



Restoration of the Jimaringle and Cockran Creek System

Wildlife & Water

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INTRODUCTION

The Jimaringle and Cockran Creek system is an important regional asset. It has many social, ecological and economic values. This ephemeral creek-line and floodplain system spans about 50 kilometres from east to west, including some 130 kilometres of winding waterway. The system is located approximately 60 kilometres west of Deniliquin in the Wakool Region.

There is an increasing amount of effort being invested by farmers, government and the community as a whole, into restoring the ecological values of these two significant creeks. An initiative of the Wakool Land and Water Management Plan (LWMP), this targeted wildlife survey and ecological assessment of the system had three main aims:

- 1.To assess the distribution, habitat and local status of wildlife (birds, mammals, reptiles and frogs) to determine key areas for conservation and direct future management.
- 2.Develop a strategy for delivering water to the creeks to maximise environmental and biodiversity outcomes.
- 3.To raise awareness about wildlife ecology and promote conservation of the remaining species.

The Wakool Land and Water Management Plan (LWMP) area is known to be immensely valuable to wildlife. The 2005-2006 Wakool LWMP Wildlife Survey yielded many significant species like the Platypus, Southern Bell Frog, Carpet Python and Freckled Duck, and the strong attendance at field days and seminars demonstrated the high level of interest that local people have in their wildlife.

These creeks have changed dramatically over the last 150 years. Much of the bush surrounding the creeks has been cleared and converted into intensive agricultural systems. Many native species, both plants and animals, have disappeared, whilst a number of new exotic pests have entered the region.

Much of the Jimaringle and parts of the Cockran are now affected by salinity, with water tables less than 50 centimetres below the surface in some places. Many of the older River Red Gums along the Jimaringle Creek have died as a result of this and of the living trees that remain many are further stressed by the prolonged drought and a general decline in flooding associated with our changing climate and a reduction in drainage from irrigation areas.

There are also potential issues with acid sulfate soils, where sulfidic sediments that have been inundated for extended periods become exposed to the air and produce sulfuric acid and other toxins, which when re-wetted can be flushed into the water, killing vegetation and fauna.

The changes that have occurred along the Jimaringle and Cockran Creeks and in the surrounding landscape have resulted in a very different fauna community. The first settlers of the region, like the Ellis and Martin families, would have encountered mammals such as the White-footed Rabbit Rat and Eastern Hare Wallaby, which now form part of Australia’s list of extinct mammals,



Parts of the Jimaringle Creek are severely degraded and in urgent need of restoration.

The Spot-tailed Quoll, also known as the Tiger Quoll or Native Cat was found by Gordon Ellis in the 1940s near the Jimaringle-Cockran Creek junction. This intriguing carnivorous marsupial has now almost completely disappeared from the inland plains and is largely restricted to the vast remnant forests of the Great Dividing Range and Tasmania.



the longest such list in modern times of any country in the world. Numerous other species have declined dramatically, are on the brink of local extinction and will disappear without concerted affects to restore wildlife habitat. On the other hand, some species have benefited greatly. Populations of open-country and “edge” species like the Sulphur-crested Cockatoo, Galah, Red-rumped Parrot, Noisy Miner, Eastern Brown Snake and Eastern Grey Kangaroo have increased substantially.

Fortunately, many sections of the Jimaringle and Cockran Creeks are still in a reasonable enough condition to have potential to return to their former glory. Many of the trees are still in good condition, and there are still good swards of native grasses and patches of shrubs. Salinity mitigation projects seem to be reducing the impacts of the rising water table and most importantly, there is a strong commitment from local landholders to protect and improve the condition of these creeks.



Parts of the Jimaringle and Cockran Creek system still provide significant wildlife habitat and support a relatively healthy mix of species.

The Noisy Miner is one of about 20 local bird species to benefit greatly from the fragmentation of bushland and the removal of undergrowth. Very few small birds are able to persist in areas dominated by the aggressive Noisy Miner, which is often seen chasing other bird species away.



As a result of landholder concerns, the Jimaringle/Cockran Creeks Restoration Project was instigated under the Wakool Land and Water Management Plan. This has the broad aims of restoring the health of the creeks in terms of agricultural production, wildlife, vegetation and water quality. This report forms a key part of this project.

Without a substantial amount of fresh water it will be difficult, if not impossible, to maintain or improve the health of the creeks. However, the system is unlikely to receive the volume and regularity of water it once had. Under current social and climatic conditions, the most likely way the creeks would receive enough water to maintain their health will be through environmental water allocations. There are now certain requirements and considerations for creeks or wetlands to receive such water. The allocation of environmental water within the system will need to be targeted strategically to produce the best outcomes per megalitre.

