

wildlife matters

australian



wildlife
conservancy

JUNE 2007

How this bird can help save northern Australia



Breaking News:

AWC bids to link Lake Eyre
and the Simpson Desert



saving australia's threatened wildlife



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 owns 15 sanctuaries covering over 1,100,000 hectares (2.7 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.

During the last four years, over 90% of AWC's total expenditure has been spent on conservation programs, including land acquisition. Less than 10% has been spent on development (fundraising) and administration.

Cover Photo: The Red-backed Fairy-wren is the subject of an important AWC research project at Mornington; see pages 17-19. (photo: Dean Ingwersen).

Inset on Cover: The Kultarr is one of the many rare and threatened species at Kalamurina; see pages 3-5. (photo: Lochman Transparencies).

Note: Photo on December 2006 cover also by Jiri Lochman.

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Welcome to the June 2007 edition of *Wildlife Matters*. Thank you to all of our supporters who helped with the purchase of Wongalara. Your generosity has made it possible for AWC to protect a very special property and its suite of animals and plants, many unique to the Top End. As you will read on pages 8-9, AWC has now completed the acquisition and has commenced delivery of key on-ground actions, including fire management and a baseline biological inventory. Already, some of the property's biological secrets are being revealed as our field staff document significant range extensions for several species. Additional survey work is sure to turn up more exciting discoveries.

On behalf of AWC, I would like to extend a special thank you to the Thomas Foundation and The Nature Conservancy, who have provided generous support for AWC during the last 12 months including in relation to Wongalara. As reported on page 7, the Thomas Foundation and TNC have established a program under which donations of more than \$10,000 to AWC for eligible projects may be matched.

Long-term supporters will recognise that this is our largest edition of *Wildlife Matters*. It reports on a wide range of AWC projects in all four corners of the continent (and in the centre!), including feral animal control, fire management, monitoring programs and the conduct of key research projects. The scale of AWC operations highlights the growing maturity of the organisation and the professionalism and skill of AWC's dedicated staff team. We are, with your support, developing an exciting new model for conservation in Australia.

A good example of AWC's leadership has been our role in delivering fire management in the Kimberley. This year, AWC was contracted by government to implement fire management across more than 8 million acres of the Central Kimberley. This has been achieved by AWC, working in close collaboration with a range of landholders (see pages 14-16). I am not aware of any other example of a non-government conservation organisation delivering fire management at this scale in Australia. It is a wonderful example of AWC's capacity to help make a real difference on the ground in one of Australia's most remote areas.

An important part of our approach to implementing practical conservation programs is developing a process for measuring our effectiveness. I am pleased to report that preliminary indicators, such as the population of key species at our sanctuaries, are positive – see the report on Scotia's endangered mammals (pages 22-23). In other words, we are delivering a good return on your charitable investments by translating donations into higher populations of threatened species!

AWC is now well placed to attempt another ambitious project – linking Lake Eyre National Park and the conservation reserves of the Simpson Desert through the acquisition of the 667,000 hectare (1.65 million acre) Kalamurina pastoral station. This is conservation on a truly grand scale: establishing the nation's largest private nature reserve and creating a contiguous network of protected areas in central Australia that is larger than Tasmania. This is our next great challenge – I hope you can help us meet this challenge of securing a precious desert wilderness before the end of 2007.

Thank you again for your generous support. I hope you enjoy reading about how that support is helping AWC make a difference where it really counts – *in the field*.

Atticus Fleming
Chief Executive

Breaking News:

Kalamurina

AWC bids to link Lake Eyre & the Simpson Desert



Kalamurina contains important habitat for migratory birds. Ecopix

AWC has secured a remarkable opportunity to establish the largest privately-owned nature reserve in Australia. Kalamurina covers a stunning 667,000 hectares, stretching from the northern shore of Lake Eyre to the southern boundary of the Simpson Desert reserves. It is a property of exceptional conservation values, containing endangered species and habitats not represented in any national parks.

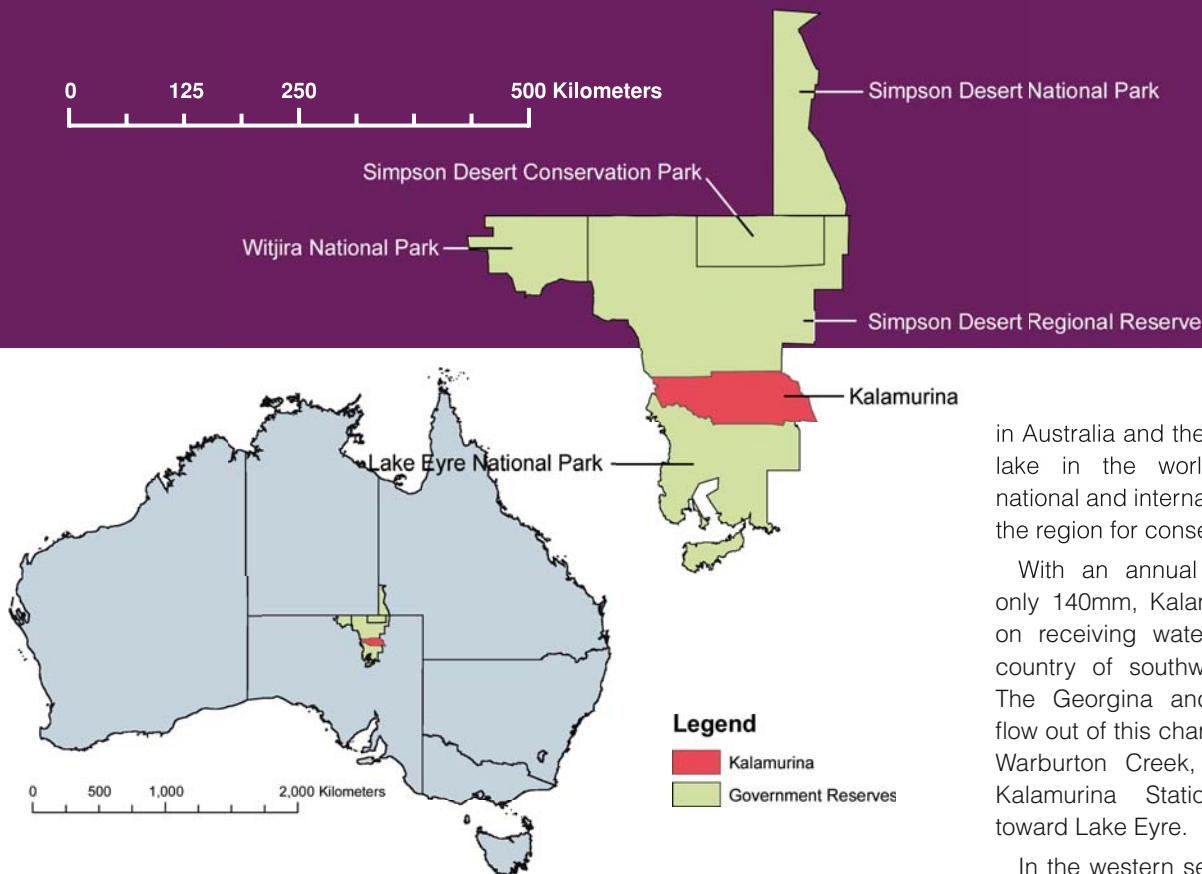
This is conservation on a grand scale - by linking the Lake Eyre National Park and the Simpson Desert Regional Reserve, AWC's acquisition of Kalamurina will create a single protected area in central Australia that is larger than the entire State of Tasmania.

In order to complete the acquisition of Kalamurina, AWC must raise \$3 million by 21 December 2007 – a total of \$4.50 per hectare (approx \$1.80 per acre). Please help make this remarkable project a reality. All donations are tax deductible.



Kalamurina: A summary of its significance

- Kalamurina will, if acquired, become the largest non-government nature reserve in Australia and, to the best of AWC's knowledge, the largest highly protected private reserve in the world.
- By linking the Lake Eyre National Park and the Simpson Desert Regional Reserve, the acquisition of Kalamurina will create a contiguous protected area in central Australia that is larger than the entire State of Tasmania.
- The acquisition of Kalamurina will, by consolidating such a large area for conservation, play a vital role in helping the fauna of central Australia respond to the effects of climate change.
- Kalamurina protects a diversity of arid zone ecosystems including extensive dunefields, a network of freshwater and saline ephemeral lakes, claypans, desert woodlands and shrublands and a range of vegetation types associated with the creeks and floodplains of the Warburton River system.
- Several threatened habitat types occur on Kalamurina, including riparian habitats that are not represented in existing national parks.
- Kalamurina protects a stunning array of desert wildlife including:
 - several threatened species, such as the Ampurta; and
 - several species endemic to the Lake Eyre Basin (ie, found nowhere else in the world), including the Lake Eyre Dragon.



Area, location and regional context

Kalamurina is located 950 kilometres north of Adelaide, west of the iconic Birdsville track. For many decades, Kalamurina has been operated as a cattle station, one of the largest in Australia. It covers a vast area of more than 6,670 square kilometres (667,000 hectares or 1.65 million acres).

Kalamurina straddles two bioregions – the majority of the property is in the Simpson Strzelecki Dunes Bioregion, with a small proportion of the eastern section in the Channel Country Bioregion. The strategic significance of the property is further highlighted by its location at the intersection of three of Australia's central deserts – the Simpson, Tirari and Sturt's Stony Deserts.

