



# EUROBODALLA NATURAL HISTORY SOCIETY

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## Tawny Frogmouth - *Podargus strigoides* – (Latham 1801)

The Tawny Frogmouth is one of the most photographed Australian birds and has been runner up in The Guardian Australia/Birdlife Australia's biennial 'Bird of the Year' poll three times since the poll's inception in 2017. It is easy to see why.

The Tawny is one of three species of the genus *Podargus* found in Australia; Marbled and Papuan Frogmouths occur in northern Australia. Frogmouths are related to owls, but they are not owls; they are most closely related to nightjars and owlet-nightjars.

English naturalist, John Latham, first identified the Tawny Frogmouth in 1801. Variations in size and colouring across its range led to the naming of several subspecies. Subsequent 'lumping' has reduced these to three. *P. s. phalaenoides* occurs throughout northern Australia and *P. s. brachypterus* in Western Australia, parts of Queensland and Victoria. Our 'local' is the nominate race *P. s. strigoides*, found in eastern and southeastern Australia from north of Cooktown, and in northern and eastern Tasmania. They occur almost wherever there are trees or large shrubs, including residential areas. They do not usually inhabit dense rainforest but are found on its edges.



Tawny Frogmouth Photo R Soroka

These are large, stocky birds, 34-53 cm long, with large heads and short legs. The large, grey or black bill has a hooked tip and a tuft of bristles above the upper bill. As mentioned, plumage colour varies considerably, but grey is most common. Males have light grey upperparts streaked with black and paler underparts with white barring and brown/rufous mottling. Females are generally darker and have more rufous mottling. Females of *P. s. strigoides* and *P. s. phalaenoides* have a chestnut/rufous morph. Juvenile plumage is like that of adults, usually with less streaking. Eyes are large and bright yellow. The combination of cryptic plumage and roosting posture makes Tawny Frogmouths surprisingly difficult to spot, despite their size. They often perch on damaged branches with their beaks pointing up, looking like part of the branch.

Confusion between frogmouths and owls is understandable, given similarities in behaviour and appearance: both are nocturnal, have large, wide eyes and soft fringing on wing feathers enabling silent flight, and the mottled plumage of frogmouths is like that of some owl species. But there are several differences, including some that you can easily observe: owls have strong legs and talons to grasp their prey whereas frogmouths' legs are short, their feet quite weak; owls have narrow downward-pointing beaks to tear prey apart, whereas frogmouths mainly catch insects with their very wide beaks; owls have full or partial 'facial discs' which frogmouths lack; frogmouths' eyes are somewhat further to the sides of their heads than the forward-facing eyes of owls.

Tawny Frogmouths have many vocalisations, the most familiar being the deep, continuous, 'oom-oom-oom' heard after dark, repeated 10-50 times. The birds call frequently, especially during the breeding season, when

pairs 'duet', taking turns or calling together. Other sounds include a drumming noise, made during the breeding season, a bee-like buzz when birds are disturbed during daytime roosting, and a loud hissing accompanied by bill-clacking when they are threatened.

Their main diet is large nocturnal insects, spiders, scorpions and centipedes. They also sometimes eat frogs, worms, slugs, snails, lizards, small birds and small mammals. They catch insects in flight or fly down from a perch to catch prey on the ground. When catching larger prey on the ground, they usually fly up to a perch before consuming it. They kill large or tough prey by bashing it against a branch. Though they feed mainly at night, they may sit with their mouths open during the day to catch passing insects.

Tawny Frogmouths form partnerships for life, and usually remain in the same territory for many years. In some drier areas, they may breed in response to heavy rain. In our region, they breed from August to December/January. One brood is normal, but some southern birds have two. Both sexes participate in nest building, incubation and feeding young. Nests are large (up to 30 cm across), flattish, loosely constructed and fragile, consisting of a loose pile of sticks and twigs topped with leaves and grass. They are usually on horizontal, forked branches 3-10 metres above ground.



Frogmouth on nest - Photo R Soroka

Clutch size is 1-3, usually 2. Incubation lasts 28-32 days. Males sit during the day and both sexes are thought to share incubation at night. Fledging takes 25-35 days; once fledged, young are fed for 1-2 weeks and may stay with parents for some months.

Listed as Least Concern, the Tawny Frogmouth is common over much of its range, but has declined in some areas, including parts of South and Western Australia. Threats include predation of eggs and young by carnivorous birds and tree-climbing snakes. The birds are also prey to cats and sometimes dogs and foxes. Birds are often injured or killed in collisions with vehicles when feeding on insects caught in headlight beams. Because they tend to remain in the same area for many years, they are particularly affected by tree clearing. They are also at risk of exposure to poisons such as pesticides and insecticides.

And finally ... Until I researched this article, I did not know that Tawny Frogmouths, along with several other Australian native birds, go into a state of 'torpor' to conserve energy in winter, when food is scarce. Another article perhaps ... Gillian Macnamara

### **2025 subscriptions are now due.**

A membership renewal form for 2025 has been sent with this newsletter. Single membership is \$20, family \$30 and for under 18s \$5. Please note that our bank account number has changed.

### **What's coming up.....**

**Saturday 8 February, 2pm Captain Oldrey Park, Broulee** (2-3km Grade 1) Meet at the carpark near the netball courts, end of Frances Street, Broulee. A walk in Broulee Bangalay sand forest that is home to Gang-Gang Cockatoo, White-cheeked, Scarlet and Crescent Honeyeater, Sacred Kingfisher, Black-faced Monarch, Variegated Fairy-wren.

**Sunday 23 February, 9am Wallaga Lake Reserve and Muranna Point** (3-4km Grade 2) Meet at the carpark at the end of Wallaga Street (which runs off Wallaga Lake Road), Wallaga Lake. A formed track and headland walk. Hooded and Red-capped Plover, Pied and Sooty Oystercatcher, Far Eastern Curlew, Bar-tailed Godwit and raptors, including Black-shouldered Kite, White-bellied Sea-Eagle.

**Saturday 8 March, 2pm Benandarah, Murramarang National Park** (2-3km Grade 2) Meet at the turnoff to Long Beach, intersection of Cullendulla Drive and the Princes Highway. A walk through the tall forest. Black-faced Monarch, Rufous Fantail, Superb Lyrebird, Eastern Shrike-tit, Eastern Whipbird, Rose Robin, various honeyeater species, Varied Sittella, Mistletoebird.



**Sunday 23 March, 8.15am to 12.30pm Wagonga Inlet Boat Trip, Narooma** (Grade 1) Numbers are limited so the first 9 members to register and pay in advance will secure a place on the boat. To register and organise payment, contact Mandy Anderson via email (mandy-anderson@bigpond.com). A variety of waterbirds, shorebirds and seabirds including cormorants, White-bellied Sea-Eagle, Bar-tailed Godwit, Striated Heron, Pied and Sooty Oystercatcher.