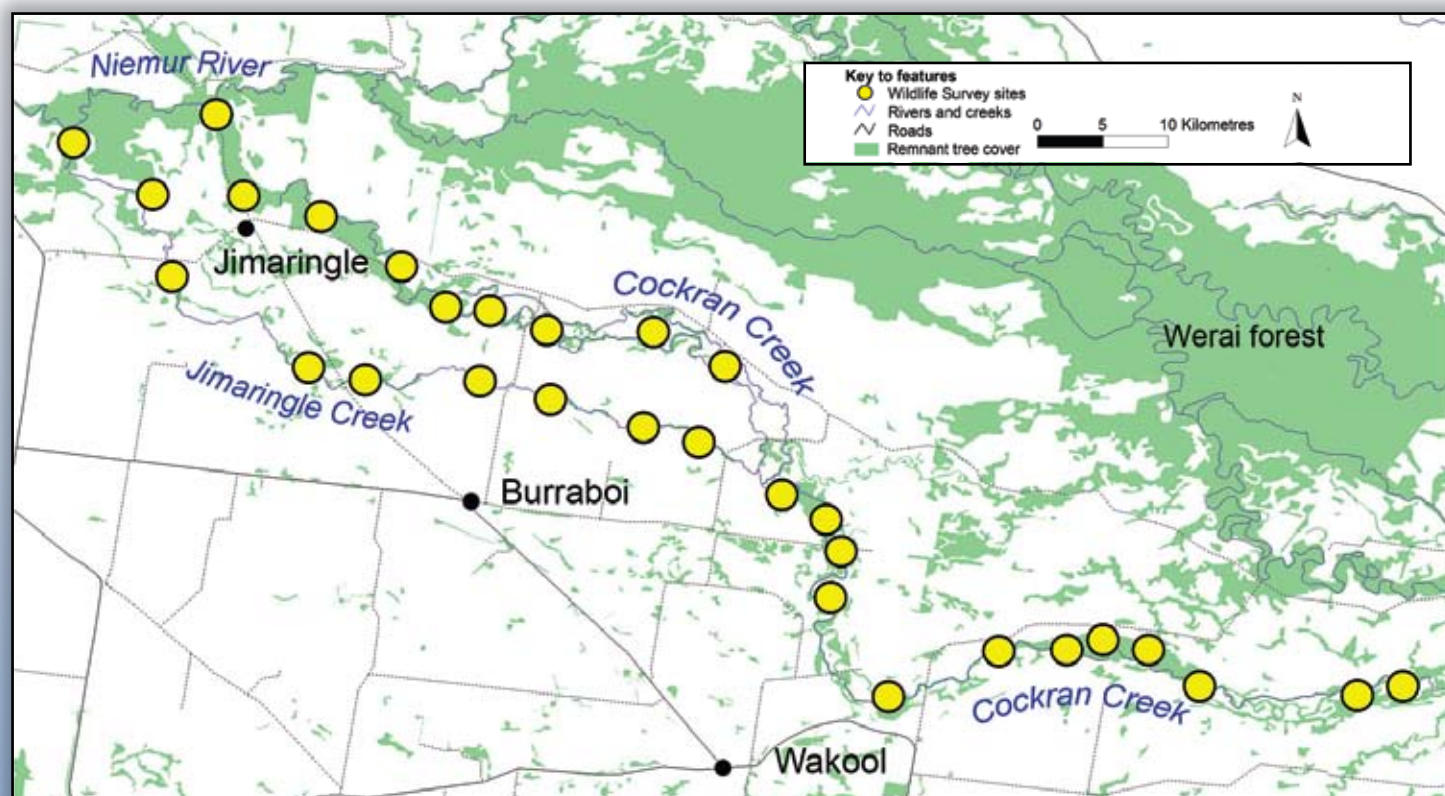
METHODS

Thirty sites were selected for wildlife sampling, encompassing the full length of the Cockran and Jimaringle Creek system and spanning 22 different private properties (see map below). Site locations were targeted toward areas with the highest habitat quality and where remnant vegetation along the creek was widest, to increase the likelihood of detecting significant species.

Our wildlife surveys were focused on terrestrial vertebrates: birds, mammals, frogs and reptiles. We surveyed birds with six 20-minute surveys at each site. These were conducted from August to December 2007, incorporating three different seasons. Reptiles and frogs were surveyed using a one-hour active search that involved log rolling and peeling bark. Nocturnal species like possums and owls were targeted with a one-hour spotlighting survey at each site.

We also trapped for other cryptic and rarely seen wildlife. Small bats were surveyed using a Harp Trap, which was set for 4 nights at each site. We positioned these at suitable locations likely to be 'flyways' or adjacent to sites where bats were likely to be roosting. Small mammals were surveyed at each site with 50 small, box-traps, known as "Elliot's", set for four nights. The total "Elliot" trapping effort for the study was 6000 trap-nights (30 sites x 50 traps x 4 nights). Each Elliot trap was baited with a mixture of peanut butter, oats, honey, and a small amount of almond essence.

A Harp Trap used for catching bats.



SUMMARY OF WILDLIFE SURVEY RESULTS

BIRDS

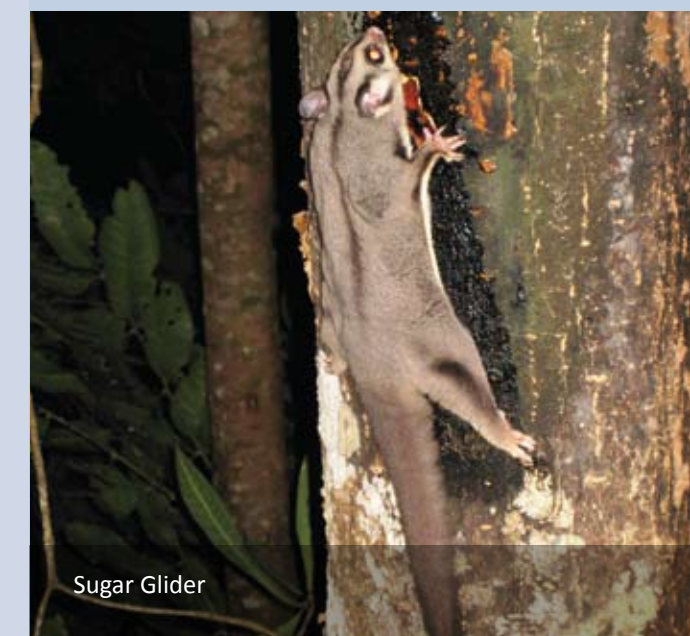
We found 109 bird species, highlighting the immense regional value of the Jimaringle and Cockran Creek system, especially for woodland dependent birds. We detected 12 species formally recognised as declining and 4 species listed as threatened in NSW; the Grey-crowned Babbler, Diamond Firetail, Hooded Robin and Bush Stone-curlew. The only comparable areas in the region for conservation value to woodland birds are the Edward and Niemur River systems to the north, and the Wakool River system to the south. The surveys revealed the particular importance of the Jimaringle-Cockran system to Bush Stone-curlers and Hooded Robins, with unprecedented positive results for community wildlife surveys in the NSW Murray Catchment. As there were a handful of sites with water in the creeks during surveys, we were able to detect 22 waterbird species. This number would obviously increase substantially if surveys were conducted whilst the creek and associated wetlands were flooded.

MAMMALS

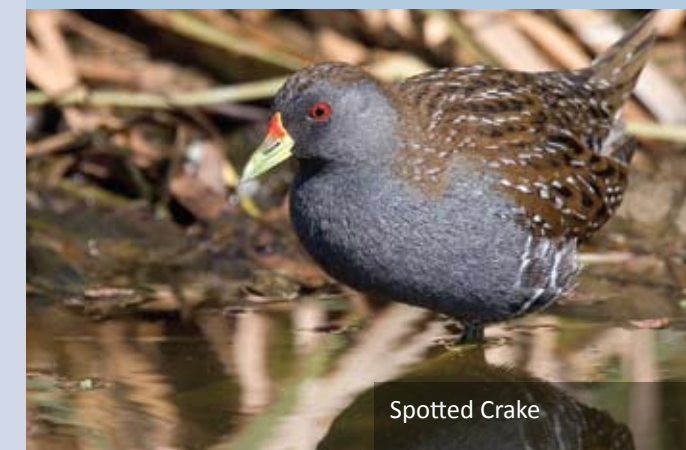
A total of 21 mammal species were found, including 10 micro-bats, 5 marsupials, 1 monotreme and 6 introduced species. The most significant species were the Echidna and the Large-footed Myotis, a threatened fishing bat that uses its long claws to catch spiders, fish and other prey from the surface of the water. Echidnas are so rare within the region that none were found on 106 farms across the entire Murray LWMP area during the recent wildlife survey. The total of 10 microbat species found reflects the high value of waterways with continuous remnant vegetation like the Jimaringle and Cockran Creeks. The most common marsupial was the Brush-tailed Possum, found at 29 of the 30 sites, with up to 24 recorded per hour of spotlighting. On the other hand, Ringtail Possums and a Sugar Glider were only found at one site, in a large Grey Box stand near the Cockran-Niemur junction. A single Yellow-footed Antechinus was caught near the Cockran-Colligen junction.

REPTILES and FROGS

There were 9 reptile and 5 frog species detected. Only the Murray region's three most abundant frogs were recorded frequently (Common Eastern Froglet, Plains Froglet & Spotted Marsh Frog), owing mainly to the dry conditions and lack of flooding. The low number of reptile species found was not surprising given our focus on floodplain habitats (e.g. River Red Gum/Black Box), which are known to be relatively poor for reptile diversity. Generally only highly mobile (e.g. Lace Monitor) or tree climbing (e.g. Carnaby's Wall Skink) reptile species can survive floods and persist in the large floodplain systems of the Murray region. One interesting reptile found though was the Wood Gecko, which is rare in the region and not associated with River Red Gum or Black Box. It was also found at the large, high quality Grey Box site near the Cockran-Niemur junction.



