AUSTRALIAN Wildlife

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Celebrating a new century of wildlife preservation in Australia

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

Kangaroos on North Stradbroke Island

Kye Norton

My partner Emma and I are wedding photographers based on the Gold Coast. I've always felt a strong connection with nature and try to get out and shoot landscapes/wildlife as much as I can.

These particular photos of kangaroos were taken on the gorge walk at Point Lookout, North Stradbroke Island. It was just after sunrise and I noticed the kangaroos feeding and shot a few frames. I was quite happy with the results, the light at that time of day is just magic!

Kye Norton,
Kye Norton Photography

More of Kye's Photos can be found on page 40 and the Inside Back Cover

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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 2013

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

I was very privileged to travel overseas last year and visit a number of cities in the United States and Canada. Part of our itinerary as tourists was a visit to natural history museums and zoos.

I particularly enjoyed most of the natural history museums and saw some magnificent displays, but found myself becoming concerned and then distressed at some of the excesses in the number of wildlife specimens on display.

Most people would appreciate that in order to display an animal, that animal has to be first caught, killed and then subject to the process of taxidermy.

My first visit to a zoo in Canada was at Toronto Zoo. This zoo is very spread out and, in order to visit the Canadian moose enclosure, we walked about a kilometre down a steep path. Disappointingly, the moose was in the far corner of the enclosure and hardly visible. Days later on a visit to the Museum of Natural History in Ottawa, I saw a Canadian moose on display in a diorama and thought at least I got to see a dead moose up close.

Weeks later, I was very excited to visit the Harvard Museum of Natural History. The visit started off with a tour of the room that featured a unique collection of over 3,000 models of flora created by glass artisans Leopold Blaschka and his son, Rudolph. The commission began in 1886, continued for five decades, and the collection represents more than 830 plant species. Our tour concluded in the great mammal hall, and it was here that I began to become very distressed. In this hall are numbers of huge glass exhibition cases and in these cases are hundreds of dead animals. By the time I finished touring the South American animals' hall and African gallery, I felt that I had probably viewed thousands of dead animals. I even found in a glass case two specimens of dead Tasmanian tigers.

All this meant that at some time in the last hundred of so years hunters from just one university in the world went out and shot/butchered/killed thousands of animals to bring back and stick in display cases.

In the case of the Tasmanian tiger, this species is now extinct. Maybe the killing of Tasmanian tigers by hundreds of museums around the world would have had no impact on their extinction, but we can't be sure of this. **Maybe if these hundreds of dead specimens had been allowed to live and breed in their native habitat, the species would still be viable today.**

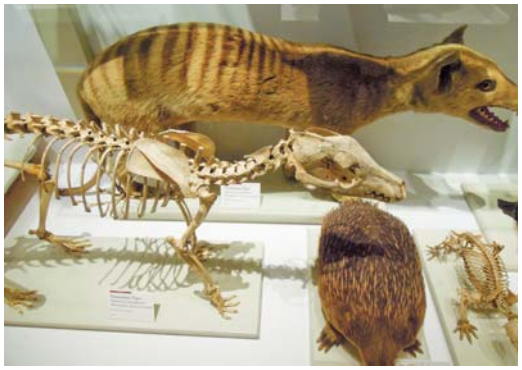
In one case alone in the Harvard Museum I saw specimens of hundreds of humming birds. Then, another case contained hundreds of micro-bats. Why is it necessary to display hundreds of one species, why not one or two specimens for scientific purposes? Surely, there has to be a limit to how many specimens are actually needed to carry out any form of research.

One of our last visits was to the New York Museum of Natural History and Art. Once again we toured room after room of dead animals, and I was once again appalled at the number of animals that have been sacrificed for display purposes.

Recently, a Queensland researcher applied for approval to take 12 blue satin bower birds for a study project. Our Society and the conservation movement violently opposed the taking of this large number of fully protected bower birds and regarded the number required in the license to be excessive to the real needs for research purposes.

With the declining of bush birds across Australia through land clearing, drought and feral predation, it is clearly wrong for scientists or other researchers to continue to want to take large numbers of native birds and animals to study with often very limited published results.

Displays in great mammal hall

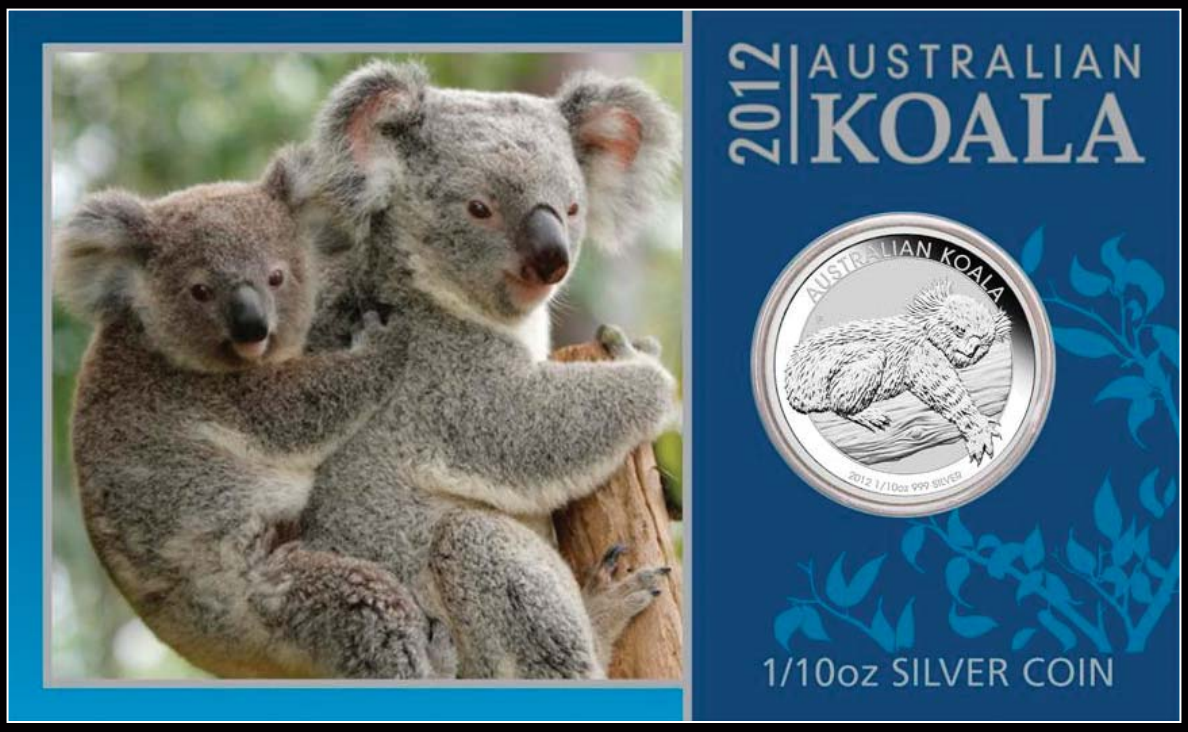


Two Tasmanian tiger and echidna specimens

Hummingbird display

Glass flora display

Australian koala silver bullion coin competition



Members' competition

I am delighted to announce the winners of the koala coin competition that was featured in the winter edition of *Australian Wildlife.* We asked members to write a paragraph that we can send to the federal minister for the environment saying why the koala should be listed as Vulnerable in Victoria.

They five winners are:

Sally Freeman-Greene - *The koala is unique to Terra Australis. So save us, don't harm us. Join Queensland, NSW and the ACT in ensuring the vulnerable status, of that koala in the tree.*

Aislinn Murphy (aged 10) - *Because koalas are so cute and it is an Australian native animal it is important we protect them so we can keep them and make more of them so they can live out in the wild, but some of them can go to Dubbo Zoo and Taronga Zoo so we can see how they live.*

Zara Ruhl (aged 11) - *Koalas should be protected because they can only live in one place in the world and that is Australia.*

Keiran Parsons (aged 7) - *Koalas are so cute and cuddly and I want them to still be here when I grow up.*

Suzzette Alden - *We must protect all our wildlife for future generations, but especially the koala which is such an iconic species.*

Suzanne Medway
President

Meet our directors

Peter Hardiman

Allow me to introduce myself. My name is Peter Hardiman; I am a former police officer with 23 years police service and was the inaugural Chief Security Officer for the Department of Education and Training for 19 years.

The transition from a law enforcement officer to take up the cudgels to be a director of our unique Society has been both challenging and rewarding. I have adapted well and it has opened up new horizons.

My main portfolio amongst other duties is to research and prepare reports on feral animals.

Recently our President Suzanne Medway and our Chief Executive Officer/Hon Secretary Patrick Medway, who are the driving force behind the modern version of our Society, came up with a novel idea of inviting all Board Directors to prepare and submit a brief profile of themselves and their activities for inclusion in our magazine to add a little insight and background of the Wildlife Preservation Society of Australia Limited.

Most of you would be aware, and I am very happy to say, that the Society has been striving to conserve Australia's unique wildlife in all its forms since its inception in 1909. During this time, dedicated volunteers have worked tirelessly and continue to do so to preserve the habitat for birds and animals, continue to write to members of parliament, local councils and other bodies to bring about updated legislation to protect wildlife and the environment.

The Society is a voluntary organisation and its continuing existence relies on funding from membership fees, donations and the like. There are ten very committed and dedicated board members and our regional advisors. Monthly meetings are held to discuss controversial issues raised on a state and national level, jointly to be kept informed on current conservation issues so as to speak authoritatively on these issues, write submissions

to government ministers and letters to editors of local and national newspapers about current wildlife issues, so as to keep our members fully informed of the vital need to preserve wildlife across Australia.

To gain a greater insight into the history of our Society, I strongly recommend two books titled *Conserving Australia's Wildlife* and *100 Years of Saving Australia's Wildlife* written by Dr Joan Webb.

A more recent and exciting development approved by our Board is an interesting enterprise in raising money for the WPSA/UTS Wildlife Ecology Scholarship, inviting members and other interested parties to invest or donate money towards launching this worthwhile educational scheme.

It's a good cause, no strings attached, so if you have any spare cash, be in it.

As a matter of general interest, the federal government introduced into Parliament a bill entitled 'National Environmental Biosecurity Response Agreement' between the Commonwealth, State and Territory governments, with the exception of Tasmania.

It is a very lengthy detailed and complex document comprising 83 pages.

On 12 February 2012, the Bill was enacted and passed through Parliament and the federal government has set aside funds in an amount of $1.2 million to implement same.

Our Society is closely examining the content of the Bill to determine its impact on our environment and the effects it may or may not have on our Society, similar bodies and interested groups. Will keep you posted in the event of any adverse findings.

WELCOME TO THE TOWNSHIP OF DUARINGA

Steven Saphore

Rumours of fires, reports of gun shots, deadly viruses and trees decimated by the dozens, where starlit nights illuminate this remote outback town, nine hours north of Brisbane. Welcome to Duaringa. What is all the commotion surrounding this enigma with a population of just 250 people? Perhaps the answer lies not with the people, but with the other population that resides there: 100,000 little red flying-foxes.

A melancholy hum of generators harmonise like a dark ensemble that drones throughout the dusty town, echoing in the streets and resonating through camping grounds in the park. The notes singing impending doom are emanating from the exclusion zone, an area of about three streets, cordoned off to the public for the night with hefty construction barricades and no shortage of fluorescent pink tape. Tonight, council workers, who form a significant proportion of this small community, will work to raze the trees growing in this area which the newly unwelcome residents may use to roost.

