EUROBODALLA
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Variegated Fairy-wren - *Malurus lamberti* – (Vigors & Horsfield, 1827)

Australia is home to ten species of Fairy-wren, nine of which are endemic. Over time, Fairy-wrens have been shifted from family to family. They were once considered to be members of either the flycatcher or the warbler family, but in 1975 they were allocated to the new family Maluridae. DNA analysis has since shown that members of this family are related to honeyeaters and pardalotes in a 'superfamily', Meliphagidae. One bird that they are not closely related to is the 'Old World' wren.

Male Variegated Fairy-wren – Photo P Gatenby

Two species of Fairy-wren are seen in our area: the Superb (*M. cyaneus*) and the less common Variegated. When it was first described in 1827, the Variegated was thought to be a colour variant of the Superb.

In 2018, the International Ornithological Committee 'split' the Variegated Fairy-wren into two species, reclassifying birds west of the Great Dividing Range (GDR) as Purple-backed Fairy-wren, *M. assimilis*. So, the Variegated range is now east of the GDR in coastal NSW and southeast Queensland, and the two species overlap along the GDR in southeastern Queensland and northeastern NSW.

Unfortunately, despite this change being more than 6 years old, some online information does not yet clearly reflect the split. For example, the Cornell Lab still lists five subspecies under *M. lamberti*, despite four of these being Purple-backed. Elsewhere, *M. lamberti* is described as monotypic, that is, there are no subspecies of Variegated Fairy-wren.

Most of us probably recognise Fairy-wrens easily from their 'giss' (general impression of size and shape). They are small birds with round bodies, longish legs and very long tails. They move fast, hopping and bouncing with tails held erect. Because they have short, rounded wings, they can lift off efficiently and fly in fast, undulating flight, for short distances, but they cannot fly far. They are mostly seen flying just a few metres above the ground.

Female Variegated Fairy-wren – Photo P Gatenby

The Variegated Fairy-wren is 14-15cm long and weighs 6-11g. In breeding plumage, the adult male is a stunning mix of brilliant blue, rufous, black, white and brown. The crown and ear coverts are an iridescent bright blue described as sky-blue or azure. The blue feathers are particularly good at reflecting ultraviolet light and the iridescence is due to the way that the barbules (remember them from the articles on feathers?) reflect light. See here for much more detail: https://www.syfy.com/syfy-wire/iridescence-in-bird-feathers-has-been-demystified

The female looks far more subdued, with greyish-brown back and wings, grey/white underparts, rufous bill and lores, a blue-grey tail with a white tip, a red-brown bill and rufous lores. The male in eclipse plumage is like the female except that the bill and lores are black. Immature males resemble females until they are 6 months old, when they develop black bills and lores. It may take them a year or two to achieve the full male regalia.

The Fairy-wren most like the Variegated is – unsurprisingly – the Purple-backed. Where the species overlap, the Purple-backed has a violet-blue mantle whereas the mantle of the Variegated is royal blue. Three other similar Fairy-wrens are the Lovely, the Red-winged and the Blue-breasted, but their ranges do not overlap with the Variegated.

Variegated Fairy-wrens prefer dense cover and can be found where there is thick, low vegetation, unlike Superb Fairy-wrens, which are often seen on open ground, Variegated Fairy-wrens usually forage inside vegetation. Their diet consists of arthropods, including grasshoppers, bugs, beetles, flies, ants, wasps and spiders. They will also eat seeds.

Their song is a high-pitched reel, softer than that of the other fairy-wrens; it is used to communicate between group members as well as to advertise and defend territory. The contact call is a repeated drawn-out 'see' or 'tsst' and the alarm call is a sharp 'zit'.

Variegated Fairy-wrens engage in cooperative breeding, as do other species in this genus. Groups consist of a breeding pair and several helpers, usually offspring from the previous year. The breeding behaviour has not been studied as closely as that of the Superb Fairy-wren, but it is thought that, like the Superb, both sexes in breeding pairs mate with other birds. When courting, Variegated males have been seen carrying brightly coloured petals – usually yellow – to display to females in their own and neighbouring territories.

Breeding is usually from spring to summer but may extend into late summer if rain is heavy. In good conditions, a group may rear two or three broods. The breeding female builds the nest, which is usually in thick vegetation less than a metre above ground. It is domed, has a side entrance, and is made of grass, twigs, spider web and bark, with a lining of grass, fur and feathers. The female lays 2-4 tiny (12x16 mm) eggs, which are matte white spotted with red/brown. She also incubates them, which takes 14-16 days. All group members assist in feeding the nestlings and keeping the nest clean. Fledging takes 10-12 days. The whole group continues to feed fledgelings for about a month. Some young remain with the group for a year or longer, becoming helpers, as mentioned above.

Conservation status is Least Concern. The main threat is nest predation by foxes, cats and rats, and several bird species, including Australian Magpies, butcherbirds and corvids. The main brood parasite of the Variegated Fairy-wren is the Horsfield's bronze cuckoo. Gillian Macnamara

A warm welcome to new members

Marie Cook, Malua Bay.
Raquel Fernandez, Denhams Beach
Vivien Howard and family, South Durras
Bill Martin, Dalmeny
Madika Penrith and Samuel Miers, Long Beach

What's coming up…..

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

Sunday 27 April, 9am Moruya Ramble (2-3 km Grade 2) Meet at the Eurobodalla Council Chambers car park, near the library entrance, Vulcan Street, Moruya. A decision of where to go will be made closer to the time. Likely to be a walk along a track. Jacky Winter, Scarlet and Flame Robin, Yellow-rumped Thornbill, White-eared Honeyeater, Nankeen Kestrel, Black-shouldered Kite, Whistling Kite, White-necked Heron, Tree Martin, Little Raven.

Saturday 10 May, 2pm Grandfathers Gully, Lilli Pilli (Grade 2/3) Meet at the corner of George Bass Drive and Denise Drive, Lilli Pilli. Parking along Denise Drive. A walk through coastal Spotted Gum/cycad forest to the black sand/rock beaches. A series of undulating tracks down to the beach and through the gully with short steep sections. After the gully, there is a series of steep stairs (grade 3) that people can choose not to climb. Great Cormorant, White-bellied Sea-Eagle, Pied and Sooty Oystercatcher, Common Bronzewing, Golden Whistler, Brown Gerygone.

Sunday 25 May, 10am: Annual General Meeting. Banksia Room, Eurobodalla Botanic Gardens, Princes Highway, Batemans Bay. The AGM will be followed by a talk on the Gang-Gang Cockatoos of Broulee by Gee Hounsell and Bill Platts. We will then have lunch, and people can choose whether to walk through the gardens, which is home to many species of local native plants and birds.
A nomination form has been sent with this newsletter.

Saturday 14 June, 2pm Burrewarra Point (2-3 km Grade 1/2) Meet at the car park at the end of Burri Point Road, Guerilla Bay. Coastal and headland walk. Eastern Whipbird, Little Wattlebird, White-cheeked Honeyeater, Large-billed Scrubwren, Australasian Gannet, Pacific Gull, albatross species, White-fronted Tern.

Sunday 29 June, 9am Gulaga – lower area (3-5km Grade 2/3) Meet near the community oval on the unnamed road that runs east off Corkhill Drive,100 metres to the south of Pam's Store, Tilba Tilba. A walk across farmland and then up into the lower reaches of Gulaga which involves a long-steep climb. Black-shouldered Kite, Satin Bowerbird, Black-faced Cuckoo-shrike, Yellow-throated and Large-billed Scrubwren, Superb Lyrebird, Crescent and Yellow-tufted Honeyeater, with the possibility of Noisy Pitta, Green Catbird, Olive Whistler and Pilotbird.

