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POWERFUL PREDATORS AND PASSIONATE PARENTS - THE LIFE CYCLE OF A WEDGE-TAILED EAGLE

Simon Cherriman

"The wedge-tailed eagle soars aloft, a king on outstretched wings" – how could it be said any better? This is a line from a poem my father wrote for me several years ago, and these words will never cease to be fresh in my thoughts. They immediately paint a characteristic image of Australia's largest bird of prey, the wedge-tailed eagle (*Aquila audax*). This 'bold eagle,' or so its scientific name implies ('*audax*' from the word 'audacious', meaning bold) is actually very shy and wary of humans and is usually observed soaring hundreds of metres above the earth on majestic, upswept wings. It is rare indeed to find a 'wedgie' that will stand its ground and appear bold to the observer, even during nesting.

With a wingspan of nearly 2.5 m and an average weight of 3.5 kg, the wedge-tailed eagle is the fourth largest eagle in the world. Apart from the little eagle (*Hieraaetus morphnoides)*, the wedge-tail is the only 'true' eagle species found in Australia, possessing long legs that are fully feathered to the toes. It is easily identified by its size, large diamond-shaped tail and obvious primary feathers that give its wingtips a 'fingered' appearance. Like many other raptors, wedgies have different colour morphs depending on their age. Immature birds are generally golden in colour, and progressively darken with age to achieve the almost entirely black appearance of mature adults, which also possess a golden wing-band and chestnut nape (neck) feathers.

Although timid in the presence of people, the wedge-tailed eagle is an amazing flyer, and it definitely inspires feelings of charisma and majesty when an observer is lucky enough to witness its full capabilities in the sky. During the breeding season, eagle pairs can be observed soaring for hours together and playing courtship games hundreds of metres above the ground. In an act that displays the eagle's true skill in the air, the male will often perform dives known as 'pothooks', where he plummets earthward with wings folded, before opening his wings slightly and climbing swiftly upward to reach a stall, which initiates another dive. As well as impressing his mate, these dives are also performed at the boundaries of the eagle's territory to advertise its occupancy to other eagles.

The size of a wedgie's territory varies according to

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Greetings all!

People often ask the question "Where does *Land for Wildlife* operate?", so we have inserted into this edition a couple of maps, produced by Claire Hall, showing the general location of *LFW* properties and the shires each *LFW* Officer is responsible for. As you can see, the 1,634 *Land for Wildlifers* who are currently registered are spread right across the south-west of WA. But maybe there are people in your area who haven't yet heard of the service *LFW* offers? If you would like extra copies of the maps to distribute, please email Claire and she will send you a pdf version. You might also like extra copies of other *LFW* publications, to pass on to friends and neighbours; if so, please contact the Editor.

On the facing page we highlight a number of people connected with *Land for Wildlife* who have won, or reached the finals of, state or national awards. Isn't it wonderful to be able to talk about good news and highlight all the excellent people there are in the community! Congratulations to everyone, including all the unsung heroes who haven't been nominated for an award (yet!) but are certainly doing a superb job managing their properties and aiming towards long-term ecological and economic sustainability.

This issue of *Western Wildlife* contains a fascinating report on wedge-tailed eagles compiled as part of obtaining an Honours Degree by Simon Cherriman, who used mountain climbing gear to get up very tall trees and perched for days at a time pretending to be a branch, while he observed, and filmed, birds on the nest. He has put some of the best footage onto a DVD (another massive learning curve in itself, he says) which he is selling to defray costs. It is an attractive and informative product.

This issue also contains more stories about fauna in the garden from *LFWers* who live in the wetter southwest – gorgeous photos! But wildlife is also found in inland areas, waterbirds being one example in this issue. All gardens can be magnets for small birds no matter where they are – how about sending in some photos of birds nesting among creepers on the verandah, for example?

On a more formal note, most of us have felt irritated at one time or another because a plant we thought we could identify has changed its name. "What did they do that for?" we rant. Well, some of you may already be aware that all dryandras are now to be called banksias ... Kevin Thiele, Curator of the WA Herbarium, explains why it has been done – read his article to get an understanding of the science behind name changes.

Have a good winter season.

Penny Hussey

EDITORIAL

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Short notes in *Western Wildlife* are often based on the main conclusions of papers published in scientific journals, with the full reference given at the end of the note. If you find it difficult to access the source reference, contact the Editor for a photocopy to be sent to you.

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Congratulations!

to all the inspiring people, individuals and groups, with whom *Land for Wildlife* is associated, whose superb efforts have recently been recognised by nomination for an award.

to Coral Turley, winner of the Western Australian Weeds Committee Invasive Plants Award (Individual). Coral is part of the Esperance Weeds Action Group but she has been a full-time volunteer and fount of knowledge about local plants for many, many years. Her wealth of knowledge and willingness to share it with others is an inspiration to all.

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to Glenice Batchelor, winner of the Department of Agriculture and Food Landcare Professional Award. Part of a farming family in Tammin and Kellerberrin, Glenice has been professionally involved in Landcare since 2000 and is especially interested in saltland management, being currently the Chair of the Saltland Pastures Association.

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to Wallatin Wildlife and Landcare Inc, winner of the Landcare Carbonsmart Nature Conservation Award. As the Upper Wallatin Creek Catchment Group (Kellerberrin Shire), they first started overall planning at the landscape scale, including nature conservation, in 1984, working with CSIRO. They have continued to build on their achievements over the years, including monitoring and evaluating actions undertaken. A truly impressive body of work.

Also reaching the finals of their award categories at the State Landcare Conference were:

Manypeaks Primary School in the Westpac Landcare Education Award.

John Pate in the Landcare Carbonsmart Nature Conservation Award.

Penny Hussey in the Department of Agriculture and Food Landcare Professional Award.

Baldivis Children's Forest in the ALCOA Landcare Community Group Award.

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to Manypeaks Primary School, winner of the United Nations Environment Award, Educators Category. The award was presented in Melbourne on June 6th. Excellent work by a small school.

to Ric and Jan Wuttrich of 'Acacia Gardens and Games', Esperance, who were awarded the Most Improved Tourist Attraction in WA from the Tourism Council of WA. There was never a goal of making a tourist attraction, in Jan's words "it just sort of evolved that way". When they received the award back in February it was a complete surprise.

Now that Ric and Jan have shown that it is possible to incorporate games and gardens discreetly into a natural bush setting using organic practices and principles, they would like to further the venture by trying to become more informative. This is integral to the next goal of using the property as a field-based interactive learning area that will hopefully be utilised by the local schools for nature-based education.

Anyone visiting Esperance who wants to have a relaxing cuppa in the gardens surrounded by the trees, frogs and birds feel free to Contact Ric or Jan on 9071 3002 or e-mail: ayejaysprings@bigpond.com.

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to *Land for Wildlife* Officer, Sheila Howat, who won the National EMS of the Year Award (Small Business Category) at the Environmental Management Systems Association Forum in Newcastle, N.S.W.

Sheila and her husband Sean incorporate tourist accommodation, eco-tourism, biodiversity conservation and wildlife rescue and rehabilitation on their forest property at Bridgetown. The Association's President, Genevieve Carruthers, congratulated Sheila on "an innovative EMS that uses a 'whole of business' approach, that by focusing on a variety of natural resource management issues, has implemented practices that not only reduce the impact on the local environment, but actually enhance it".

Sheila began developing her EMS in 2005 and was certified with the Blackwood Basin Group's BestFarms EMS programme this year.

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Wedge-tailed eagle

food supply, landforms and human disturbance, but it is generally 30 - 50 sq km in area. Most territories in south-west WA are centralised in valley systems and contain large expanses of uncleared bushland, as well as open areas that are suitable for hunting. A massive nest of branches, often more than 2 m deep, is built in a large tree with a commanding view over the surrounding landscape. Several nests normally exist in one territory. Sometimes one nest is favoured, and other times nests are used in rotation. Little is known about why wedge-tailed eagles have several nests and what makes them choose the one they breed in each year, but it is probably related to proximity to abundant food resources.