One does not need long in this town to realise the disdain for these bats amongst its residents. Classed as a protected species, two of the four flying-foxes found in Queensland (spectacled and grey-headed flying-foxes) are federally listed as threatened. As such, any attempts to disturb flying-fox colonies are illegal. Yet today, the bulk of conversation overheard regards the current dispersal (euphemised as a "damage mitigation permit") an authorised attempt that will utilise sound, lights, smoke and tree-cutting to prevent the little red flying-foxes from returning to town. A point of interest is that little reds are the most nomadic of flying-fox species and roost in large numbers and in the closest of quarters, which is why they tend to do much damage to the trees they roost in. But

Above: Found dead in a car park, this grey-headed flying-fox mother clutches her daughter under her wing in an affectionate display of compassion

this is probably also the reason why they tend to naturally move on more quickly than other species.

This will be the second dispersal attempted since their arrival into people's backyards nearly seven months ago. Since then, the local council has received an uninterrupted flow of complaints from upset townsfolk about the little reds. "Irreverent squabbling", "[defecation] covered cars and backyards", "the pungent smell", with one resident even telling me, "it's not safe to go outside in the day." In the last decade, media sensationalism has typecast flying-foxes as a disease-ridden, winged menace. Aside from the regular trappings a colony may bring with them, flying-foxes remain one of the few creatures to naturally harbour the mysterious and deadly Hendra virus. First discovered in 1994, Hendra virus caused much panic among Australia's lucrative horse racing industry, with every recorded outbreak involving infection of horses with a 75 percent fatality rate. With concerns of health, noise and soiled washing, it's no surprise Duaringa wants them gone.

Limbs of dead trees litter the streets of Duaringa

An outstanding example of power is Peter Maguire, mayor of the Central Highlands Region, who sheds some insight on the importance of this dispersal. "Health," he tells me in reference to Hendra virus, "If [flying-foxes] can kill a horse, they can kill a human," after which he assures me, "I'm not a bat expert." This is clearly so, as the devil almost always lurks in the details. Since its discovery, Hendra virus has claimed the lives of four people, none of whom contracted it from a flying-fox. (That figure pales in comparison to the over 30,000 road deaths in the same period.) None of the over 70 horse deaths caused by the virus show any direct links of

A demonstrator holds a sign as part of the Grey Cross Protest against the legalised slaughter of flying-foxes outside Queensland Parliament. Inverted crosses were hung on the gates of Parliament and the surrounding trees to symbolise shot flying-foxes

This flying-fox sucks a whole syringe of apple and lime juice

contraction from flying-foxes either. Now with a Hendra virus vaccine for horses that went on sale as of November 2012, this disease will slowly sink into the past. In reality, flying-foxes have only ever been responsible for one of the two bat-related deaths in Australia. In 1996, a woman was bitten by a flying-fox infected with ABL (Australian bat lyssa virus), dying only as a result of declined post-exposure vaccination. The other death resulted from a scratch of an ABL-infected microbat to an animal carer, also in 1996. An extremely rare occurrence, less than 0.05 percent of flying-foxes in the wild carry ABL. Furthermore, effective ABL vaccinations have prevented any more deaths since these two mid-1990s cases. Nonetheless, "humans before animals" Peter continues, now expressing concern about the psychological wellbeing of the residents. He tells me, "It's not Australia when you can't sit outside and have a barbeque without worrying about bat [excrement] in your food and drink... and when there's the potential to break the law by mowing your lawn, they've got to go".

No joy or bewilderment was to be heard either of the spectacular evening fly-out of the 100,000 bats who, in an amazing display of synchronicity, form dark swirling vortices radiating from the trees where they roost. Within minutes, the sky had exploded into a spectacled canopy. At times even the fiery setting sun was blocked from view as the amalgamation of their sheer numbers transformed them into one monumental being. An amazing phenomenon that only a privileged few in the world have witnessed.

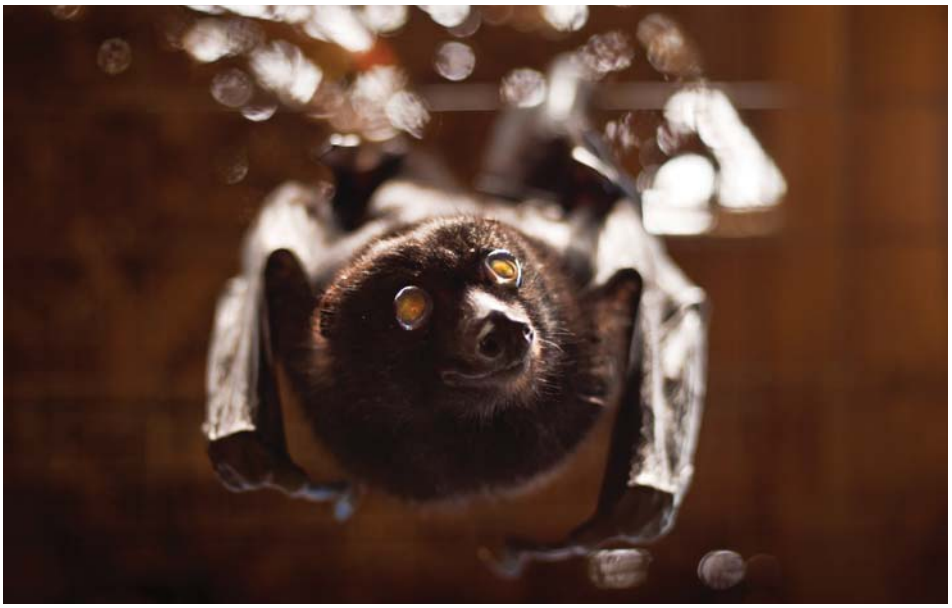
While workers within the exclusion zone set up floodlights, now chainsaw oscillations join the ghastly choir. The local police officer overseeing tonight's

100,000 little red flying-foxes return to roost as the sun rises

operation, night four of the week-long dispersal, motions me to keep my distance from the barrier and promptly warns me "no photos of council vehicles, no photos of council workers, no photos of me." Clearly, there is much tension regarding this operation. The town has come under scrutiny lately as reports of cruelty and disturbance to the flying-foxes have surfaced. The residents know this is their second and possibly last chance of a dispersal. The first attempt was botched, after a successful relocation, due to apparent bushfires that erupted next to the new colony along a river just a few kilometres away, prompting the flying-foxes to return to the town for safety.

"Flying-foxes are nomadic, a floating population who follow the flowering eucalypt across Australia", Lyn Laskus, a wildlife rehabilitator tells me. "If left alone, they would move on by themselves, but the more they are harassed, the more encouraged they are to stay here for safety, even though it is the source of harassment." A woman of remarkably small stature with the most pertinacious attitude I have ever seen, she has gained notoriety in the town because of her fortitude to educate Duaringa on the ecological importance of these creatures. Upon her last invitation to visit and inform, signs with information placed in the local park housing the roost were vandalised within days and, according to Lyn, one resident tried to run her over with a ride-on lawn mower. "I fear for the future of the little reds and the environment they support if Duaringa is not willing to learn," she confesses.

Louise Saunders of Bat Rescue & Conservation QLD speaks to ABC News as part of the Grey Cross Protest against the legalised slaughter of flying-foxes outside Queensland Parliament. She holds an orphaned grey-headed flying-fox, a threatened species, rescued that morning



Blind Bella, a black flying-fox blinded by a car accident. Even though she will never fly again, she was not euthanised because she is a great surrogate mother, taking on two to three babies every year

Injured bats of all types hang on a washing line in Trish Wimberley's clinic

Part of Duaringa's dispersal attempt, this C.H.R.C. vehicle fumigates trees while flying-foxes attempt to roost in them

A keystone species for Australia, if flying-foxes are removed from the ecosystem, the effect would be devastatingly large in relation to their abundance. Stressing the importance of letting nature take its course, she explains, "flying-foxes' preferred source of food is nectar and blossom. In return they have become one of the main pollinators of Australia's forest trees - eucalypts, melaleucas, figs, etc. People believe that because they roost in huge numbers they are not under threat. When tormented, build-up of the cortisol hormone from stress can cause babies to be aborted and, given that mothers typically have just one baby per year, they must be left alone."

At about 3.30 am, the fiasco begins; the opening of the window in which the little reds will return to roost from their night of nectar and pollen feasting. The police car overseeing the night-time cutting is joined by a fire truck and the cars of numerous locals eager to join the barrage. In a seemingly practised simultaneity, they form a battalion and begin patrolling the square kilometre or so of roads around the exclusion zone with lights flashing and horns and sirens wailing. Much to the displeasure (and confusion) of abruptly awoken campers in the park adjacent to the exclusion zone, council workers introduce their line-up of big guns to join the armada: vehicle and trailer-mounted smoke machines, which fumigate the remaining foliage the bats will attempt to return to roost in, and vehicle and trailer-mounted 'scare guns' (a pipe-based canon which relies on combustion from a propane gas tank to make a 'bang'), firing to disorientate and deter the returning flying-foxes with voluminous sound. Emblazoned across each of these machines in a bright yellow, army stencilled font are the Central Highlands Regional Council initials, C.H.R.C., giving them a type of military uniformity.

As more little reds return to the siege, it is an understatement to call Duaringa a war zone at this point. Rising up over the plume of smoke, lights and explosions stands one tree. This is the crèche, the tree flying-fox mothers leave their dependent young in who are too heavy to carry when they fly out to find food for the night. The conditions of the dispersal say the crèche tree is not to be touched as long as there are flying-fox babies in it – the environmental officer overseeing the dispersal puts the estimate at four. With cones forming a wide perimeter around the crèche, C.H.R.C. will not be allowed near it.

When flying-foxes return to the roost, mothers call out to their babies with a unique vocalisation, to which their young will respond. This method allows mothers and children to find each other over the ten to twelve weeks it takes a baby to go from birth to fly-outs. Despite the cacophony of horns, sirens and detonations echoing through the adjacent valleys, it is easy to hear the conversation of calls from mothers and babies who now cannot find each other. Dawn approaches as the little reds congregate into dark

