

*Yorta Yorta maloga  
wanagaga dhunda-n*

**Birds of the Sand Ridge Woodlands in Yorta Yorta Country**



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Yorta Yorta Nation Aboriginal Corporation: [www.yynac.com.au](http://www.yynac.com.au)

The title 'Yorta Yorta maloga wanagaga dhunda-n' in Yorta Yorta language translates to 'Yorta Yorta sandhill bush birds'.

**Front cover photograph:**

Pair of Rainbow Bee-eaters, by Chris Tzaros.

**Back cover photographs:**

Yellow Box - Cypress-pine sand ridge woodland Millewa forest, Rainbow Bee-eater, Sacred Kingfisher.

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## Yorta Yorta Nation

The Yorta Yorta<sup>1</sup> are the Aboriginal traditional owners of the area surrounding the junction of the Goulburn and Murray Rivers in present-day north-central Victoria and southern New South Wales. Yorta Yorta Nation is comprised of people with an indisputable bloodline to the original ancestors of the Land of Yorta Yorta Nation, and as such their traditional laws, customs, beliefs and sovereignty are intact. Yorta Yorta People have a long standing connection with the many different natural environments of their region, including the wetlands, the floodplains and everything in between. The landscape and watercourses continue to provide a spiritual connection to the land. Sand hill formations are part of a rich history of occupation over many thousands of years, and are of particular cultural importance; as ceremonial and burial sites, food gathering areas, hunting, and ideal camping areas elevated above the surrounding floodplain. Today, the connection to Country by Yorta Yorta Nation's people remains deep and powerful.

## The Sand Ridge Woodland Birds Project

Whether you consider the geological record, that Aeolian processes between 10,000 to 100,000 years ago forced the sand hills into being, or Yorta Yorta creation stories from the dreamtime, the ancient sand hill formations are a unique and fascinating feature of the inland area surrounding the Murray River. Traditional Yorta Yorta land extends on both sides of the Murray River from just west of Albury to around Cohuna.

Known in Victoria as Sand Ridge Woodlands and Riverina Sandhill Woodlands in New South Wales (hereafter termed sand hill woodlands), these sand hill woodland communities are characterised by plant species that are often different to the surrounding floodplains because of their distinctive aspect, topography and soil type. Overstorey species may include Native Cypress-pine, Buloke, Yellow Box, Grey Box, Needlewood, Silver Banksia and Sandalwood. The light sandy rises also support a diverse shrub layer including Emu-bush, Bursaria, saltbushes, Quandong, Fringe-myrtle, Weeping Pittosporum and various wattles. Sand hill woodlands often merge with Grassy Box Woodlands and Riverine Forests that grow on heavier soils and clays.

Sand hills that have not been cleared or disturbed are hard to find these days, and are largely being used for grazing and cropping. About 90% of Sand Ridge Woodland vegetation has been cleared and those areas that remain are subject to a range of ongoing threats and disturbance. Sand Ridge Woodlands and Riverina Sandhill Woodlands are nationally listed Endangered Ecological Communities, and many of the associated plants and animals are also now threatened.

For those patches that remain, the variety of habitats support a particular suite of wildlife, such as Sugar Gliders and a host of different reptiles such as Sand Goannas, Blind Snakes and several species of skinks that are right at home amongst the loose sandy soil. In particular, high quality sand hill woodlands provide important habitat for woodland birds with many species taking advantage of the shrubby understorey, sparse native grasses and ground-covers, and fallen debris. This report focuses on the woodland bird communities of sand hills.

1. Yorta Yorta means 'no no' in Yorta Yorta language.

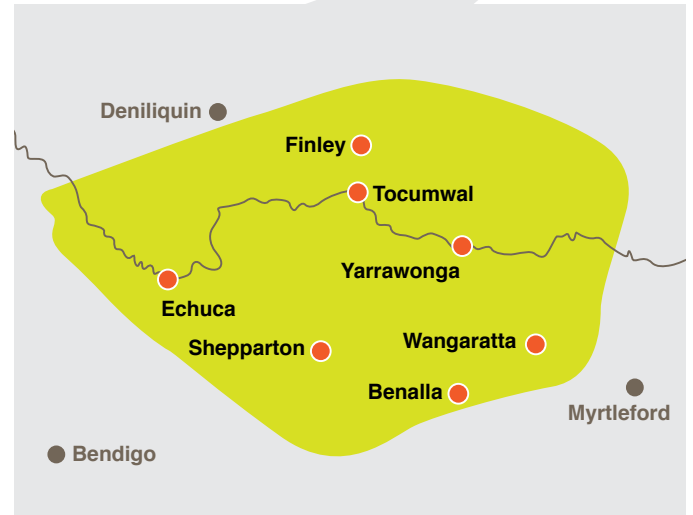




## The woodland bird communities of sand hills

Sand hills generally support a much more diverse array of tree and shrub species than the surrounding box woodlands and red gum forests. Combined with their varied physical structure of different sized trees, a patchy understorey, the presence of fallen timber and open grassy areas, sand hill woodlands provide many critical habitat features that appeal to woodland birds. But despite the special habitats they provide, the small physical area and restricted and isolated nature of sand hill woodlands limits their capacity to support their own characteristic bird community. Instead, sand hill bird communities are generally composed of species from the surrounding vegetation types. However, there are certain species that do take advantage of what sand hill habitats have to offer and that's what makes them such hotspots for woodland bird diversity. For example, the sandy soils provide ideal breeding sites for Rainbow Bee-eaters which excavate tunnels into the soft ground - the end of which contains a nest chamber where they lay their eggs and raise their young underground. And White-browed Babblers are virtually restricted to sand hill woodlands in Yorta Yorta Country, building their spherical twiggy nests amongst dense clumps of wattles and foraging in leafy litter underneath.

Over half of the bird species recorded in sand hill woodlands during this project are specialist ground-foragers, such as Chestnut-rumped Thornbills, Southern Whiteface and Red-browed Finches. Sand hills that occur as raised 'islands' amongst riverine forests of red gum are obviously a good choice for species that feed on the ground because their habitat is not affected by forest flooding. Floods never sweep away the fallen debris that is found on sand hills, allowing ground-foraging birds to make good use of this accumulated habitat. Even those sand hill woodlands on the floodplains away from the river systems, occurring now as remnants on low sandy rises amongst farming landscapes, are a haven for woodland birds. Sand hills are also very important because of their understorey shrubs, small ground-covers and native grasses, all of which provide valuable foraging opportunities for insect, seed and fruit feeding birds.



The Sand Ridge Woodland Project is helping to protect and restore these valuable and diverse woodland communities through active planning and management by three main methods:

1. In remnants, strategic fencing is being used to manage stock grazing, control pest plants and animals, and restrict vehicle access to enhance vegetation diversity and structure,
2. Revegetation through direct-seeding and hand planting is putting native vegetation back on cleared areas,
3. Strategic monitoring is being undertaken to measure the effectiveness of habitat management actions so that comparisons can be made in the future, to further our understanding of this woodland community and help inform future management.