However, of even greater importance is the fact that Kalamurina provides a vital link from Lake Eyre National Park to the Simpson Desert Regional Reserve. The acquisition of Kalamurina for conservation will create a contiguous network of protected areas across two

States covering, in total, more than 7 million hectares (18 million acres). *This is an area larger than Tasmania.*

The size of Kalamurina, and its role in connecting Lake Eyre and the Simpson Desert, is important because:

- Kalamurina captures a large and ecologically significant section of the Lake Eyre catchment, including the lower reaches of three major river systems (the Warburton, the Macumba and the Kallakoopah). The conservation of Kalamurina is thus critical to the integrity of Lake Eyre itself.
- Many of the animals found in Australia's arid zone require large areas of habitat for their survival. This enables them to utilise temporary refuge areas produced by isolated storms and showers. Even small mammals have been recorded travelling up to 10 kilometres in response to isolated rain.
- The establishment of large conservation areas and corridors, particularly areas covering a significant north-south latitudinal gradient, will assist animal and plant species in adapting to climate change.

Desert rivers of Kalamurina

A feature of Kalamurina is the Warburton Creek system, one of Australia's major inland river systems. Warburton Creek runs into Lake Eyre near the south-western boundary of Kalamurina. Lake Eyre is the largest lake

in Australia and the fifth largest terminal lake in the world, highlighting the national and international significance of the region for conservation.

With an annual average rainfall of only 140mm, Kalamurina relies heavily on receiving water from the channel country of southwestern Queensland. The Georgina and Diamantina Rivers flow out of this channel country and into Warburton Creek, which then enters Kalamurina Station and meanders toward Lake Eyre.

In the western section of Kalamurina, the Macumba and Kallakoopah Creeks converge with the Warburton before it enters Lake Eyre. Here is the key to the diversity of wildlife on Kalamurina – the convergence of three of central Australia's most important rivers to form an intricate pattern of habitats which are not represented in existing national parks.

Warburton Creek generally flows every two years, but exceptional rain events are required for the floodwaters to reach Lake Eyre, and this only happens once a decade. However, the creek breaks its banks about every four years, producing a flush of green growth in the surrounding floodplains.

As this edition of *Wildlife Matters* goes to press, the Warburton Creek is flowing into Lake Eyre, hopefully symbolising a new era of conservation for this unique landscape.

The habitats on Kalamurina

Kalamurina protects a diversity of arid zone ecosystems including extensive dunefields (white and red sand), a network of freshwater and saline ephemeral lakes, claypans, desert woodlands and shrublands and a range of vegetation types associated with the creeks and floodplains of the Warburton River system. Kalamurina also contains small areas of gibber and spinifex country. In total, the National Land and Water Resources Audit has identified at least 7 threatened ecosystems that are likely to be present on Kalamurina.





Eyrean Grasswren.

Chapman

We need your help to save Kalamurina and its wildlife

AWC has secured an opportunity to purchase Kalamurina and create one of the world's largest wildlife corridors. We now have until December 2007 to raise the \$3 million required to complete the purchase and provide for the effective management of Kalamurina.

If AWC cannot complete the purchase of Kalamurina, it is likely the property will revert to being a cattle station and the opportunity to link Lake Eyre and the Simpson Desert will be lost.

Please make a tax-deductible donation to AWC to support the Kalamurina project. At a cost of \$4.50 per hectare (\$1.80 per acre) for acquisition and management, your donation will make a real difference.

A donation of \$300 will provide for the purchase and management of 66 hectares (165 acres) of this spectacular desert wilderness.

If you donate \$300 or more, or make a monthly pledge of \$25 or more, AWC will send you a certificate to commemorate your donation. For details, see the enclosed donation form or the back page of this newsletter. *Thank you for any support that you are able to provide.*

The riverine and floodplain habitats are perhaps the most biologically significant areas of Kalamurina, providing oases in an otherwise very dry landscape. However, it is these riparian areas that are also the most heavily degraded by cattle grazing. Removal of stock is essential if these habitats are to survive and recover.

The wildlife of Kalamurina

Kalamurina is home to a rich assemblage of arid zone fauna, including a large number of threatened species. The most significant mammal species on Kalamurina is the *Ampurta*, a small carnivorous marsupial which is listed as endangered under Federal legislation. Kalamurina and adjacent lands are one of the last strongholds for this little-known species. Other mammals on Kalamurina are likely to include the Kultarr, the Long-haired Rat, at least two dunnart species and possibly the Kowari, the Plains Mouse and the Dusky Hopping-mouse.

Over 160 bird species are likely to be present on Kalamurina, including the Eyrean Grasswren. Other threatened or declining species include the Australian Bustard and the Plains Wanderer, which

has previously been recorded near the property boundary. The reptile fauna is diverse, including more than 50 species such as the endemic Lake Eyre Dragon.

Key management issues

Given the arid nature of the property, and the relatively small area of spinifex, fire management is not likely to be a major management issue at Kalamurina. Similarly, our inspection of the property revealed that there are very few weeds. Accordingly, following the removal of cattle from Kalamurina, the major management issue is likely to be the control of feral predators and herbivores.

Camels are widespread and abundant in the Simpson Desert, but relatively few were seen at Kalamurina during AWC's assessment of the property. Predation by cats and foxes is, however, a major threatening process for arid zone fauna, particularly medium-sized mammals. In addition to rabbit and camel control, AWC will need to implement a dedicated feral predator control strategy, drawing on our work at places like Scotia and at Mt Gibson.



Arid zone rivers and their associated habitats are a feature of Kalamurina.

Newhaven



A Great Desert Skink burrow.

Rains

Two priority species at Newhaven are the Mulgara and the Great Desert Skink. Both species are listed as vulnerable to extinction under Federal biodiversity legislation. However, both species are also significant because of their potential as indicator species for the health of habitats, especially in relation to the impacts of fire and feral animals. Recent surveys suggest that healthy populations of Mulgara and Great Desert Skink survive at Newhaven. The article below is drawn from a report by Rachel Paltridge (a local ecologist working with AWC) on an initial survey for both species which was conducted in March 2007.

The main objective of our initial field trip was to conduct a broadscale survey of Newhaven to determine the distribution of two species - the Mulgara (*Dasyercus cristicauda*) and the Great Desert Skink (*Egernia kintorei*). This survey was part of a broader project being implemented in conjunction with the local indigenous community, under which members of that community are employed to assist with surveys and potentially also with fire management. Both the Mulgara and the Skink are sensitive to altered fire regimes. A key objective of the project is, therefore, to identify appropriate fire regimes for these and other threatened species in central Australia.

Forty two stratified random plots were selected prior to conducting the survey, using the Newhaven Vegetation Map and the Newhaven fire-history database (1970-2006) for the stratification. Plots

were separated by a minimum of 4km to ensure independence relative to the home-ranges of Mulgara and Great Desert Skink.

At each survey site an area of approximately 300m x 200m was searched for 1 person-hour for tracks, scats, burrows and diggings. Fortunately, the presence of both the Great Desert Skink and Mulgara can be identified with relative ease by skilled observers. The Great Desert skink has a characteristic warren with multiple entrances and a large latrine within a few meters of the warren. Mulgaras also have distinctive burrows, which can be readily confirmed by the presence of tracks, diggings and sometimes scats nearby.

Mulgara sign was common and widespread in the eastern half of Newhaven with active Mulgara burrows

recorded at a total of 10 sites. Only 1 of the 10 positive sites was in the western half of the property, just west of old Gurner homestead. Most of the sites with active Mulgara sign had been burnt between 2002 and 2004 but they also occurred in mature (unburnt for > 20 years) soft spinifex habitat at two sites.

Active Great Desert Skink burrows were recorded at six of the 42 random plots, as well as two additional sites where burrows were observed whilst travelling in the vehicle. Most sites comprised regenerating spinifex (burnt between 2002 and 2004) but six of the eight plots with active burrows were either adjacent to unburnt habitat or contained scattered unburnt mature hummocks within the fire scar.

This initial survey represented a great start to the project, with abundant evidence of Mulgara and Great Desert Skink on Newhaven. Additional survey work is planned, as well as intensive burrow mapping to compare the abundance of Skinks between sites where patch burning has been regularly conducted with sites that have been burnt by larger wildfires. The "patchiness" of different aged vegetation at these sites will be determined through fine scale fire-scar mapping from satellite imagery.

Footnote: The second survey program at Newhaven revealed a total of 42 small mammals across 7 sites including Desert Mice, Stripe-faced Dunnarts, Hopping Mice, Sandy Inland Mice and Mulgaras. It is clear there is a large population of Mulgara at Newhaven.



Solar Power at Mornington

Reducing our carbon footprint

As AWC's largest sanctuary and a major regional centre for research and conservation, Mornington Sanctuary has the largest electrical power demand of any of our properties. Mornington's remote location means that electricity is currently supplied by diesel generators, with accompanying fuel costs and greenhouse-gas emissions. However, with your support, AWC is planning a comprehensive program to slash the use of fossil fuels at Mornington:

- Phase 1 involves implementing an array of energy efficiency measures.
- Phase 2 involves establishing a major solar photovoltaic power plant to provide clean electricity.

This program will cut Mornington's fuel consumption dramatically - to a third of the current usage. This will result in annual savings of:

- 24,000L of diesel fuel
- \$30,000 in diesel fuel costs
- 70 tonnes of emitted carbon dioxide

This is the equivalent of driving a quarter of a million kilometres!



Solar panels supply electricity to a residence at Mornington, but a large solar facility is required for the conservation and research centre.

The initial capital costs of solar power systems are substantial – for the Mornington program, the overall cost is more than \$500,000. The WA Government's Sustainable Energy Development Office has recently approved a \$245,000 subsidy for our program. In addition, an AWC donor has generously offered to donate \$100,000 towards the solar power plant if contributions from other donors match this amount!

