AUSTRALIAN Wildlife

SPRING Vol: 4/2011
$10 (non-members)

Celebrating a new century of wildlife preservation in Australia

Journal of the Wildlife Preservation Society of Australia Limited
(Founded 1909)

Photos from the Native Animal Rescue Group, Milton

Young flying fox after rescue

Twin sugar glider possums

Hoover and kid

This little wallaby was named ‘Dizey’ - she has now been released

Young sugar glider

Quoll

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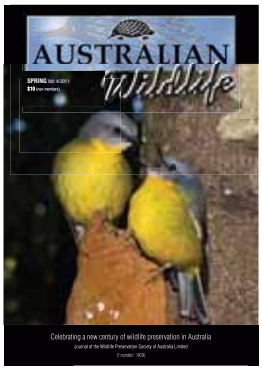

Front cover

Eastern yellow robin (*Eopsaltria australis*) – taken at Lamington National Park by Trevor Andersen from Brisbane.

The summer edition of *Australian Wildlife* will feature a spread of Trevor's photographs of birds in flight. This is one of the most difficult avenues of photography to pursue.

WILDLIFE PRESERVATION SOCIETY AUSTRALIA

Celebrating a new century of wildlife preservation in Australia

Australian Wildlife

is the official journal of the Wildlife Preservation Society of Australia Limited.
Founded in 1909, the Society is dedicated to the conservation of our unique Australian wildlife in all its forms.

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Directors 2010

Notice to our members

The Wildlife Preservation Society of Australia Limited is managed and controlled by an elected board of ten volunteer directors. The Society is a registered company limited by guarantee with ASIC and is responsible for complying with all its regulations.

Any member who might like to consider serving as a director of the Society is invited to contact the national office for more details. The most important qualification to serving as a director is "a commitment to and love of Australian wildlife".

The Society holds regular monthly meetings on the first Wednesday of each month in Sydney.

The Editor would like to feature a member's profile in the fortnightly email newsletter and occasionally in our quarterly magazine. Members are invited to consider submitting a short article with a photograph for possible publication.

Our Mission

The Wildlife Preservation Society is an independent, voluntary, non-profit conservation organisation, formed in 1909, and is committed to the preservation of Australia's precious flora and fauna. We act as a watchdog and provide advice to government agencies and institutions regarding environmental and conservation issues concerning all aspects of wildlife preservation. Our mission is to conserve Australia's fauna and flora through education and involvement of the community. We are dedicated to the conservation of our unique Australian wildlife in all its forms through national environmental education programs, political lobbying, advocacy and hands on conservation work.

Our Society has always known that a conservation battle is never really won until the victory is enshrined in legislation. We have always tried to convince politicians of the necessity to include the preservation of Australia's precious wildlife and its vital conservation habitat in all their planning and environmental issues and discussions.

From the President's desk

Suzanne Medway - President

Part of the Mission Statement of the Wildlife Preservation Society of Australia states we " … are totally committed to the preservation and protection of Australia's unique native fauna and flora in all its forms through national environmental education programs".

One of the ways our Society participates in national environmental education programs is the awarding each year of ten university grants to benefit the preservation of Australian wildlife by supporting applied scientific research with a conservation focus; and to further the Society's commitment to environmental education by supporting students with a research interest in conservation. We also aim to increase awareness of, and attract new members to, the Wildlife Preservation Society.

Under the scheme, the Society provides ten annual grants of $1,000 each to honours or postgraduate students conducting research which will contribute to the conservation of Australian wildlife. The funds are provided for purchase of equipment and consumables, travel expenses related to field research, or attendance of conferences at which the student is presenting their work.

In this issue of *Australian Wildlife* the ten recipients of the University Grants have written about their projects and supplied photographs of themselves, as well as images relevant to their project.

The range of subjects being researched is fascinating and makes for interesting reading.

I feel that the future of wildlife conservation in Australia is in safe hands when we have such talented and dedicated young people conducting research into the native fauna and flora.

Another part of our Mission Statement mentions that we are " … committed to the preservation of Australia's wildlife through … community involvement, … and hands-on wildlife conservation projects.

To help achieve this particular goal the Society instituted two annual awards – the **Serventy Conservation Medal** and the **Community Conservation Award.**

In memory of the Serventy family, the Serventy Conservation Medal was instituted to celebrate those who labour as volunteers in the conservation field for a love of nature and a determination that it should be conserved. The medal takes the form of a brass plaque that was designed by Australia's foremost sculptor Stephen Walker. The Wildlife Preservation Society of Australia also gives a cash reward of $1,000 to the winner. Many conservationists in the past have suffered financially for their devotion to the cause. This cash award will be some tribute for their dedication. The bronze plaque will be a constant reminder that the conservation movement has remembered their work in the past, just as history will remember the same achievements in the future.

Our Society knows from experience that many organisations and thousands of volunteers are already working tirelessly to save our threatened species as well as the humble and more common Australian species and the precious wildlife habitat in which they live. We are all aware of the wonderful work being carried out by volunteers across the country in saving our sick and injured wildlife. They spend many hours and days caring for a single animal that has been injured by a car, savaged by a feral animal or hurt in bush fires. We want to recognise and help these conservation groups continue with their good work on behalf of the whole community. Under the Community Conservation Award our Society will present a crystal trophy and a cash award of $2,500 to the winning conservation group that is helping to save our precious Australian wildlife.

Details and nomination forms for both these awards are enclosed in this issue of *Australian Wildlife*. Please consider taking the time to nominate either an individual or a conservation group for these annual awards.

The eastern horseshoe bat (*Rhinolophus megaphyllus*), just one of the many species of microbats being studied by Tamara Inkster. More information on university grants on page 21. Photo: Arnaud Gourret

Trees back on the land

TreeProject, a non-profit organisation established 1989, has been playing an active role in bringing the rural and urban community together to repair some of Victoria's environmental problems. For over 20 years, TreeProject has coordinated the activities of hundreds of urban volunteers in propagating indigenous trees and grasses in their backyards to be used for rural revegetation projects. Jan Campbell, who is a Balwyn resident, said: 'I've been growing plants for TreeProject for the last 18 years, and I've planted about 6,000 plants to date.'

TreeProject would like to expand its network of enthusiastic and dedicated volunteer growers to grow native seedlings that will be used to put endemic trees back on the land. These seedlings will be used to establish wildlife corridors, lower the water table, help tackle salinity and soil erosion and provide shelter for stock.

One project that TreeProject volunteers have helped to create is a 'biolink' between Mount Macedon and Cobaw Ranges which is helping to protect the habitat of the endangered pygmy perch.

The Upper Deep Creek Landcare network, made up of three Landcare groups (Newham and District Landcare Group, Deep Creek Landcare Group and Upper Maribyrnong Catchment Group) have collaborated to create a corridor of vegetation connecting up areas along Deep Creek that have become isolated from each other.

Called the Campaspe-Maribyrnong Headwaters Biolink, or the Cobaw Biolink, it is a continuous network of native vegetation in the watershed catchment area that will link Macedon Regional Park with Cobaw State Forest via the Hanging Rock Reserve. Past land clearing had resulted in a loss of habitat for local species, and left the area with extensive scattered remnants throughout agricultural land.

The pygmy perch has been the subject of a recent survey conducted by Melbourne Water. There was concern that the during the past ten years of drought, low flows in Deep Creek have been increasing water temperature and further endangering the pygmy perch, which already competes with mosquito fish. With the recent high flows the concern is that the pygmy perch, previously hidden in deeper holes, might be washed out and become food for larger predators now moving freely along the creek. Fortunately, surveys are indicating that the upper section of Deep Creek still has pygmy perch.

Revegetation with seedlings supplied by TreeProject has improved the health of the Deep Creek, by helping to keep the stream cool and by preventing bank erosion. The area now has cleaner waterways, less run-off, erosion and decay, and the result is a return of flora and fauna to the area. According to Edward Tsyrlin, a freshwater ecologist at Melbourne Water, Deep Creek now has very good river health values, which is good news for micro-invertebrates, the southern pygmy perch – a close relative of the Yarra pygmy perch – flat-headed gudgeon and possibly turtles or platypus.

'TreeProject stock', says Penny Roberts Newham Landcare Coordinator, 'is important not only for the obvious extra native plants in the ground, but also for the opportunity it provides to give landowners information on native vegetation in all its complexity and how to maximise the habitat value for wildlife.'

TreeProject volunteers receive training, a growers' manual and a growing kit that has everything needed to grow healthy seedlings, including native, provenance sourced seed provided by Victorian farmers. 'Growing native seedlings is fairly easy, can be done at home, and can involve the whole family. There is also an opportunity to participate in planting out the seedlings you have grown. It is a very important and fulfilling experience,' said TreeProject Officer Amanda Sheehan.