Saturday 12 July, 2pm Cloutts Road, Moruya (2-3 km Grade 2) Meet at the car park outside the Eurobodalla Shire Council and the Library, off Vulcan Street, Moruya. Walk along a rural road with bush and farmland areas. Australasian Pipit, Wedge-tailed Eagle, Little Eagle, Whistling Kite, Scarlet and Flame Robin, Jacky Winter, Black-faced Cuckoo-shrike, Little Raven.

Field Meeting – Captain Oldrey Park, Broulee – 8 February 2025

Eighteen members assembled in the carpark near the netball courts at Captain Oldrey Park for our first field meeting of 2025. The weather was warm, overcast and very humid, with rain and possible thunderstorms forecast for later in the day. Due to the weather, whilst levels of enthusiasm were high, energy levels were not.


Sacred Kingfishers
Photo G Hounsell

Gee was our leader for the afternoon. After welcoming everyone, she provided a brief history of the area through which we'd walk and the local community efforts to protect the remaining Bangalay sand forest in the area. She also pointed out the feeding scars from yellow-bellied gliders on a tree next to the carpark and then we headed off slowly along the nature trail. Fortunately, the trail is along level ground and has seating at regular intervals, so the walk was not taxing, and there were enough birds around to maintain our interest. Unfortunately, the light was not particularly good and many of the birds appeared only as silhouettes, which made identification rather difficult (for me at least).

After about 1½ hours, thunder started to rumble in the distance and the energy levels of many of us were flagging so we headed back to the carpark. The bird count for the afternoon was 29 species – the highlights for me being a Square-tailed Kite gliding over the path and 2 Sacred Kingfisher perched one above the other watching us as we watched them. For the first time I can recall the list did not include some of the very common species such as Magpie and Kookaburra and there were no Masked Lapwing on the oval. Once again, our timing had been good as the first drops of rain hit the windscreen before I got to Moruya on my way home. David Kay

The secret sex life of dragonflies

If you have ever seen Odonata (dragonflies and damselflies) engaged in the strange cartwheel embrace during mating, you might well have wondered why.

Fig 1 Damselflies in tandem.
Blue Ringtails, *Austrolestes annulosus*

The short answer is that it has contributed significantly to the success of the Order. The more you dig into the detail, the more amazing it becomes!

The mating cartwheel

Male Odonata engage in courtship displays, involving flying around in specific patterns to impress females and demonstrate their control of a suitable territory.

The mating process starts when the male dragonflies grasp the female by the back of the head (or neck in the case of damselflies) using modified cerci on the end of the abdomen (the "clasper"). They may settle on a suitable perch or the two of them fly around for a while. This is referred to as the "tandem position" (Fig 1).

The tandem continues for some time until the female is satisfied that the right conditions have been met for mating. The female then brings the end of her abdomen round to join the anterior part of the male's abdomen, near the thorax. Thus, the two are joined in a sort of loop that has been described as the "cartwheel position (Fig 2).

Prior to this coupling, the male has transferred sperm from the primary sex organs at the end of the abdomen to a secondary set of sex organs on segment 2 of the abdomen. (Yep, the males have two sets of sex organs!). The male then transfers sperm from these secondary organs to the spermatheca of the female for egg fertilisation using a penis-like structure. This can only happen in the cartwheel position.

Figure 2 Dragonflies mating.
Blue skimmers, *Orthetrum caledonicum*

They are the only insects that do all this. Most other insects have a far simpler approach of just joining the ends of their abdomens for mating. There are multiple evolutionary advantages that have led to the cartwheel.

One obvious advantage is that mating can take place on the wing. There is no extended period where the paired couple are stationary and vulnerable to predation. Indeed, on the wing they have the advantage of two pairs of eyes looking for trouble and they seem able to act in perfect unison in response to threats.

A less obvious, but significant, advantage is to do with making sure the males are mating with the right species of female, to avoid the waste of a fruitless inter-species copulation. This may not seem such a big deal, but such resource-wasting liaisons do occur in other insect groups. Wasps in the subfamily Thynninae, reportedly mate with the wrong species as often as 10% of occasions. Obviously, this is a waste of time and effort for the species, as no offspring occur.

A three-part lock and key

The cartwheel in dragonflies is, in effect, a sophisticated "lock-and-key" arrangement. Males can only mate with females when all three elements of the lock-and-key fit their prospective female partner.

Firstly, the male dragonfly's clasper differs significantly from one species to the next. In dragonflies, the clasper has three prongs (Fig 3). To grasp the female, two of the three prongs must fit into grooves in the inside of the head of the female (Fig 4). The head contains grooves that must match the prongs, or the initial tandem position will not occur. The female head cavity is adapted for the exact shape and dimensions of the claspers of the male of the same species. Grooves and ridges provide anchor points for the claspers to get a firm hold.

Fig 3 Claspers of male dragonflies

Male Australian emerald dragonfly, *Hemicordulia sp*

Male Australian glider dragonfly, *Tramea loewii*

Secondly, the body length of the pairing male and female must be dimensionally suitable, or the cartwheel can't be closed. As Fig 5 illustrates, if the female is a different length to the male, the necessary docking stage won't occur. Size does matter!

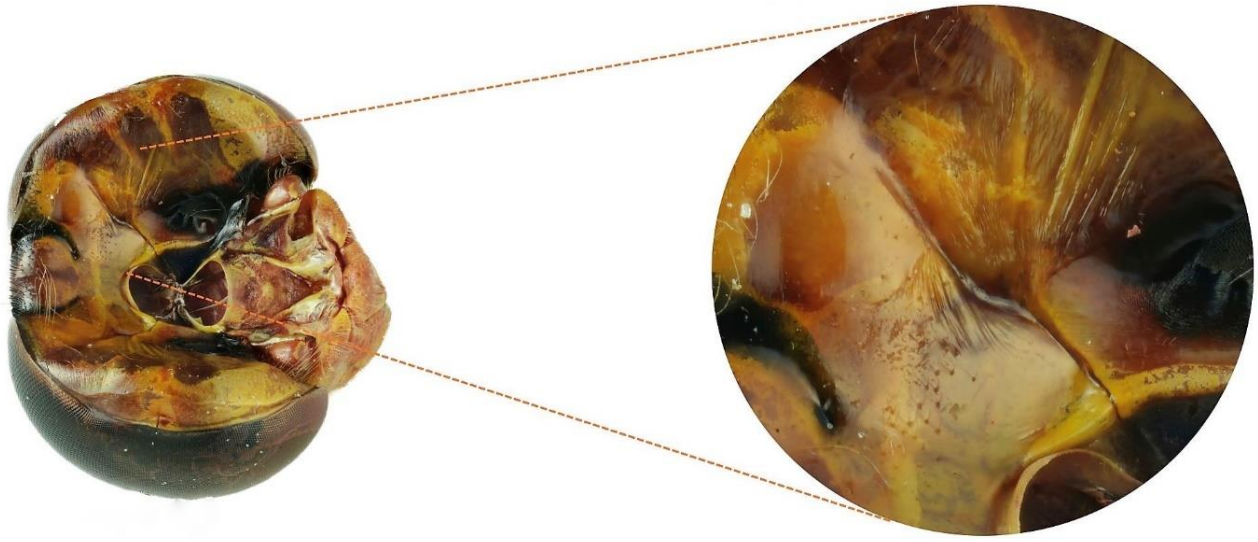
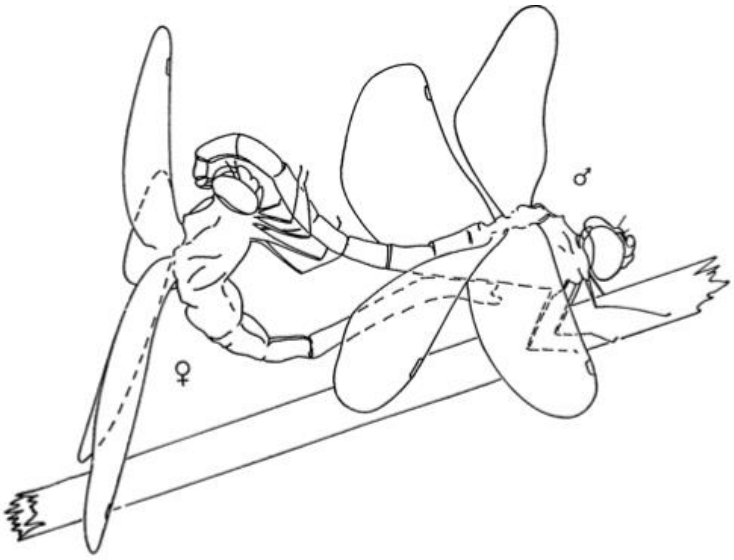