We need your help to raise additional funds - more than \$200,000 - to establish the solar facility at Mornington and to implement key energy efficiency measures.

Please help AWC reduce our carbon footprint. Donations can be made on the donor form included with this newsletter or the form on the back page, or by contacting Beth Reid in our Perth office (08 9226 0340). Remember, your donation will be doubled as a result of the match being provided by another AWC donor!

The Thomas Challenge

Matching major gifts for conservation

The Nature Conservancy (TNC) and an eminent Australian, philanthropist David Thomas, have announced one of the largest private gifts to conservation in Australia's history: a \$10 million gift

structured as a "challenge grant". Under the challenge grant, The Thomas Foundation is contributing \$2 million per annum for 5 years. These funds will be used to match gifts given by individuals

to eligible projects undertaken by AWC and other Australian partners of TNC.

This means that donations to AWC of between \$10,000 and \$1 million can be matched by TNC under the Thomas Challenge. This is a unique opportunity for AWC supporters to "double" their contribution to conservation. For more information about the Thomas Challenge, please contact Atticus Fleming, AWC's Chief Executive (08 9226 0340).

The contribution to conservation by David Thomas and his wife, Barbara, is a remarkable act of generosity and leadership, and a wonderful outcome for conservation in Australia. Already, the Thomas Challenge has had a profound catalytic impact, generating over \$900,000 in eligible donations for the acquisition and management of Wongalara. *AWC thanks David and Barbara Thomas and TNC for their extraordinary support and assistance through the Thomas Challenge.*



Michael Looker (TNC), Rob McLean (TNC) and Max Bourke (Thomas Foundation and TNC) discuss northern Australian issues with Dr Sarah Legge.

Wongalara Wildlife Sanctuary

Delivering practical land management at AWC's newest sanctuary

Thank you to all of the AWC supporters who contributed to our Wongalara campaign. As a result of your generosity, AWC has now completed the acquisition of Wongalara and commenced implementation of an ambitious land management program. Wongalara is AWC's 15th sanctuary, meaning the organisation and its small team of dedicated staff now manage more than 1.1 million hectares around Australia. In the paragraphs below, Dr Sarah Legge talks about the initial steps in delivering our conservation programs at Wongalara. Sarah's article highlights the fact that the acquisition of a property like Wongalara is just the beginning – the real challenge is to deliver practical and effective on ground management on an on-going basis.

Almost as soon as AWC completed its acquisition of Wongalara, the heavens opened as if to celebrate the dedication of this extraordinary property for conservation. Massive flooding cut off access to the property in spectacular fashion. However, as the creeks subside, the muddy mess around the homestead is cleaned up and the tracks are made navigable once again, the top priorities at Wongalara are to begin the biological inventory and monitoring program, and to implement a biodiversity-friendly fire management program. As this newsletter goes to press, a team from Mornington Sanctuary are temporarily based at Wongalara making great progress with both of these priorities.

Commencing the biological inventory of Wongalara

There's a special brand of excitement that flavours a fauna survey in any new location, and Wongalara, sitting just under Arnhem Land, was bound to throw up some highlights. Sure enough, we were rewarded from the moment we entered the front gate where a pair of Hooded Parrots flew up from the track to welcome us. Hooded Parrots are confined to a very small area of the Top End, and there could be no better species to symbolise the entrance to the newest AWC property. Sixty kilometres later and now very near the homestead, we crossed a creek that was being visited simultaneously by Gouldian Finches. We have encountered them at this creek fairly regularly since then.

Chance observations such as these are thrilling and informative, but unlike diurnal, brightly coloured birds, most animals are cryptic - hiding under leaf litter or underground, only emerging from cover at night, or requiring a very close examination with an eye lens in order for their identity to be revealed. This means we need to set a variety of different traps to capture animals, and actively search and use spotlights at night for certain species. Most animals are also fussy about where they live, so biological inventory work must be structured around the full range of ecosystems found in an area.

Wongalara supports a diverse array of ecosystems, dominated by a wide

mix of open woodlands and shrublands. The sandy uplands are cloaked in Woollybutts, Rusty Bloodwoods, Stringybarks and Scarlet Gums with a healthy understorey of grevilleas and peas. Stands of Lancewood (a very hard timbered acacia) perch on the sides and tops of many of the hills; the Firegrass that typically coats the ground under the lancewood emits an attractive rosy blush between the grey-green leaves of the acacia canopy. The gullies running off the higher country are choked with tall paperbarks and pandanus, with rainforest patches on the steeper, rockier sections. In the north of the property the extensive cracking blacksoil-floodout country of the Mainoru River runs into paperbark floodplains and open grasslands.



AWC ecologist, Ray Lloyd captures a small snake in a Wongalara crevasse. Swanie provides moral support.

Heathcote



The lost city at Wongalara is prime habitat for Rock Ringtail Possums.

Ecopix

new routes and contingencies that are developed on the run, adding a spicy condiment to the burning program.

Operational spice notwithstanding, the burning program at Wongalara during May has been very successful, with fires generally carrying long enough to form good firebreaks, burning patchily and being extinguished at night by the heavy dews that characterise this time of the year.

This first prescribed burning season has been a great start to our goal of changing fire patterns on Wongalara so that the size and frequency of fires are both reduced. Over time, the biodiversity monitoring program that we are establishing this year should help reveal the benefits of this fire management to wildlife by recording the recovery of species and ecosystems over time.

Our survey is sampling this variety of habitats and thus characterising their associated fauna. For example, in wetlands we are catching Common Planigales as well as a broad assemblage of frogs (17 species so far, out of a total of 22 species likely to occur on the property). In the southwest of Wongalara an astonishing formation of limestone rock pillars emerge from the Scarlet Gum woodland, and here we are finding Common Rock Rats and Rock Ringtail Possums. The heavy sandstone slabs that nestle between Callitris pine and eucalypt woodlands near the centre of the property are a refuge for Knob-tailed Geckoes, *Nephrurus shea*. This find is especially exciting as it represents a large range extension from the previously known distribution.

The region that includes Wongalara is relatively poorly surveyed, and we are already picking up range extensions for a number of species other than the Knob-tailed Gecko, including plants (eg. the Snappy Gum, *Eucalyptus leucophloia*, a favoured nest tree for Gouldian Finches), as well as large populations of species for which Wongalara purportedly lies on the very edge of their recorded distributions (eg. Apostlebird, *Struthidea cinerea*).

This first survey effort is forming the basis of a larger biodiversity monitoring program that will track the changes in flora and fauna over time as we remove stock, feral animals and weeds, and manage fire.

Fire management at Wongalara

Without active intervention, frequent and extensive fires dominate the north Australian landscape in the mid to late dry season. A management priority for Wongalara is to implement a prescribed burning program that limits the frequency and extent of these uncontrolled fires.

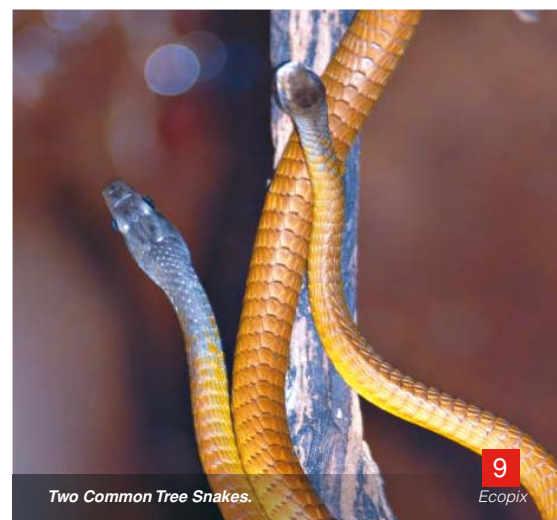
After examining the region's fire history using archived satellite images, and talking to neighbours to explain our strategy and get their feedback, we developed a prescribed aerial burn plan for May 2007. The aim of our burn plan is to stop large fires from entering Wongalara from the most common ignition points outside the property boundaries, and also to break up ecosystems within the property into two or more 'cells' so that if a fire affects that area later in the year, it will not burn the entire vegetation patch. In this way, we hope to create vegetation of mixed ages within any single ecosystem, thus catering for fauna with a wide range of ecological requirements.

In practice these simple objectives can be hard to achieve operationally. For example, translating a hypothetical line on a map into a real burn on the ground is challenging if that area burnt last year (and the grass regrowth is limited), or the area is low lying (and is holding moisture longer than elsewhere). This means that hypothetical plans are often "shelved" for



A Common Planigale captured at Wongalara.

Heathcote



Two Common Tree Snakes.

Brooklyn Wildlife Sanctuary

Inventory and monitoring in a biodiversity hotspot

Brooklyn Wildlife Sanctuary ranges from high altitude World Heritage tropical rainforest and tall wet Eucalyptus forest in the east, through a decreasing altitude and rainfall gradient to vast open savanna woodlands in the west. In 2006, AWC, CSIRO and the Queensland Herbarium commenced a survey and monitoring program at Brooklyn to investigate the flora and fauna patterns across the property and to measure its recovery during the process of destocking. In this article, Dr Alex Kutt (CSIRO Sustainable Ecosystems) and Jeanette Kemp (Queensland Herbarium) describe the progress to date on this important collaborative project.