Orphans from Trish Wimberley's Australia Bat Clinic are fed and blanketed

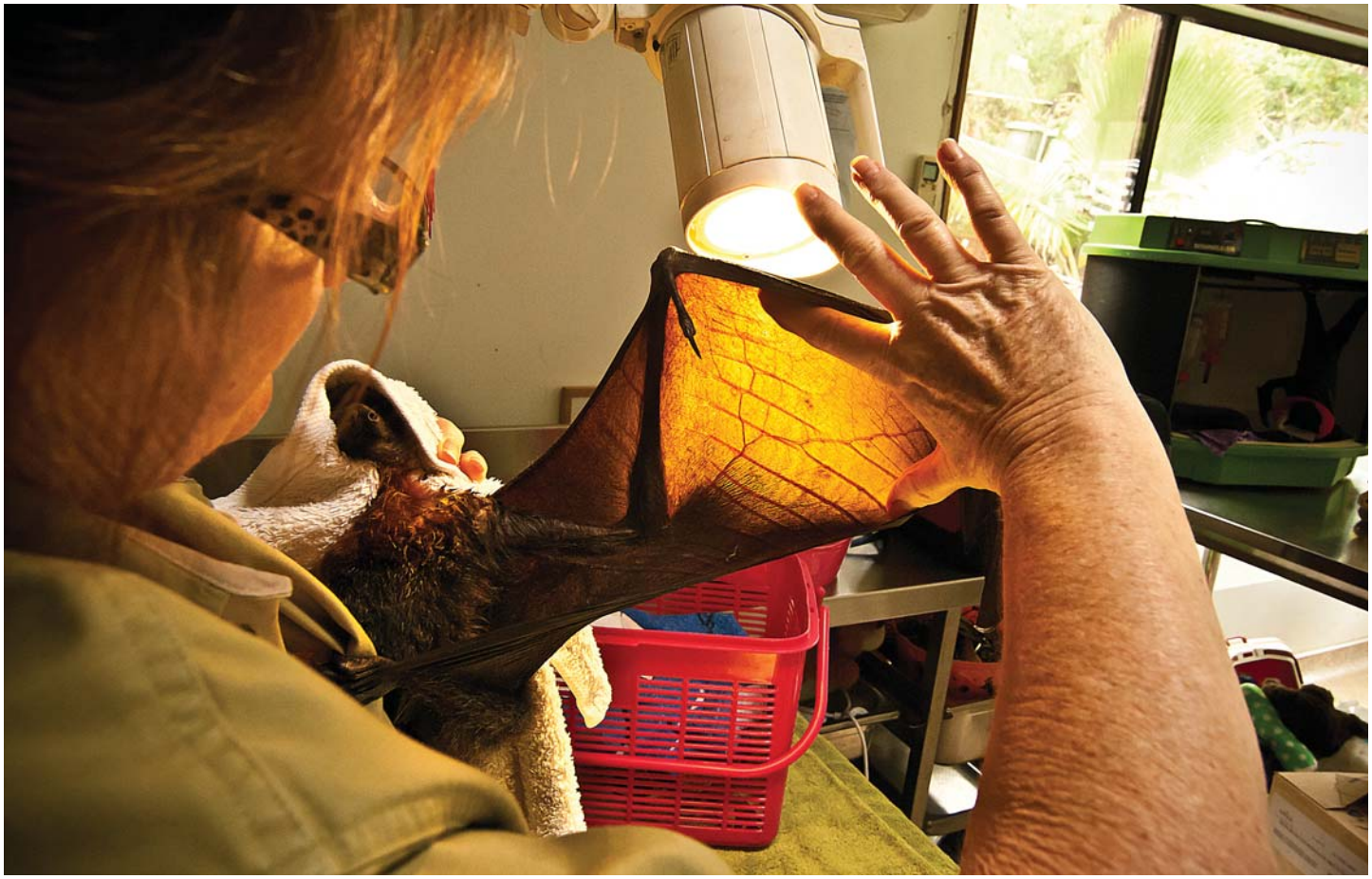
swirling masses just as the evening before, and like a frenzied colony of ants, Duaringa now works twice as hard to prevent them from reaching their old roost.

The sun rises, the last scare gun is fired and the final siren is switched off. Favourably for the flying-foxes, it seems the dispersal has been somewhat of a success, as the vast majority of the colony has relocated to bushland about one kilometre away. Duaringa is now left to pick up the pieces of their town and restore balance to their community. The limbs of dead trees litter the streets, casualties caught between the contest of nature and best interests. Lyn Laskus prays the flying-foxes are left alone now, where they will continue on their way in their own time.

Isabella, a two week old black flying-fox whose mother died in fruit netting

Eve of Hallow

"Behind me you can see blacks and the threatened grey-headed flying-foxes," says Louise Saunders, president of Bat Rescue & Conservation QLD, as she educates a group of children dressed up as vampires, fairies, zombies and bats on this gloomy, overcast Halloween evening in Brisbane's south east suburbs. They are waiting for the climatic finale of her presentation in which the colony she stands in front of will fly out only metres above their heads to find food for the night. The annual Halloween event organised by Louise's completely volunteer-based organisation aims to educate children and adults alike, dispelling the great amount of misinformation and hysteria regarding flying-foxes. "As a matter of fact, flying-foxes are nothing like the spooky, bloodsucking, cave-dwelling character that many think they know through television and movies," she tells the children. Flying-foxes do not use echolocation to navigate; instead, their diurnal vision grants them eyesight as good as humans' during the day



Trish Wimberley inspects the blood vessels in the membrane of the damaged wing of a flying-fox found caught in fruit netting. "A lucky bat will be rescued. An even luckier one will fly again."

and as good as cats' during the night. They roost in trees rather than caves and other dark places. Their vegan regimen consists of pollen, nectar and fruit much unlike the diet of their insectivorous microbat brethren (and the three species of vampire bats found only in central America who subsist on the blood of livestock and fish). In fact, flying-foxes are more biologically similar to primates than they are to microbats. "Some carers believe them to be primates", says Louise, "but of course we all know they're just puppies with wings," she says with a smile referring to their playful nature and incredibly canine-like face, "that's why we call them flying-foxes."

This event is also in reaction to the Queensland State Government who, on National Threatened Species Day (7 September), gazetted changes to the Animal Care and Protection Act in an attempt to legalise the shooting of flying-foxes. Previously outlawed once before in 2008, the Australian Animal Welfare Advisory Committee declared shooting flying-foxes an act of cruelty. "... And it's still just as cruel now as it was then", Louise explains to her juvenile horde of monsters. "In 2008 it was found that 92 percent of flying-foxes would be shot through the wings and left to die slowly", she startlingly divulges. "Half of flying-foxes shot will be females, which means the babies of mothers will be left behind to starve and eventually die," she continues. "Most importantly, bullets don't discriminate between blacks, little reds, grey-headed, or spectacled flying-foxes; threatened species will be shot too." The new law will once again grant orchardists the right to kill flying-foxes as a means of crop protection. In 2001, a single farm in Queensland killed one fifth of the world's population of spectacled flying-foxes (18,000), a threatened species, over a six-week period using an electric grid. "A typical outcome of a few in power left to decide the best interest for many", Louise says, "we're fighting politics, but conservation is not about politics. When koalas needed support (in reference to the 2012 koala population crisis), they got funding and education; we get bullets." As the camp of flying-foxes amass and leave their trees, kids point, adults take pictures and Louise looks down; we might be the last people to see this.

The unsung saviour

Speeding down a road barely wide enough for a single car, with a sheer drop to the immediate left, I find myself clutching the seatbelt as empty packets of saline solution and electrically insulated fibreglass poles bounce around Trish Wimberley's van. She is speeding down the driveway of her 40-acre property to rescue a flying-fox found in a carpark 60 kilometres away. This is one of the thousands of rescue calls that organisations like Trish Wimberley's get every year.

Before legislation aimed at culling flying-foxes, simply living close to humans was enough to see their population impacted. "The common killers are fruit netting, barbed wire, electricity wires and dog attacks, but the biggest one is human ignorance." Trish tells me. Mono-filament fruit netting is a surprisingly brutal killer of flying-foxes; those who survive often do not end up flying again. Tangled up and unable to move, the netting simply rubs their sensitive noses and limbs raw, their fragile bones break and their wing membranes rip. After that a deadly combination of dehydration, starvation and the sun means they usually only have a few hours. Those that survive often do not end up flying again.

Barbed wire, a trap for low-flying bats who simply don't see it, is just as deadly, if not more ruthless. Often during attempts to get free, flying-foxes bite the wire and end up with an impaled mouth or eye. Dog attacks almost always result in euthanasia

A mother found caught tangled in fishing line is reunited with her baby after her swelling has subsided

because the injuries are simply too severe. "A lot of people would do the right thing if they knew what to do", Trish explains to me as her eyes switch from map to road.

Fruit netting, provided the right type is used and it is applied correctly, is actually the most effective, not to mention wildlife-friendly method of crop protection.

"People think they'll die if they touch a bat, but it's actually the other way around." In Australia, if a person is bitten or scratched by a bat, protocol dictates instead of administering post-exposure ABL prophylactics, provided the bat is available, carers must euthanize it for testing. Negative results mean no vaccination. "There are so many wildlife-friendly methods to protect your fruit and property. Even if you don't like [flying-foxes], you have to realise their importance", Trish says.

We arrive at the rescue to find a disturbing scene: a family of grey-headed flying-foxes, a threatened species, lie before us deceased. In an affectionate display of compassion, the lifeless mother clutches her daughter, also dead, under her wing. Yet from this calamity escapes new life, for it is soon realised this mother bears twins, an extremely rare occurrence in bats, as her son is found crawling not far away. As Trish gives the newly orphaned flying-fox an injection of sodium chloride and glucose for rehydration, she speculates a car accident to be the cause of this tragedy, but decides to take the bodies with her for a post mortem examination. Trish believes this orphan should get along just fine with the 11 others she has back at the clinic.

People from all over flock to Trish's clinic in search of advice or help when they have bats in care. Today she is training new carers on the basics of raising a baby flying-fox. With no government funding, education or support, people like Trish Wimberley rely on the compassion of others to assist in this important job.

Trish says raising a baby flying-fox is remarkably similar to raising a human baby in terms of the tactile upbringing they require. A creature that craves social interaction, a new recruit cleaning the wings of an impatient orphan tells me, "if you don't give them love and affection, you will get a very

A flying-fox found tangled in fruit netting is sedated to allow Trish to inspect its damaged wing

Flying-foxes are more biologically similar to primates than microbats

sad creature that in no way resembles a flying-fox". Babies will stay in care for about ten to twelve weeks until they are able to fly off to find food for themselves. "It beats having kids... guaranteed every one I raise will go back to the wild", the carer-in-training jokes. Trish introduces me to one of her permanent tenants, Dipper the flying-fox. Rendered unable to fly from fruit netting injuries, Trish chose to keep Dipper instead of euthanizing her, who tries to climb onto me from a coat rack where she effortlessly blends in with the hanging garments. "Everyone knows Dipper... if she's not eating, she just wants to play", I'm told by a volunteer.

Telling of flying-foxes' innate predilection for nectar and blossom, Trish Wimberley exemplifies, "a baby flying-fox, even those born of a C-section, raised by a human caregiver, fed only formula and fruit its whole life, every single time will go for a eucalypt blossom without ever having seen one before in its life". She solemnly concludes, "now, the only saviour of Australian bushland is the country's most hated creature".

With time, volunteers and resources all reaching their limits, the future is looking bleak for the only true flying mammal.

With ignorance and misinformation surrounding flying-foxes at its highest in years, these indispensable, sentient forest pollinators need our understanding more than ever. Yet for a creature relegated to myths, macabre symbolism and disease, can Australia save them?

Dingo dreamtime

author unknown

The Dreamtime or Jurkurdbah describes the Aboriginal Australian belief system for many inland Indigenous Australians. The Jurkurdbah is so much more than merely dreams as the English term coined by anthropologists would suggest. Knowledge in Indigenous Australian society was passed down from generation to generation through an oral tradition. Stories, although they may seem simplistic, held meaning on many different levels for the intended audience, and were told to children and adults as a way of explaining the origins of the natural environment and its spiritual connection.

The following dingo stories originate from the Yamatji (Tjupan) nation around Mount Magnet, Meekatharra, and Sandstone in the Murchison region of Western Australia.

Birth of the dingo

Long ago in The Dreamtime there was an enormous black kangaroo. He would chase and kill people whenever he saw them hunting and going about their daily life. Many brave men had tried to kill this kangaroo only to be slain by this massive, ferocious monster. One day the leader of the clan called a meeting with everyone. The leader had clever powers and was known as the Mabarn man by his and extended families in the area. He said to his people, "'I have this magic axe and it is made of special stone, and we are sick and tired of living in fear! I am giving this axe to my sons to collect wood from the sacred country of the mulga trees. From this wood I will carve a guardian creature that will fight the monster kangaroo and protect us".