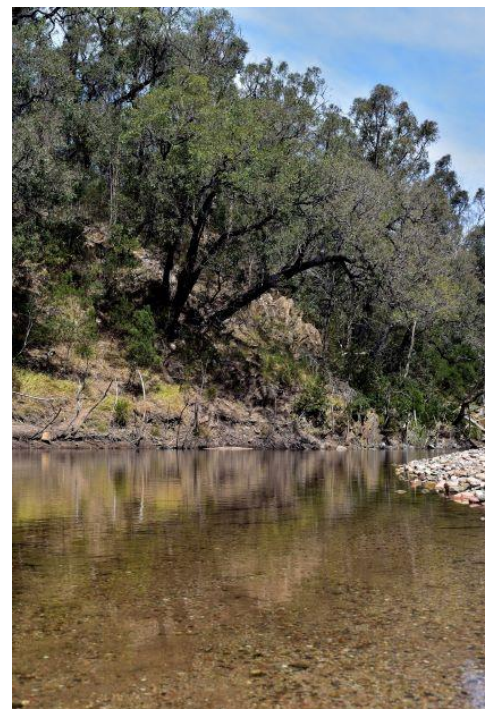
**Saturday 12 April, 2pm Pedro Swamp/Pedro Point, Moruya Heads** (3-4km Grade 2) Meet at Moruya South Head Beach car park, near the corner of Charles Moffitt Drive and Coronation Drive. Walk along Pedro Point Road. White-bellied Sea-Eagle, Square-tailed Kite, Eastern Shrike-tit, Red-browed Treecreeper, Variegated Fairy-wren, Pied and Sooty Oystercatcher, Eastern Reef Egret, cormorants, Hooded Plover.

### Field meeting Belowra 29 September 2024

A beautiful spring morning provided a perfect backdrop to our field meeting to Belowra. Julie and Peter Collett had organised a stop along the way at Belimbla, at the property of Trevor and Liz Kincaid on the Tuross River. On the drive out to Belimbla, the sides of the roads were lined with the purple flowers of *Tetralochea* and the red and yellow flowers of Native Holly *Podolobium icifolium*. We arrived at Belimbla and as soon as we parked our cars, we were greeted by a cacophony of bird calls, most notably the loud calls of at least two Restless Flycatchers that were harassing an Australian Magpie perched high in a tree. As we looked at the action, we thought we could see two pairs of Restless Flycatchers but later realised that the other two were in fact two male White-winged Trillers. Not a species that we see often as they are more often seen during the warmer months in the western areas of the Shire.

Liz led the way down a series of tracks, and we were surrounded by birdlife. Rufous Whistler were very vocal as were Grey Fantail, Superb Fairy-wren and Yellow-faced Honeyeater. We saw a White-bellied Cuckoo-Shrike low down among the regrowth which provided a great opportunity to see the smaller area of black on the face that distinguishes it from the more commonly seen Black-faced Cuckoo-Shrike. As we walked down the many bush tracks, we watched where we put our feet as Long-nosed Bandicoots had been busy looking for food leaving their signature diggings everywhere.

Down by the river, we saw a Lace Monitor and heard a Buff-rumped Thornbill which then darted across the river. Deb saw a small green parrot fly up into a tree and she was keen to identify it. We all searched for it in the tree, but it stayed very still and we did not see it again. Deb asked Liz what parrots she had seen on the property and Liz mentioned that she had seen Turquoise Parrot before the fires. This most closely fit with what Deb had seen, and I noted the similarity of the habitat to where the species was seen in 2017 in Bimberamala National Park, just north of the Shire. Liz told us that this was the first Turquoise Parrot seen there since the fires. We continued our walk and had very good views of a White-naped Honeyeater, White-winged Trillers and a female Scarlet Robin.



Tuross River – A Marsh

We didn't make it to Belowra as there was so much to see here. We thanked Liz and Trevor for sharing their lovely property with us and Julie and Peter for organising such a wonderful walk. On the way back home, we heard the familiar calls of Greengrocer cicadas along Belowra Road. Julie Morgan

## Field meeting Bingie Point 9 November 2024

In an effort to add some variety to the walks program, a geology walk was organised for the penultimate field meeting of the year. Local geologists Geoff Scott and Judith Egan led the walk out to the Bingie Bingie Point rock platform on Saturday afternoon, 9 November. It was a warm sunny day, and the coastal scenery was spectacular. Whales were spotted as we walked down to the point. Fifteen members of ENHS attended, along with a few friends of Geoff and Judith.

Geoff described and explained the 'complex suite' of granite rocks at Bingie Bingie Point, formed during the Early Devonian Period, (around 390 million years ago), and the process of their formation. The formations are part of the Moruya Granite Suite. The granite dykes that cut across the older metasedimentary rocks at Mullimburra Point and the granite quarried for the pylons of the Sydney Harbour Bridge are part of this suite. (Metasedimentary rocks are formed when sedimentary rock is buried and subjected to high temperatures and pressures, causing it to recrystallise.)



Photo M Anderson

At Bingie, two types of granitic rocks solidified approximately 15 kilometres below the earth's surface. Because of their different chemical compositions, the magmas did not mix well, the lighter grey tonalite and the darker grey gabbroic diorite providing an outstanding example of two differing igneous rocks and their relationship to one another. These rocks have themselves been cut through by thin dykes of 5 different rock types: fine-grained micro diorite, greyish leucodiorite, pink alpine, crystalline dacite and dark basalt. The igneous rocks (rock formed when molten magma crystallises and solidifies) cooled at different rates and depths. The coarse-grained rocks like granite, diorite and gabbro have cooled more slowly and at greater depths. Fine-grained rocks like basalt have cooled rapidly at or close to the surface.

Geoff pointed out the boundaries between the different rock types and the inclusions of one rock into another. Our thanks go to Geoff and Judith, who were a mine of information, and explained everything in a manner that was interesting and easy to understand. Geoff also handed out information sheets from which some of the facts for this report were taken.

Whilst bird-watching was not the major goal of this excursion, we can't resist the urge to observe and list as many species as possible. We saw a variety of seabirds including Great Cormorants, Crested Terns, a Caspian Tern and a pair of White-bellied Sea-Eagles. In addition, there was a number of bush birds seen and heard nearby when we reassembled at the conclusion of the walk. Gee Hounsell and Mandy Anderson

## The Broulee Gang-gang gang.

It is common belief that Broulee has always had a resident population of Gang-gangs. After the Black Summer fires, having lost a lot of their natural habitat, Gang-gangs started appearing quite openly in the unburned areas of Broulee, starving and desperate for food. They were easily spotted, feasting on the long, brown seed pods of the Coastal Wattle along the bike path and in other coastal spots. The following year, in early December, Dr Susan Rhind asked me to observe a hollow from which Gang-gangs were about to fledge. The regular observer was away during the critical week between the chicks' daily appearances at the entrance to the hollow and their fledging when they leave the hollow for good. There is so little data on Gang-gangs, especially in coastal areas, that information such as day and time of fledging are essential additions to our knowledge of them. That got me totally hooked!



I photographed every Gang-gang I saw after that and sent my information to iNaturalist and Susan Rhind at ganggangfarsouthcoast@gmail.com. I had not, at that point done any systematic observations, until one morning, in late January 2024 that all changed when Bill arrived on the scene. Bill, a High School Science teacher and bird-watching enthusiast has an analytical mind and a thirst to learn more about the hidden curiosities of the natural world. We both appeared on Captain Oldrey Park one morning, he with his binoculars and me with my camera and we realised what an amazing opportunity we had to learn more about this fascinating group of birds that were starting to appear in quite significant numbers, on our patch. We joined forces, and together did lots of observing, photographing, collecting, searching, researching, analysing, discussing and asking ourselves lots of questions. The big question was, why this significant number of Gang-gangs (up to 22 at that time ) had chosen this area to mate, find a hollow to breed, and raise their young. Geoff McVeigh, an enthusiastic bird photographer based in Canberra, joins us when he is in Broulee and has contributed many photos, videos and observations to our ever-increasing data bank.