Measuring changes at Brooklyn

In May 2006, our project commenced with the establishment of 50 permanently marked monitoring plots across Brooklyn. The monitoring sites are expected to tell a fascinating story about Brooklyn's recovery from grazing and its response to AWC's practical land management. The sites were stratified by altitude, geology and vegetation type. Twice a year, a standardised survey of plants and animals will be undertaken at each site over a four night / five day period. Each fauna sample will comprise 8 timed bird counts, 4 pitfall traps, 6 funnel traps, 20 Elliott traps, 2 cage traps and 5 timed "active searches". This standardisation requires an extraordinary level of effort, but ensures that the sites will faithfully reveal patterns of change over time.

The 50 sites have already been sampled twice; for two weeks in May 2006 (wet season), and two in November 2006 (dry season). A third survey was being undertaken as this newsletter was going to press. The November 2006 survey involved 9 Earthwatch volunteers and 5 staff from CSIRO, James Cook University and the Queensland Environment Protection Authority. To date 800 bird counts, 1200 pitfall trap nights (1 trap open for 1 night = 1 trap-night), 1900 funnel trap nights, 16,000 Elliott trap nights, 400 cage trap nights, and 100 active searches have been completed.

Some of the emerging patterns include the high diversity of granivorous birds, mixed bird flocks and reptiles in the stony ranges; and the high mammal diversity (but relatively low bird

diversity) on the Mt Lewis footslopes. A number of new and significant species have been recorded; including the rare Yellow-naped Snake and the very cryptic blind snake *Ramphlotyphlops broomi*. Part of the significance of Brooklyn is its biogeographic location at the crossroads of the wet-dry tropical divide. For example, four species of whipsnake (*Demansia spp.*) occur on the property and gecko diversity ranges from two rainforest endemics (chameleon and leaf tail geckoes), a granite boulder endemic (*Oedura coggeri*) and a number of typical savanna and arid species (*Diplodactylus spp.*).

In the latest survey (May 2007), 100 nest boxes were mounted permanently in trees in each of the sites. The nest boxes will specifically target more cryptic species such as the Feathertail



Glider and the Brush-tailed Phascogale, though a range of arboreal mammals is expected to be recorded.

Mammals and climate change

A number of the monitoring sites are located down the altitudinal gradient from the high rainforest of Mt Lewis to the alluvial plains of the Mitchell River. The top sites can only be accessed by foot, and sampling requires an arduous 10km return journey every morning for five days to check traps. This gradient was established to investigate how the fauna, particularly mammals, respond to changes in altitude and habitat. A diversity of ground-dwelling mammals (predominantly rodents and dasyurids) have been recorded, including the very secretive Prehensile-tail Rat (a first for Brooklyn). Neat patterns occur; as we move down the slope, the predominantly rainforest species Dusky Antechinus, Bush Rat and Fawn-footed Melomys give way to open woodland species like the Yellow-footed Antechinus, Canefield Rat and Grassland Melomys. As our climate warms, the habitat boundaries along the altitudinal gradient on Mt Lewis are expected to shift. Accordingly, over time, our sites on Mt Lewis will provide important data on the long-term effects of climate change on native mammals.

Northern Quolls: defying the Cane Toad

The Northern Quoll is listed as endangered, and is sadly declining across northern Australia. A key factor in the demise of the Northern Quoll is the relentless expansion of the Cane Toad. However, at Brooklyn, our surveys have revealed a healthy population of Northern Quolls on the granite slopes of Mt Lewis despite the occurrence of Cane Toads in this area. It is unclear why the Brooklyn Quolls appear to readily co-exist with Cane Toads. Perhaps the rugged refugial habitat at Brooklyn ensured the survival of the Quoll population until individual Quolls learnt not to eat Cane Toads? In any event, the

Quoll population at Brooklyn will become increasingly important as this beautiful animal disappears across much of its range elsewhere in northern Australia.

Phenomenal flora diversity

The native plant species list for Brooklyn is spectacular, currently including 988 species representing more than 11% of Queensland's native plants. The most diverse groups include grasses (130 species) and legumes (75 species). Brooklyn is certainly one of the most floristically diverse conservation reserves in Australia! With a number of habitats yet to be sampled, the flora list will soon pass 1000 species. Some areas are extremely species rich, and can contain more than 80 plant species in a 500m² plot: surprisingly, these areas include non-descript, seasonally inundated open woodlands.

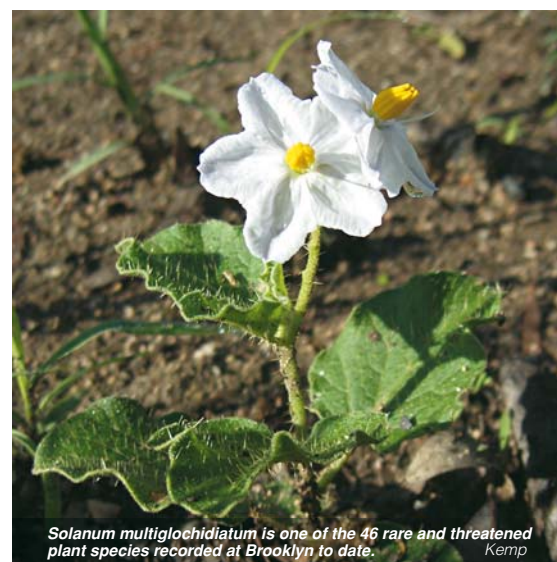
The number of threatened plants at Brooklyn is equally extraordinary; 46 species, representing 5% of the total flora. This is largely due to the high number of rare and restricted high altitude rainforest endemics. More rare species are likely to be recorded as rainforest botanists concentrate on Mt Lewis in the near future. For at least 16 rainforest species, Brooklyn represents a large proportion of their total population and distribution. Several plants are also very poorly known, with 6 species recorded less than 10 times in the Queensland Herbarium's collection. This includes the very rare white potato orchid (*Gastrodia urceolata*), recorded at Brooklyn Station for only the third time in Queensland.

The field herbarium at Brooklyn now contains specimens of 540 woodland and open forest species. Digital scans of every specimen and some 218 field photographs comprise a "virtual herbarium" enabling creation of field identification books to be used at Brooklyn and other AWC wildlife sanctuaries such as Mt Zero/Taravale.

We look forward to providing further updates as the Brooklyn plant list exceeds the magical 1,000 species.



The Northern Death-adder (*Acanthophis praelongus*) is moderately common on Brooklyn. Vanderduys



Solanum multiglochidiatum is one of the 46 rare and threatened plant species recorded at Brooklyn to date. Kemp



The endangered Northern Quoll; this young animal was trapped in a pitfall trap and was one of five individuals recently trapped on the foothills of Mt Lewis. Vanderduys



Paruna Wildlife Sanctuary

Paruna Wildlife Sanctuary is a 14 kilometre wildlife corridor covering more than 2,000 hectares (5,000 acres) and functioning as a critical link between Walyunga and Avon Valley National Parks. Located approximately an hour from Perth, Paruna is a vitally important site for the conservation of the threatened mammals of south-western Australia. AWC ecologist, Dr Jacqui Richards, provides an update on our programs at Paruna Wildlife Sanctuary.

Halting the decline of the Woylie

Karakamia Wildlife Sanctuary, AWC's first reserve, has long played a vitally important role in the conservation of one of Australia's iconic endangered mammals – the Woylie or Brush-tailed Bettong. Sadly, the Woylie appears to have declined significantly in recent years and Karakamia now appears to be home to the only remaining high-density population of Woylies in Western Australia.

Karakamia is free of feral cats and foxes, with the property surrounded by a feral-proof fence. As a result of this security from feral predators, the Woylie population at Karakamia enjoys a high rate of recruitment. This allows AWC to translocate, each year, a number of animals to AWC's nearby Paruna Wildlife Sanctuary. The Woylies released in Paruna also bolster the populations in Walyunga and Avon Valley National Parks, both of which adjoin Paruna.

In mid-2006, AWC translocated ninety six (96) Woylies from Karakamia to Paruna. Each animal received a thorough health check prior to translocation, and

ten animals were fitted with radio collars to monitor their survival and track their post-release movements.

In a bid to enhance our understanding of the factors that influence Woylie survival, AWC staff and University of WA Honours student Andrew Hide monitored the Woylies released at Paruna for three months. This involved extensive trapping across the entire 2,000 hectare sanctuary, with more than 2,000 trap nights undertaken. In addition, radio-tracking of the collared animals occurred on a daily and then a weekly basis.

Paruna contains good habitat for Woylies and AWC employs an intensive feral animal control program: however, Paruna is not completely surrounded by a feral-proof fence. Accordingly, there is a relatively low level of feral predator activity at Paruna. AWC's monitoring of the released Woylies was designed, in part, to help identify whether the level of feral predator activity at Paruna is impacting on the Woylie population and, if so, to what extent.

The initial monitoring results demonstrated that the Woylies did not disperse far from the release site and all

animals that were re-trapped had gained weight. This confirmed that Paruna offers quality habitat with an ample food supply. Overall, 90 of the 96 released animals were trapped at Paruna in the first two weeks post-release, providing evidence for the success of the translocation.

However, three radio-collared Woylies were killed by foxes or cats, and more recent monitoring in 2007 suggests that additional Woylies have been lost to predation. Fortunately, the Woylie population still manages to produce new recruits, and the animal is a common sight during regular spotlight monitoring.

The monitoring program also highlighted the importance of Paruna for other endangered mammals – more than 40 Quenda were captured as well as 14 Chuditch (Western Quoll).

The Woylie monitoring program at Paruna has provided important information on the ecology of this highly endangered mammal. The project has also confirmed that Karakamia and Paruna will continue to play a critical role in the conservation of the Woylie. However, a preliminary analysis of the results also suggests that AWC





AWC field ecologist, Jo Williams, releases an endangered Black-flanked Rock-Wallaby, with assistance from Noah Fleming (trainee ecologist!).

