opened up a world of experiences, from actively implementing conservation practices to working days and nights in the field, learning from Traditional Owners and even improving her 4WD driving skills.

"I started my six-month internship with the north-east team in May and have been super busy with field work since. I've had opportunities to travel and in three months I've been on five field trips which included targeted trapping surveys for Northern Bettongs and Northern Quolls, camera trapping, fauna surveys and a Brush-tailed Bettong reintroduction in Newhaven," Christine said.

"I am interested in on-ground conservation, working closely with Traditional Owners and different stakeholders to reach meaningful conservation outcomes. My interests are in behavioural and landscape ecology, species translocations, predator-prey interactions and fire."

I would definitely recommend the internship to others, as it was recommended to me. I've met some great people, seen so many new places and I've learned so much already especially about Australian species that I didn't know existed!"

For more information, please email intern@australianwildlife.org



Dr Irvine John Hunter

“My father had an enduring passion for Australia’s unique fauna and flora. He would have enjoyed seeing his gift inspire support for the protection of Australia’s wildlife.”

Professor David Hunter

Generous \$1 million legacy gift helps save threatened wildlife

Shauna Chadlowe, Chief Development Officer

Among AWC’s short list of inaugural supporters are Dr Irvine John Hunter and his wife Lydia (who passed away in 2006). The Hunters walked much of AWC’s journey with us, supporting our work along the way. We would like to celebrate Irvine Hunter for his generous \$1 million legacy gift that is helping AWC to scale up its conservation actions and restore Australia’s biodiversity.

Born in Sydney, Irvine never knew his father, John Irvine Hunter who died suddenly before his birth. Growing up in Lindfield, Irvine was academically gifted and graduated in medicine at Sydney University in 1950. After several years as a resident at the Royal Prince Alfred Hospital, he travelled to England where he trained as a pathologist at University College London and then lectured at Cambridge. There, Irvine met Lydia, an anaesthetist, and the pair married in 1955. Remarkably, Irvine also completed a law degree during this time.

After the birth of their son, David, the family returned to Sydney. Irvine pursued a career in pathology, serving first as Director of Pathology at Lidcombe Hospital, then Bankstown Hospital and then at Royal Darwin Hospital in the mid-70s. While in Darwin Irvine obtained his pilot’s license and became a flying doctor providing medical care to remote communities. During the 1980s he worked at Lismore Base Hospital, then in private practice in Western Sydney before retiring in the 1990s.

In retirement, Irvine and his wife became adventurous travellers – visiting countries like Iran, Côte d’Ivoire, Libya and Mali’s famed city Timbuktu. Irvine also had another enduring passion – a fierce, quiet commitment to the country of his birth and its unique flora and fauna. He had a keen enthusiasm for AWC’s efforts to re-establish

native wildlife in areas where feral cats and foxes have driven them to extinction. He visited Mornington Wildlife Sanctuary in the Kimberley and Scotia Wildlife Sanctuary in far western New South Wales where he was inspired by AWC’s work to restore Australia’s disappearing wildlife.

Irvine had a quiet disposition and a warm spirit – he could tell a funny story. We shared many conversations about AWC’s efforts to conserve wildlife. He often asked me about AWC’s fundraising strategy, sent me articles and shared ideas about how we could increase support. How appropriate then that his legacy formed the first \$1 million of AWC’s recent \$3 million matching challenge. He would have been delighted with the enthusiastic response the challenge received.

Irvine’s generous gift is now enabling the scaling up of AWC’s actions to control feral predators and rewild vast feral-free areas. Most importantly, his legacy is rewriting the future for some of Australia’s most threatened species. In recognition of Irvine’s generosity, the arterial road through Scotia’s massive (8,000 hectare) feral predator-free area has been named Hunter’s Way. The road provides crucial access for AWC’s field team to effectively conserve Scotia’s endangered mammal population. Fittingly, the most common tracks on this quiet road in Australia’s outback are not from tyres, but the footprints of some of Australia’s most iconic species, like Bilbies, Bettongs and Numbats.

Irvine celebrated his 94th birthday with family on 6 September, 2019. Four days later he died peacefully. Always courteous and full of respect for others, Irvine was a true gentleman. Rest in Peace, Irvine John Hunter. We will remember you.