Male Gang-gang

### Family Groups

We identified a few family groups. A family group usually consists of one or two immature birds and the adult parents. Some Gang-gang pairs may have 3 young in a season but we haven't seen any of these yet. The immature males are easy to spot as their red crest is less well developed than the adult males, in most cases. The immature females are more difficult as they are very similar to the adult females. The juvenile males (0-around 1 year old) are grey all over but they do have some red in their crest. The immature males (1-3 years old) are grey with a red crest and mottled grey and red 'face'. This can vary between individuals.

The juvenile females are slightly smaller than the adult females, lack the orange and pale yellow colouring on their chest feathers and usually have a less curved and twisted crest. The juveniles may have a smoother, whiter beak than the adults but this isn't always the case.

The parents feed their young for up to a year after fledging and this also helped us identify some of the juvenile females. 'Juvenile' refers specifically to a bird in its first plumage, meaning the feathers it has right after leaving the nest, while 'immature' refers to any bird that hasn't reached full adult plumage. So even though the term juvenile refers to the plumage, if a bird was being fed, we could conclude it was from a recent fledging.



Female Gang-gang

Some of the family groups we identified were: 'Baldy Family' comprising Little Baldy (juvenile male), Bella (juvenile female), male and female parent, 'The Red Family' comprising Little Red (immature male but not a juvenile), Regina (juvenile female), male and female parent, 'The Solo Family comprising Solo (juvenile female), male and female parent.

Initially the family groups mostly stayed together during the times we observed them, but occasionally the juveniles would separate out and explore the environment together, chew bark around hollows and play fight. As we headed towards breeding season, the adults would often fly off separately during the day, and explore hollows, sometimes leaving a small group of immature birds on their own. Different family groups would often feed and drink near each other but when finished would take off in their group. We believe Little Baldy, Bella, Regina and

Solo fledged near the end of last year as we observed them being fed by a parent bird, but Little Red wasn't observed being fed so we assumed he was born the year before.

## Diet

The Broulee Gang-gang gang's staple throughout all the time we have been observing is the seed of the Blackbutt (*Eucalyptus pilularis*), although they have taken advantage of other foods as they become available throughout the season. During January it was the Cedar Wattle seed. Bill collected material they discarded while eating and analysed the way they extracted the seeds from the pods.

Next came the Red Bloodwood (*Corymbia gummifera*) flowers which were prolific this year, late January through February. They would snap off a little bunch chew a few of the sugar rich stamens and discard the rest. Bill collected material as it was being dropped and even noted how the stem was chopped off at a 41–42-degree angle. They were still eating Blackbutt seed during this time. When the Red Bloodwood finished flowering, they returned to Blackbutt fruit which seems to be their favourite as they've been eating it almost exclusively until now. Once again Bill collected discarded material and watched videos of them eating. He was able to determine the different methods they use to extract the tiny seeds out of the casings.



The fruit of the Bangalay were next. Bill found remnants of Bangalay fruit under a feeding female which showed a 'top-off' eating style, similar to that used on Blackbutt fruit, except that the top 'ring' removed was much thicker (the seeds are deeper in the fruit) and the ring was commonly broken in the process. There appear to be some seeds left in the remnants (not the clean removal seen in Blackbutt fruit). They also, on occasion, extracted seeds from Angophora (possibly *Angophora floribunda*) and Red Bloodwood. Lerp on Bangalay (*Eucalyptus botryoides*) leaves was another food source for a brief period. At the end of July, Little Baldy was seen snapping off the leaves of a Norfolk Island Pine and licking the sap that dripped out of the end.

In late August they were observed sampling Sydney Golden Wattle (*Acacia longifolia*) flowers and in September, sampling green Black wattle (*Acacia mearnsii*) seed pods and Sunshine Wattle (*Acacia terminalis*) seed pods, and in September, Bendethera Wattle (*Acacia covenyi*) seeds and brownish Black Wattle seed pods.

During our observations we have not seen them eating any exotic species or feeding from bird feeders. We can identify the trees in which the Gang-gangs have been feeding by the debris lying under them. The colour of the debris gives us an indication of how long ago the Gang-gangs were present, as the debris changes colour as it ages in a similar way it does for the Glossy Black-Cockatoos.

## Drinking

The Gang-gangs have found a range of drinking sources, but when available, have preferred drinking hollows in Blackbutts, Angophoras and Red Bloodwoods. During dry periods, when the hollows dry out, they have drunk from birdbaths, puddles and the top of a water tank. The drinking hollows are quite high up in the trees and have a much smaller opening than breeding hollows. Because the openings are smaller, we usually saw only one bird at a time drinking there. Occasionally there would be two, and this was done to a pecking order. If the order was not followed, the superior bird would fly down and displace its inferior. While waiting their turn, the other birds would sit in tree branches close by and swoop down when ready. Low, restless flying would often





occur when birds were waiting to drink. You can tell when a hollow is being used for drinking as the bird dips their head down to collect water in their bill then tips their head back allowing the water to travel down their throat.

### **Communication**

Loud creaky noises while flying: iik! Iik sound while chewing,(especially around hollows) soft occasional iik while eating which gets louder and more pronounced when it's time to move, louder iik calls when confronting perceived danger. Conversation: during Gang-gang conversation an iik will often be responded to by an iiek

### **Grooming**

Gang-gangs spend a lot of time preening, especially first thing in the morning, as part of their wake-up routine and after a feed. They also allopreen, which is preening the skin and feathers of other birds. This usually occurs between bonded adults, but we have observed it between parents and juveniles, and between juveniles.



### **Feeding:**

Juveniles will sidle up to an adult, rocking back and forth when they want a feed, making a continuous 'churring' sound. Beak-to-beak exchange between siblings were also observed (perhaps play fighting)

### **Chewing, spring cleaning and pruning**

While not eating, drinking, grooming, roosting and flying, the Gang-gangs spend a lot of time chewing, spring cleaning and pruning. Even out of mating season, they would do this as if preparing for the future. We have many photos and videos of them chewing the dead bark around the outside of hollows or chewing sticks sticking out from the trunk. A mature pair we named 'The Home Renovators' spent a lot of time on a favourite Blackbutt. They'd separate from the group after the morning feeding and drinking and set to, chewing around and inside the many hollows, cleaning out fungus from the hollows, chewing and trimming dead sticks and pruning away some of the immature growth. The young would also spend a lot of time chewing and exploring hollows high up in the canopy.

### **Roosting**

After a few months of observations, we discovered where they roosted at night so, just before sunset, we'd position ourselves by their favourite trees and count them as they flew in, usually after sunset. Sometimes they'd noisily announce their arrival, other times they would be totally silent. Initially on arrival you could see them settling into their spots and once they were fully settled they became totally invisible. The Little Baldy family used the same branch in the same tree, in the same position (left to right) almost every night for 3 months May to August.

### **Importance of Connected Corridors**

Over the 700+ hours we have observed the Broulee Gang-gangs we have rarely seen them fly over large, open spaces. They will use tree corridors wherever they can. They tree-hop, flying over the top of or along the side of the trees, taking a sharp, 90 degrees turn to follow a line of trees around a rectangular space. Exceptions are flying over roads such as George Bass Drive.

So, while we answered some of the original questions we asked ourselves, what we hadn't found up until recently, was where their breeding hollows were. We believed their hollows couldn't be too far away as they needed somewhere close to feed, train and socialise their young. We surmised they would be in a cluster somewhere close by as Gang-gangs choose hollows within a few hundred metres of other breeding pairs. We had seen some Gang-gangs 'working' on hollows since January but as breeding season drew closer, we saw adults separating from their young, pushing them away when they were begging for food and regular roosting spots become abandoned.