Blaxell

must consider the construction of a feral-proof fence around the entire Paruna sanctuary if we wish to secure a significant and sustained further increase in the population of the Woylie and other endangered mammals.

Capturing cats on camera

While foxes are controlled within Paruna by regular baiting, little is known about the number of feral cats that occur within the sanctuary. AWC has sought to address this issue by implementing an innovative cat monitoring program using “camera traps”. Established with the support of the Threatened Species Network (TSN), the objectives of the camera trap program include:

- to determine whether feral cats are playing a role in reducing the rate of population increase of threatened mammals, such as the Woylie and Quenda;
- to estimate how many cats occur in Paruna and to enhance our understanding of their behaviour; and
- to help develop a mechanism for the control of cats.

The camera traps have been in place since the beginning of 2007. Each trap is placed for a period of four weeks along

one of eight transects running along the Avon River, in areas of high mammal traffic. Each camera is accompanied by a sand pad (for tracks), a lure of ‘pongo’ – a delightful combination of cat urine and other material – and a FAP (Feline Attracting Phonic), which emits a regular high-pitched, cat-like noise. John Angus from the WA Department of Environment and Conservation (DEC), who has conducted similar camera trapping projects throughout WA, has provided a wealth of advice to AWC on the use of the camera traps.

The initial results have provided an intriguing snapshot of the lives of several fauna species in Paruna. At least four feral cats, sporting a variety of coat colours, have been ‘captured’ by the digital cameras. A number of young foxes dispersing into Paruna have also been photographed, along with the odd feral pig. By far the majority of images, however, have included Woylies, Chuditch, Echidna, Tawny Frogmouths and Magpies – we are obviously blessed with inquisitive native fauna.

We will provide more information on the results of our camera trap surveys on the AWC website. As regular readers of *Wildlife Matters* will be aware, AWC

is also working with DEC and the Invasive Animals CRC to develop a bait that will allow the broadscale control of feral cats. More information on that project, at Mt Gibson Wildlife Sanctuary, will be included in the next edition of *Wildlife Matters*.

Endangered Rock-wallabies released at Paruna

The Black-flanked Rock-wallaby population within Paruna Wildlife Sanctuary was boosted in April 2007 with the release of a further 18 individuals. In a joint operation with DEC, the animals were sourced from Mt Caroline Nature Reserve and Querekin Rock. More than 70 Black-flanked Rock-wallabies have now been released at Paruna since 2001.

The 18 animals included 8 males from Mt Caroline and a further 5 males and 5 females (4 of which also carried pouch young) from Querekin Rock. The Rock-wallabies were released at dusk as part of a special event involving supporters from as far as away as New York. The event was covered by Channel 10, who showcased these beautiful Rock-wallabies on the 6pm news.

A new approach to fire management

Implementing a co-ordinated fire strategy across more than 8 million acres

In April 2007, AWC was engaged to develop and implement an innovative fire management strategy across the Central Kimberley. By June 2007, the strategy had been prepared and extensive prescribed burning operations had been delivered in partnership with Kimberley landholders and government agencies.

The role of AWC staff in implementing the Central Kimberley fire strategy has included:

- preparing basic fire history maps for 8 pastoral leases, one national park and an area of unallocated crown land;
- working with landowners to develop prescribed burning strategies for their properties;
- implementing aerial burning operations, from a helicopter, along burn routes extending for more than 1,750 km; and
- partnering with government agencies, including the Department of Conservation, to ensure co-ordinated delivery of fire management across the Kimberley.

The fact that AWC was engaged to work with landholders and deliver fire management across such a large area of the Kimberley is important recognition of AWC's leadership in the area of fire management and our track record of working collaboratively with other landholders. In fact, the early success of the strategy is a powerful example of what can be achieved by landholders and an organisation like AWC working together, with the support and assistance of government agencies. Participating landholders have demonstrated a deep commitment to improving fire management, for the benefit of both the environment and the productivity of their pastoral operations. Their practical expertise has been a critical factor in the success, to date, of the strategy.

The next step for AWC is to map the prescribed burns that have been carried out and to monitor their effectiveness during the dry season, especially when we enter the period of high risk for wildfires. While it will take several years to re-establish conditions in the Kimberley that are fully compatible with the delivery of appropriate

fire regimes, our efforts in 2007 will be regarded as successful if the prescribed burns operate to limit the scale and intensity of wildfires in the late dry season.

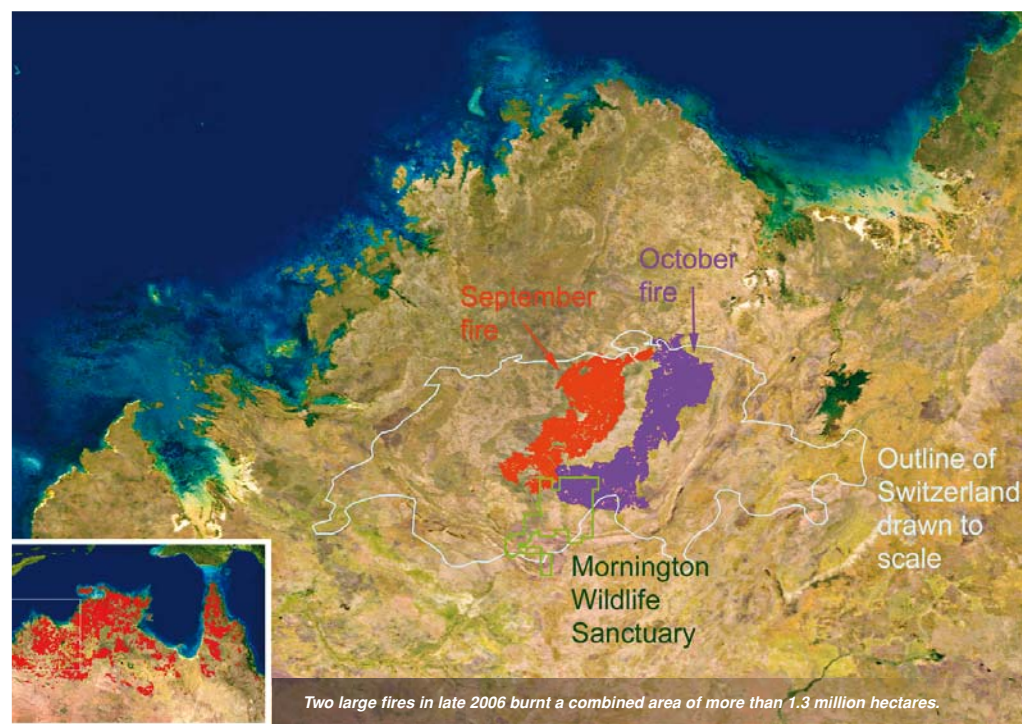
The problem: a cycle of extensive wildfires

For over 20 years, the Kimberley has been locked into a regular cycle of intense and very extensive fires in the mid to late dry season. These fires typically recur in any one area every two years. In the first year after a fire the fuel loads are usually too low to carry another fire, but after two years the grass layer has built up just enough so that high temperatures, dry air, and persistent south-easterlies between June and November conspire to encourage conflagrations which engulf large areas.

For example, in late 2006 two massive fires in the Central Kimberley burnt a total of 1.3 million hectares over the course of six weeks before they were extinguished by AWC staff when the fires entered

Mornington. The satellite map included with this article shows the Kimberley, the boundary of Mornington Wildlife Sanctuary, and the areas covered by each of these fires. To illustrate their scale, the outline of Switzerland has been superimposed onto the map. Both of these fires were started by people. Although lightning strikes can also ignite massive fires, this happens relatively rarely because lightning is usually associated with rain.

Both the scale and the high frequency of these Kimberley fires are causing enormous damage to the wildlife and habitats of the Kimberley. For example, wildfires destroy the sensitive vegetation along creeks (and thus the animals that depend on this fragile habitat like Purple-crowned Fairy-wrens). They are also blamed for eating away at the margins of rainforest pockets, penetrating too deeply into sensitive gorge habitats, causing woodland thinning, and promoting the decline of plant species like cypress



Two large fires in late 2006 burnt a combined area of more than 1.3 million hectares.

in the Central Kimberley

pine (*Callitris intratropica*) and heathy vegetation with slow life cycles. Some animal groups such as small to medium sized mammals are particularly intolerant of high fire frequencies. For conservation managers, addressing the problem of frequent massive fires is therefore extremely important. Pastoralists are also concerned by the pattern of regular, extensive wildfires as they cause significant loss of pasture at a time of the year when fodder for stock is already a scarce resource.

The solution: a new, regional approach to fire management

Tackling a problem of this scale represents a formidable challenge - the Kimberley is vast and sparsely populated, resources for fire management are constrained and the region has, until now, lacked a co-ordinated approach to fire management.

In response to this challenge, the Rangelands Natural Resource Management Co-ordinating Group (a community-based organisation responsible for delivering Federal and State funding) contracted AWC to deliver the first stage of an NHT-funded project ("Ecofire"). The Ecofire project aims to reduce the extent of mid to late dry season fires in the Kimberley by facilitating better cooperation and communication between neighbouring properties, and by bolstering the resources available to the community for fire management implementation.

AWC was contracted, in part, because our fire management at Mornington has always involved dialogue and cooperation with our neighbours. The development of a fire management strategy for the Central Kimberley is, therefore, a natural extension of AWC's approach at Mornington.