If you would like to find out more about TreeProject and how to be involved, please contact the office or check out the website. Phone: 03 9650 9477. Email: info@treeproject.asn.au Website: www.treeproject.asn.au

Mount Macedon 2009 Tree Project

John Blamey at the Pygmy perch habitat site

The Hunter's pioneer conservationist

Rohen Conners (Grandson) and Margaret Conners (nee Dews) (Daughter)

Wilfred Dews OAM

Born 14 April 1909; Died 18 February 2011

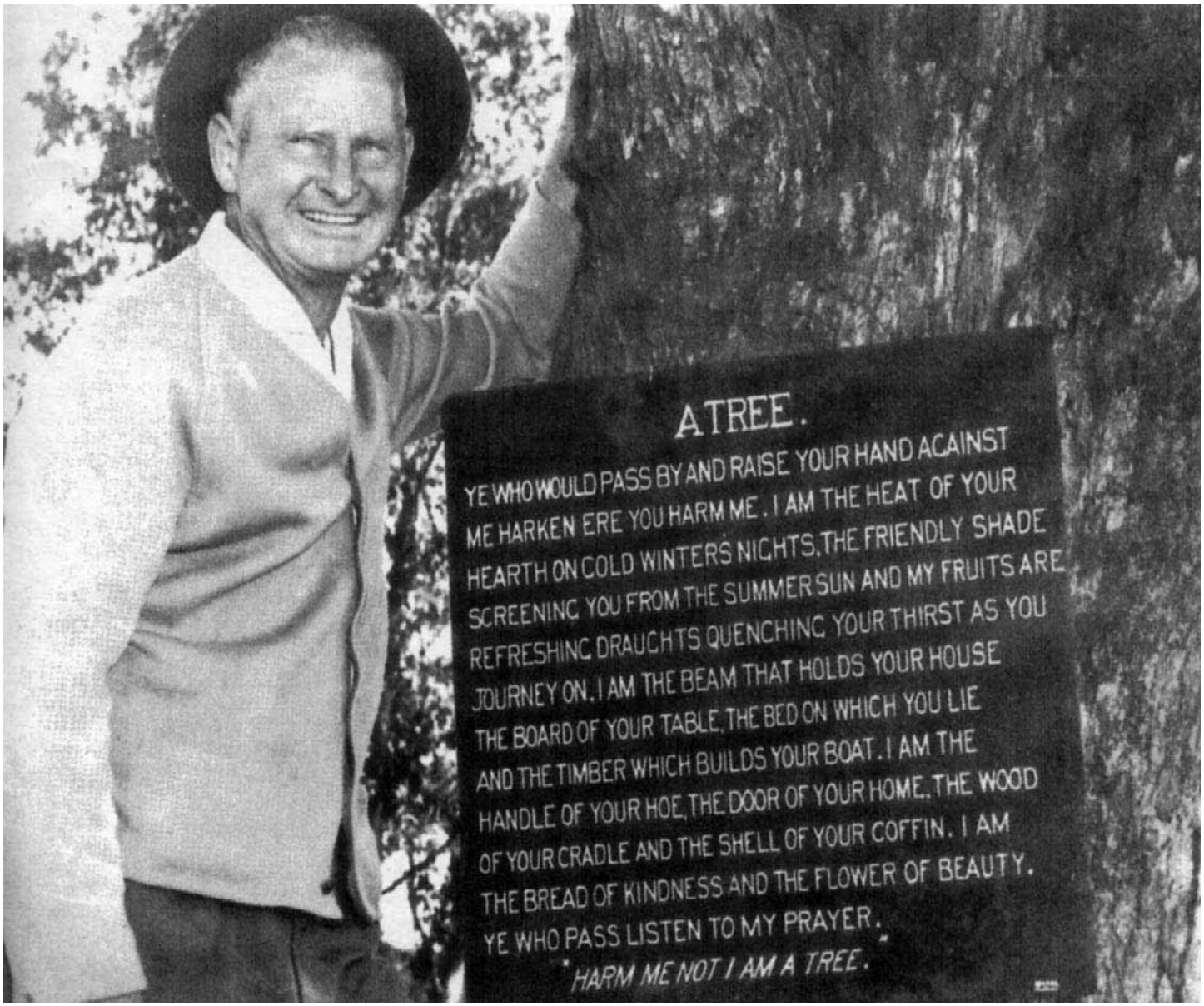
Wilfred Dews planted the seed of modern environmentalism in the Hunter region at a time when few valued Australia's natural heritage. His pioneering conservation achievements were all the more extraordinary, considering his background and the place that benefited from it - Australia's first industrial region.

Wilfred Clyde Dews ('Wilf') was born the fifth of ten children to Harry and Rosina Dews in Teralba, one of Lake Macquarie's first coal mining communities. Leaving school at 14, Wilf joined his father and brothers at Stockton Borehole Colliery which remained his only workplace.

In 1949 a change of ownership saw the colliery substantially modernised and presented Wilf with a life-changing opportunity. Having previously been forced to work on the pit top due to poor eyesight, he convinced the new management to employ him as Australia's first dedicated colliery gardener.

Wilf's colliery garden consisted of Australian trees and shrubs and was a popular attraction with botanists, bird watchers and visiting mining executives alike. He also initiated a commemorative tree planting and plaque program for retiring employees to mark their labour as well as symbolise the return to earth of the once-living material they had extracted.

As a precursor to his later activism, Wilf convinced management to



Dews OAM and his colliery garden 'Tree Prayer' circa late 1950s

preserve a critical wetlands area for birds near the colliery.

In the post-war era the rapid and often reckless growth of suburbia saw the removal of vast areas of bushland. This violence towards nature appeared to Wilf's eyes to depend upon the belief that Australia's flora and fauna were of little value. Alarmed at how much was being lost, seemingly without question, he began attending meetings of *The Wildlife Preservation Society of Australia* ('WPSA') in Sydney and travelled home on the midnight train to Newcastle.

In 1959 Wilf and his wife Mavis decided the Hunter region needed its own conservation group. They organised a public meeting for like-minded people to form a group to "Promote, restore and protect bushland". Buoyed by over a hundred attendees, this vision became the founding mission of the *Newcastle Flora and Fauna Protection Society* ('*Flora and Fauna*') which was soon established.

Flora and Fauna worked tirelessly to protect the Hunter's natural heritage. Politicians and their bureaucrats were lobbied, members got themselves on to community trust boards, newspaper articles were written, advertisements placed, and debates held. When these didn't work, public meetings, mass letter writing and stickers usually did.

Importantly, Wilf's activism spanned class boundaries, genders, political parties and stretched across political jurisdictions from the town halls of the Hunter to Macquarie Street (Sydney) to Canberra.

Flora and Fauna members led the fight for the establishment or protection of the following Hunter reserves: Mount Sugarloaf Reserve; Blackbutt Reserve; Pulbah Island Nature Reserve and Aboriginal Place; Awabakal Nature Reserve and Field Studies Centre; Kooragang Nature Reserve; Shortland Wetlands; Glenrock State Recreation Area; and Belmont State Wetlands. The membership also led the movement to stop sandmining within Hunter national parks and reserves.

Wilf believed the conservation movement must reach out to children and youth to ensure an appreciation of Australia's natural heritage grows with successive generations. *Flora and Fauna* organised school nature excursions and talks as well as donated prizes for environmental projects. Over the years Wilf set his own example by complementing his organisational activism with "hands on" work for the environment. Modelling himself on the famous 'Man of the Trees,' Richard St Barbe Baker, Wilf propagated thousands of native plants and donated them to schools and public parks.

The *quality* of the environment was as important to Wilf as the quantity he was fighting to preserve. In 1971 he predated 'Clean Up Australia Day' by some eighteen years when he organised the first annual 'Cleanathon' in the Lake Macquarie area.

Public recognition of Wilf's pioneering dedication to Australia's natural heritage came with many awards including the inaugural *Hunter Environfest Award for Service to the Environment* (2000) and an Order of Australia Medal for 'lifelong service to conservation and the environment and to the community' (2005).

Wilf never forgot the WPSA – founded as it was in the year of his birth – for the confidence and support he believed it gave him to pursue his environmental activities. As his ability to read and write in his last years failed him, Wilf insisted that of all the publications he had been receiving, one should remain. That was *'Australian Wildlife'*.

Wilf passed away peacefully in Lithgow's Three Tree Lodge on 18 February and his parting wish was that people remember him by planting a native tree.

Hunter Wetland Centre

Hunter Wetland Centre

Triated pardalote. Photo: David Cook

Scarlet robin. Photo: Leo Berzins

Support the twitter Space

Clive Williams

Eastern yellow robin. Photo: Leo Berzins

Male spotted pardalote. Photo: Arthur Chapman

These days when anyone mentions *twitter* we usually associate it with modern communications technology. It hasn't always been so. Not so long ago the word would still have been associated with communication, but it would have been avian communication, the twitter of small birds – tweet, chirrup, chirp, melody and various other descriptions. Sadly it's no longer something we hear so much, particularly in our cities, yet birds have always been important to humankind. Caged birds, particularly songbirds, have been kept for centuries. There is probably no creature which features in poetic literature more frequently than birds, whether generically or as specific identities such as the lark or the nightingale. Birds feature just as prominently in Australian literature. *Bellbirds* by Henry Kendall is probably the best known, but the oriole, wagtail, cockatoo, pelican, swan, seagull, kite and brolga all have attracted the attention of Australian poets. The fact that poets have responded so deeply to birds suggests that birds affect the human emotions. They have the capacity to make us happy.

We like living with them around. Paradoxically, we have done our best to make this difficult by destroying much of their habitat.

Modern society is no longer ignorant of the link between maintenance of habitat and survival of a species. One of the successes of the conservation movement has been to raise this awareness. I think it is fair to say that Australians generally are motivated to do what they can to assist in the preservation of Australian wildlife, both fauna and flora. Many people have planted Australian native plants in their gardens and local government authorities have done likewise in their public parks and gardens. The motivation for doing so has not only been to

Superb fairy wren. Photo: Drew Douglas

Willie wagtail. Photo: Neil Saunders

Superb fairy wren (blue wren). Photo: Tim Bayman

plant native species for their own sakes, but to attract native birds. There is no doubt that these efforts have been successful. Most householders have planted similar types of foliage, principally callistemon and large hybrid grevilleas such as Robyn Gordon, which have been readily available from nurseries. Nectar-eating birds love these plants. Have you noticed how many lorikeets, noisy miners and wattle birds can be seen in suburban gardens these days? Their proliferation is clear evidence that if we create the right habitat, animals which depend on that habitat will thrive. However, success with large nectar-eating birds has led to a major problem. Small birds such as the blue wren, willy wagtail and yellow robin have been forgotten.

