

wildlife matters

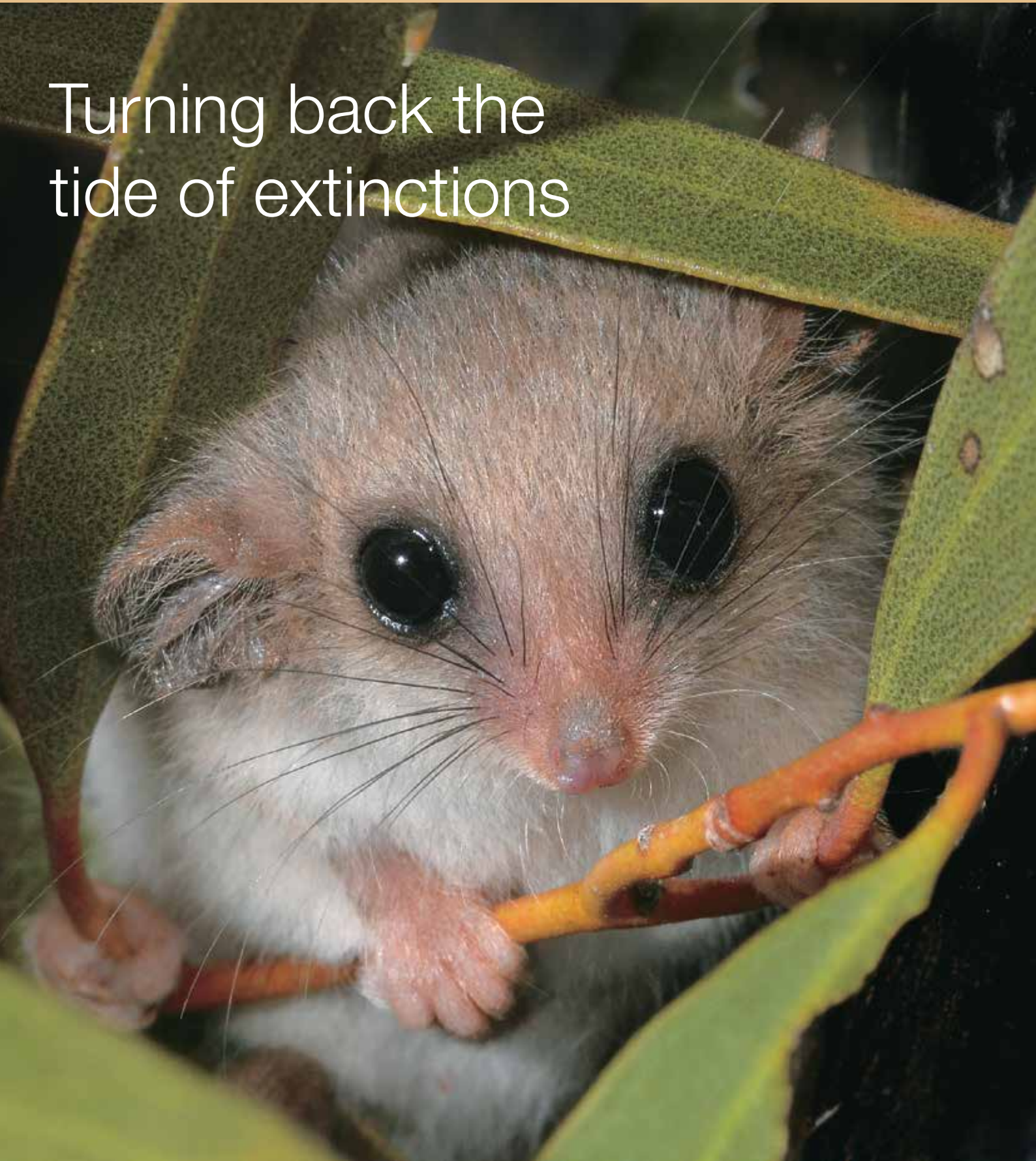
Winter 2017

australian



wildlife
conservancy

Turning back the tide of extinctions



Saving Australia's threatened wildlife



Welcome to the Winter 2017 edition of *Wildlife Matters*.

As you read this edition, I hope you are excited by the scale of Australian Wildlife Conservancy's (AWC) work across Australia and inspired by our success to date. Your support makes it all possible.

Our work is driven by a strong sense of urgency because as a nation we have a narrow window – perhaps the next decade – to halt the decline that has been occurring for 200 years in Australia's unique biodiversity. Remarkably, despite Governments spending billions of dollars every year on conservation, this loss of biodiversity continues:

"Australia's biodiversity is under increased threat and has, overall, continued to decline."

"Australia is unable to measure the effectiveness of most of our investments in biodiversity management ..."

Australian State of the Environment Report (2017)

These quotes, from the State of the Environment report recently prepared under national legislation, highlight one of the great public policy failures of the last few decades for our federation. Our irreplaceable natural capital is being lost.

It is clear that business as usual will mean catastrophic failure: much of Australia's remaining biodiversity will be swept away by a wave of extinctions. A radical new approach, driven by a much stronger sense of urgency and a much sharper focus on outcomes, is required.

To this end, AWC has developed and is implementing a new model for conservation which delivers an exceptional ecological return on investment. Our science-based metrics – which track the population of key species and our success in reducing the impact of threats – show that our pioneering approach is producing **higher outcomes at lower cost**.

Driven by a sense of urgency, and empowered by your support, AWC is delivering ground-breaking conservation projects across the country. For example:

- In NSW, AWC has been contracted to deliver park management services in two national parks; the first time that a non-government organisation has ever been contracted to deliver such services (see pages 4-5).
- Across Australia, AWC is implementing the nation's largest program of threatened species reintroductions (see pages 6-7).
- Our level of investment in science (see pages 9-11) is unmatched in the non-government sector, with a team of field ecologists deployed across the country.
- At Newhaven, in central Australia, AWC is embarking on the planet's largest feral cat eradication program (see pages 14-15).

As a supporter of AWC and an important member of the team, I hope you feel a strong sense of ownership in our achievements to date and a sense of excitement about AWC's important role over the next decade.

Your ongoing support will be invaluable – **as June 30 approaches, please make a tax deductible donation to AWC**. You can be confident it will make a difference where it counts – in the field, supporting practical, science-based conservation and delivering a great ecological return for species like the Bilby, Northern Quoll and Rufous-crowned Emu-wren.