In addition to Mornington Wildlife Sanctuary, the project requires AWC to help in the development and implementation of fire management on eight other properties in the Central Kimberley. These properties represent



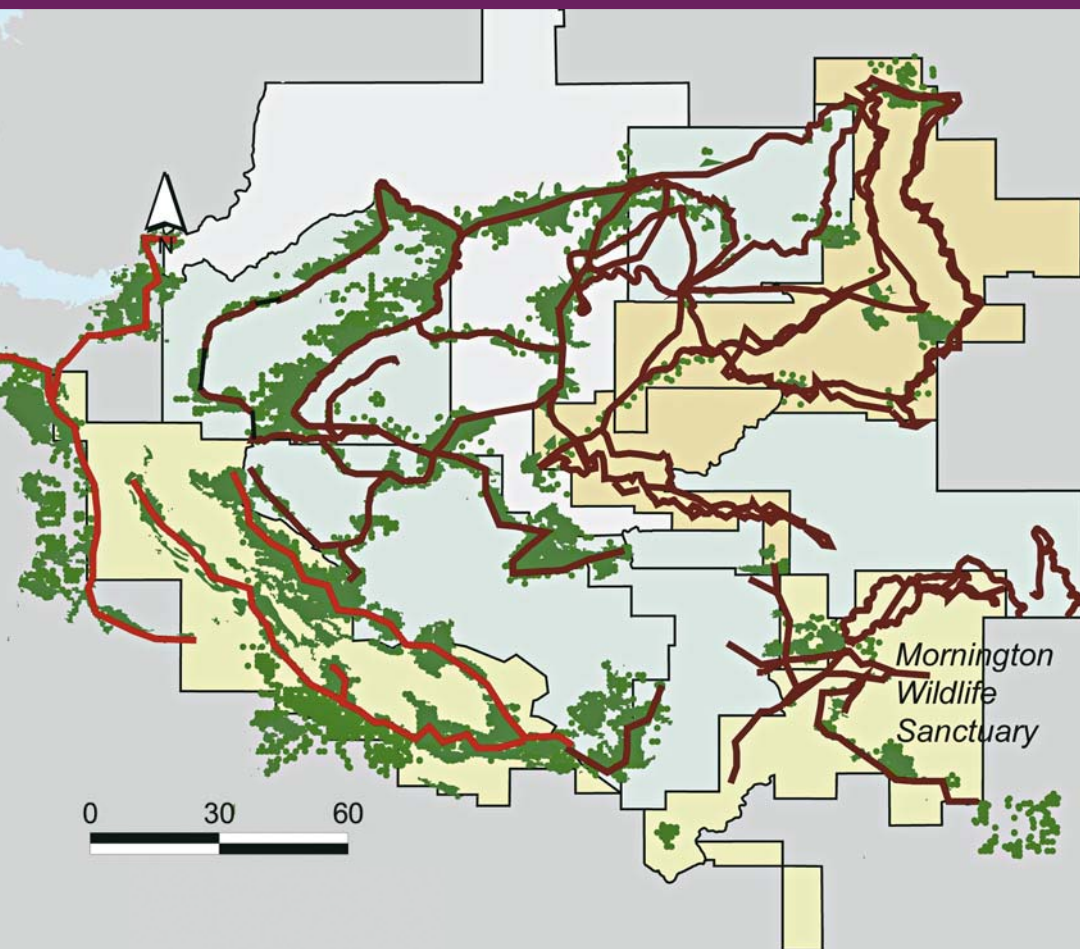
A fire lit by aerial incendiary in the Central Kimberley.

Legge



Rainforest patches in the Kimberley are at risk from extensive wildfires.

Walden



Central Kimberley Aerial Control Burns



Land Tenures

- Pastoral
- Unallocated Crown Land
- Aboriginal Pastoral
- Conservation Land

Routes and results

- Aerial burn routes by AWC
- Aerial burn routes by DEC
- Hotspots and fire scars detected by satellite

A map showing the routes over which AWC conducted aerial prescribed burning with landowners: incendiaries were dropped over more than 1,700 kilometres.

a range of land uses including pastoral properties, Aboriginal pastoral land and national park. The project is therefore an important model for co-ordinated fire management across multiple tenures.

Delivery of the Central Kimberley fire management plan

In the first stage of the project, AWC carried out an analysis of fire patterns in the region using archived satellite imagery. This analysis was shared with property managers and, when combined with their own experience, helped to identify which areas of each property were most at risk from extensive wildfires (because of high fuel loads, or proximity to a regular ignition point, etc). In turn, this led to the development of a regional "Burn Plan". The Burn Plan includes specific details of where prescribed burning will occur

to establish firebreaks which, hopefully, will stop the spread of wildfires later in the year. The Plan also identifies where to put in mineral earth breaks to act as fire fighting lines, if required.

Following this initial planning, AWC staff spent the best part of three weeks in an R44 helicopter, dropping incendiaries over a cumulative 1,750 km of firebreak lines in the Central Kimberley. The results look extremely promising, in that the prescribed fires have burnt "patchily", were mostly

extinguished on the first night by heavy dews, yet still formed good breaks.

By the end of the year, some of these firebreaks will be put to the test from the massive uncontrolled fires that are bound to affect the Kimberley. This will be the ultimate test of whether our new, collaborative approach to fire management has been able to improve outcomes for both the environment and pastoral production by minimising the scale and frequency of wildfires.



The fire project has involved collaboration by a range of stakeholders.

Legge

The Red-backed Fairy-wren

Defining a model for wildlife-friendly fire



A male Red-backed Fairy-wren in breeding plumage.

Murphy

Inappropriate fire management is a key factor in the decline of many mammal and bird species across northern Australia. In particular, extensive fires in the late dry season are recognised as having a severe impact on biodiversity. Most land managers therefore advocate the use of prescribed burns in the early dry season. Fires in the early dry season (while there is still some moisture around) are easier to control and are less intense, so can be used strategically to “break up” the country, helping to limit the scale of any wildfires which may occur later in the season.

There is no doubt that a key objective of fire management must be to limit the scale and frequency of late, dry season wildfires. There is also no doubt that prescribed burning in the early dry season is a key strategy in achieving this objective (as reflected in our strategy for the central Kimberley - see pages 14-16).

However, recent evidence suggests that some early dry season fires may have their own negative impacts and pose a risk to the survival of some plants and animals. For many small mammals and other fire sensitive species, the key factor may be the length of the interval between fires rather than the season or intensity of any fire – in other words, the survival of fire sensitive species is likely to require the maintenance of patches of “long-unburnt” habitat within the landscape. Prescribed burning programs must therefore take into account the need for

patches of “long unburnt” habitat and the need to avoid creating a homogenous landscape of young vegetation.

Accordingly, when AWC undertakes prescribed burning operations in the early dry season in northern Australia we are aiming to achieve both of the following objectives:

- breaking up the country to limit the scale and intensity of any wildfires that may occur later in the dry; and
- delivering a “patchy” burn, so that individual fires leave patches of habitat unburnt as they move through the landscape: this means that the landscape should always contain a mix of vegetation of different ages, including patches of long-unburnt habitat.

However, achieving these outcomes ‘in the field’ represents an enormous challenge for AWC and other land

managers. There are many gaps in our existing knowledge. How do we design our early season burning strategy to accommodate fire sensitive species? Can we afford to increase the size of early dry burns so they are more effective at stopping late dry wildfires? How big do the unburnt patches need to be? We need more information about the impact of early dry season fires and, in particular, the mechanism by which fire affects sensitive species.

To answer these questions, AWC Ecologist, Dr Steve Murphy, has embarked on a ground-breaking study of a key indicator species – the Red-backed Fairy-wren. In the following paragraphs, Steve talks about his project, which promises to make a significant contribution to the development of fire management strategies across northern Australia.

Why did you choose the Red-backed Fairy-wren?

AWC has an established research program examining the relationship between fire and the decline of seed eating (granivorous) birds, like the Gouldian Finch. The Red-backed Fairy-wren is an ideal species to look at the effects of fire on *insectivorous* animals. Previous studies have shown that Red-back Fairy-wrens are fire sensitive – ie, they respond to fire - which is a necessary attribute for an indicator species. Also, they are very common and occupy relatively small territories, which means that devising landscape-scale experiments is logistically easier than if we were looking at a larger ranging species. Red-backs are also easy to catch and observe, and have long legs capable of holding the 4 small bands

(2 on each leg) that we use for individual marking. All of this helps with census work and population monitoring.

What are the key questions being addressed by this research project?