Hope was given to the clan and that evening the sons set off on their journey and returned after two nights with the wood. The spirit dingo was made with a mulga branch for a backbone, forked sticks for ears, the teeth of a marsupial mole, and the tail of a bilby. After several days and nights of sacred secret rituals and chanting, the clever Mabarn man was finally able to bring the great big dingo guardian to life. The Mabarn man and his clan believed that the dingo had enough power, hatred and venom to destroy the monster kangaroo.

The following morning, some clan members and the Mabarn man's sons set out to hunt and gather food, with the dingo following closely behind, carefully disguised. Bringing small children was a clever ploy to flush the monster out, thought the Mabarn man as they would venture near the monster's camping ground. Finally the hunting party came across the monster kangaroo fast asleep in the afternoon shade near a large breakaway hill. The sons shouted and woke the monster kangaroo from its slumber. At the same time the dingo pounced and grabbed the monster kangaroo by its throat and killed him instantly.

The hunting party and the Guardian returned home and the sons told their father what had happened. Now the people were able hunt and gather food near the billabong without fear of the monster kangaroo killing them. To this day the elders had two or three dingoes as pets to protect them from harm and dingoes do not bark, they howl.

Dingo hunting

In The Dreamtime there was a giant dingo that lived on the eastern side of Australia. One day as he was about to go into a deep sleep in the afternoon he heard a faint deep drumming sound in the distance coming from the westward direction. He suddenly stood up as the sound became louder, trying to see where it was coming from. He began to follow the sound as it led him to a rise. He could not see anything yet but continued to follow the deep rumbling beats until he came to a gigantic hill (Uluru) in the middle of Australia. From here he was able to see what was making this sound and the dingo tingled with excitement. The dingo saw the giant emu nesting on its eggs, and the emu had also seen the giant dingo and was very worried about its eggs. As a way of protecting the eggs the giant emu suddenly took off running northward, and the giant dingo hungrily gave chase. They ran and ran for miles over plain after plain, and spinifex country. As they ran they left great big marks in the landscape which later became hills, gullies and canyons in central and north Western Australia. They began to have a big appetite from chasing the emu, which was beginning to get very tired. The emu soon slowed until it could finally run no more and the dingo grabbed it by the throat and killed it. He started to eat the emu from behind and ripped out all of its fat and vomited about the ground scattering it as he journeyed southward. The dingo then had a drink at a huge lagoon before heading to Albany. As he arrived in Albany the dingo met a huge whale in the harbour before resting near the shore. Here the dingo still looks out to sea and is visited by the whales every so often.

Today the dingo's resting place is known as Dog Rock. The emu can still be seen lying on its stomach if you visit Meekatharra at a place known as Gabinintha or Yagoongoo.

Sometimes when the wildflowers bloom in red and yellow you can see the emu's fat and blood below Yagoongoo hill. But most of the emu's fat turned into gold and was named Kulkulli. Kulkulli has been mined of its gold now, but that is the place where the giant dingo travelled leaving behind the emu's fat.

Canis lupus dingo, Fraser Island. Photo: Sam Fraser-Smith

Beautiful Blue Mountains

Nakia Belmer

I was born at the foot of the Blue Mountains and have always been surrounded by wildlife.

As a child I would often venture down to the local bush which ran alongside the Nepean River and if I wasn't chasing lizards I was trying to catch a fish. This love for outdoor adventure has followed me into my adult life and has led me to study wildlife conservation at the University of Western Sydney. My passion for wildlife and fitness has moulded me into a keen bushwalker and amateur wildlife photographer and, as a resident of the Blue Mountains, I am not short of bushland to explore. For many years I would just bushwalk and mountain-bike with a small digital camera until four years ago, when my photography took a great leap as I purchased my first professional camera, a Canon EOS 500D with a 250mm lens. This allowed me to get closer to my subject with minimal disturbance and a higher quality resolution for my smaller subjects.

The main motivation behind my wildlife photography was to share the sights that I would encounter when hiking with family and friends that were not as keen as me to get out into the bush.

My curiosity for wildlife and animal behaviour has never diminished and I find myself trekking through the mountains at any chance I get.

I am passionate about promoting the World Heritage Blue Mountains National Park by sharing my wildlife adventures and sometimes encounters, whether with its flora or fauna, through photography. I feel that if I am able to share these images throughout the world it may encourage people to be more considerate of natural ecosystems and their role. This led me to sharing my images on the photo blog panoramio (http://www. panoramio. com/user/nakiabelmer). Through this website I am able to map my images on external links such as Google Earth and Google Maps, helping me share these images with a greater audience.

I feel lucky to have seen as much as I have and live in such a beautiful part of Australia. We are certainly the lucky country and I would feel that I was letting myself and future generations down if I did not promote the protection of our diverse and individual flora and fauna.

If I was to leave one message behind I would say this: Australia has lost approximately 20 bird species and 27 unique endemic mammal species in the past 200 years (the world's worst

Above: View south east from Narrow Neck fire trail

Jacky lizard (*Amphibolurus muricatus*), Blue Mountains National Park

Snake flower (*Scaevola ramosissima*), Blue Mountains National Park

record) and approximately 3,000 ecosystems are currently threatened. The influence of invasive species and habitat destruction upon our unique wildlife is catastrophic and the protection of these unique ecosystems for future generations to enjoy is a must.

There are many different ways people can help, from volunteering with your local conservation or land care groups, to donations for research and development.

Thank you for your time and I hope my photography gives you a little taste of your backyard, Australia!

View of Narrow Neck fire trail from Mount Solitary, Jamison Valley, Blue Mountains Natioanl Park

Australian emerald (*Hemicordulia australiae*), Blue Mountains National Park

Sydney flannel flower (*Actinotus helianthi*), Blue Mountains National Park

Tufted blue-lily (*Thelionema caespitosum*), Blue Mountains National Park

Top left: Lace monitor (*Varanus varius*), Blue Mountains National Park

Top middle: Red beardie orchid (Calochilus paludosus), Blue Mountains National Park

Top right: Hedgehog wattle (*Acacia echinula*), Blue Mountains National Park

Middle left: Jacky lizard (*Amphibolurus muricatus*), Blue Mountains National Park

Middle right: Waratah (*Telopea speciosissima*), Mt Hay, Blue Mountains National Park

Bottom left: View west from Splendour Rock, Blue Mountains National Park

Ospreys forever

The Australian osprey (*Pandion haliaetus cristatus*)

Chrissy Banks

She sits perfectly poised, a light breeze ruffling her glossy brown feathers. Behind her, the turquoise waters of the Indian Ocean crash against the rocky outcropping she rests on. 'Regal' is the word that comes to mind as I quietly walk towards her. 'Snap-snap', goes the shutter of my camera. She turns at the sound, looks directly at me, and my heart pounds just a little. Golden eyes pierce mine, intense and intelligent. She is magnificent, an undeniable goddess of her realm. I marveled at how close she is allowing me to approach; I'm now only metres away. Perhaps I am the lesser of two threats for, just up the beach, a surfer makes ready his kite boarding kit. He's absorbed in what he is doing, utterly oblivious to the fact that watching him carefully is one of our biggest coastal raptors: the osprey.

As the kite ripples along the sand she grows restless. I stand ready with my camera to capture the moment she leaps off the rock, legs outstretched, mighty wings open on the upstroke. The kite behind me billows with a sudden 'crack'. I jump a mile and the osprey takes to the air. I miss a clear shot and think less than congenial thoughts about the kite-boarder. How on earth anyone can miss seeing, or simply ignore (which is worse in my opinion), such a thumping big bird is beyond me! Disappointed, I can only stand and watch her wing away.

Then to my delight she wheels back around and soars the currents not ten metres above me, indulging in a bit of aerial lunch spotting. She dips, hovers, soars, and flexes long, dark talons with deadly grace... She is utterly exquisite!

Second in size only to the white-bellied sea eagle – as far as coastal raptors go – ospreys are diurnal (meaning day hunters) and possess characteristics that are unique from other birds of prey: they have closable nostrils to shut out water, rounded talons rather than grooved, have toes of equal length, tarsi (legs) that are stout and reticulate (scaly), barbed footpads called spicules to hook into prey, and a reversible outer toe on each foot; this means osprey have two toes facing forward and two

Above: In preparing to dive an osprey brings its feet right back against the body

Champion fishers, osprey will also take small rodents, mammals and amphibians

facing back allowing for a superior hold on prey to what other raptors manage. These unique attributes have set the osprey slightly apart from other birds of prey, and in scientific circles have earned them their own taxonomic genus *Pandion*; family Pandioniadae.

And it is well deserving that they do. Osprey are the only *single living species* found globally, excluding Antarctica, proving their adaptability in inhabiting both temperate and tropical continents. Four subspecies of osprey exist, of which Australasia's *(P. h. cristatus)* is the smallest and by far the prettiest (I'm biased of course).

Growing anywhere from 50-60 centimetres in length and with a wingspan of 167 centimetres in the bigger birds, Australian ospreys have rich brown feathers above, and dazzling white underbellies beneath. The head is white, streaked with wisps of brown and a glossy ribbon of brown sweeps over each eye. Eyes tend to be topaz or amber rather than brown, with the transparent nictitating membrane a pale blue. This membrane (also known as a third eye or haw) is located between the other two eyelids and the cornea and slips sideways across the eye when used. Its main purposes are to keep the eye moist while the bird is awake and to protect the eye during hunting. Tarsi are white, talons and beak are black and the cere (the fleshy ring at base of the beak) a grayish-blue. Tails are fairly short and fan wide in flight. Osprey wings are double-jointed and have a graceful 'bow-like' appearance when seen from below. In flight they carry drooping feet and, coupled with the bow wings, have a gull-like appearance in the air (albeit a big gull). Distinguishing between sexes can be extremely difficult as both male and female osprey wear a light brown, speckled necklace across the breast, although the female's deepens with maturity. In some cases males may be missing it altogether. Females are generally thicker in body and broader in wing, but while it is easy enough to decipher male from female in a nesting pair, it is far more difficult with an individual bird. Quite unexpected for a large bird, the call of an adult is a high-pitched, short call that sounds like a trill cheep.

While fish is the definite palate pleaser, osprey have been known to prey upon small terrestrial animals such as rabbits, rodents, amphibians, small reptiles and even occasionally birds. Splendidly adapted to a life of fishing, this deadly predator is equipped with some impressive biological fishing kit. Stunning topaz eyes contain a specialised pigment that acts as a filter, allowing them to see clearly through the surface of water (a field of green breaker). The fish can swim, but they can't hide. Sharpness of vision also plays a role. Eagle-eyed indeed, an osprey can spot a suitable fish from as high up as 40 metres away, and the execution of a catch is nothing short of spectacular. Sighting its prey, an osprey dives head first at high speed toward the water, wings half-folded, and tarsi tucked back and close to the body. Seconds before striking, the tarsi come right forward in line with the head, the nostrils close, talons are opened wide, and it plunges feet first into the water with tremendous force. A great explosion of water erupts as a result, engulfing the osprey completely. Beneath the water the miraculous design of double-jointed wings allow it

This juvenile osprey scans the immediate coastal bushland with interest

Also known as the sea hawk, fish eagle or fish hawk, Australasian ospreys are non-migratory and the smallest of the four subspecies

to take a stroke up. It clears the water, wings beating strongly, tail fanned wide, clutching a catch quite often no less than 25 centimetres in length.