Sugar Glider



Spotted Crake



Yellow-footed Antechinus



Wood Gecko



Peron's Tree Frog

SPECIES LIST

BIRDS

- Emu
- Australian Shelduck
- Australian Wood Duck
- Pacific Black Duck
- Grey Teal
- Australasian Grebe
- Darter
- Little Pied Cormorant
- Great Cormorant
- White-faced Heron
- Great Egret
- Intermediate Egret
- Australian White Ibis
- Straw-necked Ibis
- Royal Spoonbill
- Yellow-billed Spoonbill
- Wedge-tailed Eagle
- Whistling Kite
- Swamp Harrier
- Brown Goshawk
- Brown Falcon
- Nankeen Kestrel
- Spotted Crane
- Purple Swampphen
- Dusky Moorhen
- Black-tailed Native Hen
- Bush Stone-curlew #
- Black-fronted Plover
- Red-kneed Dotterel
- Banded Lapwing
- Masked lapwing
- Common Bronzewing
- Crested Pigeon
- Peaceful Dove
- Galah
- Long-billed Corella
- Little Corella
- Sulphur-crested Cockatoo
- Cockatiel
- Yellow Rosella
- Eastern Rosella
- Red-rumped Parrot
- Pallid Cuckoo
- Horsfield's Bronze Cuckoo
- Southern Boobook Owl
- Tawny Frogmouth
- Australian Owlet Nightjar
- Laughing Kookaburra
- Sacred Kingfisher
- Rainbow Bee-eater
- Dollarbird
- White-throated Treecreeper
- Brown Treecreeper
- Superb Fairy-wren
- Variegated Fairy-wren
- White-winged Fairy-wren
- Spotted Pardalote
- Striated Pardalote
- Western Gerygone
- Weebill
- Chestnut-rumped Thornbill
- Buff-rumped Thornbill
- Yellow-rumped Thornbill
- Yellow Thornbill
- Southern Whiteface
- Striped Honeyeater
- Little Friarbird
- Noisy Miner
- White-plumed Honeyeater
- Brown-headed Honeyeater
- Jacky Winter

- Red-capped Robin
- Hooded Robin #
- Grey-crowned Babbler #
- Chestnut-crowned Babbler
- Varied Sittella
- Crested Shrike-tit
- Golden Whistler
- Rufous Whistler
- Grey Shrike Thrush
- Restless Flycatcher
- Grey Fantail
- Willie Wagtail
- Black-faced Cuckoo Shrike
- White-winged Triller
- Olive-backed Oriole
- White-breasted Woodswallow
- White-browed Woodswallow
- Dusky Woodswallow
- Grey Butcherbird
- Pied Butcherbird
- Magpie-Lark
- Australian Magpie
- Pied Currawong
- Australian Raven
- Little Raven
- White-winged Chough
- House Sparrow *
- Zebra Finch
- Diamond Firetail #
- Mistletoebird
- White-backed Swallow
- Welcome Swallow
- Tree Martin
- Clamorous Reed Warbler
- Little Grassbird
- Rufous Songlark
- Brown Songlark
- Common Starling *

MAMMALS

- Echidna
- Yellow-footed Antechinus
- Eastern Grey Kangaroo
- Common Ringtail Possum
- Common Brushtail Possum
- Sugar Glider
- Lesser Long-eared Bat
- White-striped Mastiff Bat
- Southern Free-tail Bat
- Gould's Wattle Bat
- Chocolate Wattle Bat
- Inland Broad-nosed Bat
- Inland Forest Bat #
- Little Forest Bat
- Southern Forest Bat
- Large-footed Myotis #
- Cat *
- Rabbit *
- Hare *
- Fox *
- Pig *

REPTILES

- Eastern Long-necked Turtle
- Southern Marbled Gecko
- Wood Gecko
- Lace Monitor
- Carnaby's Wall Skink
- Boulenger's Skink
- Robust Ctenotus
- Eastern Brown Snake
- Red-bellied Black Snake

FROGS

- Peron's Tree Frog
- Plains Froglet
- Common Froglet
- Spotted Marsh Frog
- Barking Marsh frog
- # = Species listed as Threatened in NSW
- * = Introduced Species



Crested Shrike-tit

Flooding Timbered Areas for Woodland Dependent Species

Many of the bat, marsupial and reptile species we recorded are dependent on woodlands and forests. They may roost or breed in tree hollows, rely on fallen logs and branches, feed in the canopy or depend on trees in other ways. Many of Australia's bird species are also dependent on forests and woodlands. During the wildlife surveys we recorded our most useful and comprehensive information from the bird surveys.

Due to the widespread clearing and removal of woodlands and forests, birds dependent on timbered areas have declined dramatically over the last two centuries. Some species have fared worse than others, being more sensitive to the effects of habitat fragmentation. Woodlands in particular have suffered greatly and so have the birds that rely on them. A good diversity of woodland dependent birds indicates a healthy and structurally diverse vegetation community. Woodland birds are ideal for gauging the value of a patch of bush for biodiversity conservation.

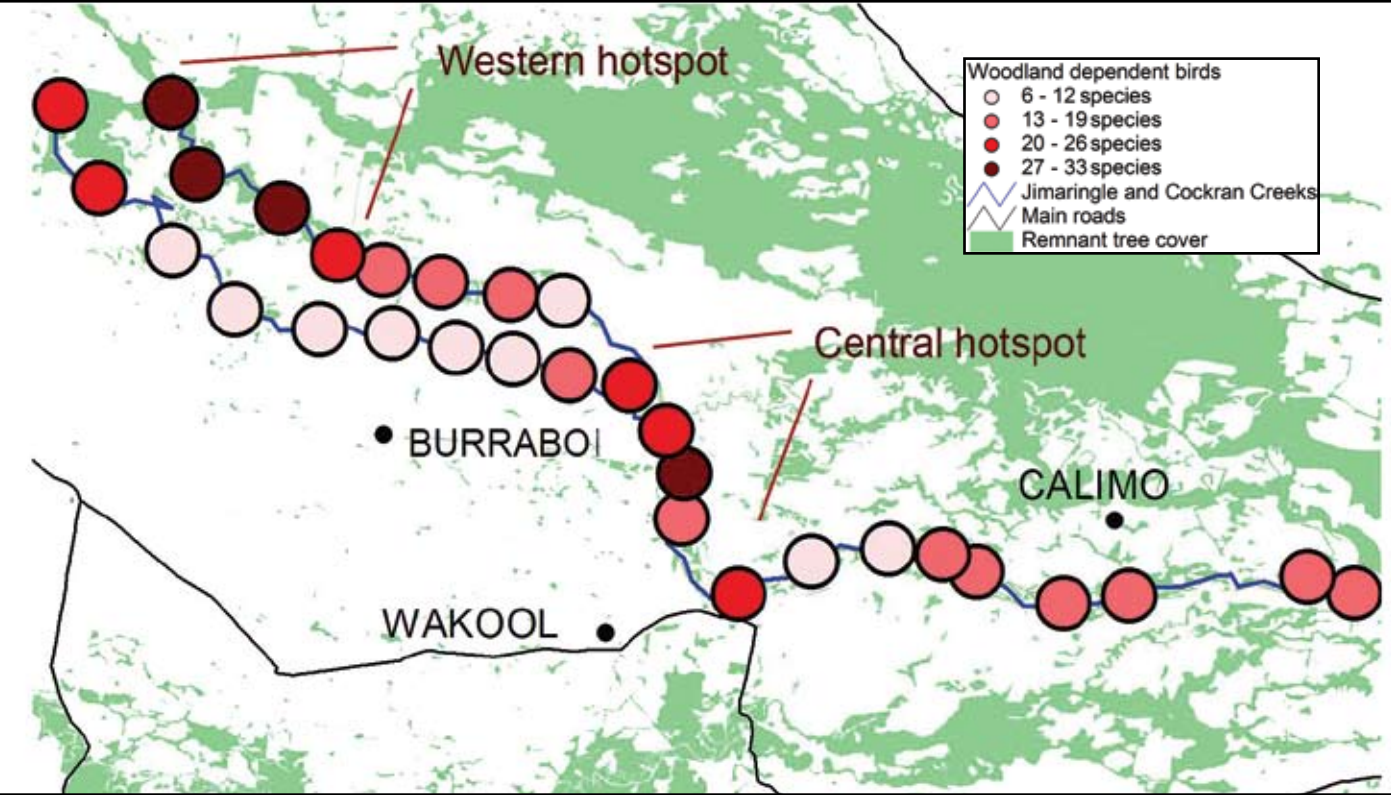
The total number of woodland dependent bird species detected during the bird surveys at each site was used to identify key areas of the Jimaringle/Cockran Creek for conservation. Sites with the greatest number of woodland bird species (20 or more species) were located in the central and western parts of the Jimaringle/Cockran system (see map below). Specifically, these regions can be described as the remnant vegetation patches near the confluence of both the Jimaringle and Cockran Creek with the Niemur River (at the far western end of the study area), and that in the region surrounding the western end of the Merriginnie Road. Many species like the Varied Sittella and Buff-rumped Thornbill were largely restricted to sites in these areas.

