



# 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)



Sharks inhabited this planet long before we humans existed. They are nature's perfect creation, unchanged in millions of years. To see a shark swimming free in the ocean is a privilege few of us experience and, at the rate sharks are being killed, few of us ever will.

Pet dogs attack more people than sharks, horses kill more people than sharks.

Most if not all shark attacks are a mistake or, as in my case, provoked.

Media headlines screaming **KILLER SHARKS OFF COAST, MAN EATERS IN HARBOUR** have brainwashed much of the public into believing sharks to be extremely dangerous. If they were no one could ever safely swim in the ocean, yet every day thousands of people do just that.

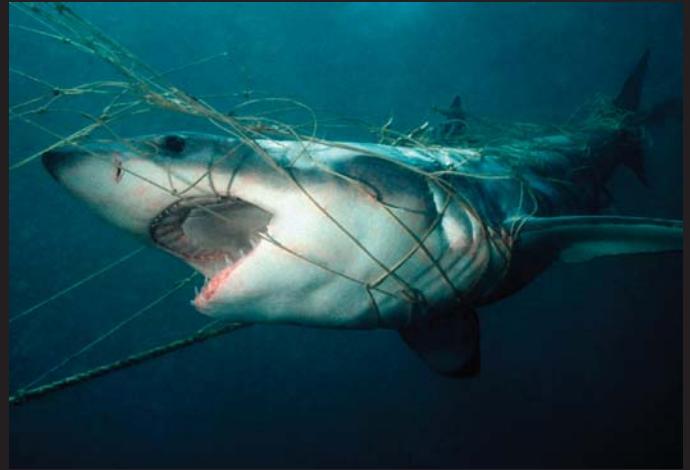
The shark meshing program with its indiscriminate catch should be abandoned. We share this planet with all nature's creations, and sharks have as much right to their world as we have to ours.

Valerie Taylor

Photographs by Ron and Val Taylor



Tiger and hammerhead sharks caught in a mesh net off Sydney. These nets are supposed to stop sharks from attacking bathers. Fewer sharks are caught each year but the terrible toll on harmless marine life continues unabated. Val Taylor once edited a book on sharks and her research showed that there had only ever been one proven attack on a human by a hammerhead and that was over 100 years ago in Kingston harbour Jamaica. Ron and Val Taylor have found all hammerheads to be very cautious and none threatening.



A young great white shark (*Charcharodon carcharias*) caught in a net off the east coast of Australia. Ron Taylor cut the little shark free



Bottlenose dolphin (*Tursiops truncatus*) caught in a net. In their wild youth Ron and Valerie used to sometimes cut out the animals that were alive. The netters knew they did this but they were careful not to get caught. Val bumped into a netter a couple of years ago and he said "Mrs Taylor I hated you and Ron cutting up our nets but you were doing what you believed was right". They had a bit of a chat about the good old days and departed without hard feelings. He said he sometimes watched Ron and Val through binoculars but their little tinny was much too fast for his big boat.



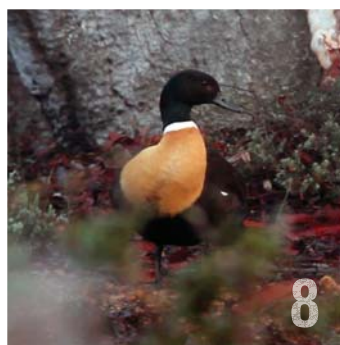
Scalloped hammerhead shark (*Sphyrna lewini*) caught in a net off NSW



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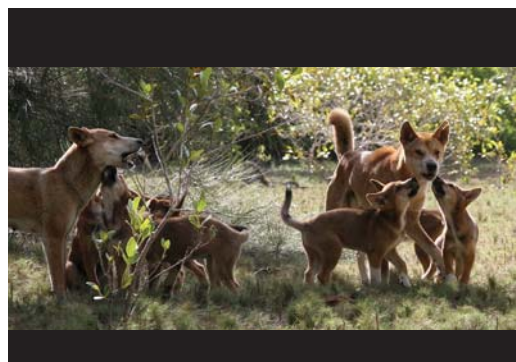
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### Front cover and back cover

Artist and wildlife photographer Jennifer Parkhurst met her first dingo over 25 years ago on the beach in Womboyne National Park, New South Wales. It was love at first sight. Since then she has travelled to almost every state in Australia – through the outback, along little-used desert tracks, to places remote and strange, and inevitably, to World Heritage Fraser Island, to fulfill her passion for photographing and studying Australia's iconic dog. She spent up to six days a week over five years working in the field on the Island in order to reveal the intimate details of the dingo's life in the wild.

Articles and comments expressed in this magazine do not necessarily reflect the opinions of the Editor, Society or members. Articles contributed from outside sources are included for the reading enjoyment of members and to encourage discussion on different points of view.

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Celebrating a new century of  
wildlife preservation in Australia

# Australian Wildlife

is the official journal of the Wildlife Preservation Society of Australia Limited.

Founded in 1909, the Society is dedicated to the conservation  
of our unique Australian wildlife in all its forms.

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## Directors 2010

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## 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

**When a person first offers their time and effort to volunteer, they seldom think of rewards or acknowledgement, they just think of what they can do to help.**



In general terms, volunteering is the practice of people working on behalf of others or a particular cause without payment for their time and services. Volunteering is generally considered an altruistic activity, intended to promote good or improve conditions in our society.

People also volunteer for their own skills development, to meet others, to make contacts for possible employment, to have fun, and a variety of other reasons.

Volunteering takes many forms and is performed by a wide range of people. Many volunteers are specifically trained for the areas they work in, such as in wildlife conservation, rescue and rehabilitation of injured wildlife. Other volunteers serve on an as-needed basis, such as in response to a natural disaster. The Victorian bush fires are a good example of volunteers and the local community helping not only the human victims, but also the animals affected by the disaster.

My time spent as a volunteer for the preservation and conservation of Australian wildlife has enabled me

to definitely improve my skills development, to meet so many inspirational people and to have lots of fun. Although at times it can be very distressing, particularly when I hear about wanton cruelty or neglect of our precious native wildlife.

Every year across NSW and ACT, hardworking volunteers lend their helping hands to assist charities in their community. The NRMA Helping People Awards recognise the tireless contribution these people make.

I was absolutely delighted to learn in early October that I had been nominated for the NRMA Helping People Awards and was a finalist. I was even more delighted to be informed in late October that I had been awarded the 2010 Environmental Volunteer Award for my contribution to preserving Australia's wildlife.



Suzanne Medway receives her 2010 NRMA Helping People Award from Emma Degenhardt of Conservation Volunteers

NRMA held an award presentation in Sydney on Thursday 2 December and I was pleased to be able to invite my husband, mother, daughter and two sisters to be with me and help me celebrate receiving this special Award.

As well as receiving a blue crystal trophy and a certificate, a presentation of a cheque for \$5,000 was made by Emma Degenhardt of Conservation Volunteers and Wendy Machin, President of the NRMA Board.

I have decided to allocate these funds to one of our special projects – The Wildlife Preservation Society of Australia University Grants Scheme. This injection of extra funds will enable a special grant to be launched in 2011 – more details will be released soon.

I am grateful to the NRMA for helping to recognise those hard working people in our country who contribute so much to our community by volunteering their time and service.



Suzanne Medway, Wendy Machin, President of the NRMA Board, and Patrick Medway at the Award ceremony