Thank you for your support.



Atticus Fleming
Chief Executive

The AWC mission

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 manages 26 sanctuaries covering almost 4 million hectares (10 million acres).
- Implementing practical, on-ground conservation programs to protect the wildlife at our sanctuaries: these programs include feral animal control, fire management and the translocation of endangered 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 purpose of education and promoting awareness of the plight of Australia's wildlife.

About AWC

- AWC is an independent, non-profit organisation based in Perth, Western Australia. Donations to AWC are tax deductible.
- Over the last 10 years, around 87% of AWC's total expenditure was incurred on conservation programs, including land acquisition, while only 13% was allocated to development (fundraising) and administration.

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Cover image:
Western Pygmy Possum, Mallee Cliffs.
W Lawler

Sir David Attenborough and Tim Flannery celebrate AWC achievements

AWC's commitment to on-ground conservation is unique

A distinguishing feature of the AWC approach to conservation is our commitment to deploying the vast majority of our resources in the field.

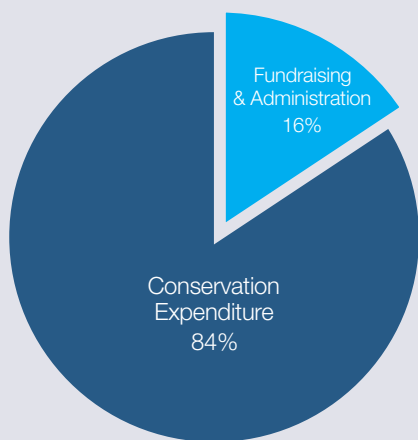
Our latest audited financial statements highlight that in 2016/17 84% of AWC's operational expenditure was on conservation, with only 16% on administration and fundraising combined.

We are the only organisation in our sector which deploys such a significant proportion of resources in the field. (When capital expenditure is included, we have allocated 87% to conservation over the last decade!)

Our business model is unique, meaning we can deploy a high proportion of our staff (around 80%) in the field.

The extra boots on the ground are critical given the urgency and scale of the challenges we face in protecting and restoring Australia's wildlife.

In many ways, this is the secret to our success – a dedicated team of land managers and field ecologists working in remote areas, often in challenging conditions, to deliver effective, science-based conservation.



Breakdown of AWC's operational expenditure 2016/17



Professor Tim Flannery and Sir David Attenborough

On 25 February 2017, legendary naturalist Sir David Attenborough and Professor Tim Flannery were special guests at an AWC event in the United Kingdom.

Held in the offices of Macquarie Group in central London, the focus of the evening was a discussion between Sir David and Tim about Australia's wildlife, the challenges involved in protecting it and the achievements of AWC.

The conversation between Sir David and Tim has been filmed and will be presented by AWC on social media in June 2017 (watch out for an e-news with details of how to watch Sir David and Tim in action). The discussion covers a range of topics including the reaction of early British naturalists to Australia's unique wildlife, the quest to save species such as the Gouldian Finch and the ingredients needed for success in conservation.

The evening was, in particular, a celebration of AWC's ability to deliver effective conservation at a grand scale:

- AWC sanctuaries, covering nearly 4 million hectares, are home to a very high proportion of Australia's wildlife including 88% of native bird species and 72% of native mammal species.
- AWC protects some of the largest remaining populations of many animals including, for example, 80% of the Sharman's Rock-wallaby population and over 30% of Australia's remaining Numbats.
- AWC manages more cat and fox-free land on mainland Australia than any other organisation.
- AWC delivers the largest non-government fire management program in the country.
- AWC also implements the largest non-government science program in Australia.

Our thanks to Sir David Attenborough and Tim Flannery for participating in our special event in London. Stay tuned to social media for the opportunity to watch their discussion.

Measuring ecological health in the Pilliga and at Mallee Cliffs

As part of a historic partnership with the NSW Government, AWC has been contracted to deliver park management services, including the establishment of a large feral predator-free area and the reintroduction of regionally extinct mammal species such as Bilbies, at two national parks – the 36,000 hectare Pilliga National Park/State Conservation Area (Pilliga) and the 58,000 hectare Mallee Cliffs National Park (Mallee Cliffs).

It is the first time in Australia that a non-government organisation has been engaged to deliver such on-ground park management services.



Malleefowl at Mallee Cliffs National Park. W Lawler

A feature of AWC's role in the Pilliga and Mallee Cliffs is the design and delivery of a long-term monitoring program to measure the ecological health of each park and track any changes in health over time. As far as we know, these programs will represent the most comprehensive and intensive ecological health monitoring regime of any protected area in Australia, reflecting the strong commitment of the NSW Government to threatened species management under its *Saving our Species* program.

Why are we measuring ecological health?

Across our properties, AWC has two broad objectives when measuring ecological health:

1. Tracking ecological health over time will identify how biodiversity in a protected area is faring – for example, it will tell us whether populations of key species (such as Bilbies at Scotia or Koalas in the Pilliga) are improving or declining. When combined with information on the cost of activities such as feral animal control, this provides a measure of the ecological return generated by the investment in park management. Systematic adoption of such a framework across protected area networks could greatly enhance the allocation of scarce resources.
2. Ecological health monitoring can be combined with research projects to explain why biodiversity indicators are increasing or decreasing. For example, in the case of the Pilliga and Mallee Cliffs, we are proposing an embedded research project which will quantify the benefits of removing feral animals and reintroducing small mammals (see page 5).

How are we planning to measure ecological health in the Pilliga and Mallee Cliffs?

AWC has developed a draft ecological health monitoring framework which provides for the measurement of a suite of indicators in both the Pilliga and Mallee Cliffs.

In combination, these indicators are intended to provide a snapshot of the state of biodiversity in each place. Our draft ecological health monitoring frameworks are currently subject to review by the Office of Environment and Heritage.

Selection of indicators: the first step in developing our framework for measuring ecological health at any property involves selecting a range of indicators which will provide a reasonable signal of ecological health.

- For species indicators, we select a range of taxa that are: (a) threatened and/or declining (such as the Pilliga Mouse); or (b) play an important role in ecosystem functioning (such as the Barking Owl or large goannas). We also conduct surveillance monitoring for a range of other species to provide early warning of any unexpected declines.
- For threat indicators, we generally measure all ecologically significant threatening processes. Typically this will include the density or activity of feral animals, the extent of weeds and the extent/pattern of wildfires.
- We also measure indicators of ecological processes including attributes of habitat such as the extent of diggings by native mammals.