The Red-capped Robin is typical of the more sensitive woodland bird species that are generally only found in the largest, healthiest patches of bush like those in the western and central parts of the Jimaringle/Cockran system.



The main reasons these patches are so good for woodland birds is that they have a diversity of habitats and have a wide area of remnant vegetation along the creek. Big, old River Red Gums can produce abundant nectar, support a good source of invertebrates and provide hollows for hollow dependent animals like owls, parrots and bats. These large trees also produce valuable fallen timber. A layer of shrubs or young trees can provide many species like the Fairy-wrens with cover from predators and places to nest. When patches have a good cover of native grasses, they provide food for a number of species that eat their seeds like the Diamond Firetail. And the bigger the patch of bush, the more species that have larger home ranges can persist, like the Varied Sittella.

We recommend that the central and western areas be considered the Jimaringle/Cockran Creek's biodiversity hotspots for woodland dependent fauna. The ongoing maintenance and improvement of the ecological health of these areas should be the highest priority for wildlife conservation in the system. Any future environmental water should ensure flooding beyond the main creek channel that incorporates these hotspots.



BUSH STONE-CURLEW

One of the Wakool region's greatest claims to fame in terms of wildlife is its Bush Stone-curlews. These iconic, ground-dwelling birds have excellent camouflage and can easily resemble fallen timber. Most people, especially the district's older farmers, are familiar with their eerie, wailing calls at night. Decades ago, almost every reasonable sized farm in the Murray region had at least one resident pair but today they're now one of the most endangered birds in south-eastern Australia.

Their precarious southern existence has been largely attributable to a lack of habitat and their difficulty in breeding successfully and raising young. Although the chicks are also highly camouflaged, they have little other defense against introduced predators like the fox, which often uses smell to locate prey. There is often a lack of fallen timber for the birds to hide amongst because branches are so often piled up and burnt to keep a neat and tidy farm.

As part of the Wakool region, the Jimaringle and Cockran Creeks are highly valuable to the Bush Stone-curlew. From our 30 sites we recorded them at five (17%), and they were known to be present at a sixth. These are our best results to date for this species for wildlife surveys across the NSW Murray Catchment since 2001.

It also appears that two of the pairs encountered may have raised chicks; however we are unsure whether they fledged successfully. These birds would be feeding in the more open farmland at night, and roosting in the remnant vegetation around the creeks during the day.

Fortunately for the Bush Stone-curlew, all landholders who participated in this study are aware of this bird and showed interest in their conservation. Those lucky enough to have breeding pairs on their property are in a great position to support this species. Retaining fallen timber, controlling foxes and cats, and ensuring grass height is low enough for the birds to maintain a view of their surrounds are clear priorities. There are also some exciting trials underway in the Wakool-Moulamein region using predator-proof fences and captive breeding and release to supplement the local population.

To assist a successful breeding event, minimise disturbance to the area (e.g. grazing, vehicles) and concentrate fox control efforts around the site. For a copy of a recent habitat management guide on Bush Stone-curlews please contact the NSW Murray Catchment Management Authority in Deniliquin.



There are at least six pairs of the endangered Bush Stone-curlew surviving along the Jimaringle-Cockran Creek system.

HOODED ROBIN

Another very exciting result for the Jimaringle and Cockran Creek Wildlife Survey was the high number of Hooded Robins. They are listed as a threatened species in NSW and are considered one of the woodland bird species most severely affected by habitat fragmentation in south-eastern Australia.

We recorded them at 17% (5/30) of our sites, each usually with at least one pair. This is very impressive considering our wildlife surveys across the NSW Murray Catchment usually detect them at between only 2% and 10% of sites. All of the sites that we found them were part of the central patch of bush at the end of the Merriginnie Road (see map). This area is clearly a local hotspot for Hooded Robins.

The Hooded Robin somewhat resembles a small magpie or butcherbird, with its black and white feathers. It feeds by hunting small invertebrates on the ground. It benefits from fallen timber because of the additional perches that it can use to pounce on prey. Hooded Robins generally prefer habitats consisting of lightly timbered woodlands with edges or clearings.

Like a third of Australia's bird species, Hooded Robins are co-operative breeders. This means that a pair's offspring from previous seasons will often help during the breeding season to raise their younger brothers and sisters. It is not uncommon to find Hooded Robins in family groups of three or four birds.