*The Superb Parrot is an iconic bird of sand hill woodlands in Yorta Yorta Country.*

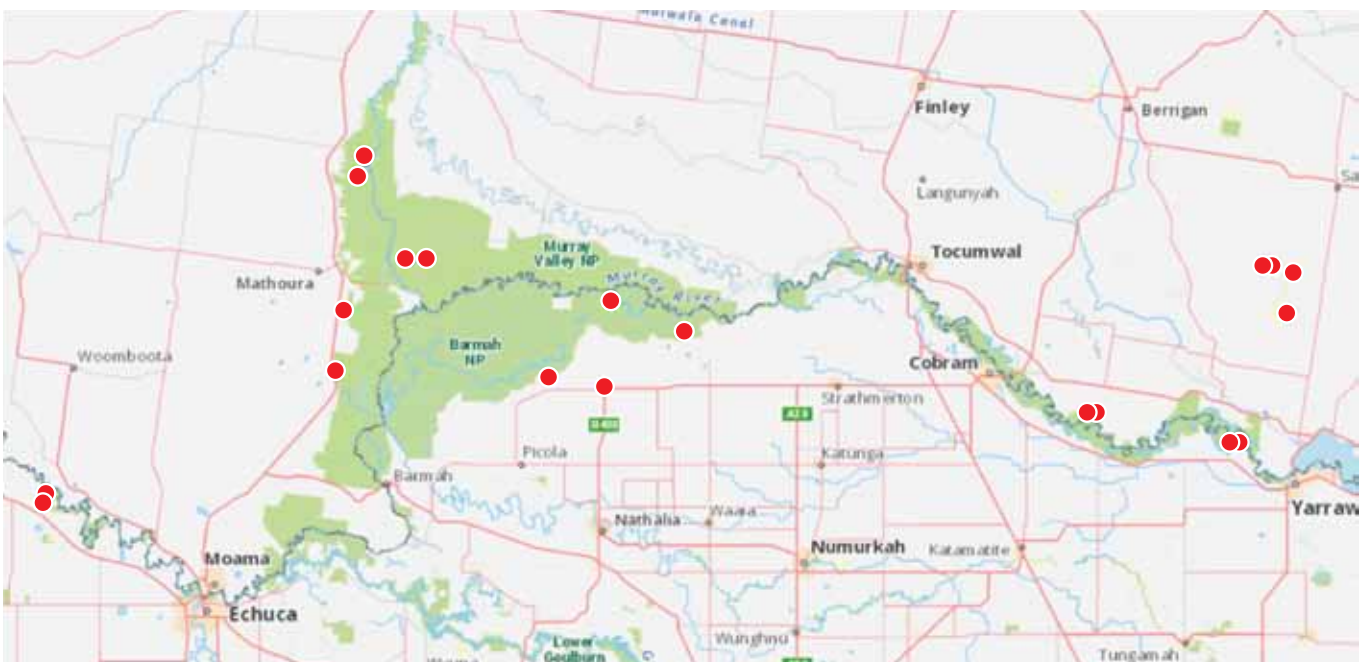




High quality sand hill woodland on Cornalla sand ridge in the Millewa forest, NSW.

## The Sand Ridge Woodland Project

Sand hills have had little if any standardised bird monitoring in the past, so results from this monitoring are providing new insights into the birds that inhabit these woodlands. This booklet summarises the results of the 160, 20-minute bird surveys that occurred at twenty sites for two years (2015-2017), carried out by Chris Tzaros (Birds Bush and Beyond) and members from the Yorta Yorta Nation Aboriginal Corporation's (YYNAC) *Woka Walla*<sup>2</sup> crew which is an enterprise that contributes to a range of on-Country environmental projects. These surveys established a benchmark with which future surveys can be compared to determine change over time, particularly as revegetated and protected areas continue to increase in quality.



Location of Sand Ridge Woodland Bird Survey sites in Yorta Yorta Country.



Ashton Cashion, Chris Tzaros and Zac Gilbert conducting sand hill woodland bird surveys.

## The contribution of Yorta Yorta People to woodland bird monitoring in the sand hills

The bird surveys importantly involved active participation and involvement of Aboriginal people from the Woka Walla crew. By engaging Woka Walla, young Aboriginal People have been given the opportunity to participate directly to an important ecological monitoring program. Participants have acquired skills and scientific knowledge of woodland birds on their traditional lands, how to identify different species, the role they play in ecosystems and the methods by which bird surveys can be undertaken. This experience has been rewarding and enriching where western science meets traditional ecological knowledge, for both Aboriginal and non-Aboriginal people alike, to practice and respect the tradition and lore of caring for Country, and recognising that woodland birds are a very important part of this story.

Having worked with the Woka Walla works crew for nearly 3 years, Ashton Cashion from Mooroopna, on the Goulburn River, is part of an energetic team that has been involved in a range of Sand Ridge Woodland Project activities including weed control, tree-planting, fencing for habitat protection and rabbit control.

As a regular participant in the woodland bird surveys since the beginning, Ashton is a shining example of how patience, enthusiasm, curiosity, attention to detail and cultural knowledge have all come together, enabling him and his colleagues to excel at the art of bird-watching and survey techniques.

*“At the start, it was a bit hard to learn the birds, especially by their calls”* revealed Ashton when interviewed about the project. *“But after a while I got the hang of it a bit more and now I can identify about 30 species, where I could only recognise a handful at first”*. As for what is most enjoyable about the bird surveys, Ashton commented that seeing the different birds come and go with the changing seasons was of great interest, and taking note of the different numbers. When asked about his favourite bird of the sand hills, Ashton claimed that the Diamond Firetail was at the top of the list because it was the first bird he could confidently identify by call. *“Doing more bird surveys is definitely something I’m keen to do in the future. Being out in the bush and just understanding more about what’s out there is what appeals to me about doing the bird surveys”* Ashton concluded.



## Monitoring birds of the sand hill woodlands

Everyone has heard the story of the 'canary in the coalmine', which was an effective early warning signal of toxic gases in underground mines. Monitoring of wild birds can also tell us a lot about the health of our natural ecosystems. Different species often use different habitats and they rely on various resources within a woodland ecosystem, so their presence, absence or abundance may act as a useful indicator of habitat type and quality. For the Sand Ridge Woodlands Project, information on woodland birds can not only be useful to protect important high-quality remnants at key sites. Results can tell us how effective habitat restoration actions have been, what features of the habitat are present or in a particular condition, and inform future management activities.

Monitoring sites were selected to represent a range of sand hill vegetation types, patch sizes, habitat condition and age structure, and over different seasons. This was to compare:

1. Woodland bird community composition between sites with different attributes, including those that had been revegetated, and
2. To determine changes to bird communities over time in response to seasonal changes.

For each species, both their reporting rate (the percentage of surveys in which a species was detected), and their abundance (the average number of individuals per survey where detected) was calculated.

## Indicators of quality sand hill habitat



Like most finches, the striking Diamond Firetail feeds on the ground on small seeds. They live in family groups and typically build their bulky grass nests in the foliage of tall shrubs and eucalypt saplings. Being specialised in their diet, the presence of Diamond Firetails usually indicates a complex, high-quality woodland ground-layer complete with a range of native grasses and herbs, coupled with nearby taller dense vegetation for nesting. Though there are other birds that also feed on the ground on seeds, the Diamond Firetail is one of the more reliable indicators that ground habitat is in good condition. In Yorta Yorta Country, sand hill woodlands provide important habitat for this species which is declining in many woodland areas across south-eastern Australia.



Brown Treecreepers are a familiar bird of many woodland habitats throughout Yorta Yorta Country, including red gum forests, box woodlands and sand hill communities. They conspicuously clamber over tree trunks and branches as they actively search for insects such as spiders and beetles, all the while giving their distinctive *pink-pink* contact calls. Requiring tree-hollows for nesting, Brown Treecreepers typically indicate the presence of mature hollow-bearing trees. The species was found across all of the vegetation types surveyed during this project, but their reporting rate was highest in Grey Box dominated woodland, followed by Native Cypress-pine.