# Know your directors

## Dr David Ronald Murray

### Vice President

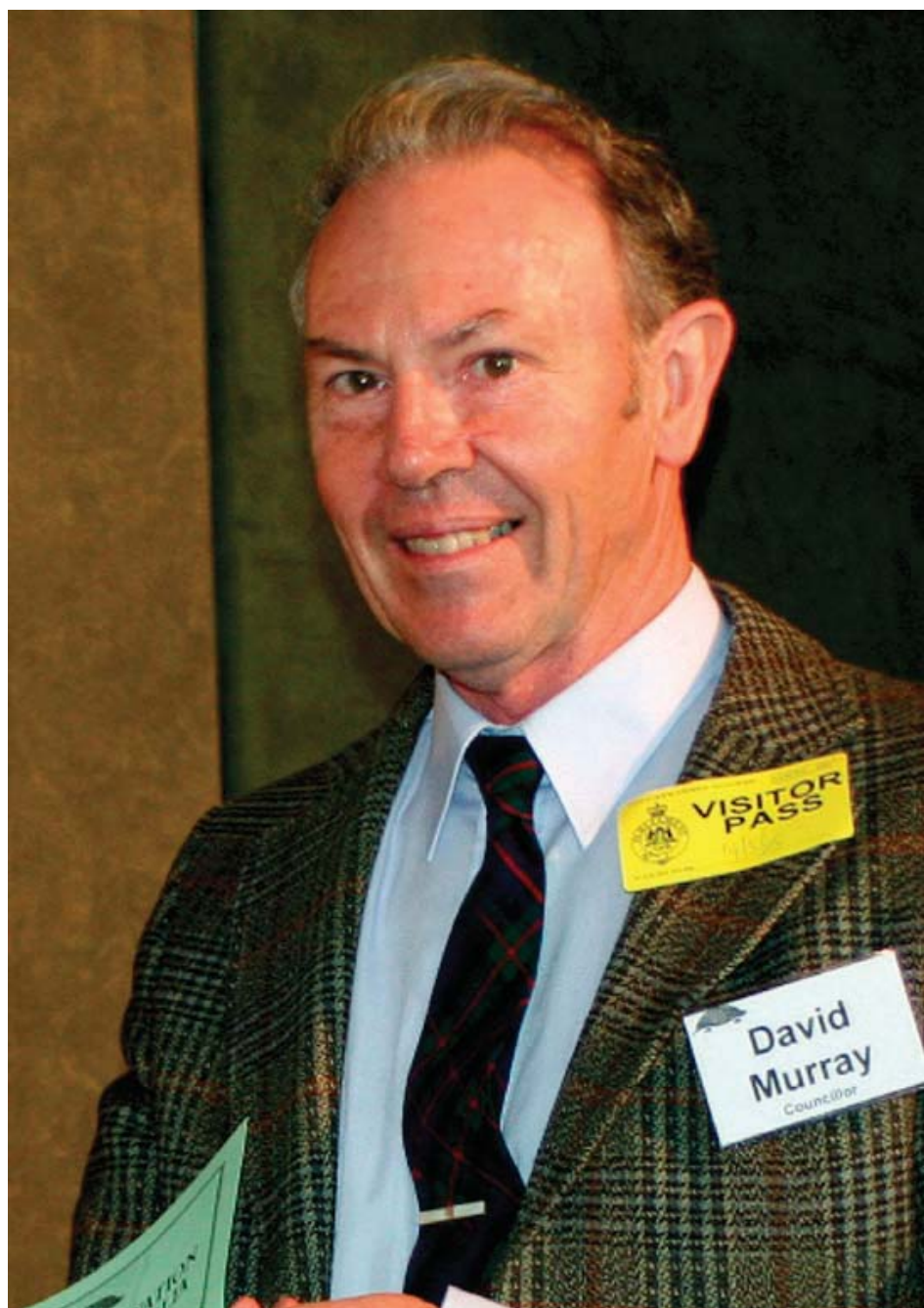
My background is in plant sciences and microbiology, with a B.Sc. (Hons) in Botany from the University of Sydney (1964) and a Ph.D. from the same institution (1969). My last academic appointment was at the University of Western Sydney (1995–1998), where I taught Botany to Horticulture students. I have edited or written ten books, the latest being *Successful Organic Gardening* (2<sup>nd</sup> edition, 2006). My special interests are legumes, sustainable horticulture and agriculture, and the impact of elevated concentrations of carbon dioxide on plant composition.

I received a bursary from the Royal Horticultural Society in 2006 to study organic gardening principles in the United Kingdom.

I have been a long-term supporter of the Seed Savers' Network and was a keynote speaker at their last two conferences (2008 and 2010), dealing with 'The Problems of Land Clearance', 'Toxic Agriculture' and 'Problems with Genetically Modified Plants'.

I have been a Director of the Australian Flora Foundation since 1986, a member of the Executive of the Linnean Society of NSW since 1992, and President 2006–2007. I first attended an NCC Annual Conference as a Linnean Society delegate in 1992.

I was an elected member of the Executive of the Nature Conservation Council of NSW for 13 years (1993–2005), which is where I met Vincent Serventy and came into contact with the WPSA. During that time I was an NCC representative on the Noxious Weeds Advisory Committee (1993–2003) and the first NSW Biodiversity Advisory Council (1996–1999). Other representative positions included my contributions to *The State of the Environment Report* (about 1995) and as a member of the Hazardous Chemicals Advisory Committee. I



helped to formulate NCC's policy on Sustainable Agriculture in 1998.

Currently I am the representative of the Australian Plants Society (NSW) to the Australian Cultivar Registration Authority (since 2000); I was the former President of the Iris Society of Australia (NSW region, 2005–2009), and am now Vice President; I have been President of the Friends of Wollongong Botanic Garden since 2006, a Life Member of the Australian Conservation Foundation, and both Vice President and Scientific Adviser on Plants to the Wildlife Preservation

Society of Australia. In October 2009 I was also elected to the Board of the David G. Stead Memorial Wildlife Research Foundation of Australia in order to further a closer relationship with that group.

The WPSA financed my attendance at the Australian Network for Plant Conservation Conference entitled *Our Declining Flora – Tackling the Threats* in April 2008. My accounts of this conference were later published in *Australian Wildlife* (Vol. 3 Winter 2008, pages 9–10; Vol. 4 Spring 2008, pages 10–12).

# The black rat - a feral pest

Suzanne Medway

The black rat (*Rattus rattus*) is listed among the world's ten worst vertebrate pests and is notorious for its economic impacts on agriculture and environmental impacts on native wildlife.

Introduced in 1788 with European settlement, the black rat quickly replaced the native rat which has co-evolved with Australia's bushland for thousands of years. Europeans disturbed the environment, making it more suitable for the pest rodent. The species' fast breeding helped the opportunistic black rat to take over quickly.

Despite its name, the black rat is usually brown or grey. A prominent characteristic of rats that helps distinguish them from similarly sized carnivorous marsupials is their front teeth: a pair of chisel-shaped incisors with hard yellow enamel on the front surfaces. Other characteristics that identify a black rat from other rats include the following:

- long pointed head (can be more rounded in juvenile)
- large thin ears (20+ millimetres) which reach middle of eye when bent forward
- Sleek, smooth coat – charcoal grey to black or light brown above, cream or white below
- scaly tail, much longer than head and body
- body 165-205 millimetres, tail 185-255 millimetres, weight 95-340 grams.

Juveniles (also those of the brown rat) are sometimes mistaken for marsupials or mice.

The black rat has now spread throughout much of coastal Australia and is most commonly seen in urban environments, but also in undisturbed areas around the coast.

Black rats are very closely associated with humans; hence they commonly live in urban areas. They prefer to live in roofs, wall cavities, trees, scrapes or burrows around farms, making nests of shredded materials. Black rats are very agile climbers. Although they are predominantly nocturnal, they are often seen during the day.

The black rat has successfully adapted to human urbanisation partly because it eats just about anything. It is also a

prolific breeder. Females have litters of about five to ten young and may have up to six litters per year. The young are born blind but develop rapidly and are weaned after twenty days.

In Australia, predation by black rats on offshore islands has recently been listed federally as a key threatening process. Despite this, very little is known of its impacts or potential impacts on biodiversity in mainland Australian ecosystems.

Understanding this is vital, as with its wide dietary niche and preference for complex habitat structure the species is a potential competitor of small native mammals, such as the bush rat (*Rattus fuscipes*), that have similar resource requirements.

Black rats threaten not only native wildlife but also humans through the range of pathogens they carry. Among these are *Angiostrongylus cantonensis* and pathogens causing leptospirosis and cryptosporidiosis, all of which are a health concern in metropolitan areas in Australia. Helminthes, bacteria and viruses are spread by rat faeces contaminating human food while rat urine can transmit bacteria such as *Leptospira* and *Salmonella*. Disturbingly, due to the high numbers of black rats, there is a potential for the species to act as a reservoir for diseases coming into the country, consequently helping those diseases become established

The presence of black rats in Sydney Harbour National Park is of particular concern because of the high conservation value of the area and its high public profile. For example, North Head supports endangered populations of long-nosed bandicoots (*Perameles nasuta*), little penguins (*Eudyptula minor*), and sunshine wattle (*Acacia terminalis*), along with an additional 119 species of native fauna, 547 species of flora and an endangered ecological community of eastern suburbs banksia scrub. As a result of preferential grazing on seedlings, black rats negatively impact on the population recruitment in some plants and substantially increase plant mortality.

