AUSTRALIAN Wildlife

WINTER Vol: 3/2013
$10 (non-members)

Celebrating a new century of wildlife preservation in Australia

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

Steve Parish Images

Over a million budgerigars in a single flock, north west Queensland

A spectacular invertebrate covered outcrop in the coral sea

Banded stilts form huge flocks at the Coorong National Park, South Australia

Contents

features

regulars

Front and back cover:
Pink anemonefish (*Amphiprion perideraion*) is a wonderful fish to spend time with. They are usually seen either alone or in small family groups wafting back and forth in the current among the swaying tentacles of their host anemone. Photography Steve Parish from the new 'Inspired by Nature' gift book series.

Australian Wildlife Society
Conserving Australia's Wildlife since 1909

Australian Wildlife

is the official journal of the Australian Wildlife Society (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 Australian Wildlife Society (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 Australian Wildlife Society (Wildlife Preservation Society of Australia Limited) 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 AM - President

I was thrilled and absolutely delighted to receive a letter from the Governor General notifying me that I had been appointed a Member of the Order of Australia (AM) in the 2013 Queen's Birthday Honour's List for "significant service to wildlife conservation". I wish to thank all the members and supporters of the Society who must have made this possible.

Do humans have the right to hunt an animal to extinction for their own personal gain?

Our Society strongly believes in and has lobbied since its formation in 1909 for the protection and conservation of native Australian wildlife, especially those animal listed as Endangered or Vulnerable by the relevant government agencies.

Since 1986, when the International Whaling Commission imposed a moratorium on whaling, there has been a steady resurgence in whale populations. The recovery of several species pushed to the brink of extinction by commercial whaling is a reminder of the resilience of nature. Even so, there is a nearly constant push to ease the restrictions that have protected the whales and, in some cases, to actually resume the hunting of whales!

Now we are fighting a similar battle to fully protect marine turtles and the endangered dugong, which are being slaughtered to the brink of extinction in Northern Queensland under the guise of "traditional hunting".

Our Society has joined a coalition of conservation organisations to change the Native Title Act to ban the "traditional hunting" of all Australian wildlife listed as Endangered or Vulnerable.

Do humans have the right to clear land that is habitat to Australian wildlife listed as Endangered or Vulnerable?

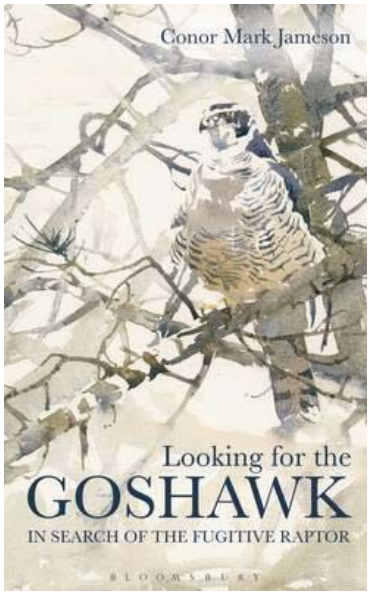
Land clearing has been a very contentious issue in the conservation and environmental movement for many years. As much land has been cleared in the last 50 years in Australia as was cleared in the previous 150 years! Without the introduction of government legislation this rate of clearance will probably continue to increase. As it is, eucalyptus forests of mainland Australia, where logging is the major cause of forest degradation and loss, are being destroyed and replaced by mono-culture plantations often by imported species of pine! This is especially so in the southwest of the country and in Tasmania. The rainforests in northern Queensland are still threatened by over-development and very poor planning laws, which do not protect the large areas of rainforest existing on private land. Native vegetation clearance represents one of the largest contributors to greenhouse emissions in Australia. About 20 percent of Australia's known species of flowering plants and conifers are endangered, vulnerable, or threatened with extinction, especially in the south-west of the country and Tasmania through continual land clearing and habitat destruction. Where is our native wildlife supposed to live and breed in the future if the habitat is destroyed?

In Steve Parish's article on page 11 he writes 'The future of our planet looks to be compromised. We cannot afford for our own good health and happiness to feel disempowered, enraged or disappointed... Grassroots movements and clear communication of our desires is the way forward; working towards what we want in any arena contributes to the change towards a better future. Education, inspiration, personal development, community, social networking, and connection – all and more will help work towards that balance that we wish for.'

I heartily agree with Steve's sentiments and believe that only through coalitions of like-minded conservation and environmental organisations (and relevant government legislation) can we achieve the protection for not only Endangered and Vulnerable species of wildlife, but also for its vital habitat.

We appeal to all like-minded Australians who care about the future of Australia's native wildlife to consider joining the Australian Wildlife Society and contribute towards the future successful conservation of our precious wildlife.

Book Review

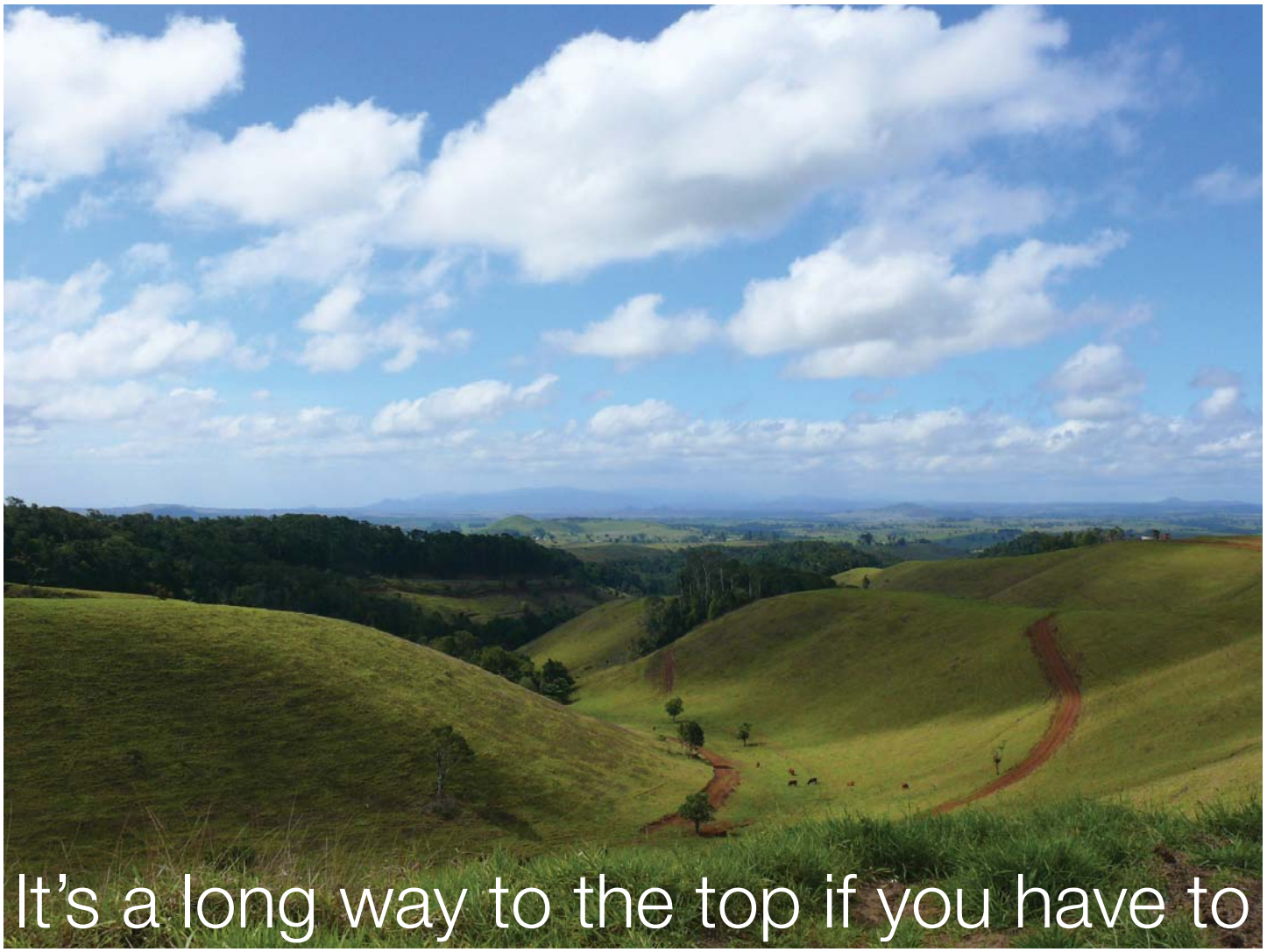


Looking for the Goshawk - In search of the fugitive raptor by Conor Mark Jameson

This book traces Conor Jameson's travels in search of the goshawk, a magnificent yet rarely seen raptor. Each episode of the narrative arises from personal experience, investigation, and the unearthing of information from research, exploration and conversations. There is a lot of fascinating detail about natural history and Jameson's own personal reminiscences, but not a great deal of detail about the actual bird. This is not a book for bird observers, but rather a personal tale of discovery.

Publisher: Bloomsbury

RRP: $39.99



It's a long way to the top if you have to climb a bole; vines and the rainforest

Mason Campbell and Dr Ainhoa Magrach

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We have all seen Tarzan swinging through the trees gracefully shifting from vine to vine whilst travelling to his next adventure, but have you ever stopped to wonder what he was actually hanging from? If not, you're not alone. In fact, as late as the mid 1970s, worldwide knowledge of the ecology of woody vines (lianas) was described by one researcher as a "virtual blank". This is despite a strong interest in vines by many early luminaries, including the great Charles Darwin himself who in 1867 wrote an article for the erudite Linnaean Society entitled "On the Movements and Habits of Climbing Plants". Unfortunately, after Darwin's era, the exclusive study of vines to any great extent abated for over a hundred years. However, by the early 1980s a renaissance of interest into vines had begun and this continues to grow into the present day as we attempt to glean a clearer understanding of how these "ropes of the jungle" operate.