### **Then it happened...**

September 25, 2024, 8:23:49 am!! We saw two Gang-gangs mating! We know they mate very close to their chosen breeding hollow, so we know of one hollow we need to keep a close eye on. Now we need to locate the others!

### Spin offs:

Contributions to Lucy Aplin's AI Gang-gang identification project.

Contribution of feathers to Stacey Taylor for DNA identification.

Input into Michael Mulvaney's survey guidelines for locating Gang-gang nest trees and important foraging locations.

Presentation on The Broulee Gang-gang gang for Stage 2 BPS students.

Contribution to and participation in Dr Susan Rhind's community Gang-gang presentation in Broulee. Gee Hounsell

### Silkpod vine *Parsonia straminea*

If you have been bushwalking lately, it would be hard to miss the thick covering of silky hairs, laden with seed on the ground. In some lights, it almost looks like a covering of snow. When you look up you can see thick pods ready to erupt and release their contents.

This is the Silkpod vine or Monkey Rope vine. The scientific name, *Parsonia straminea*, is derived from *Parsonia*, in honour of James Parson (1705-1770), a London physician and botanical author, and *straminea*, a Latin word, meaning chaffy, or straw coloured, referring to the straw-coloured hairs on the seeds. It prefers moist, partially shaded habitats and is common in rainforest and wet sclerophyll forest in eastern New South Wales and Queensland. It is also found on the margins of rainforest and eucalypt forests which have not burned very frequently.

It is a vigorous woody vine that clings to the trunks of surrounding trees and shrubs. It climbs by twining stems and adventitious (appearing in an abnormal position) roots which form sporadically along the stem of the plant and grip the trunk. It can grow to 30m high, and the main stem can be up to 9 cm in diameter.



Silkpod Photo J Kay

Fruit are long cigar shaped woody seed pods up to 16 cm long which release numerous seeds with a plume of fine white silky hairs at one end which are carried by the wind. The plumes are about 10-15 mm long. The flowers are clusters of small, cream/white or pinkish coloured flowers which are tube-shaped and perfumed in spring, summer and autumn. According to the references I have checked, it flowers most of the year, but that's not what I have observed locally. The flowers provide nectar for a variety of insects including bees, wasps, butterflies and beetles.



Parsonia Hawk Moth  
Photo J Holmes

At the local level, the silkpod vine is one of the larval food plants of the Parsonia Hawk Moth (*Tetrachroa edwardsi*) and the Eurobodalla has played a part in understanding more about this species. In October 2009, ENHS member Glenn Cocking found a moth near a silkpod vine growing on the edge of Little Pedro Swamp, an ephemeral wetland to the east of Pedro Swamp. At the time, little was known about the larval stages of the species other than it was thought that the larvae fed on a large vine. In November 2014, Jim Tuttle (co-author of the now published *Hawkmoths of Australia*) travelled to the Eurobodalla and searched the silkpod vines near the swamp and located a caterpillar and an egg.

Jim successfully reared the species, and the various stages of the moth's development were documented. The moth is quite large measuring up to 12cm across the wings, and flies from late September to January. From November, the female lays a small green egg (1.5mm) on the underside of a new leaf growing near the tip of the vine. The larva hatches a few weeks later and will feed on the vine for a couple of months. While they begin as a small green caterpillar, they grow to around 9cm. The caterpillar pupates and buries itself below the ground, eventually making its way to the surface and emerging as a moth. Helen Kay and Julie Morgan



## Bird flight - continued

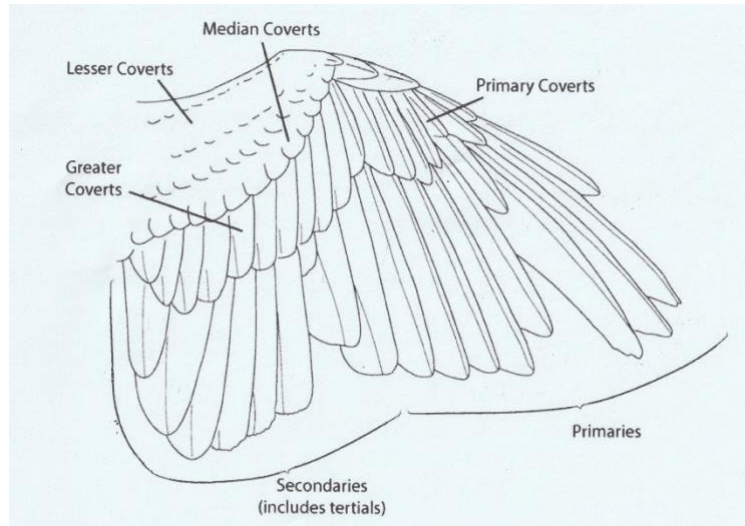
Please see the article in the previous newsletter for basic information on: aspects of bird anatomy that facilitate flight; the physics of flight; some theories as to how flight developed. This article describes wing anatomy and wing feathers; it looks at how wing shape and size relate to flight performance; it describes some types of flight.

### Wing anatomy

Like a human arm, a bird's wing has an upper arm bone (humerus) and two forearm bones (ulna and radius). The 'hand' has three digits rather than five. The primary and secondary feathers give the wing its 'airfoil' shape. The primaries attach to the digits and the secondaries attach behind the carpal joint (equivalent to our wrist joint) on the ulna.

Forming the outer layer of wing feathers are overlapping layers of 'coverts', which give the wing its smooth surface, reducing drag. These feathers cover the upper and underwing as well as the front or leading edge.

Some birds' wings have 'vestigial' (the remains of) claws. Most are not functional and most disappear as the bird matures, but some birds, such as the Masked Lapwing and Spur-winged Plover, retain them.



### Those terms again

Just a quick recap on **lift** and **wing loading**, explained in the previous article.

Due to the wing's curvature, the upperwing area is greater than the underwing area, so air travels faster over the upper surface, reducing air pressure on the top of the wing and creating lift. When the wing is tilted (front edge up, back edge down), it deflects air downward, also creating lift.

Wing loading is measured by dividing the bird's weight by its wing area. A smaller wing loading means that a bird can fly more slowly and manoeuvre more accurately, whereas a big wing load requires more energy use to keep the bird airborne. The Australian Emu cannot fly at all. And humans with ornithopters struggle: [https://youtu.be/\\_KT7lpNK7GI?si=XeB1vySvsrrKkjo6](https://youtu.be/_KT7lpNK7GI?si=XeB1vySvsrrKkjo6)

### Wing shape

No doubt you have noticed that different species have different shaped wings. And here I need to mention just one more commonly used term: wing aspect ratio. This is the length of the wing divided by its width. So, a long narrow wing like that of the Australian Hobby has a high aspect ratio and the short, wide wing of the Wonga Pigeon has a low aspect ratio. Long narrow wings usually produce more lift and short, wide wings facilitate accurate manoeuvrability in small spaces, such as those encountered in dense woodland.

Long wings are efficient in the air but an encumbrance under water. Puffins, for example, are not great at flying but are excellent divers. And penguins have given up flying altogether.

Several birds, including the Wedge-tailed Eagle, have 'fingered' wingtips, that is they have gaps between the primary feathers. These reduce drag and air disturbance at the wingtips, facilitating soaring - see below.