The female eagle usually lays two eggs on a bed of fresh green (often eucalypt) leaves placed in the middle of the chosen nest, and these are incubated mostly by her for about 45 days. When they hatch, the tiny eaglets are covered in natal down that appears white and fluffy, just like a baby chicken! Initially they cannot see very well, and are brooded constantly by their parents in their first few weeks of life high in the eyrie. The young chicks are vulnerable in the early stages of development, and during this time it is common for one to kill its weaker sibling. Although cruel, this is nature's way of ensuring the strongest bird survives and its genes are passed on to represent the next generation.

Adult wedge-tailed eagles are very dedicated parents, and are kept busy providing their developing young with fresh food regularly. The male eagle does most of the hunting, especially while the chick is very young, and the female spends much time brooding. Often, after having brought a partially consumed fresh kill to a perch near the nest, the male will brood the chick while the female leaves the nest and has her share of the feed. Although they are extremely powerful killers, wedge-tailed eagles are amazingly gentle when at the nest and show great care as they feed their chicks. It is indeed a fascinating experience to see a predator show these rare signs of tenderness!

A young eagle develops very rapidly. At about three weeks of age it has grown a lot in size but is still covered in white down. At six weeks, the eaglet is very alert shuffling around the nest, has many feather pins emerging (especially on the wings), and is beginning to learn how to stand. By ten weeks of age, a well developed covering of golden feathers has emerged, and the eaglet exercises its new wings frequently each day. During the last few weeks before fledging, the adult eagles spend much time away from the nest, and their youngster will sometimes emit continuous 'sir, yeee-sir, yeee-sir, yeee-sir' squeals as it impatiently waits to be tended to. This call increases in intensity when an

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Wedge-tailed eagle

adult is nearby and becomes very loud and demanding if one lands on the nest – behaviour much like a toddler having a tantrum! After about 90 days of transformation from a tiny, white eaglet, the powerful, immature eagle is ready to make its first flight.

Being at the top of the food chain, wedge-tailed eagles don't really have any predators (except humans). Conversely, though, there is a huge variety of animals that they eat themselves. Wedgies are mostly suited to hunting small to medium-sized mammals, so in general their diet includes bandicoots, bettongs, young kangaroos and wallabies, as well as introduced species like rabbits. However, they are extremely adaptable predators eating whatever is most readily available, and sometimes feed on foxes, feral cats, piglets, birds like ravens, ducks, cockatoos, parrots, pigeons and even emu chicks, and reptiles including bobtail skinks and monitor lizards. They have also been known to cooperatively hunt adult kangaroos. Carrion is probably an important part of eagle food for breeding pairs during the non-breeding season, and all year round for non-breeding sub-adults. The increasing number of road-killed animals, particularly in country areas, has no doubt provided an extra food source for some eagles, however it is unknown how these 'artificial' meals affect eagle reproduction and the population size overall.

The most common and effective method used to determine what eagles eat is to collect the remains of prey animals from their nest. In the Perth region, I carried out a university honours project on eagle diet from 2004 to 2006. This research involved visiting the nests of several breeding pairs to collect the remains of prey, such as

bones, fur and feathers, which had accumulated during each breeding season. These were carefully sorted, and identified by comparing the remains, for example bones, with reference material, for example skeletons from the WA Museum, to determine the species to which they belonged. Using this information, together with data from analysing regurgitated pellets also collected from eagle nests, and observations of feeding events at nests, a list of the numbers of different types of prey animals eaten during the three breeding seasons was compiled*.

Thirty-seven species of vertebrate were identified as eagle prey in the Perth region. This further highlights the adaptability of the wedge-tailed eagle to eat a wide variety of animals. Some of the species listed (for example magpie larks and rainbow lorikeets) are quite small, and it is interesting that eagles invest the energy to capture something that would appear to be of very little reward. Also, many of the native marsupials are nocturnal, which indicates that eagles are capable of hunting in semi-darkness, or working together to flush prey from its hiding place and capture it during daylight.

Wedgies were once persecuted for being supposed sheep killers and thousands were shot through the 1900s when bounties were offered for their scalps. In most cases, the eagles were eating sheep that had died of other causes, so they are not a major threat to farmers. Research into their diet and the general shift in attitude towards conservation, means wedgies today are respected and seen as valuable assets to our unique country.

* For list of prey items recorded in this study, and of references, contact the Editor by email.

Simon Cherriman has completed an Honours Degree in Environmental Biology at Curtin University and is working as a field zoologist. He can be contacted by email: aquilla84@iinet.net.au or mobile: 0422 916 747 Photos: Author.

Note:

'A King on Outstretched Wings': a documentary about the wedge-tailed eagle in the Perth region.

a DVD by Simon Cherriman
Running time: 30 mins approx.
Cost: $20 per copy
Order by email:
aquila84@iinet.net.au

FLORA

DRYANDRAS ARE BANKSIAS!

Kevin Thiele

The Western Australian Herbarium has recently changed the names of all species of *Dryandra* to an equivalent name in *Banksia*, to reflect a taxonomic change in which the two genera have been merged into one. This change is an important one that affects many people in Western Australia. It is also controversial, both among taxonomists and the wider community. The purpose of this article is to briefly explain the reasons why taxonomists change names from time to time, and the specific reasons behind the merging of *Dryandra* and *Banksia*.

Why do taxonomists keep changing the names?

Names of plants and animals are changed from time to time for two main reasons. Firstly, the naming of organisms is governed by a set of internationally agreed rules (the International Code of Botanical Nomenclature in the case of plants), and sometimes it is found that a name in current use breaks the rules and needs to be changed to conform with them.

Secondly, names are used to indicate relationships between organisms. The name of a species such as *Banksia coccinea* carries within it the name of the genus to which the species is considered to belong (in this case, *Banksia*). If a taxonomist can demonstrate that a species actually belongs in a different genus from the one it is currently placed in, then the name must change to reflect its new classification.

This is the case with *Dryandra*. Two botanists, Kevin Thiele from the Western Australian Herbarium and Austin Mast from the University of Florida, recently published a paper with strong evidence that dryandras are actually a subgroup of *Banksia* rather than a genus in their own right. This new understanding of the relationships between the two groups has been accepted by all Australian herbaria. The change of the names is a reflection of this new understanding.

Why do we now believe that dryandras are actually banksias?

In the past, botanists have believed that banksias and dryandras are two separate but closely related branches of the tree of life, with one branch containing all the *Banksia* species and an adjacent branch containing all the *Dryandra* species (Figure 1).

However, the evidence presented by Mast and Thiele strongly supports a different relationship, in which the dryandras are an offshoot of the *Banksia* branch (Figure 2). This new understanding was gained particularly by studying genetic sequences of species in both genera, supported by studies of their morphology and anatomy. It also used a relatively new technique called phylogenetic analysis, which is believed to be able to accurately reconstruct the way in which species evolve and the branching patterns of the evolutionary tree of life.