Where are the vines?

As anyone who has attempted to walk through all but the southernmost of the Australian rainforests will attest, vines can be quite abundant. Indeed, many of you may be surprised to learn that up to 40 percent of all the woody species in some tropical forests are climbing plants. In Australia, more than 85 percent of the climbing angiosperm (flowering plants) genera can be found in Queensland, where their species diversity peaks around the wet tropics region of the far north with well over 400 species recorded to date. It is no surprise that the diversity peaks in this region of Queensland as most genera of Australian climbing plants display a close taxonomic association with the rainforest ecosystem; the largest continental expanse of which may be found in the wet tropics area.

But why is there such a close association between vines and the rainforest? One way to answer this is by describing what differentiates vines from trees. The most obvious answer to this is that morphologically, vines are long, skinny and flexible whilst most trees have large, inflexible trunks. The reason for this difference is that vines have "decided" to invest the majority of their energy into producing masses of leaves and roots allowing them to compete vigorously for the limited nutrient and in

Above: The highly fragmented nature of the central Atherton tablelands rainforest can clearly be seen under the skies of a beautiful summer's day

The spectacular white inflorescence of the large native "potato vine" (*Faradaya splendida*)

particular light resources available within the rainforest ecosystem. For instance, around a quarter of all those leaves that you crunch through when walking in the subtropical rainforests around Brisbane were once a part of a vine high up in the sunny canopy. However, this investment strategy does not come without a cost: vines do not have enough resources left over to invest in structural support (ie trunks), and they therefore rely solely on the surrounding trees for structural support and as their primary means of canopy access in order to obtain the light required to photosynthesize.

Climbing up and up

So how do the vines get to the canopy? Most people will have witnessed the "typical" scaling mechanism of main stem climbing vines where the primary axis of the vine encircles the unwilling tree host. However, numerous other ingenious mechanisms have evolved by which vines achieve tree ascension. For instance, one interesting strategy commonly employed by many major climbing plant groups such as our large tropical peppers (Piper spp.) is to glue themselves onto the trunk of any nearby tree utilising multiple adhesive roots, specially grown at each of their stem nodes. Another climbing mechanism you may have unwittingly been unlucky enough to encounter in our rainforests is the use of hooks and spines to attach and cling to any surrounding vegetation. This strategy is commonly utilised by many of our vines and in particular our climbing palms (the infamous lawyer canes or wait-a-whiles) which not only enables them to attach and hold fast onto surrounding vegetation but prevents them from slipping back down a tree as they climb. So the next time you are

Two large lianas embrace as they twist towards the rainforest canopy high above

These pale green flowers of the native "Burney bean" liana (*Mucuna gigantea*) were aggressively defended by the native green ants (*Oecophylla smaragdina*) seen here farming aphids for honeydew

The start of a long climb towards the canopy for a native liana utilising a "main stem" climbing strategy

unlucky enough to encounter a hook climbing vine you will now know that they are not covered in hooks simply as a nefarious attempt to prevent you enjoying your idyllic rainforest stroll! A further interesting climbing strategy which some vines employ is the modification of pre-existing organs into tendrils that twine around nearby supports. A well known exotic example of tendrillar climbing you may have noticed is that of the passionfruit species, however you may be unaware that many of our Australian vines utilise the same strategy through the modification of many different organs such as leaf tips, stipules or even branches transformed into tendrils that slowly curl their way around and pull themselves into any unsuspecting branch they find within close proximity. So as you can see, canopy ascension whilst no easy task, may occur by many different means. Consequently, the next time you're lucky enough to enjoy a visit to our marvellous rainforests take the time to have a close look at the wonderful and diverse array of strategies vines use in their never ending struggle to "get to the top".

Stuck in one place; no way!

You now know how vines move vertically within a forest but you may not have known that even once established they still have the ability to move considerable distances throughout the forest. And if you thought that all plants are sessile, inanimate objects stuck in the one place, you may have to reconsider that notion, especially in the case of vines. For example, once vines are established within a rainforest, unlike trees, they are not necessarily confined to a relatively vertical growth trajectory. For instance, if you were to follow a single rainforest vine as it winds through the forest you may notice its gradual ascent towards the canopy interrupted by intermittent horizontal jumps from tree to tree as its water shoots search out supports using large circular growth patterns – a process known as circumnutation. Even once it has reached the canopy it may weave its way between and over the crowns of multiple trees potentially ending up hundreds of metres or more away from its rooting location. Not only does this allow the vine to find the best canopy real estate (as determined by sunlight availability) but also to spread its plethora of leaves like a vast sunshade over all the trees below.

Vines also have the unique ability to "relocate" from their initial rooting location primarily through the prodigious ability to propagate by vegetative means. For instance, if you look closely at many of the vines within the forest you will notice that as they bend and wind their way through the forest understorey looking for a suitable tree to climb, they root at multiple locations along their stems. This allows for the generation of new genetically identical individuals known as ramets. These can also form through a similar process of shooting from underground stems known as stolons. Both of these vegetative reproductive strategies enable many new genetically identical individuals to arise within a given area of forest from a single parent vine. This ability, along with their remarkable ability to survive the impact of their host tree falling and subsequently re-shoot, enables them to rapidly colonise favourable high-light environments such as those produced within tree-fall gaps and along rainforest edges.

A final mechanism that allows vines to successfully move around the landscape and between forest patches is their ability to produce fruits that employ long distance seed dispersal. One strategy used by a large Australian vine family (Apocynaceae) is to attach seeds to a silken "parachute" which once released from high up in the canopy may be carried large distances around the landscape by even the gentlest gust of wind. Other vines make use of the ocean and waterways to spread their seeds potentially hundreds of kilometres resulting in a pan-tropical littoral distribution. They do this by setting adrift their seeds safely contained within a majestic portable flotation device, to drift at the current's whim until they are deposited on a far away shoreline. Another common mechanism many Australian vines utilise is to "persuade" animals to act as unknowing couriers of their seeds thereby distributing them (with free fertilizer!) around the landscape. They achieve this by "advertising" their seeds within fruits decorated in bright colours and contained within nutritious "packaging" leading many animals to readily gobble them up. The seeds are then released many kilometres away from the parental vine where they can safely germinate and avoid having to compete with their parents or siblings for resources.

The serious stuff; vines and forest disturbance

The disturbance of rainforests through fragmentation and over-exploitation is rapidly becoming an unfortunate but common feature of many forests throughout tropics, and the ecological features of vines (as described above) have allowed them in particular to take advantage of this disturbance and becoming incredibly successful. Slowly, worldwide studies on vines within disturbed forests are beginning to show us how an increase in vine abundance following forest disturbance can lead to increased tree mortality and changes in the tree species composition of these plant communities. However, these changes within the plant communities of disturbed forests across the tropics are likely to lead to numerous as yet unknown ecological and evolutionary consequences.

Our study, located in primary patches of forest on the Atherton tablelands, aims at analysing precisely the impacts that forest fragmentation

A highly modified liana branch slowly twines itself around an unsuspecting host tree's branch

A dehisced liana seed pod having successfully scattered its wind-dispersed seeds now dangles gently in the breeze

and disturbance has over the vine community and their interactions with trees. To the best of our knowledge this is the first large scale study specifically focused on vines and rainforest fragmentation attempted in Australia. It is hoped it will produce findings that will help us better understand the dynamics of our rainforests and develop management guidelines to aid in their protection.

Conclusion

So as you can see, there is much more to vines than just a walking impediment slowing your traverse through the forest and fortunately you don't even need a leopard skin outfit or a pet monkey to enjoy them! However, a continuing study of their ecology will be crucial if we are to truly understand the fundamental part they play within our complex rainforest ecosystem.

About the authors and their current research

Both authors work in the field of conservation ecology and are based at James Cook University, Cairns Campus where Mason Campbell is a PhD student and Dr Ainhoa Magrach is a post-doctoral researcher. At present they are jointly working on a project examining how the modern landscape itself impacts upon vines. For example, due to the clearing of the once large, continuous rainforest, vines now mainly exist within varying sized patches of rainforest, scattered throughout the landscape and highly segregated by human modified habitat. How is this habitat fragmentation impacting upon the abundance, biomass and species composition of our remaining rainforest vines? And how do the vines consequently impact upon the forest community as a whole?

To answer these questions and many others they have begun a large scale research project using the "natural laboratory" of the Atherton tablelands in far north Queensland approximately 50 kilometres west of Cairns. This area was once a vast continuous rainforest, clothing a mid elevation (600-1,000 metre) plateau of rich volcanic soils. However, with European settlement in the early 1900s a concerted effort to log and clear the rainforest and replace it with agriculture began in the area. This process was so successful that by the mid 1980s over 87,000 hectares were gone leaving behind only a miniscule proportion of the previous extent of rainforest, now to be found as many isolated remnant patches scattered amongst the farms. To understand how lianas have responded to this habitat modification, they are examining them and the different sized forests within which they live throughout the region. It is hoped that understanding how the vines respond will enable us to better conserve and manage vines within their current distributions and also to predict how they will likely behave in the forests of the future.

This research is supported by an ARC Discovery Grant (awarded to Distinguished Professor William Laurance) and an APA scholarship to Mason Campbell.