The key questions relate to understanding why a fire sensitive species will persist, decline or become locally extinct when exposed to early and late dry season fires. In particular:

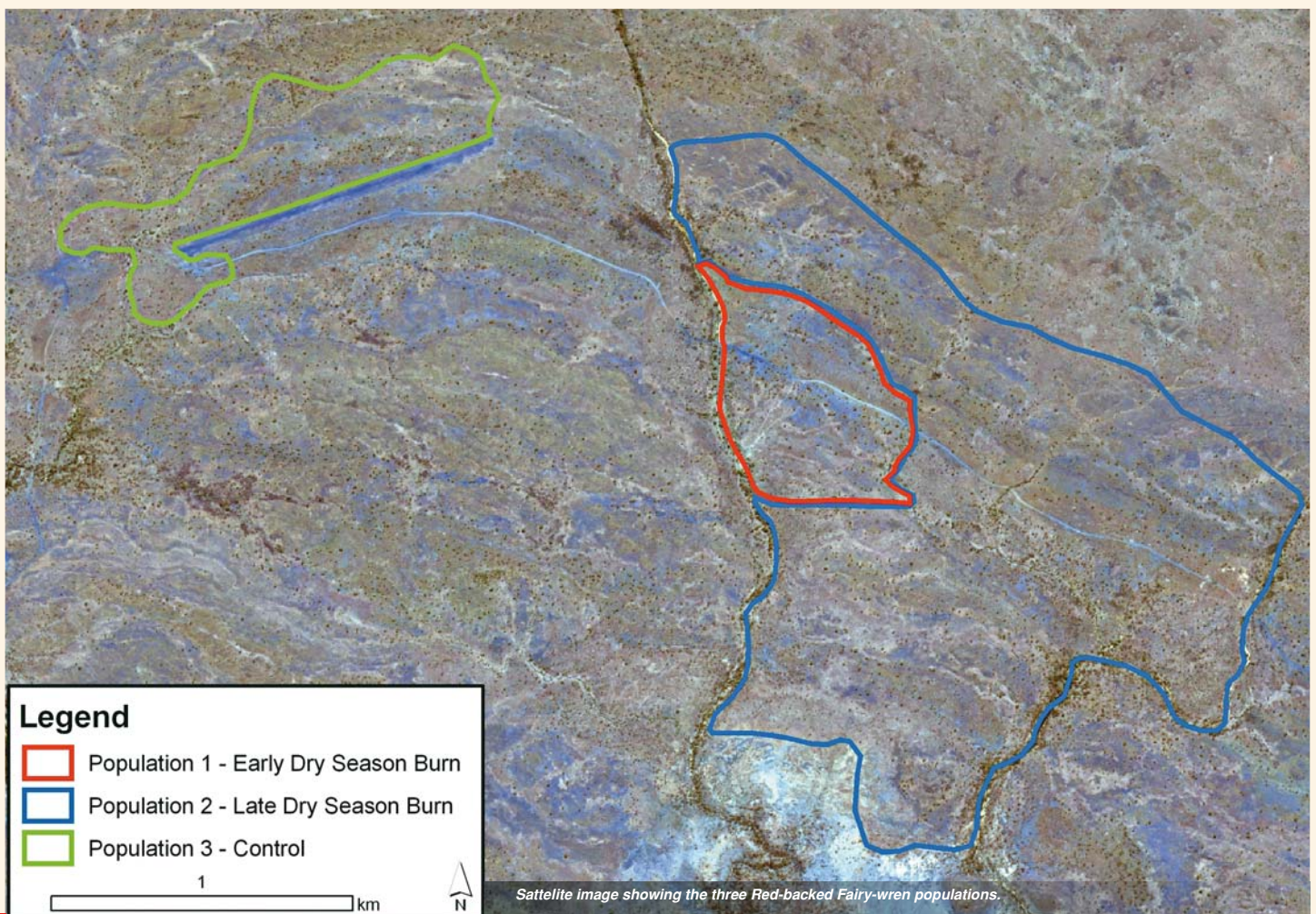
- How do various fire attributes (such as early versus late, proportion of territory burnt etc) affect population parameters such as immediate post fire survival, individual physiological fitness, habitat use, the likelihood of staying on the territory after the fire, pair maintenance, later reproductive success etc?

- What are the social and demographic implications on the neighbours of birds whose habitat has been burnt?
- Do patches burnt early in the year act as refugia if adjacent territories are burnt later in the year?

Can you describe the key components of the project?

The project involves identifying three different populations of Red-backed Fairy-wrens and applying a different fire regime to the habitat of each population.

- The habitat of Population 1 has been subject to an early burn.
- Population 2, which is adjacent to Population 1, will be subjected to a later, hotter fire, similar to the widespread fires that commonly occur in the Kimberley in the late dry season.





The cool burn in Population 1 habitat: 35% of the area was left in unburnt patches.

Rains

- The third population is the “control” population.

For each population, it was necessary to build a “pre-burn” profile by identifying the intimate details of individual birds within each population. This was achieved by recording, on multiple occasions, the exact location, activity and social partners of each bird. Also, individuals were captured and scored for physiological health (eg the amount of haemoglobin in the blood, muscle mass, body weight).

After the experimental early dry burn (Population 1), we have immediately set out to find and repeat all these measures for all of our birds. The data will be analysed against the proportion of territory burnt, which is mapped using aerial photography.

Later in the year, the habitat of Population 2 will be burnt in a late dry wildfire simulation, and we will repeat the profiling process. The habitat of Population 2 is adjacent to the area that has been burnt in an early cool fire (Population 1). We will be particularly interested to see if the early burnt patches are recolonised as refugia, and if subsequent breeding success differs for birds in the various fire treatments.

What are the results to date?

One-hundred and sixty-six Red-backs were caught and colour-banded within the three populations prior to the first experimental burn. These birds were observed 639 times prior to burning, and so we have a clear picture of who was with who, territory size and how each

bird used the different elements in their habitat (i.e. grasses, shrubs, trees etc).

In mid-May, the habitat of Population 1 was burnt in a cool fire (35% of the 40 hectare area was left in unburnt patches). This early dry simulation affected the territories of 56 individuals.

- At three days after the burns, 53 birds had been resighted and further surveys are expected to show that all birds survived the actual fire.
- Most pre-burn pairs have remained stable despite some considerably large movements.
- Preliminary results show that the response of the birds depended on the amount of their former territory that burnt – birds relocated completely if all of their territory was

burnt, but were more likely to stay depending on the number of shrubs that remained unburnt, rather than a specific threshold of unburnt grass.

- In 376 observations since the burn, few birds have been seen foraging in burnt parts of the study area. Some birds move back into their former territories each evening to roost.
- A surprising result is that several birds have moved into areas that were unused by wrens before the burn. Why these patches were unsuitable before the fire is unclear, but over the coming weeks, these, along with all of our other birds, will be re-caught to see how they are coping physiologically.
- We expect the birds in Population 2 will also survive the late season fire, when it is applied. However, we are interested in the demographic parameters and subsequent breeding success of these birds, compared to Population 1 birds.

This is a vitally important project in helping to define fire management strategies that will promote the survival of fire-sensitive species. Watch out for an update in future editions of *Wildlife Matters*.



Dr Steve Murphy implementing the cool burn in Wren habitat (Population 1).

Australia's Mammal Extinctions

Dr Chris Johnson is one of Australia's leading biologists. AWC is pleased to be working with Chris at Mt Zero-Taravale Wildlife Sanctuary and Brooklyn Wildlife Sanctuary, where one of Chris' students is undertaking a project on the endangered Northern Bettong. The Northern Bettong is one of many Australian mammals that are listed as threatened with extinction. In a recently published book, Chris provides a comprehensive analysis of the history of mammal extinctions in Australia over the last 50,000 years. Here, Chris shares with AWC supporters some of his thoughts on the causes of Australia's mammal extinctions.

Is there something wrong with Australian mammals? Over the last 200 years at least 18 species have gone extinct. This is about half of all recent mammal extinctions world-wide. With many of our surviving mammals in precariously low numbers, more extinctions are possible. Australian mammals seem to be exceptionally prone to extinction – why?

In a new book I take a long view of this problem, beginning with the giant mammals that still roamed the continent 50 000 years ago: the diprotodons, marsupial tapirs, marsupial lions, giant kangaroos and others known collectively as the 'megafauna'. They disappeared in a mass extinction about 45 000 years

ago. The cause has been debated for over 150 years: was it a change in the climate? hunting by ancient Aboriginal people? or habitat change caused by those people's use of fire?

I think the evidence is now overwhelming: it was hunting. It's not just that the extinctions coincided so closely with human settlement throughout Australia, at a time of stable climate and unconnected with any widespread increase in fire. More tellingly, the species that disappeared shared a particular set of traits that would have made them especially susceptible to over-hunting. Most important, they had low reproductive rates and long development times, meaning that

their populations were slow to replace animals killed by hunters. Because of this, even low rates of killing amounted to over-harvest. Very similar patterns of extinction followed human arrival in other parts of the world. Australia's mammals suffered especially badly, but this is explained by the fact that our mammals tend to have unusually low reproductive rates. Slow reproduction is presumably an adaptation to the low productivity of Australian ecosystems, but it put diprotodons and the rest at a special disadvantage when people arrived. Some slow-reproducing species did survive, but only if they had the protection of dense forests or lived in trees where they were harder to hunt.





The mainland Mala is one of Australia's rarest mammals. Parish



The Dingo may hold the key to controlling foxes and cats across parts of Australia. Ecopix

The next phase of mammal extinction unfolded about 3 000 years ago, with the extinction of the thylacine and devil on mainland Australia. The blame for this is usually laid on the dingo, which came to the mainland at about that time. But there is another, and I think a better explanation – thylacines and devils declined because of increased hunting pressure, due to more efficient weapons in the hands of an increasing human population. During the last few thousand years Australian Aborigines adopted many new technologies and strategies for hunting and gathering, and population densities increased. The invention of the spearthrower was an especially important change in the hunting of large mammals. We know from rock art that people hunted thylacines by spearing them. The rock art of northern Australia suggests that thylacines disappeared when people began using spearthrowers, before the dingo arrived. The spearthrower never reached Tasmania, where devils and thylacines (at least until recently) survived.