With regards to fauna, survey work

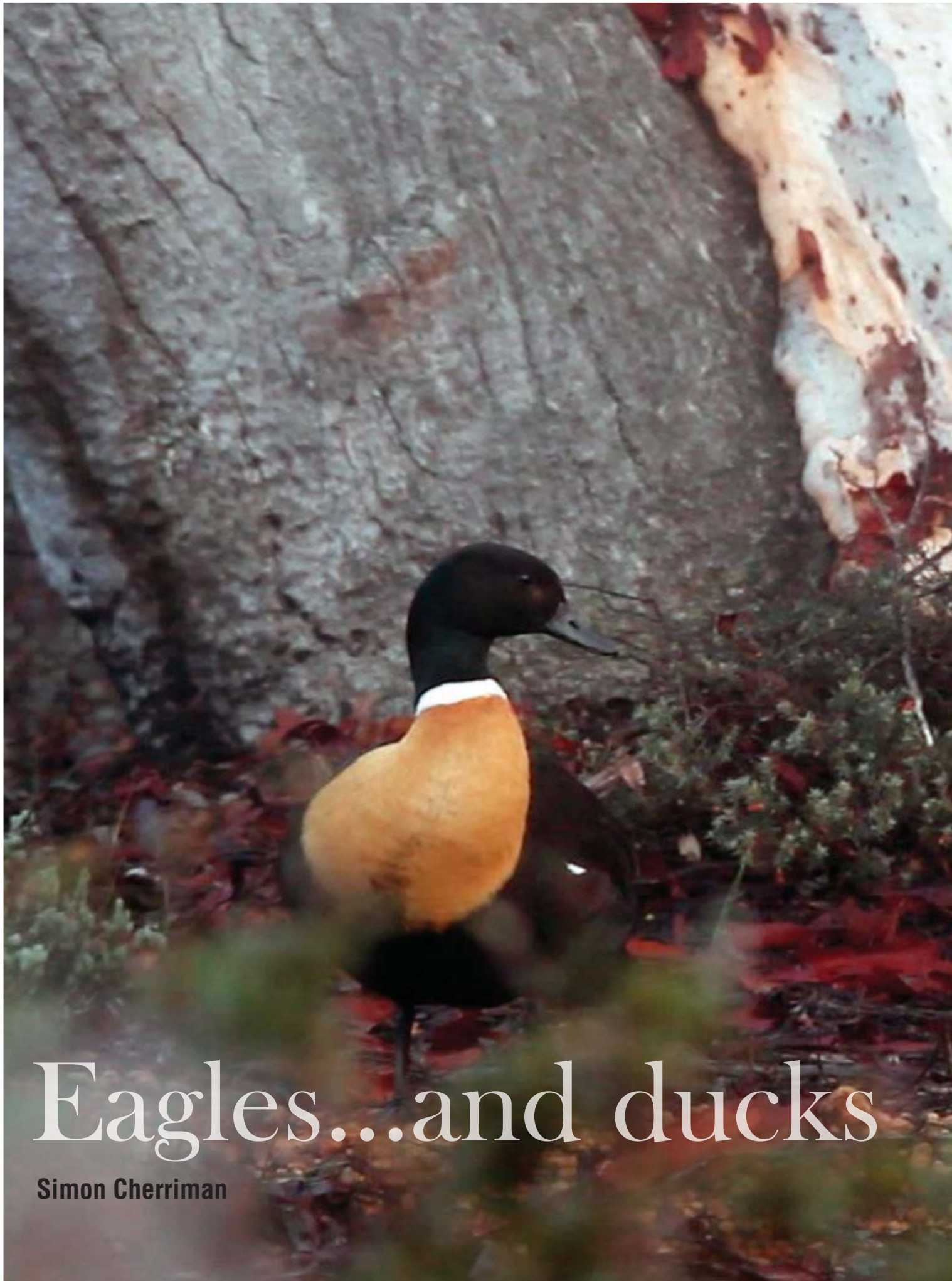


across the park suggests that native small mammal communities (bush rats, antechinus, and pygmy possums) are largely extinct in this area and have been replaced with black rats. Black rats are also the most abundant feral animal species throughout Sydney Harbour National Park, probably aided by the extensive urban areas that surround the park, where black rats are common. Black rats have been implicated in the extinction of two native *Rattus* species on Christmas Island: bulldog rat (*Rattus nativitatis*) and Maclear's rat (*Rattus macleari*). There is also circumstantial evidence of negative spatial relationships between black rats and native rodents on mainland sites. This can lead to severe ecosystem dysfunction with significant flow-on effects for local and regional biodiversity.

Understanding the function of competition in invaded communities is important for establishing how pest species penetrate native habitats, thereby diminishing resources and displacing native fauna, and for monitoring the success of control and recovery programs.

Native assemblages that had been invaded by a symmetrical competitor may be restored by giving native species a short-term advantage over invaders. This advantage can be sustained by the native species themselves via competitive exclusion processes without further management action and financial costs. As bush rats show rapid recovery of their population following population reduction, they could be reintroduced into the Sydney Harbour National Park.





# Eagles...and ducks

**Simon Cherriman**





Simon Cherriman is a 26-year-old ornithologist, wildlife filmmaker and environmental educator from Parkerville, just outside Perth in Western Australia. He is currently making a film, *A Wedged Tale*, as part of his Masters in Science Communication, Natural History Filmmaking, which will be finished at the end of 2010. For more information about the film, visit [www.awedgedtale.com](http://www.awedgedtale.com). Simon can be contacted by email: [aquila84@inet.net.au](mailto:aquila84@inet.net.au)



# Eagles

So you're sitting there...it's dark outside. Not even a light breeze. A sliver of moon has just risen in the predawn...the horizon is bleached golden, preparing for the sun to appear. What's that smell? No one around to blame. But you know it's just the roo. Dead, still, seething with maggots, lying in front of your hide. The peep-hole is filled by your large camera lens, so there's not much room to see out. In the stillness, the sound of flies buzzing is easy to hear. A distant crow calls, 'nark-nark-nark'... Then, suddenly, a shape appears. It's by the road; you didn't even see it land. It's an eagle: a dark, adult, wedge-tailed eagle. And the anticipation is now unbearable. It walks up to the carcass and begins feeding, hooking into the flesh with scimitar toes and the curved weapon that protrudes from a sinister face. The little red light on the LCD screen of your camera, blinking, tells you IT'S RECORDING! Wow! It actually is RECORDING! You want to yell and scream and tell the world in excitement. But you just keep sitting there, watching.

An hour passes. Your bladder pushes at the side of your stomach. OK, it pushes on something that makes you aware of its fullness. (Anatomy isn't my subject!) The eagle is joined by its mate – she's larger, blacker, more beautiful. Like a true female she



Eagle and prey

dominates, and the male steps aside. Their young lurks in the background. Watching mum. She's smart and alert – VERY alert. She can see you through the lens. She KNOWS. After seven minutes she leaves in suspicion. A rumbling thunder approaches and the young flaps with all its might to take to the air before an enormous road train charges past on the nearby highway. Time ticks. Another hour passes with nothing. You yell angry words inside your head at your bladder to go away. Then a second adult eagle lands. It's there, now well lit by the morning sun. And it feeds for two hours before your eyes. More filming, more recording, more excitement. More bladder pain.

Five hours later, you leave the hide. A cheeky grin spreads across your face for two reasons: RELIEF! Oh the relief! The bladder issue is no longer a problem. And the thoughts of what you've just seen. They were only ten metres away, feeding, and you FILMED them! What an awesome experience.

You collect your backpack and camera gear together, then ignoring the acacia prickles in your bare feet, walk back to where your car is parked, about a kilometre up the road. Somewhere between Cue and Mileura Station, about 800 kilometres north of Perth. The engine fires and you drive with excitement back to camp. Time for a hot cuppa.



Eagle and kangaroo prey



# Ducks

It's a chilly morning in Dryandra Woodland, 200 kilometres south-east of Perth. You're on the last field trip taking footage for the film *A Wedged Tale*. All is well and it's an exciting feeling to be nearing the end of the shoot.

You've just photographed the female shelduck on her nest, in a hollow spout five metres up. It was hard to see her in the dark, but with the head torch you were able to shine the light in at just the right angle. You're thrilled because it is your first shelduck nest. At 16, all those years ago, you didn't manage to find a nest along the river. Many flooded gum hollows were empty. But you've found one now; the male walking on the ground in the middle of the woodland gave away the secret – and it's EXCITING! What an awesome thing to see.

Then you hear it. Inside the hollow, some faint sounds: 'Peep, peep, peep', soft cries. And again: 'Peep, peep'. Your mind races and you can feel your eyes lighting up. DUCKLINGS! The female duck peers upward casually at your torchlight, but you then notice subtle movement and she shuffles on the nest. On the down feathers she's plucked from her own body to place inside the hollow. On the new



Mother duck emerges from the nest with a chick

ducklings, hatching, right there under her. In front of you. Thirty-five days to hatch, and the day you've arrived is day 35. What luck! This is it: a rare opportunity, one not to be missed. The stake-out begins...

The hide was easy to erect, just like pitching a tent really. A few poles, the canvas, then camouflage. The leaves rustle and sweep the ground like a

broomstick as you drag over fallen branches. Your fingertips tingle with pain as the spiky isopogon shrubs leave tiny splinters.

The wet leaf-litter feels soothing on your palms as you scrape it up in handfulls, dirt under fingernails, and sprinkle it on the roof of the hide. It's now ready and you crawl in. Spare memory card, spare battery...rrrrrr! It's



Simon Cherriman at the duck hide







glows in the light of your head torch. You take position back in the hide, and once again the hours tick by. 7 a.m. 7:25. 8:30. 8:55. Golden sunbeams break the mist and the dawn bird chorus builds and fills the air. It's magical, amazing, the best time of day. A grey shrike-thrush whips the air with its melodic whistle. Brown honeyeaters chirp loudly and silvereyes call with their delicate voices. The female shelduck's honk comes and goes from within the nest hollow, like a brass musician playing their instrument from inside.

Over two hours have gone before the female emerges to check the coast is clear. She's meticulous and takes 45 minutes to look around. And as soon as she honks to the male duck, THEY arrive. Here they are again. Duckling Killers have returned. Raven calls and the sound of their wings flapping make you watch in anticipation. The suspense is terrible. It's like an action movie, but you're outside. It's free, happening there before you for nothing. And it's better than any TV. It's natural history at its best. The female duck bows her head as a raven flies past, and she glares upward in a protective manner. This whole wait has felt like you're waiting for new life to emerge. Now you feel like you'll witness death. You've seen it before, a raven swoops to pluck a tiny duckling from its family, flying upward as the duckling struggles to free itself from the raven's clenched bill. Cheeps of desperation, loud and continuous, fading as the raven flies off. BUT...