Photography and text Steve Parish

Wildlife conservation

A journey towards empathy

As a child of seven years I connected with a large old male lion at the Adelaide Zoo. Standing close to where it lay, it yawned. The pungent breath wafted over me and I fell deeply in love with its very presence. My guardian at that moment was my missionary uncle who had returned on leave from India relating exciting stories about man-eating tigers and leopards and the people who hunted them – exciting fodder for a young eager child.

The only information about nature to be had at that time was old copies of National Geographic, with which I pasted the walls of my very small bedroom. This was the 1950s; there was no colour television or books on nature.

This feeling of awe turned to fear as I became an adolescent and wished to hunt animals rather than care for them. I developed an obsession for guns and began to collect them. Fortunately for me, at this time, I met an underwater photographer who turned my unseemly focus and fostered in me a passion for photography, conservation and marine life.

At the age of 30, I raised my head from the depths of the ocean to discover a world of terrestrial creatures with the Queensland National Parks and Wildlife Service; employed as a photographer. It was an exciting age when environmental education was highly valued and wildlife conservation promotions were very active under the careful direction of Peter Ogilvie and the Environment Minister at the time, Ivan Gibbs. Our mission was to market the natural resources and wildlife of Australia to its inhabitants. We set animal songs to music, nature audio-visuals set to music, poetry, animal posters and even a cartoonist was employed. The ABC made programs about natural history and the people who worked with wild animals and places. The agenda was to engage people with their natural history – did we succeed?

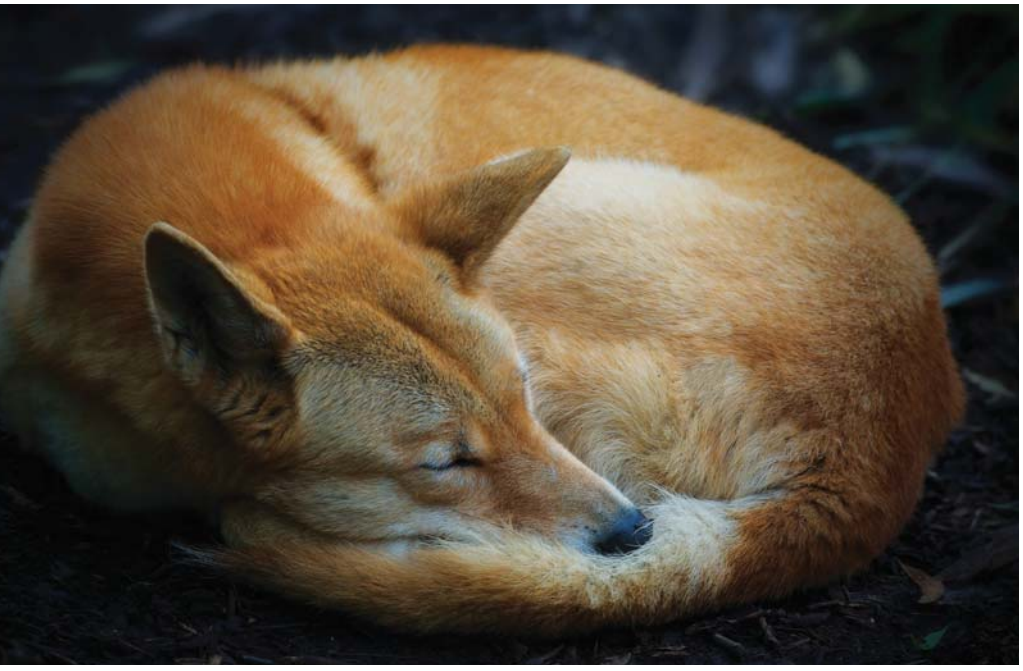
At the time, the government seemed to be supporting and financing the projects, yet was equally intent upon removing great tracts of virgin bush for commercial gain. Wind the clock forward to today – cattle approved to graze in national parks, logging re-introduced into protected reserves, major port developments close to the World Heritage Great Barrier Reef, shooting in national parks and on and on.

If you have a connection with deep ecology and live in an awareness of planetary sustainability, then the above sounds like madness. It is madness!

The future of our planet looks to be compromised. We cannot afford for our own health and happiness to feel disempowered, enraged or disappointed. So, how do we stay optimistic and active to work towards a better future with the giant of "development and growth" on our shoulders? It is my belief, after

Above: Male royal spoonbill in breeding plumage

The leafy sea dragon is the South Australia state marine emblem and a symbol for marine conservation in that state. It is Steve's favourite marine fish



An alpine dingo sleeping at Healesville Sanctuary in Victoria. Steve has run photo workshops in that sanctuary for over a decade

many years of observation, learning and personal shifting, that a balanced and awake person cannot live unsustainably; that a balanced and aware person will understand their connection and place in the natural world; that personal suffering will always detract from natural values – a person desperately trying to feed their family will not care for the quality of the forest nearby.

Grassroots movements and clear communication of our desires is the way forward; working towards what we want in any arena contributes to the change towards a better future. Education, inspiration, personal development, community, social networking, connection – all and more will help work towards that balance that we wish for.

While reviewing my own career in photography, I am relieved that my journey towards being a hunter was interrupted before it had really taken hold.

Hunting was hugely popular in the 1950s and 1960s, far more so than today. That experience constantly reminds me how easily a child can take a life path towards or away from nature. While empathy towards each other seems a natural, in my experience connection to nature is best achieved for children through a wildlife experience, and that is why I have long been a fan of the wildlife carer movement, the fauna park – even the zoo. Important educational work is accomplished when hand-raised native animals are taken into classrooms. This, along with educational natural history books and evocative images of animals establish good attitudes to the natural world.

Does this really work? You bet it does!

A hollow log provides a wonderful nest for a family of sugar gliders

STEVE PARISH PHOTOGRAPHER

Steve has travelled Australia extensively, in doing so discovering that his lens not only magnifies the spirituality of this ancient continent, but has also allowed him to create an impressive body of work that speaks volumes about the spirit of nature. Whether expertly rendered wildlife shots, cityscapes or beguiling portraits of quintessential Aussie characters, Steve's camera seeks out the "soul" of this country and exposes it for all to admire. His creative photographic journeys have left him with a library of more than 600,000 photographs — unrivalled by other Australian photographers. Each provides a history of nature's artistry, from the traced outline of a feather in the sand, to the gleam of light reflected in a lizard's eye. Many also reflect the inherent sense of peace the natural world bestows on humankind. When exhibited, Steve's images draw crowds that marvel both at his skill and at the vibrancy of the living world. Almost 50 years behind the lens has also furnished Steve with a desire to help our wild flora and fauna and to speak out for protection of their habitats. He is regularly involved with conservation efforts and frequently lends his time and voice to help encourage others to join the cause for wildlife conservation.

The *Inspired by Nature* series reflects Steve's generous heart and philosophical nature and has been written in collaboration with his wife Kate.

INSPIRED BY NATURE THE SERIES

Steve and his partner Kate have recently released eight gift books in this series offering insights into creating a rich and fulfilling life connected to soul and nature.

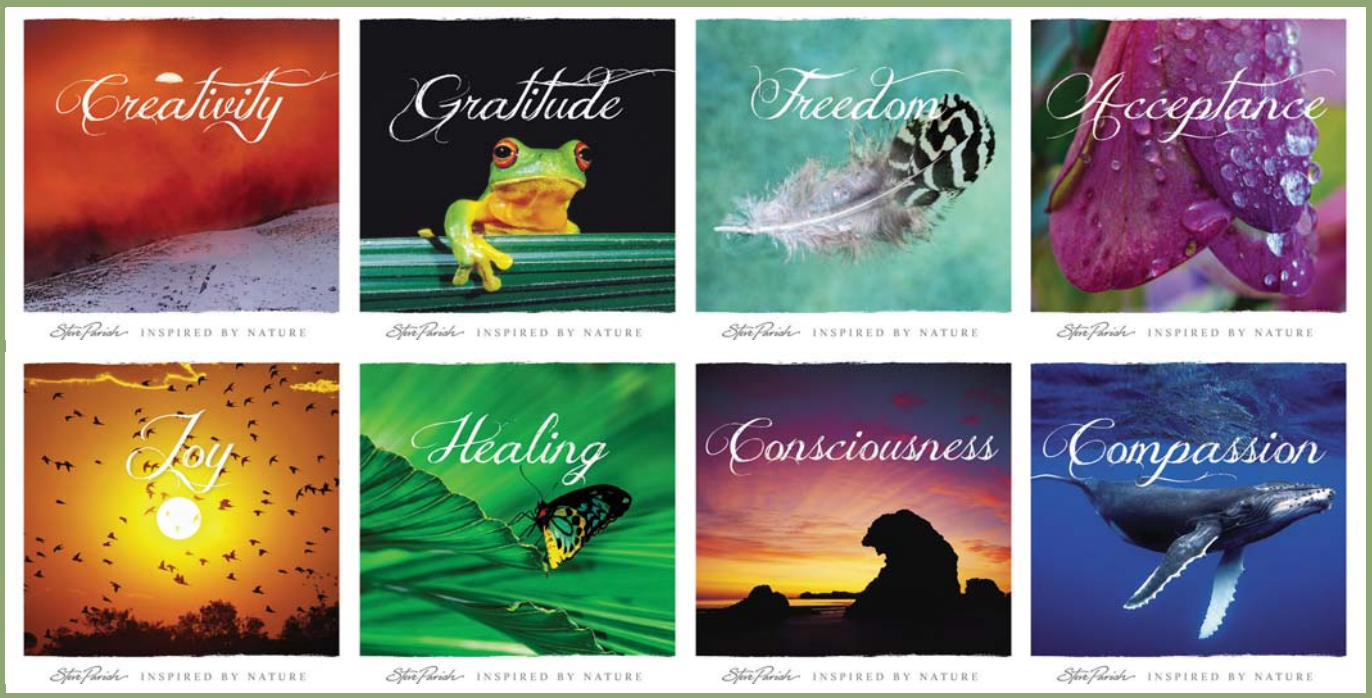
There is no handbook to life given to us when we enter this world. We are born into a diversity of life situations which we will accept or deny, growing and learning, adapting and searching — each of us finding a path, each of us on a quest for our own reasons for being.