In this new understanding, dryandras are seen as specialised banksias. The ancestor of the whole group was a banksia (perhaps similar to the *Banksia*

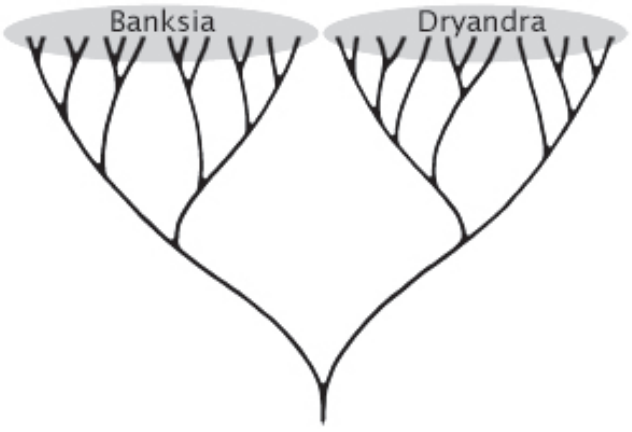

Figure 1. The traditional understanding of the evolutionary relationship between Banksia *and* Dryandra. *Each 'twig' on the evolutionary tree represents a species. Note that the figure is schematic only, and does not represent actual species.*

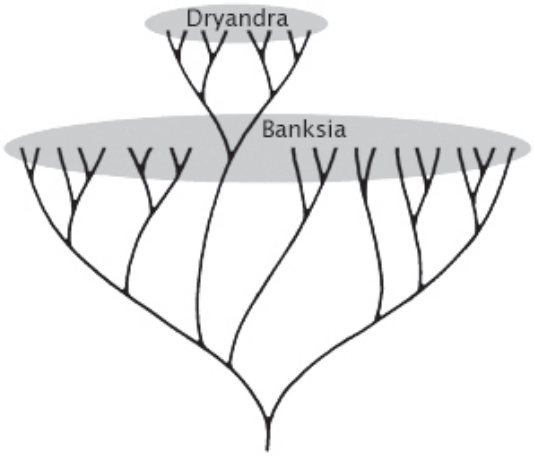

Figure 2. The new understanding of the relationship between Banksia *and* Dryandra*, with the dryandra branch as an evolutionarily specialised offshoot of the* Banksia *tree.*

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Banksias

fossils that have been found in the Kennedy Range). For part or perhaps most of the evolution of the group, all new species were typical banksias. Then at some point in evolution, one species of banksia evolved a strikingly new form and became the first dryandra. This new form appears to have been a very successful experiment, as it rapidly evolved into a wide range of species.

Incidentally, our new understanding of the relationships in the two genera provides a simple explanation of their distributions. Banksias are widespread in Australia, but dryandras are much more restricted, occuring only in south-western Western Australia. Figure 2 helps us understand this – the early evolution of banksias occurred before the deserts of the Nullarbor and central Australia had formed, so many groups of *Banksia* occur on both sides of the continent. But the first dryandra evolved from its banksia ancestor in Western Australia after the south-west was isolated by increasing aridity, and none of its ancestors managed to cross the deserts.

When botanists first studied our flora they were tricked by the strikingly different forms of the two groups into believing, intuitively, that all the banksias were closely related and all the dryandras were related separately. In this case, intuition appears to have led to a false understanding, which the new knowledge has corrected.

OK, but why do we need to change all the names?

It is widely accepted that the names of organisms should reflect their evolutionary relationships. Species in a genus are understood to be all closely related, and to be all more distantly related to species in a different genus.

For this reason, when we believed that banksias and dryandras had evolved and were related in the manner of Figure 1, it was reasonable to name their species in two different genera. However, if Figure 2 is correct (and we have good evidence that it is), then maintaining the two genera would result in the serious anomaly that some *Banksia* species (such as those on the left hand side of Figure 2) would be evolutionarily more closely related to *Dryandra* species than to other *Banksia* species (such as those on the right hand side).

Botanists believe that naming organisms in a way that doesn't reflect their evolutionary relationships inhibits our understanding and the growth of knowledge. It is for this reason that a consensus of botanists have decided that if dryandras are evolutionarily specialised banksias, then they should be named as such, rather than having a separate genus that doesn't reflect this pattern.

So how should we call dryandras now?

Scientific names are meant to reflect scientific knowledge, and for this reason the scientific names of all dryandras have been changed to a *Banksia* name. In most cases, the new name carries the same species epithet as in the old (e.g. *Dryandra sessilis* has become *Banksia sessilis*). In some cases, however, the dryandra name is already used in *Banksia*, so the species epithet has been changed according to the rules of the botanical code. Thus, *Dryandra hirsuta* has become *Banksia hirta*, and *Dryandra longifolia* has become *Banksia prolata*. These changes, while unavoidable, are relatively few.

In all publications or discussions that use scientific names, the Western Australian Herbarium will be using the new names rather than the old. Common names, however, reflect more general understandings and can be more loosely applied. The dryandras occupy a clearly recognisable branch in the *Banksia* evolutionary tree. Members of this branch can still be called "dryandras" in a vernacular sense. Note that to reduce confusion a lowercase "d" and roman type is used in this article to refer to dryandras in this vernacular sense, but uppercase and italics are used when referring to a scientific name such as *Banksia sessilis*. In addition, many dryandra common names will undoubtedly persist for many years, and this is perfectly appropriate.

In conclusion

Taxonomists don't change names on a whim or in order to sow confusion, but as a way of growing our knowledge and keeping taxonomy up-to-date with the latest scientific thinking and understanding. While we recognise that changing names causes difficulty and frustration in the short term, we believe that carefully considered change is appropriate when new knowledge brings new understanding of the relationships of species. A proper naming system that reflects evolutionary understanding brings benefits to everyone in the long term through clearer understanding and through opening new avenues of research. We believe that these benefits outweigh the short-term costs of the change.

Kevin Thiele is Curator of the WA Herbarium. Contact him by email: kevin.thiele@dec.wa.gov.au

FAUNA

NESTWATCH PROJECT: THE OBLONG TURTLE

Elaine Lewis, Catherine Baudains and Caroline Mansfield

Herdsman Lake has a large population of oblong turtles (long-necked tortoise, *Chelodina oblonga*) but recently local residents have noted that they seem to be decreasing in numbers. Why? The lake is surrounded by busy roads, could it be an increase in roadkills? Or is something affecting nesting success, predators perhaps, or weeds making it difficult to dig burrows? The 'Nestwatch Project' was set up to investigate some possibilities. It ran from March 2006 to February 2008 and produced some worrying results.

Oblong turtles are semi-aquatic freshwater turtles that may live for many decades. They are carnivorous, eating water bugs, tadpoles, small fish, crustaceans, ducklings and even carrion. Oblong turtles are at the top of the under-water food chain and provide a meaningful indicator of environmental quality. Their well-being can be viewed as a means of monitoring changes to the aquatic ecosystem since all members of this ecosystem are interdependent.

Juvenile oblong turtles may take over two decades to reach sexual maturity and adult size. Females are larger than males and are mature when the carapace length is over 17 cm. They mate in winter and spring when the daily maximum temperatures remain above 17.5°C and rain is expected. Females will travel from several to 500 m to find suitable nesting sites.

Open, comparatively flat sunny sites that are above the high water mark, with little vegetation except for native grasses, are preferred. Furthermore, they prefer to make nests at a structural edge, such as the interface between sand and a log or sand and low grass. Evidence suggests that the density of one of the edges may maintain a micro-climate with added moisture, which has been found to be important for the developing embryo, in that hatchlings are larger in moister environments.

A hatchling oblong turtle. (Photo: E. Lewis)

Female turtles leave the water in spring and summer to lay their eggs. The first wave of females leaving the water occurs in the September/November period, frequently in the first week of October and another wave in December/January. They lay 25-40 eggs per year and it has been observed that larger females lay larger and heavier eggs than smaller females. The eggs incubate for 200-230 days, although the maximum incubation time recorded was 291 days.

It appears that varying conditions at the different lakes in the Perth metropolitan area result in a range of hatchling emergence times. In a study of the oblong turtle at the Blue Gum, Booragoon and Piney Lakes in the City of Melville, hatchlings started appearing in May, but have been found as late as November/December. At Thompson and Bonganup Lakes in the City of Cockburn, there is evidence that the young usually emerge about mid-August, with slight variations depending on seasonal conditions, irrespective of whether the eggs were laid in the spring or summer nesting period.