Designing the monitoring regime: AWC ecologists need to design a suite of biological surveys to measure each of the indicators. Key questions include where to put sampling (monitoring) sites, how many sites are required, and what survey techniques will generate the most reliable data.

AWC has recently undertaken a baseline survey at Mallee Cliffs involving over 50 monitoring sites, stratified initially by habitat type.

These sites hosted a range of standard trapping techniques (pitfall, cage and camera traps) as well as bird surveys, vegetation surveys and nest boxes. Additional surveys, such as spotlight transects for large kangaroos and targeted searches for Malleefowl, were carried out at other locations within the park.



AWC Wildlife Ecologist Dr Laurence Berry and volunteer Elise McCarthy undertaking biological surveys in the Pilliga *W Lawler*

Data collection and analysis: Collecting the data at the Pilliga and Mallee Cliffs will involve delivering one of the nation's most substantial biological survey programs. We propose to undertake more than 14,000 trap nights every year at both locations. This level of effort is expected to increase further once regionally extinct mammals such as Bilbies are reintroduced. During our baseline survey at Mallee Cliffs, highlights included records of Western Pygmy Possum, Malleefowl and 35 reptile species including the endangered Mallee Worm-lizard. At the time of writing, the Pilliga baseline survey is underway with high numbers of Yellow-footed Antechinus recorded, as well as several threatened Pilliga Mice. Camera trap data on feral animals at both locations is still to be analysed.

Embedding a key research project

Our draft monitoring framework at both sites has been designed to also embed a key research project: examining the effect of establishing a feral-free area, and reintroducing small mammals, on extant fauna and vegetation.

To this end, we expect additional monitoring sites will be required within each fenced area in order to ensure sufficient replication across vegetation types inside and outside the feral-free area. This BACI design (before-after-control-impact) will identify changes in the health and composition of fauna (eg, small ground-dwelling mammals) and vegetation as a result of removing feral predators and restoring important ecological processes - including soil and litter turnover, the dispersal of plants and fungi, herbivory and predation - through the reintroduction of ecosystem engineers such as the Bilby.



A nationally threatened Pilliga Mouse *W Lawler*



Red-tailed Phascogales reclaim Mt Gibson

In early May, AWC field ecologists translocated 19 Red-tailed Phascogales to AWC's 7,800 hectare feral cat-free area at Mt Gibson Wildlife Sanctuary.

The Red-tailed Phascogale is the fifth nationally threatened mammal species to be reintroduced at Mt Gibson. With additional translocations over the next two years, Mt Gibson is set to host the largest and most secure population of this beautiful marsupial.

The Red-tailed Phascogale may be largely unknown to many Australians, but the story of its catastrophic decline is shared by most of our small to medium-sized native mammals. Once found across much of the continent – from the junction of the Murray and Darling Rivers to the MacDonnell Ranges (central Australia) and across the western deserts – the Red-tailed Phascogale has disappeared from over 99% of its former range. By the late 1800's, it could no longer be found in eastern Australia; by the 1920's it had disappeared from central Australia and by the 1970's the phascogale had vanished from the bloodwoods of the western deserts. It now hangs on in small patches of remnant bushland in the southern and central Wheatbelt in Western Australia.

The Red-tailed Phascogale is a beautiful and engaging animal: a small, semi-arboreal marsupial with a long reddish tail adorned with a black brush. Weighing between 40 to 70 grams, individuals can leap up to two metres between trees.

Phascogales feed primarily on insects and spiders, which they forage for on the ground, but will also consume small mammals, birds and reptiles opportunistically. They do not need to drink. Females can live up to three years, producing two to three litters each consisting typically of seven to eight young. Males, however, live for less than 12 months: they die after expending all of their energy in the winter mating season.

The primary cause of their tragic decline is predation by feral cats. The first specimen – from 1843 in south-western WA - was collected by naturalist John Gilbert, who reported that a domestic cat had captured it. The loss and fragmentation of habitat, and predation by foxes, have also contributed to the decline of the phascogale.

Mt Gibson: new hope for the Red-tailed Phascogale

Mt Gibson Wildlife Sanctuary occupies over 130,000 hectares within a transition zone between the eucalypt-dominated southwest and the mulga-dominated arid interior. It contains a rich diversity of habitats; however, as with all of inland Australia, the region in which Mt Gibson is located has lost a high proportion of its original mammal fauna. Prior to AWC acquiring Mt Gibson, the Red-tailed Phascogale was one of 16 mammal species that had disappeared from the region.

AWC has set about reversing the loss of Australia's mammal species by establishing the largest feral cat and fox-free area on mainland Western Australia at Mt Gibson: 7,800 hectares of diverse woodland and shrubland is now protected by a feral-proof conservation fence. By early 2017, Bilbies, Numbats, Woylies and Greater Stick-nest Rats had already been reintroduced as part of one of the nation's most significant biodiversity reconstruction projects.

We do not know exactly when phascogales disappeared from this region. However, an assessment of subfossil evidence on Mt Gibson identified the jawbone of a Red-tailed Phascogale in a cave only a few hundred metres from our conservation fence: a ghostly reminder of what has been lost across so much of inland Australia.

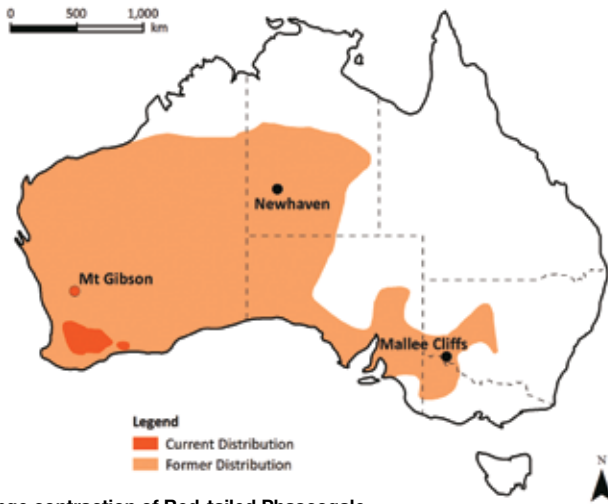
Red-tailed Phascogale



Thank you to key supporters of the Red-tailed Phascogale translocation: WA Department of Parks and Wildlife, Perth Zoo, Lotterywest and the Northern Agricultural Catchments Council.