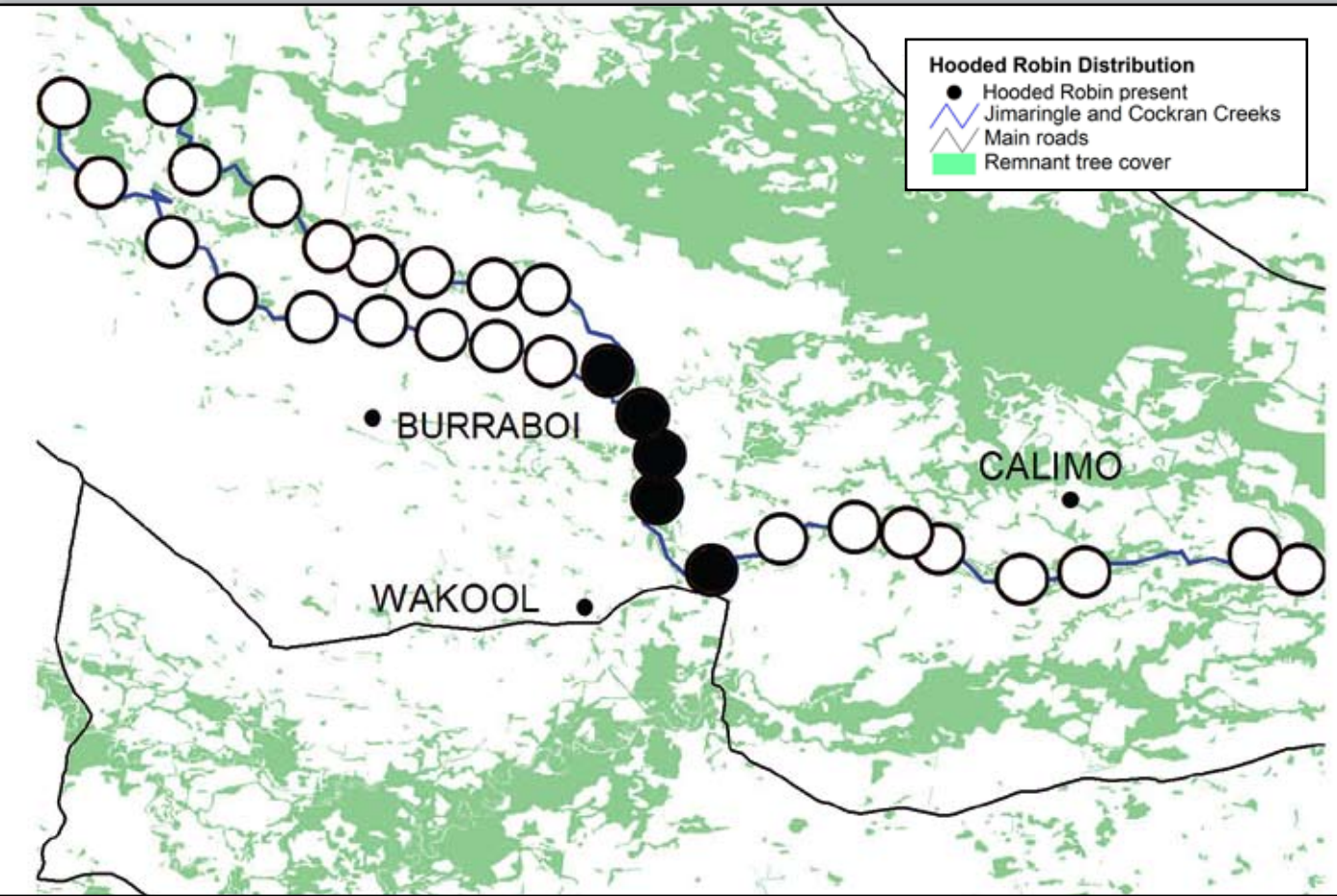
Interestingly, the Hooded Robin can sometimes be negatively affected by fencing off timbered areas. The exclusion of stock can allow grasses to grow too high, especially at sites dominated by exotic annuals. This endearing little bird has great difficulty hunting ground-dwelling insects in areas with too much low vegetation.

The Hooded Robin, one of our most sensitive declining woodland birds, has a local stronghold in the central part of the Jimaringle-Cockran system.



This habitat requirement of relatively open areas highlights the need for us to provide a patchy mosaic of shrubby and non-shrubby woodlands across the landscape. It also highlights the potential of grazing as a tool to manage the structure of native vegetation to provide habitat for a particular threatened species.

Across the NSW Murray Catchment and throughout much of their range, Hooded Robins are almost exclusively found in the largest patches of bush remaining in the agricultural landscape. They don't survive in areas with only small, isolated patches. It is a very positive result that we found so many of these birds in the Jimaringle-Cockran system and testimony to the highly significant value of the area for threatened and declining woodland birds.



The Echidna, found at “Kuringle” along the Jimaringle Creek, was a major highlight of the study. They are very rare in the Wakool LWMP area.



A Snapshot of Activity Along the Jimaringle and Cockran Creeks



Local kids gather around Wildlife Ecologist Hugh McGregor to get a good look at a Southern Marbled Gecko.



Locals getting up close with their local wildlife.



Locals learn about the value of the Cockran Creek for bats at the “Colligen Creek” Wildlife Field Day.



Lauren Mathers, LWMP Officer, cooking up a storm at Wildlife Field Day on the Cockran Creek at “Yambinya”.

THE BOOM & BUST CYCLE OF WETLANDS

The very essence of inland Australian wetlands and waterways is that they only flood intermittently, often for just a few weeks or months at a time. This ‘boom and bust’ cycle of ephemeral wetlands is one of nature’s greatest phenomena and is a classic component of nature and ecology in Australia.

Within minutes of filling, a wetland or waterway that has been dry for months or years starts to spring to life. After only a few days or weeks there is a hive of activity. Trees begin to flourish, waterplant seeds and spores have germinated and are growing rapidly, invertebrates and frogs are busy breeding, and waterbirds have arrived in great numbers.

This pulse of life is unique to ephemeral wetlands, and nowhere else in the Murray region can we witness such a concentration of wildlife. The River Red Gum and Black Box areas of the Murray region are among Australia’s most important ecological assets, and form some of the greatest wetlands on Earth.

As far as tree species go, the River Red Gum is particularly dependent on flooding but is generally killed when flooded for longer than about 18 months. Many originally ephemeral wetlands that have been artificially kept full are now stagnant, support little biodiversity and contain dead red gums, evidence of an inappropriate flooding regime and the loss of the ‘boom and bust’ cycle. In years of high water allocations, block banks holding water back have killed River Red Gums by prolonged inundation. Many trees have also died as a result of high water tables and salinity, all negatively impacting wildlife habitat.

Wetlands Watering Project – Bringing Wetlands Back to Life

In 2001, the NSW Murray Wetlands Working Group, with support from Murray Irrigation Limited, the Murray LWMPs and numerous landholders, embarked on an innovative program of watering wetlands on private property using irrigation infrastructure. This ongoing project has now helped restore wetlands on over 140 properties in the Murray region, incorporating over 3500 hectares, with a multitude of benefits to wetland biodiversity, such as a great improvement in tree health and stimulation of waterbird breeding events. Many of the wetlands were in desperate need of a “drink” and hadn’t been flooded for many years or even decades in some cases. With more and more demand for this “wetlands water” we need to distribute it strategically to get the best possible outcomes from every drop.

Nardoo is one of the first waterplants to become established when shallow wetland areas are flooded and start springing to life.



Flooding stimulates waterbird breeding. This Hoary-headed Grebe carries its chicks on its back and even dives for food with them aboard.



River Red Gums rely on flooding but are killed if inundated for too long. These “Five-star Hotels” are a haven for wildlife.



BEFORE WATERING

The dramatic response of Spike-rushes, Nardoo and other waterplants at this site, only five weeks after watering, created ideal habitat for a wide range of wetland dependent wildlife.



AFTER WATERING



FLOODING OPEN AREAS FOR WETLAND DEPENDENT FAUNA

There is no doubt that the future delivery of environmental water will be crucial for maintaining and improving the health of timbered areas within the Jimaringle-Cockran system, especially the core central and western native vegetation blocks that have been identified as the most significant. Flooding here will greatly benefit woodland dependent species like the Hooded Robin.