Fig 4 The head cavity of a female Dragonfly

Fig 5 Dragonflies in the mating cartwheel (Credit: Clifford Johnson 1972)



Thirdly, the secondary sex organs of the male include a pair of structures called the genital lobes. These are designed to precisely fit inside sub-genital plates on the female sex organs in the same species. It is a bit like a docking mechanism on the space shuttle. The dimensions must be just right for successful docking to happen. Once the docking does occur, the male has two pairs of special hooks called hamuli, which then engage with catchpoints on the female to hold the docked parts together. The hooks also must be exactly right in size and shape to match the catchpoints (Fig 6).

So, thanks to this lock-and-key arrangement, inter-species couplings occur only rarely and where they do it is only between closely related species that form species complexes. Thus, Odonata mating is generally a pretty efficient process.

Occupational Health and Safety

Mating in predatory insect species can be a risky occupation for the males. They may have successfully mated – but then the male often finds that he has something of a "tiger by the tail". In Asilidae robber flies, for example, males are often eaten by the females after mating. This occurs so frequently that the alternative common name of 'cannibal flies' is often used. Male mantises too, are at great risk in the mating process and often end up as a snack after copulation.

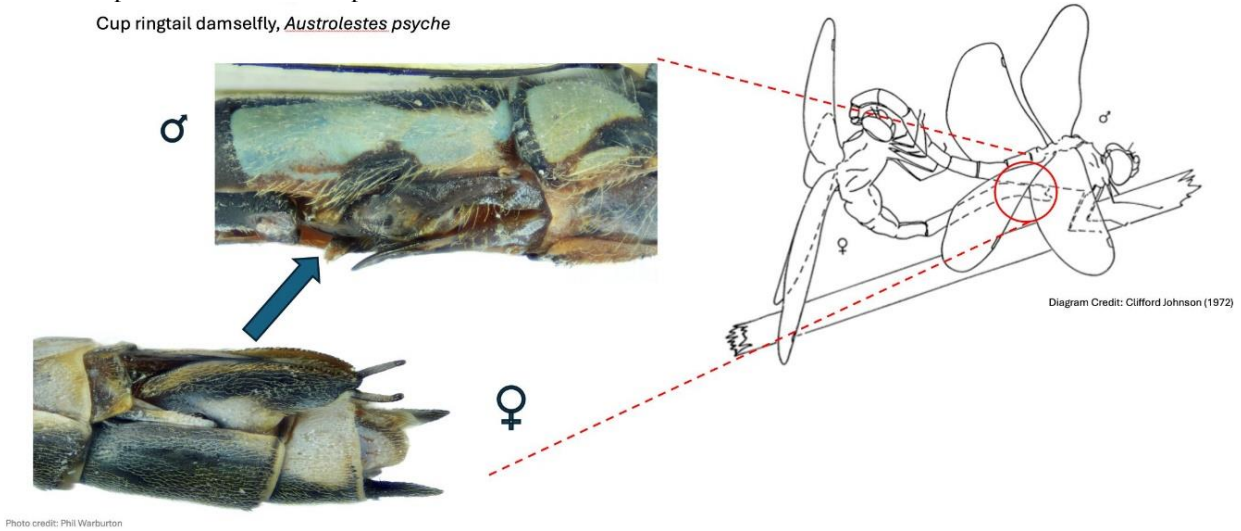


Fig 6. Joining of female and male secondary sex organs

Thanks to this cartwheel mating structure, the dragonfly males are in a much safer situation. True, they are mating with a peak predator of the insect world, but they have her safely controlled at arm's length – or at tail's length at least - with their clasper, until they judge they can make a clean get-away. As a result, predation of the dragonfly males, by the females, has not been observed to be a major issue, and males often mate multiple times with different females. But at the very least, the male gets to stick around to provide for another important task - security guard.

Mate guarding

Another evolutionary benefit of the coupling is that the male provides guarding for the female during mating. The male often continues protection duties until the female has laid all her eggs (Fig 7). In the process, he is helping to ensure her safety from predators that might be deterred by the seemingly large, combined structure of the two insects. At the very least, he might physically come between a potential attacker and the female, increasing the chances that she will survive and hopefully perpetuate his genes.

Fig 7. Male guarding female during laying.
Australian Emperor, *Anax papuensis*

But wait there's more! Both males and females have remarkable methods for controlling which sperm fertilises the eggs.

Sperm competition

When the male secondary organs are docked with the female sex organs, it has been shown that the male can use the penis-like structure to scrape any predecessor's sperm from the female spermatheca. Once he has done this, he then transfers his own sperm across to the female. This discovery caused ripples in the scientific world when it was first discovered in the 1970s. Nothing like this was known anywhere in the animal kingdom. It only becomes possible because of the secondary sex organs in the male that facilitate the cartwheel arrangement.

It doesn't stop there. The females exercise choice over which sperm gets used to fertilise the eggs. The female has the remarkable ability to eject unwanted sperm from the spermatheca and then go on to find another mate. She may do this if a better territory for laying eggs is available or if her male loses control over his own territory.

These methods amount to 'sperm competition' which provide another avenue for evolutionary development for the species. It helps select for individuals with better characteristics such as mate guarding behaviour and territory control.

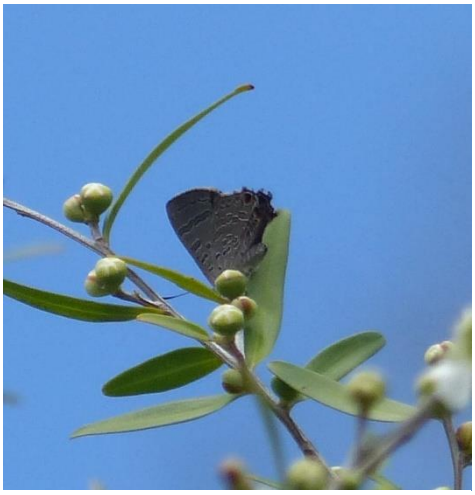
Conclusion

So next time we see a pair of dragonflies or damselflies in the cartwheel, it might be time to pause and marvel at the remarkable evolutionary process that led to this approach. It helps explain the global success of insects in this Order, that firmly occupy their niche as peak predators. Phil Warburton

Summer 2025 has brought a few firsts for ENHS

I thought that it would be informative to highlight a few firsts for Eurobodalla Natural History Society.