Small birds need dense foliage to protect them from large aggressive birds such as noisy miners and currawongs, as well as cats and dogs. The kind of plants suitable for the nectar eaters does not provide this safety and so the number of small birds in suburban areas has declined significantly.

The Wildlife Preservation Society, in conjunction with the Foundation for National Parks and Wildlife, used National Tree Planting Day to issue a press release inviting Australian householders and local government authorities to plant shrubs to provide a haven for small birds. We urged people to plant shrubs which could be pruned into dense hedges or clumps so that small birds could be encouraged to return to their gardens. It is not a case of either/or, as habitat for both larger birds and small birds can co-exist as long as water is available close by and small birds can find safety easily. The response to our press release was very encouraging. There were 27 articles published in newspapers from far-north Queensland to Victoria to Western Australia. In fact all mainland states were represented. We are encouraged to think that such a simple community involvement as we have proposed can have significant long-term benefits to Australian wildlife. It will obviously take some years for the benefits of current plantings to be apparent. However, the Society urges members, not only to take part in the project, but to urge their family, friends and neighbours to participate also. We will welcome any feedback you choose to send and any advice of the types of shrubs you have planted. This will enable us to answer questions from others.

Let us all look forward to increasing the twitter in our backyards.

Dingoes on Fraser Island

Reviewing ancient law to resolve future conflicts

Adam O Neill

Dingoes are categorised as apex predators and as such are part of a group that comprise the least abundant species in an ecosystem but exert the largest ecological influence. Apex predators figure as totem animals in numerous ancient indigenous cultures. The Ainu people of the Japanese archipelago worshipped the bear "Kamahi", which translates to the meaning of god. The Ashanti people of West Africa worshipped the leopard and to kill one attracted a penalty of death. The Aztecs revered the jaguar and the Australian Aborigines embraced the dingo as the physical embodiment of a dreamtime figure. As a totem animal, dingoes were revered and protected, and even today Aboriginal elders in touch with traditional law are forbidden to lay harm on a dingo. For over 5,000 years Aboriginal people shared a harmonious relationship of mutual respect with the dingo.

Recent developments in the field of ecology have established that apex consumers play a critically important role in structuring ecosystems, and reveal logic to ancient indigenous law. The removal of large predators can have far-reaching devastating effects on ecosystem health and productivity, so it is reasonable to assume that these ancient laws were designed for the purpose of ecological sustainability. Common to most of these laws was their strict and unbending nature. Regarded as god-like creatures, apex predators were offered protection to the extent of lethal law enforcement. These measures may appear to be extreme, but indicate that the design of these laws provided for the respective species social integrity. Recent studies on apex predators have also shown that social integrity is not only a necessary prerequisite for healthy ecological function but also for reducing the occurrence of conflict.

The fundamental similarity between human cultures that revered apex predators was that these cultures endured through many millennia. As humans spread out from Africa to inhabit the globe, large predators were systematically wiped out wherever they went. Lions in particular suffered massive reductions in range. Once widespread across the globe, lions are now largely restricted to the continent from which we first emerged. As humans settled into their new environments and developed cultures and traditions, fashioning new laws became essential to uphold social

Above: Rebuilding social structures could very well be the key to mitigate the effect of conflict, understanding codes of conduct and respect for humans are lessons in survival that can only be learned when curricula are maintained within stable social structures. Photo: Jennifer Parkhurst taken on one of our study sites near Lake Eyre

standards and ecological sustainability. The development of laws that protected large predators was undoubtedly a very slow process; the environmental damage associated with predator removal can happen at an incredibly slow rate. Deforestation, for example, can take up to one thousand years as long-lived trees fail to recruit as a result of overgrazing. These subtle changes would have been difficult to detect, and identifying a cause could have involved tens, hundreds, even thousands of human generations. To our credit, Western cultures through modern science has not only recognised massive ecological degradation but has identified the cause, and this has been achieved in a comparatively short time frame. Having recognised apex predators as essential regulators of ecosystems has revolutionised the field of conservation biology, but taking the first precarious step of maintaining and restoring predator populations has set a new challenge: we now have to learn how best to co-exist.

Hindsight can be a very powerful tool, but as technology propels us forward we increasingly neglect to look back. In the context of predator protection and in the advent of progressive science we can certainly see the value in ancient indigenous law. But can we take these old doctrines seriously? Centred on myth and spirituality, these old laws were largely enforced through superstitious fear. In one sense, science has become a double-edged sword; it reveals logic to ancient law but dispels the myth and superstitious fear that was used to uphold that law. In the past the fear of predators was diluted by the fear of consequence that would come to those that harmed them. In our modern world fear for human safety drives an urgency to oppress them. Lethal control has become our only weapon of defence, but in this line of defence are we in fact provoking further attacks?

In human societies violent and aggressive behaviours are often associated with social collapse, historically documented as a legacy of war, depression, violence and acts of aggression are a common theme. Recent studies on animals reveal striking parallels; as a result of culling practices, orphaned African elephants are becoming increasingly violent and dangerous. Eight of the nine recorded cougar attacks on humans occurred in time and space of intense cougar persecution. A leopard that was wounded by a poacher killed more than four-hundred people in India, and American coyotes have become man-killers in the wake of lethal control.

Similar to wolves and coyotes, dingoes are considered socially complex; stable populations maintain distinct family lineages for decades, and their societies are governed by strict hierarchic dominance. Packs of up to ten individuals maintain distinct territories with low dispersal rates and low recruitment. When social integrity is compromised under conditions of lethal control, populations become dominated by younger age structures and dispersal rates increase as more offspring are produced in a fractured society. Social integrity could very well be the key to mitigate the effect of conflict; understanding codes of conduct and respect for humans are lessons in survival that can only be learned when curricula are maintained within stable social structures.

Dingoes on Fraser Island have a long history of social stability; managed under forestry policy until the early 90s, they we left unhindered as they posed no threat to livestock. Reportedly, lethal control of dingoes began on Fraser in 1995 with an organised cull in operation by 1998. After the fatal attack on a young boy in 2001, the cull was intensified and cull and conflict have been snowballing to the current time. The destruction of two dingoes that attacked a young girl in 2011 indicates a problem in perpetuity, in the light of moral, ethical and environmental considerations, total eradication is simply unacceptable. The dingo population is there to stay, and it appears that current methods to manage them are failing as sustainable solutions. Perhaps it is time to look back and examine ancient law for its practical application, to use the tools of hindsight and find the logic that is veiled beneath obscure legend and superstitious belief. According to ancient Columbian myth, jaguars were sent to this world as a test of our will and integrity, and adopting the underlying principle of total predator protection will certainly put those values to the test.

Rebuilding social structures will certainly take some time: in the advent of such radical change, can we weather the storm? Can we refrain from the despatching of dingoes that nip at the heels of our toddlers? I believe so. Educating visitors to the Island is well within our line of expertise, educating the dingoes is apparently a far more difficult task. Dogs in general respond badly to heavy-handed tactics, good education stems from nurture and reward. Respect is a two-way street but it is also a road long travelled. Fraser Island dingoes are on policy street right now, it's one-way traffic and it's going somewhere but perhaps it's time to turn back.

In stable communities young dingoes are bound by strict social constraints. The loss of important adults can inflict severe trauma and stress on surviving community members; affected individuals are highly susceptible to behaviour disorder such as hyper-aggression and depression. Photo: Arian Wallach taken on Fraser Island

Scratchy being fed

Devils need angels

David Cobbold, Peel Zoo

Tasmanian devils are endangered in the wild, but Peel Zoo, in Western Australia, is helping to save the iconic marsupial with an extremely successful captive breeding program.

In Tasmania, the native population of devils has been decimated by the devil facial tumour disease (DFTD). DFTD is present across most of Tasmania. Only the north-west corner seems to have been spared. Nevertheless, in some areas, the wild population of devils has declined by up to 95 percent. Numerically that means the population has plummeted from 250,000 in 1996, when the disease was first noticed in the Mount William National Park area of north-eastern Tasmania, to around 10–15 thousand today. And there's no cure for DFTD in sight.

The best knowledge available on the disease at the moment indicates it is a viral cancer; one of only three known to exist. In addition, it appears to be spread through the exchange of saliva. That is, when devils gather, the resulting fights, including bites to the face, allow the transfer of the virus. Once infected, the plight of a devil is tragic.

DFTD prevents the infected animal from eating, drinking, breathing ... it's a slow, painful death. Infected animals usually die within months of the tumours becoming visible. However, there is some hope on the horizon.

The Tasmanian Government has established a "Save the Tasmanian Devil Program". The program aims to establish and manage an "insurance population" of devils on the mainland. One of the major projects involves developing "Devil Ark" at Barrington Tops in NSW. Australian Reptile Park and the Foundation for Australia's Most Endangered Species (FAME) are working hard to see this grand vision come to life.

On a smaller scale, but no less important, is the work of Peel Zoo. Because the gene pool of the devils is now so small, every devil is extremely valuable. Jocelyn Hockley, Senior Keeper, Save the Tasmanian Devil Program, says: "The Department of Primary Industries, Parks, Water and Environment Tasmania is currently working with Peel Zoo to incorporate their Tasmanian devils into the Strategic Framework for an Insurance Meta-population." It's this sort of teamwork that is essential in saving the species.

Peel Zoo looks after four Tasmanian devils; one male and three females. And all three of the females are carrying young in the pouch. That is a phenomenal success story. Narelle MacPherson, Director of Peel Zoo, states: "We only took custody of the animals in April 2010. A pair of females came from Tasmania Zoo and a breeding pair from East Coast Nature World. While the devils are a long way from home, they've settled in very nicely. Our success in breeding is testimony to this fact."