The Nestwatch Project consisted of three main phases: site identification, weed control and monitoring the site and surrounds. The site was selected by the DEC Regional Parks Officer responsible for the region. It was located on the north-eastern side of Herdsman Lake in a comparatively flat, open, rectangular (50 m x 25 m) area about 30 m from the water. Grass weed species dominated the site.

Weed control at the site was important because the dense weed cover prevented female turtles from readily accessing their preferred nesting ground. In addition, weeds at a nesting site have been found to confuse hatchlings, causing disorientation and preventing their safe return to the water. The first spraying of the grass weeds was undertaken in October 2006 and re-spraying occurred periodically, determined by the amount of weed re-growth.

Throughout the project the site and surrounds were monitored weekly. At the start of the project there was dense growth of grass weeds at the site and no evidence of turtle nests. The spraying of the weeds exposed the ground and this appeared to facilitate nesting activity by the turtles.

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FAUNA

Oblong turtles

A nest that has been dug out (predated). (Photo: E. Lewis)

Predated eggs. The dark smear on the shell is blood. (Photo: E. Lewis)

The trial site was used for nesting by oblong turtles some time during the September 2006 – January 2007 nesting period. Site visits in May and June 2007 showed that 20 nests had been dug out by predators. These predated nests were located in open sandy soil and at structural edges. During the September 2007 – January 2008 nesting period another 11 predated turtle nests were found, making a total of 31 predated nests observed at the trial site during the project.

A characteristic shape to the predated nests was observed: the holes had a steep back and a shallow slope down at the front. This shape suggested they were dug by paws. However no predators were observed at or near the site during the day or on night visits.

A wide range of birds and other animals have been reported predating turtles and their eggs and hatchlings. Introduced predators, particularly the fox, have been found to kill turtles and destroy eggs. However, the species of the predator (or predators) that destroyed the turtle eggs at the trial site was not determined.

No turtle hatchlings, or evidence of hatchlings, were observed at the trial site at any stage during the project. However, between June and September 2007, nine live hatchlings and one dead hatchling were observed in the surrounding area. This hatching period appears to support the evidence mentioned previously, that different environments in the various wetlands of the Perth metropolitan area result in a wide range of hatching times for the oblong turtle.

What could be done to protect the nests from predation? Should they have physical protection, a metal gate, for example? Discussions with the land manager (DEC) are exploring what might be possible. Further study is also required to determine the identity of the predator/s to enable targeted management action.

Can you help? Do you visit Herdsman Lake? Could you please note any turtle sightings in the study area and let Elaine know? She can be contacted through email on: 19105349@student.murdoch.edu.au. DEC staff at the Community and Regional Parks Branch can be contacted on 9431 6500.

Many thanks to DEC staff for supporting the project.

Elaine Lewis is a doctoral candidate at Murdoch University, investigating aspects of Education for Sustainability. Catherine Baudains and Caroline Mansfield lecture at Murdoch University.

WILDFLOWER SOCIETY OF WA

BUSHLAND PLANT SURVEY PROGRAMME

This popular programme is on again - this year it will be surveying three sites: on the Swan Coastal Plain, the Dandaragan Plateau and at Bush Hereitage's 'Charles Darwin Reserve' between Wubin and Paynes Find. You do not have to be an expert to take part, as all volunteers receive training on plant survey techniques.

To find out more about the programme, including what has been achieved in the past 20 years, contact:

Vanda Longman on 9385 9469
email: longman@internode.on.net

FAUNA

WINGS OF CHANGE - WHAT THE BIRDS ARE TELLING US

Nic Dunlop

Throughout human history birds have provided information to people about the state of their shared environment. Birds have long told traditional hunter gathers and agrarian societies about the passage and productivity of seasons, the coming of rain and the location of resources such as food plants or fish.

Bridled terns over Penguin Island.

Although as western urban societies we have somewhat distanced ourselves from the lore of birds, they have nevertheless warned us of impending disaster such as the ecological and health impacts of the organochlorine pesticides in the 1960s. Recently, and closer to home, the sudden death of over 9,000 nectar-feeding birds raised the alarm about the very serious threat to human health in Esperance caused by fugitive lead carbonate dust from ship-loading operations. Had it not been for a set of coincidences that triggered this spectacular response, the lead contamination would have remained undetected and unreported for many more months, with very serious health implications for that community. Birds in the Esperance area are now being used in a structured way to monitor the long-term persistence and impact of lead and nickel contamination in a project called 'Bush Canaries' – recalling the role of caged birds in warning underground coal miners about dangerous levels of monoxide gas.

Visit almost any of our small offshore islands off the south-west coast during the summer holidays and you will find the early morning sky alive with clouds of dark bridled terns. You don't need a particularly long memory to know that has not always been the case.

The bridled tern is a tropical, pelagic species more usually associated with islands with coral reefs, *Pisonia* trees and coconuts than our offshore environment. During the colonial period in Western Australia this species was recorded breeding as far south as the Houtman Abrolhos Islands. By the 1920s it was established in small breeding colonies on the small rocks around Rottnest and in Shoalwater Bay and by the late 1950s it had reached the islands off Cape Leeuwin. Until recently the most extreme breeding locality was on some stacks near Pt D'Entrecasteaux on the western south coast. However this summer a substantial colony was documented on Investigator Island, just west of the Recherche Archipelago, that probably started in the mid 1990s. Colonisation of the Recherche will probably proceed through the next few decades.

Not only have many new bridled tern colonies been founded south, and now east, of the Abrolhos Islands but observers have recorded much infilling of the conquered domain and the steady growth of established colonies such as North Fishermen near Green Head, Lancelin Island and at the Rottnest colonies. The bridled tern colony on Penguin Island near Rockingham has grown from an estimated 400 pairs in 1982 to approximately 4,000 pairs in 2007.

The trends observed in the bridled tern might be dismissed as the result of a genetic or ecological shift operating on one species. However, parallel changes have been observed in the region south of the Houtman Abrolhos in a suite of tropical pelagic seabird species. These include common noddies and sooty terns which colonised Lancelin Island during the 1990s. Lancelin Island is 150 km north of Perth and nearly 300 km south of their original limit at the Abrolhos. Both species have been prospecting Penguin Island 45 km south of Perth in recent years. Populations of red-tailed tropicbird,

continued on page 11

FAUNA

continued from page 10

Wings of change

Common noddies at Lancelin Island

A common noddy pair at Lancelin Island

wedge-tailed shearwater, roseate tern and crested tern are also showing comparable shifts in distribution and / or abundance. So what we are witnessing is not a species-specific phenomenon but a sea-change, a shift in the normal distribution of prey resources for pelagic (offshore) feeding seabird species of tropical origin.

Two factors, both of which are associated with anthropogenic global warming, appear to be involved. One is the increasing frequency of the *El Nino* which causes major breeding failures in these species at the Abrolhos and further north but, curiously, not at the frontier colonies south of the Abrolhos. The second is a background rise in sea temperature off the central-west and south-western Australia coasts of approaching 1° C that has occurred over the last 30 years. This is one of the highest regional rises in ocean temperature recorded and would assist some tropical seabird prey species to disperse southwards.

It has become apparent that the responses of our tropical seabirds are portents of a changing ocean climate, a warning that our marine biodiversity and fisheries are threatened by climate change and that, like the seabirds, we will have to find ways to adjust.