### Take-off, flying and landing

**Take-off** requires enormous energy, especially if the bird is on the ground or on water, as it needs to generate lift, by creating airflow across the wings. Smaller species can simply jump into the air. Some larger species take off by dropping from treetops or cliffs, converting their 'gravitational potential energy' (energy due to height) into thrust and lift. Larger birds on the ground or on water need to take a run-up. This does not look

elegant: we have all probably seen a few ungainly displays by our local Australian Pelicans. Facing into the wind enhances airflow and lift.

Once airborne, a bird may engage in a variety of manoeuvres. Gliding and soaring are typically used more by larger, heavier species, as flying requires more energy for them than it does for small birds.

When **gliding**, the bird holds its wings out to the side at a slight angle to produce lift. It does not flap, so uses little energy. A glide cannot be maintained indefinitely - an occasional shallow dive is needed to increase speed and combat drag.

**Soaring** is a form of gliding that makes use of air movement to maintain or increase the bird's height. When flying over land, birds such as eagles engage in **passive soaring**, using rising air currents or 'thermals'. Seabirds such as albatross (long narrow wings) engage in **active soaring**, using the wind over the ocean's surface to provide lift.

**Flapping** involves two basic stages with some complex wing movements and constant adjustment. During a down-stroke, the bird angles the wings so that lift is converted into forward movement or thrust. During an up-stroke, the bird folds its wings slightly to counteract drag and increase speed. This increases lift, counteracting weight and enabling the bird to maintain its height or to climb.

**Hovering** generates lift but no forward motion. It requires rapid wing movement and constant adjustment to stay in place, so uses a great deal of energy, therefore most hoverers are small, light birds. Most also have long, narrow wings, though the most proficient hoverers, the hummingbirds, do not. Like many flying insects, they move their wings in a figure 8, which gives them lift on both up- and down-strokes. Some hummingbirds beat their wings 80 times a second.

Few Australian native birds hover efficiently; most cannot sustain the movement or control their position. Our most competent small hoverer is the Eastern Spinebill. Weighing about 11 grams, it beats its wings 12-15 times per second. One online source states that the Eastern Spinebill uses the same figure of 8 movement as the hummingbirds, but I have not seen that reported elsewhere and could not find any online footage showing it.

**Bounding flight** consists of short periods of flapping alternating with periods when the wings are folded against the body. Small birds use this type of flight when travelling long distances.

**Formation flying** occurs most often during long flights, including migration. A group of birds can be seen flying in an approximate 'V' formation. This is thought to save energy. Essentially (and avoiding the complex physics and technical terms) the wing movements of the leading bird create air movement that reduces the drag for the birds behind. Birds change places regularly so that they share the effort of leading and the benefits of following. Some bird species using this technique have also been observed to coordinate their wing flapping, which further improves efficiency.

**Flying backwards:** Apart from the mythical oozlum/ouzelum bird that flies backwards to keep the dust out of its eyes, there are a couple of real birds that do this, including some hummingbirds and the Red-tailed Tropicbirds, which I have watched flying backwards very briefly during its display flight.

**Landing** can be a tricky manoeuvre, especially for large birds with high wing loads. If they do not slow down before landing, they risk injuring or even killing themselves, for instance when landing on a cliff ledge. Some species manage this by aiming for a point below their actual landing target then pulling up early, reducing air speed to almost zero.

For large waterbirds, the best option is to land on water and, if possible, into the wind. They also use their feet as skids. To lose height rapidly before landing, some, including the Black-tailed Godwit, use manoeuvres known as **whiffling**. This includes: locking wings in a bowed position; zig-zagging; flying sideways; and - the oddest to watch - maintaining normal head position while briefly turning the body upside down, which displaces the air under the wings and causes rapid descent.

I could not find a video of godwits whiffling, so these are Greylag Geese landing at a nature reserve in Durham, UK: [https://www.youtube.com/watch?v=OBidvIA\\_NW0](https://www.youtube.com/watch?v=OBidvIA_NW0)



And finally ... have you ever wondered why birds rarely if ever collide in mid-air? It is because they always veer to the right. Well, budgerigars do anyway. <https://www.discovermagazine.com/planet-earth/scientists-finally-figure-out-why-birds-dont-crash-into-each-other>. Gillian Macnamara

## **World's Oldest Known Wild Bird Lays an Egg**

In early December on Midway Atoll a tiny island off the northern end of the Hawaiian archipelago, biologists spotted a female Laysan albatross, along with her mate, fussing over her new egg.

This wasn't any albatross: she is the world's oldest known bird. She was first tagged in 1956, nursing an egg and given the tag Z333. But since then, she has come to be known by the name Wisdom. As it takes Laysan albatross at least five years before they start to breed, biologists have estimated that she's at least 74 but may be older. Apparently, the life span of a Laysan albatross is usually no more than 40 years.

The Laysan Albatross only breed every two years because it's a very long, intensive process. They lay one very large egg. and both parents tend to the chick for many months as it develops. They must have a year off to recover their condition, travelling the oceans and returning when ready to breed again. Laysan albatross usually mate for life, but Wisdom is an exception. She has outlived at least three partners and has probably raised at least thirty chicks.

Considering that Midway was hit by the tsunami from Japan about 10 years ago and faces further threats from long line fishing and plastics in the ocean, her longevity is remarkable.

For further information and a photo of the proud parents, visit: <https://www.theguardian.com/us-news/2024/dec/06/worlds-oldest-known-wild-bird>. Helen Kay

## **Did You Hear That?**

Sarah and I started a Reed Warbler project out at Brindabella, when we did an experimental field trip, and banded some birds in November 2019. For the next three breeding seasons (2020/21, 2021/22 and 2022/23), we went out to the site every month from September to March, found the nests in the reeds, mist netted the reeds, and put colour-bands on 71 birds.

However, by the end of the 2022/23 season, the blackberries in amongst the reeds were making it impossible to walk through the reeds to look for nests. So, after a discussion with the owner of the property (Peter), we decided to burn the reed beds prior to the 2023/24 season. Before we started the project, Peter would regularly burn the reeds, and they would come back quickly and vigorously.

The burning took place in July/August 2023, and we went out for our first field trip in September. To our surprise, and dismay, the re-growth had been unusually slow, and the new green reeds coming out of the blackened soil, were only about half a metre high. Obviously, no Reed Warblers were going to take up residence in these virtually non-existent reed beds. We went back in October and November, but the reeds never rose to the occasion, so to speak, and we finally abandoned the season in December. Subsequently, the reeds did achieve some height, and they flowered, but they were very late, and the stems were very thin.

In 2024 we tried again. Because the beds had been extensively burned, all the net sites (distinct avenues in the reed beds) had disappeared. We therefore had to mark these out again from scratch, and went out in early August, to get everything ready for a start in September. The reeds, as mentioned above, were thin and spindly, but new green growth was coming, so we were optimistic for the 2024/25 season. A month later however, there had been little further growth, and there was not a Reed Warbler to be heard. We put up some nets and tried calling the birds in, but they were not there. We left somewhat downhearted, with a plan to come back in October and pack everything up, and for the second time, abandon the season.