This summer provided the first record of a Copper Ant-blue butterfly for the society. It was seen on private property west of Bodalla, on 17 January. Julie Collett, Isis Joyce and I met for a walk and even though it was quite a windy day, Isis spotted the butterfly at the top of a Lemon-scented Tea Tree. The butterfly was feeding on the flowers and had its wings folded so we could only see the underwing of the butterfly. We all studied the features of the underwing using



Copper Ant blue Photo J Collett

our binoculars and Julie managed to take a few photos despite the windy conditions. We later identified the butterfly as a Copper Ant-blue (*Acrodipsas cuprea*).

Black Wattle Photo J Morgan

I checked ENHS records, and there were no records of this species, so I also checked other databases. When there are no records in the area of butterflies, I contact Michael Braby, Australia's leading butterfly expert, to let him know. He was excited by the news and explained that this species is rarely encountered unless specifically targeted. Michael had found the species in the Eurobodalla previously at Burrewarra Point and Gulaga and pointed out that the records in databases like the Atlas of Living Australia (ALA) are incomplete. He identified the butterfly as a female and suggested that we try to locate the breeding site. Michael pointed out that the females of this species prefer old-growth senescent Acacia trees such as Black Wattle (*Acacia mearnsii*) that have an extensive colony of Crematogaster ants. He suggested that we look for borer holes made by wood-boring insects as the ants breed in these holes. The ants attend to the eggs and larvae of the Copper Ant-blue butterflies and the butterfly larvae later feed on the ant larva.

Julie and I met and looked for a suitable tree and found an old Black Wattle not far from where we had seen the butterfly. We looked for eggs which are tiny and can be laid anywhere on the trunk and larger branches, often high up, but did not find any. Michael believed that this was a suitable breeding site and encouraged monitoring of the site. Julie has continued to monitor the area, but no further activity was recorded.

Diamond Firetail Photo J Mather

Another first was the record of two Diamond Firetail in Lilli Pilli in January reported by Jennifer Mather. This species is rarely seen in the Eurobodalla and is usually recorded in the western areas of the shire, like Belowra. Two birds were sighted in a reserve near a creek not far from the beach in tall Spotted Gum forest. Other species recorded at the time included Black-faced Monarch, Lewin's Honeyeater, Eastern Yellow Robin and thornbills. A record of this species this close to the coast is another first for our Shire.

It's always a delight when a new member joins the Eurobodalla Natural History Society and begins to submit records from their area. Isis Joyce joined the society in 2024 and has already submitted a number of interesting sightings from Nerrigundah. In December, Isis reported five Scarlet Robin with two young which is the first breeding record of this species in the Eurobodalla. Scarlet Robin are considered winter migrants to the coast and are generally recorded from autumn to spring, and occasionally in summer in western areas of the shire. Scarlet Robin records have declined sharply since the 2019/20 fires, and it is especially heartening to receive a breeding record. Isis also reported a pair of Brown Treecreeper moving through a forested area of her property in November, which is yet another first for the society. Brown Treecreeper is not a species that is generally seen in the Eurobodalla and when I looked at the ALA database, there were only a few reports over the past 30 years from areas including the Deua, Araluen and Monga. Julie Morgan

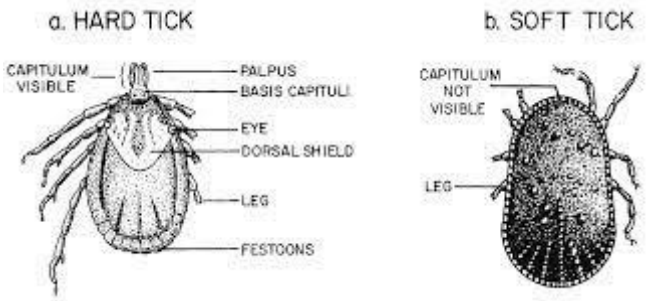
Ticked off

Exploring our natural environment has many joys. But one significant downside is the risk of being bitten by a tick, leading to days of swelling and itchiness and, for some, much more serious side effects.

Ticks are blood-feeding arachnids of the order Parasitiformes and the subclass Acari. They are ectoparasites, meaning they feed on the external surfaces of their hosts. These hosts are vertebrates, and include mammals, birds, reptiles and amphibians.

There are almost 900 species of tick worldwide, divided into two main families: *argasidae* or soft ticks and *ixodidae* or hard ticks. Australia is home to over 70 species, 66 of which are endemic. Five species have been introduced from overseas via domestic animals, including the brown dog tick, *Rhipicephalus sanguineus*, which is common worldwide. Of the 70-odd species found in Australia, 14 are soft and over 50 are hard. Only 17 Australian species are known to feed on humans. Echidnas, platypus, wombats, and goannas are all hosts to their own tick species.

A hard tick has a flat body with a hard plate, known as a dorsal shield or scutum, covering part of its back. The mouthparts, which are in front, are visible from above.



A soft tick is also flat, but its mouth parts are under its body, giving it an oval shape, and its leathery body lacks a scutum.

Both hard and soft ticks have sensory organs called Haller's organs on their forelegs. These organs sense heat, humidity, carbon dioxide and movement, and are used to search for mates as well as hosts.

Because ticks are small, it is easy for them to attach to a host unnoticed. This is particularly true of immature ticks, which can be smaller than a full stop. Even unfed adult ticks are often smaller than sesame seeds.

Once on their host, ticks may take some time to seek out a spot to bite, often preferring somewhere warm and moist. They then use their mouthparts to pierce the host's skin and extract blood. The mouthparts vary between species but generally, from the outside to the inside, a tick's mouth includes:

- Two palps, which help detect the host, moving out of the way during feeding without piercing the skin
- Two retractable, hooked rods or chelicerae that puncture and dig into the skin, making a space for the 'needle'
- The hypostome, a needle covered in backward-facing barbs that enable the tick to stay hooked into the host

When they bite, ticks inject a cocktail of chemicals via their saliva, including:

- anaesthetics that prevent the host from feeling the bite
- immunosuppressants that prevent the host from rejecting the tick
- anticoagulants that slow blood clotting
- vasodilators that counter the host's natural response to constrict blood vessels and reduce blood flow

The process of managing the hosts' blood flow can be complex. Some ticks that feed for long periods have vasoconstrictors as well as vasodilators in their saliva so that they can slow the host's blood flow when necessary.

Ticks are active throughout the year, but adults are generally most active in spring and summer, preferring warm, humid weather. The duration of each life stage, the number of hosts required, and the total lifespan all vary considerably between the two families and between species within each family.

Hard ticks have four life stages: egg, 6-legged larva, 8-legged nymph, and 8-legged adult. Generally, larvae and nymphs require a feed of blood from at least one host to develop to the next stage, and adult females need a bloodmeal to produce eggs. The number of eggs laid varies from hundreds to thousands. Some hard ticks take up to 3 years to complete their life cycle, and most die because they fail to find a host for their next meal.

Soft ticks also go through egg, larval, nymphal and adult stages, but they have as many as 7 nymphal stages. They can live for years without feeding and some live for up to 16 years.

Worldwide, ticks are the major vectors of disease-causing agents to humans, pets and wildlife. They transmit a vast array of infectious agents, and they can cause toxic reactions and death. Hard ticks are more likely than soft ticks to spread disease.
The Department of Health and Aged Care lists 6 Australian tick species that are known to bite humans and transmit diseases. Of these, the most well-known are:

1. *Ixodes holocyclus*, the eastern paralysis tick, common in coastal Queensland, New South Wales, and northern Victoria. Hosts may experience flu-like symptoms, rashes, unsteadiness, partial paralysis, allergic reactions, and life-threatening anaphylactic shock
2. *Amblyomma triguttatum*, the ornate kangaroo tick, common throughout Australia, particularly in south-west Western Australia
3. *Bothriocroton hydrosauri*, the southern reptile tick, also feeds on cattle, horses and humans. It is found throughout Tasmania and Victoria and along the Victoria/ NSW border, in southeastern South Australia and a couple of areas of southern Western Australia. It has also been reported at Jenolan Caves and in a small area south of Gosford.