It's cruel, evil, wrong, you're thinking. But it's not. This is natural. It's a part of the wondrous cycle of life. Nature has its way and we often take a strong stance on death as cruel. It's not.

The ravens have young in a nest too, probably hungry. Some may have already been stolen from the nest by square-tailed kites, or eagles, in turn seeking to provide food for their young. They must eat too. Ducks overproduce, usually having ten or more young, an insurance policy so that at least a few survive. This is the way Mother Nature has evolved and this is part of how She works. You're just excited to be here, whatever happens.

The ravens' presence lingers for several more minutes, then fades as you hear wing beats disappear.



Mother duck on the nest

All seems well, as you can tell from the conversation, now relaxed, between Mr and Mrs Shelduck. And she returns inside one last time. The male arrived a while ago, just before sun-up. Your focus on the nest has neglected to acknowledge him, but he's there. He's walked past the nest tree several times. Doing laps around it in the mist. Calling to check his mate is OK. He's now preening himself impatiently like a husband waiting for his missus to finish using the bathroom.

His white neck-ring and chestnut breast feathers are striking as the early light catches the colours, a magnificent bird, plumage almost regal. He still preens elegantly as the mist fades, and continues to call faintly to her, a soothing call, 'It's all OK my love. I'm here, I'm here to watch out for you'. Loyalty unquestioned.

A loud scratching noise grabs your attention away from the male and the female is suddenly there at the hollow again. NOW THIS IS IT! She turns around. And puts her wing down. She's bringing them out. You can hear faint cheeps from the ducklings. It's been ten hours of waiting...the suspense is worse than ever. It's going to happen. You're ITCHING! Excited. Your mind rushes and your hands shake on the camera. The female calls, soft buzzing honks. She focuses back at her brood, her actions tell you what she's doing. The peeps get louder. It must be quite a leap to that hollow entrance. The nest is a metre down inside the tree.

Minutes tick. You're watching the viewfinder in the most suspense you've been in all year. You watch the female in detail. Eyes focused at her feet. Any second now...

HERE THEY ARE! Ducklings, tiny, fluffy white ducklings. Their heads appear below their mother. A day old, they are C-U-T-E. Tears well up in your eyes, they are the most gorgeous creatures. And you've witnessed their first views of the world. Their tiny little heads, only hours out of the shell. They look out, unknowing of their height. It's a five-metre drop to the ground, but they look straight on. It's amazing to see this moment, one that has taken hours to reach. But worth every minute. Every second. The female checks her babies, then peers downward and drops to the ground in a single flutter to join the male. Then the calls begin: loud quacks and honks, repeated quickly in desperation. The ducklings react instantly, you can HEAR their thoughts: 'Where did my mum go...where IS she?'

In one flowing movement they walk... into thin air, and drop down: one... two...five...nine... twelve! They fall and hit the ground with loud plop noises. But they seem unharmed, and instantly get up and walk, welling around their mother. She calls, cocks her head and listens, as though making sure her family is all together. Then the family depart, walking away slowly through the trees. Disappearing and out of sight. The moment is over.



# SALT Scuba Diving **to help** Reef Check Australia **save reefs**

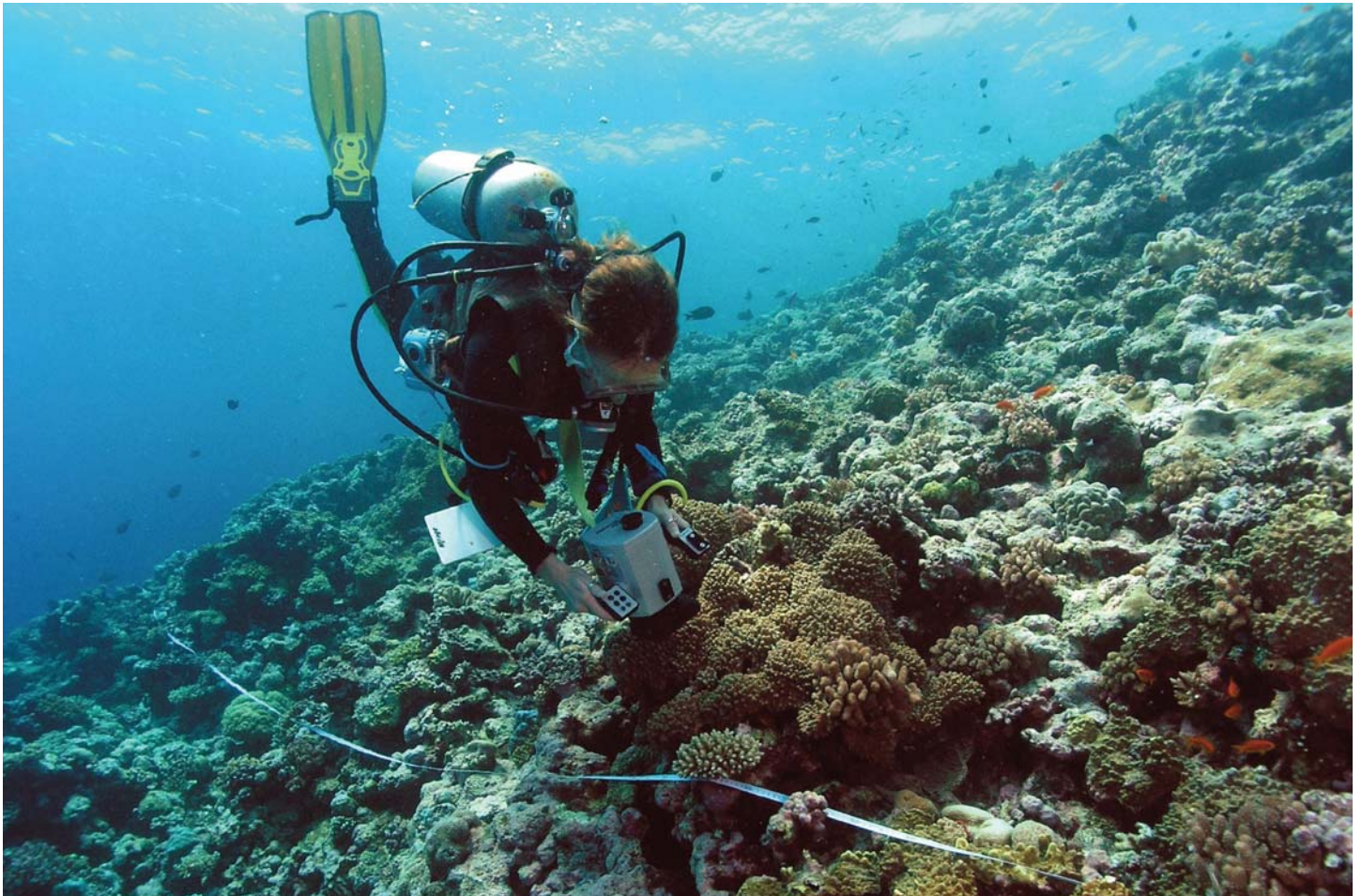
Caitlyn Cohalan

Reef Check Australia (RCA) will now be able to visit and monitor the reefs in our area as it joins SALT Scuba Diving on board their super fast vessel Saltspray.



RCA surveying the reef





Reef Monitoring

SALT has generously invited RCA on its dives and this will enable RCA to monitor and survey outer lying coral reefs on a more regular basis.

According to RCA our reefs are among the best kept in the world and being able to join SALT Scuba Diving on their dives will allow them to survey reefs more frequently and survey a greater amount of new reefs.

Owner and manager of SALT, Matt Dee, said the decision to have RCA join them onboard was easy as the work that RCA does in working to preserve coral reefs is invaluable.

"It was not a difficult decision to get involved with RCA their core values fall in line with ours at SALT," Matt said.

"RCA's coral surveys are conducted in a way that makes the data acceptable to the scientific community for use in ratified programs.

"... These surveys add weight to the important issues surrounding the ongoing conservation of our precious Barrier Reef," he said.

RCA is a local not-for-profit organisation that monitors our reefs in a bid to educate the nation on the

devastating impacts of global warming and the importance of preserving our reefs.

Managing Director of Reef Check Australia, Jo Roberts, said that RCA is very happy with the newly formed relationship.

"RCA is made up of a network of volunteers who go out on dives and survey the reef, so to be able to go out

with SALT gives us more opportunities to do our work," Ms Roberts said.

RCA combines research and education in its pursuit of protecting Australia's endangered reefs.

"It is our hope that by educating the people of Australia on the impact of climate change, together we will be able to change the otherwise poor future of our beautiful coral reefs," she said.



The crew at SALT





A common green tree frog (*Litoria caerulea*) found in Townsville

## Secrets of a frog-killing fungus

**Jamie Voyles - Amphibian Disease Ecology Group,  
James Cook University, Townsville**

Amphibians in Australia and around the world are experiencing unprecedented population losses and local extinctions. While there are multiple causes of amphibian declines, many die-offs are attributed to a disease called chytridiomycosis, which is caused by a fungus known as *Batrachochytrium dendrobatidis* ("Bd"). Mass-mortality events in frog populations have coincided with the appearance of Bd in wild amphibian communities and Bd has been proven to be highly lethal in rigorous laboratory experiments. Despite intensive ecological study of chytridiomycosis, virtually no information was available to explain how this fungus kills frogs... until now. With the generous support of a WPSA University Research Grant, I aimed to resolve the cause of sickness and death in frogs with chytridiomycosis.