We arrived at the site on October 24 after the usual 4-hour drive, ready for some lunch and a cup of tea, before collecting and packing up all the gear. Peter had been doing a bit of burning off, which had got away from him, and about two thirds of the beds had again been burnt to the ground. None of us were concerned as there

were no birds there anyway. The remaining reeds (in two beds separated from each other by about 30m) looked about the same as they did in September, with perhaps a bit more growth of the new green reeds. We got out of the cab of our camper, and were about to go inside to make lunch, when Michael thought he heard a Reed Warbler call. His hearing is a bit dodgy these days, so he thought he was imagining things, but then Sarah appeared from the other side of the camper and said, "Did you hear that?"

We weren't ready for this scenario, but to our credit, just in case, we had brought everything that was required. We had a quick lunch and burst into action, as much as two 70-year-olds can burst! We put nets up at both ends of each remaining reed bed and caught and colour-banded two birds. Both were males, and we caught both, in both of the nets at each reed bed; they were obviously patrolling and defending the entire bed in each case. So, there were at least two birds there, and we are fairly certain there were no other males at the site. There could have been females which were not responding to the playback calls. We thoroughly checked each reed bed for nests, there were none.

The next trip was on 26 November. There was certainly more growth of the new reeds, and there was a lot of calling coming from both reed beds. Again, we put nets up at both ends of both reed beds. We caught one of the males that was caught in October, and four new birds; three females and one male, and we found one nest. There were no eggs in it, but it was a fresh new nest, and we put a camera on it which we will retrieve in December.

We think the lesson here is that trying to predict nature is a risky business. One really must do the experiment to see what actually happens. The reed beds were in what looked like to us, a terrible state in August and September 2024, and then a large part of them was burned to the ground, again, in October. There was very little reed area left, this area of reed beds was very isolated anyway, and we were convinced that no Reed Warbler would 'decide' to breed in such an out-of-the-way, small and poor habitat. We could easily have packed up in September and not made the trip in October. But we 'did the experiment' so to speak and will now have probably at least three pairs breeding in what is left of the reed beds.

We went back in December. The nest which we put the camera on had not progressed, but we caught 6 new birds and re-trapped another, where it was originally banded in October. So, they have not moved on or elsewhere.

Two of the birds we caught had brood patches, so we know they are females. We can therefore recognise these as the female of a pair if we catch them on the cameras. And if we can recognise the female, we know the other one is a male. This is very useful as it is difficult to sex Reed Warblers.

We found 3 nests containing 3 eggs, and 2 new empty nests, and put cameras on all.

By various deductions, we know there are at least 10 birds total in the two reed beds. And we were just about to write off the whole season in October! Michael and Sarah Guppy

### **A surprising mimic**

As a volunteer with the National Parks Beach-nesting Shorebirds protection program, I regularly visit Corunna Point near Mystery Bay. On one recent visit with Bronwen, after having successfully located our two resident Hooded Plovers, we started to compile an eBird list of the nearby bush birds, identifying many from their calls, as is often the case. After listing Grey Butcherbird, Noisy Friarbird, Red Wattlebird, Pied Currawong, Grey Shrike-thrush and Little Raven, it dawned on us that all these calls were coming from the same spot in the top of a Banksia. We finally tracked down a single Grey Butcherbird and watched as it performed the gentlest medley of all of those birds. I use the word "gently" deliberately because that is not an adjective that I would normally use to describe the call of the Grey Butcherbird. I don't find it nearly as endearing as that of its Pied cousin.

I did not realise that Butcherbirds were imitators. This was a first for me, and a fantastic experience.

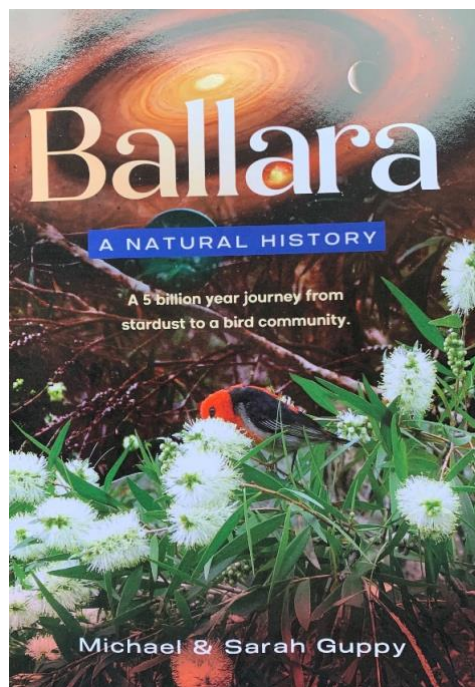
Researching a little further afield, I learnt that Butcherbird mimicry is not at all uncommon. In a post from the Sunshine Coast Council, I listened to a sound-file of a Butcherbird incorporating the mimicry of the Eastern



Koel, Laughing Kookaburra, Noisy Miner, Rainbow Lorikeet, local pet African lovebirds and Sun Conure, and even a dog barking.

One theory which aims to explain this mimicry is that the male is showing to the female bird that his superior learning skills might also be applied to other tasks more directly related to survival, such as food provision, territory defence and predator avoidance". Mandy Anderson

## A New Book



Michael and Sarah Guppy have been regular contributors to this newsletter for many years. They have coauthored a book called Ballara, which the name of their 10-ha property in Moruya. The property was purchased by Sarah's father Stephen Marchant, one of the founders of the ENHS. In 1973, Stephen did a 10-year study of the bird community and after he left, Michael and Sarah continued the study.

The book focusses on the geology, vegetation, soils and birds of the site, Indigenous and white settler impacts and the scientific studies on the site. The book presents the results of these studies and discusses these results in the context of today's major issues such as climate change, extinctions and habitat destruction.

All proceeds from the sale of this book will be donated to support the Long Term Ecology Group at The Australian National University. By purchasing this book, you are helping to fund vital research that contributes to the preservation of Australia's unique biodiversity for future generations.

## Highlights from ENHS records - Spring 2024

Avian species	Number	Place	Observer	Comments
Stubble Quail	Up to 10	Com	JC	
Brown Quail	2, 1	Bingie/Com	DHK/JC	
Blue-billed Duck	Up to 9	Barlings S	MA/D Allardice	
Musk Duck	2, 1	Kianga/Brou L	MA	
Australian Shelduck	9	Com	JC	
Hardhead	3	Com	JC	In October
Australasian Grebe	12, 10, 6, 5	Barlings S/Com/ MHS/Coila L	MA/JC/NC/ FM	Fewer elsewhere
Hoary-headed Grebe	8, 2, 1	MB/Barlings S/ MHS	MA/NC	
Bar-shouldered Dove	2, 1 or call	Sth DS/Surfside/ Coila L/MB	JCof/ DB/FM/ MA	
Tawny Frogmouth	4, 1 or call	Broulee/Sth DS/ MB/Bergalia	GH/M Burk/ MA/DHK	2 young at Broulee
White-throated Nightjar	Calling	PS	JM	First return 15 October
Australian Owlet-Nightjar	1 or call	Com/MKS	JC/SMG	
White-throated Needletail	30	Sth DS	JCof	First return 14 November
Eastern Koel	6, 5	Coila L/Broulee	FM/GLM	Fewer elsewhere
Channel-billed Cuckoo	Up to 4	Widespread	Various	First return 7 September; copulating in MYA