Other sources list *Ixodes cornuatus*, the southern paralysis tick, which is common in Victoria and Tasmania.

Tick predators in Australia include ants, beetles, spiders, frogs, toads and birds, particularly domestic fowl and corvids. There are several videos online of corvids removing ticks from wallabies and kangaroos.

Unlike leeches, ticks have not so far been found to have any medicinal uses. But …
- they are a food source for some animals
- they may regulate some animal populations by transmitting diseases to the weaker animals
- they contribute to biodiversity

So apparently, we shouldn't wish that they didn't exist. Helen Kay and Gillian Macnamara

Field Meeting – Wallaga Lake and Murunna Point – 23 February

The Sunday outing in February to Wallaga Lake and Murunna Point was a new venue for some. Several members had had a long drive from as far afield as Mossy Point, and it was good to welcome 17 participants.

Initially quite a long time was spent surveying the sandflats. This is usually a fruitful site for shorebirds and waders, and we were not disappointed. There was a pair of Pied Oystercatchers, to the delight of those of us who are involved in the volunteer Shorebird Recovery Programme. In total, 6 Pied Oystercatchers were observed in various parts of the lake. Additionally, there was a group of around 17 Red-capped Plovers, and most pleasing of all, 4 Hooded Plovers, including one chick.

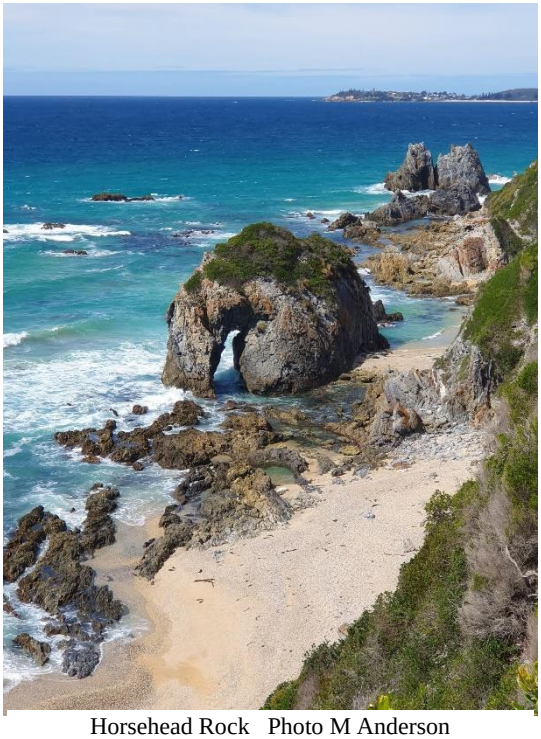
This particular walk is always enjoyable because of its variety of habitats. In addition to the lake itself, there are open farmland, groves of casuarina, and littoral forest composed principally of Pittosporum. The area sprang to fame amongst local birders in 2014 when 3 Noisy Pittas were observed over a few days. Unfortunately, they were not present this time. In fact, the likelihood of seeing Pittas on the coast at this time of year is low, as they are presumed to be altitudinal migrants, moving down to the warmer climate from Gulaga and the mountain range in winter.

Making our way through the Pittosporum forest, we added to our list of bird species a number of smaller bush birds including White-browed Scrubwrens, Brown and Striated Thornbills, a Yellow Robin and a pair of Golden Whistlers. Hawkeye Collett (Julie) also spotted a Grey Goshawk as it disappeared into the canopy.

The view back across the lake to Gulaga from Murunna Point is spectacular. The water is quite shallow so the pale sand lends a splendid pale aqua colour. We were able to add a number of shorebirds to the list from this vantage point. As we made our way to the top of the rise, we enjoyed the view to the south, taking in Bermagui and the closer settlements of Beauty Point and Fairhaven.

We continued along the headland to a lookout which overlooks Horsehead Rock. A small Mustard-bellied Snake was seen in the leaf litter making a hasty retreat away from this large group of intruders. The majority of the group continued further south to a second lookout point which offers a closer view of Camel Rock.

We retraced our steps to the carpark and compiled the observation sheet, arriving at a total of 43 avian species, in addition to the snake, a number of insects and some small lizards. It was a most enjoyable morning, spent in yet another beautiful part of the Nature Coast, and as usual leaving us feeling grateful for the special place we live in. Mandy Anderson



Horsehead Rock Photo M Anderson

Ned's Forest

Ned's Forest, located in Meringo, is a protected area owned by BioDiversity Legacy, an organisation committed to preserving natural habitat for future generations. The property is bordered by many smaller residential properties and is approximately 1km from the nearby Eurobodalla National Park.

The forest consists primarily of old-growth eucalyptus trees, which are essential for the survival of various arboreal species. These trees, some over 200 years old, provide hollows that serve as nesting and shelter sites for gliders, owls, and other cavity-dependent species. Additionally, littoral rainforest patches found in the gullies support moisture-loving plants, adding to the ecological complexity of the area.

A notable feature of Ned's Forest is its ability to support diverse plant communities despite the absence of a permanent water source. The undergrowth includes native shrubs such as banksias (*Banksia integrifolia*), acacias (*Acacia* spp.), and Casuarinas, which provide food and shelter for a variety of animals. The mixed habitat types create an ideal environment for numerous terrestrial and arboreal species.

Photo P Spurway

Ned's Forest is home to an impressive array of wildlife, including several threatened and endangered species. These include:

- Greater Gliders (*Petauroides volans*) – This species, classified as endangered, relies on tree hollows for shelter, and eucalyptus leaves for sustenance
- Powerful Owls (*Ninox strenua*) – These large, nocturnal raptors depend on the forest's old-growth trees for nesting sites
- Glossy Black Cockatoos (*Calyptorhynchus lathami*) – A vulnerable species that feeds on the seeds of she-oaks (*Allocasuarina* spp.)
- Masked Owls (*Tyto novaehollandiae*) – A species that prefers undisturbed forest habitats for breeding.
- Swamp Wallabies (*Wallabia bicolor*) and Echidnas (*Tachyglossus aculeatus*) – Common ground-dwelling mammals that thrive in the protected environment

- Reptiles such as goannas (*Varanus* spp.) and various snake species also inhabit the area, playing a role in maintaining ecological balance

The protection of Ned's Forest is a testament to the power of local action. In 2023, Ned McNaughton a young local naturalist, was out taking photos and discovered that the land was slated for development. Ned arranged to meet renowned Australian ecologist Professor David Lindenmayer, and together they found patches of old-growth habitat with 200+ year-old hollow-bearing trees supporting populations of threatened and critically endangered species. Their advocacy, supported by local community groups, resulted in the purchase of the property by conservation-focused investors and the organisation Biodiversity Legacy Ltd. Helen Kay

Birds in the News

Red Goshawk photographed for the first time in Central Australia.
In February this year, wildlife ecologist Dr Tim Henderson photographed an endangered Red Goshawk at the Newhaven Wildlife Sanctuary, west of Alice Springs. This is the first confirmation of this species in the region for three decades.