The translocation

After nearly two years of detailed planning, the translocation of 19 Red-tailed Phascogales (11 females, eight males) culminated in a tightly choreographed operation executed with precision by AWC field ecologists over an intense 48-hour period.



Range contraction of Red-tailed Phascogale

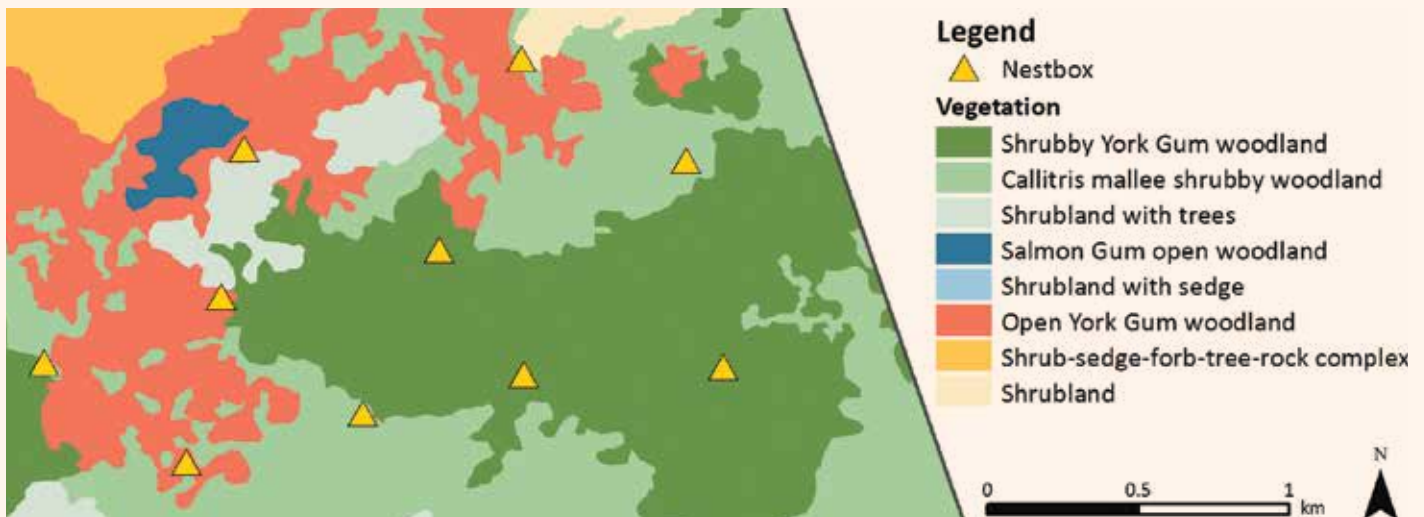
The location of our feral-free area was carefully selected to ensure it captures a good combination of habitat for all of the species that are being reintroduced there. In particular, the feral-free area includes thousands of hectares of high quality habitat for phascogales, such as York Gum and Callitris woodlands with shrubby understory, featuring high levels of canopy cover, good connectivity, good fire history and lots of tree hollows for shelter.

In this phascogale-friendly habitat, protected from feral cats, the first 19 individuals were released on 10 May 2017. After fighting a losing battle for more than a century, the establishment of a new population at Mt Gibson represents a historic step in halting and reversing the decline of the Red-tailed Phascogale. With additional translocations, AWC expects the Mt Gibson population to grow to more than 1,300 animals, which will be the largest remaining population. The total population of the species is currently estimated at less than 10,000 animals. Future translocations to Newhaven (central Australia) and Mallee Cliffs (near the Murray River in NSW) will see AWC returning the phascogale to its heartland across Australia.

- The 19 Phascogales were sourced from two sites in the central Wheatbelt. Both sites had been monitored by AWC ecologists and staff from the WA Department of Parks and Wildlife (DPaW) to ensure the capture of animals for this translocation would not compromise the viability of each of the source populations. Sites were isolated from each other, promoting greater genetic diversity in the initial founding population for Mt Gibson.
- After being trapped overnight, each phascogale was given a health check, and a DNA sample was taken, before the seven-hour drive to Mt Gibson.
- At Mt Gibson, the phascogales were released after dusk into purpose built wooden nest boxes in high quality phascogale habitat. To the extent possible, males were released so they were surrounded by females.
- Detailed post-release monitoring is now being undertaken using camera traps and by inspecting nest boxes.
- An additional 40 animals are proposed for translocation over the next two years.



Red-tailed Phascogale captured on camera trap at Mt Gibson



Release sites were located in a mix of high quality habitat

Eastern Pygmy Possums back at North Head

AWC continues to break new ground in our mission to reverse the decline of Australia's wildlife.

The reintroduction of the Eastern Pygmy Possum to North Head Sanctuary – in the heart of Australia's largest city – is a powerful symbol of our commitment to restore the nation's threatened wildlife.



Eastern Pygmy Possum J Clarke

North Head Sanctuary sits on a dramatic headland overlooking the entrance to Sydney Harbour. It contains the largest remaining area of an endangered ecological community, the Eastern Suburbs Banksia Scrub, but has lost many of its native fauna species. AWC, in working with the Sydney Harbour Federation Trust, is implementing a bold plan to restore the animals that have disappeared from this natural jewel of our largest city.

AWC ecologists recently released seven Eastern Pygmy Possums at North Head, building on an initial reintroduction of 10 in December and January. All of the Eastern Pygmy Possums are being released into nest boxes positioned in a 15 hectare area in the middle of North Head. This area has been chosen as it has good foraging resources, including a large number of flowering Banksia species. A total of 20 possums will be released as part of this second translocation, with all animals sourced from state forests on the central coast of NSW.

The Eastern Pygmy Possum is listed as threatened in NSW: it has suffered extensive habitat loss throughout its range, amplified by the impact of feral cats and foxes and altered fire regimes. Its return to North Head (the first ever translocation of the species) builds on AWC's reintroduction of native Bush Rats on the headland, soon to be followed

by the return of the Brown Antechinus. Each of these species has an important ecological role to play – the Pygmy Possum, for example, acts as a pollinator and can help restore the health of the banksia scrub.