## What was found?

A total of 89 different woodland bird species were recorded. The average number of species recorded at each site was 31.7, ranging from 45 species at the high-quality Wahgunyah forest near Savernake, New South Wales, to 15 species at a simplified sand hill remnant at Kilnyana, also near Savernake. The high-quality remnant woodland of Yellow Box, Grey Box and White Cypress-pine at Wahgunyah forest also yielded the greatest number of species detected on a single 20-minute transect, with 24 species being recorded. On average, 11 species were recorded per 20-minute survey and the lowest recorded was three species.

The most commonly recorded birds, occurring at 15 or more sites and with a reporting rate of over 50%, were the Yellow Thornbill, Yellow-rumped Thornbill, Superb Fairy-wren, Striated Pardalote and Weebill. These species are regarded as 'generalists' and commonly occupy a range of different habitat types, including sand hill woodlands. A large range in the reporting rates of individual species is apparent in any bird monitoring project. In this study, reporting rates ranged from 0.63% when a species was seen only once in the 160 surveys, to 67.50% for the abundant Yellow Thornbill. For those 17 species that had a reporting rate of less than 1%, there is little that can be determined regarding trends during the survey period. For this study, 80% of the 89 species recorded had a reporting rate above 1% and these are listed in the table below.

Common name	Reporting Rate (%)	Abundance	Common name	Reporting Rate (%)	Abundance
Yellow Thornbill	67.50	7.16	Pied Butcherbird	8.75	1.36
Yellow-rumped Thornbill	60.00	5.41	Western Gerygone	8.75	1.29
Superb Fairy-wren	56.25	7.00	Sulphur-crested Cockatoo	8.13	4.23
Striated Pardalote	50.63	2.80	Dusky Woodswallow	8.13	3.62
Weebill	49.38	4.14	Little Friarbird	8.13	1.85
Rufous Whistler	41.25	1.97	Hooded Robin	7.50	1.67
White-plumed Honeyeater	40.63	3.95	Sacred Kingfisher	7.50	1.17
Red-capped Robin	40.00	1.95	White-browed Babbler	6.88	4.27
Eastern Rosella	36.25	3.48	Tree Martin	6.88	4.18
Grey Fantail	34.38	1.73	Crested Pigeon	6.88	3.00
Willie Wagtail	30.00	1.79	Grey-crowned Babbler	6.25	2.80
Red-rumped Parrot	29.38	5.40	Striated Thornbill	5.63	4.22
Galah	29.38	3.79	Grey Butcherbird	5.00	1.63
Grey Shrike-thrush	28.75	1.28	Spotted Pardalote	4.38	4.29
Yellow Rosella	25.63	3.76	Superb Parrot	4.38	2.71
Australian Magpie	24.38	2.21	Wedge-tailed Eagle	3.75	1.50
Common Bronzewing	23.13	3.19	Golden Whistler	3.75	1.50
Jacky Winter	23.13	1.97	Brown Falcon	3.13	1.20
Brown Treecreeper	22.50	3.00	Whistling Kite	3.13	1.00
Chestnut-rumped Thornbill	20.63	3.76	Varied Sittella	2.50	3.50
Silvereye	20.00	5.16	Diamond Firetail	2.50	2.00
Buff-rumped Thornbill	19.38	4.23	Scarlet Robin	2.50	1.75
Mistletoebird	18.13	1.31	Olive-backed Oriole	2.50	1.75
White-throated Treecreeper	16.88	1.30	Crested Shrike-tit	2.50	1.25
Noisy Miner	16.25	4.88	Restless Flycatcher	2.50	1.25
Black-faced Cuckoo-shrike	16.25	1.31	Brown Goshawk	2.50	1.00
Peaceful Dove	15.63	2.96	Horsfield's Bronze-cuckoo	2.50	1.00
Rainbow Bee-eater	15.00	3.46	White-browed Woodswallow	1.88	3.00
Brown-headed Honeyeater	14.38	3.09	Magpie-lark	1.88	1.67
Noisy Friarbird	13.13	2.29	Red Wattlebird	1.88	1.00
White-winged Chough	12.50	7.80	Flame Robin	1.25	3.50
Australian Raven	10.63	1.82	Pied Currawong	1.25	2.00



Chestnut-rumped Thornbill



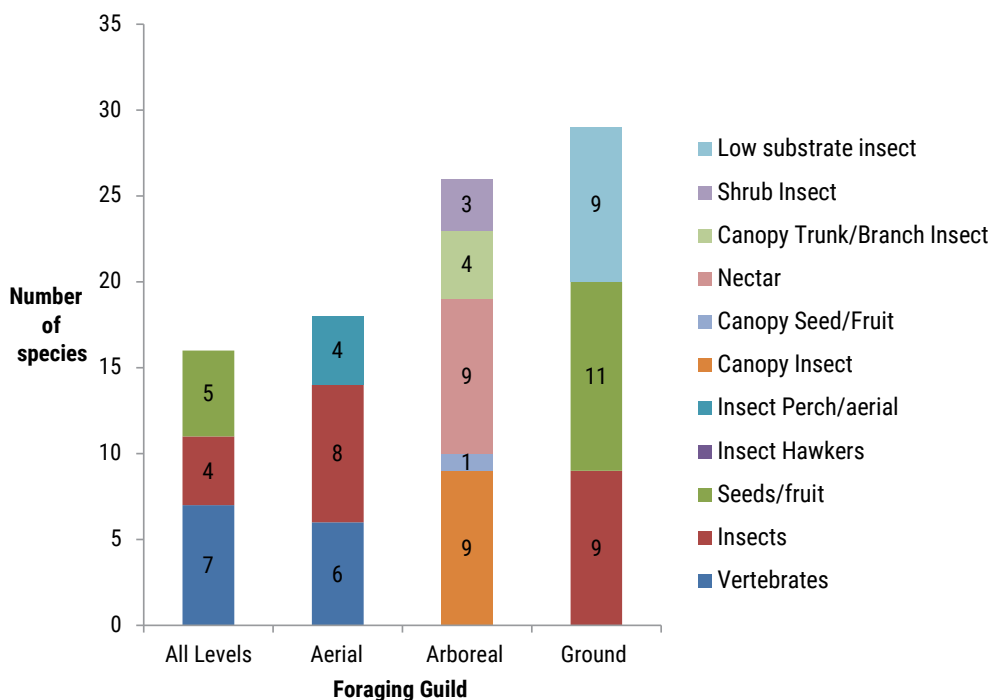
Grey Fantail

## What they eat equals where they are found!

To help explain the patterns in bird populations found during the Sand Ridge Woodland Birds Project, bird species recorded during the surveys were placed into foraging guilds (i.e. where birds feed) and dietary classes (i.e. what birds eat). Amongst bird ecologists, there is no absolute consensus on what foraging guilds are or what species should be placed into each guild or class, but classifications used here were based upon observations made during the surveys and information contained within the literature. Birds representing four foraging guilds and 11 dietary classes were recorded (see chart below).