Ospreys are none the worse for wear employing this dramatic style of fishing. Fine, dense and oily plumage ensures they don't get too wet, yet excess water is taken on which impairs flight. They must rid themselves of it. They do this dog-style! Starting at the head, it is a full body shake stretching out over the shoulders and wings all the way to the tip of the tail – all while holding a fish. Flight is not possible while shaking, so an osprey will only shed water from a suitable height, as a significant amount of that height is lost in the process. If struggling with a big catch, osprey will risk waiting until landing to shake. It is worth noting that contrary to some speculation, osprey cannot swim and have been known to drown if their talons barb a fish too heavy to carry. While fish between 25 and 35 centimetres in length are preferred, the weight of a catch can vary anywhere from 50 to 2,000 grams. Exceeding that weight is when an osprey can get in trouble. In saying that, they are capable of carrying solid fish as long as their own undercarriage. In every case the osprey turns the fish head first into the flight path to minimise drag and, in the case of bigger fish, grip with both feet like we would ride a snowboard. And while they may be fussy about size (after all who wants to get wet for a guppy), they aren't fussy about fish species. For the osprey any old fish will do so long as it's big enough. *Especially* if you are feeding a full clutch of offspring!

Reaching sexual maturity at three to four years of age, it is recognised that ospreys mate for life and enjoy a recreational, almost playful courtship. During breeding season (Spring), a large, untidy nest is constructed predominately of sticks, driftwood and seaweed. Ospreys build their nurseries at the uppermost forks of trees, or on rocky outcroppings. Man-made platforms atop tall poles are also used. These are erected specifically in areas where a significant number of nesting pairs are recorded (eg Rottnest Island, Western Australia). Ospreys nest by freshwater lakes where food supply is bountiful, by coastal waters and off-shore inlets. The females generally lay a clutch of two to four eggs over a month. White with russet splotches, eggs are about the size of a large chicken egg, and are incubated up to five weeks, during which time the female relies on the size of the nest to help conserve heat. Chicks hatch within days of one another and weigh in at only 50-60 grams. Within an average of 69 days, however, they are fledging.

It takes an incredible parental partnership of five weeks' fishing and hunting to keep a full clutch of chicks alive. When food is scarce, or if one of the parents dies, the first chicks to hatch are the ones likely to survive – if they survive at all. This makes the following story quite incredible:

"They're a beautiful bird", Yvonne Sitko tells me enthusiastically of the osprey, and she should know. Yvonne runs the Western Australian Bird of Prey Centre in Perth and recently rehabilitated a male osprey after he fell approximately 50 metres out of his nest at the top of a Norfolk Pine. Dubbed 'Mr O' by locals, he was rushed to Yvonne for treatment. "Mr O came into captivity in a very bad state", Yvonne recalls soberly. "He was emaciated and very dehydrated, and for a while it was touch and go. For the first week he had to be force-fed fish slurry, much to his disgust. Being an osprey their main diet is fish and with that comes the smell. Oh my word, the smell! For the sensitive carer, cleaning would have required an oxygen mask and for the mess a paint scraper. House cleaning on a whole new level!" she laughs.

Soaring the wind current with effortless ease, an osprey can spot a fish from as high up as 40 metres

Mr O was suffering from severe bacterial and fungal infections. Yvonne explained that birds can pick up these infections from eating dead fish, contaminated food, or drinking contaminated water. "It was touch and go for a while there", she says of Mr O's initial response to treatment, "however, he soon picked up and began eating for himself. Fish were his favourite, herring to be specific – he was a fussy bird. He'd eat about four to six herring a day." As Mr O regained his appetite, his health and fitness improved. He showed signs of wanting to fly and Yvonne was more than happy to encourage that. "He was getting pretty comfortable in the aviary", she chuckles. "I got him out exercising and working as much as possible. I didn't want him getting so comfortable he didn't wish to go back to his hard-working mate and three demanding kids." There was no fear of that. The day of his release, one month after being brought in, he winged toward his nest with an exhilarated cry.

The true champion of this story though, is Mrs O. When her mate suddenly disappeared, she became sole provider for a clutch of three. It was early in the season, the first week out of five that chicks need the care of both parents to survive. Defying the odds, Mrs O fished continually to keep all three offspring alive. "It would have been a hard and confusing time for her", Yvonne said, "but she did it. She's an incredible bird." And was Mrs O pleased to see her wayward mate winging toward her out of the blue.

"It was amazing", Yvonne said of the reunion. "She saw him coming, launched herself off the nest with a shriek and flew right at him. I thought she was going to attack him, but instead she gave him a solid, mid-air clout as if to say, 'Where the blazes have you been?'" According to Yvonne, this is typical raptor behaviour. "They show emotion", she explained, and Mrs O would have been both furious with him for disappearing and excited to see him. "He wasn't allowed back into the nest, though", Yvonne adds with a laugh. "He had to spend a few weeks on a lower branch and earn his way back with some pretty impressive catches. They've since been seen flying and fishing as a couple", she adds, "so all's well that ends well." And in this case it ended well indeed. All three fledglings have left the nest and Mr and Mrs O are back to fishing for themselves and soaring the air currents, wing-to-wing. They'll be back next Spring, to the same nest, to raise a new clutch of chicks. And hopefully this time, Mr O will watch what he eats.

I feel warmed by the story of Mr and Mrs O, and my mind travels back to that day on the beach. Even now I can still see the osprey winging lazily out of sight. I lowered my camera with immense satisfaction. She had allowed me close and treated me to a playful, aerobatic display leaving me richer for the experience and just a little humbled.

The osprey. Regal. Intelligent. Magnificent. And I may be just a little bit in love.

Tasmanian devils

The facial tumour disease affecting Tasmanian devils has wreaked a shocking toll, with most of the marsupial's population already killed. Yet among the destruction there is hope for a cure - one that may also provide clues to fighting cancer in humans.

Imagine you are a scientist specialising in a form of transmissible cancer so virulent that it has a 100 percent mortality rate and is so contagious that it has already spread to, and killed, at least four-fifths of the population. Imagine further that you are working on a government program to sequester the tiny remaining adult population with the goal of preserving the species should the biological holocaust continue its march across the land. Finally, imagine that every time you attempt to monitor these chosen few remnants of the species – this modern-day Noah's Ark - for signs of infection or illness, they try to bite off your hand.

"Yeah, that could have taken a finger off", says David Schaap, senior keeper with the captive management and translocation section of the Save the Tasmanian Devil program, as a sound not unlike two chalkboard erasers being banged together issues forth from the writhing, snorting burlap sack that he has pinned, using his considerable bulk, onto the dirt track.

His patient at this sanctuary on the Tasmanian coast about one hour's drive north of Launceston is Tango, a male adult Tasmanian devil. Tango has been raised entirely in captivity, and thus lacks the fear of human beings common to his species in the wild. Proof of his apparent familiarity with Schaap is written in the dried blood on Schaap's forearms from the claw wounds that Tango and his kin have inflicted during this morning's rounds.

Tango is one of about 20 adult devils living in a dusty 22-hectare enclosure of scrub and gum trees, ringed first by a two-metre-high fence of corrugated iron to keep the devils in, and then by another of mesh netting to keep predators out. The enclosure is intended to simulate life in the wild for Tango's offspring, should the conditions ever arise for them to be released back into it. This outcome can only happen either through wholesale extinction of the wild population due to devil facial tumour disease (DFTD) or the development of a vaccine against it.

People like Schaap are coming to the end of a race to prevent the world's largest carnivorous marsupial – and one of Australia's most iconic animals – from extinction caused by this particularly aggressive cancer. Earlier this year, signs of the disease were reported for the first time in the island's north-west – the last spot in Tasmania to have remained disease-free and, it was hoped, home to a naturally immune devil.

DFTD, which was identified less than two decades ago, is passed through violent contact – usually a bite – between an infected animal and a healthy one. Once it is infected, the creature becomes capable of transmitting the disease to any other devil it encounters and, since devils tend to bite each other frequently during the course of communal feeding, regular social interaction and mating, the rate of transmission is high. Thus, it is necessary to ensure that secure compounds are constructed – this is one of two in Tasmania and there are several more on the mainland – to 'rebuild' the species and quarantine them while scientists look for a cure.

"If this were happening in human beings, it would be worse than AIDS", says Dr Chris Boland, science manager at the Save the Tasmanian Devil program. What good timing it would be, then, for a dramatic last-minute turnabout of the type Hollywood so commonly peddles. Incredibly,

A devil infected with DFTD

scientists working in Australia and abroad say that they may have found just that.

In February 2012, a professor at Canberra's Australian National University published a paper announcing that her team had succeeded in mapping the Tasmanian devil's genome – a complete copy of the entire set of its gene instructions. In 2011, a pair of US scientists at Penn State University also successfully mapped the devil genome using a different technique and at a different level of detail. Not only might these developments help to cure DFTD, the ANU team said, it could also help to cure cancer in human beings by providing scientists with an unprecedentedly slow-motion model of how cancer progresses.

Tasmanian devils have been stuck with a bad rap

Tasmanian writer David Owen says the breadth of misunderstanding shocked him as he co-wrote *Tasmanian Devil: A Unique and Threatened Animal* (2005), which is the only complete modern history of the beast. A widespread misunderstanding of its disposition, he says, most likely meant that the seriousness of the problem facing the species was initially under-evaluated. "I think a series of unfortunate events have been responsible for turning the devil into what it has become in the popular imagination", he says.

It's easy to see where the misconception originated. After all, if the Tasmanian devil – with its massive jaws, razor-sharp claws and warbling, haunting nocturnal howls – seems strange to us in the age of the internet, what must it have been like to the 19th-century settlers of Van Diemen's Land? "If anyone desires to see a blacker, uglier, more savage, and more untameable beast than our 'Devil', "wrote popular Victorian artist and author Louisa Anne Meredith, in 1880, "he must be difficult to please."

The fact that this description seems more than a little overblown did little to stop it contributing to an enduring negative image. Meredith's contemporaries, in fact, seemed almost intent on outdoing one another with wildly unsubstantiated reports of their encounters with this strange beast that, being nocturnal, is almost always heard and not seen. Tall tales of violent and anti-social devils – a far cry from the curious little fellows who follow us around the sanctuary, scoping out the photographer's camera bag for the shiny treats inside – became the norm.

A 1948 Tasmanian tourism authority publication, for example, described them as "ugly, bad-tempered and vicious". Then, in 1954, Warner Bros Cartoons introduced Taz, that whirling dervish of a comical monster, whose sloped brow and almost rabid taste for flesh would define for much of the world the face of the Tasmanian devil. The branding was complete.

Yet those who work and live closely with the creatures find themselves frequently charmed by them, says Nick Mooney, a retired wildlife biologist who formerly worked for Tasmania's state government. The owner of a cabin, he suggests, might wake to find a prosaic household item – a single boot or a box of nails, for instance – gone before following its trail to a nest where big round eyes peer out from behind some long-missing pots and pans. One encounter, while he was staying in shearers' quarters during a kangaroo count in the late 1970s at Brambletye, in the state's north-east, left Mooney forever changed, he tells me.

"I woke just on first light (and was aware of) something stirring, very close. I drifted off again and awoke again at dawn. I sat up wondering

A devil infected with DFTD

about my weird dreams and, looking down, saw a perfect set of big devil prints, wet on the lino, walking from the door straight up to me, then a pair of hind feet as the animal sat up, probably to sniff my face", he says.