The fungus normally infects the outer layers of amphibian skin but it was a mystery how a superficial skin infection would cause death. The key was to investigate the unique functions of frog skin. The integument is an important physiological organ for frogs; they absorb water, electrolytes and respiratory gases (such as oxygen) through their skin. Several years ago scientists hypothesized that Bd disrupts normal skin functioning and causes problems with their osmotic balance.

Working with scientists from James Cook University and University of Sydney, I set out to test this hypothesis. We conducted a two part experiment to monitor changes in skin condition, blood chemistry and cardiac functioning in common green tree frogs (*Litoria caerulea*) that were experimentally infected with Bd.

The results of these experiments indicated that Bd causes damage to frog skin that is sufficient to cause mortality. Firstly, frogs with the highest fungal burdens lose the

ability to regulate absorption of electrolyte across their skin. This break down in normal skin function coincides with severe reductions in blood plasma potassium and sodium concentrations and leads to cardiac electrical malfunctioning known as aystolic cardiac arrest. Thus, the break down in the skin caused by Bd initiates a cascade of physiological events that result in death. These novel results were published in the prestigious journal *Science* and featured in multiple international media reports last year.

WPSA recognised the importance of understanding the physiological effects of the disease - knowing how Bd kills frogs is critical information for researchers, wildlife managers and veterinary clinicians in treating captive frogs. We now believe that providing electrolyte supplementation in conjunction with fungicidal baths may be the best way to treat amphibians with chytridiomycosis. Laboratory tests will soon begin to optimise treatment regimes for multiple species of Australian amphibians. The WPSA has, therefore, made an important contribution to amphibian conservation efforts in Australia and around the world.

I am extremely grateful for the support I received from WPSA. I could not have completed this work without your funding assistance. It is not common that a student is entrusted with a large sum of money to monitor frog hearts. In this case, however, the contribution of the WPSA made an enormous difference. The scientific report and associated commentary can accessed at this link: <http://www.sciencemag.org/cgi/content/full/326/5952/582/DC2>

Thank you for your support!

Jamie was a recipient of the WPSA University Research Grant in 2007 for her project "Amphibian declines and extinctions occurring in Australia that are attributed to the disease chytridiomycosis"





Noisy scrub bird

# The noisy scrub-bird

Dr Vincent Serventy AM

A small brown bird was first brought to the attention of science through John Gould's lavishly illustrated *Birds of Australia*, published in England in 1845. Gould originally named this new species the noisy brush-bird (*Atrichornis clamosus*, the 'loud bird without bristles'). It has unusually small rounded wings, a strong muscular body and a very loud voice (according to John Gilbert, it was the loudest of all the songbirds he knew, and the most difficult to obtain as a specimen).

The bird became increasingly difficult to find. After the turn of the century, searches were made throughout the south-west by many ornithologists. They all proved fruitless, and scientists began to fear the bird was extinct.

The noisy scrub-bird could no longer be found in the Augusta–Margaret

River area, or in the hills near Waroona, where Gilbert had first seen it, nor around Albany, where several specimens had been obtained last century. But it was not extinct. The bird's wariness and brown plumage make it virtually invisible in the dark, impenetrable scrub. Almost flightless, it keeps to the densest vegetation, moving like a small, fleeting shadow

through the undergrowth. Only the resonant, musical song of the territorial male gives his location away. This song led John Gilbert to discover the noisy scrub-bird in 1842, and the same song drew Harley Webster, an Albany school teacher, into the scrub at Two Peoples Bay late in 1961. At the foot of a mountain, he saw a bird that, despite years of bird-watching in the south-west, he had never seen before.

Shortly afterwards, in February 1962, a small remnant population of about 100 birds was found inhabiting the gullies of Mount Gardner. This rediscovery gained international publicity. Local, national and international conservationists worked hard to stop residential developments planned for the area, and to protect the bird's habitat.





Noisy scrub bird

Two Peoples Bay Nature Reserve was formally gazetted in 1967 and covered the entire headland, the adjacent islands and the short isthmus connecting to a wetland system of lakes, streams and swamps - remnants of an estuary in the Pleistocene era. All of the known noisy scrub-bird habitat was included, giving the reserve a diverse array of vegetation types suitable for many other species. Research into the noisy scrub-bird showed that the bird was sensitive to fire and needed dense, long-unburnt scrub with a well-developed leaf-litter fauna. In fact, it was

probably the change in fire regimes, grazing and clearing of habitat following European colonisation that had brought the bird so close to extinction.

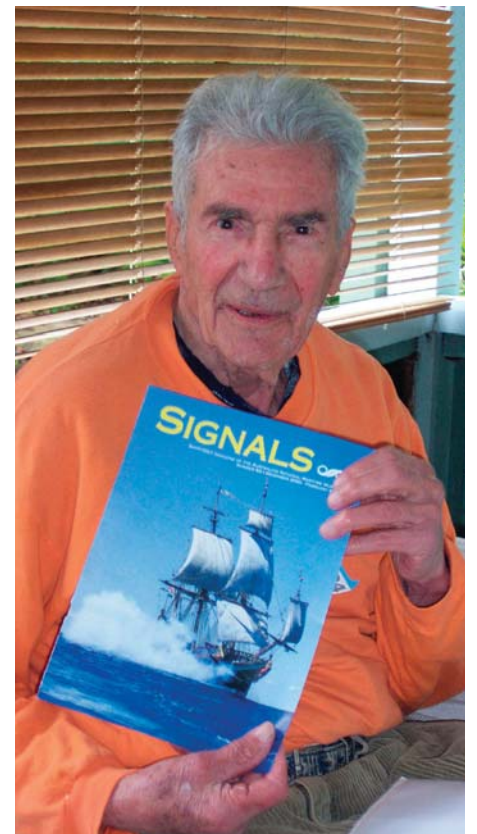
From the early 1970s, the reserve was managed to exclude fire and, in response, scrub-bird numbers began to increase. By the end of the 1970s, the population had grown sufficiently for conservationists to contemplate creating other populations outside Two Peoples Bay Nature Reserve. If it was confined to a single population, there could never be much of a future for the scrub-bird. The amount of

habitat within the reserve is limited, and the population would always be vulnerable to wildfires. Colonising new areas outside the nature reserve would be a slow process for the flightless bird. To spread, it needs corridors of continuous scrub connecting breeding areas to vacant habitat. It also takes many breeding seasons to produce a supply of dispersing birds.

Since 1983, noisy scrub-birds from Two Peoples Bay have been released in several places east of Albany. When released into good habitat that is protected from fire, the birds breed and their offspring gradually colonise all the available habitat. In this way the total number of noisy scrub-birds has increased tenfold since their rediscovery, and the population is now spread along almost 50 kilometres of the coast around Two Peoples Bay.

#### **Editor's note:**

*The late Dr Vincent Serventy AM was honorary president of the Wildlife Preservation Society of Australia. After he died in September 2007, Vincent's papers, photographs and unpublished writings were left to the Society. The above article is one of the many that Vincent wrote that are in the Society's collection of Vin's papers.*



The late Dr Vincent Serventy AM





# The new natives

Arian Wallach - School of Earth and Environmental Sciences, The University of Adelaide

Exotic species have a notorious reputation. They kill, consume and harass natives, sometimes to extinction. Australia has lost much of its biodiversity to these marauding pests, with almost half of the world's mammalian extinctions over the past 200 years occurring here. The worst villain of them all has been the red fox, although cats and rabbits are certainly on the Most Wanted list as well. Pest control has become the fundamental toolkit of conservation activity, and much of Australia's wilderness is under a constant shower of 1080 poison-baits. Despite the extent of efforts applied to rid Australia of its pests, benefits to biodiversity have seldom been demonstrated. In fact, in many cases it seems to have made matters worse.

Once an exotic species integrates into the complex web of nature, it becomes almost impossible to extract them without causing unforeseen damage. For example, killing foxes can cause cats to erupt, and eradicating cats risks causing a rabbit plague. In most cases however, eradication efforts are simply ineffective because individuals killed are rapidly replaced by immigration or reproduction. Research over the past few years suggests yet another important reason why pest control does not provide the expected benefit to biodiversity:

exotic species are not the root of the problem. Instead, the spread of exotic species and the resulting loss of native biodiversity are both symptoms of a deeper ecological dysfunction. Research has now provided compelling evidence that ecological health and resilience are tightly linked with the presence and stability of large (apex) predators.