The climate change signals in Western Australia are not however restricted to marine birds. A recent paper in *Austral Ornithology (Emu)* by Bureau of Meteorology scientist Lynda Chambers, reports on the analysis of bush bird and waterfowl records from Middlesex Field Study Centre near Manjimup*. The founders of this conservation property, Dick and Molly Brown, recorded the presence of birds in a 2 ha area near their homestead every day for 27 years between 1973 and 2000. This period coincided with a decline in rainfall and increase in minimum temperatures in their region and over most of south-western Australia. Dr Chambers found that amongst the migratory species nine of 19 had significantly changed their arrival times, seven of 17 species had altered departure times and eight of 17 were present for a different length of time each season. Much remains to be discovered about how our bush birds are responding to climate change and the implications for our biodiversity and the management of land for wildlife.

* L. Chambers. 2008. Trends in timing of migration of south-western Australian birds and their relationship to climate. *Emu* 108(1) 1-14

Dr Nic Dunlop is Biodiversity Conservation Officer based at the Conservation Council of WA. He can be contacted on: nic.dunlop@conservationwa.asn.au . All photos by Nic Dunlop.

The 'Bush Canary' project near Esperance Port.

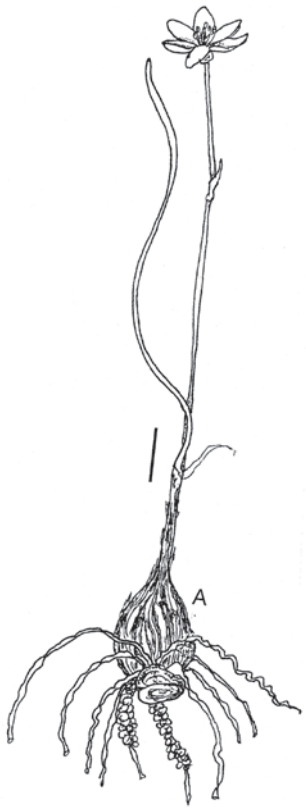
FLORA and FUNGI

TINY STARS

Penny Hussey

To dogged bush regenerators trying to cope with an increasing tide of weeds, it sometimes seems as if everything with a corm or bulb must be introduced. But there are some native perennials with tubers, rhizomes, bulbs or corms, though they are not as prolific as Cape tulips or watsonias. Orchids are one such group, but there are many others, mostly inconspicuous except when in flower.

In winter and spring across the south-west, look for a flash of brilliant, shiny butter-yellow which advertises the flower of a graceful, delicate, tiny star, *Hypoxis* sp. They grow from corms and have slender stems and narrow leaves with solitary starry flowers, usually having either four or six perianth segments. Only occasionally, in favourable sites and excellent seasons, will they grow taller than 10 cm. Where to look for them? – well, everywhere that has an intact ground layer flora! Look in woodlands, limestone cliffs, granite swards or the damp margins of lakes (salt or fresh), as long as that low layer has not been swamped by weeds or eroded by disturbance. There are several south-west species, and a new one has just been reported*.



Hypoxis salina. *Scale bar = 5mm*

Hypoxis salina was discovered during the wheatbelt biological survey. It grows on seasonally-wet sandy soils within natural saline areas, among thickets of *Melaleuca thyoides* (saltbuster, possibly the most salt-tolerant of all the melaleucas) but the tiny star probably relies on fresh water from rainfall. It can grow to 4 cm tall, but is often shorter. It flowers in spring. The flowers are small, less than 1 cm across, but obvious when open because of their bright yellow colour. Currently it is only known from the Lake Chinocup area, but it may be more widespread. Look for it this spring on natural salt lake systems near you (and please report back to your local herbarium or *LFW* Officer if you think you have found it).

Hypoxis is in the family Hypoxidaceae, a part of the larger lily group, Liliaceae. The family is quite widespread, occurring in America, Africa and East Asia as well as Australasia. *Hypoxis* itself occurs in South America, Africa, southern Asia, Australia and New Zealand. There are five species in the south-west of WA (all endemic) with another species in the Kimberley. There is also another genus in the Kimberley, *Curculigo*, also with starry yellow flowers. The corms of *C. ensifolia* are valued as bush tucker.

There are other genera with yellow lily-type flowers in the south-west, including weeds, but they are all more robust than tiny stars and so are unlikely to be confused with them.

* Lyons, M.N. and G.J. Keighery. 2007. A new species of *Hypoxis* (Hypoxidaceae) from saline wetland margins in Western Australia. *Nuytsia* **16**: 317-320.

NEW FUNGI WEBSITE LAUNCHED

The new Perth Urban Bushland Fungi (PUBF) website was launched on May 15. The website is an upgraded version of the one that had been operating for several years previously.

PUBF works with community groups to collect data on fungi and build inventories of fungi for Perth bushlands. It increases community skills and knowledge of fungi via surveys, workshops, walks and presentations, and contributes to the reference collection of fungi at the WA Herbarium.

Fungi are critically important to healthy ecosystems being part of the three F's – Fauna, Flora, and FUNGI! The website is a valuable resource for identifying fungi, accessing reports on fungi surveys from bushland in the Perth metropolitan area, and information on forthcoming events.

There are a number of free downloads including A3 posters, and a field book which has colour photos and descriptions of fungi you would expect to see in the Perth region. By printing the A5 sized pages and inserting them into plastic document protectors in a 2-ring binder you can create a very handy field guide.

As many fungi species are common throughout south-west WA, the information on the website will be useful in areas outside the Perth metropolitan area.

The website address is www.fungiperth.org.au.

Claire Hall

FAUNA

WANTED - Information about Western Ringtail Possums in the Greater Albany area

The western ringtail possum is suffering a dramatic decline in parts of its range throughout the south-west of WA. The population occurring along the South Coast around Albany may be a stronghold for the species, but information about this population is lacking.

We need YOUR HELP to increase our knowledge of the distribution and habitat preferences of this important population. This information is vital in aiding its management and conservation.

The area specifically of interest includes from Torbay to the west, Millbrook to the north to Cheynes beach to the east, including the central Albany city area, but information from further afield would also be welcome.

If you have, or have had in the recent past, ringtail possums on your property or if you have recently sighted them anywhere within this area (alive or dead) please contact DEC on 9842 4500 or email Sandra Gilfillan at sandragilf@yahoo.com.au with any details (if possible include dates, specific locations, and any other useful information like observed feeding or nesting trees).

TAMMAR AND BLACK-GLOVED WALLABIES

"UNDER THE SPOTLIGHT"

The tammar and black-gloved (or brush) wallabies are "under the spotlight" in the Gondwana Link area between the Fitzgerald River and the Stirling Range National Parks. Non-invasive techniques of spotlighting and remote sensing cameras are being used to gather information on the distribution, abundance and habitat use of these animals. Information from the wallaby research will be used to guide management and restoration efforts in the area.

The black-gloved wallaby can be readily seen with a spotlight, often standing still in the light, however tammars are more elusive, rarely moving far from cover. Footprints and scats can be used to give an indication of the presence of the wallabies, but identification by this method can prove difficult. If you have either of these species on your property or if you suspect that you have and would like more information about how to detect them please contact Sandra Gilfillan, the Gondwana Link / Greening Australia Wallaby Project Officer, on 98425237 or email sandragilf@yahoo.com.au.

Bush detective

It is a lizard trap in the 'set' position. When Aboriginal people still lived as nomadic hunters and gatherers, dragon lizards were a tasty snack. But, as anyone who has observed them will know, they run very fast, and so are hard to catch. On granites they escape from predators by running beneath a slightly raised slab of rock where they are out of reach of a raptor's claws, or a human's spear point. So the human hunters created a raised slab balanced on a smaller piece. As soon as a lizard is chased beneath it, the small stone would be pulled out and – crunch! Dragon for lunch!

Why is there a small bit of rock wedged under this slab?

MEMBERS' PAGE

PYGMY POSSUMS SAVED

Leonie and Gerald Gowland rescued a family of pygmy possums (*Cercartetus concinnus*) early in 2007.