In the interest of setting the record straight, then, here are a few facts: first, the devil, which has an average life expectancy in the wild of seven or eight years, doesn't spin when it's agitated and rarely bites humans. Far from being untameable and savage, its natural response when cornered is to play dead, like a possum. It is curious and highly sociable. Indeed, it's this very sociability that has caused such a rapid spread of the disease that now threatens its very existence.

It was nature photographer Christo Baars who first documented DFTD – a condition that causes the rapid growth of tumours on the animal's face and neck – in 1996 in Tasmania's north-east. Unable to eat or drink, the affected animal typically dies of starvation and dehydration within a year of contracting the disease. But because Tasmanian devils belong to a group of marsupials called Dasyuridae, which are highly susceptible to cancer as they age, few observers treated the initial reports with anything approaching the concern they deserved.

"At first, people just thought, 'Oh, that's a terrible cancer, but devils *get* cancer'", says Chris Boland. "But then more and more reports started coming in from along the east and the north-east; they became so frequent that they couldn't be dismissed any more. It was apparent that we had an urgent situation on our hands."

A devil infected with DFTD

"That's it", says Dr Janine Deakin, pointing to a pair of large computer monitors that provide the only light in this tiny corner of her sprawling laboratory in the RN Robertson Building on ANU's main campus. She traces on screen the ghostly outline of what could be two snakes, perhaps taken by X-ray, lying prostrate in a yellowish gel. They are, in fact, a magnified pair of chromosomes representing a strand of DNA that carries the genes of a healthy animal. "We have to start by looking at the healthy genes", she says, "and then see how their appearance differs from those mutated genes found in the diseased tissue of a tumour". Being able to identify the mutated genes is the first crucial step in developing a targeted gene therapy to eradicate the disease.

Healthy juvenile devils feeding

It was a team led by Deakin that published the devil genome in a February article in the San Francisco journal *PLoS Genetics*. "It's been a huge milestone, since very little was known about devil genetics or genomics prior to this study", she says. "We've come a long way in a very short period of time. All of this information has provided us with the starting blocks for vaccine development."

To understand just what is so significant about the sequencing of the devil genome, it's important to understand how DFTD differs from other cancers.

Cancer represents, at its root level, an unregulated growth of our *own* cells. The breast cancer that has metastasised into our lymph nodes began as a healthy cell in our breast tissue; that non-small-cell lung carcinoma was once a healthy cell

Taz, the whirling dervish character created by Warner Bros Cartoons

in our lung until it was exposed to asbestos fibres; and those Cancer Council adverts entreat us to protect our skin so that solar radiation does not cause a cancer-causing mutation in our cells.

"Every human cancer necessarily dies with its host", explains Deakin, "losing all of the genetic information and knowledge that might have come from studying it".

DFTD, too, is the rapid and uncontrolled growth of cells inside the body of a Tasmanian devil. The big difference, however, is that these are *not* the devil's own cells, but rather the mutated cells of the first devil that contracted the contagion. One of the genome project's first significant findings was that 'Patient Zero' was a female who bit another devil and her cancer cells invaded its system like a virus. Then that devil bit another devil and, in so doing, transmitted the first devil's cells to a third animal – and on and on it went.

It is precisely because the devil cancer is so different to human cancers in terms both of the way in which it is contracted and how it evolves that makes it so valuable to the study of human cancer, continues Deakin. "It's like being able to watch a cancer evolve in slow motion: the devil population serves as a kind of Petri dish in which a single cancer can be studied and, potentially, treated. The information gleaned in the process can then be transferred to the study and treatment of humans with cancer."

"In DFTD, you can study extreme evolution of a cancer", agrees Boland. "These cancers are now 15 years old."

According to the UK's Dr Elizabeth Murchison, who led a team of British and American scientists who sequenced the DFTD genome last year, all devil cancers are essentially the same and, as such, should be treatable by a single vaccine: she calls it a 'magic bullet'.

The newly mapped genome is particularly exciting for immunologist Dr Gregory Woods, from the Menzies Research Institute Tasmania, who is now focusing all his efforts on those handfuls of genes that are known to be different in healthy and infected animals. If our genome contains all the information that makes us what we are, then it should contain the map of our immune system, too. This is a potentially critical point for DFTD, because the devil's natural immune response – to fight off a foreign body when it enters its system – does not turn on in response to an invasion of these malign cells. It is this lack of an immune response that accounts for the disease's shockingly high mortality rate.

Finding a vaccine, says Woods, as he walks past a laboratory wall plastered with long strands of plaster moulded into a double helix, rests on figuring out where in that genome the immune system is being neutralised. It is such a simple point, he says, but so critical to understanding the confounding nature of the disease.

According to Elizabeth Murchison, researchers must focus on applying the information contained in the genome to solving the crisis facing the Tasmanian devil. Whether that means simply using it to develop a vaccine for Tango and the insurance population in the sanctuaries, or a broader program of targeted gene therapies for the population at large, remains to be seen.

Dr Stephen J O'Brien is not a man who minces words. The jocular former chief of the Laboratory of Genomic Diversity at America's National Cancer Institute is one of the world's foremost experts on comparative genetics and warns against ignoring the impact that Janine Deakin's research could have on the study of human cancers.

"Animals are incredibly informative", he said. "There are only two species on earth that have transmissible cellular tumours. One is the dog and the other is the Tasmanian devil. It would be idiotic to ignore that."

And while scientists warn that it is far too early to say exactly what aspect of human cancer research will benefit most from the mapping of the devil genome – there is little doubt about the level of interest that a vaccine against cancer, against any form of cancer, would generate globally.

"Let's say that everything goes absolutely perfectly", says Chris Boland, "and in four years' time some of our great scientists have developed a successful vaccine against DFTD. Now, a vaccine against a cancer is going to get worldwide news; cancer biologists and oncologists will surely prick up their ears."

University Grants 2012

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 2012 winners.

The presence of the amphibian chytrid fungus (*Batrachochytrium dendrobatidis* (*Bd*)) in frog populations of the Adelaide bioregion of South Australia

Jerome Kalvas,
Murdoch University

Chytrid fungus, *Batrachochytrium dendrobatidis (Bd),* is the most significant harmful organism affecting amphibian populations, and is already responsible for numerous amphibian population extinctions and declines globally. The pathogen's widespread global host range, in over 400 amphibian species on five continents, gives unfortunate candidacy for it being the most destructive infectious disease ever known. Chytrid fungus invades the thickened skin layers around the mouth, feet and abdomen of amphibians causing damage to the keratin layer. It is not known exactly how this can kill the frogs, however it is thought that the fungus may release toxins that are absorbed through the skin, or it may directly affect the amphibian's water uptake and respiration given frogs can drink and breathe through their skin. Surviving individuals are thought to be carriers and once in the environment there is no means of eliminating it. Because some frog species are highly susceptible and some appear less susceptible, chytridiomycosis can have variable mortality effect on frog populations. Amphibian population declines due to chytridiomycosis can occur rapidly with a real risk of extinction for rare, specialised or endemic species. Within Australia, *Bd* is considered the primary cause of extinction in at least four amphibian species (*L. nannotis, L. rheocola, T. acutirostris, N. dayi*) and has been detected in an additional 14 threatened species and 33 non-threatened species. Given the severity of this disease risk, the federal Department of Environment and Heritage (now referred to as the Australian Government Department of Sustainability, Environment, Water, Population and Communities) has listed *Bd* as a Key Threatening Process and prepared a Threat Abatement Plan which states that surveillance for chytridiomycosis is essential to manage this threat to native amphibians.

Fletcheri swab

The distribution of chytrid fungus throughout Australia, while not completely known, appears to include four zones; an east coast zone (Cooktown to Melbourne); a south-west zone (Perth through southwest Western Australia); Tasmania, where infections were first identified in 2004; and a zone

Ewingi swab

around Adelaide first identified in 1995. Concerningly, climatic and geographic modeling have identified the Adelaide bioregion as a high-risk area for *Bd*, yet reliable data on the presence of *Bd* in South Australian amphibians remain sparse.

The main aim of this project is to conduct a broad disease survey into the presence of the disease chytridiomycosis in frog and tadpole populations in the Adelaide bioregion, and thereby allow further investigations as to whether *Bd* is involved in any declines in abundance and/or range of native frog species in this region. Of the 11 frog species found in the greater Adelaide bioregion, the growling grass frog, *Litoria raniformis*, is listed nationally as vulnerable and Bibron's toadlet, *Pseudophryne bibronii*, is listed as rare in South Australia and threatened within the Adelaide and Mount Lofty Hills regions. Three of the 11 species (*L. ewingi, L. dumerili* and *L. tasmaniensis)* have been found to be infected with *Bd* in the Adelaide zone (Speare, 2005); and unpublished data indicates the potential presence of *Bd* in *C. signifera* and *G. laevis* around Adelaide as well. The secondary objective is to apply the first national non-invasive chytridiomycosis mapping protocol, recently developed by Skerratt *et al*. (2008), and assess its usefulness as a national and global standardised protocol that may enable comparison among amphibian populations world wide. The study's third objective is to provide new data to improve the accuracy of the national model of *Bd*'s biogeographic requirements within Australia. This will help identify which naïve populations would be at greatest risk if *Bd* was introduced and contribute to the conservation of South Australia's native amphibians and South Australia's and Australia's wildlife biodiversity.

This study will use a simple and standardised survey protocol, involving non-invasive sampling of frog populations to detect the presence and distribution of chytrid fungus at 12 different sites within the Adelaide bioregion, more if funding allows. This will make an important and urgent contribution to South Australia's ability to manage the risks associated with *Bd*, and safeguard South Australia's native frogs from this serious disease. Once conservation managers have information about chytrid distribution in the region, they will be able to make more informed decisions about quarantine, testing, treatment and movement of amphibians. This will help prevent *Bd* transmission from areas with chytridiomycosis to areas that are chytrid-free, and will help to direct conservation actions towards populations that are most likely to be affected by the disease.

I would like to thank the Wildlife Preservation Society of Australia for contributing towards the diagnostic costs of this surveillance project to thus enable me to complete my Masters degree in Veterinary Conservation Medicine.

Monarto Restoration Plan Newsletter 2012

Hi, my name is Dr Jerome Kalvas and I am working as a Veterinarian for ZoosSA based at Monarto Zoological Park. It is a real privilege working at such a site that has bountiful wildlife and exciting to see the restoration of the degraded habitats. I am currently studying a Masters Degree in Veterinary Conservation Medicine and am undertaking a survey of the presence of the amphibian chytrid fungus *Batrachochytrium dendrobatidis* (*Bd*) in frog populations of the Adelaide bioregion of South Australia. Monarto Zoo is one of the sites which I will be using within the study region and to date I have collected and sampled good numbers of three frog species, the Eastern Banjo frog, the spotted grass frog and the common froglet. Chytrid fungus is the most harmful organism affecting amphibian populations globally. Chytrid fungus and the associated disease chytridiomycosis are causing many amphibian extinctions and declines worldwide, including in Australia, where the disease is listed as a Key Threatening Process.

Although chytrid occurs throughout Australia, its distribution in South Australia is poorly known. This study will use a simple and standardised survey protocol, involving non-invasive sampling of frog populations to detect chytrid fungus presence. By determining presence and distribution of chytrid in areas with sparse data currently available including the Adelaide bioregion, this study will allow the disease threat to be better managed; informing decisions on movements of frogs, quarantine, testing and treatment; and helping to safeguard Australia's native amphibians.