Gnarly, the father of all our joeys

This image was published in a Public Library of Science journal: *To Lose Both Would Look Like Carelessness: Tasmanian Devil Facial Tumour Disease*. McCallum H, Jones M, PLoS Biology Vol. 4/10/2006, e342. http://dx.doi.org/10.1371/journal.pbio.0040342. It is published here under the Creative Commons Attribution 2.5 license

Success in breeding is an absolute necessity. The Tasmanian devil is listed as Endangered by Federal and State governments. It is on the Red List of the International Union for the Conservation of Nature and Natural Resources (IUCN). At present, there is no cure for DFTD and no way of stopping it ravaging the native stocks in Tasmania. That means the species is vulnerable to extinction.

To continue their successful breeding program, Peel Zoo aims to develop something similar to the Barrington Tops Devil Ark. The isolation of WA and the fact that the Nullarbor acts as a natural, impenetrable barrier, create a double redundancy to ensure the survival of the species. The current and future prodigy of the Peel Zoo development may then be exported around the country, so as to ensure the future of Australia's last great carnivore.

While the future is uncertain, and at this stage predictions for the fate of the Tasmanian devil is dire, the need to save Australia's last great carnivore has drawn some influential parties together. We can only hope their focus, with support from the public and corporate sectors, will ensure a happy ending to an otherwise sorry tale.

To find out how you can help save the Tasmanian devil, visit these websites:
www.tassiedevil.com.au/tasdevil.nsf
www.devilark.com.au
www.fame.org.au/devil_sponsor.html
www.peelzoo.com/animals-2/save-the-tasmanian-devil

Itchy and Scratchy

Developing best-practice approaches for restoring River Murray forest ecosystems that are resilient to climate change

Martin Breed (CI), Dr Kym Ottewell, Dr Mike Gardner, Prof Andrew Lowe
University of Adelaide, South Australia

The overall aim of this project was to develop best-practice advice and adaptive management options for revegetation of the Murray-Darling Basin.

Trees are key ecosystem structures that have been utilised by humans for millennia. Consequently, tree-based ecosystems (eg forests) have been changed, often resulting in disruption of ecosystem processes (eg pollination, seed dispersal). As such, land managers seeking to maintain or reinstate lost ecosystem services through revegetation, or seeking a profit through agroforestry, need to make a critical decision of where to source quality seed stock that ensures establishment success and maximises tree growth and survival. This decision needs to pay particular attention to the stress expected due to climate change, as well as the altered state of contemporary landscapes.

Currently, the sole use of locally sourced seed in revegetation programs is widespread and is based on the expectation that populations are universally well suited to local conditions. This practice ignores the fact that natural populations regularly are not well suited to local conditions due to natural processes. Perhaps, more importantly, this seed sourcing strategy ignores two key global drivers that disrupt local population suitability: habitat disturbance and climate change. Consequently, science-based alternative seed-sourcing strategies that mitigate against these drivers are required, and were investigated in this project.

With WPSA support, we performed forestry-style growth experiments of over 1,500 seedlings of two eucalypt species, of which both are routinely used for revegetation in the Murray-Darling Basin. We then analysed the genetic makeup of these seedlings. For one of the study species we determined that habitat disturbance had genetic impacts, such as increasing inbreeding, and these genetic changes reduced growth. For the other study species, we found no evidence for superior suitability of locally collected seeds to local conditions, even though seeds were transplanted over 300 kilometres from their source.

The implication of this research, together with additional data from other studies, is that the current seed-sourcing strategy, *local is best*, is probably not the best approach to replace the areas of vegetation lost by past human actions for habitats that are resilient to climate change. We present a guide to alternative seed-sourcing strategies based on this research that should maximise the opportunity of revegetated populations to adapt to climate change. We focus on the fact that evolution and environmental change are ongoing and can occur rapidly, and by spreading risks and augmenting genetic diversity, the probability of long-term revegetation success should be maximised in a cost-efficient manner.

Looking forward, our research group is determined to directly test alternative seed collecting strategies. Revegetation needs to transition from an *ad hoc* practice to a scientifically informed profession. We recommend that an appropriate starting point would be to establish long-term experiments to fully assess the practical feasibility and success of the different provenancing strategies.

The core of this project was funded by the Native Vegetation Council of South Australia, and the financial support received from the WPSA is greatly appreciated – thank you!

Editor's note: Martin Breed won a Wildlife Preservation Society of Australia University Grant in 2010 for his project "Developing best practice approaches for restoring River Murray forest ecosystems that are resilient to climate change".

Eucalypt plantation

Shelter after Yasi

Cyclone Yasi

Lana Field, North Queensland Wildlife Care Inc.

We knew she was coming; we just weren't sure where she was going to land. Cairns? Innisfail? Townsville? The Burdekin? The night of 2 February was one North Queensland was never going to forget. She was a Category 5 and she was wide. We are used to cyclones every wet season, but we all knew Yasi was different; she was one of the big ones.

It was a long night. We lost power at about 10pm with a bang. We saw the high voltage transformer across the park blow up in a shower of sparks. Most of Townsville lost power between 8 and 11pm though some people didn't lose power at all!

My mother, husband and I gathered in the back bedroom with the cat, dog, turtle and dragon while we sat out the worst of it. My husband and I went downstairs to our 'safe' room often to check on the four possums, three turtles, one snake and cage full of rats. It was warm, dark and quiet in the room and, apart from being in smaller cages, everyone was comfortable. We were ready to evacuate into the room with them if we needed to.

Upon first light the following morning, we took note of the damage to trees and fences in the yard. We walked over to the park behind us and were very surprised and pleased to see swallows, our resident bower bird and many other bird species flying around looking for food. We realised then, that though a lot of wildlife may have survived, there would be a lot in trouble. We had no land line phones and could not ring out on the mobile, but by about 9am we were able to send and receive text messages. I messaged my best friend in Brisbane and asked her to call the local radio stations and let them know our address and that we were ready to take any wildlife once the wind and rain had eased and it was safe to drive on the roads. Then Mum and I sat down and started to text all group members asking if they were okay and able to receive wildlife.

We ended up with a fair spattering of carers spread around town who were willing and able to open their doors. Mobile calls starting coming in about 11am and instead of telling people to ring the carers, we just gave them the addresses and went on to the next call. We received about 200 calls in the three days following Yasi mostly about birds, but also a couple of possums, and

Animals loose

sadly we also received two snakes that had been caught up in masking tape, that people had removed from their windows and ignorantly discarded. The birds included sooty terns that had been blown in from somewhere off the coast, TI pigeons, fruit doves, and peaceful doves, lots and lots of peaceful doves. We also received a lot of nutmeg manikin finches in nests.

For the weeks and couple of months following Yasi, we received a large number of water birds (ducklings and magpie geese) including eight very late ducklings that arrived in May. We assume that because of the cyclone, the parents have had late clutches to make up for lost clutches.

I don't think we could have planned any better for Yasi because you never know

Shelter pen destroyed

what damage you may receive or who may or may not lose power (six days). The lines of communication being cut also made it difficult, but if we had said to the radio stations pre-cyclone to send wildlife to us and then experienced a major drama at home, it would be been a bigger problem.

Cyclones are not the sort of disaster where a trailer full of equipment would be useful because there is a big chance that it could not be accessed and cyclone damage is wide spread, it is not centralised.

We kept our doors open and our phone number on the airwaves and we saved 90 percent of the orphans that came through our door. Unfortunately a lot of adults presented with non-repairable injuries.

It is difficult for me to speak for all the carers in the Townsville or North Queensland area about what was experienced but I would like to make a special mention to Janelle Gay, Dawn Underwood, Jim and Eleanor Pollock, Margaret Neihoff, Brenda Nutting and Daryl Dickson and her partner Geoff. I would also like to make mention of the JCU vet clinic that rushed to get back online and provided wonderful support, a special mention to vet nurses Trudi and Locklea who gave us extra time and supplies.

Editor's note: The Wildlife Preservation Society of Australia donated funds to North Queensland Wildlife Care Inc. for the care of wildlife affected by natural disaster.

Shelter before Yasi

Tape Removal

Doves and duck

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University Grants 2011

The Wildlife Preservation Society of Australia University Research Grants are scholarships offered to honours or postgraduate students at Australian universities.

Each year, ten grants of $1,000 are awarded.
The following articles are contributed by the 2011 winners.









The effect of fauna underpasses on the ecology and movement patterns of western grey kangaroos (*Macropus fuliginosus*) in a landscape fragmented by anthropomorphic development

Paul Chachelle
The School of Animal Biology,
The University of Western Australia

The construction of roads drastically alters the landscape and can present a significant barrier to the physical movement of animals. Such a barrier may restrict the ability of animals to find suitable habitat for foraging and can result in direct mortality through vehicles colliding with an animal. By far the most visible species of wildlife killed on roads in Australia are large macropods such as kangaroos. Every year countless numbers of kangaroos are injured and killed by vehicles. Such collisions are a common occurrence in many parts of Australia, especially on the outskirts of cities such as Perth, where rapid development and the construction of roads has resulted in a substantial loss of habitat for native fauna. Also, as more people move into those areas, the number of roads and cars travelling on the roads has, and continues to, increase at a dramatic rate. Vehicles colliding with kangaroos present a serious problem, not only from a conservation and animal welfare perspective, but also in terms of cost to humans as such collisions are responsible for significant property damage, injury and human mortality.

One solution to reduce the incidence of vehicles colliding with kangaroos would be to install wildlife fencing along major roads to prevent kangaroos and other animals accessing those roads. This solution, although effective at reducing vehicles colliding with kangaroos, would have a negative impact on sensitive areas such as nature reserves, as it would severely restrict the ability of kangaroos and other native animals to move between habitats, migrate in response to seasonal variations in climate or availability of food, or disperse away from maternal ranges. Animals would therefore be effectively locked up in nature reserves, and this could lead to overpopulation, overgrazing, ecosystem damage, loss of biodiversity and potentially the extinction of some plant and animal species.