These books aim to help you touch those moments when time stops and space is created, when emotion fades, stress disappears and your true self and life's meaning are glimpsed. Available through all good bookshops and online through Pascal Press Steve Parish e'Shop.

If you would like the chance to win a complete set of the series, write a short sentence on your first inspirational moment with Australian native wildlife and email, post or fax to:

Email: info@wpsa.org.au | Fax: 02 9599 0000 | Post: AWS, PO Box 42, Brighton Le Sands, NSW, 2216

The winning entry will be published in the Spring edition of Australian Wildlife.



Ipswich Koala Protection Society, Queensland

Steven Saphore

I met Ruth Lewis, President of the Ipswich Koala Protection Society, in what wouldn't be considered the most usual of circumstances, but when you work with people in the wildlife field, this tends to become average. She is collecting koala droppings which she will mash up and make into a drink for her orphaned koala joeys. 'I know, right?' she retorts to my bewilderment, 'Sounds delicious huh?' However, she explains to me that these are not ordinary droppings. Termed "pap", before a baby koala is able to go off milk, a mother will feed her joey these specialised droppings, which pass on the microbes necessary for it to digest the highly toxic and nutritionally devoid eucalyptus leaves, the only food a koala will eat for the rest of its life.

We are at the house of Helen Darbellay, secretary of the Ipswich Koala Protection Society, which acts as a rehabilitation centre for injured koalas. Ruth puts away the ingredients for her nefarious concoction and pulls out two grapefruit sized handmade pouches and places them on the table. As she prepares tiny bottles of a special milk formula whilst meticulously checking the temperature, I notice the pouches appear to come alive as they begin to writhe. In no time, two hungry heads belonging to koala joeys squirm their way out to daylight, each no bigger than a fist.

Ruth takes the first baby koala, named Haylo, and cradles her in preparation for feeding. At approximately four months old, she is tiny. As Haylo begins to suckle on the bottle, Ruth takes her hand and covers Haylo's delicate face, telling me 'It mimics what it would be like to be in her mother's pouch as she feeds'. With a baby koala requiring feeding every four hours, taking on the role of wildlife carer is a full time commitment. Haylo was found crawling in the middle of the road where her mum had been hit by a car. They were both rescued and taken to the Moggill Koala Hospital for assessment and treatment. With Haylo's mother too sick to look after her, the joey was placed into foster care. It was feared Haylo's mum, Rose, wouldn't survive the accident; however she eventually made a full recovery and has since been released back into her native area. 'If everything goes well', Ruth tells me, 'Haylo will also be released back into the wild in several months' time'.

The second baby koala is even smaller than Haylo. With no name yet, Ruth tells me he isn't doing so well. 'Mum was very sick and had no milk', says Ruth, 'and unfortunately, had to be euthanized'. This little koala puts up a fight as Ruth tries to

Above: Jesse, a koala joey under the care of Helen Darbellay from the Ipswich Koala Protection Society gives a pensive look while drinking from a bottle

feed him, but ultimately gives in. At approximately three months old, he is severely undersized for his age. Encouraged not to name him should it rake in the scent of a reaper, Ruth expresses concern for his future. Pausing from feeding to wipe spilt formula from the nameless koala's furry mouth, she tells me, 'I don't know how well he's going to do, but we won't stop trying'.

It is not only the future of this miniscule marsupial clinging to the fringes of life that concerns Ruth, but the future of all koalas. The reality of the situation stands thus: Urbanisation; the encroachment of humans into koala territory sees the marsupial's population at a decline of approximately 1,000-3,000 each year – and that is growing. With fewer than 100,000 koalas left in the wild, the species that Australia has fondly adopted as their emblem may go extinct in as little as 50 years. Koalas are federally listed as Threatened, so it is against the law to harm or disturb one. As such, Ruth feels the problem of their demise exists not with the creature, but the environment in which they live. 'Everyone loves koalas', she tells me, 'They get protection. Their trees don't.' Since the advent of European settlers into Australia, over 80 percent of eucalyptus forests have been annihilated to make way for industrial and suburban development. Living within close proximity to humans is the single most devastating impact the koala population will ever see.

Train casualty

At that moment, Ruth receives a phone call. After what I hear as unintelligible mumble through the phone's speaker as it is pressed against Ruth's ear, her disposition suddenly turns austere. 'A koala with a severed arm has been found in a tree metres from a train track where it presumable was run over', she tells me. At least the fourth koala hit by a train this year, it is being brought in by her ambulance now for assessment. In the meantime, Ruth rings a veterinarian to meet the injured koala at Helen's house/ rehabilitation centre, as she suspects the need for euthanasia will arise. The koala arrives in a cage, silent but

Ruth Lewis, President of the Ipswich Koala Protection Society, with Jessie and Elsa, koala joeys currently in rehab

Ruth takes her hand and covers Haylo's delicate face, telling me 'It mimics what it would be like to be in her mother's pouch as she feeds'

Haylo, the four month old literal "handful"

This female koala in Ipswich, Brisbane, presumably run over by a train, was found climbing up a tree near the tracks. Brought into a koala rehabilitation centre, she must now be euthanized. This is just one of hundreds who will share the same fate every year as a result of human activity

Gary Bain says 'The joy is out of rescuing and treating animals because they're released into a miserable environment'

Nameless, the baby koala whose future is as uncertain as are all koalas. He sadly died a few days later

tremendously apprehensive. Looking into its eyes, I could sense the perturbation of fear and confusion that would have been ransacking its thoughts at that second. The veterinarian, seizing the moment, sedates the koala with a quick injection. A few seconds later as the soporific drug takes effect, the vet removes the wild koala from the cage and I instantly grasp the severity of her injuries; its right forearm has been severed half way up, leaving the paw hanging by a single tendon. It is miraculous the koala was even able to move, let alone climb a tree. 'Definitely run over by a train', says the vet as she feels the koala for any sign of internal injuries. She focuses her examination to the koala's ovaries and announces the marsupial is infertile, most probably from koala Chlamydia. Completely different to the human form of the disease (something the media loves to distort), Chlamydia in koalas causes chronic infections, infertility and liver failure, as well as a host of other problems. Surveys predict approximately 50 percent of koalas in the wild are infected. Due to this ailment and the severity of the koala's injuries, the vet makes the executive decision to euthanize. This comes as a blow to not only Ruth, Helen and the vet, but to the koala population as a whole.

As the life slowly trickles from the koala's veins, Ruth recounts on what she told me before. This is not an isolated event; it is just one of the hundreds of cases organisations like Ruth Lewis's will deal with each year. The biggest killers are traffic accidents and dog attacks, but above all stands human ignorance. Working in the field of koala conservation requires a great deal of passion and dedication, especially considering these efforts receive no government funding and is more-often-than-not entirely self-funded. Since the koala crisis gained publicity this year, however, more and more people are eager to join the struggle. Ruth tells me, 'The Ipswich City Council provides our organisation with ambulance registration... and we now have other corporations eager to donate things like cages and medical supplies'. However, she feels the age old idiom, "prevention is better than cure" seems to be a lesson that everyone missed at some point.

Moreton Bay's long-awaited rail link comes to life

'The Moreton Bay Rail Link is set to transform the region, providing a dedicated public transport link for one of the fastest growing areas in the country', says the official Queensland Government transport department website. Gary Bain, president of Pine Rivers Koala Care, feels differently. Moreton Bay is home to one of Queensland's biggest koala populations, 'And now the government is building a barrier directly through it', says Gary. Recalling the disastrous koala translocation efforts of Coomera, where large expanses of bushland were cleared for urban development, '14 of those translocated koalas were killed by dogs alone', Gary staggeringly reveals, 'Translocation of koalas doesn't work'. Before human development posed any threat to koala habitat, barriers separating the tree dwelling marsupials used to be rivers, now they are highways and railways. '... As a result, koalas are not getting the chance to spread their DNA', Gary extrapolates, 'In suburbia, for a koala to live five years is a long time... and that's just when they are reaching their prime'. As our conversation moves onto the duality of passion and practicality, Gary references a group with intentions to build a sanctuary, which would allow injured koalas, unsuitable for release back into the wild, to circumvent euthanasia and live out the rest of their days. A solution that would be a pleasing idea for many, he feels conversely, 'If someone has the money to set up something like that, why not use the money to stop them from getting there in the first place?'

With the Australian zeitgeist built on the pursuit of economic growth, how can one expect to combat such inevitable habitat destruction? A quick internet search will easier yield results of a koala's worth in dollars rather than statistics regarding their population. Of the average $1 billion per year Australia makes from koala related tourism, almost none goes back into conserving the species.

With no plans to halt development and not enough mitigation for koalas, can Australia save them?