Shining Bronze-Cuckoo	4, 2, 1	Punkalla, NA/ PS/MB/MKS/ Belimbla	FM/JM/MA/ SMG	First return 8 September
Fan-tailed Cuckoo	1 to 4	Widespread	Various	
Brush Cuckoo	1	PS/MKS	JM/SMG	First return 18 October
Pallid Cuckoo	1	Cadgee	IJ	November
Lewin's Rail	1	BBWG	GC	
Buff-banded Rail	2, 1	Com/BBWG	JC/GC	
Baillon's Crake	1	BBWG/MYA	DB/GC/NC/ MA/B Nagle	September and November
Spotless Crake	1	BBWG	GC/MA	
Dusky Moorhen	2, 1	MHS/Com	NC/JC	
Eurasian Coot	70	Kianga	MA	Fewer elsewhere
Southern Giant-Petrel	1	Kianga	C Marshall	Immature resting at Carter's Headland
Shearwater sp.	Hundreds	Off MB/ BP/ Kianga/DY	MA/NC/T&A Ross/ C Marshall	Streaming past in September and October
Yellow-billed Spoonbill	1	MHS	NC/MA	At Newstead Pond
Royal Spoonbill	30	Bodalla	MA	
Nankeen Night Heron	3, 1	MHS/Com/Sth DS/ BBWG	MA/JC/NC/ JCof	
Striated Heron	1	Broulee	GLM	
Cattle Egret	30, 20	Com/MYA	JC/JM	Beginning to attain breeding plumage late September
White-necked Heron	2, 1	Com/MA/Benan darah/Bergalia	JC/MA/JCof/ DHK	
Intermediate Egret	1	Com/MB	JC/MA	
Little Egret	4, 1	MB/Broulee/ Brou L	MA/GLM/GC	
Eastern Reef Egret	1	MB	MA	
Australian Pelican	Up to 50	Com	JC	Feeding in the river and roosting onshore
Australasian Gannet	2, 1	Bingie Pt/MB	FM/MA	
Great Cormorant	More than 500	Com	JC	Feeding in the river and roosting onshore
Great Pied Cormorant	6, 5, 2, 1	Sth DS/Coila L/ Brou L/Bingie	JCof/FM/MA/ GC	
Australasian Darter	1	MHS/Kianga/ NA	NC/MA	
Aust Pied Oystercatcher	10	Kianga	MA	Nesting at Sth DS
Sooty Oystercatcher	Up to 12	MB	MA	
Pied Stilt	8, 2	Com/Bumbo Rd	JC/V Brown	
Pacific Golden Plover	1 or 2	MB	MA	
Red-capped Plover	30, 12	Brou L/MB	GC/MA	Fewer elsewhere
Hooded Plover	4, 2	Bogola Head/ MB/Corunna/ Bingie Pt	MA/AM	Immatures at Bogola Head. Attempted to nest at Bingie Pt, unsuccessful.
Black-fronted Dotterel	2	Com	JC	September
Far Eastern Curlew	24, 16, 1	MHS/TS/NA	R Clunes/NC/ MA	
Bar-tailed Godwit	130, 31, 24, 9	DY/TS/MHS/ Broulee	MA/NC/ R Clunes/GH	
Latham's Snipe	2, 1	MHS/Com	NC/JC	
Little Tern	1	Brou L	MA	September
Caspian Tern	7, 2, 1	Sth DS/Coila/ MB	JCof/MA	
Greater Sooty Owl	Calls	MB	A Christensen	
Osprey	2	NA	MA	Nesting



Square-tailed Kite	1	PS/Bingie/MKS Kianga	JM/DHK/SMG /MA	
Swamp Harrier	2	Barlings S/MB	T&A Ross/MA	Displaying at Barlings
Grey Goshawk	1	PS/Bodalla	JM/MA	
Brown Goshawk	2, 1	PS/Bingie/MYA SF/Punkalla NA	JM/AM/DHK/ FM	
Collared Sparrowhawk	1	PS	JM	
Oriental Dollarbird	8, 2	Broulee/Com/ /Bergalia/MB/ Nerrigundah	GLM/JC/DHK /MA/IJ	Singles elsewhere. First return 9 October
Azure Kingfisher	1	MYA/Com/ Nerrigundah	DHK/JC/IJ	
Sacred Kingfisher	4, 2	Com/PS/Broulee /Punkalla NA	JC/JM/GLM/ FM	Singles elsewhere
Australian Hobby	1	Broulee/Coila	GH/GLM/MA	
Glossy Black Cockatoo	4, 2	PS/Broulee/MY A SF/Bergalia	JM/GLM/FM/ DHK	
Gang-gang Cockatoo	12, 8, 2	Broulee/MB/Sth DS/Cool/MKS	GH/GLM/M Burk/DO/SMG	Nesting at Broulee, inspecting hollows at Sth DS
Eastern Rosella	10, 2	Com/Bergalia/ MB/Punkalla NA/Belowra	JC/DHK/MA/ FM	
Musk Lorikeet	Up to 12	MB	MA	
Little Lorikeet	4	MB	MA	
Noisy Pitta	Calling	Surfside	DB	
Red-browed Trecreeper	2	Nerrigundah	IJ	
Southern Emu-wren	Up to 15	Broulee	GLM	
White-cheeked Honeyeater	5, 1	Broulee/BBWG/ Tilba	GLM/GC/MA	
White-naped Honeyeater	4, 3, 2	PS/MB/Tilba/Be limbla/Broulee/ Cadgee	JM/MA/FM/ GH/IJ	
Brown-headed Honeyeater	6, 4, 1	Com/Kianga/PS/ Nerrigundah	JC/JM/IJ/ A Christensen	
White-eared Honeyeater	1	Benandarah	FM	September
Noisy Friarbird	Up to 18	PS	JM	Nesting
Scarlet Honeyeater	20, 10	TS/Com	GM/JC	
White-fronted Chat	Up to 15	TS/Coila L	FM/MA	
Striated Pardalote	2, 1	Com/Broulee/PS /MB	JC/GLM/JM/ MA	Nesting at Com
White-throated Gerygone	1 or call	Com/Belowra/ Nerrigundah	JC/IJ	
Buff-rumped Thornbill	6, 1	Punkalla NA /Belimbla	MA/FM	
Varied Sittella	6, 3	Benandarah/PS/ Belowra	FM/JM/JC	
Australasian Figbird	8, 6	MYA/Coila L	JM/FM	Dependent young at Coila
Spotted Quail-thrush	1	Corunna	MA	
White-bellied Cuckoo- shrike	1	ERBG/PS/MB/ Belimbla	MA/JM/FM	
Common Cicadabird	Up to 10, 1	PS/LP/MKS/ MYA SF/ Punkalla NA/ Belimbla	JM/I Bevege/ AM/FM	
White-winged Triller	2	Belimbla	FM	
White-browed Woodswallow	20	PS	JM	November

Dusky Woodswallow	10, 6, 4	Belimbla/Cadge e/Nerrigundah/ Punkalla NA/ Belowra	FM/IJ/JC	
White-breasted Woodswallow	150, 6	MYA SF/PS	JM/AM	
Rufous Fantail	1	MKS/PS/ Corunna	SMG/JM/MA	First return 2 November
Leaden Flycatcher	2, 1 or call	PS/Nerrigundah/ MKS	JM/IJ/SMG	First return 7 October
Satin Flycatcher	1	Nerrigundah	IJ	In November
Restless Flycatcher	2, 1	Com/Belimbla/ Punkalla NA	JC/FM	
Black-faced Monarch	Up to 5	MYA SF	FM	Nesting at this location. First return 14 September
Little Raven	Up to 80, 2	Com/MB	JC/MA	
White-winged Chough	11, 6, 4, 2	MKS/PS/ Belowra/MB	SMG/JC/JM/ MA	
Rose Robin	1 or call	Benandarah/PS/ Belowra/ Com/ Punkalla NA	FM/JM/JC	
Scarlet Robin	2, 1	Belowra/Belimbla/ Nerrigundah	JC/FM/IJ	
Golden-headed Cisticola	Up to 10	Com	JC	
Fairy Martin	6	BBWG	MA	
Mistletoebird	4, 2, 1	Com/PS/MYA SF/Punkalla NA	JC/JM/FM	
Red-whiskered Bulbul	1	Kianga	T&A Ross	
Diamond Firetail	3	Belowra	JC	September
Australian Pipit	4, 3	Com/Belowra/ MB	JC/MA	Singles elsewhere