A photograph taken by a motion sensitive camera of a kangaroo using an underpass beneath the Kwinana Freeway

In North America and Europe, fauna underpasses in combination with wildlife fencing have been demonstrated to be effective at reducing the incidence of animal-vehicle collisions involving animals such as large ungulates and carnivores, while allowing animals to maintain their usual daily and seasonal movements. Although a number of fauna underpasses have been constructed in Australia, no previous study has ever investigated the effectiveness of fauna underpasses in relation to large macropods. Also no previous study worldwide has ever examined the use of underpasses by large mammals at the level of individuals rather than species.

Several fauna underpasses have been installed under the newly constructed Perth to Bunbury Highway. This highway runs through a portion of the Rockingham Lakes Regional Park, which incorporates Marlee Reserve and Paganoni Swamp Nature Reserve, which has been identified as being of regional and international importance.

The main aim of this project is to determine the extent to which a large macropod species utilises wildlife underpasses to move between habitat in an environment fragmented by major roads and other human development. Within that aim I will be investigating:

- The home-range requirements as well as the daily and seasonal movements of a population of peri-urban western grey kangaroos (*Macropus fuliginosus*).
- The extent to which kangaroos use fauna underpasses at an individual

Above: Paul Chachelle working in the field

'Max' wearing his identification collar and ear tag

level, rather than species level, by incorporating novel technologies such as identification collars fitted to kangaroos and infrared cameras installed in the underpasses.

- The potential of fauna underpasses to reduce intra-specific competition and grazing pressure on reserves by allowing animals to move between habitat and access their traditional feeding areas.
- Whether there is any sex bias in underpass use and if so, what impact that has on the ability of males with an aversion to underpasses to pass on their genes (ie their fitness).
- Which aspects of underpass design and environmental factors influence underpass use.

Currently I have 47 kangaroos collared and ear-tagged, 17 of which (11 females and 6 males) are fitted with VHF radio collars, while the other animals have been fitted with white collars which have a unique three to four letter name printed in large black letters. These collars will allow me to recognise kangaroos using infrared cameras installed within the underpasses. A community participation campaign will encourage local residents to report sightings of collared animals, including the name of the kangaroo, the location, date and time of the sighting on a specially constructed website.

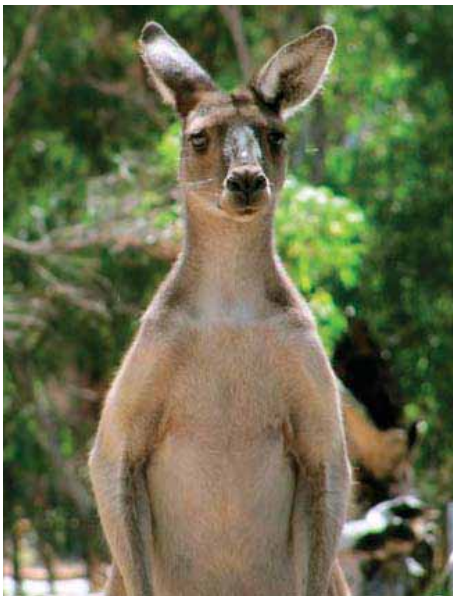
Although my project is still in its early phases, from data collected so far from both radio tracking and infrared cameras, I estimate that 60-65% of individuals from within the population are currently using the underpasses on a nightly basis, to move from the reserve to the grasslands in the evening to feed, and returning to the reserve early in the morning. From the data so far it appears that the radio-collared females exhibit very strong site fidelity. as those individuals which I have recorded using the underpasses do so every night. Interestingly, I have not recorded movement of an adult male through an underpass. As female western grey kangaroos experience a synchronised breeding season, some males may start using the underpasses to follow females during the October – January mating season.

DNA analysis will allow me to determine whether males which use the underpasses sire significantly more offspring to those females which use the underpass than those males which have an aversion to underpasses. I will also be able to compare the paternity of the offspring of females which do not use the underpass to those which do. I will compare the DNA of individual females with a high overlap in home-range to determine if those individuals are related. If two individuals which have a home-range overlap of 90-100% are found to be related, this would suggest that feeding and resting sites are maternally inherited and thus underpass use would also be behaviour which was learned from an individual's mother.

In the latter period of my PhD I will be investigating the aspects of underpass design and environmental factors which may encourage or discourage underpass use by western grey kangaroos.

The results of my study will make a significant contribution to the relatively new but rapidly expanding sub-discipline of road ecology. This will be one of the few studies which has ever attempted to study the landscape ecology of western grey kangaroos, and the first to ever study the landscape movements of a population of western grey kangaroos in an area experiencing rapid development due to the construction of roads and housing developments. It will be the first study to investigate how aspects such as population dynamics and intra-specific interactions may be influenced by the use of fauna underpasses. It is expected the findings of this study will also be applicable to other large macropod species and will contribute to a national database on the effectiveness on fauna underpasses. If underpasses are demonstrated to be effective and become more widely adopted by road authorities, this will not only benefit large macropods such as kangaroos and wallabies, but it will also have a flow-on effect as other native species may utilise those underpasses.

The aspect of my research I love the most is that I am gaining an intimate understanding of one of our most iconic Australian native animals. The more I learn I realise the amount of misinformation that is out there in regards to kangaroos. I also feel privileged that I am able to contribute to the knowledge regarding the use of underpasses by Australian fauna and that this knowledge will hopefully lead to the construction of fauna underpasses in Australia becoming more widespread. I am also very grateful to the Wildlife Preservation Society of Australia for supporting my research.


A young male from my study population

The conservation of arid zone ecosystems in Australia:

From genes to climate science

Paul Duckett,
Conservation Genetics Lab,
Biological Sciences,
Macquarie University

A small arboreal gecko (*Gehyra variegata*) (tree dtella),

Covering more than 70 percent of continental Australia, the arid zone represents the country's largest biome and houses an exceptionally diverse and largely endemic lizard fauna. Partly associated with the difficulties of working in such a harsh and large environment, the dispersal characteristics of many species in the arid zone are unknown, yet gaining knowledge of dispersal is vital if we are to manage and help mitigate the negative impacts of climate change.

It is commonly accepted that global climates have controlled the natural distribution of biodiversity. Evidence from both contemporary observations and the fossil record exemplify the influence a changing climate exerts on the distribution of species. However, the world's climate is now changing at an unprecedented rate and a large number of species are expected to face extinction. To survive, species may adapt to climate change, yet this seems unlikely as the rate of change is predicted to exceed the rate of adaption. The alternative is to relocate, but only mobile species with sufficiently high dispersal ability can be expected to keep pace with the shifts in their environmental suitability.

Predicting the areas which species will either expand or contract into is relevant to understand future population structure and help mitigate any deleterious genetic consequences. Using ecological niche modelling (ENM) to predict species distributions under various climate scenarios has become a central research technique. However, this approach lacks a quantitative process to evaluate if species are capable of relocating to their new predicted range. Coupling

ENM with genetic measurements of dispersal has potential to achieve this objective.

For part of my PhD thesis, I use standard genetic techniques to measure the average annual distance a small arboreal gecko (*Gehyra variegata*) (tree dtella), disperses across the various arid zone landscapes which represent the entire distribution for this species. I will then couple the genetic findings with ecological niche models to develop a new quantitative assessment method, which analyses the connectivity between the species present and predicted future distribution. Finally, I will measure the loss of genetic diversity the predicted range shift will cause, and the evolutionary consequences for this gecko species.

Fieldwork throughout the arid zones of New South Wales, Queensland, South Australia, and the Northern Territory was completed successfully during 2009 and 2010, where 874 individual tissue samples were biopsied from geckos across approximately 1 million km^2. After the successful development of microsatellite markers required for the genetic component of this study, genotyping of all samples was successfully completed in 2010.

Preliminary analysis indicates that climate change will cause dramatic distributional shifts in the location of favourable environmental conditions for this gecko species. With consideration for the dispersal characteristics of *G . variegata* I show that up to 41 percent of the species' current distribution may fail to reach areas of favourable climate in the near future. We can therefore expect substantial reductions in the population of this species and losses to genetic diversity. This new approach takes advantage of molecular and occurrence record datasets allowing critical assessments of how rapid climate change will impact the world's biodiversity.

Simpson Desert

The core of this project is funded by Macquarie University, and the financial support from the WPSA which has contributed to the genetic analysis in this study is greatly appreciated – thank you.

Sunset over the Simpson Desert

Drought, disease or destiny?

Identifying the cause of decline of the eastern quoll

Bronwyn Fancourt,
School of Zoology,
University of Tasmania

The eastern quoll (*Dasyurus viverrinus*) was once an integral part of faunal communities throughout south-eastern Australia. Their numbers dwindled rapidly in the early 1900s, and they are now considered extinct on the mainland. While the species has persisted in Tasmania, their numbers are declining rapidly, with statewide spotlighting surveys recording declines of more than 50% over the past ten years. Live trapping at a number of sites in 2010 supported this finding, indicating local declines of 60-100% over the past 20-30 years. The cause of this recent decline is not known.

Black eastern quolls are historically less common than the tan morph, however declining populations are showing a reversal of colour ratios in favour of the black quolls

While Australian fauna has endured numerous extinctions and declines in recent history, Tasmania remains a stronghold for marsupial diversity. The eastern quoll is one of five species that were once widespread on the mainland that now survive only in Tasmania. However, marsupial dynamics in Tasmania are changing rapidly and new threats are emerging. The Tasmanian devil is in steep decline due to the spread of the fatal devil facial tumour disease, and the red fox was recently introduced to the state. Devil declines may be allowing increases in feral cat abundance, which could threaten quolls and other species. Given this background of instability, it is imperative that we identify the cause of the eastern quoll's decline, and understand how it relates to factors involved in changes to other species.