Apex predators play a critically important role in maintaining ecosystem function. Sitting on the top of the food web, they exert

a predatory force that cascades down through the web's layers. This predatory force acts to suppress and regulate herbivores and mesopredators (smaller - subordinate - predator species). The loss of apex predators

**Top left:** Wild camels in the Simpson Desert. After thousands of years mega fauna are back in Australia. Dingoes probably have the ability to regulate even these giants but it will require long-term protection for them to form such capable packs

**Top middle:** Chased up a tree near Lake Eyre. Native prey can survive alongside the *Australian wildcat* as long as dingoes 'keep them honest'

**Top right:** Wilderness enriched with wild horses

**Bottom left:** The *Australian rabbit* is an asset or a pest depending on how dingoes are managed

**Bottom middle:** Wild goats outcompete rock wallabies where dingoes are controlled. When allowed to recover, dingoes regulate goats to the benefit of rock wallaby survival

**Bottom right:** Desolation of the Gammon Ranges conservation areas (National Park and Aboriginal Protected areas all look like this in many places - it is sad but very often these dead mulga forests extend as far as the eye can see). This is a direct consequence of poison baiting and dingo control in general





Intact social structures are essential both to the wellbeing and ecological function of the dingo

releases this inhibiting factor resulting in population eruptions of both native and exotic herbivores and mesopredators, and the decimation of biodiversity and productivity. In North America, for example, wolves regulate the density and behaviour of elk thereby protecting vegetation to the benefit of beavers and riparian songbirds. On the other hand, the loss of wolves and cougars from much of their range has resulted in the elimination of tree recruitment, in some areas for over a century.

Across the globe apex predators have been driven to extinction or extreme range reduction mainly through long-term intensive persecution. Michael Soulé, renowned American conservation biologist, eloquently described the worldwide annihilation of large predators as the “*decapitation of ecosystems*”. Many leading ecologists argue that the loss of large predators rivals climate change as a principal threat to life on this planet. There is even compelling evidence that large predators help ecosystems buffer the effects of climate change and disease. Research and conservation focus is therefore increasingly turning towards wolves, lions, sharks and other apex predators. The devastating consequence following their loss, and the extraordinary ecological

recovery that follows their restoration, is a universal pattern. Australia is no exception to this fundamental ‘law of nature’, as recent studies demonstrate.

Based on years of living in the bush as a professional hunter, Adam O’Neill (C&A Environmental Services)

published a controversial theory that the dingo is a vital guardian of Australian ecosystems, and that our efforts at pest control are counter productive. A comprehensive scientific review of the main drivers of extinctions over the past 50,000 years led Chris Johnson (University of Tasmania) to a similar conclusion. Johnson and colleagues conducted an analysis of extinction patterns across the continent and found that marsupial species have mainly been lost where dingoes were scarce. This study provides striking evidence that persecution of an apex predator can cause a wave of extinctions across a continent. Indeed, the presence of dingoes has been found to correlate positively with practically every threatened species studied, including several species of small native mammals, rock-wallabies, turtles and ground nesting birds. For example, a comprehensive study of factors influencing the survival of bilbies in the Tanami Desert, by Rick Southgate (University of Adelaide) and colleagues, found a positive association with dingoes.

These ecologists suggested that the mechanism that supports native biodiversity is the suppression of exotic mesopredators (foxes and cats) and herbivores (eg rabbits,



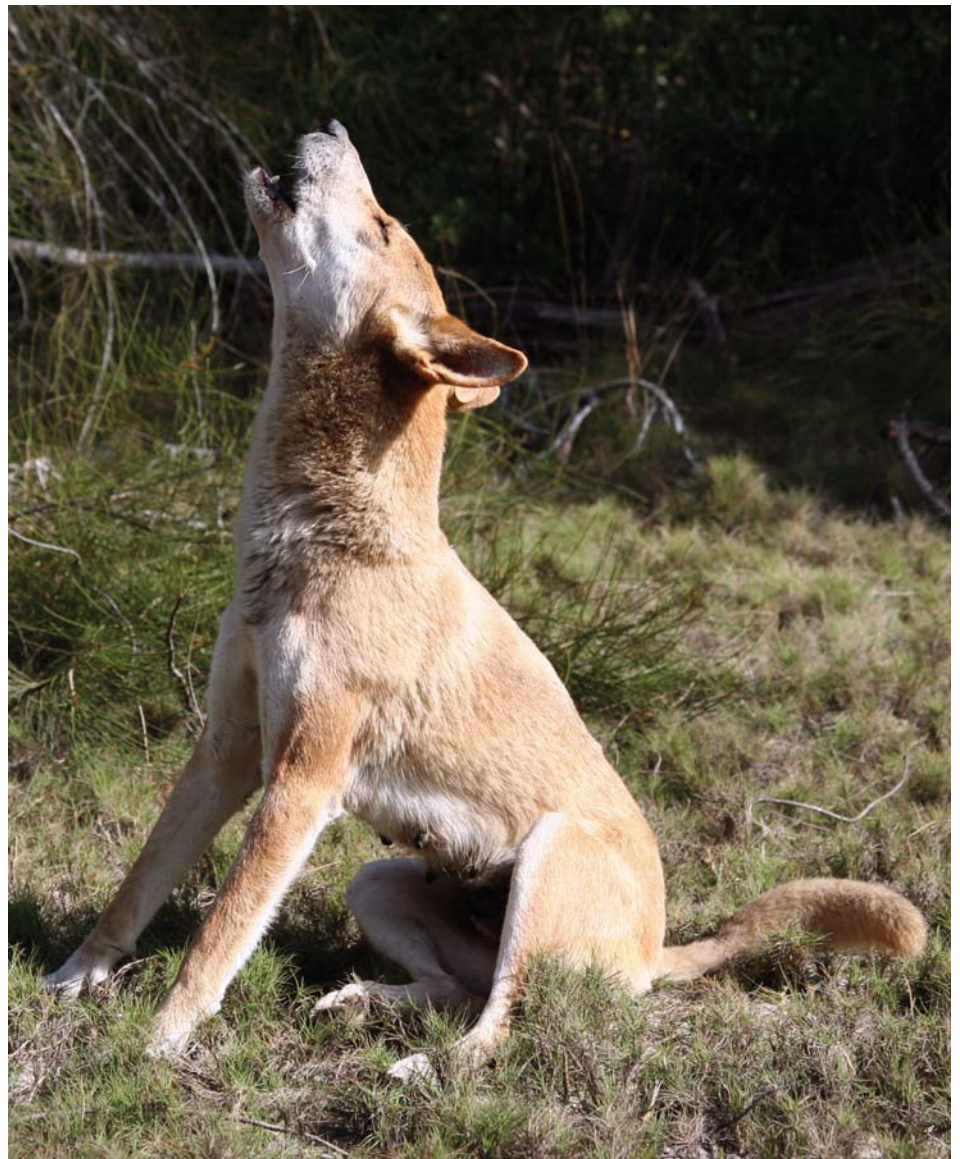
Dingo track from the Northern Flinders Ranges at a site of a yellow-footed rock-wallaby colony. Dingoes have survived inside the dingo barrier fence and protect threatened species through top-down regulation



goats and kangaroos) by dingoes. This has since been confirmed. Chris Johnson and Jeremy VanDerWal (James Cook University) established that dingoes set an upper limit on fox densities, and Michael Parsons (Curtin University) and Daniel Blumstein (UCLA) demonstrated that kangaroos avoid areas where dingo scent is present. A large field study by Mike Letnic (University of Sydney) and colleagues found two distinct 'ecological universes' on either side of the dingo barrier fence. Inside the fence foxes and kangaroos dominate while outside the fence dingoes, small native mammals (including the threatened dusky hopping mouse) and vegetation are more abundant. These studies fall in line with Euan Ritchie (Deakin University) and Chris Johnson's analysis revealed that across the globe large predators have a four-fold suppressing influence on mesopredators.

Dingoes, like other wolves, are highly intelligent and socially complex. Just how intelligent they are was recently demonstrated experimentally in the Dingo Discovery Centre in Victoria by Bradley Smith and Carla Litchfield (University of South Australia). Dingoes live in family groups (packs) lead by a single breeding pair. Packs hunt, defend their territory and care for pups cooperatively, and we are now realising that their ecological influence is tightly linked with the cohesiveness of their social structure. Predator control (even at low levels) fractures the dingo's pack structure and disrupts their ecological functioning. The social stability of dingo populations even provides a more consistent and long-lasting benefit to the arid zone vegetation than does rainfall alone. In our arid zone study sites, plant cover and diversity increased as rainfall *decreased*, because dingo control was more intensive in the higher rainfall regions. This result challenges the popular view that the devegetated state of the Australian arid zone is caused by droughts.

These scientific advances have prompted several prominent ecologists to call for the recovery of dingo populations wherever possible. For example, Chris Dickman (University of Sydney) and colleagues have proposed reintroducing dingoes back inside the dingo barrier fence to facilitate the recovery of degraded wilderness areas.



And Chris Johnson added that, in addition to dingo recovery, Tasmanian devils could be reintroduced back to the mainland to help rebuild Australia's predator guild.

Although the recovery of biodiversity through the promotion of predators requires a major shift in the established conservation paradigm, its application has extraordinary potential to restore ecosystem health and function.

The fox, cat, rabbit, goat, donkey, horse, pig, deer, camel, cane toad and others are now an integral part of the Australian wilderness and beauty. They are the *new natives*. Nowhere else in the world is the extraordinary camel to be found in the wild. And who can avoid being filled with wonder at the site of a wild brumby? The incredible rabbit that survives anything hurled at them, and the clever fox that will always out-manoeuvre us. Who knows when the cat arrived, but some

say they have been here since the Dreaming. The wild goat perched on the cliffs drenched in sunlight like a mythological creature, is a sight to behold. And the wise old cane toad sitting silently on a stump in the rainforest, as if he has been there since the beginning of time. Do these scenes spell the doom for the rock wallaby, the bilby and the quandong tree? Not while the dingo howls in the background.