Every bequest makes an important difference to the future of Australia’s threatened wildlife. For more information about how you can leave a lasting legacy and join The Copley Circle, please contact:

Emma Morgan, AWC Bequest Manager
Mobile: 0427 568 408 | Email: emma.morgan@australianwildlife.org

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I wish to become a regular supporter and give a **tax deductible**

donation each month of: \$25 \$50 \$100 \$ _____
Other (minimum \$10)

I wish to pay by: **Direct debit from my bank account**
Please fill in Direct Debit Request (see opposite).

Credit card - Please fill in details or call (08) 9380 9633

DIRECT DEBIT REQUEST

I / We request that you draw by way of the Direct Debit System, \$ _____ per month, for the payment of a monthly donation to Australian Wildlife Conservancy Fund.

My / Our Account details are:

Institution: _____

Account Holder Name: _____

Account Number: _____ BSB: _____

I / We acknowledge that this Direct Debit Request is governed by the terms of the "Direct Debit Client Service Agreement" (set out below).

Signature: _____ Date: _____

Print Name: _____

DONATION

I would like to make a **single tax deductible donation** of:

\$100 \$300 \$500 \$1,000 \$5,000 \$ _____
Other (minimum \$10)

I wish to pay by: **Credit card** - Please fill in details or call (08) 9380 9633

Cheque/Money Order - (enclosed)
Payable to the **Australian Wildlife Conservancy Fund**.

BEQUESTS

I am interested in making a bequest in my Will. Please send me some information.

INFORMATION

Please tick this box if you do NOT wish to receive news and information on our latest initiatives and progress.

Please send any news or information by email only.

Our Commitment to You, Drawing Arrangements:

- We will advise you, in writing, the details of your monthly donation to Australian Wildlife Conservancy (amount, frequency, commencement date) at least 3 calendar days prior to the first drawing. Thereafter each drawing will be made on the 15th day of each month (or part thereof as specified).
- Where the due date falls on a non-business day, the drawing will be made on the next working day.
- We will not change the amount or frequency of drawings arrangements without your prior approval.
- We reserve the right to cancel your monthly donation to Australian Wildlife Conservancy if three or more drawings are returned unpaid by your nominated Financial Institution and to arrange with you an alternative payment method.
- We will keep all information pertaining to your nominated account at the Financial Institution, private and confidential.
- We will promptly respond to any concerns you may have about amounts debited to your account.
- We will send a receipt within 45 days of the conclusion of the financial year summarising your entire year's gifts for tax purposes.

Your Rights:

- You may terminate your monthly donation to Australian Wildlife Conservancy at any time by giving written notice directly to us (PO Box 8070 Subiaco East WA 6008), or through your nominated Financial Institution. Notice given to us should be received by us at least 5 business days prior to the due date.
- You may stop payment of a monthly donation by giving written notice directly to us (PO Box 8070 Subiaco East WA 6008), or through your nominated Financial Institution. Notice given to us should be received by us at least 5 business days prior to the due date.
- You may request a change to the donation amount and/or frequency of the monthly donations by contacting us on (08) 9380 9633 and advising your requirements no less than 5 business days prior to the due date.
- Where you consider that a drawing has been initiated incorrectly (outside the monthly donation to Australian Wildlife Conservancy arrangements) you may take the matter up directly with us on (08) 9380 9633, or lodge a Direct Debit Claim through your nominated Financial Institution.

Privacy

AWC collects personal information to process donations, issue tax deductible receipts and to contact you. AWC's full privacy policy is available at www.australianwildlife.org/privacy.

Your commitment to us, Your responsibilities:

- It is your responsibility to ensure that sufficient funds are available in the nominated account to meet a drawing on its due date. (You may be charged a fee by your Financial Institution if the account details are incorrect or there are insufficient funds in the nominated account when we attempt to deduct donations.)
- It is your responsibility to ensure that the authorisation given to draw on the nominated account, is identical to the account signing instruction held by the Financial Institution where your account is based.
- It is your responsibility to advise us if the account nominated for transactions with the Australian Wildlife Conservancy Fund is transferred or closed.
- It is your responsibility to arrange a suitable alternative payment method with us if the Australian Wildlife Conservancy Fund drawing arrangements are cancelled either by yourselves or by your nominated Financial Institution.
- Please enquire with your Financial Institution if you are uncertain whether direct debit functions are available on your account. (You may be charged a fee by your Financial Institution if the direct debit facility is not available on your account.)