Diagnosing the cause of a threatened species' decline is an essential first step in management for recovery. But diagnosis can be very difficult when several different factors act together. Furthermore, many species that are now endangered and in need of recovery declined to their present state of rarity many years ago, so that it is no longer possible to directly study the factors that were responsible for decline and measure their impacts on populations.

My PhD research aims to understand eastern quoll demography, population viability and ecological sensitivity in the current environment of rapidly changing predator dynamics (with declining devils and introduction of a novel predator, the red fox), anthropogenic disturbance (habitat modification and fox baiting

Above: Bronwyn Fancourt with an eastern quoll

programs) and changing climate (recent drought and long-term climate change). Eastern quoll populations will be regularly monitored at four sites (two with declining populations, two with relatively stable populations) over the next 2½ years. The comparison of a range of demographic, health and environmental variables in declining populations with stable populations as a reference will enable identification of specific factors associated with the decline. Field work commenced in May and will continue every second month in the pursuit of critical leads and much needed data to help answer these questions.

The Wildlife Preservation Society of Australia generously contributed to my honours research in 2010 which provided strong supporting evidence that eastern quolls are indeed in marked decline. This research has formed the basis of a nomination for listing the species as endangered under the Tasmanian *Threatened Species Protection Act 1995*, and has provided me with a solid foundation to continue this research to the next crucial step of identifying the cause of the decline of the eastern quoll. I am extremely grateful to the Wildlife Preservation Society of Australia for continuing their support of this research into 2011.

Eastern quolls can be found in a range of habitats including sub-alpine areas

Volunteer Halley Durrant checks a trap in the snow

The evolutionary ecology of an endangered alpine lizard threatened by climate change

Maggie Haines,
University of Melbourne

Alpine bioregions are among the most threatened by climate change worldwide and comprise only 0.15 percent of the Australian landscape. Australia's alpine ecosystems are particularly susceptible to both direct and indirect effects of climate change because they comprise small and highly fragmented populations, many of which are at serious risk of local population extinction. Alpine-restricted species are often physiologically adapted to cold climates and they may not be able to adapt fast enough to keep up with the current rate of climate change. Since they already inhabit the highest elevations, they cannot expand their range upwards to escape shrinking habitats and higher temperatures.

Adult male Pseudemoia cryodroma (alpine bog skink) taken in the field at Mt Buller

Victoria's alpine communities contain several of Australia's most threatened habitats and animal species. These include four alpine-restricted reptiles listed as endangered or critically endangered at the state level, two of which are also listed as federally endangered. The greatest obstacle to conservation of alpine reptiles is lack of essential information for effective management and federal protection. I will help to redress this via a detailed study of an endangered alpine lizard, the alpine bog skink (*Pseudemoia cryodroma*). The alpine bog skink is a small (approximately 55mm body length), live-bearing lizard found only in Victoria at elevations above 1,200m. As part of my PhD, I am investigating key habitat requirements, genetic diversity, genetic distinctiveness, and temperature tolerances of the alpine bog skink as well as its common, widespread sister species the southern grass skink (*P. entrecasteauxii*).

Thus far, I have collected 106 samples from sites in the Victorian Alps, which include popular ski resorts such as Mt Baw Baw, Mt Buller and Mt Hotham. I also used available samples from the Australian Museum, Museum Victoria, and South Australian Museum. These species have variable colour patterns and it can be difficult to distinguish them. An important outcome of this project will be to provide tools such as effective field identification resources that will contribute to long-term survey and monitoring for the alpine bog skink.

Preliminary genetic analysis suggests possible hybridisation between the alpine bog skink and the southern grass skink. Interestingly, the data indicates that the alpine bog skink is actually more closely related to another species within its genus. I will examine more samples and analyse additional genetic markers to fully understand the genetic relationships and distinctiveness of the alpine bog skink.

The Wildlife Preservation Society of Australia grant will contribute to the cost of fieldwork. My goals for this field season are to complete habitat surveys, collect samples from potential hybrid zones and bring animals back to the laboratory to study their thermal physiology. In addition to the Wildlife Preservation Society, I would also like to thank the Arthur Rylah Institute, Department of Sustainability and Environment; Holsworth Wildlife Research Foundation; and Museum Victoria 1854 Student Scholarship for financial and in-kind support.

Mt Loch is one of my field sites

Alpine bog skink (*Pseudemoia cryodroma*) taken at Lake Mountain

Community structure, altitudinal gradients and climatic responses of microbats in the wet tropics

Tamara Inkster,
Centre for Tropical Biodiversity and Climate Change,
School of Marine and Tropical Biology,
James Cook University

The rainforests of the Wet Tropics World Heritage Area are globally recognised for their high level of biodiversity and their unique biota. Over 200 different species inhabit the 9,000 square kilometre area, with over 90 of these species being regionally endemic. Microbats contribute significantly to this diversity with over 30 species (60 percent of all mammals) inhabiting the area. The biogeographic history of this unique region means many species found in the Wet Tropics have adapted to a cool, wet and relatively stable environment. This makes the fauna of the area particularly vulnerable to emerging threats such as global climate change.

In order to mitigate potential biodiversity loss in the Wet Tropics World Heritage Area we must first gather baseline data on different taxa. The high species variation found in microbats makes them an ideal study taxon for investigating how species distributions and community assemblages may be affected by different climate change scenarios. This study will examine microbat ecology in the Wet Tropics through a thorough investigation into regional and altitudinal species distributions, species activity patterns, and community structures, and make predictions about how these species may respond to climate change.

In order to achieve this, species distributions and activity are being monitored at six independent altitudinal gradients throughout the Wet Tropics, incorporating 25 individual sites spanning elevations of 100m to 1,600m. Data is being collected through a combination of acoustic monitoring (recording of species specific echolocation calls) and capture of animals. Collected acoustic data will provide information on species presence, abundance, and activity, while capture data will provide information on morphometric attributes of animals (sex, size, reproductive condition).

In addition to species data, environmental data, including daily and annual temperature, humidity, and rainfall measurements, is also being collected. This data, collected from long term monitoring stations set up by the Centre for Tropical Biodiversity and Climate Change, will be analysed in combination with species data. Relationships between species ecology and current and predicted environmental trends will be investigated using predictive modelling. The models will be used to explore how species may react under various predicted climate warming scenarios. Understanding how species may respond to such changes will allow us to make informed decisions regarding the conservation of this diverse group, as well as the mitigation of overall biodiversity loss in the Wet Tropics and other tropical ecosystems.

The northern long-eared bat (*Nyctophilus bifax*). Photo: Arnaud Gourret

A large proportion of my candidature has been spent in the rainforests of North Queensland, collecting necessary data. The funding I have received from the Wildlife Preservation Society of Australia, along with support from the Skyrail Rainforest Foundation, and the Centre for Tropical Biodiversity and Climate Change, James Cook University has helped cover the cost of my field work. This support is greatly appreciated.

Above: Tamara Inkster with the eastern tube-nosed bat (*Nyctimene robinsoni*)

Wildlife responses to black rat control in Sydney Harbour National Park

Helen Smith,
University of Sydney

Invasion of non-native species into foreign ecosystems is one of the biggest challenges for conservation and restoration biologists. In particular, fragmented ecosystems with vacant niches are highly susceptible to invasion by alien species. The black rat (*Rattus rattus*) is a major threat to biodiversity, and has caused significant declines in fauna and flora through competition, predation and disease. Despite this, black rat impacts have not been quantified in Australia. My research will quantify the ecological impacts of black rats in the Sydney Harbour National Park, specifically to inform management authorities of the ecological consequences of alien invasion.

Progress so far

I began my PhD in March 2011. During this time I have:

- Selected 16 suitable sites in the Sydney Harbour National Park and determined initial black rat densities using live trapping, chew cards and camera traps
- Successfully run two trials at Taronga Zoo (see results below)
- Completed a tree climbing course to install bat boxes safely
- Purchased all required bat boxes (using a combination of funding from the WPSA and other sources) and have begun installing boxes into the sites.

In this report I will outline how I spent my WPSA award, and report on the preliminary results from two trials. I will also outline the significance of my work and the next stage for my research.

Helen Smith installing a bat box

Budget

The WPSA grant of $1,000 was put towards purchasing bat boxes. Artificial bat boxes are essential to ensure microbat residency on each site (hollows are hard to find, and difficult to monitor non-invasively). A total of 80 boxes are required for replication and to maximise the chance of occupancy over the course of my PhD. This grant covered an eighth of the total number of boxes required for my project, and I have already begun installation of these boxes. The grant was also used to cover travel costs, mainly petrol, as the study areas are well spaced (to ensure independence) and transport is essential to move gear around (ladder, boxes, etc).

Preliminary Results

Trial 1: Bat box entrance

Aim: to design an appropriate modification of my bat boxes to ensure that black rats can enter, which will allow me to record microbat predation events by black rats.

Bat boxes were modified with four designs to allow black rats to enter: three designs had slit entrances made with rubber of 0.8mm, 1.6mm, 3.0mm thickness and one box had a PVC pipe elbow entrance. Boxes were trialled at Taronga Zoo and installed with peanut butter bait to encourage visitors.

Black rats were able to enter the PVC elbow, whereas the rubber entrance was difficult to push through, and was damaged by the rats chewing at it.

Trial 2: Possum guard exclusion

Aim: to design a simple way of excluding black rats from climbing so that I can record differences in reptile predation events on trees with/without black rats.