***I thank the WPSA for supporting this research project over three consecutive years.***

In 2007 Arian was first awarded a University Grant for her project "Persistence of endangered mammals: Is the dingo the key?"

In 2008 Arian was awarded a second University Grant for her project.

In recognition of her outstanding research in 2009 the Wildlife Preservation Society of Australia awarded a Centenary Grant to Arian.





Summa with tail transmitter after release

# Queensland Bilby Recovery Program

**Al Mucci - General Manager Life Sciences, Dreamworld**

In May 2010, Dreamworld staff Al Mucci and Tina Niblock travelled to Currawinya National Park to release two important captive-bred female bilbies. These two females named Summa and Wyarra are genetically important introductions to the current bilbies inside the predator-proof fenced area. The conditions for the release in this harsh arid landscape were absolutely perfect: lots of rain has provided much needed plant growth and invertebrate feed for the bilbies to forage on. This was the second release of bilbies from Dreamworld.

As part of the release program, in collaboration with the Department of Environment and Resource Management (DERM) and Save the Bilby Fund, a monitoring program exists which the staff assisted on. Six bilbies were spotlighted over the course of the release and these two females will make a welcome addition to the existing males looking for mates.



Bilby release team



Future investigations are well underway for future release sites without a predator-free fenced area. This is the next major goal to be achieved if this program is to be successful in the long term.

**Editor's note:** Dreamworld is one of South East Queensland's largest native wildlife parks, caring for over 500 native animals and birds, many of which are critically endangered. Dreamworld has developed a conservation strategic plan to guide the co-ordination management and communication with regard to its support of conservation and research initiatives.



Currawinya National Park predator-free area



Entering the predator-proof area



DERM's Peter McRae interviewed by BBC UK



Project team preparing for bilby release



Waiting for dark to release the bilbies



The release





# Time to wake up, here's a hammer to the head

Alexander M. Wray-Barnes

Shark populations worldwide are highly threatened, and negative influences such as the increase of shark fishing, loss of prey species and the broader implications of climate change pose a bleak future for sharks and their associated ecosystems. Humans have an unprecedented fear of shark attack, which has been magnified and warped by popular culture. The NSW and Queensland governments' response to the fear of shark attack expressed by recreational swimmers has been to implement a shark meshing program along a number of beaches. The shark meshing program since 1950 has killed 12,359 sharks in NSW alone. However, in the shark meshing program no records have been kept nor has research been done into its capacity to save human lives. The sheer impact on shark populations and the lack of community support for the program should indicate that the program is not scientifically supported and is thus unwarranted.

The shark meshing program (SMP), instigated in NSW in 1937, involves the lowering of nets six metres below the surface on 51 beaches in NSW. In a broader look at the SMP's impact on wildlife, the nets regularly kill animals such as turtles, dolphins, whales, seals, penguins, dugongs and sharks.

*So what makes sharks vulnerable and why is the SMP further threatening their survival?*

Sharks have been one of the most successful groups of organisms in evolutionary history. For over 400 million years they have maintained ecological stability in the world's oceans through predation. However,

sharks are threatened today as they have slow growth rates, mature late in their life and only give birth to a few pups at a time. This slow reproductive strategy, alongside the recent evolution of fishing technology and targeted culling programs, means that shark populations worldwide are becoming increasingly threatened.

Considering that sharks are increasingly under threat, the SMP is another factor compounding the impacts that are threatening their populations' survival. This is prominent in the globally endangered scalloped hammerhead (*Sphyrna lewini*), which is under immense human pressure. *S. lewini* is

declining in population, and in 2009 it was listed under the IUCN Red List as globally 'Endangered' with data collected from all parts of the world, except for Australia.

In Australia, the lack of scientific data on this endangered species prevents our understanding of its population size and any potential conservation efforts. As there is no historical or current research on this species in Australia, the only method for determining the species' population size is through the SMP. An attempt to assess the impact of the SMP began in 1995, where species killed have been monitored by the NSW Department of Primary Industries, although results to species level have not been reported. As a result of the lack of data on *S. lewini*, environmentalists are not able to assess the real impact on endangered species, which presents a danger in

Top: Hammerhead shark (*Sphyrna lewini*) caught in a net. This little shark is one of thousands killed in the mesh nets off the east coast of Australia each year. It is sad that so many beautiful but harmless sea creatures die this way in the somewhat mistaken belief that by killing them swimmers are being protected from shark attack. Photo: Ron and Val Taylor



itself for species such as *S. lewini*. Under the precautionary principle as key legal framework within Australian legislation, the lack of scientific evidence or information cannot be used as an excuse for environmental degradation. From this argument, the lack of scientific knowledge for Australia's *S. lewini* population and other endangered wildlife should not be used as an excuse to continue the program.

Hammerheads are not targeted sharks; however, they suffer the highest mortality rate from the SMP. Between 1950 and 2008, 4,666 hammerheads were killed in NSW (the most of any shark group in the SMP). Although the SMP is aimed to prevent shark attack, hammerheads are considered 'low risk', with no reported attacks by hammerheads from 1900 to 2008. The classification change in South East Queensland to 'high risk' is due to their sheer numbers. As a result, many species of wildlife, including *S. lewini*, are caught unnecessarily.

An interesting equivalent to assessing the impact of the shark meshing program, in the terrestrial sphere, would be environmental impact statements. In the development industry, developers are required to undertake a stringent impact assessment for a development proposal, presented to local government or the Department of Planning for assessment. In the instance of an endangered species or ecological

community existing on the proposal site, development is unlikely to proceed. So how can the shark meshing program be justified? It could be justified that animal attack disregards the conservation of a species; but, for instance, the presence of the endangered and poisonous broad-headed snake (*Hoplocephalus bungaroides*) would cause the halting of a development. In addition to this, globally, human fatality from snake bite is more probable at 0.13 fatalities per million people per year, than shark fatalities at 0.065 per million people per year.

*As the SMP is in place to protect the community, what do they think about the shark meshing program, and do they think it is necessary?*

The Sydney Aquarium Conservation Fund (SACF) undertook a study into public perception of the SMP. Results from the survey showed that there was a lack of public understanding, with no knowledge of the impacts or number of sharks and other wildlife killed. The survey showed that the majority of participants did not know if the beach they swim at was meshed and a high proportion did not use the presence of meshing as a determinant for beach choice (72%). It was also discovered that 57.1% of participants did not think that the SMP was necessary. Consequently, the majority of the community does not use the meshing program as a determinant of beach choice or even support the program.

*In response to these arguments, the real question to ask is: does the meshing program save lives?*

Studies on recorded shark attacks have shown that before the meshing program commenced there were fewer attacks per year, and that after the start of the program, there were more. Due to the increase of Australian population and beach usage, this increase of shark attacks is not surprising. Until comparable data on meshed to non-meshed beach attacks is available, the effectiveness of the shark meshing program will remain unknown.

If measures are going to be taken to protect an ever-growing population on land from the declining populations of sharks in the water, it could probably be predicted that if the meshing program continues, endangered species such as the scalloped hammerhead and the great hammerhead will become extinct within our lifetime.

The data on shark kills from the SMP is grossly inadequate, and there have been no studies on the effectiveness of the program. In addition to this, the NSW Department of Primary Industries' public consultation document is fundamentally flawed. The results indicate that scalloped hammerheads are 'unlikely to account for more than 10% of hammerhead deaths'. However, this data is based on an old study with a very small sample size of five.

Considering that shark species are under threat worldwide, the loss of



Green turtle (*Chelonia mydas*) caught in a net. Hundreds of sea turtles are caught off the NSW coast in the shark meshing nets each year. The turtle pictured is near the surface. She had tried, possibly for days, to fight her way free until exhaustion overtook her and she died. Photo: Ron and Val Taylor



12,359 sharks can't be justified. In the face of a lack of detailed species-by-species information and high wildlife death rates, the internationally endangered status of the scalloped hammerhead shark and unacceptable double standards applied to different dangerous species, the SMP could be considered unjustifiable.

### Further Reading

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Rio Declaration (92) <http://www.unep.org/Documents/Default.asp?DocumentID=78&ArticleID=1163>. Last accessed 21/09/2010.

### Editor's note:

Alexander is currently in his final semester of a B. Environmental Science and Management at the University of Newcastle.

Alexander wrote to me saying:

"I have been reading through the literature and discovered that the scalloped hammerhead shark (*S. lewini*) is endangered on a global scale yet little is known of their status in Australia. I have also been looking through the NSW Shark Meshing Program public consultation document dated March 2009. I was astounded to find that 4,666 hammerheads have been caught in the last 58 years (the most of any shark species in the SMP). From 1990-2008, a little over 51% of sharks captured in NSW were hammerheads and that 72% of shark species caught in the SMP off the Central Coast were hammerheads. These sharks have been identified as hammerheads rather than their species name. This makes it extremely difficult to determine whether *S. lewini* is endangered in Australia as they are elsewhere in the world.

The nail which hammered *S. lewini* into my sights for future research was that of the 778

captured in NSW from 1995-2008, only four were released alive. This indicates to me that for a species endangered everywhere else in the world, it probably won't be much different in Australia if something isn't done ASAP to prevent a population crash. That having been said, I am aiming to develop a study that will catalyse research into determining the exploitation status of *S. lewini* in Australian waters next year.