A koala joey under the care of Helen Darbellay from the Ipswich Koala Protection

'Any wildlife conservation should result in net gain for animals – this is a failure'

A grim fairy tale

Lee K Curtis

Once upon a time, back in the year 2000, Queensland held the rank of sixth highest land clearer in the world, clearing an average of 450,000 hectares of native bushland each year. The Queensland State Government and the Federal Government were being pressured, both at home and overseas, to stop the bulldozers. When Queensland introduced laws to prevent the clearing of endangered native vegetation on leasehold land, panicked landowners initiated a clearing blitz before those laws went into effect.

During this time, a small group of concerned people in central Queensland purchased an 8,000-hectare block of land, which had a clearing permit. They bought the land in order to ensure it was not cleared. Most of this property had never been cleared and consisted of remnant woodland. The Federal Government, in the form of the National Reserve System, pitched in two-thirds of the purchase price and the Bimblebox Nature Refuge Agreement was signed with the State Government in 2003. The whole point of signing these agreements with the State and Federal governments was to protect the conservation values of the property forever and ever ("in perpetuity").

The owners of Bimblebox worked very hard to make sure all the plants and animals on the land were well cared for. The property's caretaker, Ian, knows that to some his little piece of paradise might appear a "neglected nether region – a by-passed eye-sore between the glamorous reef 'n rainforest and the awesome outback". But he is quick to point out that Bimblebox is famous for its rich biodiversity and is a perfect example of the Desert Uplands ecosystems at their best, only five percent of which are held in conservation reserves.

Among the native species reported to date there are over 275 plants, at least 150 birds, 16 mammals, 27 reptiles and three frogs. A number of species are threatened or of high conservation significance.

Ian has his favourite plants, and he describes them with the passion of a true bush poet, whose heart beats in rhythm with Nature:

The Bimblebox, like no other. Each one his own making, with the figure and grace of age and sage, broken, gnarled, grey cloaked poplar box; towering, hallowed and hollowed. Sculpted by centuries of adversity but forever benevolent. Stoic, sedentary immortal giant, home to pest or pet alike, cockatoo, crow, cicada, koala; midwife and giver of last rites to another people, our last living connection with them.

Ian is also a staunch supporter of soft spinifex (*Triodia pungens*) and its incredibly significant role in the ecosystem:

Much maligned, oft despised, enigmatic emblematic Aussie. While all down the line of time, dealing daily safe harbour to creatures terrestrial, vulnerable and small – knobby gecko, legless lizard, leopard skink, dunnart, bettong, bandicoot, curlew, squatter pigeon, night jar – all finding shelter in a microcosm, perennial encircling the eternal, carbon copied blueprint for survival, history's lessons for the future, in situ study of ecology, and economy. For when drought has dashed all other growth and forlorn hope, and a dismal pitiless sky cannot raise a cloud, spinifex rises still, with sustenance and hydration for starving steer and patient kangaroo who, when grazing tough and bitter tussock, are tasting sweeter wetter morsels.

Ian understands the connectivity between the plants and the animals – the vital symbiosis that allows us all to survive on this planet and that the slightest interruption in this meticulously designed system that Mother Nature has created, bodes badly for the future of an untold number of species, including our own.

One of the main goals in establishing Bimblebox Nature Refuge was to carry out research and monitoring

This page: The common wallaroo does not live up to its name as it is a wonderfully varied species of kangaroo that comes in a wide array of sizes and colours.
Photo: Sonya Duus

A perfect example of the Desert Uplands ecosystems at their best

The eastern version of this delightful little finch has a white rump, while the western one's is black. Photo: www.ataglance.com.au

to demonstrate and evaluate the integration of cattle production with nature conservation. A number of ongoing research projects are being conducted by a variety of organisations and researchers, for example, Queensland Herbarium is conducting fire management research which could contribute substantially to current understanding of the interaction between fire and grazing, and their cumulative impacts on Desert Uplands biodiversity; CSIRO has implemented a biodiversity monitoring program to assess the relationship between the grazing practices and biodiversity, and a PhD student is doing research on avian and plant diversity and how they relate to grazing land management. The results of these studies, and many others, could strongly influence, for the better, current cattle grazing methods in central Queensland, allowing for agriculture and biodiversity to coexist in a more harmonious manner.

Remember at the beginning of this lovely story I wrote that the agreements signed by the Queensland and Federal Governments and the owners of Bimblebox were to protect the conservation values of the property

forever and ever? Well, "forever" didn't even last ten years. One day, a BIG mining company, Waratah Coal, decided that they wanted the coal under Bimblebox and applied for mining permits so they could bulldoze the property and dig enormous holes from which they can extract the dirty coal, which will then be loaded on to over a thousand coal wagons each day and chug their way to a port (dredged, no doubt) and shipped through the Great Barrier Reef to China, where it will be burnt, or perhaps stored until we run out, then the Chinese can sell it back to us at a ridiculously inflated price.

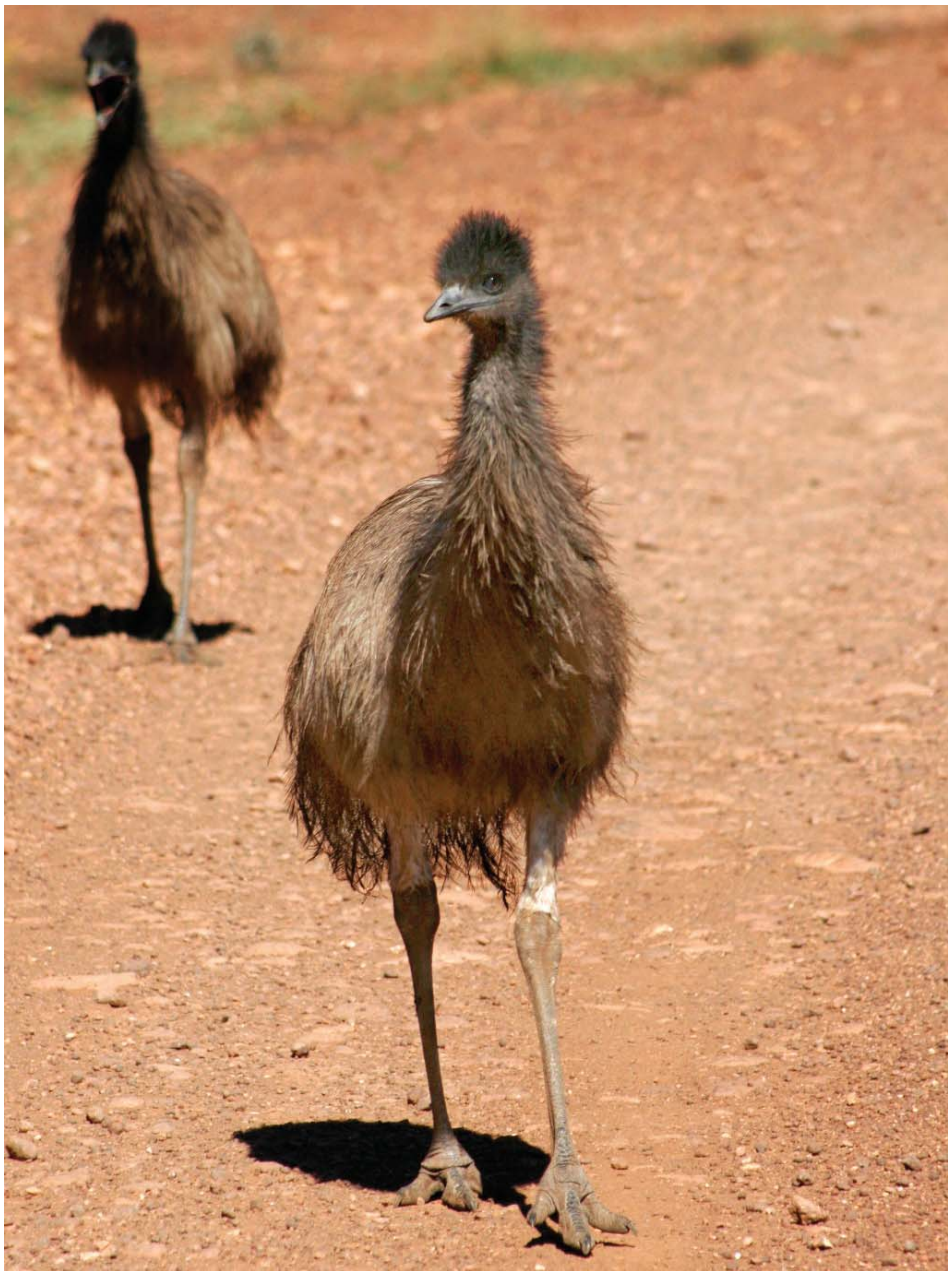
'Bimblebox' laments Ian, *'alas succumbing too soon to the coal miner's dubious claim, to bring us prosperity and modernity – when we all know it be otherwise'.*

What does it say about us as a nation when we allow short-term gain and long-term destruction carried out by an industry, that is inarguably one of the dirtiest on the planet, to take precedence over the ongoing maintenance and enhancement of a healthy biodiversity – proven to be of great benefit to all forms of life – as well as promoting and maintaining other existing, healthier and more

These charming birds are seen roosting together, day and night, in flocks of up to 100 individuals. Photo: www.ataglance.com.au

Byrnoe's gecko is the speedster of ground geckos, taking off at full speed when disturbed. Photo: Sonya Duus

Colourful members of the cockatoo family, galahs hang out in large flocks in woodlands that have ready access to water and frequently visit areas inhabited by humans. Photo: www.ataglance.com.au



These teenagers will be in Dad's care for six months then venture out on their own. Photo: www.ataglance.com.au

The delicate Sundew is an insectivorous herb with sticky hairs which attract then trap its prey. Photo: Sonya Duus

sustainable industries? Isn't it time we change the bit about protecting the conservation values of a nature refuge in perpetuity... *unless a mining company wants it*?