Research suggests that over the past 40 years, the Red Goshawk has disappeared from at least one third of its breeding area and may be barely surviving in another third. Its population is estimated between 900 and 1,400 mature individuals.

Historically, the Red Goshawk was found in open woodlands and forests stretching from near Sydney through much of Queensland and the Northern Territory to the Kimberley in Western Australia. It has been wiped out from at least 34% of its original range, largely due to habitat loss and changed fire regimes in south-eastern Australia. The Red Goshawk was listed as federally Endangered in 2023.

Newhaven is a long way from the areas where Red Goshawks have been recorded breeding in recent years. Recent research has shown that juvenile Red Goshawks make impressive long-haul flights into the arid and semi-arid zones - some birds making months-long excursions of over 1500 kilometres, from breeding territories on Cape York Peninsula into the Northern Territory and western Queensland. Some of the birds tracked in flight reached altitudes above 1000 metres.

This Newhaven sighting is a very significant record. GPS tracking has shown that once they become a juvenile, they take a risky 1,500km journey from their parents near the northern coast into central Australia, spending about eight months there before returning. There is much more to learn – why they take this epic journey and what they eat during these forays inland is entirely unknown.

Wisdom's baby is born – It's a boy!
Our last newsletter featured an article on Wisdom, a female Laysan albatross said to be the world's oldest wild bird. In early December last year on Midway Atoll, biologists spotted Wisdom, along with her mate, fussing over her new egg.

So, wildlife biologists waited to see if Wisdom's latest egg would produce a chick. And much to their delight, it did. The hatchling emerged on 30 January, according to a Facebook post from the nonprofit Friends of Midway Atoll National Wildlife Refuge.

When the egg hatched, Wisdom's mate was caring for it. She, meanwhile, was at sea restoring her energy. On 6 February, she returned to take over parenting duties from her mate and meet the chick for the first time. For a cute video of the chick and parents visit:
https://www.facebook.com/watch/?v=1174659117704949 Helen Kay

Temperature regulation in mammals and birds.

Until recently, I had not thought much about temperature regulation (thermoregulation) in animals. Probably like most of you, I knew that mammals and birds are 'warm-blooded' or, more accurately, 'endothermic', from the Greek endon (ἔνδον) meaning 'within' and therm (θερμ) meaning warm or hot. So, endotherms regulate their body temperature mainly by managing the heat released within their bodies. I was also aware that most reptiles are 'cold-blooded' or 'ectothermic', ecto (ἐκτός) meaning outside; they rely on the external environment to regulate their body temperature. I was surprised to learn that this is not a clear distinction, and that some ectotherms regulate their own body temperature at times: for example, the Burmese python, when incubating its eggs, increases its metabolic rate and generates body heat through shivering[1].

So, why be an endotherm? A major advantage is that mammals, including humans, have more control over body temperature than ectotherms; they can remain active in low temperatures to forage and are more likely to survive extreme drops in temperature. But this comes at considerable cost: the heat within our bodies is produced chiefly through the metabolism of food, particularly sugars and fats, so we need to eat much more and much more frequently than do ectotherms.

Many endotherms conserve energy by slowing their metabolism and heart rate, entering a state of low body temperature or hypothermia in response to food scarcity or other challenges. Some mammals enter long periods of controlled hypothermia, known as hibernation when it occurs in winter. During these periods, the animal relies on stored energy from food consumed beforehand. In Canada and Alaska, Brown bears hibernate for 5 – 8 months, depending on conditions. But the record for the longest hibernation goes to a 'local', an Eastern Pygmy-possum, which was recorded as having hibernated for 367 days[2]. Prolonged periods of hypothermia during summer, known as estivation or aestivation, are more common in ectotherms than endotherms, but there are examples of estivating endotherms, including some African hedgehogs.

There is another state of hypothermia, like hibernation and estivation but much shorter. This is known as 'daily torpor' or just 'torpor'. Unfortunately, there is not yet a standard definition of torpor that distinguishes between torpor and 'normal' daily fluctuation in temperature and metabolic rate. This makes comparisons between studies problematic. Some studies define torpor as requiring a drop in body temperature of more than 6° C. Each episode of torpor lasts less than 24 hours, and the animal forages in between episodes. Animals that can enter a state of torpor are known as heterothermic, hetero (ἕτερος) meaning other or different.

Reading about torpor in Tawny Frogmouths was what piqued my interest in thermoregulation. Tawny Frogmouths use torpor to conserve energy in winter when the temperature drops and insects – their main food – may be scarce. Torpor may also be triggered by high temperatures, scarcity of water or environmental disasters such as fires and floods. One disadvantage of torpor is that animals in this state are likely to be sluggish and more vulnerable to predation.

It was widely believed that torpor is uncommon in birds because it is unnecessary, as birds can migrate to avoid conditions such as cold weather or food scarcity. But, as we know, many bird species do not migrate. Perhaps partly because of this belief, there has been little research into torpor in birds until recently. It certainly makes sense that birds use torpor to conserve energy, if we consider the physics of temperature conservation. As body size decreases, the ratio of surface area to body size increases and, as heat is lost through the body surface, smaller animals need to produce a lot of heat to maintain body temperature, which means using considerable energy. So, it is easy to see why periods of torpor would be important for the survival of small animals, including birds.

According to an article by Fritz Geiser and colleagues[3], there have been records of 'torpor-like states' being observed in Australian birds, both captive and free, from 1923 onwards, across a range of species, including Welcome Swallows, Dusky Woodswallows and Mistletoebirds. The first study to provide measurements of changes in metabolic rate and temperature was conducted in 1969 on captive Spotted Nightjars. The birds' temperatures during torpor were found to drop by as much as 9.4°C and their metabolic rate by an astounding 75%. More recent studies have found that free-ranging Owlet-Nightjars often enter a state of torpor lasting about 4 hours during early mornings in winter. Tawny Frogmouths in the wild have also been shown to enter a state of torpor in winter, though they do so during the night, and for about 7 hours.

Many questions about torpor have not yet been answered; these include how it evolved and precisely how it is triggered and regulated. This article provides a very basic introduction to some of what is known. If you would

like to explore further, try this 2023 article by Shankar et al: Daily Torpor in Birds and Mammals: Past, Present, and Future of the Field. (I would give you the URL, but it takes up half a page.) The suggestion comes with a 'rabbit hole' warning - the article cites 116 references! Gillian Macnamara

1 https://pmc.ncbi.nlm.nih.gov/articles/PMC4843938/
2 https://www.guinnessworldrecords.com/world-records/70495-sleepiest-mammal
3 https://www.une.edu.au/__data/assets/pdf_file/0009/35748/TorporOzBirdsZoolSin06.pdf