Understanding the interactions between wallabies and roads in an expanding urban context

Amy Bond

Roads are a significant part of urbanised landscapes and, while they are vital for the development and connection of cities and towns, they often cut through and further fragment remnant habitat patches. This breaking up of wildlife habitats can have a variety of significant impacts on the wildlife populations living within these areas and the daily movements and behaviour of the individuals within these populations. The most obvious of these impacts is mortality from wildlife–vehicle collisions, but this is just one aspect of interactions between roads and wildlife. The impact of roads and traffic on the daily behaviour of wildlife has been greatly understudied, but is a crucial part to understanding the full suite of impacts from roads on wildlife.

Red-necked wallabies living in urban areas can have very regular contact with road environments as they move between remnant habitat patches, and in some places forage along the roadsides. Due to this relatively regular and sometimes extended contact with roads, the behaviour of wallabies while they are close to roads may be greatly influenced by the presence of the road. Wallabies often forage in the grassy verges of some roads, but this may come at the expense of being in a high disturbance environment. By investigating and comparing rates of foraging, maintenance activities and vigilance between wallabies near roads and away from roads, changes in the regular activities of wallabies caused by roads of varying disturbance levels will be able to be revealed.

Other behavioural aspects have also been investigated, exploring how differences in the behaviour of wallabies while crossing roads and in response to vehicles may be influencing their risk of road mortality. Preliminary results suggest that wallabies may behave differently at different roads, perhaps depending on the traffic volume of the road. Wallabies at the road with the highest traffic volume and speeds tended to display slightly more risky behaviours when crossing the road than wallabies at lower traffic volume and speed roads. Wallabies at this road were slightly less likely to be present within the road verge before crossing, and so may be less aware of the current traffic condition on the road before crossing. Wallabies were also much more likely to pause in the middle of the road and have higher pausing frequencies when crossing this road compared to the lower volume roads. Additionally, wallabies at this road were more likely to pause if a vehicle approached them during the road crossing. This pausing behaviour greatly lengthened the time that the wallaby took to cross the road and was therefore at risk of a collision with a vehicle. It is hoped that further investigation of these behaviours and wallaby responses to approaching vehicles will help inform drivers of appropriate actions when faced with wallabies on or beside roads, so as to help avoid collisions.

Wallabies on road

Other aspects of this project include characterising wallaby roadkill hotspots and investigating best approaches of avoiding wildlife–vehicle collisions from the drivers' perspective. From this project I aim to be able to inform road agencies, councils and drivers of areas where and when collisions with wallabies are more likely and the best possible ways to reduce and avoid such collisions. Additionally, through revealing physical features of roads that may contribute to collisions with wallabies, recommendations may be able to be made on design features to avoid around new and upgraded roads.

Sourcing to the sink or sinking to the source: how do fragmentation barriers influence dispersal of rainforest mammals?

Katrien Geurts, PhD,
James Cook University,
Cairns

In the Wet Tropics bioregion of north Queensland, rainforest restricted species are threatened by habitat fragmentation and further degradation by climate change. Suitable habitat will contract when temperatures increase. For endemic upland species dispersal to highland refuges will be imperative for their continued existence. We investigated the influence of patch size, vegetation structure, isolation distance and surrounding landscape matrix on population dynamics, movements and genetic variation. Non-flying mammals were surveyed by spotlighting, mark-recapture and DNA sampling in continuous rainforest, remnants close to continuous forest and fragmented patches.

First results show that for some animals size doesn't seem to matter. Beforehand it was conceived that bigger was better: better habitat quality, more resources and more refuge from predators. Trapping and spotlighting surveys that were conducted for a year in rainforest patches of different size and with a different degree of isolation show that abundance, sex ratio and body condition of mammals in small patches are just as high as in large patches. This demonstrated that small patches have an important habitat value and was exemplified by a Lumholtz's tree-kangaroo female that was found raising a juvenile joey and a pouch young in a fragment as small as three hectares.

However, for dispersal movements through fragmented landscape interspaced with hostile pasture land, a certain level of connectivity is needed. It is possible that animals seem to be doing well, but will be suffering from inbreeding effects in the long term. Species composition, for example, across the sites appeared more variable, which may indicate that some species are more sensitive to fragmentation effects. Therefore, trapping surveys are still continued to build on existing data and DNA samples are currently under analysis.

Small pockets of rainforest have a great possibility to play an important role in the landscape for mammals of the region. As most of these patches are on private land, it will be beneficial to create greater community and landholder involvement by making it interesting for them to conserve these small rainforest remnants, for example by carbon trading or tax rebates. It is also possible to strike conservation agreements on these properties so that habitat can be preserved for the future. One of the landowners, after being informed about these results, was convinced of the value of his land and has pledged it for revegetation.

Research is still continuing and, if future results show less gene flow between patches than between continuous rainforest sites, then this would provide an incentive for building corridors and revegetating small patches to maintain them as stepping stones and habitat in the landscape. If varying distances between populations show different degrees of isolation, this would assist in estimating an optimal corridor length. Overall the information from this PhD should contribute to design the landscape for higher connectivity, which will accommodate successful dispersal of some iconic species, such as Lumholtz's tree-kangaroo, to climate change refugia.

A large amount of gratitude is owed to the land-owners for letting me access their properties and to the volunteers who provided me with vital assistance during field work. I also thank my supervisors for their guidance and support. This project has received James Cook University ethics approval (A1569) and a scientific purposes permit from Queensland Parks and Wildlife Service (WISP08662211/ATH11/006). This PhD project would not be possible without the funding support of James Cook University, Skyrail Rainforest Foundation, Australian Geograpic Society, Norman Wettenhall Fund, Wet Tropics Management Authority and the Wildlife Preservation Society of Australia.

Fawn-footed melomys in a climbing palm. Photographer: Michelle Venter

Above: Giant white-tailed rat in a straight jacket. Photographer: Matt Moss

Cape York rat in the bag. Photographer: Sophie Hince

Katrien Geurts with the catch of the day, a brushtail possum. Photographer: Shelby Southworth

Katrien Geurts weighing up the evidence. Photographer: Alberto Rico

Fragmented landscape of the Atherton Tablelands Photographer: Katrien Geurts

Lumholtz's tree-kangaroo joey watching us set traps. Photographer: Debbie Vanvaerenbergh

Bats, birds, insects and floods: understanding ecosystem processes to better conserve our river red gums

Rachel Blakey
Australian Wetlands,
Rivers and Landscapes Centre,
University of New South Wales

Introduction

River red gums (*Eucalyptus camaldulensis*) are among the most widespread eucalypts in Australia. Their ability to withstand both drought and flood allows them to dominate the riparian zones and wetlands of the Murray–Darling basin. These trees form the basis of a range of plant communities, and support a great diversity of flora and fauna, including many threatened species. Despite their importance, river red gum communities are under threat from clearing, grazing and altered hydrological regimes. Large areas of trees are in a state of dieback and the Murray–Darling basin has been declared one of the top ten threatened river systems worldwide.

In response to these problems, successful campaigning by WPSA and other environmental groups has seen over 200,000 hectares of remnant river red gum forests along the Murray River declared national parks in 2010. This leaves conservation managers with the significant challenge of protecting and restoring these remnant forests in light of uncertain future climate conditions. While conservation strategies in the past have focussed on preserving species, populations and communities, there is increasing consensus that in order to conserve these assets effectively, we need to shift our emphasis to understanding the ecosystem processes which maintain them.

Rachel setting up bat recording equipment in the Barmah–Millewa forest. Photo credit: Emma Pont

Important ecosystem processes which drive river red gum persistence include: flooding, drying and defoliation from herbivorous (leaf-chewing, mining, galling or sap-sucking) insects. These processes may interact. For example, overall impact of herbivorous insects on leaf loss increases when trees are in drought. This reduction in leaf area affects trees' ability to photosynthesise and ultimately their health. For saplings, which have young, highly palatable nitrogen-rich leaves, these pressures can be even more acute. Globally, herbivorous insect populations are predominantly regulated by insectivorous birds and bats in terrestrial systems. When influences of these two predators have been examined separately, bats have far outstripped birds in their ability to control insect populations and limit leaf loss. However, these interactions have never been examined in Australian systems. Given the widespread water stress, high rates of insect herbivory and abundance of insectivorous bats within river red gum communities, it follows that bats may provide a significant ecosystem service to trees suffering the dual impacts of water stress and leaf loss.

This is where my project comes in. I want to unravel the relationships between river red gum saplings, herbivorous insects and their predators within a floodplain context. To do this, I will set up an experiment where I use removable nets to exclude predators from trees in the largest remaining stand of river red gums,

Above: Rachel with one of the suspects for insect regulation: a lesser long-eared bat

Barmah–Millewa Forest. I will be measuring insect abundance and leaf loss in trees where birds and bats have been excluded and comparing them to control trees. This will allow me to determine whether birds or bats (or both) are playing a role in regulating leaf-chewing insect communities, and thus maintaining tree health. The study will be replicated in both dry and wet sites, to find out the effect of flooding on these interactions.

As similar studies have never been conducted in Australia, it will be interesting to see whether bats will be discovered to play a role in maintaining ecosystem health, as observed overseas. This could have flow-on effects for how we approach forest management, potentially leading to integrated management of bat habitat within areas prone to dieback.

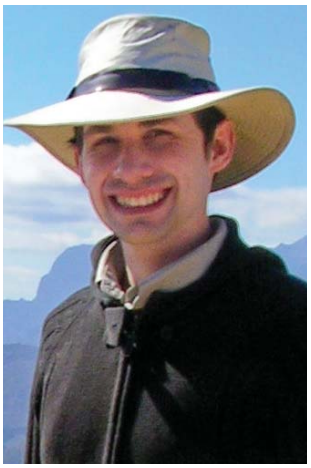
This project wouldn't be possible without the generous assistance of the Wildlife Preservation Society of Australia and the Australasian Bat Society. I look forward to reporting back my project outcomes in *Australian Wildlife* in 2013!

To many Australians, river red gums are a symbol of the resilience of the Murray–Darling Basin. Photo credit: Celine Steinfeld, UNSW

Volunteer Emma Pont, trying to keep her feet dry in the wetland

This long-eared bat has the ability to glean insects from leaves, so it may play a role in regulating insect populations on trees

Improving the conservation of the Great Barrier Reef through better prediction of coral bleaching



Robert Mason,
University of Queensland

Coral bleaching is a phenomenon that risks the health and ecology of the world's coral reefs. Coral reefs are built on a symbiotic relationship between single-celled algae and corals, which the algae live within. The energy that the algae provide to the coral from photosynthesis is the main energy source of corals, and allows them to create calcium carbonate skeletons that are the basis of all tropical coral reefs today. When the temperature of seawater or the level of sunlight become too high, the algae begin to produce compounds that are toxic to the coral, and the algae are expelled by the coral tissues. Without their main source of energy, corals and all creatures that depend on them decline in health and face increased mortality.

The research aquaria at Heron Island Research Station, January 2012. Photo credit: R Mason

Climate change is causing a general increase in sea temperature, and may cause changes in the levels of cloud cover, affecting light levels received by corals. These effects are leading to increased occurrence and severity of extreme temperature events that can cause coral bleaching.

A better understanding of coral bleaching is required to help us protect areas such as the Great Barrier Reef. Coral bleaching is a physiological process, and can be investigated using well known methods developed for physiological research. An understanding of the physiology behind coral bleaching can help us to predict when, where and why coral bleaching will occur. Through physiological research, my PhD project aims to increase our understanding of, and our ability to predict, coral bleaching.