Threatened species lists:

Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC) Listed

- Koala (*Phascolarctos cinereus*)
- Squatter pigeon (*Geophaps scripta*)
- Black-throated finch (*Poephila cincta cincta*)
- Ornamental snake (*Denisonia maculate*)
- Yakka skink (*Egernia rugosa*)
- Brigalow scaly-foot (*Paradelma oriental*)

Queensland Nature Conservation Act Threatened Species

- Little pied bat (*Chalinolobus picatus*)
- Cotton pygmy goose (*Nettapus coromandelianus*)
- Freckled duck (*Stictonetta naevosa*)
- Black-necked stork (*Ephippiorhynchus asiaticus*)
- Square-tailed kite *Lophoictinia isura*)
- Black-chinned honeyeater (*Melithreptus gularis*)

Species of Conservation significance

- Common dunnart (*Sminthopsis murina*)
- Spectacled hare-wallaby (*Lagorchestes conspicillatus*)
- Rufous bettong (*Aepyprymnus rufescens*)
- Squirrel glider (*Petaurus norfolcensis*)
- Inland forest bat (*Vespadelus baverstocki*)
- Mulga/king brown snake (*Pseudechis Australis*)

The male central bearded dragon often sports a black beard. Photo: Sonya Duus

Controlling animal pests

feral goats

Peter Hardiman

The feral goat has established populations in a variety of habitats across Australia. It competes with native fauna and causes land degradation, threatening plant and animal species and ecological communities. The feral goat in some quarters is considered an agricultural pest, but also has commercial value and is harvested for its meat. To protect the environment, feral goat programs are best undertaken in areas of high conservation value.

History

Goats arrived in Australia with the First Fleet in 1788. As they were small and hardy, ate a range of plants and provided milk and meat, they were convenient livestock for early European settlers.

During the 19th century, sailors released goats onto islands and some areas of the mainland for emergency food. Certain breeds were imported for their hair. More recently, goats have been used to keep plantations, forests and inland pastoral land free of weeds. Feral herds developed as these domestic goats escaped, were abandoned or were deliberately released.

Feral goats now inhabit across 28 percent of Australia. They are found in all states and territories and some offshore islands, but are most commonly found in the rocky or hilly semi-arid areas of western New South Wales, South Australia, Western Australia and Queensland. There are at least 2.6 million feral goats in Australia, but numbers fluctuate enormously with drought, management programs and high fertility, so it is very difficult to accurately assess numbers.

Ecology

Where dingoes and wild dogs are present, feral goats generally do poorly. However, they are often found in sheep-grazing areas, where dingoes and wild dogs have been culled or heavily controlled by pastoralists.

Feral goats live in herds and, although males and females live separately for much of the year, they share about one kilometre square under good conditions, but a larger area when food or water is scarce. The two groups only mix together during the breeding season in autumn and winter, with females becoming sexually mature in their first year. Feral goats breed twice a year, with twins and triplets being common.

Feral goats have a varied diet which includes leaves, twigs, bark, flowers, fruit and roots. They will eat most plant types in pastoral regions and often consume vegetation that is avoided by sheep and cattle.

Impact

Feral goats have a major effect on native vegetation through soil damage and over-grazing of native herbs, grasses, shrubs and trees. This grazing can cause erosion and prevent regeneration. They foul water holes and can introduce weeds through seeds carried in their dung.

Particularly during droughts, feral goats can compete with native animals and domestic stock for food, water and

Above: Feral goats at Bourke western New South Wales

Feral goats at Bourke western New South Wales

shelter. For example, they may threaten some yellow-footed rock wallaby populations by competing for rock shelters and food, leaving the wallabies exposed to a greater risk of predation by foxes and wedge-tailed eagles.

Feral goats carry footrot, and can infect or reinfect sheep through their contact with sheep. They could also carry exotic diseases such as foot and mouth disease.

Control

Control of feral goats is a complex issue. Whilst they continue to be a major environmental and agricultural pest, they also have some commercial value and are used as a game species by recreational hunters. Feral goat populations tend to recover well from culling, except on islands, where eradication is not possible. To protect the environment, control is best focused on areas that contain threatened native plants, animals and ecological communities.

In arid and semi-arid country, feral goats are sometimes mustered for slaughter and young females may be sold as breeding stock for mohair flocks. In accessible areas, shooting from helicopters is the most humane and efficient method of removing small numbers.

When looking for food, feral goats centre their movements on the availability of permanent water. In times of drought, they need to drink more and stay closer to water. This makes the water source an ideal place to trap feral goats by surrounding it with goat-proof fencing and using one-way gates that allow the goats into the trap to drink but do not allow their movement out again.

A technique known as the "Judas Method" similar to that used for the entrapment of feral donkeys can be used to locate small herds. A feral goat fitted with a radio transmitter collar is released to be amongst the herd. Signals from the radio transmitter reveal the location of the herd, making the entrapment much easier.

National problem - solution

Competition and land degradation by feral goats is listed as a key threatening process under the "Commonwealth Environment Protection and Biodiversity Conservation Act 1999. (EPBC ACT)". Under this Act the Australian Government, in consultation with state and territories, has developed the "Threat abatement plan for competition and land degradation by unmanaged goats".

This plan aims to reduce the impact of feral goats on native wildlife in the following ways:

- Preventing unmanaged goats occupying new areas in Australia and eradicating them from high conservation-value areas.
- Promoting the maintenance and recovery of native species and ecological communities that are affected by competition and land degradation by unmanaged goats.
- Improved knowledge and understanding of the impact of unmanaged goats and their interaction with other species and other ecological processes.
- Improving the effectiveness, target specificity and humaneness of control options for unmanaged goats.
- Increasing the awareness of all stakeholders of the objectives and actions of the threat abatement plan, and of the need to control unmanaged goats.

Feral goat control programs need to be co-ordinated with other activities such as on-ground protection of threatened plants and animals and the control of other invasive species such as rabbits, feral pigs and feral donkeys. The threat abatement plan provides a national framework that promotes the best use of the resources available for feral goat management.

Conclusion

Goats and sheep are very closely related. The domestic goat known as the "poor man's cow" is descended from the pasang or wild goat *(Capra hircus)* of Turkey. The domestic sheep *(Ovis aries)* has been kept by man since prehistoric times. Goats are distinguished from sheep by the beard on the chin of most males. Goats also have shorter tails than sheep and they turn up. Goats are usually covered in straight hair, but some kinds have a woolly undercoat. Goats are suitable for milking – although goats give less milk than cattle, and thrive on much poorer pasture.

The prevalence of feral goats in some states of the Commonwealth continue to be a perennial problem and are a grave threat to our environment, plant life and endangered wildlife species. To illustrate this allow me to give you an example that happened a long time ago.

In the early 1600s the Portuguese took a herd of goats to the fertile, wooded island of St Helena off the west coast of Africa. Goats have voracious appetites. They do not simply munch grass; they rip out the entire plant. They tear leaves off trees and sometimes clamber up the branches. More seriously they eat plant seeds and pull young trees out of the ground and so prevent the growth of new plants. Within 200 years, the goats had destroyed most of the plant life of St Helena. In 1810 all the goats were killed, but by then wind and the rain had eroded most of the unprotected soil.

Learning to love the Tasmanian devil

(*Sarcophilus Harrisii*)

Libbie Finn

From as early as I can remember, it seemed that I was destined to work with animals. I was always drawn to them. Now, in my early 20s, my life revolves understanding and caring for animals. I have been lucky enough to volunteer and work at the National Zoo and Aquarium in Canberra. My time there has helped me to deepen my understanding of animals and their care as well as to develop individual relationships with many of the animals.

Learning about the conservation issues that animals face in the wild has sometimes made me feel frustrated and concerned that not enough is being done for them. I felt this most strongly about the Tasmanian devil. I've always been passionate about them and I wanted to know more. With some research, I found a place where I could go to study and learn how to help these curious creatures.

My new place of learning was in Tasmania at a wildlife park called Trowunna. This facility operates the Devil Education and Research Centre where they offer a variety of courses. The one that most interested me was called "Tasmanian Devil and Dasyurid Captive Management". The more I read about it, the more I wanted to go. I booked my flights (first time on a plane!) and went to Tasmania.

Upon arriving at Trowunna, I couldn't believe how pretty and how different it was. I was more than amazed at the beautiful landscape. I met other Tassie devil enthusiasts from different Australian zoos, who were also doing the course. The managing director of the park and our teacher for the week, Androo Kelly, and his staff were very nice and made me feel welcome.

The first day, we toured the park to look at all the different animals. Most of them were devils, which I was really excited about. Among the devils I saw many orphans and hand raised young. For five days we had discussions with various staff members and experts in the field. We learned a huge amount of information about wild and captive devils; such as what they eat, how they socialise, behaviours and breeding.

Along with a bit of theory, we also did a lot outside hands-on practical work. This included handling of devils: learning how to pick them up, how to judge their behaviours and how to ensure that they were healthy.

Tasmanian devils are truly fascinating. Not everyone always understands them; they are often seen as vicious and mindless. My week certainly gave me a greater understanding of their true nature.

The Tassie devil was first given a scientific name, "*Dipelphis ursine*", by George Harris, a naturalist in 1807. He thought they were a type of possum. It was renamed again in 1838. Three years later it was again changed by French botanist and geologist Pierre Boitard to its current name, *Sarcophilus Harisii* . This name literally means 'Harris's flesh lover'. Tasmanian devils are part of a group which is called the Dasyuridae, a family of marsupials. In this family there are many small mouse-like animals, but the quoll and the devil are the largest species. In fact, the Tasmanian devil is the largest carnivore of all the marsupials.