I was hoping, if you wouldn't mind, assisting me with publishing the attached article in your magazine to help instigate studies into this issue.

I didn't have any images on hand for this article, so I'm glad that Val Taylor could come to the rescue. Could you please just let Val and Ron know that if it wasn't for their shark documentaries shown to me as a child, I probably would not have as large a passion for shark conservation as I do today. It is through their work that my future career has been decided"

**Table 11 Summary of major animal groups caught in the SMP from January 1950 to 2007/08**

Fish	Likely composition	No.	Marine mammal s, reptiles, birds	Likely composition	No.
<b>Elesmobranches</b>			Dolphins	3 species	143
Hammerheads	3 species	4666	Turtles	3 species	96
Stingrays	Up to 8 families	3040	Whales <sup>2</sup>	4 species	7
Whalers	5 species	2949	Dugong	<i>Dugong dugon</i>	6
Angel shark	2 species	2313	Seals	2 species	4
Port Jackson	2 species	651	Penguins	<i>Eudyptula minor</i>	1
Great whites	<i>Carcharodon carcharias</i>	577	<b>Sub-total</b>		<b>259</b>
Grey nurse	<i>Carcharias taurus</i>	377			
Tigers	<i>Galeocerdo cuvier</i>	352			
Sevengills <sup>1</sup>	<i>Notorhynchus cepedianus</i>	158			
Shortfin mako	<i>Isurus oxyrinchus</i>	144			
Threshers	3 species	125			
Wobbeongs	3 species	42			
Unknown		5			
<b>Osteichthyes</b>					
Finfish	At least 14 species	406			
<b>Sub-total</b>		<b>15,805</b>			
<b>Total</b>		<b>16,064</b>			

<sup>1</sup> denotes that sevengill is the common name historically used to describe this species, but CSIRO's Codes for Australian Aquatic Biota now uses the common name of broadnose shark. For consistency and data comparison, the term sevengill will be used in this document.

<sup>2</sup> denotes that 'whales' includes killer and false killer whales which are members of the dolphin family.

(Source: DPI unpublished data)





# Our rivers' lament: fighting hoof and nail for riparian protection

Melanie James

Australia's rivers, estuaries, lakes, swamps and wetlands stretch like vital arteries across our continent sustaining our populations and wildlife. Much of Australia's development and agricultural industry crowd around them, and because of this, our rivers experience high amounts of pressure. Approximately 60% of Australia's land is dedicated to grazing and thus livestock damage is one of the largest threats through its impacts on river banks, known as riparian zones. Worldwide discussion on food and water security has highlighted one very important factor for Australian communities, that water is vital to our existence. But from our enormous river systems, such as the Murray–Darling, to backyard streams, Australia's river ecology and water quality have been, and will remain, under threat. It is clear that protection from degrading processes, such as livestock access, is required, but how is the Australian Government addressing this crisis, and what needs to be done to restore riparian zones and rivers?

In general, Australia's river systems are highly degraded through altered flow regimes, loss of terrestrial and aquatic habitat, the introduction of exotic plant species as well as an increased sediment, nutrient and pollution load. So what is being done to protect our river systems and adjoining riparian vegetation? Currently riparian zones are protected from vegetation clearing under a number of Acts, including the *Fisheries Management Act 1994*, *Native Vegetation Act 2003* and the *Native Vegetation Regulation 2005*. In addition to legislative protection, the NSW and Australian governments have provided 436 million dollars over four years for regeneration grants, including assistance for fencing livestock from

rivers. However, considering rivers are already highly degraded, the major issue still remains: rivers are not *mandatorily* protected from degrading processes such as livestock access, and regeneration is only undertaken by environmentally-minded citizens.

Evidence for the disturbance of riparian zones by livestock is well-documented, including grazing and trampling of vegetation, compaction of bank soil, introduction of excess nutrients from effluent and the transport of exotic plant species. These disturbances contribute to erosion and can cause river sedimentation and changes in channel direction through a build-up of dirt in the river channel,

known as a geomorphic change. This wide range of impacts from livestock and the complex interactions between rivers, plants, soils and wildlife, make protecting ecological values of riparian zones and rivers a complex issue. This brief discussion of riparian restoration and potential methods in relation to stock fencing provides evidence that fencing offers a number of benefits for our river systems, despite some limiting factors discussed below.

It has been proposed that, as livestock imposes a strong ecological and geomorphic pressure, the logical step to improve river systems is to enact legislation for mandatory river fencing. Theoretically, this would allow native seed stored within the soil to grow without pressure of stock grazing, allowing natural regeneration of the streambank vegetation. This would initiate what is known as successional regenerative stages, where native plants grow progressively from disturbance-tolerant species, to species adapted to less disturbed landscapes. However, as usual, environmental and ecological rehabilitation solutions are not so clear-cut or straightforward. This is due to a range of interdependent factors influencing river systems, including nutrients, exotic plant species and available seed banks. Thus, natural rehabilitation in agricultural areas poses a number of problems.

The prevention of livestock access would assist in the lessening of erosion from trampling, transport of exotic seeds, and potentially decrease levels of nutrients from effluent. Issues of nutrient availability in agricultural areas, exotic plant dominance and depleted native seed banks pose a number of limiting factors on the success of fence construction. Rehabilitation activities characteristically remove exotic weeds from the rehabilitation site; however, as their seeds are easily transported in rivers, they quickly recolonise the riparian zone. Additionally, excessive nutrient levels promote growth of exotics and as exotic species are adapted to high nutrient levels, they thus outcompete natives which grow in poorer soils. Agricultural areas are particularly prone to fertiliser and effluent runoff, providing excessive

Top Left: Williams River in the mist. Photograph by Paul McNamara





Williams River. Photograph by Paul McNamara

quantities of nutrients to rivers and riparian zones. Consequently, exotics will naturally occur and out-compete native plants in agricultural zones. In addition to nutrients and exotic species, if fencing is placed in without regeneration through manual planting, it is not assured that natural successive stages can occur. Many areas have been degraded severely for long periods of time, and due to grazing and trampling of germinating seedlings, there may be no soil-based seed bank remaining. If mandatory fencing does not include manually rehabilitating areas of high impact, fencing off riparian zones may have severely limited success. So, unless nutrients are managed on a catchment level and land is manually rehabilitated, exotics will continue to dominate.

Although fencing offers a number of advantages, the implementation of a country-wide riparian fencing program must consider impact on the community. There are a number of benefits for farmers, including reduced salinity and a reduction of soil loss; however, fencing large areas is expensive and would also place excessive pressure on government funding. As a result of this, incentives for fence construction may not be available on such a large scale or may not provide sufficient assistance for

some livestock owners. Alternatively, areas of key ecological importance could be fenced. A number of programs run across Australia are categorising waterways on their environmental importance. So instead of making fencing a nation-wide or state-wide regulation, whole river systems or parts of river systems could require mandatory fencing, depending on their environmental significance.

Although there has been a large amount of study on riparian restoration, the reality of regeneration projects is that each river system and each ecological community along a river requires varying management strategies. Hence, using previously successful programs as an unquestioned template for restoration strategy is to be discouraged, and the results of these studies treated cautiously when closely assessing the function of fencing off river systems.

In the end, for livestock fencing to result in true restoration, it will need to include control of nutrients, weed removal and native revegetation. The potential positive impact of fencing without these activities is somewhat limited, although it can assist in the lessening of erosion, transport of exotic seeds, and potentially decrease nutrient levels. If river fencing proves

too expensive and its impact on the community too large, options for fencing environmentally significant rivers could prove valuable. It is therefore evident that current strength of legislation and level of government funding are not enough to fix historical impacts, nor are they sufficient to solve increasing disturbances on river systems.

### Further Reading

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### Editor's note:

Melanie is studying for a B. Environmental Sciences and Management at Newcastle University.



# WPSA Merchandise

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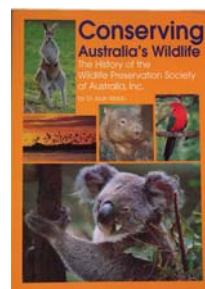
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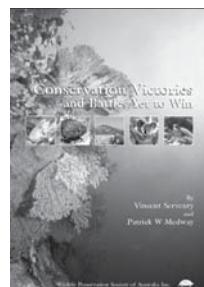


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"The challenge to the present adult generation is to reduce the increasing pressures on the Earth and its resources - and to provide youth with an education that will prepare them emotionally and intellectually for the task ahead.

**SUZANNE L. MEDWAY**  
President



# Common lizards of the Fleurieu Peninsula of South Australia

John Martin's interest in photography began in 1975. He switched from film to digital in 2000 and has never looked back - one might say that digital is instant gratification! His passion is macro photography of reptiles, insects, and plants. He also enjoys bird and landscape photography.



Common, or Eastern blue-tongue (*Tiliqua scincoides scincoides*)



Tawny dragon (*Ctenophorus decresii*)



Gulf's Delma legless lizard, (*Delma malleri*) - gravid female nearing egg laying



Common or Eastern bearded dragon (*Pogona barbata*)



Common/Eastern bearded dragon (*Pogona barbata*)



Eastern shingleback or sleepy lizard (*Tiliqua rugosa aspera*)