Gerald was surprised to find a nest on top of the dog's box, under some trees. Fascinated by the babies and their unlikely home, he kept a discrete watch for several days. Gerald was aware that there was a boobook nearby that posed a threat to the babies, then one day, the mother was not there.

After waiting long enough to be sure that she was not going to return, Gerald and Leonie contacted a neighbour and gathered up the babies for hand rearing. The babies were too small to be hand fed and were provided with small dishes - this meant that they were constantly covered in food and were washed

every two days to keep them clean.

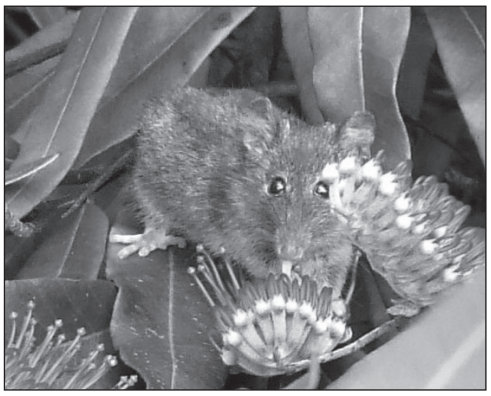
The day finally came when they were large enough to be released and they were brought back to the original nest site from where they eventually moved on. Leonie and Gerald have not seen them again, but are philosophical about it, after all, they are very small.

The experience was a heart-warming event for the Gowlands who love their bushland home near Albany. They have taken lots of photographs and made a video of the release.

Dorothy Redreau

Ready to leave! (Photos: Leonie Gowland)

HONEY POSSUMS GALORE!



Noeline Goodsell had an abundance of honey possums (*Tarsipes rostratus*) last spring at her property 'Valley of the Giants Ecopark'.

There were honey possums galore to be seen feasting on the abundance of nectar provided by the flowering grevilleas. The event lasted for about 12 weeks. Noeline says that there has been a general increase in local fauna since DEC began fox and cat baiting under the *Western Shield* program in the 'Giants Forest' on the northern boundary of the property.

It was a very exciting time to be able to get so close to these extraordinary animals. "Many people took the photos of a lifetime and the possums seemed to be lapping up the attention along with the plentiful supply of nectar from the blossoms," Noeline said.

These delicate little marsupials are unique in the fact that they are the only mammals, apart from some bats, that feed only on nectar and pollen. Found only in the southern parts of WA, they are mouse sized and have a long snout and a long brush-tipped tongue, long monkey-like prehensile tail and a striped back. Nocturnal in hot weather, on cooler days they can be seen busily darting from one blossom to another. *Dorothy Redreau*

Photos: Noeline Goodsell

FAUNA

ECOSYSTEM ENGINEERING BY BOODIES AND BILBIES

Organisms that create, modify or destroy structure within the physical environment are called 'ecosystem engineers'. They can modify the environment in many ways, including by altering water flows, nutrient levels, seed capture and habitat quality and may also increase species richness, diversity and productivity by creating patches of habitat differing in resource availability, thus enabling organisms with different resource requirements to co-exist. Digging for breeding burrows or to find food is one of the most important of these engineering activities, especially in Australia's arid zone woodlands and shrublands. Many studies have shown that the pits dug by animals seeking food create 'fertile patches' where seeds and nutrients collect. These patches provide enhanced germination and establishment sites in areas where resources are limited.

At the time of European settlement there were many native animals that disturbed the inland soil in search of food, including dalgytes (bilbies), boodies, woylies, bandicoots, numbats, echidnas and goannas, but changes eliminated many of them from the mainland. The introduced rabbit moved into the vacant niche. A recent study* looked at whether the rabbit is as effective an ecosystem engineer as the native animals it replaced.

The study was conducted at Arid Recovery, an 86 sq km feral animal-proof exclosure in northern South Australia. In one area the bilby (*Macrotis lagotis*) and the burrowing bettong or boodie (*Bettongia lesueur*) have been reintroduced, and Gould's goanna (*Varanus gouldii*) still exists. Another part of the exclusion-fenced area has goannas but not the other two, while outside the fence are

Dalgyte foraging digging at Dryandra Woodland. (Photo: Wanda Robinson)

control sites with rabbits, goannas – and of course foxes and feral cats. This study did not look at burrows, only at the shallow pits made by the four animals while feeding. Bilbies and boodies are omnivorous and dig for seeds, invertebrates, bulbs and fungi, while goannas are carnivorous and dig for invertebrates and small reptiles. Rabbits are herbivorous and dig for bulbs and roots.

The results were clear, the foraging pits constructed by all four animals contained more litter and seeds, and more useable carbon, than the intervening soils – that is, they create fertile patches. But the four ecosystem engineers were not equally effective. Bilbies and boodies dug about four times as many pits and moved five-to eight-times more soil than rabbits – this is even without factoring in that there were 40% fewer of these animals than there were rabbits. Interestingly, goannas made more diggings when they were with the native mammals than when they were on their own, whilst outside the reserve they only excavated one-third the amount of soil, in the last case possibly because of the effect of predators.

So what does this tell us? Firstly, that the native mammals played a vital role in creating fertile patches and so maintaining the ecosystem health of the arid zone. The surviving goannas and the introduced rabbits have not successfully taken over this function. (Note also that the rabbit's beneficial effect on patch creation is greatly outweighed by its devastating impact on plant growth and survival.) Thus the reintroduction of bilbies and boodies will have positive and unique effects on the restoration of fertile microsites in arid Australia.

To enable these animals to survive outside their expensive fenced exclosures, and so bring their beneficial actions to other patches of remnant bushland, we must all do as much fox and feral cat control as we possibly can!

* James AI and DJ Eldridge. 2007. Reintroduction of fossorial native mammals and potential impacts on ecosystem processes in an Australian desert landscape. *Biological Conservation* **138**: 351-359

Did you know ...?

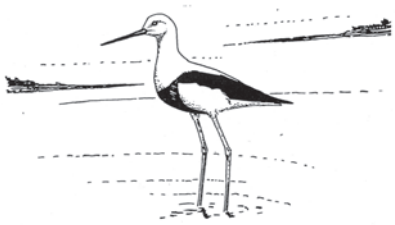
that plants are invaluable in reducing noise pollution? Trees can cut noise levels by as much as 75%, and a 30 m strip of trees can absorb six to eight decibels. Revegetation along roadsides is not just about preventing erosion, minimising cross-winds, utilising excess runoff, providing habitat for fauna, and looking attractive – it also cuts down traffic noise!

FAUNA

SHOREBIRDS - OBSERVERS NEEDED

Bill Rutherford

Black-fronted plover



Banded stilt

December 2007 saw the launch of the 'Shorebird 2020' programme by Birds Australia in partnership with WWF Australia and the Australian Wildlife Conservancy. It is a continuation of the long running national shorebird population monitoring scheme which is one of the longest running shorebird monitoring schemes in the southern hemisphere and among its many achievements boasts continuous records from Tasmania dating back to the 1960s. As such it forms the national database for many decisions relating to the protection of wetlands and the Environment Protection and Biodiversity Conservation Act.

But before we go further – what are 'shorebirds'? They used to be called 'waders' and they are seen feeding around the edges of coastal beaches and shorelines, estuaries and mudflats, or inland lakes, lagoons and dams. Birds such as plovers, curlews, sandpipers, stints, stilts, avocets, oystercatchers, dotterels and others – but not gulls, terns or ducks – fit in this category. Many of them undertake extraordinary migratory journeys.

Shorebird research in south-west WA

Many questions relating to shorebirds in Australia are still to be answered and we here in WA are ideally suited to deliver some of the answers. One of the great unknowns of shorebird ecology in Australia is the role the lakes of the arid interior and wheat growing regions, both salt and fresh, can play in the annual life cycles of both migratory and non migratory species.