Libbie learning how to hold a larger male devil

At one time, the Tasmanian devil was widespread over the whole of Australia. Many people believe the arrival of the dingo 3,500 years ago quickly resulted in the devil's extinction on the mainland through competition for food. The Ice Age, 12,000 years ago, prevented the dingoes from entering Tasmania so the devils were able to live as the largest predator on the island.

One of the other little known facts I learned at Trowunna was that devils include vegetation in their diet. They are foragers and eat what they can find. They will eat a whole carcase of an animal and everything inside the stomach, which often includes vegetation. A Tasmanian devil can eat up to 40 percent of their own body weight.

The Tasmanian devil is a nocturnal hunter. If they were all-black, they would completely stand out against the night sky. The white markings around the chest, flank and the base of the tail makes it much harder for predators of the devils to determine the true shape of their prey.

The devils can make many sounds that sound strange when you first hear them. I was lucky enough to hear several of these different noises. Some are just to let other devils know that they are around. Others can be fierce and loud, as if to say 'go away, I don't want you here'. Some noises are quiet: if you talk back to them in a quiet voice, they realise it's okay and will allow you in their space.

Tassie devils live alone but eat socially. One of the coolest things for me was becoming part of the Tasmanian devil's social group when they were feeding. I

Looking around

would take a piece of meat and go into their enclosure. As curious animals and social eaters, they would approach me. I'd get a good grip on the meat and we would have a game of tug-o-war. This "game" is a normal part of their eating rituals. It was a special experience to be part of their group.

Over the week I found out that it isn't only the tumours that are harming the devils but also land clearance, poison baiting, dog attacks and traffic that impact on their population. Some research suggests that two to three percent of the total Tasmanian devil population is killed on roads. I think that it is important that these issues are not forgotten in the battle to beat the facial tumors. It will be no use saving the devils if they don't have secure places to live.

A lot of people want to know what is being done to help reduce the devil facial tumour disease (DFTD). There is no easy answer, as 38 different scientists are currently studying the Tasmanian devils and all of them have a different opinion. What is known is that the disease is spread when devils fight and break their skin. Since DFTD was first discovered in 1996, the total population has decreased by 70 percent. If no cure is found and things continue on as they are, Tassie devils may become extinct by 2035.

There is some research into changing chromosome structures of modern Tassie devils in an effort to cure DFTD. It seems that there have been some genetic changes from their original ancestors 15,000 years ago. These changes, along with low genetic diversity, have made the devils very vulnerable to DFTD. The tumours develop and progress completely differently to other tumours. Research has also discovered that there are three slightly different strains of the tumour. This may change how DFTD is studied: not as something that is fixed but as something that is changing. I hope this research can lead to a way to help the devils overcome this disease before it is too late.

At the National Zoo and Aquarium in Canberra, we have some older devils that are no longer part of the breeding program. There are several multi-million dollar breeding facilities in Australia. However, there are important roles to play after these breeding programs. The Tasmanian devils at our zoo would class as a Senescence group, where post breeders would come for their retirement. I feel that it is also important for there to be places where the older devils and devils who won't become breeders can have a happy life.

Libbie having a social interaction at feeding time

My experience at Trowunna has given me a greater understanding and respect for Tassie devils. A lot of people don't see the beauty within these animals or how sweet they can be. When you work alongside an animal, you gain their trust. With this trust, they respect you. I hope to continue to build this trust with not only Tasmanian devils but with all animals.

I feel very privileged to have studied at Trowunna. I will have memories for a lifetime.

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New South Wales wetlands

home to myriad wildlife

Office of Environment and Heritage New South Wales

Wetlands are home to many different types of mammals, birds, frogs, fish, reptiles and plants. In New South Wales, wetlands cover about 4.5 million hectares or six percent of the State and wildlife is found in a range of wetlands, including lakes, lagoons, estuaries, rivers, floodplains, swamps, bogs, billabongs and seagrass beds. Animals and plants live in wet and dry floodplain wetlands such as the Macquarie Marshes, coastal wetlands such as Myall Lakes, hanging swamps in the Blue Mountains, and sphagnum bogs in the Snowy Mountains. They are even found in Lake Pinaroo, an intermittently flooded lake in Sturt National Park, in the hot and dry north west corner of the State.

The breeding of many animals is tied to the regular, natural flooding of wetlands. For example, colonial nesting waterbirds require large floods to support regular breeding. Migratory waterbirds also use a range of wetlands to breed, rest and feed during their annual long journeys.

Many wetlands in inland New South Wales can be dry for 10 years or longer, before being inundated after heavy rainfall and staying wet for several years, allowing wetland plants and animals to regenerate and reproduce. For example, regular large flooding events in floodplain forests are needed for river red gums (*Eucalyptus camaldulensis*) to reproduce. The floods need to be two to three years apart so the river red gum seedlings become established. Flooding also replenishes underground water sources used by river red gum forests.

During droughts in inland New South Wales, coastal wetlands offer refuge for many waterbirds and provide nurseries for many types of fish. Hanging swamps and upland swamps are used by rare animals such as the Blue Mountains water skink (*Eulamprus leuraensis*) and corroboree frogs (*Pseudophryne* spp.) in the Snowy Mountains.

Frogs

Frogs and wetlands seem to go hand in hand. When wetlands flood from rainfall or river flows, frogs start calling and breeding; and when the volume of croaking increases, we know frogs are celebrating.

Although all frogs need some water to live and breed, not all frogs are found in wetlands. Of the 71 frogs known from New South Wales, 47 species depend on wetlands, and another 14 species occur in rivers. Common wetland frogs include the striped marsh frog (*Limnodynastes peronii*), spotted grass frog (*Limnodynastes tasmaniensis*), green tree frog (*Litoria caerulea*), and red-eyed green tree frog (*Litoria chloris*). Eighteen species of wetland and river frogs – a quarter of all frogs in New South Wales – are threatened, including the southern corroboree frog (*Pseudophryne*

Above: River red gum, Peery Lake. Photo: Neal Foster, OEH

corroboree) and the green and golden bell frog (*Litoria aurea*).

Most wetland frogs have limited tolerance for drying. In inland wetlands in New South Wales, where water can be scarce for years or suddenly abundant, frogs depend on the flooding of wetlands to breed successfully.

Birds

Wetlands provide a variety of habitats and food sources for birds to live and reproduce. Many waterbirds move regularly to newly flooded habitats to feed and/or breed before a wetland dries down. Some semi-permanent, permanent and coastal wetlands can provide refuge for species when wetlands in other regions are dry for long periods. Many species depend on particular wetlands for refuelling and resting during their long migrations between wetlands in New South Wales and other parts of Australia or other countries.

Inland wetlands also provide important habitat for waterbird species, and at least 34 species depend on wetlands in the Murray-Darling Basin for breeding. Wetlands in the Murray-Darling Basin, such as the Macquarie Marshes, are also important for colonial nesting waterbirds, including ibis, herons, cormorants and spoonbills, and regularly support more than 20,000 waterbirds and more than 500,000 during large floods.

Some waterbird species, for example, glossy ibis, freckled duck and blue-billed duck, are thought to breed almost entirely within wetlands in the Murray-Darling Basin. During large floods, the internationally significant Macquarie Marshes and Narran Lakes support some of the largest breeding colonies of straw-necked ibis, intermediate egret and rufous night heron in southern Australia.

Fish

Fish rely on wetlands for breeding, feeding or shelter. Many species of marine fish rely on coastal wetlands to breed and nurture their young before returning to the open ocean. Inland rivers and wetlands in New South Wales support iconic fish such as the Murray cod (*Maccullochella peelii*).

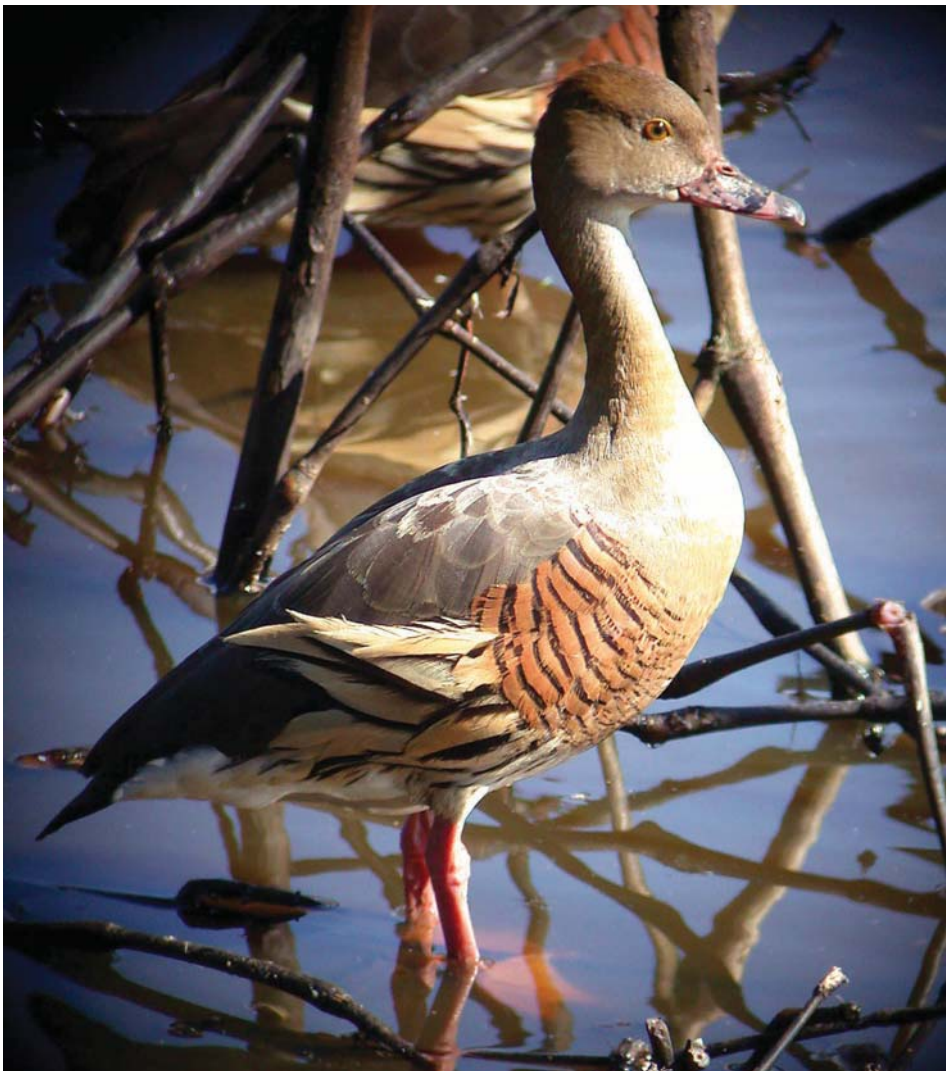
In New South Wales, freshwater rivers and wetlands are home to 49