It is another story for wetland dependent species though. They tend to prefer more open wetland areas with few or no trees so it is important that we keep waterbirds, frogs and other wetland fauna in mind when thinking about where we will distribute environmental water in the future.

The relatively small number of waterbirds (22 species) and frogs (5 species) found during the surveys was simply a reflection of the dry conditions because the Jimaringle and Cockran Creek system still has great potential to support a significant number of individuals and species when areas are flooded.

Many of the herons, egrets, spoonbills, cormorants, ibis and other colony-nesting waterbirds regularly use flooded trees to nest in but most waterbirds prefer more open areas (with little or no tree cover) where waterplants, shallows and mudflats flourish.

Migratory shorebirds, which do very well at the Tullakool Evaporation Ponds, prefer open mudflats with very shallow water.

They avoid timbered areas and often rely on the most open wetlands in the landscape like treeless freshwater swamps and salt lakes. These amazing birds fly up to 25 000 kilometres every year. They breed in or near the Arctic during our southern winter and migrate to Australia to spend summer here, stopping over at places like China's Yellow Sea on the way. After summer the birds return to the northern hemisphere to breed again, essentially living in an endless summer.

There has been a widespread global decline in migratory shorebird populations, even in once relatively common species like the Curlew Sandpiper. Wetlands watering sites that incorporate open areas and produce mudflats will benefit these declining species that are one of nature's greatest phenomena.

The NSW Murray Catchment is particularly important for three threatened waterbird species, the Australasian Bittern, Australian Painted Snipe and Brolga, all of which are closely associated with ephemeral wetlands that have emergent waterplants and few or no trees. The Australasian Bittern is closely associated with Cumbungi and Phragmites reed-beds, where it breeds, but uses rice crops widely when they're available.

Frogs also generally do better in more open wetland areas with healthy waterplant communities. The threatened Southern Bell Frog spends the winter months in permanent wetlands and waterways but during spring and summer disperses into open, ephemeral wetland areas that have waterplants.

Therefore, in contrast to the woodland dependent wildlife, treeless or lightly timbered areas within the system have a greater potential to be important for wetland dependent wildlife. These open sites are often not recognised as potentially important wetlands because of the lack of River Red Gum or Black Box cover, especially after a prolonged drought, and may appear just as any other treeless paddock dominated by non-native plants.

Ideally, flooded sites should incorporate both timbered and open areas so that woodland and wetland dependent species can benefit. Flooding River Red Gum and Black Box will help maintain the woodland and forest habitats of the system, whilst flooding open depressions will stimulate substantial waterplant growth and produce productive mudflats.

Southern Bell Frog – Wakool Stronghold

The threatened Southern Bell Frog wasn't recorded during this study but large numbers were found at several sites in the Wakool region during the Murray LWMP Wildlife Survey in 2005 and 2006. They were often associated with ephemeral wetlands, including rice crops, channels and vegetated storage dams, as well as major waterways with more permanent water supplies. This species, like most local frog species, prefers shallow wetland areas with aquatic and emergent waterplants, which are typically more extensive in relatively open areas with little or no tree cover.

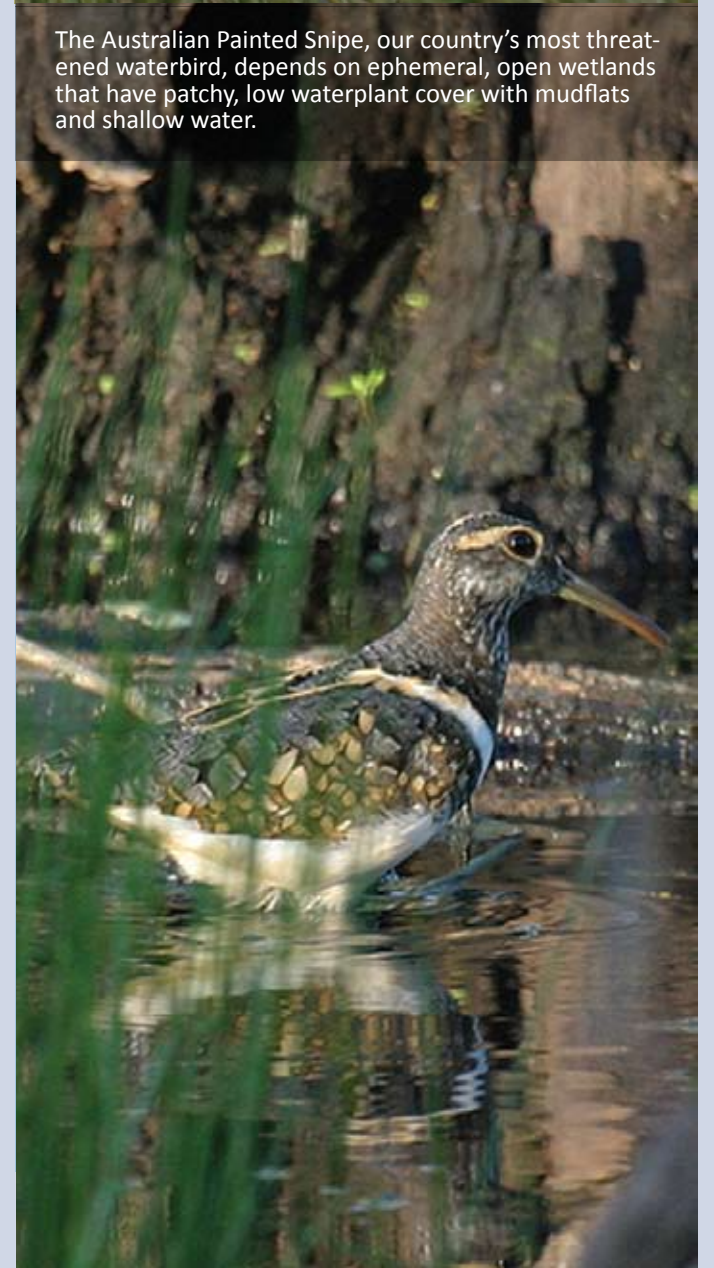
Yellow-billed Spoonbills rely on shallow wetland areas for feeding.

Ideally flooded sites should incorporate both timbered areas and relatively open areas. This way both woodland and wetland dependent species will benefit significantly

Emergent waterplants, such as Eleocharis Spike rushes and Nardoo thrive in open areas with little or no tree cover.

Royal Spoonbills also rely on shallow wetland areas for feeding.

The Australian Painted Snipe, our country's most threatened waterbird, depends on ephemeral, open wetlands that have patchy, low waterplant cover with mudflats and shallow water.



BATS & THE LARGE-FOOTED MYOTIS

Bats are by far the most abundant mammals along these creek-lines. We caught a total of 354 individual bats, incorporating 10 different species. All of these bats use echolocation, where they emit ultrasonic calls and listen for the echoes to navigate through the environment and hone in on prey like moths and beetles. Each species has its own niche for hunting invertebrates. Some specialise in hunting large moths above the canopy (e.g. White-striped Mastiff Bat) while others have mastered the art of detecting bugs on tree trunks (e.g. Long-eared Bats).