Three of the recently released pygmy possums are carrying tiny radio transmitters, allowing us to collect nesting and movement data. Early results show that animals are moving nesting locations every few days, nesting in a range of habitat features including a ringtail possum drey, hollows in dead stags and forks of trees and the stump of a Xanthorrhoea (grass tree).

The transmitters are very small, weighing only 0.75 grams. This makes them logistically challenging to fit to the animals. To keep weight to a minimum each collar has a battery life of only 40 days. For our ecologists, tracking in the thick scrub of North Head can be difficult, as signals bounce around and pushing through the scrub can be slow going. The reward will be a new population of a threatened mammal species and a healthier ecosystem at North Head - a spectacular showcase for conservation overlooking Sydney Harbour.

In addition to the Sydney Harbour Federation Trust, our partners in this project include the NSW National Parks and Wildlife Service and Forestry Corporation of NSW.



AWC ecologist Dr Jennifer Anson monitoring an Eastern Pygmy Possum nest box

Saving the Sharman's Rock-wallaby



Sharman's Rock-wallaby habitat on Mt Zero-Taravale. W Lawler



Sharman's Rock-wallaby captured on camera trap

One of Australia's rarest mammals, Sharman's Rock-wallaby, is the subject of an exciting new research project at Mount Zero-Taravale (Mt Zero). In May, the research took a critical step forward when 15 rock-wallabies were radio-collared. This is the first time any individuals of this species have been radio-tracked.

The catastrophic decline in small and medium-sized mammals across the tropical savannas is now well documented. However, there are significant gaps in our knowledge of some guilds, such as the rock-wallabies of north Queensland. Rock-wallabies take shelter in rocky crevices and caves during the day: does this rocky habitat provide sufficient shelter from cats and fire and are rock-wallabies vulnerable when they leave the rocks to forage in surrounding areas or disperse between colonies?

Sharman's Rock-wallaby is one of the rarest mammals in Australia, with an estimated population of less than 800 animals. AWC is the difference between survival and extinction for this species, with an estimated 80% of the population including over 30 confirmed colonies occurring on Mt Zero.

A new research project, carried out by University of Queensland PhD student, Catherine Hayes, in partnership with AWC, will examine a range of critical issues related to the survival of the Sharman's Rock-wallaby.

The research will:

- estimate the population size and the location and size of individual colonies;
- identify the home range and patterns of habitat use (eg, how far from rocky shelter do rock-wallabies travel to forage?);
- analyse the risk from feral cats; and
- inform the design of fire management regimes to protect rock-wallaby colonies.

In May 2017, the project took a major step with the team capturing and radio-collaring 15 rock-wallabies (seven males, eight females) across three different colonies. This is the first time that any Sharman's Rock-wallaby has ever been fitted with a radio transmitter. The collars have VHF and GPS signal and are programmed to take a location fix every 90 minutes through the night.

Capturing a rock-wallaby is not an easy task: special purpose traps need to be carried to remote locations in steep, rocky terrain. Traps are baited around 5pm, with the team returning around 11pm to check the traps. Animals are weighed, morphological measurements are taken, a genetic sample is obtained and, if the animal is large enough, the radio-collar is fitted.

Two of the sites with radio-collared rock-wallabies will be subject to prescribed burning as part of our fire management program at Mt Zero, while the third site will not be burnt. Data from the collars will tell us where and when wallabies are active and whether this changes in response to fire and seasonality. Combined with a range of other data to be collected, including via a network of camera traps, this vital research promises to help provide a more secure future for one of Australia's rarest macropods.

Integrated cat and fox control – how low do we need to go?

AWC ecologists are at the forefront of efforts to identify strategies that will reduce the impact of feral cats at a landscape scale.

At Scotia Wildlife Sanctuary, one of the nation's most important scientific research projects is testing a critical question for conservation: how low do cat and fox densities need to be in order to generate an increase in native wildlife?



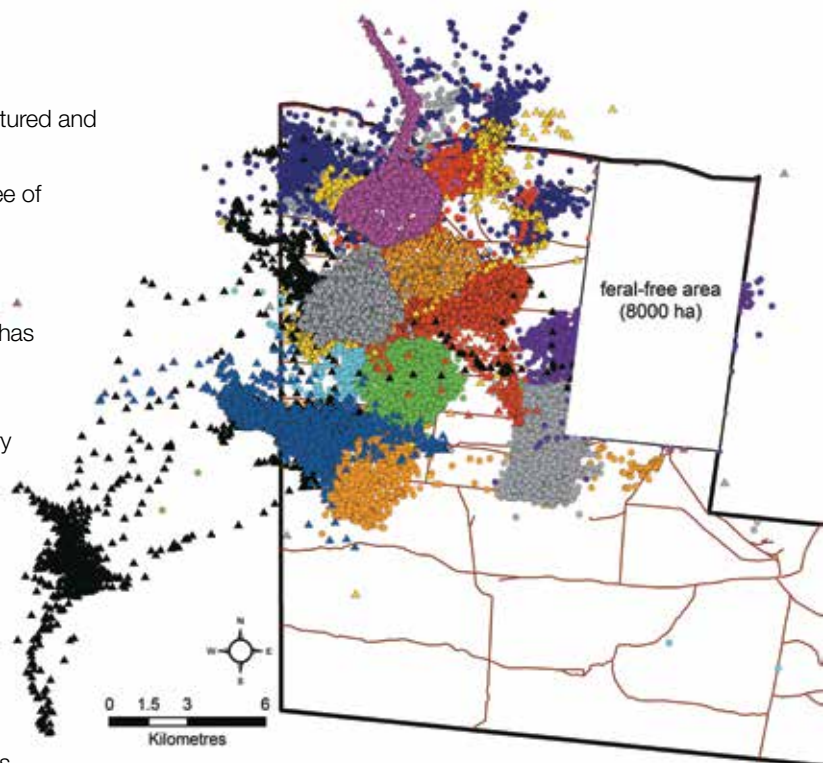
A feral cat with radio collar at Scotia Wildlife Sanctuary A Carter

Over the last two years, the AWC team at Scotia has captured and radio-collared 17 foxes and seven cats.

All of the foxes and four of the cats have GPS collars (three of the cats carried VHF collars). To date, we have collected approximately 59,000 GPS points from foxes (see map) and 24,000 GPS points from cats.