Alpine tree frog. Photo: Dave Hunter

Southern corroboree frog, Kosciuszko National Park. Photo: Dave Hunter

Southern bell frog. Photo: Sascha Healy, OEH

Egret chicks in Macquarie Marshes. Photo and copyright: Thomas Rayner



Plumed whistling duck. Photo: Chris Herbert

species of native fish ranging from carp gudgeons (*Hypseleotris spp.*), which are about five centimetres long, to the iconic Murray cod (*Maccullochella peelii*), which can grow up to 1.8 metres in length and weigh up to 114 kilograms. Fish species that regularly inhabit freshwater wetlands in New South Wales include carp gudgeons (*Hypseleotris* spp.), golden perch (*Macquaria ambigua*), bony bream (*Nematalosa erebi*), Murray Darling rainbowfish (*Melanotaenia fluviatalis*) and unspecked hardyhead (*Craterocephalus fulvus*).

Mammals

Although visitors to a New South Wales wetland might not expect to see furred animals living in the water, there are at least nine species of mammal that rely wholly or partly on New South Wales wetlands. Some mammals, such as the platypus (*Ornithorhynchus anatinus*), live in wetlands because they are adapted to the wet conditions and there is a plentiful supply of their preferred foods.

The platypus (*Ornithorhynchus anatinus*) is well adapted for a semi-aquatic lifestyle. Its streamlined body and a broad, flat tail are covered

with dense waterproof fur, which provides excellent thermal insulation. It depends on rivers, streams and bodies of freshwater, and feeds in both slow-moving and rapid (riffle) parts of streams, but prefers coarser bottom substrates, particularly cobbles and gravel.

The fishing bat (*Myotis macropus*), also known as the southern Myotis or large-footed Myotis, lives in tree hollows, caves, mines, culverts and under bridges, often close to water. It catches its prey by raking its claws across the surface of the water as it flies.

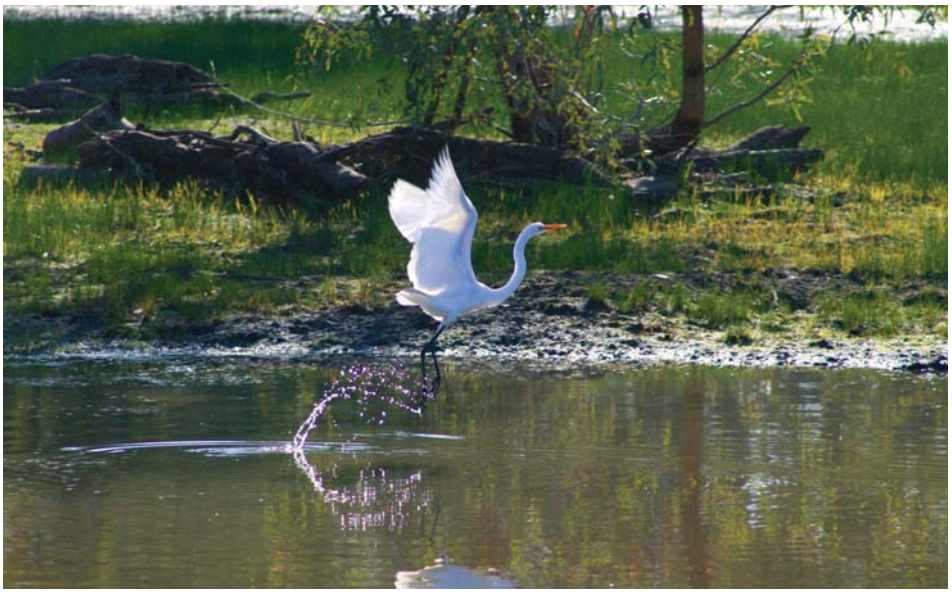
Other mammals living around wetlands include the swamp rat *(Rattus lutreolus)* yellow-footed antechinus (*Antechinus flavipes*), common planigale *(Planigale maculate),* common blossom bat, (*Syconycteris australis*), eastern chestnut mouse (*Pseudomys gracilicaudatus*), and pale field rat (*Rattus tunneyi*).

Reptiles

Many reptiles depend on New South Wales wetlands. Some reptiles such as freshwater turtles live in wetlands for much of their life cycle, while others such as water skinks and snakes rely on wetlands some of the time and spend the rest of their lives on dry land, usually quite close to streams or open water.

New South Wales wetlands support five species of water skink, including the endangered Blue Mountains water skink (*Eulamprus leuraensis*), three freshwater turtles, six snakes, and the eastern water dragon. Other water skinks found living in or close to wetlands include the alpine water skink (*Eulamprus kosciuskoi*), the eastern water skink (*Eulamprus quoyii*), the southern water skink (*Eulamprus tympanum*), and the aptly named swamp water skink .

Some of Australia's more dangerous snakes live very close to wetlands and water bodies. The keelback or freshwater snake (*Tropidonophis mairii*) is semi-aquatic and invariably found in close proximity to streams, swamps and lagoons. Other snakes that spend a lot of time close to wetlands and water include the well-known red-bellied black snake, the Australian copperhead, the highly



Egret in flight, Yanga National Park. Photo: Paul Childs, OEH

Yellow spoonbill chicks, Narran Lake. Photo: Peter Terrill, OEH

Murray cod rescue, Blackwater event in Edward River

Juvenile platypus discovered on a busy street in Dubbo. Saved by National Parks and Wildlife staff and released into the Macquarie River at Dubbo. Photo: M Bannerman

Fishing bat. Image and copyright: Stewart Macdonald

venomous eastern tiger snake (found in a range of habitats, including river floodplains), the blue-bellied black snake, and the rough-scaled snake.

Freshwater turtles found in New South Wales wetlands are the eastern long-necked turtle (*Chelodina longicollis*), broad-shelled river turtle (found in rivers of the Murray-Darling Basin) and the Murray turtle (*Elusor macrurus*) (found in rivers of the Murray-Darling Basin and associated drainages west of the Great Dividing Range).

Plants

Many wetlands have distinctive plants which are adapted to the wetting and drying cycles of wetlands. The types of plants found in a wetland depend on:

- whether a wetland has mostly fresh, saline or brackish water
- surface and underground drainage
- frequency of inundation
- other factors such as soil, temperature, rainfall and topography.

River red gums, black box and coolibah trees, shrubs such as lignum and rushes such as cumbungi and *Juncus* thrive in many inland wetlands.

Eastern long-necked turtle. Photo: Rosie Nicolai, OEH

Rushes and club-rushes dominate large areas of some wetlands such as the Gwydir Wetlands, which have fewer trees and shrubs.

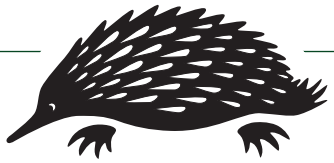
Trees such as swamp mahogany, swamp paperbark and swamp she-oak, and shrubs like the swamp banksia, tea-trees, hakeas and ferns, dominate many coastal wetlands. Wetlands also feature distinctive grasses such as common reed and water couch, sedges, spike-rushes, aquatic macrophytes (eg ribbon weed and *Ruppia*), herbs and forbs (eg nardoo and wavy marshwort), algae and mosses.

Saltmarshes feature plants adapted to more saline conditions such as pigface (*Carpobrotus* species). Marine wetlands such as those at Towra Point and Myall Lakes are dominated by seagrasses such as *Zostera*, *Posidonia* and *Halophila*.

Visit environment.nsw.gov.au/wetlands/wetlandplantsAnimals.htm to find out more about wildlife in wetlands.

Wavy marshwort. Photo: Tim Hosking, OEH

Membership Form



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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 MEDWAY AM
President

More images from Bimblebox

Ian's favourite Bimblebox flower 'lovely for a day then lost for a year'. Photo: Sonya Duus

The red-tailed black-cockatoo is dependent on old trees, primarily eucalypts, in which they build their nests. Rampant land clearing is depriving them (and many other hollow-dependent species) of homes. Photo: www.ataglance.com.au