Insect-eating birds were by far the dominant dietary class containing 50 species (56.2% of the total species recorded). Insectivores were mainly represented by ground-foraging and arboreal feeding species (34 species). Of the ground-foragers, 18 (62%) of the 29 species in that guild were

insectivorous. This included species that glean insects from the ground surface and low vegetation, such as the Chestnut-rumped Thornbill, Southern Whiteface and White-winged Chough, as well as those that utilise low substrates like fallen branches in which to find their food, such as the Willie Wagtail, Buff-rumped Thornbill and Red-capped Robin. Of the arboreal foragers, 16 (61.5%) of the 26 species in that guild were insect-feeders. This comprised species that feed in tree foliage such as Striated and Spotted Pardalotes, Weebill and Black-faced Cuckoo-Shrike, canopy branches and trunks such as White-throated Treecreeper and Varied Sittella, and shrubs such as the Yellow Thornbill and Silvereye. Most of the remaining insect-feeders (16 species) took their prey on the wing, either by hawking insects above and between the canopy such as the Dusky Woodswallow and Tree Martin, and by snatching aerial insects from a nearby perch, such as the Jacky Winter and Grey Fantail.



The number of woodland bird species per foraging guild and dietary class.





*Peaceful Dove*

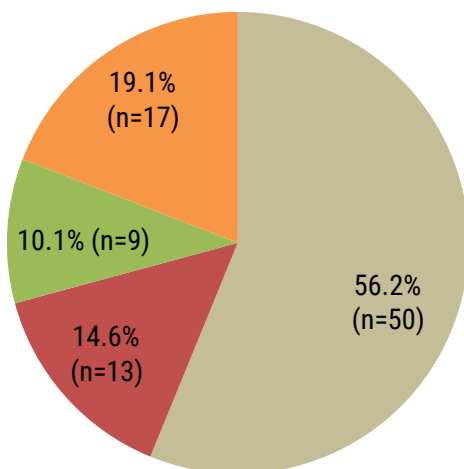


*Grey Butcherbird*

Seed and fruit-feeding species also made up a large component of the sand hill bird fauna, containing 17 species (19.1% of the total species recorded). Eleven of these species were ground-foragers such as the Peaceful Dove, Red-rumped Parrot and Diamond Firetail, whereas the remaining six species consume seeds/fruit at all levels, from trees, shrubs and on the ground, such as the Sulphur-crested Cockatoo, Eastern Rosella and Superb Parrot.

Thirteen species (14.6% of the total species recorded) were carnivorous, feeding on vertebrates such as other birds, small mammals, reptiles, frogs or large insect prey. Carnivores represented two foraging guilds – species that forage at all levels of the woodland, such as the Grey Butcherbird, Laughing Kookaburra and Australian Raven, and aerial species that scan for prey whilst on the wing, such as the Whistling Kite, Wedge-tailed Eagle and Peregrine Falcon.

Nectar-feeders made up the smallest dietary class, comprising nine species (10.1% of the total species recorded). All nectarivores belonged to the arboreal foraging guild, where species such as the Noisy Friarbird, Little Friarbird, White-plumed Honeyeater and Brown-headed Honeyeater primarily forage on the blossom of trees such as Grey Box and Yellow Box. However, floral resources provide an inconsistent supply of food for birds, only being present for part of the year, so nectarivorous species typically supplement their diet with sugary exudates such as manna (sap appearing on leaves and branches after insect attack), honeydew (sweet fluids secreted by tiny bugs on foliage and bark) and lerp (the sugary covering of the psyllid insect found on eucalypt leaves).



■ Insectivores   ■ Nectarivores  
 ■ Carnivores   ■ Seed/Fruit

*Percentage and number of woodland bird species per aggregated dietary class.*



*White-plumed Honeyeater*



*Dusky Woodswallow*



*Mistletoebird*

## Woodland birds in different sand hill habitat types

Birds were surveyed across three different sand hill woodland vegetation types; Yellow Box, Grey Box, or Native Cypress-pine dominated woodland. The woodland bird community was most diverse in both of the box eucalypt vegetation types, with Grey Box habitat supporting 73 species and Yellow Box supporting 67 species. Native Cypress-pine dominated woodland, comprising either White Cypress-pine or Murray Pine, and often associated with Buloke, supported 63 species. Seasonal changes had little influence on the species richness per habitat type, with the number of species per habitat remaining relatively constant throughout the year.

Grey Box and Yellow Box woodlands were richer in species that feed on aerial insects, both those that hawk insects on the wing, such as the Dusky Woodswallow, and those that catch their prey in the air from a nearby perch, such as the Dollarbird. The increased number of these species may be attributed to the wider spacing between trees in these habitats – the open space providing good aerial foraging opportunities. Grey Box and

Yellow Box sand hill woodland also supported substantially higher numbers of both nectar-feeding, and birds that feed on insects on tree trunks and branches. This concurs with the fact that Grey Box and Yellow Box are the most notable nectar-producing trees found across Yorta Yorta Country. In addition, these trees have flaking and decorticating (peeling) bark on the upper limbs. Therefore, both nectar and bark insect resources are likely to be more readily available than in Native Cypress-pine sand hill woodland.

Apart from having a higher overall species richness, box sand hill habitats also supported higher reporting rates of a number of species, particularly the Laughing Kookaburra, Striated Pardalote, Weebill, Mistletoebird and White-throated Treecreeper, which occurred at reporting rates around double those of Native Cypress-pine habitat. Eucalypt foliage was the preferred foraging substrate for birds like pardalotes and Weebills because their primary source of food - lerp and foliage insects, are more prevalent on eucalypt leaves. Parasitic mistletoe was more commonly found



*Dollarbird*

*Sand hill woodland on Tongalong sand ridge in Barmah National Park. This patch is dominated by Yellow Box with a sparse understory of Gold-dust Wattle and a healthy ground-layer of native grasses, fallen timber and bare areas – great habitat for a variety of woodland birds.*



growing on Grey and Yellow Box trees, thus supporting higher numbers of Mistletoebirds – a species which feeds almost solely on the fruit of mistletoe. White-throated Treecreepers and Varied Sittellas feed mainly in the upper branches and trunks of trees, probing under bark in search of insects, and again this foraging substrate is more readily available on box eucalypts, explaining the higher reporting frequency of those species in box sand hill habitat compared to Native Cypress-pine.

Native Cypress-pine dominated habitat supported fewer overall species than box sand hill woodlands, and that finding was somewhat unexpected. However, Native Cypress-pine sites were particularly rich in a number of small woodland birds, such as the Horsfield’s Bronze-cuckoo, Grey Shrike-thrush, Red-browed Finch, Southern Whiteface and White-browed Babbler, which occurred at more than double the reporting rate in Native-pine habitat than in box sand hill woodland. One reason for this preponderance of these species is that Native-pine habitats appear to be