<b>Non-avian species</b>	<b>Number</b>	<b>Place</b>	<b>Observer</b>	<b>Comments</b>
Common Wombat	1 or signs	Com/Cool	JC/DO	
Short-beaked Echidna	1	MKS/PS/MB	SMG/JM/MA	
Long-nosed Bandicoot	1 or signs	PS/MB	JM/MA	
Sugar Glider	1	PS	JM	
Common Ringtail Possum	1	Broulee	GH	
Common Brushtail Possum	2	Com	JC	
Eastern Grey Kangaroo	Up to 40	Cool	DO	
Red-necked Wallaby	4, 1	Cool/PS	DO/JM	
Swamp Wallaby	6, 4	PS/Sth DS	JM/JCof	
Dingo	Calls	Com	JC	September
Samba Deer	5+	Cool	DO	Also at West Flat & Belowra
Fallow Deer		West Flat	JC	
Grey-headed Flying Fox	1 or 2	Com	JC	
Bottle-nosed Dolphin	6	Kianga	T&A Ross	
Humpback Whale	Pods	DY/Kianga	T&A Ross	
Snake-necked Turtle	5	Com	JC	
Yellow-bellied Water- skink	3	Com	JC	
Eastern Blue-tongue	1 or 2	Broulee/Com/MB	GLM/JC/MA	Juvenile at Broulee
Jacky Lizard	1 to 2	BP/Bingie Pt/ Coila L/Cool	NC/FM/DO	Laying eggs at BP
Gippsland Water Dragon	Up to 3, 1	Com/TS/Tilba	JC/NC/MA	
Lace Monitor	3, 2	PS/Cool	JM/DO	Singles elsewhere

Diamond Python	1	Cool/MB	DO/MA	
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<b>Frogs</b> JC/JM/HR/DO	Common Eastern Froglet, Brown-striped Frog, Tyler's Toadlet; tree frogs: Screaming, Eastern Sedgefrog, Peron's, Tyler's, Verreaux's.
<b>Moths</b> JC/JM/T&A Ross/FM/ J Holmes	Diamondback, Geranium Plume, Meal, Lucerne Seed Web, Cabbage Centre Grub, Black Red-lined Geometrid, Neat Epidesmia, Twin Emerald, Cream and Variable Wave, Plantain, Mecynata, Apple Looper, Red-spotted Delicate, Eyespot Anthelid, Processionary, Favoured Footman, Banded, Spotted, Rock and Lydia Lichen, Variable Halone, Lichen-eating Caterpillar, Magpie, Tiger, Old Lady, Granny's Cloak, Yellow-banded Day, Green-blotched, Bogong, Brown and Variable Cutworm, Native Budworm.
<b>Butterflies</b> MA/DB/JC/IJ/JM /GLM/FM	Greenish Grass-dart, Lilac Grass-skipper, Orchard Swallowtail, Black and Imperial Jezebel, Caper White, Cabbage White, Dusky Knight, Brown Ringlet, Varied Sword-grass Brown, Common Brown, Meadow Argus, Australian Painted Lady, Yellow Admiral, Monarch, Bright Copper, Varied Dusky-blue, Blotched Blue, Common Grass Blue.
<b>Dragon &amp; Damselflies</b>	Common Bluetail, Australian Emperor, Tau and Australian Emerald, Common Glider, Orange Threadtail.
<b>Beetles</b> JC/JM	Green, Pruinoso and Dusky Pasture Scarab, Spotted Flower Chafer, Acacia Leaf, Small Blue Leaf, Metallic Green Acacia, Dotted Paropsine, Lycid Mimic Jewel, Pittosporum Leaf, Green Comb-clawed, Eucalyptus Variegated, Pintail, Soldier, Banded Pumpkin, Yellow-spotted Darkling, Tiger and Stinking Longicorn, Honeybrown, Flower. Ladybirds: Common and 26 Spotted, Striped, Steelblue, White-collared (Spotted Amber), Mealybug, Transverse, Variable.
<b>Bugs</b> MA/JC/JM/FM	Harlequin, Bronze Orange, Green Vegetable, Assassin, Horehound. Cicadas: Silver Princess, Beach Squeaker, Black Prince, Double-spotted, Golden Twanger.
<b>Other insects</b> JC/JM	Bees: Masked, Reed, Halictid, Stingless, Blue banded. Wasp: Orange Caterpillar Parasite, Common Paper, Cattle Poisoning Sawfly. Fly: Wallaby Louse, Common Brown Crane Cockroach: Beautiful.
<b>Spiders</b> MA/JC/JM	Orange-legged Swift, Black House, Leaf-curling, Lucrida Jumping, Huntsman, Daddy Long Legs, Whip, Water, White-tailed, Red Back, Garden Wheel Weaving Orb, St Andrew's Cross, Two-spined, Flat Rock, Wolf, Pointy Crab, Two-tailed.

**RAINFALL (mm). September:** 25.5 at MKS, 26 at Bergalia, 22 at Com, 33 at MB, 21.25 at Cool.

**October:** 18 at MKS, 24 at Com, 19.5 at MB, 43.25 at Cool. **November:** 108 at MKS, 48.5 at Com, 75 at Cool.

### Contributors

MA	M Anderson, MB	GLM	G&L McVeigh, Broulee		V Brown, ACT
DB	D Bertzeletos, Surfside	GM	G Macnamara, TS		M Burk, DS
GC	G Clark, ACT	AM	A Marsh, Bingie		A Christensen, MB
NC	N Clark, Surf Beach	JM	J Morgan, PS		R Clunes, Surfside
JCof	J Coffey, DS	DO	D Ondinea, Cool		M Craig, TS
JC	J&P Collett, Com	RS	R Soroka, Surfside		J Holmes, Pedro
GH	G Hounsell, Broulee	FM	Field Meeting		C Marshall, DY
SMG	S&M Guppy, MKS		D Allardice, MYA		J Mather, LP
IJ	I Joyce, Nerrigundah		I Bevege, LP		B Nagle, Broulee
DHK	D&H Kay, Bergalia				T&A Ross, Kianga
<b>Places</b>					
BB	Batemans Bay	ERBG	Eurobodalla Botanic Gardens	PDD	Percy Davis Drive, MYA
BBWG	Batemans Bay Water Gardens	LP	Lilli Pilli	PS	Pedro Swamp
BI	Bermagui	MKS	Maulbrooks Rd S, MYA	PP	Potato Point
BP	Burrewarra Point	MO	Meringo	SB	Surf Beach
Cool	Coolagolite	MYA	Moruya	SF	State Forest
Com	Comerang	MH	Moruya Heads, N&S	T'bella	Trunketabella
CO	Congo	MB	Mystery Bay	TN	Tomakin
DS	Durras	NA	Narooma	TS	Tuross
DY	Dalmeny	NP	National Park	WL	Wallaga Lake



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