Heron Island, in the southern Great Barrier Reef, is the location of a field station run by the University of Queensland, where I am conducting this PhD study. The research station contains aquarium tanks that are supplied by seawater taken from the surrounding reef. Using large water conditioners, the water

temperature can be changed to any desired water temperature for experimental studies, and large indoor lights replicate sunlight for photosynthesis. Using this facility, corals can be exposed to the extreme temperatures (29-33°C or more) and light levels that they experience during episodes of coral bleaching. Precise measurements can be taken in time series, and coral samples snap frozen at any point, enabling the physiological state of the coral to be preserved and investigated.

During my first experiment (conducted in January last year), I recreated in these aquarium facilities the different rates of sea temperature increase that occur in nature prior to a coral bleaching event. Using small live coral samples collected from the surrounding reef, I found that, no matter what the rate of heating, coral bleaching always occurs at the same temperature (32°C). This information will be used to help develop a method of predicting coral bleaching using satellite–detected sea temperatures and light levels (much like the weather is predicted by the Bureau of Meteorology).

In August last year, I performed another field trip to Heron Island Research Station to collect coral samples for an experiment that I ran over October and November. Following collection by hand, the small coral samples (four centimetres or less) were attached to frames and set out on the reef to grow and recover before being brought into the research aquarium for the experimental treatment in October. This experiment examined the influence of high versus low light levels on coral bleaching.

I would like to thank the Wildlife Preservation Society of Australia for their invaluable support of my project, along with the Heron Island Research Station and my supervisors Associate Professor Sophie Dove, Dr William Skirving, Professor Ove Hoegh-Guldberg and Dr Bronte Tilbrook.

Reef. Photo: M. Mello Athayde

Conducting research on SCUBA at Heron Island Reef. Photo credit: M Mello Athayde.

Mortality and behaviour of juvenile northern quolls during dispersal

Teigan Cremona,
PhD Candidate,
University of Technology Sydney

Northern quolls were once abundant in Kakadu but have been declining for the past 10 years. The invasion of the cane toads in 2003 was the final nail in the coffin and caused quolls in the East Alligator Region to become all but locally extinct. Researchers from the University of Technology Sydney and the University of Sydney have collaborated with the Territory Wildlife Park to reintroduce captive-bred 'toad-smart' quolls to East Alligator. These quolls were conditioned to avoid eating cane toads, and as a result have higher survival than toad-naïve quolls. 'Toad-smart' quolls have survived and reproduced in Kakadu for three years and we are now seeing the second-generation reach sexual maturity. I have been radio-tracking young quolls as they become independent from their mothers. I have found that juvenile quolls spend significant amounts of time foraging and denning with their mothers even after they become independent. This suggests that young quolls may learn to avoid toads via social learning. Potentially, young quolls may learn to avoid eating toads by watching their mothers sniff and reject toads.

A toad-trained northern quoll. © Jonathan Webb

While the results of the toad training are promising, the quoll population is still declining at East Alligator. Hence, we need to investigate the other factors affecting quoll survival including predation by dingoes and feral cats and the effects of changed fire regimes. Unfortunately, wild dogs and dingoes are abundant on the study site, and forage atop some of the highest rocky outcrops. Dog numbers may be elevated via roadkill and campground rubbish in the dry season, and during the wet season when food is scarce, predation by dogs may be preventing the recovery of this quoll population.

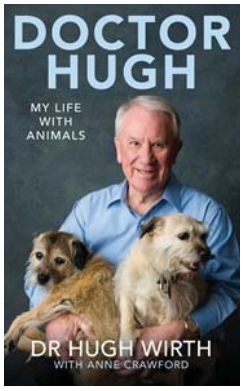
We would like to acknowledge the Wildlife Preservation Society's support of this project, making access to volunteers possible.

Above: Teigan and a toad-trained quoll at the Territory Wildlife Park. © Teigan Cremona

Teigan radio-tracking a juvenile quoll in Kakadu National Park. © Jonathan Webb

A juvenile quoll after being microchipped and collared. © Teigan Cremona

Book Reviews



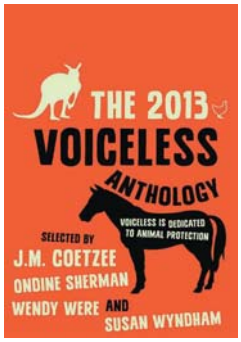
Dr Hugh: My Life With Animals - Dr Hugh Wirth with Anne Crawford

From his time as a young country vet to running his own busy practice in suburban Melbourne, Hugh has treated all manner of animals and told off any number of owners. He has encountered everything from carpet snakes and circus elephants to coughing chihuahuas. Hugh has taught three generations of Australians how to care for their pets (no creature too great or small) through his weekly ABC radio show.

As, at times, the indomitable national chief of the RSPCA and the global president of the WSPA, he has taken everyone on-from people perpetrating cruelty to animal rights activists, public service mandarins and even his own profession. Despite being forthright and sometimes controversial, he has received a string of honours, awards and appointments.

Doctor Hugh's memoir, written in his unmistakable tell-it-as-it-is voice, will delight, enrage, inform, entertain and teach every one of us how to care for and understand the rights of animals in our modern world.

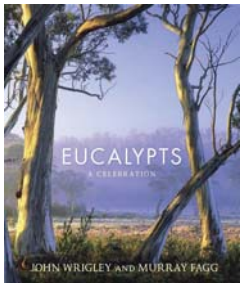
RRP: $29.99
Publisher: Fairfax Books



The 2013 Voiceless Anthology - Selected by J.M. Coetzee, Ondine Sherman, Wendy Were and Susan Wyndham

Voiceless is an Australian think tank promoting respect and compassion for animals. Part of that endeavour is the awarding of the Voiceless Writing Prize sponsored by Australian Ethical Investment. With a prize pool of over $20,000 it is one of the largest awards of its kind in Australia. Judged by an expert panel, the prize is awarded for Australian writing which advances the public's understanding of animal sentience, human-animal relationships and the ethical treatment of animals. The 2013 Voiceless Anthology presents the very best of the bounty of entries received for this year's awards.

RRP: $22.99
Publisher: Allen & Unwin

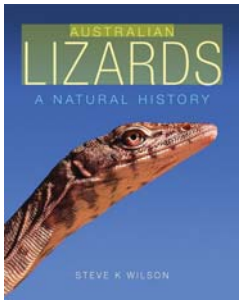


Eucalypts: A Celebration - John Wrigley and Murray Fagg

A superbly illustrated celebration of the beauty and diversity of Australia's most iconic and best-known trees.

Eucalypts are a familiar part of the Australian landscape and an integral part of their identity. They have farmed them and used them to build houses, furniture, roads, and bridges since the beginning of white settlement. They have been inspired by them, painted them, made films about them, written books about them, and of course Aboriginal Australians have long made musical instruments from them. Though a small number are found as native plants in several other countries, Eucalypts are a very Australian tree. This beautiful book celebrates their diversity, their beauty, and the role they play in the history, culture, and economy of Australia. It looks at their evolution, biology, horticulture, and ecology, together with their classification and the botanists involved. Through historic and contemporary images, it examines the many ways in which they have served Aboriginal, colonial, and contemporary Australians in both practical and aesthetic ways. Eucalypts have quite literally been the building blocks of that nation and this beautiful book tells their complete story for the first time.

RRP: $39.99
Publisher: Allen & Unwin

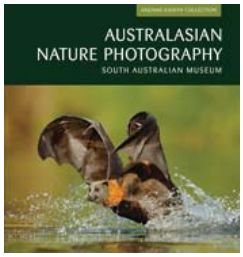


Australian Lizards: A Natural History - Steve K Wilson

The extraordinary lives of lizards remain largely hidden from human eyes. Lizards feed, mate, lay eggs or give live birth, and carefully manage their temperatures. They struggle to survive in a complex world of predators and competitors. The nearly 700 named Australian species are divided into seven families: the dragons, monitors, skinks, flap-footed lizards and three families of geckos. Using a vast array of artful strategies, lizards have managed to find a home in virtually all terrestrial habitats. *Australian Lizards: A Natural History* takes the reader on a journey through the remarkable life of lizards. It explores the places in which they live and what they eat, shows how they make use of their senses and how they control their temperatures, how they reproduce and how they defend themselves. Lavishly illustrated with more than 400 colour photographs, this book reveals behavioural aspects never before published, offering a fascinating glimpse into the unseen lives of these reptiles. It will appeal to a diverse readership, from those with a general interest in natural history to the seasoned herpetologist.

RRP: $49.95
Publisher: CSIRO Publishing

Book Reviews

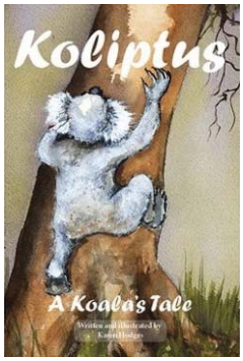


Australasian Nature Photography - South Australian Museum

This collection presents the finest photographs submitted to the ANZANG Nature Photographer of the Year competition. Each photograph is accompanied by technical information as well as anecdotes about how the picture was taken, which will stimulate yet further interest in the flora and fauna and their conservation in the region.

RRP: $39.95

Publisher: CSIRO Publishing

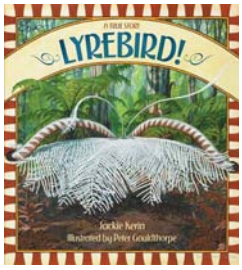


Koliptus - A Koala's Tale - Written and Illustrated by Karen Hodges

This beautifully illustrated book is a tale about Koliptus the koala and his bush friends. The tale takes you through Koliptus' life journey from a young joey to a fully-grown koala. An ideal gift for children aged 10-14 to teach them the value of our native wildlife.

RRP: $39.99

Publisher: smudge publishing



Lyrebird! A True Story - Written by Jackie Kerin and Illustrated by Peter Gouldthorpe

This true story, retold by Jackie Kerin and beautifully illustrated by Peter Gouldthorpe, celebrates a remarkable friendship between a gardener and one of Australia's most extraordinary birds.

RRP: $16.95

Publisher: Museum Victoria

Kangaroos on North Stradbroke Island Kye Norton

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To commit to being a part of our future, please complete this form. You may cancel your donation subscription at any time by notifying the national office.

Wildlife Preservation Society of Australia
PO Box 42
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Tel: (02) 9556 1537
Fax: (02) 9599 0000
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Founded in 1909

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☐ I want to join the Friends of WPSA and give by automatic deduction each month to help protect our unique native wildlife and its important habitat

I will give via: Credit Card (please complete authority form below)

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Signature Date

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Deduction will be made on 15th of each month.

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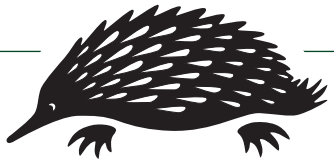

WILDLIFE PRESERVATION SOCIETY OF AUSTRALIA LIMITED

PO Box 42 Brighton Le Sands NSW 2216

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Membership category (please tick)

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- ☐ Concession (pensioner/student/child): $50
- ☐ E-mag (emailed as PDF, no hardcopy will be sent): $30
- ☐ Associate (library, school, conservation groups): $85
- ☐ Corporate: $125
- ☐ Life: $1,000

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

Three year membership (please tick)

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Name on Card: .....Expiry:.....

Signature:.....

Amount $.....

Donation $.....

Total $.....

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PO Box 42, Brighton Le Sands NSW 2216.
Email: info@wpsa.org.au Website: www.wpsa.org.au

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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

Kangaroos on North Stradbroke Island

Kye Norton