Having water along these creeks is very important for bats. Flooding stimulates a flush of invertebrate life, as we all know by the example from mosquitoes. The water also promotes healthy trees, which generally support more bugs, beetles and other invertebrates. No bat species is more dependent on water than the Large-footed Myotis.

The Large-footed Myotis was the most significant bat we found during this study. Like most species that are dependent on natural wetlands, it is threatened by the loss and poor management of habitat. It uses echolocation to find water spiders and small fish on the water's surface, then rakes its large claws across water as it hones in on its target.

Recent work on the Large-footed Myotis by Susan Campbell from The University of Melbourne has shown that individuals spent 88% of their foraging time over water and that trawling behaviour was recorded four times per minute during foraging bouts. This feeding behaviour was dependent on the availability of relatively smooth, uncluttered water surfaces, further highlighting the value of flooding relatively open areas where there are few or no trees. The day roost sites were always in trees that were within 100 metres of water.



The Cockran Creek site on "Calimo East" where the Large-footed Myotis was found.



The Inland Forest Bat was one of ten bat species found along the Jimaringle/Cockran Creek system.



A Large-footed Myotis found on the Cockran Creek. The enormous feet are used to rake the waters surface to catch prey.

GRAZING REGIMES & VEGETATION MANAGEMENT

Grazing is not necessarily bad for the Jimaringle-Cockran system but we need to refine the grazing regimes so that both biodiversity and production values can be improved in the long term. In most cases this requires the resting of areas for long enough to allow the regeneration of young trees, shrubs, native grasses and ground covers, and then implementing a "light" or "crash" grazing regime that enables recovery and maintains the native vegetation.

The short-term and long-term value of a patch of bush for wildlife is often influenced greatly by its grazing regime. Yet grazing can be both positive and negative, so finding the right balance for the environment can be difficult.

On one hand, heavy grazing without resting can be extremely detrimental, especially at sites with largely intact native grass and ground cover communities. The immediate impacts on wildlife can include reducing resources (e.g. native grass seeds for food, shrubs for nest sites), encouraging weeds and reducing the diversity of native plants. Constant grazing pressure, especially combined with fertilizer application, increases nutrient levels in the soil that are incompatible with healthy native vegetation but favour weeds. If heavy grazing continues over many years, it will suppress the recruitment of young trees and shrubs, essentially making a 'living dead' patch of bush with no long term future. On the other hand, complete removal of



Reed Bed Management

Cumbungi and Phragmites reed-beds provide important habitat for many native species, such as bitterns, crakes, reed-warblers, water rats and various frogs, but when these reed-beds dominate a site the overall biodiversity plummets and it slows the movement of water, impeding flows. It has increased in many sections of the Jimaringle and Cockran Creeks (see below), most likely because of the sustained deeper water levels associated with irrigation flows over summer, when it thrives. Burning, cutting, ploughing, crash-grazing (see above), manipulating water levels, herbicide application, reducing nutrient inputs and other control methods can help achieve a balance of patchy reed-beds, maintain fresh, young stands, and improve flow rates.



grazing at sites dominated by exotic annuals can sometimes be equally detrimental, promoting excessive growth and also restricting the recruitment of young trees, shrubs and native grasses. Striking the right balance of grazing for a particular site is largely determined by its current condition.

Grazing wetland areas when they are wet, including the creek-lines themselves, can be also be detrimental through trampling native vegetation, disturbing sediment in the water, compacting the soil and increasing nutrient levels.

Fortunately, many landholders along the Cockran and Jimaringle Creeks have been very proactive in managing grazing regimes to recover native vegetation and have already fenced off their bushland, often using the incentives provided by the Wakool LWMP. Having the entire creek fenced off and only grazed for just a few weeks of the year in winter or early spring (often just to contain non-native grasses and weeds) will help the system enormously and benefit a wide range of wildlife species by allowing native grasses and ground covers to set seed later in the year.

The three local species of Fairy-wren: the well known and common Superb Fairy-wren, often called the "Blue Wren", is regularly seen around the garden; the Variegated Fairy-wren is locally closely associated with Lignum, and the White-winged Fairy-wren prefers shrubby areas with little or no tree cover. At a Jimaringle Creek site where grazing was well managed we found all three Fairy-wren species in the extensive Lignum.



OTHER VEGETATION TYPES

With all this focus on the River Red Gum and Black Box that dominates the Jimaringle/Cockran system it is easy to forget the other vegetation types that don't require flooding. It is crucial that we also keep them in mind.

The patchy stands of Grey Box that can be found adjacent to these creeks are highly valuable. Further east, they form part of the Grassy Box Woodland complex, which has been very heavily cleared and compared to River Red Gum or Black Box is extremely rare. Sandhill Woodland is also very special. We need to incorporate the conservation of these other vegetation types into the work being undertaken in the local area.

Interestingly, there were two species, the Wood Gecko and the Common Ringtail Possum, that we found exclusively in Grey Box stands, highlighting the importance of maintaining and expanding them. Although Grey Box can tolerate very limited flooding it is by no means reliant on it, and where there are heavy soils it can be killed by flooding for just a few weeks.

Most of the uncommon and rare reptiles in the Murray region rely on non-floodplain vegetation types like Grey Box and Sandhill Woodland. There are sandhills spread throughout the Jimaringle-Cockran system but almost all the native vegetation has been cleared from them. Sandhill Woodland is particularly important for reptiles, supporting species like blind snakes.

Vegetation Types – In a State of Change

With our changing climate, some of the vegetation types in the Murray region are also likely to change. There are River Red Gum areas that are slowly being transformed into Black Box because of the reduced frequency and duration of flooding. Some of the Black Box areas may also eventually become Grey Box and other non-floodplain vegetation types. The distribution of future environmental water will have a big impact on which areas of River Red Gum or Black Box are maintained.