By the time Europeans reached Australia, therefore, the mammal fauna of the continent had already been fundamentally changed by human impact. All of the largest species had gone, and in particular all of the original predators above quoll-size had disappeared from the mainland. This removal of the original predator fauna set the stage for the next wave of extinctions,

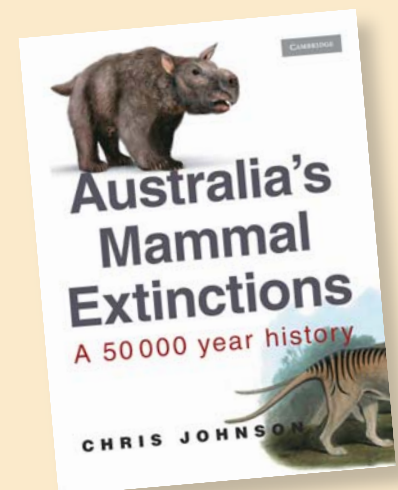
which affected medium-sized mammals from drier habitats in inland Australia.

There has been much debate over the causes of these recent declines. Proposals include changed fire regimes, disease epidemics, effects of rabbits and introduced livestock, and introduced predators. However, the evidence points clearly to introduced predators, the red fox and the feral cat, as the main cause in almost all cases. Why did these two predators cause such appalling damage to Australia's mammals? Partly, this was because the introduction of the rabbit resulted in enormous populations of foxes and cats. But the lack of large native predators was also crucial. Predator species are often intensely aggressive towards one another. Large predators attack and kill smaller ones, making it difficult for a new predator to get established in an environment that already has a large native predator. In the absence of native large predators Australia was completely open to the cat and fox invasion.

Or almost completely open: when the thylacine went extinct the dingo stepped into the role of top predator on mainland Australia. We have good evidence that dingoes reduce the numbers and impact of foxes and cats, enough to suggest that dingoes could help protect vulnerable native species from extinction. This may seem far-fetched, but consider the story of the extinction in the wild of the mainland sub-species of the mala (or

rufous hare-wallaby). In 1987 this once-common animal survived only in a small part of the Tanami Desert that was free of foxes and cats. Dingoes were common, and because they sometimes hunted mala, they were poisoned. Foxes and cats invaded within a few weeks and soon all the mala had been killed. From the early days of European settlement dingoes have been persecuted as predators of livestock, and they are rare or absent across large areas of southern Australia. These are the places where foxes and cats are most abundant and have been most destructive to native mammals.

It is clear that if we want to guarantee native mammals a future, we need to protect them from introduced predators. This can be done by predator eradication in intensively-managed nature reserves, as has been achieved in some AWC properties. Elsewhere, I believe we should be thinking about using dingoes to control foxes and cats, and thus help us protect native biodiversity.



Chris' book is available from all good bookstores and is a "must-read" for anyone interested in Australia's natural history and, in particular, in the conservation of Australia's mammal fauna.



AWC's Peter Hensler and Brooke Bateman, a student of Chris Johnson's, conduct a survey at Mt Zero.

Scotia Wildlife Sanctuary

Measuring the success of AWC's threatened mammal releases



Bridled Naitail Wallaby, one of the mammals reintroduced at Scotia.

Ecopix

Sir David Attenborough has described the Scotia Endangered Mammal Recovery Project as “a vitally important project for Australia and the planet”. The Project involves the establishment of the largest feral-predator free area on mainland Australia.

In total, 77 kilometres of feral-predator proof fencing will be constructed at Scotia enclosing over 15,000 hectares (nearly 40,000 acres). Already, an area of 4,211 hectares has been enclosed by the feral exclusion fence, with 6 endangered mammals released into this cat, fox and rabbit-free environment. Dr Joss Bentley reports on the success of the project and its significance for the conservation of Australia's most endangered mammals.

In November 2004, AWC launched the Scotia Endangered Mammal Project to help prevent further extinctions of Australia's threatened mammal fauna. Scotia is located on the far western plains of New South Wales, the area with the highest mammal extinction rate in Australia – 22 species, more than 47% of the region's terrestrial mammals, have disappeared. To address this situation, AWC set out to protect a small and struggling population of Numbats that had been reintroduced by Scotia's previous owners (Earth Sanctuaries), and

to release a minimum of six additional nationally threatened mammal species. Over the past two years, five species have been reintroduced. In November 2004 there was a pilot release of Woylies, which was soon followed with quarterly releases of Boodies, more Woylies, Bilbies and Bridled Naitail Wallabies until September 2005. Then in March 2006, Greater Stick-nest Rats were reintroduced.

Although it is planned to reintroduce additional species to Scotia in the future, it is critical that the health and wellbeing

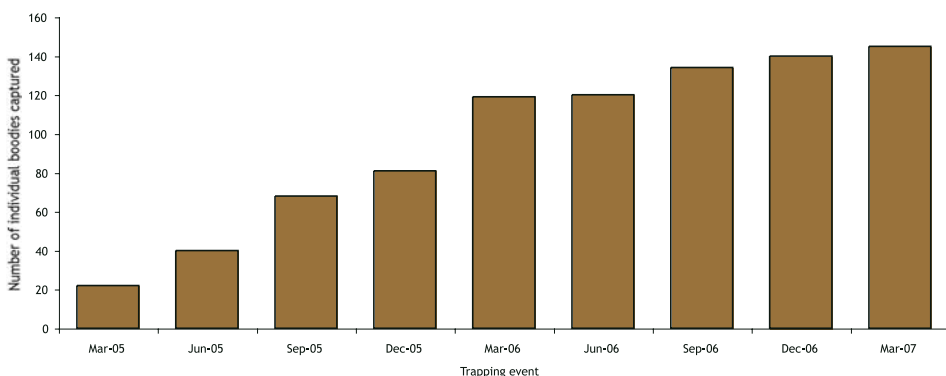
of existing populations is measured. So every three months, the Scotia ecologists and numerous volunteers spend a sleepless but rewarding week trapping Stage 1's inhabitants. To do this a permanent trapping grid has been established and over 9,500 trap nights of data have been collected (the first two years data was collected by Graeme Finlayson of the University of Sydney, and will form the basis of his PhD). Preliminary inspection of the data suggests that each of the four species initially released appear

to have established self-sustaining populations. The Boodies and the Bilbies in particular appear to be thriving with steady but continuous increases in population size since the first release. The Boodie population has increased from the initial 20 in the first release, to over 150 (see graph). In March this year it was particularly gratifying to see female Woylies with large pouch young, as although Woylies were routinely captured previously, few appeared to have large pouch young, and there was some concern that reproduction and recruitment rates for this species may be too low. Over the past six months, however, Scotia has returned to 'average' rainfall, and it appears that the Woylies have responded. It may be that this species will only recruit new animals into the population in average or good years, unlike the other species that remain continuous breeders. Despite a shaky start, the Stick-nest Rats also appear to have established a small but vigorous population, with those animals that made it through the first few weeks post-reintroduction all surviving. Small stick-nests have started to appear at various locations throughout Stage 1.

Unlike the other species, which are all relatively easily captured, Numbats cannot be trapped, and are difficult to survey using observational techniques. So for this species a different monitoring technique is used: track surveys. Over 15 km of dirt roads in Stage 1 are 'dusted' early in the morning, then late in the afternoon the roads are inspected for numbat tracks, each of which is entered

in the GPS and the direction of the track recorded. Although it's not possible to tell exactly how many individuals make these tracks, it is possible to make a general estimation of population size, and population trends and patterns of habitat use can be inferred. Recent surveys suggest that the Numbat population has climbed to more than 80 animals, and has been stable for the past couple of years.

As well as monitoring the populations of reintroduced animals, it's important to understand the impact of their reintroduction and the associated management (ie the exclusion of feral predators and competitors) on the wildlife populations that exist naturally at Scotia. To do this, nearly 40 monitoring sites have been established. Sites are stratified across the four main vegetation types found at Scotia, and are located both inside and outside Stage 1. At each site reptiles, birds and small mammals are surveyed, vegetation characteristics and landscape function are measured and a photographic record taken. Although the data from the 2006/2007 summer monitoring is yet to be analysed, nine new species were recorded, four of which are threatened: Western Pygmy Possum, Mallee Worm-lizard and Australian Bustard (all Endangered), and the Wedgesnout Ctenotus (Vulnerable). It is clear that Scotia is making a significant contribution to the protection of Australia's threatened fauna not only through reintroductions, but also by protecting naturally occurring populations of threatened species.



The population of Burrowing Bettongs (Boodies) has steadily increased at Scotia.



we urgently need your help

yes, I want to help save australia's endangered wildlife



▲ Newhaven is a joint project with Birds Australia

Kalamurina

Please direct funds to Kalamurina

I would like to help link Lake Eyre and the Simpson Desert. Please allocate my donation to the acquisition and management of Kalamurina.

Kalamurina can be protected for only \$4.50 per hectare (\$1.80 per acre).
• A donation of \$100 will purchase and protect 22 hectares (55 acres)
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Commemorative Certificate

I have donated \$300 or more or made a monthly pledge of \$25 or more. Please send me a certificate commemorating my contribution to the conservation of Kalamurina.



Mornington Solar Facility

I would like to help AWC reduce its carbon footprint by establishing a solar facility at Mornington.

Please use my donation to support AWC operations around Australia.



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

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

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

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I am unable to give monthly but would like to make a

single tax deductible donation of:
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I wish to pay by: **Credit card** - Please fill in details or call (08) 9226 0340.

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

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

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I / We request that you draw by way of the Direct Debit System,
\$ _____ per month, for the payment of a monthly donation
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I / We acknowledge that this Direct Debit Request is governed by the
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Information

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

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 summarizing 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 1897 West Perth WA 6872), 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 1897 West Perth WA 6872), 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) 9226 0340 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) 9226 0340, or lodge a Direct Debit Claim through your nominated Financial Institution.

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.)



Please post this form to:

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