Across both years the home-range size of resident foxes has been very consistent and almost entirely exclusive – approximately 1,000 hectares.

The four male cats with GPS collars have ranged over very large areas – approximately 3,500 hectares. One of the cats was trapped more than 20 kilometres from where it resides.



GPS locations of 17 foxes at Scotia Wildlife Sanctuary

The project is addressing a series of critical, inter-related questions:

- **How do we obtain an accurate measure of the density of feral cats?** The GPS data, combined with an extensive array of camera traps and sandplot data, is helping us develop a methodology for calculating the density of feral cats which we expect will be applicable across much of southern and central Australia. The ability to estimate the density of feral predators in these landscapes will be ground-breaking.
- **What influences the behaviour of foxes and cats and their use of the landscape?** The GPS data is helping identify the influence of factors such as surface water and fire on the movement patterns of feral cats and foxes; for example, one feral cat has avoided an old fire scar covering around 600 hectares.
- **Does fox control work?** We will commence fox control in the study area in late 2017, measuring whether control measures deliver a sustained reduction in fox densities, or whether it is offset by high rates of immigration and recruitment.

- **What happens to cats when foxes are controlled?** If fox control is effective, we will measure whether a reduction in the fox population affects the density and/or the spatial behaviour of cats. Will cats increase in number or change their movement patterns in response to less competition from foxes?
- **Is it possible to suppress cat (and fox) densities to the extent required to generate an increase in small native species?** AWC has 10 years of baseline data on small mammals, reptiles and birds in the study area: we will seek to identify the threshold density of feral predators that triggers an increase in native wildlife (noting the threshold may be different for different species).

The secret life of Kalamurina dingoes

Kalamurina Wildlife Sanctuary, on the north shore of Lake Eyre, is home to one of the nation's purest and least disturbed dingo populations.

A major research collaboration between AWC and the University of Adelaide is starting to reveal the secret life of our Lake Eyre dingoes.



Dingo with radio collar C O'Brien



Hunting on the water's edge C O'Brien



Fitting a radio collar M Schofield



Genetic analysis confirms the purity of Kalamurina dingoes C O'Brien

There is increasing evidence that dingoes play an important role in maintaining the health of an ecosystem by regulating the number of native herbivores (such as large kangaroos), thus preventing over-grazing and conserving soil nutrients. There is also direct evidence that dingoes predate on feral cats and influence their behaviour – however, the evidence for dingoes suppressing the density of feral cats and foxes remains equivocal. Accordingly, there is a critical need to better understand the role of dingoes, how they use the landscape and how they interact with feral predators.

In 2016, AWC staff and a University of Adelaide PhD student (Jack Tatler) captured 16 dingoes at Kalamurina, placing GPS collars on 10 of them. All dingoes were captured within 35 kilometres of the homestead, adjacent to the Warburton Creek that flows into Kati Thanda – Lake Eyre. Genetic analysis of samples taken from 14 of the dingoes suggests very high levels of purity, and medium-weak relatedness between individuals. The Kalamurina dingoes present a diverse range of colour forms including orange, sandy, white and black and tan.

We have retrieved 50,000 GPS locations from nine of these dingoes over a nine-month period. The data shows a broad variance in home range size, from 3,500 hectares to around 16,000 hectares.

The dingoes mostly occupy discrete areas except for one couple – a male and female – who spent most of their time together. The Warburton Creek is a hotspot for dingo activity, although one dingo had a large home range extending into the desert, suggesting a source of water among the sand dunes. The analysis of dingo scats collected during 2016 reveals a broad diet including rabbits, long-haired rats and feral cats!

In 2017, an additional six animals have received GPS collars; a further 10 animals will have been fitted with satellite downloadable GPS collars by the end of May. These collars incorporate sophisticated tools to record acceleration that can be used to model behaviour such as hunting, as well as temperature sensors to determine when the animal is in the open or resting in shade.

This research is particularly important because it is focused on an undisturbed dingo population with an intact pack structure. It promises to reveal important new information about how dingoes use the landscape – including physical constraints such as temperature and water – and their potential role in maintaining a healthy ecosystem on the edge of Kati Thanda – Lake Eyre.

Yampi: exploring one of Australia's great natural areas



Golden-backed Tree-rat captured on camera trap



AWC Field Ecologist Annika Spiridis with a Northern Quoll at Yampi. *M Bruton*



Kimberley Brush-tailed Phascogale captured on camera trap

The Yampi Sound Training Area (Yampi), covering over 560,000 hectares in the Kimberley, is a nationally significant site for conservation and a key site for the Australian Defence Force (Defence). AWC and Defence are forging an exciting new partnership designed to deliver effective conservation at Yampi, consistent with its use as a military training area.

In late 2016, AWC field ecologists ventured into Yampi to commence a major, multi-year biological exploration of one of Australia's most important and little known natural areas. Owned by the Commonwealth (Defence) since the 1970's, Yampi has never been comprehensively surveyed. A few small surveys (several hundred trap nights spread across nearly 50 years) have merely scratched the surface of this vast, mega-diverse landscape, hinting at its role as one of the last great refuges for Australia's endangered mammals.

AWC's field team ventured into Yampi during one of the Kimberley's wettest summers for several years. Two low pressure systems dumped 340 mm of monsoonal rain as our ecologists helicoptered, tramped and climbed to designated trapping sites in key sections of the property.

Our survey program focused on the following habitat types:

- Rainforest and wet monsoon forest pockets.
- Riparian (riverine) areas in the lowland plains and in the upland valleys.
- Woodland and savanna country associated with granite ranges and rolling quartzite hills.
- Lowland grassy swamps.

The first step was to deploy remotely triggered camera traps. Aided by the Dambimangari Rangers, we set out 100 camera traps at 23 sites across the property in mid-November.

By mid-January, as the wet season closed in, we were back on site to retrieve and re-deploy the cameras (to an additional 11 sites) and to conduct live trapping (Elliot traps, cage traps, funnel traps) at a series of locations. This systematic trapping program was backed up by spotlighting and opportunistic surveys.

We were looking, in particular, for Golden-backed Tree-rats, Northern Quolls and Golden Bandicoots.

The results confirmed our assessment of Yampi – it is likely to be a vital refuge for these nationally threatened species – and revealed several unexpected, additional biological treasures.