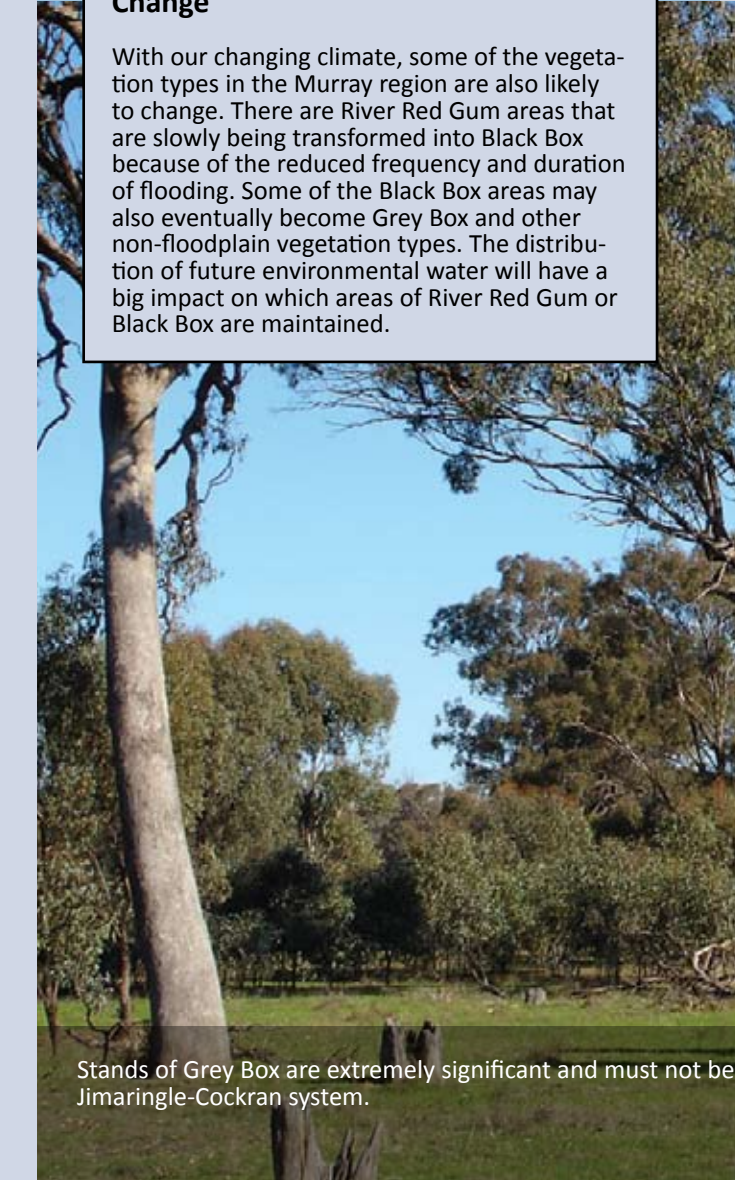
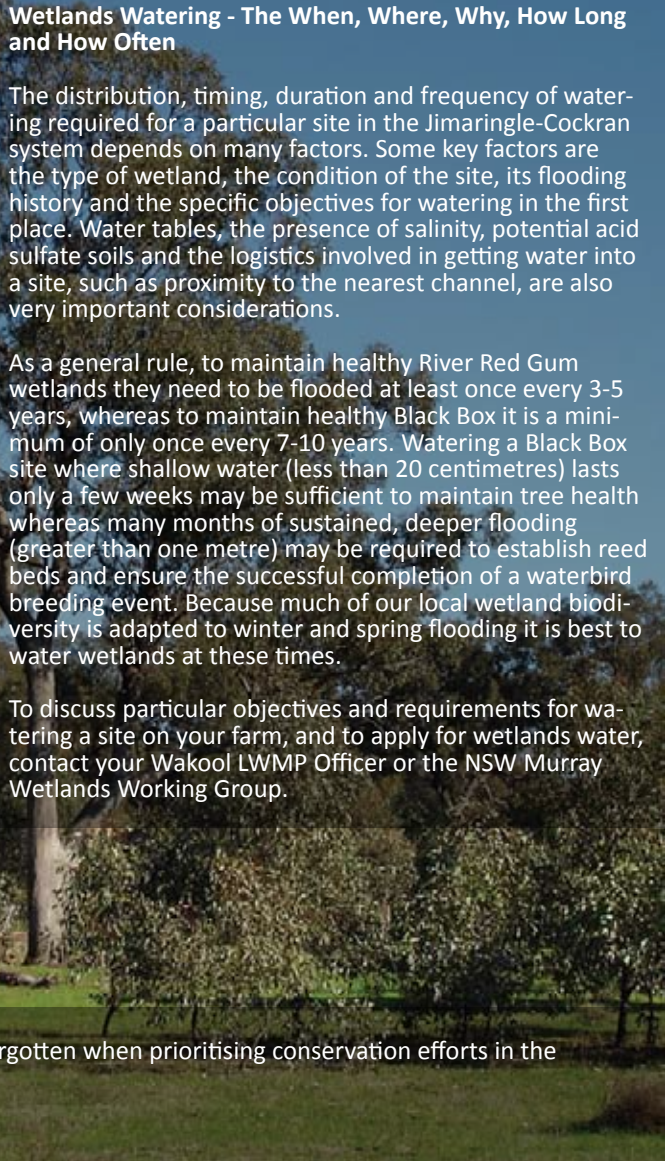
Common Ringtail Possums were only found in a Grey Box-dominated area.

Wetlands Watering - The When, Where, Why, How Long and How Often

The distribution, timing, duration and frequency of watering required for a particular site in the Jimaringle-Cockran system depends on many factors. Some key factors are the type of wetland, the condition of the site, its flooding history and the specific objectives for watering in the first place. Water tables, the presence of salinity, potential acid sulfate soils and the logistics involved in getting water into a site, such as proximity to the nearest channel, are also very important considerations.

As a general rule, to maintain healthy River Red Gum wetlands they need to be flooded at least once every 3-5 years, whereas to maintain healthy Black Box it is a minimum of only once every 7-10 years. Watering a Black Box site where shallow water (less than 20 centimetres) lasts only a few weeks may be sufficient to maintain tree health whereas many months of sustained, deeper flooding (greater than one metre) may be required to establish reed beds and ensure the successful completion of a waterbird breeding event. Because much of our local wetland biodiversity is adapted to winter and spring flooding it is best to water wetlands at these times.

To discuss particular objectives and requirements for watering a site on your farm, and to apply for wetlands water, contact your Wakool LWMP Officer or the NSW Murray Wetlands Working Group.



Stands of Grey Box are extremely significant and must not be forgotten when prioritising conservation efforts in the Jimaringle-Cockran system.

CONCLUSIONS

The Jimaringle and Cockran Creek system is highly significant for wildlife. The populations of Bush Stone-curlew and Hooded Robin are particularly important but the presence of other threatened species like the Large-footed Myotis and Diamond Firetail also highlight the immense regional value of this system. The only comparable systems for wildlife are the Edward and Niemur Rivers to the north and the Wakool River to the south. On top of securing environmental water for the system, there are many things that can be done to improve wildlife habitat and the ecological health of the creeks. Managing grazing regimes that promote native vegetation, avoiding the removal of fallen timber and controlling feral animals are three key actions that will benefit the system. The two main conclusions from this wildlife survey are as follows:

- 1) The western and central remnant vegetation blocks should be considered the biodiversity hotspots of the Jimaringle and Cockran Creek system and be given priority for all future conservation efforts.
- 2) The delivery of environmental water and other conservation initiatives should also incorporate more open (lightly timbered or treeless) areas beyond the main channel where wetland dependent fauna will benefit most significantly.

On top of the hotspots we have identified and the need to incorporate open areas, there are other important issues that need to be considered when determining the distribution of future environmental water, especially salinity and potential acid sulfate soils.



The Jimaringle-Cockran system is still highly significant for wildlife but there is an urgent need to restore wildlife habitat to maintain, secure and improve this significance.

Making the most of our Megalitres - Every Drop Counts

With the increasingly precious nature of our water resource and more competition for environmental water, it is critical for us to get the biggest biodiversity return possible for every megalitre used. It will be more and more important for us to deliver environmental water strategically and maximise the efficiency of our biodiversity benefit per megalitre.

With the appropriate management regimes, approximately 200-300 megalitres across 20 hectares for 2-6 months, with a maximum water depth of about 50 cm, is capable of supporting more than 50 waterbird species, including threatened species like the Australasian Bittern, Australian Painted Snipe and Brolga.



The Australasian Bittern, like so many waterbird species and other wetland dependent fauna, has suffered severely from a lack of wetland flooding because of the drought, and the loss of wetlands since European settlement. Efforts to restore wetland habitat along the Jimaringle-Cockran system will give this threatened species a fighting chance.



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Land and Water Management Plan



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