Observations from the Peel-Yalgorup system suggest that many of the sharp-tailed sandpipers that use the Ramsar site as their non-breeding home during the austral summer, move away when summer rains occur inland in the wheatbelt and beyond. This is also true of many of our resident species such as the black fronted dotterel, black-winged stilt and red-capped plover.

Observers based in the inland areas are uniquely placed to answer this question and indeed a group of intrepid observers based in the Katanning area has recently discovered small concentrations of migratory shorebirds on the lake systems of the inland Great Southern region.

Other big picture questions that need to be answered with shorebirds in the southern half of WA relate primarily to the conservation of their muddy land and estuarine habitats on the Swan Coastal Plain and estuaries on the south coast.

Recently one long-standing question relating to the movements and site use over time of the south-west's most important shorebird site, the Peel-Yalgorup Ramsar site, has been answered. Until this year shorebird experts have not been able to say with any certainty where the many thousands of migratory shorebirds that use the Lake McLarty part of the Peel-Yalgorup system go after this freshwater wetland dries out usually, in early February. Some birds move back onto the Peel Inlet using Austin Bay and the Yunderup mudlands for feeding, but not all of them. Where the rest went was poorly understood. This situation changed recently with the third sighting of a leg-flagged shorebird, this time a curlew sandpiper (the previous two being red-necked stints that had been banded and flagged in December 2007 during the 'Shorebird 2020' workshop). These sightings not only help with the conservation of these birds in the south-west but also highlight the role community and volunteer groups can play.

About 'Shorebirds 2020'

The main goal of the 'Shorebird 2020' project is to "continue, and where possible improve, the existing shorebird population monitoring scheme" and as such offers a great opportunity for people to help with this highly important national monitoring scheme. The primary objectives of the program are to collect data on the numbers of shorebirds in a manner that can be utilised to aid their conservation and management, specifically long and short-term population trends, and explore what may be causing those changes. Further, the project will seek to understand the relationship between habitat quality and threats to the distribution and abundance of shorebirds.

How you can help - shorebird monitoring volunteers needed

We want to hear from anyone with an interest in shorebirds and

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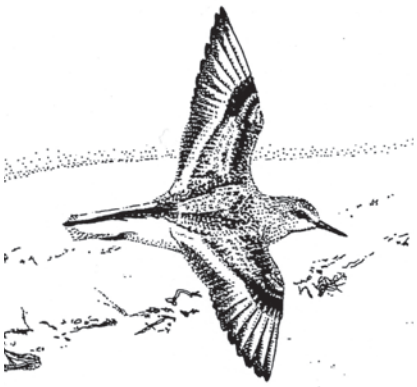
Shorebirds



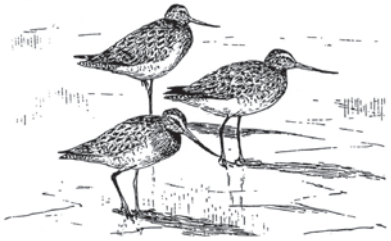
Sanderling

shorebird conservation, or who would like to learn more about these amazing birds. In particular we are looking for volunteers to assist with biannual national population monitoring counts at sites throughout Australia. People with limited shorebird experience need not feel daunted as we will be supporting volunteers with a shorebird identification toolkit, workshops and regional mentors.

We especially need help at Albany, Kalbarri, wheatbelt reserves and Vasse-Wonnerup.

To register your interest and learn more about this exciting project, please contact Jo Oldland or Rob Clemens at Birds Australia national office on (03) 9347 0757, or Bill Rutherford at Birds Australia WA on (08) 9383 7749.

Bill Rutherford is WA Shorebird Conservation Coordinator at Birds Australia WA. Illustrations from "The Atlas of Australian Birds".



Bar-tailed godwits

FAUNA

CARNABY'S COCKATOO RELEASE

Cocky away! (Photo: Rick Dawson)

As a volunteer with the Black Cockatoo Rehabilitation Centre (BCRC), I had the privilege, early in May, to be involved in the release of 21 Carnaby's cockatoos at Yanchep National Park.

It was a special day, with perfect weather, lovely surroundings, and a good turnout of spectators including members from the Perth Zoo, DEC staff, and volunteers from the BCRC, all of whom were involved in the actual release of the birds from their carriers.

This was the largest release of rehabilitated black cockatoos ever undertaken in WA. In the past 12 years 90 Carnaby's cockatoos have been released in small groups of up to 13, but this is the largest flock to go at one time. The rehabilitation and release of these endangered birds are important parts of the recovery plan for the species.

The number of white-tailed black cockatoos has declined in the past 50 years, due to a loss of habitat and a low rate of reproduction, which averages only 0.6 chicks per breeding pair per year. This species (Carnaby's) is endemic to the south-west of WA and individuals have a lifespan of between 25 and 50 years.

The BCRC is a dedicated small group of volunteers who work closely with DEC and the Perth Zoo specialising in the care of sick, injured and orphaned red-tailed and white-tailed black cockatoos. For info contact Glenn: 0417 988 872.

Zara Kivell

Did you know .....?

... that dog excreta contains significant amounts of nitrogen and phosphorous? Figures from CSIRO suggest around 2 kg of nitrogen and 1kg of phosphorous are contributed to the landscape per household per year by dogs in the Perth Hills. Nutrient contributions from this source into your bushland will depend on the area and the number of dogs, but it is a significant external nutrient input to be considered.

Wayne van Lieven, City of Gosnells

IN BRIEF

DOES POPULATION SIZE AFFECT TREE SEED?

A recent paper* studied the quality and quantity of seed produced by salmon gum (*Eucalyptus salmonophloia*) and gimlet (*E. salubris*) from small and larger populations in the western part of their range. The authors found that seed quality and seedling vigour and survival to one year were independent of population size or fragmentation for both species, but that gimlets produced fewer seeds per capsule on trees in small populations. They infer that because these trees are pollinated by birds capable of travelling considerable distances, the populations are still genetically linked.

Current wisdom says that when collecting seed for revegetation, it is best to source from a large population to avoid in-breeding effects. This study found no evidence to support this for these species, but warned that over-harvesting from a small area could have an impact on recruitment and so long-term persistence of that population.

* Krauss SL, Hernamutz L, Hopper SD and DJ Coates. 2007. Population-size effects on seeds and seedlings from fragmented eucalypt populations: implications for seed sourcing for ecological restoration. *Aust. J. Botany.* **55**, 390-399.

RARE PLANT SURVIVAL – ALLOCATION OF HUMAN EFFORT

Are you interested in banksias? A recent paper* summarises 25 years of study and provides lots of interesting facts about these fascinating plants.

For example, there are several prostrate banksia species, and one of the rarest is *Banksia goodii*, which occurs in the Albany hinterland. It is an attractive ground cover with large rusty-brown flower heads. It is a resprouter, and produces very few seeds, especially when in small populations – no seeds have been found at all if the population has eight or less plants. It is suggested that its conservation status would be improved by having fewer, larger populations rather than several small populations (many of which will only persist until the present plants die) with the same overall number of plants. So, are we wasting resources trying to keep all the populations, including the smaller ones, going? Read the whole paper for more thought-provoking insights.

* Lamont BB, Enright NJ, Witkowski ETF and J Groenveld. 2007. Conservation biology of banksias: insights from natural history to simulation modeling. *Aust. J. Botany*. **55**: 280-292.

SOMEONE'S PET IN YOUR BUSHLAND?

Many people in our society keep pets, most commonly cats and dogs. These animals give pleasure and companionship to their owners, but may be a source of irritation to neighbours. While a relatively simple fence will contain a dog within a specified area of a property, it is much more difficult to contain cats. In urban and peri-urban areas, domestic cats may include several properties within their territory.