Survey methods and trap nights

Remote cameras:	6,774 trap nights
Elliot traps <i>(small mammals):</i>	1,027 trap nights
Funnel traps <i>(reptiles):</i>	471 trap nights
Cage traps <i>(medium mammals):</i>	324 trap nights
Harp traps <i>(bats):</i>	5 trap nights
Spotlighting:	19 person hours
Diurnal active searches:	5.5 person hours



Yampi Sound Training area covers 560,000 hectares adjacent to the Kimberley coast

Northern Quoll

The Northern Quoll was detected at 19 of the 34 camera sites, and at four live trapping locations, across a broad range of rocky highland and lowland habitats. Northern Quolls were also detected incidentally whilst driving along the main access track at night, inside one of the sheds during the day, and while staff checked in via satellite phone on the hill behind the Kimbolton operations base.

Golden-backed Tree-rats

Golden-backed Tree-rats (a species that has disappeared from large areas of its former range, including Kakadu National Park) were regularly detected across Yampi. Elsewhere, this species is confined to rocky, sandstone country and adjacent woodlands, but on Yampi it was found in a broad range of habitats: it was detected at 25 camera sites and at six live trapping locations.

Golden Bandicoots

There are two species of bandicoots in the Kimberley – the nationally threatened Golden Bandicoot and the more widespread Northern Brown Bandicoot. The two species are impossible to tell apart except by genetic testing.

We caught a total of six bandicoots at two live trapping locations. Subsequent genetic analysis has shown that two of these bandicoots were Golden Bandicoots, while the other four were Northern Brown Bandicoots. Bandicoots were also detected at 18 remote camera sites. Additional targeted live trapping and genetic analysis will be required to identify which of the populations caught on camera trap are Golden Bandicoots and to map their distribution on Yampi.

The presence of Golden Bandicoots is particularly significant as it is a species that is almost extinct on mainland Australia. The Federal Government has identified it as one of the country's highest priority threatened mammals.

Kimberley Brush-tailed Phascogale

The Kimberley subspecies of the Brush-tailed Phascogale, recently identified as nationally endangered, was detected on three occasions while spotlighting in the vicinity of the operations base. It was also detected at four camera trap sites. It is extremely rare: this subspecies is known from only one other location, making Yampi vitally important for its survival.

Other threatened and important species

- **Western Partridge Pigeon:** Flocks of up to a dozen nationally threatened Western Partridge Pigeons were observed. The species was also detected at four camera sites.
- **Ghost Bat:** A single Ghost Bat was detected whilst spotlighting near the Kimbolton operations base; its large size, colouration and distinctive facial markings clearly illuminated as it flew overhead.
- **Wyulda:** The Wyulda or Scaly-tailed Possum is endemic to the Kimberley. It was detected at 13 camera trap sites including in granite and rolling quartzite hills. Elsewhere it is restricted to rugged sandstone areas and adjacent woodlands.
- **Monjon:** A small orange-coloured rock-wallaby was detected on camera at one site; it is most likely a Monjon, the world's smallest rock-wallaby species.

A total of 189 native fauna species were recorded during this initial ecological survey. Of these, 33 species were detected at Yampi for the first time including Wyulda, the endemic Kimberley Honeyeater and Kimberley Fat-tailed Gecko, Buff-banded Rail, Eastern Siberian Whimbrel, Rainbow Pitta and Woodworker Frog. Additional surveys in 2017 will enhance our knowledge of Yampi's spectacular biodiversity and help inform the ongoing design and delivery of feral animal control and fire management.

Newhaven Endangered Wildlife Restoration Project

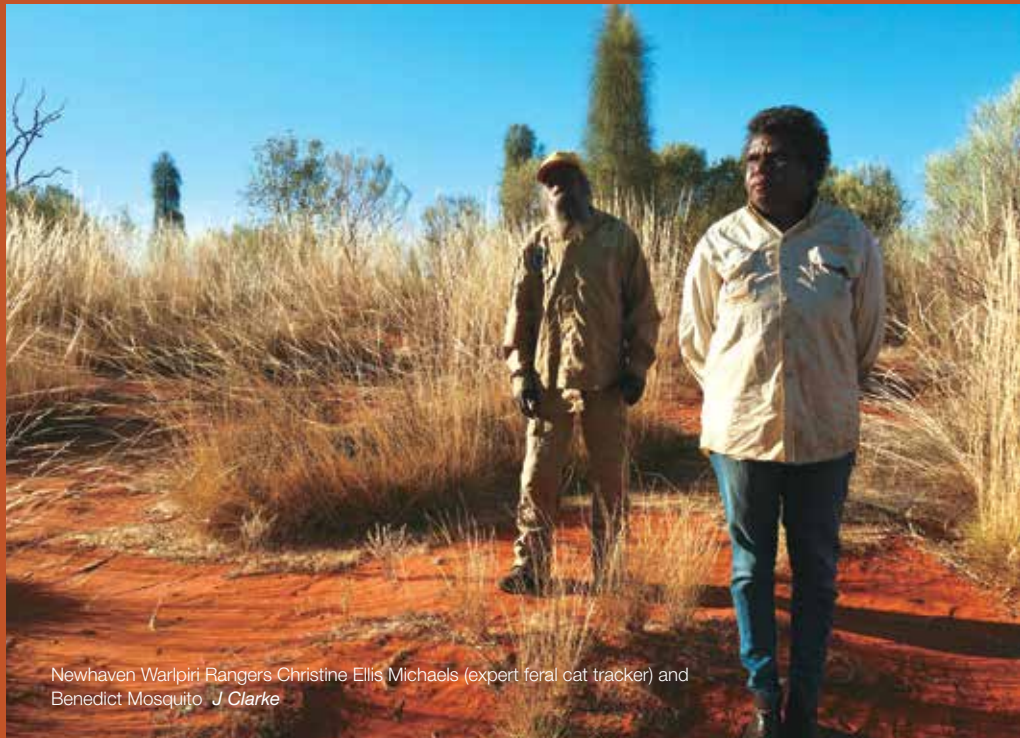
AWC's Newhaven Warlpiri Rangers are helping drive the development of Australia's largest feral predator-free area by playing critical roles in the establishment of a feral-proof fence and the removal of feral cats.