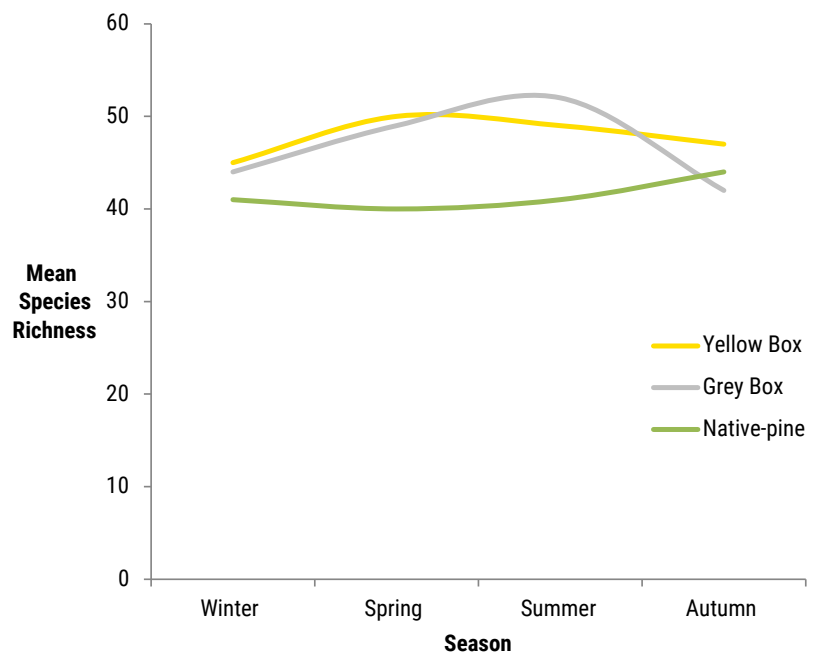
less attractive to the native but highly aggressive Noisy Miner – a species that prefers open box eucalypt woodland, especially those in a fragmented and modified condition. Noisy Miners often dominate sites where they occur, effectively excluding nearly all other small-medium sized birds. In this project, Noisy Miners occurred at 8 (40%) of the 20 bird survey sites, mostly within Yellow Box dominated habitat (reporting rate of 39.29%), and rarely within Native Cypress-pine woodland (reporting rate of 2.08%). Therefore, small woodland birds sensitive to Noisy Miner aggression are able to find enough cover in the diverse Native-pine dominated sand hill communities. This demonstrates the importance of Native Cypress-pine remnants even if they have fewer species.



*Horsfield's Bronze-cuckoo*



*Noisy Miner*



*Mean species richness in each sand hill vegetation community over the four seasons (combined over the two years).*



## Seasonal changes to sand hill woodland bird communities

Seasonal variation has a strong influence on the composition of bird communities and the distribution of many species. Monitoring woodland birds on a regular seasonal basis gives us a much clearer picture of when, what and where different birds are moving, and which species are resident year-round.

Species that do show seasonal movements are categorised in different ways based on their patterns of movement. Migratory species include those whose entire populations move from one part of Australia to another. Partial migrants can turn up almost anywhere anytime, and show more irregular movements, moving around the broader landscape in response to food availability such as flowering eucalypts or mistletoe (e.g. Noisy Friarbird), changes in insect abundance (e.g. Grey Fantail) and seeding of particular shrubs or grasses (e.g. Superb Parrot). Although these species may be present in the sand hills year-round, their populations may be supplemented at particular times of the year, thus their abundance varies seasonally.

Seasonal changes in bird species in this project elicited some interesting results. A few species results are described below to illustrate the diversity of species' movements, and the importance of sand hills in the life cycle of these woodland birds.

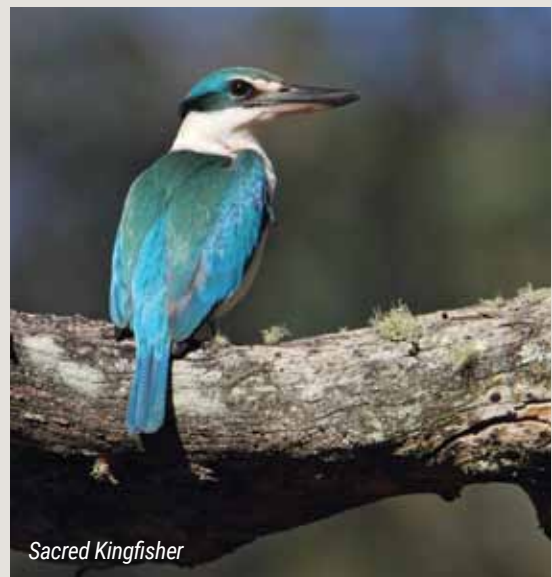
Season had little overall effect on the number of bird species recorded during surveys. Spring (68 species) and summer (69 species) yielded the greatest species richness, but these figures were not much higher than autumn (64 species) and winter (63 species). However, autumn and winter yielded higher total numbers of individual birds than spring and summer. This is most likely due to bird behaviour at these times. In the autumn and winter, many species occur together in flocks, often mixed with other species, but in spring and summer, they establish and maintain breeding territories so they are only seen in pairs or singly, rather than flocks.

Migrants such as the Rainbow Bee-eater, Sacred Kingfisher and White-browed Woodswallow arrived in early spring to breed in the area and stayed until the end of summer, then headed back to inland and northern parts of Australia. There are also autumn-winter migrants, such as the Flame Robin, Yellow-faced Honeyeater and Golden Whistler, which were only recorded in the sand hill woodlands during the cooler seasons. These species typically move north from the mountainous environments of the Great Divide.



*Silvereeye*

The Silvereeye is an example of a partial migrant. It is a small, non-descript insect-eating bird that specialises on foraging in shrubs, and they are present in sand hill woodlands throughout the year. The reporting rate for this species was relatively consistent each season; autumn (20.0%), winter (17.50%), spring (20.0%) and summer (22.50%). However, if we look at their abundance, we realise that there are substantially more individual Silvereeyes occurring in the autumn and winter (average of 7.3 individuals per survey where detected), compared with spring and summer (average of 3.3 individuals per survey). This is due to the arrival of many birds from Tasmania and southern Victoria that migrate northwards into drier woodland habitats, such as sand hill communities, at this time.



*Sacred Kingfisher*

Sacred Kingfishers were completely absent from the sand hill woodlands during winter, but were recorded at an average reporting rate of 15.0% in spring-summer. These warm season migrants to south-eastern Australia, including Yorta Yorta Country, arrive in September-October from northern Australia and perhaps even further afield from Papua New Guinea and Indonesia, and they generally depart around April.



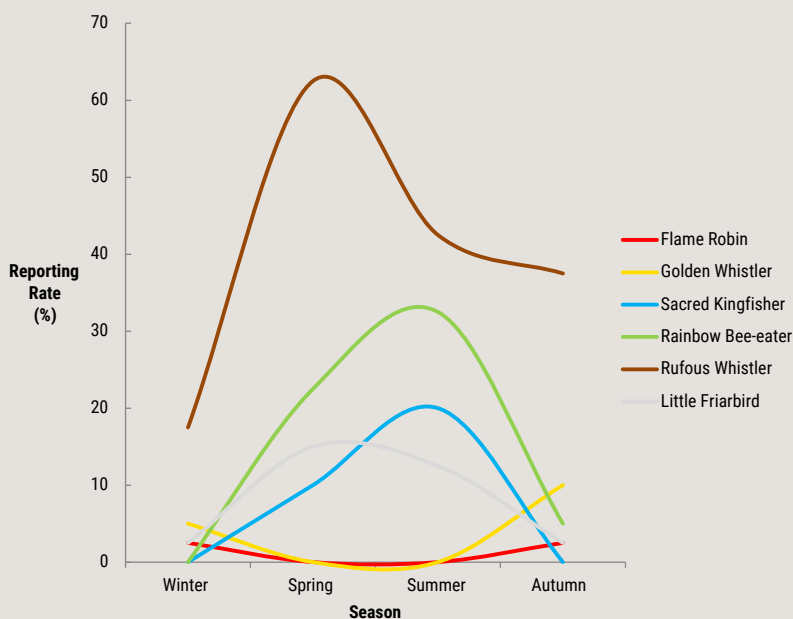
Flame Robin

Flame Robins are altitudinal migrants; every autumn, virtually the entire population leaves their breeding habitats in the mountainous forests of the Great Dividing Range, and the high country of Tasmania, migrating to drier and more open areas such as the woodlands of northern Victoria and southern New South Wales. In winter, they typically form flocks comprised largely of 'brown' birds. These are a mix of female and young birds – males not acquiring their bright orange plumage until their second year. It is truly remarkable that such little birds, occasionally in the company of others such as Striated Pardalotes, Grey Fantails and Silvereyes, disperse and migrate so far, especially those from Tasmania. It clearly demonstrates the importance of protecting and managing habitat in all areas of a species range, both in their breeding and wintering areas. This species has undergone a steady decline in recent decades, consequently being included on the New South Wales threatened species list.