For the reptile predation section of my project, I ran a two-week trial at Taronga Zoo to establish if I could use metal sheets to exclude black rats from climbing up trees. I need to make sure that the foils exclude rats, but allow possums to pass. This trial fits into the reptile impact section, where the foils can be used as a way to exclude rats from trees, and the number of reptiles on rat proof and non-rat proof trees can give a measure of rat predation. I used peanut butter bait to encourage visitation. I selected trees with isolated branches so that rats could not climb another tree and reach the bait from above.

Results: Brushtail possums were easily able to straddle the foil, and were not hindered by the presence of the foil. Ringtail possums found it more difficult to climb the foil, but were still able to get over the foil. No black rats were observed climbing or jumping over the foil, provided there were no side branches which the rat could grip onto.

Future Directions

My research explores the concept of replacement, and more specifically, the ecological impacts of replacing a native species with an alien one. In my case, I focus on the replacement of native bush rats (*Rattus fuscipes*) with feral black rats (*Rattus rattus*). In July, I began the black rat removal treatments, and in August, I helped release 100 native bush rats into four one hectare sites in the Sydney Harbour National Park. Using the apparatus bought with WPSA money, and trialled earlier this year, I will now be able to compare predation rates of black rats on microbats, small birds, reptiles, seedlings and invertebrates in the upcoming breeding season. My long-term goal is to compare the impacts of native and non-native rats in bushland areas of Sydney.

One of the bat box designs with PVC pipe. All boxes are installed at minimum height of 4m

Significance

My research is the first experimental study to determine the ecological implications of alien black rats on native Australian wildlife. My research will explore the ecological factors that shift when a resident rodent is displaced, and the knock-on effects that influence overall ecosystem health. This will fill a major knowledge gap about the current and future potential threat of the black rat to Australian natives. It also explores the responses of wildlife to the reintroduction of a rodent that was once abundant in Sydney. The reintroduction program will provide enormous conservation benefits to natives by blocking reinvasion processes. The findings from my project will inform management authorities of the direct impacts of the black rat, and the wildlife responses to the reintroduction of the bush rat. This will help authorities to effectively use management techniques and financial resources that promote ecologically sustainable bushland reserves.

Acknowledgements

This project could not happen without the financial support of the WPSA. It is an honour to receive a 2011 University Grant Award, and the $1,000 has made this work possible. I look forward to being involved with the Wildlife Preservation Society for the duration of my PhD award.


Helen Smith Rat trapping

Evaluating the effectiveness of road mitigation measures for wildlife: how much monitoring is enough?

Kylie Soanes,
Australian Research Centre for Urban Ecology,
Royal Botanic Gardens/University of Melbourne

A large amount of time, effort and funds are spent in an attempt to mitigate the impacts of disturbance on wildlife. As such, rigorous evaluation of the effectiveness of wildlife mitigation and restoration programs is critical to ensure successful strategies are widely adopted, and unsuccessful ones are not repeated. However, when survey efforts are reduced to save costs the ability of monitoring programs to detect an effect is limited.

For example, millions of dollars are spent worldwide on crossing structures in an attempt to reduce the impacts of roads on wildlife. These structures aim to increase population viability by reducing habitat fragmentation and roadkill. While studies monitoring the use of structures by wildlife are common, quantitative evaluation of their effectiveness at improving population viability is typically lacking. A comprehensive evaluation of crossing structures should address several key questions, including: a) Are the structures used by wildlife?; b) Do populations become more connected?; and c) Does population viability increase?

Possums and gliders are particularly susceptible to increased mortality rates (ie roadkill) and habitat fragmentation caused by large gaps in canopy cover at roads. Mitigation measures include gliding poles (for gliding species only), canopy bridges, and the retention of tall trees in the centre median (referred to as 'natural canopy connectivity').

A female common ringtail possum with her two back-young photographed using the canopy bridge to cross the highway

In 2005 research was undertaken to investigate the impact of the Hume Highway on arboreal mammal populations in Victoria. These studies found that the highway reduced survival rates for the squirrel glider (*Petaurus norfolcensis*) (McCall et al. 2010), and created a barrier to movement for squirrel gliders (van der Ree et al. 2010) and common brushtail possums (*Trichosurus vulpecula*), (Gulle, unpub. data) where natural canopy connectivity was not present. Glider poles and canopy bridges were installed at these sites in 2007. Post-mitigation research is now required to evaluate the effectiveness of these structures.

This project aims to evaluate the effectiveness of each mitigation measure for squirrel gliders and common brushtail possums. Once the full monitoring program is completed, I'd like to explore the influence of reduced sampling effort on the outcome to identify an optimum level of effort.

Are the structures being used?

Two canopy bridges and four gliding poles were fitted with remotely triggered infrared cameras. These cameras have detected frequent use by several species including squirrel gliders and common brushtail possums.

Do populations become more connected?

Post-mitigation radio tracking surveys were recently completed and preliminary results indicate that canopy bridges, glider poles and natural canopy connectivity enable squirrel gliders to cross the highway, whereas unmitigated sites remain a barrier to movement. Analysis of geneflow will also be completed using genetic samples collected during mark-recapture surveys.

One of two 70m long canopy bridges which are used by arboreal animals to cross the dual-carriage Hume Highway in north-east Victoria

Does population viability increase?

Mark-recapture surveys are conducted annually at mitigated, unmitigated and control sites. These surveys will be used to determine if survival rates, population density and reproductive output change as a result of mitigation. Surveys have been ongoing since 2008, and preliminary analysis will begin late 2011.

How much monitoring is really enough?

Study design, duration and sampling methods are often reduced to save cost, which can severely limit the ability of monitoring to detect an effect of mitigation. It is therefore important to identify monitoring methods that provide high quality information cost-effectively. Upon completion this project will compare the information costs of using more limited study designs in an attempt to identify an optimal monitoring effort.

Common brushtail possum

Squirrel glider

Ecology and management of flying foxes in urbanised south-east Queensland

Joanne Towsey,
School of Biological Sciences,
University of Queensland

Flying foxes are large bats that roost communally in camps during the day then spread out at night to forage in vegetation in surrounding areas. While foraging they play an essential role ecologically by dispersing and pollinating forest trees. Despite their ecological significance, populations of some Australian flying foxes are declining as a result of factors such as habitat loss, persecution by humans and poor management. Continuing declines in flying fox numbers will likely have significant ramifications for many of Australia's native forest ecosystems.

In recent years, flying foxes have been coming into increasingly closer contact with people due to existing daytime camps becoming enveloped by urban sprawl, and as a result of flying foxes shifting into urban areas possibly in order to access more reliable food sources. Our towns and cities can support large numbers of these animals, and this close proximity to people can lead to human-wildlife conflict situations. This conflict puts managers of flying foxes in a difficult position; they need to conserve populations of flying foxes, but also need to manage the negative consequences. This presents a really interesting challenge for conservation, and my PhD is focused around (i) understanding how and why the animals are distributed across urban environments in the way that they are, and (ii) how we can manage Australia's urban flying fox populations to make sure we conserve them, but also minimise the human-wildlife conflict.

My research is being conducted in south-east Queensland, a region where many flying fox camps have split up or changed location over the past few years. I want to find out why these changes are occurring and whether they are temporary or permanent. To answer these questions I am currently measuring the amount of foraging resources available for flying foxes in Brisbane, and working out how the bats are spreading out across the urban environment when they leave their camps in the evenings. My ultimate goal is to find out how we can manage urban vegetation into the future in order to ensure both adequate supply for the maintenance of urban flying fox populations and thus their ecosystem services, such as pollination and seed dispersal, and to help ameliorate human-flying fox conflicts.

I would like to thank the Wildlife Preservation Society of Australia for providing me with this grant money which will contribute greatly towards the field work component of my research.

Google map of my study area in Brisbane, Queensland.

Joanne with flying fox

Modelling fauna populations within a production landscape

Maggie Triska,
Ecosystem Restoration and Intervention Ecology (ERIE) Research Group,
The University of Western Australia

Habitat loss directly linked to human consumption demands (ie, land use) is growing worldwide. Therefore, integrating land use with maintaining biodiversity is an increasing challenge that may be partially addressed in production landscapes through restoration efforts. However, restoration may take decades to reach completion, thus monitoring (through field work and modelling) can be used as predictive measures of success prior to restoration completion based on restoration trajectories and species habitat requirements.

Tracking tunnel mounted on a marri (*Corymbia calophylla*) used to survey for brush-tailed phascogales within the jarrah forest

My research occurs in a production landscape in the jarrah (*Eucalyptus marginata*) forest in southwestern Australia. Within this region, Alcoa World Alumina Australia mines and restores approximately 550 hectares annually creating a mosaic of seral and mature forest. Many native fauna species have been documented in restored forest, but their continued use of restored areas ultimately depends on their habitat requirements. To assess species' current and potential distributions I analyzed habitat associations of reptiles and small mammals, from data already collected, and the presence of brush-tailed phascogale (*Phascogale tapoatafa*), for which minimal data (observations and potential sign) were available for the region.

Reptile and small mammal presence-absence data was analysed in the program Presence (MacKenzie et al. 2002) to determine occupancy and detection probabilities. Detection probabilities often varied by month or year and occupancy by habitat variables (vegetation cover, time since fire, log density, etc). GIS techniques were then applied to display habitat associations and predicted occupancy of detected species. Additional reptile and small mammal trapping will commence this spring to validate the completed models and supplement species for which few detections occurred.

Brush-tailed phascogale presence was assessed using tracking tunnels, which

were placed in the field from April to August 2011. However, these resulted in only one phascogale detection, which further suggests their rarity in the region. The lack of detections restricted additional analysis and, without further research, only provides speculations as to the cause (historic or current disturbances and land use, predation) of the low density and what restoration techniques will promote their return.