Highlights from ENHS records - Summer 2024-25

Avian species	Number	Place	Observer	Comments
Brown Quail	Call	Com	JC	
Stubble Quail	Up to 20	Com	JC	
Musk Duck	5, 4	Brou L/Tilba L /Kianga L	MA	
Freckled Duck	1	MHS	S Heyward	Newstead Pond
Hardhead	2, 1	MHS/BI	MA	
Australasian Grebe	6, 4	MHS/MB/TilbaL	MA	Singles elsewhere
Hoary-headed Grebe	2, 1	MHS/PS	MA/JM	
Brown Cuckoo-Dove	8, 5	Pedro/MKS	JS/SMG	
Topknot Pigeon				No records this summer
Tawny Frogmouth	5, 4, 2	Pedro/Broulee/ MB	JS/MA	Three young at Pedro
White-throated Nightjar	Up to 6	PS	JM	
Australian Owlet-Nightjar	Calls	PS	JM	
White-throated Needletail	300, 60, 40, 30, 25	Surfside/PS/PP/ Broulee/Cool	DB/JM/GLM/ DO	Smaller numbers elsewhere
Eastern Koel	10, 6, 4	Broulee/Sth DS/ MB	GLM/JCof/MA	Fewer elsewhere
Channel-billed Cuckoo	4, 3	MB/PS/Pedro	MA/JM/JS	Young at MB and Pedro
Shining Bronze-Cuckoo	1	PS	JM	Only record this summer
Brush Cuckoo	2	PS	JM	Only record this summer
Lewin's Rail	1	NA	MA	
Dusky Moorhen	4, 1	BBWG/KiangaL	MA	
Eurasian Coot	35, 20	Kianga L/Com	MA/JC	
Yellow-billed Spoonbill	1	Bergalia	DHK	
Royal Spoonbill	10, 8	NA/MB	MA	
Nankeen Night Heron	4, 3	MHS/Com	MA/JC	
White-necked Heron	2, 1	Bergalia/Com/ Bodalla/ Eurobodalla Rd	DHK/JC/MA	
Intermediate Egret	1	Com/Bodalla	JC/MA	
Little Egret	6, 2	MB/WL	MA/FM	
Eastern Reef Egret	2, 1	MB/WL/Bingie Pt/ Broulee	MA/FM/DHK/ GLM	
Australasian Gannet	3, 2	MB/Broulee	MA/GLM	
Great Pied Cormorant	6, 1	Kianga L/Sth DS /Broulee/Brou L/ WL	MA/JCof/GLM/ FM	
Australian Darter	1	PS/NA	JM/MA	
Aust Pied Oystercatcher	12, 10, 9	Tilba/MB/WL	MA/FM	
Sooty Oystercatcher	12, 6	MB/Broulee/ Tilba	MA/GLM	
Pacific Golden Plover	Up to 17	MB	MA	
Red-capped Plover	30, 23	WL/Sth DS	FM/JCof	Dependent young at Sth DS
Hooded Plover	6, 4, 2	MB/WL/Coila L/Bogola Hd/ Tilba L	MA/FM	Immature at MB

Whimbrel	2, 1	Bengello Bch/ NA	GH/MA	With Far Eastern Curlew and Bar-tailed Godwit (Bengello)
Far Eastern Curlew	25, 6, 3, 2, 1	Bengello Bch/ WL/NA/MB/PP	GH/FM/MA/DO/ JM	
Bar-tailed Godwit	95, 40, 25, 5, 1	DY/NA/WL/ Bengello Bch	MA/DO/FM/GH	
Ruddy Turnstone	1	Bogola Hd	MA	
Red-necked Stint	2, 1	Sth DS/Brou L	JCof/MA	
Latham's Snipe	8, 2, 1	MHS/Bergalia/ Com	MA/S Heyward/ DHK/JC	
Little Tern	8	Brou L	MA	
Caspian Tern	5, 4, 2, 1	Sth DS/MB/WL/ PP	JCof/MA/FM/JM	
Masked Owl	1	Pedro	JS	
Barn Owl	1	Surfside	DB	
Powerful Owl	1 or call	Pedro/Broulee	JS/GLM	
Osprey	Up to 3	NA	MA	
Square-tailed Kite	1	Broulee/MKS/PS /MB/Tilba	GLM/GH/FM/ SMG/JM/MA	Immature at Broulee
Wedge-tailed Eagle	3	Cool	DO	Singles elsewhere
Swamp Harrier	1	Com/MB	JC/MA	
Grey Goshawk	2, 1	TS/PS/MB/WL	GM/JM/MA/FM	
Brown Goshawk	1	MKS	SMG	
Collared Sparrowhawk	2, 1	Com/PS	JC/JM	Immature at Com
Rainbow Bee-eater	3	Surfside	DB	In December, flying high and heading inland
Oriental Dollarbird	8, 5, 4	MB/Broulee/ Bergalia	MA/GLM/DHK	Fewer elsewhere
Sacred Kingfisher	6, 3	Com/PS	JC/JM	Breeding at Com and Nerrigundah (IJ)
Australian Hobby	1	TS/Tilba	GM/MA	
Brown Falcon	2, 1	Com/MB	JC/MA	
Peregrine Falcon	1	TS	GM	
Glossy Black-Cockatoo	6, 3	Pedro/Broulee/ Sth DS/ MYA/ MB	JS/GH/JCof/ L Dann/MA	Dependent young at MYA
Gang-gang Cockatoo	12, 8, 6, 5	Broulee/Sth DS/Tilba/Cool/ Com/MB	GH/JCof/MA/DO /JC	Male and female fledglings in December at Broulee
Eastern Rosella	10, 2	Com/Bergalia/ Nerrigundah/MB	JC/DHK/IJ/MA	1 dependent young at Com
Musk Lorikeet	6, 4, 2	Murramarang NP/Com/Broulee /PS	JM/JC/FM	
Little Lorikeet	2	Murramarang NP	JM	On flowering ironbark (*Eucalyptus fibrosa*)
Superb Lyrebird	2	LP	AL	Adult with juvenile
Southern Emu-wren	3 to 5	Broulee	GLM	
Crescent Honeyeater	1	Broulee/MB	FM/MA	
White-naped Honeyeater	20, 12	Murramarang NP/Broulee	JM/FM	
Brown-headed Honeyeater	6, 4	MB/Com	A Christensen/JC	
Noisy Friarbird	20, 12, 10	PS/Bergalia/ Pedro	JM/DHK/JS	Dependent young at Pedro and Com
Scarlet Honeyeater	40	Murramarang NP	JM	On flowering ironbark (*Eucalyptus fibrosa*)
White-plumed Honeyeater	1	Broulee	GLM	Unusual on the coast

Striated Pardalote	2	Com	JC	
Pilotbird	Call	Nerrigundah Rd	JM	
Varied Sittella	8, 6	Broulee/PS/ Pedro	FM/JM/JS	
Australasian Figbird	10, 3, 1	MYA/BB/NA/ PS/TS	JM/MA/GM	
Eastern Crested Shrike-tit	2	MKS	SMG	
Rufous Whistler	4, 3	PS/MB/ Nerrigundah	JM/MA/IJ	Nesting at Nerrigundah
White-bellied Cuckoo-shrike	Up to 8	PS	JM	Unusual gathering of White-bellied and Black-faced Cuckoo-shrike, Olive-backed Oriole and Noisy Friarbird
Common Cicadabird	8, 1, call	PS/Cool/Com/ MKS	JM/DO/JC/SMG	Nesting at PS
White-winged Triller	4	Belowra	JC	
Dusky Woodswallow	6, 5, 3	Nerrigundah/ Cool/Brou L	IJ/DO/MA	
White-breasted Woodswallow	Up to 12	PS	JM	Displaying
Rufous Fantail	2, 1	MurramarangNP /PS/Nerrigundah	JM/IJ	
Leaden Flycatcher	4, 2, 1	PS/Nerrigundah/ Cool/Brou L	JM/IJ/DO/MA	
Restless Flycatcher	3	Cool	DO	
Black-faced Monarch	4, 3	MB/Nerrigundah /Murramarang NP/PS	MA/IJ/JM	1 or calls elsewhere
Little Raven	4, 2	MB/MHS/MYA	MA/JM	
White-winged Chough	9, 6, 5, 3	MKS/PS/Com/ Punkalla	SMG/JM/JC/MA	
Scarlet Robin	Up to 5	Nerrigundah	IJ	Two dependent young. First breeding record for ENHS.
Golden-headed Cisticola	Up to 10	Com	JC	
Australian Reed Warbler	4, 2	Com/BBWG/ MB	JC/MA	
Tree Martin	30, 20, 10	Com/MYA/ Nerrigundah	JC/JM/IJ	Nesting at Nerrigundah
Mistletoebird	4, 1	PS/BP/WL	JM/RSor/FM	Possibly nesting at PS
Diamond Firetail	2	LP	J Mather	Unusual at this location
Australasian Pipit	2	Com/Bingie Pt/ MB	JC/DHK/MA	