Golden Whistler

Only small numbers of Golden Whistlers were recorded throughout the sand hill woodland bird surveys, typically in association with other autumn-winter migrants. At this time, much of the Golden Whistler population spreads inland from the ranges and areas closer to the coast in eastern Australia.



Variation in the seasonal reporting rates of some woodland birds recorded during the sand ridge woodland bird surveys.



Rufous Whistler



Little Friarbird

Rufous Whistlers and Little Friarbirds occur in the sand hill woodlands throughout the year but they are significantly more common in spring-summer when migrating birds arrive from further north in Australia.

## Bringing birds back – How has revegetation helped?

*Perched in the dappled light at the edge of a small rounded hopbush, a male Red-capped Robin sat motionless as it scanned the nearby ground for its next meal. In one sudden movement, amid a flash of black, red and white, the bird pounced on a small moth that had caught its keen eye. Prey firmly clasped within its beak, the robin fluttered to a nearby perch and proceeded to beat its prey against the branch, after which it gulped down its tasty catch. A moment later, the bird perched atop another nearby shrub, this time a daisy-bush, and repeated its stealthy craft to locate more food.*

As this short story indicates, one of the most important features of sand hills for woodland birds is understorey vegetation. Shrubs, especially in dense patches with various species, offer ideal foraging opportunities for insect-feeding birds such as Grey Fantails and Yellow Thornbills. Common Bronzewing and Red-capped Robin typically feed from the ground underneath patches of shrubs, taking seed and small insects respectively. They also afford good shelter for nesting for birds such as White-browed Babblers and Red-browed Finches, and dense cover from predators and aggressive birds. Sparse shrubs provide important vantage points for birds that prefer more open spaces, such as Hooded Robins and Jacky Winters, and also provide important food for the seed-eating Superb Parrot and Yellow Rosella.

Reintroduction of shrubs at sand hill sites has occurred to varying degrees since 1997. Much of the earlier work was conducted by Greening Australia in the late 1990s and early 2000s at strategically selected sites to benefit threatened flora and fauna and protect sites from over-grazing. More recently, the Sand Ridge Woodland Project has protected revegetated and/or enhanced 2,349 hectares of sand hill country since 2013!

Of the 20 bird survey sites, six were set up in areas where understorey vegetation was mature and revegetation well-established (i.e. 15-20 years old), and six were at sites without any understorey (or sites that have only recently been revegetated within the past year or so).

Bird communities on sand hills with understorey shrubs differed substantially from those without understorey. The average number of species recorded at shrubby sites was 34.3, whereas at sites without understorey the average number of species was 26.8. Similarly, at sites with understorey vegetation, the average reporting rate for woodland birds was 20.97%, compared with 12.78% at sites with no understorey.

But not all species respond the same way to revegetation. Some species, such as the Brown Treecreeper, Jacky Winter and Hooded Robin, prefer an open woodland structure and are not necessarily benefited by the presence of understorey. Revegetated sites contained four species (Painted Button-quail, Superb Parrot, Flame Robin and White-browed Babbler) that did not occur at sites without shrub understorey, and conversely sites without revegetation supported five species not present at revegetated sites (Little Eagle, Hooded Robin, Varied Sittella, Apostlebird and Diamond Firetail). However, when comparing the reporting rate of birds found at both revegetated and non-revegetated sites, it is apparent that these species occurred much more frequently and generally in higher numbers at



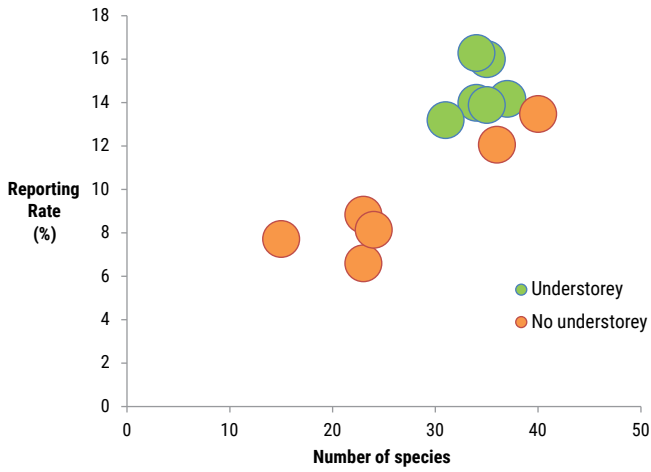
*Revegetated sand hill woodland on Cumalong sand ridge, Millewa forest, NSW.*

sites with revegetated understorey. The species that were both higher in abundance and reporting rate were those that are most reliant on understorey shrubs for foraging and/or nesting, such as the Red-capped Robin, Western Gerygone and Grey-crowned Babbler.

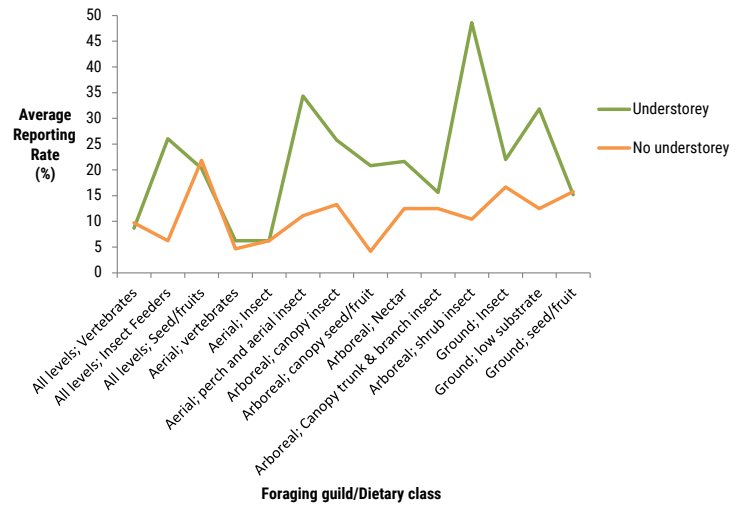
There were also considerable differences between sites with and without understorey in the composition of foraging guilds. Sites with understorey supported much higher reporting rates for species representing the arboreal and ground foraging insectivore guilds - the most significant disparity being in the shrub feeding insectivores, aerial perch insectivores, all level insectivores and ground/low substrate insectivores. A complex and diverse habitat with multiple structural layers clearly benefits most bird species in sand hill woodlands. Sites without understorey generally supported lower reporting rates of birds across all foraging guilds and dietary classes, except vertebrate feeders that forage at all levels, seed/fruit feeders that forage at all levels and seed/fruit feeders that forage on the ground.