Cats are efficient hunters and this ability may cause disputes between neighbours, one of whom has a cat and one who does not. While many Local Government authorities may have by-laws concerning cats, nowhere is an individual landholder authorised to harm an animal that clearly has an owner, for example if it is wearing a collar and identification tag. If you do have a problem with a neighbour's cat, please talk to the Shire Ranger, and to the neighbour. Perhaps you can persuade them to attach a couple of bells to the collar, or even accustom the cat to being kept in at night.

BLACKBERRY CONTROL

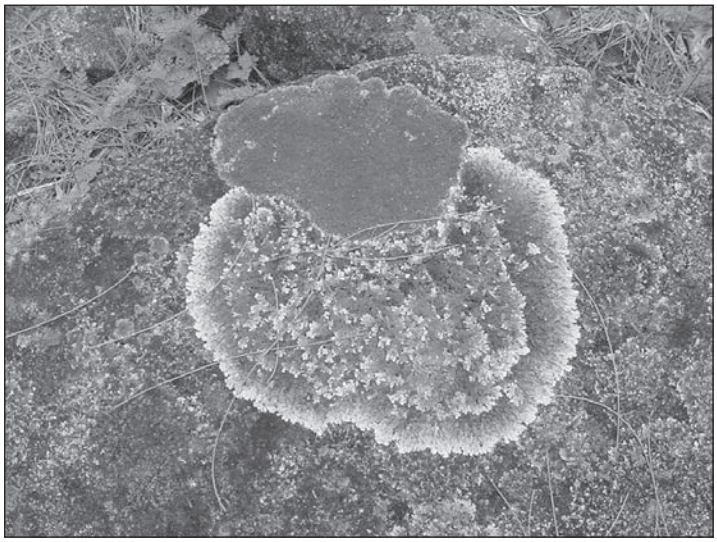
This last summer, a lot of work has been done to create a blackberry-free corridor between Australind and Darkan. The aim is to separate the American species (*Rubus laudatus*) which occurs in the Perth region, from the European species (*R. anglocandicans*) that occurs in the south-west. A rust has been imported as a biological control agent and is being used successfully against the European species which is susceptible to it, but the American species is not; so it is important to separate the two populations lest they interbreed and the resistant gene gets passed on. Further control and monitoring of regrowth will continue for the rest of this year. If you live in that general area and would like to know more about the project, contact Andrew Reeves, Weed Officer, DAFWA, on areeves@agric.wa.gov.au .

In the Perth area, the Helena River Catchment Group obtained funds from the Swan ALCOA Landcare Program to control weeds, including blackberry, along part of the lower Helena River. The operation was planned for three years of action, in the following sequence: Year 1, Oct/Nov, spray (metasulphuron); year 2, burn, May – date determined by rains, respray Sept/Oct (glyphosate); year 3, spot spray, opportunistic (glyphosate). The weed control has been extremely successful. If you would like more details, or to view the site, contact the Editor.

IN BRIEF

COMPETITION IS A FACT OF LIFE - ALL LIFE!

All living things compete for resources, and the strongest, or the fiercest, or the best organised, wins. To us a granite boulder may not seem a very desirable site for a residence, but it is ideal for some lichens. This boulder is smothered in lichens, there are at least four species in this photo, but the big greeny-grey one in the centre, a *Xanthoparmelia*, is growing fast – you can see it spreading out in rings. It is growing over the top of two other species of brownish-grey *Xanthoparmeli*a that cover most of the rock. Clearly the winner in this competition! But look what is happening where it meets the chocolate-coloured *Rhinodina* at the top of the boulder – this one is defending its space very successfully. It looks as though this lichen has created some sort of chemical barrier that is preventing it being overgrown.



Lichens are fascinating organisms, and a whole new area of biodiversity about which we know little. While they are themselves a symbiosis of a fungus and an alga, they also have parasitic fungi that live on them! Sometimes they kill the lichen, sometimes they co-exist. In this year's Fungal Foray, look for delicate fungi among the lichens.

Thank you to Graeme Rundle for the photo and Ray Cranfield (DEC Manjimup) for the lichen information.

Did you know ...? *native grasses and fire*

that the first year after fire in many WA woodlands, including banksia and wandoo, the native annual speargrass *Austrostipa compressa* often dominates the understorey so that it becomes a golden yellow grassland? In subsequent years there are very few of these plants – only on disturbed track edges, for example. But because you can't see it, doesn't mean the plant isn't there! It is still present in the soil seed bank, just waiting for the right stimulus to grow again. A study of the Yule Brook Botany Reserve in 1998* found that up to 119 viable seeds per square metre were still present more than 45 years after the last fire-stimulated germination event!

On Gooseberry Hill in Kalamunda, it has been observed that little grassbirds will come in to nest in those years when the annual speargrass is dominant.

So take care, after a fire, that you don't attack this grass as a weed!

* Smith MA, Bell DT and WA Lonergan. 1999. Comparative seed germination ecology of *Austrostipa compressa* and *Ehrharta calycina* (Poaceae) in a Western Australian banksia woodland. *Aust. J. Ecology* **24**: 35-42.

COMING EVENTS

Global Geotourism Conference

17-20 August 2008

Esplanade Hotel, Fremantle

An exploration of the role of geological features in the global tourism industry. Hosted by FACET. Costly, but very high profile speakers.

For more information see:

www.promaco.com.au/2008/geotm

Local Wildflower Shows

Learn more about local plants – visit a wildflower show!

Mullewa 24 – 31 Aug
Mt Barker 1 Sept – 30 Nov
Ravensthorpe 6 – 20 Sept
Esperance 10 – 13 Sept
Wubin 11 – 14 Sept
Ongerup 15 Sept – 5 Oct
Busselton 18 – 19 Sept
Chittering 18 – 21 Sept
Albany 24 – 27 Sept
Kojonup 26 Sept – 1 Oct
Cranbrook 27 Sept – 5 Oct

For details visit the Wildflower Society website:

http://www.ozemail.com.au/~wildflowers

BIRDS STAR ON RADIO

In Britain, the Birdsong Channel on digital radio plays birdsong originally recorded in a Wiltshire country garden in 1991. Playing 24 hours a day, it regularly attracts 500,000 listeners a week who say that they "find it very relaxing", "it takes us away from our everyday existence", and "it reminds you that there's more to life than human beings".

Claire Hall

IN BRIEF

LISTEN TO THE BIRDS

Did you know that the first published recording of birdsong was a Nightingale in 1910?

The sound of birdsong has inspired poets and songwriters and has given immense enjoyment to many people. As far as the birds are concerned, song is their way of communicating with each other. In the absence of visual contact, song enables the birds to communicate through dense vegetation and over long distances. This often creates a problem for us as we peer into the trees or fumble with binoculars trying to catch a glimpse of the elusive bird that won't sit still.

Help is at hand to identify birdsong through the large amount of information, including sound and video clips, available on the internet simply by googling "birdsong".

Whilst the information available specifically on Australian birds is not as extensive as for other continents, the Birds Australia WA website www.birdswa.com.au/bookshop lists CDs, audio tapes and video tapes available for purchase. The "Australian Bird Calls: South-western" CD contains calls of 79 bird species.

It seems that there could be a potential niche for some keen sound recordists to record their local birds. The BBC Nature website www.bbc.co.uk/nature/programmes/radio/dawn_chorus includes advice about how to make sound recordings. You can use a recording device as simple as a video camcorder set on picture and sound, or sound only.

Remember Sir David Attenborough's *Life of Birds* program? You can watch and listen to the Superb Lyrebird do his camera, car alarm and chainsaw impersonations by searching for "video lyrebird" on www.video.google.com. An amazing performance!

Claire Hall

Illustration: Louise Burch

This newsletter is a compendium of articles written by many different people. The views expressed are those of the authors, not necessarily those of the Department of Environment and Conservation.
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