Four Warlpiri rangers are currently employed by AWC at Newhaven, with additional employment expected as we enter the next stage of fence construction.

In addition to substantial socio-economic benefits for local communities, this historic project is set to deliver an exceptional ecological return for central Australia's threatened wildlife.



Newhaven Warlpiri Ranger Duncan Jungala Gallagher *J Schofield*



Newhaven Warlpiri Rangers Christine Ellis Michaels (expert feral cat tracker) and Benedict Mosquito *J Clarke*

Establishing the conservation fence at Newhaven

Duncan Jungala Gallagher (pictured bottom left), one of the Newhaven Warlpiri Rangers, commenced work establishing the fenceline in late May. Duncan is operating the machinery (including a grader and a dozer) required to create the fence alignment, which will extend for 44 kilometres around the Stage 1 feral-free area.

The fenceline will be approximately eight to 10 metres wide. Identifying and mapping the alignment for the Stage 1 fence involved consultation with traditional owners in Nyiripi, Yuendumu and Papunya, facilitated by the Central Lands Council, to ensure we avoid sites of cultural significance. The fence alignment was also informed by an assessment by AWC ecologists and botanists to ensure areas of important habitat were not affected.

Establishing the fenceline will take six to eight weeks. Construction of the fence will then commence, providing additional opportunities for local employment. Our aim is to complete construction of the Stage 1 fence by around February 2018. We are also in the initial stages of planning for the construction of the Stage 2 fence, which will extend for another 130 kilometres or more!

The first step in the planet's largest feral cat eradication

The Stage 1 fence will enclose 9,450 hectares comprising a stunning array of habitats including a dramatic quartzite range which overlooks vast spinifex plains, mulga woodland and dunefields decorated with desert oak. The Newhaven Warlpiri Rangers – including Alice Henwood, Christine Ellis Michaels and Benedict Mosquito – will lead the way in removing feral cats and foxes from this area. Alice, Christine and Benedict are renowned for their cat-tracking and hunting skills; utilising these unique skills, we expect to have removed all feral cats and foxes within approximately 12 months of completing the fence – ie, by early 2019. Stage 1 will be the largest fox and cat-free area on mainland Australia. When combined with Stage 2 (another 60,000+ hectares), Alice, Christine, Benedict and the rest of the AWC team will have delivered the planet's largest (by area) feral cat eradication.

Pending the completion of the Stage 1 fence, our feral cat control efforts are focused on key habitat for extant threatened species such as the Great Desert Skink and the Brush-tailed Mulgara. So far this year, the Newhaven Warlpiri Rangers have removed 19 feral cats.



Prescribed burn on the spinifex plains at Newhaven Wildlife Sanctuary J Clarke

Delivering a massive ecological return

The Newhaven Warlpiri Rangers are playing a critical role in reversing the tide of extinctions in central Australia – restoring a vast landscape so that it contains a diversity and abundance of mammals similar to that which existed prior to the arrival of European settlers.

This project will secure a significant increase in the global population of at least 10 nationally threatened mammals (see table), doubling the population of at least six species including culturally significant species such as the Mala. Some of these species have been extinct in central Australia for more than 50 years.

Measuring the effect of feral cat removal

AWC is implementing a large-scale research project to quantify the benefits of removing feral animals and reintroducing regionally extinct small mammals, many of which deliver important ecosystem services by, for example, continually turning over soil.

Our science team has established a network of nearly 50 fauna monitoring sites, and a suite of vegetation monitoring sites, in matched habitat types inside and outside the Stage 1 fenced area. This design will provide a robust signal of the changes that occur as a result of removing feral animals – for example, we expect ground-dwelling birds, mammals and reptiles (such as Great Desert Skink and the Rufous-crowned Emu-wren) to increase after feral cat removal.

Our monitoring will also identify any changes in vegetation structure that occur as a result of the introduction of regionally extinct mammals, some of which are herbivores and some of which may play an important role in distributing seeds and spores.

Our baseline (pre-feral animal removal) surveys this year involved over 6,000 trap nights, with 624 reptile captures (51 species), 215 mammal captures (eight species) and 28 amphibian records (three species).

Fire management

Delivering effective fire management across Newhaven and, at a finer scale, within the Stage 1 area is another critical

ingredient in preparing for the return of species like the Mala, the Central Rock-rat and the Bilby and in promoting the restoration of extant fauna such as the Black-footed Rock-wallaby (which utilises fire sensitive plants such as native fig, which need to be protected from wildfires). Prescribed burning at Newhaven is currently underway; our burning is designed to deliver a fine scale mosaic of different aged vegetation within the Stage 1 area so that: (1) the risk of a large wildfire within the feral-free area is minimised; and (2) the diversity of habitat for reintroduced mammals is enhanced. In addition, dedicated fire control lines are being established parallel to the fence line both inside and outside the Stage 1 area.

Species	Global pop est (2012)	Newhaven pop est (9,450 ha)	% increase	Newhaven pop est (69,000 ha)	% increase
Western Quoll	13,500	90	1%	650	5%
Red-tailed Phascogale	<10,000	625	6%	2,500	25%
Numbat	<1,000	210	21%	1,300	130%
Golden Bandicoot	25,000	7,000	28%	32,500	130%
Bilby	10,000	700	7%	4,500	45%
Burrowing Bettong	14,500	2,500	17%	22,500	155%
Brush-tailed Bettong	<18,000	1,200	7%	9,000	50%
Rufous Hare-wallaby (Mala)	4,000	2,400	60%	18,000	450%
Black-footed Rock-wallaby	<10,000	750	8%	1,500	15%
Shark Bay Mouse	10,000	7,500	75%	48,750	488%
Central Rock-rat (Antina)	<1,000	1,250	125%	1,825	183%

Estimated mammal populations to be established at Newhaven

Please make a tax deductible donation to support the Newhaven Warlpiri Rangers (see insert or back cover for donation details).

Please help save Australia's endangered wildlife



Feral cat control

Please direct my donation to feral cat control including the establishment of feral-cat free areas

Newhaven Warlpiri Rangers

Please direct my donation to support the Newhaven Warlpiri Rangers

Conservation science

Please direct my donation to support AWC's field ecologists

AWC operations generally

Please direct my donation to AWC operations generally

To donate online at our website please visit www.australianwildlife.org

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- 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.

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- 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.
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- 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.)



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