Revegetation through direct-seeding, such as this example on the Cumalong sandhill in the Millewa forest in New South Wales, brings back structural diversity to woodland habitat, benefitting a wide range of bird species. Many small woodland birds are able to utilise revegetated habitat within a year or so, but their response is more noticeable as shrubs mature and self-regenerate. Within 3-5 years, many woodland birds are able to reside and even breed in revegetated habitat. Parts of this site were direct seeded initially in 2001, with follow-up in 2006, and then broad-scale direct seeding occurred in 2011 and, most recently through the Sand Ridge Woodland Project, in 2015.





The number of species and their reporting rate at sites with and without understorey vegetation. Only two of the sites without understorey supported relatively high species richness and reporting rates, with similar figures to sites with understorey.



A comparison of the average reporting rate of woodland birds by foraging guild and dietary class at sites with and without understorey.



Yellow Thornbill

At home amongst the shrubs, Yellow Thornbills are small insectivores that glean their prey from the foliage of tall shrubs, as well as low in the tree canopy. This species was recorded much more frequently and were significantly more abundant at sites with an established understorey.



Yellow Rosella



Superb Fairy-wren

Superb Fairy-wrens are specialist understorey dwellers of sand hill woodlands. Though they are regularly seen out in the open bouncing around on the ground and in amongst fallen branches, they are never far from cover. When disturbed, they retreat quickly to dense shrubs where they shelter until danger has passed. At sites with understorey, Superb Fairy-wrens were four times more frequently recorded than sites without understorey.



Common Bronzewing



Red-capped Robin

The striking Red-capped Robin is typical of so many ground-foraging woodland birds in that it relies on a combination of understorey shrubs, fallen branches and patches of open ground with short grass or sparse debris. This species was particularly widespread and occurred at nearly all of the bird survey sites, absent only from three sites that did not support understorey vegetation. Revegetation on bare sand hills, and restoring understorey on sand hills that contain remnant trees but lack that all-important shrub layer, really benefits species such as the Red-capped Robin, Grey-crowned and White-browed Babblers and Superb Parrots.

Yellow Rosellas and Common Bronzewings forage on seeds and make use of understorey vegetation in different ways. Yellow Rosellas feed on seeds of shrubs but they also forage widely on seeds and buds in trees and from a variety of grasses and weeds on the ground, often in the open and not necessarily around shrubs. This species was recorded at similar reporting rates at sites with and without understorey, but their abundance was higher at sites without understorey. Common Bronzewings on the other hand are virtually always found in amongst the understorey, foraging on fallen seed on the ground below shrubs that have seeded, especially wattles. This species was recorded at twice the reporting rate at sites with understorey as opposed to sites without shrubs.

## Threatened and declining birds in sand hill woodlands

This project has confirmed that sand hill woodlands are of immense regional significance to a range of birds and other wildlife, including many rare and threatened species. Nine (10.1%) of the 89 woodland bird species recorded on the surveys are currently listed as threatened either in Victoria, New South Wales or both. Two species are listed as 'Endangered' in Victoria and nine species are listed as 'Vulnerable' in New South Wales. One species is recognised nationally as 'Vulnerable'. The respective classifications for each threatened species can be seen in the table below.

In addition to threatened species, there were 12 species recorded on the surveys that are regarded as 'declining' throughout their south-eastern

Australian range. These species occur in low densities throughout the region and though they have no specific threatened status, their populations have shown a significant downward trend over the past couple of decades. A number of these declining species are among a group listed in Victoria as the threatened 'Temperate Woodland Bird Community'. Of the decliners, the Red-capped Robin was the most widespread species recorded during this project, found at 17 (85%) of the 20 sites, occurring on 40.00% of all surveys conducted over the two years. This was followed by the Brown-headed Honeyeater, which occurred at 11 (55%) of the sites (at a reporting rate of 14.38%), and the Jacky Winter at 10 (50%) of the sites (at a reporting rate of 23.13%).

Species	Number of sites present	Total number of individuals collectively over all sites	Reporting rate (%)	Abundance	Conservation status		
					Vic.	NSW	National
<b>Threatened species</b>							
Superb Parrot	6	19	4.38	2.71	E, TW	V	V
Dusky Woodswallow	5	47	8.13	3.62	-	V	-
Scarlet Robin	4	7	2.50	1.75	-	V	-
Grey-crowned Babbler	3	28	6.25	2.80	E, TW	V	-
Hooded Robin	3	20	7.50	1.67	TW	V	-
Varied Sittella	3	14	2.50	3.50	-	V	-
Diamond Firetail	3	8	2.50	2.00	TW	V	-
Flame Robin	2	7	1.25	3.50	-	V	-
Little Eagle	1	1	0.63	1.00	-	V	-
<b>Declining species</b>							
Brown Treecreeper	8	108	22.50	3.00	TW	-	-
Red-capped Robin	17	125	40.00	1.95	TW	-	-
Brown-headed Honeyeater	11	71	14.38	3.08	TW	-	-
Jacky Winter	10	73	23.13	1.97	TW	-	-
Western Gerygone	8	18	8.75	1.29	TW	-	-
Southern Whiteface	5	85	9.38	5.67	-	-	-
White-browed Babbler	4	47	6.88	4.27	-	-	-
Restless Flycatcher	3	5	2.50	1.25	-	-	-
Crested Shrike-tit	2	5	2.50	1.25	-	-	-
Fuscous Honeyeater	1	1	0.63	1.00	TW	-	-
Painted Button-quail	1	1	0.63	1.00	TW	-	-
Apostlebird	1	1	0.63	1.00	TW	-	-

Summary of threatened and declining species recorded during the bird surveys.

TW = Victorian threatened Temperate Woodland Bird Community, V = Vulnerable, E = Endangered.



*Superb Parrot*

Aptly named, the Superb Parrot is an iconic species of sand hill woodlands throughout Yorta Yorta Country. It was recorded at six (30%) of the 20 survey sites, but its reporting rate was highest in habitat communities dominated by Native Cypress-pine (occurring on 6.25% of all surveys), followed by Grey Box (5.36%). Listed as Vulnerable in New South Wales and nationally, and Endangered in Victoria, this species depends on a variety of native shrubs such as wattles and hop-bush, and ground-covers such as saltbushes, as a food source. This is particularly important during and just after breeding. In spring, small flocks of adult males gather in some sand hill woodlands, dangling like Christmas decorations from the outer foliage of shrubs as they forage on seed pods, whilst their female partners are back on the nest in nearby red gum forests. Once young birds fledge, they too are partial to feeding on shrubs, joining their parents and learning which foods to consume. Protecting large old wattles and hop-bushes on the sand hills and allowing them to regenerate, and restoring understorey shrubs in patches on some of the bare areas, is really important for the conservation of this high-profile threatened species.



*Hooded Robin*

Having disappeared from much of their temperate woodland range in recent years, there is a lot of concern for the future of the Hooded Robin in south-eastern Australia. Hooded Robins, which are listed as Vulnerable in New South Wales, occur sparsely throughout large areas of well-connected open woodland, especially patches without dense understorey. During this project, the species was detected at just 3 (15%) of the 20 survey sites, inhabiting Grey Box communities (where it occurred on 17.86% of all surveys in that habitat) and Native Cypress-pine woodland (4.17% of all surveys in that habitat). In these habitats, they were observed using open patches between widely spaced clumps of shrubby understorey. As a ground-foraging insect-feeder, the Hooded Robin watchfully waits on a low vantage point such as a stump or fallen branch, then snatches insects from the bare ground, so having some open areas of bare ground, leaf litter and short grass is important to allow this species to forage.