Overall, in order to maintain biodiversity in a changing landscape we need to understand how species utilise unmined regions and extrapolate that to restoration as it ages. Modelling techniques provide an outlet to predict species occupancy based on various scenarios and encourage new management procedures (such as nest boxes, log piles, or corridors) for successful species return.

Example of a trapping grid, in unmined forest, used for surveying reptiles and small mammals

Acritoscincus trilineatum, one of the species for which occupancy maps and models were created from presence-absence data

Discovering and protecting Australia's hidden biodiversity

Mark Wallace,
Kings Park and Botanic Garden,
School of Plant Biology,
University of Western Australia

Imagine that some people had twice as much DNA as others. Imagine that they looked the same as everyone else but were unable to have children with 'normal' people. This may sound fanciful (because it doesn't happen in humans), but this is exactly the situation in many plant species around the world.

Plants that have twice as much DNA as others are known as polyploids. Polyploids are very common in the plant kingdom, particularly in crop species such as wheat, and weed species such as lantana. In natural systems polyploids help generate and maintain biodiversity; however, relatively little attention has been given to their conservation. Their conservation has been overlooked because we are often unaware of their existence because they appear to be the same as 'normal' plants. New technology, however, has made identifying polyploids much faster, simpler, and cheaper. For the first time, polyploids can now be properly considered in conservation planning in Australia.

Ribbed sword sedges often grow on banded ironstone

Identification of polyploids is important when assessing the conservation status of a species. Conservation assessments usually hinge on the total number of remaining individuals and the ability of these populations to survive and reproduce into the future. Some people, particularly in Europe and North America, argue that polyploids and 'normal' plants should be considered separately when planning conservation and restoration. This is primarily because these plants cannot interbreed, but also because they often possess different ecological traits. To be considered separately, however, they first need to be identified and my project will explore new means of identifying polyploid plants.

During efforts to restore a threatened species, particularly when returning a species to a habitat, it is important to identify polyploids because, generally, they do not grow in the same area as 'normal' plants. If, through restoration, polyploids and 'normal' plants are unintentionally mixed in a single population there can be dire consequences because if they breed they will produce sterile offspring thereby threatening the viability of the population. Sterile offspring are produced in the same way that a horse and a donkey (which have different amounts of DNA) produce sterile

Westernmost population of ribbed sword sedges. Plants can be seen in foreground of photo

Ribbed sword sedge (foreground) growing in cracks on a granite rock

mules if they breed. This is obviously something that is vital to avoid when planning conservation and restoration of a species if it is to survive in the long term.

My project focuses on the conservation of a group of rare plants endemic to Western Australia's biodiversity hotspot. These plants, the ribbed sword sedges, are particularly important because they are threatened by the expansion of iron ore mining in the region. To ensure that polyploids are properly considered when planning conservation of this group, I will use WPSA funds to conduct fieldwork to determine how many polyploid plants exist and where they occur. This information will help inform environmental impact assessments and can be used by mining companies (eg Gindalbie Metals who provide core funding for this research) to plan their restoration so that polyploids and 'normal' plants are not unintentionally mixed. By doing this I can hopefully contribute to better conservation of these rare plants and pave the way for a greater consideration of this type of hidden biodiversity in Australia.

Sampling plants from the edge of a granite outcrop near Paynes Find

Wildlife Preservation Society of Australia Limited

Community Wildlife Conservation Award

The Wildlife Preservation Society of Australia Community Wildlife Conservation Award is an annual award to a community conservation group that is making a major contribution to wildlife preservation in Australia.

Our Society is very conscious that we need to join together with other conservation groups to save and protect all native Australian wildlife populations in all its many and varied forms across Australia.

The Wildlife Preservation Society wants to recognise and help these conservation groups continue with their good work on behalf of the whole community. Our Society knows that many organisations and thousands of volunteers are already working tirelessly to save our threatened species, as well as the humble and more common Australian species, and the precious wildlife habitat in which they live.

The Award

Our Society will present a crystal trophy and a cash award of $2,500 to the winning conservation group that is helping to save our precious Australian wildlife.

Nominations

Nominations for the Wildlife Preservation Society of Australia Community Wildlife Conservation Award should be made in writing to be received by our Society by 31 December. Nomination forms can be downloaded from our website at www.wpsa.org.au. Completed nomination forms can be sent to the Wildlife Preservation Society by email to info@wpsa.org.au or faxed to 02 9599 0000 or mailed to PO Box 42 Brighton Le Sands NSW 2216.

Selection Procedures

The decision on the granting of each year's award will be decided by a full meeting of the Council of the Wildlife Preservation Society of Australia.

For further information, please contact the Executive Director at the National Office on Tel 02 9556 1537.

Founded in 1909 and dedicated to the conservation of Australia's unique wildlife

Wildlife Preservation Society of Australia Limited

The Serventy Conservation Medal

The Wildlife Preservation Society of Australia created the Serventy Conservation Medal in honour of three members of the Serventy Family.

In memory of Dr Vincent Serventy AM, who was a member of the Wildlife Preservation Society of Australia for more than fifty years, President for thirty years and was the President of Honour. Over the sixty years of his environmental work in Australia, and internationally, Vin worked to realise his vision of a world whose people understand that we do not own this earth, but are trustees for its future, and that we should live in harmony within nature. He has justly been called the *'father of conservation in Australia'*.

In memory of Lucy Serventy who seventy years ago became a Life Member of the Society and so began a lifetime interest in conservation.

In memory of Dr Dominic Serventy, who as the elder of the eight strong Serventy clan, played a leading part in encouraging their interest in natural history. He is regarded as among the world's greatest ornithologists.

Our intention is to award the medal to those who labour as a volunteer in the conservation field for a love of nature and a determination that it should be conserved.

Medal Design

The medal has been designed by Australia's foremost sculptor Stephen Walker. The Wildlife Preservation Society of Australia also gives a cash reward of $1,000 to the winner. Many conservationists in the past have suffered financially for their devotion to the cause. This cash award will be some tribute for their dedication. The bronze medal will be a constant reminder that the conservation movement has remembered their work in the past, just as history will remember the same achievements in the future.

Nominations

Nominations for the ***Serventy Conservation Medal*** should be made in writing to be received by our Society by 31 December. Nominations forms can be downloaded from our website at www.wpsa.org.au. Completed nomination forms can be sent to the Wildlife Preservation Society by email to info@wpsa.org.au, or mailed to PO Box 42 Brighton Le Sands NSW 2216.

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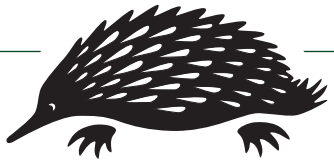
For further information, please contact the Secretary at the National Office on telephone 02 9556 1537 or by email info@wpsa.org.au

Founded in 1909 and dedicated to the conservation of Australia's unique wildlife

Membership Form



WILDLIFE PRESERVATION SOCIETY OF AUSTRALIA LIMITED

PO Box 42 Brighton Le Sands NSW 2216

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- ☐ Family: $65
- ☐ Concession (pensioner/student/child): $45
- ☐ E-mag (emailed as PDF, no hardcopy will be sent): $25
- ☐ Associate (library, school, conservation groups): $80
- ☐ Corporate: $120
- ☐ Life: $1,000

(Includes postage within Australia. Add $40 for overseas postage)

Three year membership (please tick)

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- ☐ Concession (pensioner/student/child): $120
- ☐ E-mag (emailed as PDF, no hardcopy will be sent): $68
- ☐ Associate (library, school, conservation groups): $215
- ☐ Corporate: $325

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Consider - A Bequest

Another way which you can support the work of the Wildlife Preservation Society of Australia Limited is to remember us in your will.

If you would like to make a bequest to the Wildlife Preservation Society of Australia Limited, add the following codicil to your Will:

> I bequeath the sum of $..... to the Wildlife Preservation Society of Australia Limited for its general purposes and declare that the receipt of the Treasurer for the time being of the Wildlife Preservation Society of Australia Limited shall be complete discharge to my Executors in respect of any sum paid to the Wildlife Preservation Society of Australia Limited.

"The challenge to the present adult generation is to reduce the increasing pressures on the Earth and its resources - and to provide youth with an education that will prepare them emotionally and intellectually for the task ahead.

SUZANNE L. MEDWAY
President

Sydney coastal walk

Greg Byrnes

The Sydney coastline from Watsons Bay to South Coogee has been linked by a series of pathways that allows walkers to enjoy the local wildlife while limiting their impact on the environment. Through a section of swampy grass and moss near Coogee, for example, a boardwalk keeps pedestrians safe and also protects the fragile ecosystem from random trampling.

A variety of birds are encountered on this walk. New Holland honeyeaters and superb fairy wrens frequent the shrubs and undergrowth along the paths. There are signs of bush regeneration carefully replacing introduced plants with natives.

Over the waters, such as Gordons Bay, terns are seen. One rainy afternoon they were circling then plummeting into the water to fish. Black cockatoos are regular visitors, often passing through about mid-afternoon with their high-pitched frail screeching. On the higher cliffs near Waverley an unidentified bird of prey is often soaring above.

At times a skink will be noticed sunning itself on a stony ledge, while down on the shore, among the rocks, crabs scuttle, with surprising agility, sideways into a crevice when humans approach. Scuba divers and snorkellers enjoy observing underwater creatures at Clovelly and Mackenzies Bay, but the pathway also approaches very close to the water there, inviting walkers to rest on the boulders and admire the view and sea-breeze. Flotsam on the beaches reveals many interesting specimens among the kelp, such as a little sea-urchin, brain coral or the head of a lobster, but plastic litter shows there is room for improvement.

This pleasant coastal walk is an example of wildlife being preserved, to some extent, near a major city.

Photos from the Native Animal Rescue Group, Milton

Powerful owl prior to being released

Baby white headed pigeon

Baby firetail finch being fed