*White-browed Babbler*

Along with a suite of other woodland birds, the White-browed Babbler has declined in many areas across south-eastern Australia in recent decades. White-browed Babblers were present at 4 (20%) of the 20 survey sites, occurring at a reporting rate of 6.88% of all surveys. In Yorta Yorta Country, it is a species that is almost entirely dependent on sand hill woodlands, especially in shrubby patches of understorey at sites dominated by Native Cypress-pine. In this habitat, they typically build their football-sized nests made out of small twigs in the dense foliage of large wattles and other shrubs. They are highly sociable and gregarious birds. During the sand hill woodland bird surveys, they were observed in groups ranging in size from three to six birds. A ground-foraging insectivore, the species actively searches for small beetles, centipedes and other prey by tossing over leaves and bark and probing into crevices in the ground and amongst fallen branches, moving with bouncing hops from one place to another.





Western Gerygone



Rufous Whistler



Superb Fairy-wren

Above and below left: Small woodland birds, such as the Western Gerygone, Rufous Whistler, Superb Fairy-wren, Diamond Firetail and Southern Whiteface are all dependent on understorey shrubs and soon recolonise revegetated habitat.

## Successes of the Sand Ridge Woodland Bird Project: What have we learnt and where to from here?

People often query – does revegetation help woodland birds and assist with threatened species conservation and recovery? Results from this project clearly indicate that at sites where understorey revegetation has occurred, threatened and declining birds have generally responded well. However, survey results also suggest that revegetation needs to be heterogeneous, with clumps of shrubs in some areas, scattered shrubs in other areas, as well as open spaces with just grasses and trees. If we are to conserve most species then revegetation needs to reflect that different species have different habitat preferences both in terms of floristic composition (types of plant species present), structural complexity (physical attributes of the habitat) and condition (quality).

With the spotlight firmly on sand hill woodlands, and the Sand Ridge Woodland Project specifically targeting the protection and rehabilitation of sand hill woodlands, the future of these amazingly rich and diverse sites indeed looks promising throughout Yorta Yorta Country. As habitat regenerates at the long list of sites treated by this project, the benefit to woodland birds will be exponential. With these results in hand, it is obvious that a range of management approaches need to be undertaken on the sand hills to cater for the varied needs of all woodland birds, especially those that are threatened and declining.



Diamond Firetail

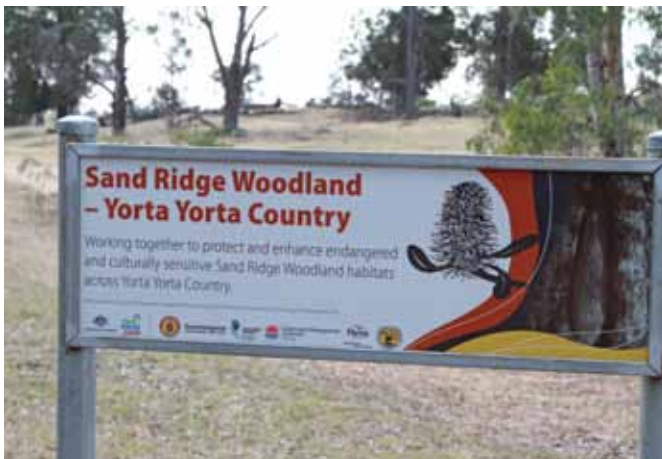


Southern Whiteface



Rainbow Bee-eater

Above: Fencing-off sand hills and protecting these sensitive areas from disturbance and over-grazing will benefit all woodland birds, such as the ground-nesting Rainbow Bee-eater, seen here emerging from its nest tunnel in a sand hill.



Cumalong sand hill, *Millewa forest*, NSW.



This regenerating habitat on the Cumalong sand hill will provide valuable future habitat for woodland birds.

## Key findings:

- Sand hills support a rich assemblage of woodland birds – a total of 89 different species were recorded during this project.
- Sand hill woodlands support many species that take advantage of what these habitats have to offer, such as soft sandy soils, patches of shrubby understorey, fallen branches and debris – that is what makes them such hotspots for woodland bird diversity.
- Over half of the bird species recorded in sand hill woodlands during this project are specialist ground-foragers, especially insectivorous species.
- Seed and fruit-feeding species comprise a large component of the sand hill bird fauna.
- Woodland bird communities were most diverse in Grey Box and Yellow Box vegetation types.
- Grey Box and Yellow Box woodlands were richer in species that feed on aerial insects.
- Grey Box and Yellow Box sand hill woodland also supported substantially higher numbers of nectar-feeding birds and species that feed on insects on tree trunks and branches.
- Native Cypress-pine dominated habitat supported fewer overall species than box sand hill woodlands – an unexpected result.
- Native Cypress-pine sites, however, supported a much higher number of small woodland birds. Most of these species occurred at more than double the reporting rate in Native Cypress-pine habitat than in box sand hill woodland.
- In this project, Noisy Miners occurred at just under half of the bird survey sites, mostly within Yellow Box dominated habitat and rarely within Native Cypress-pine woodland.
- Season had little overall effect on the number of bird species recorded during surveys. Generally, the greatest species richness was recorded in spring-summer but this was only marginally more than autumn-winter. However, autumn-winter yielded higher total numbers of individual birds than spring-summer.
- Seasonal variation in the occurrence of particular bird species is notable. There are many species that occur in Yorta Yorta Country only at certain times of the year, and these movements are regular and occur every year.
- Sand hill communities with understorey shrubs supported a greater number of woodland bird species than those without understorey.
- Similarly, at sites with understorey vegetation, the reporting rate for woodland birds was nearly double that of sites without understorey.
- Sand hill woodlands without understorey do, however, support some woodland birds that prefer this open structure.
- Many of the most commonly recorded species rely on understorey shrubs.
- A suite of threatened and declining species also prefer sites containing patches of understorey shrubs, highlighting the importance of revegetation.
- Diversity of habitat structure is important: a heterogeneous, patchy understorey is required with some shrubby patches and plenty of open foraging spaces as well.
- Threatened and declining species utilise many sand hill sites, often in good numbers.
- Noisy Miners appear to be a key threat to woodland bird diversity and abundance at many sites, especially open habitat lacking understorey.
- People with limited bird surveying experience have the capacity to quickly learn the woodland birds of their area with regular tuition and practice. Members of the *Woka Walla* crew that assisted with bird surveys considerably improved their bird recognition skills throughout the course of this project and are now able to identify by sight and sound most of the commonly encountered species in the sand hill woodlands.

## Recommended next steps and future research

- Continue to fence sand hills and revegetate, creating a mosaic of different habitats, with a patchy network of understorey shrubs as well as open bare areas.
- Revegetation should target both public and private land. There are numerous remnant sand hill woodlands on private property that could be fenced and improved for nature conservation.
- Noisy Miners are most-likely the reason for some species only occurring in Native Cypress-pine sand hill woodland. Additional survey work should be conducted to confirm this, and revegetation actions should occur at more sites that are dominated by Noisy Miners to make them less attractive to miners and more suitable for other woodland birds.
- Now we have benchmark data, there is scope to repeat these woodland bird surveys in around five-ten years' time, to compare the results and identify the changes in bird communities in response to revegetation activities.



For further information on the Sand Ridge Woodlands Project,  
 visit the Goulburn Broken CMA web site:  
[www.gbcbma.vic.gov.au/traditionalowners/yortayorta/projects](http://www.gbcbma.vic.gov.au/traditionalowners/yortayorta/projects)



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