Non-avian species	**Number**	**Place**	**Observer**	**Comments**
Platypus	1	Nerrigundah	IJ	In February
Common Wombat	1 or signs	Cool/Com	DO/JC	
Short-beaked Echidna	1 or 2	PS/MB/Cool	JM/MA/DO	
Long-nosed Bandicoot	Signs	PS/MB	JM/MA	
Sugar Glider	Calls	PS/Cool	JM/DO	
Common Ringtail Possum	Drey	MB	MA	
Common Brushtail Possum	4, 2, 1	Pedro/Com/PS/ MB	JS/JC/JM/MA	
Dingo	Call	Com	JC	
Eastern Grey Kangaroo	Up to 83	Sth DS	JCof	
Red-necked Wallaby	7, 6, 3	Pedro/Cool/ Nerrigundah	JS/DO/IJ	1 or 2 elsewhere

Grey-headed Flying Fox	Hundreds flying SE	Pedro	JS	Camp at MYA in Riverside Park
Bush Rat	1	Nerrigundah	IJ	
Sambar Deer	1 or 2	West Flat	JC	
Fallow Deer	1 or 2	West Flat	JC	
Snake-necked Turtle	Up to 20	Com	JC	
Yellow-bellied Water-skink	Up to 4	Com	JC	
Weasel Skink	1	PS	JM	January
Eastern Blue-tongue	1 or 2	Broulee/Com/ MB	GLM/JC/MA	
Jacky Lizard	1	Sth DS/Broulee/ PS/PP/Cool	JCof/GLM/JM/ DO	Hatching of many small lizards at Bergalia (DHK)
Gippsland Water Dragon	Up to 6	Com	JC	
Lace Monitor	4, 3, 2, 1	Pedro/PS/Cool/ Com/ Nerrigundah	JS/JM/DO/JC/IJ	
Diamond Python	1	Com/MB	JC/MA	
Mustard-bellied Snake	1	WL	FM	

Frogs JC/JM/HR/DO	Common Eastern Froglet, Brown Striped Frog, Tyler's Toadlet; tree frogs: Eastern Sedgefrog, Screaming, Peron's, Tyler's, Verreaux's.
Moths JC/IJ/JM/ P Martin	Forest Splendid Ghost, Forester, Pale Cup, Four-spotted Cup (larva), Banded Concealer, Wattle Goat, Meal, Tree Lucerne, Couchgrass Webworm, White Rush, Pink Arhodia, Black and Red-lined Geometrid, Black-banded Wedge-Moth, Mahogany Bark, Hakea, Neat Epidesmia, Twin Emerald, Cream, Purple and Varied Wave, Plantain, Mecynata, Apple Looper, Red-spotted and Sea-blue Delicate, Wattle Snout and Banded Porela, Grey-headed Anthelid, Coprosma Hawk, Cowled Rough-head, White Cedar, Hookwing and Reticulated Footman, Banded and Lydia Lichen, Variable and Eastern Halone, Magpie, Crimson and Pale spotted Tiger, Tiger, Double-line and Three-line Snout, Eastern Calathusa, Variable Spot-wing, Plain Pantydia, Old Lady, Edward's Praxis, Triangle Owlet, Brown-bar, Mistletoe, Brown Cutworm, Native Budworm.
Butterflies MA/JC/IJ/GLM/ JM/JS/FM	Splendid Ochre, Barred Skipper, Lilac Grass-skipper, Spotted Sedge-skipper, Narrow-brand Grass-dart, Blue Triangle, Orchard Swallowtail, Black, Spotted and Imperial Jezebel, Cabbage White, Dusky Knight, Brown Ringlet, Varied Sword-grass Brown, Marbled Xenica, Common Brown, Meadow Argus, Australian Painted Lady, Yellow Admiral, Copper Ant Blue, Imperial Hairstreak, Varied Dusky-blue, Common Grass Blue.
Dragon & Damselflies JC/JM/RSor	Common Bluetail, Scarlet, Black-faced and Wandering Percher, Blue and Fiery Skimmer, Tau & Australian Emerald, Graphic Flutterer, Common Glider, Common Archtail.
Beetles JC/IJ/JM/JS/FM	Christmas – Queen, Cashew, Campfire, Emerald Tip; Argentinian, Dusky Pasture, Nectar & Green Scarab, Dotted Paropsine, Pruinose, Repsimus, Net-winged, Metallic Green Acacia, Darkling Pie Dish, Click, Yellow Poracantha Borer, Banded Pumpkin, Honeybrown, Acacia Leaf, Small Blue Leaf, Tricolour Soldier, Belid and Botany Bay Weevil, Plague Soldier, Jewel, Devil's Coach Horse, Tiger Longicorn. Ladybirds: Transverse, 26 and Common Spotted, Striped, White-collared, Variable, Steel Blue, Yellow-shouldered, Mealybug, Tortoise-shelled, Fungus-eating.
Bugs JC/JM/FM/RSor /M Fyfe/A Nicol	Bronze Orange, Horehound, Harlequin, Green Vegetable, Assassin, Metallic and Yellow-dotted Shield, Water Scorpion, Backswimmer, Water Boatman and Water Strider. Cicadas: Beach Squeaker, Greengrocer, Razor Grinder, Double-spotted, Black Prince, Yellowbelly, Silver Princess, Double and White Drummer, Golden Twanger, Alarm Clock Squarker, Redeye.
Other insects JC/JM/JS/FM/ RSor	Bee: Blue Banded, Masked, Teddy Bear, Carpenter, Gold-tipped Leafcutter. Wasps: Common Paper, Blue Flower, Orange Caterpillar Parasite, Digger Fly: Giant Yellow Robberfly, Wallaby Louse. Lacewing: Blue-eyes, Antlion. Other: Olive-green Coastal Katydid, Yellow-winged Locust, Black Field and Mole Cricket, Large Brown Mantid.
Spiders JC/JM/GLM	Two-spined, Whip, Black House, Leaf-curling, Jumping, Huntsman, Daddy Long Legs, White-tailed, St Andrew's Cross, Garden Orb Weaving, Water, Prowling, Bleeker's and Lucrida Jumping, Spiny.

RAINFALL (mm). December: 55 at Bergalia, 54 at Com, 19 at Cool. **January:** 225.5 at MKS, 282 at Bergalia, 286.5 at Com, 194.5 at Cool. **February:** 53.5 at MKS, 41 at Bergalia, 45 at Com, 41 at MB, 89 at Cool.

Contributors

MA	M Anderson, MB	DHK	D&H Kay, Bergalia	FM	Field Meeting
DB	D Bertzeletos, Surfside	GLM	G&L McVeigh, Broulee		M Craig, TS
GC	G Clark, ACT	GM	G Macnamara, TS		A Christensen, MB
NC	N Clark, Broulee	JM	J Morgan, PS		L Dann, MYA
JCof	J Coffey, Sth DS	DO	D Ondinea, Cool		M Fyfe, Broulee
JC	J&P Collett, Com	HR	H Ransom, Mossy Pt		S Heyward, MHS
SMG	S&M Guppy, MKS	JS	J Sagar, Pedro		A Nicol, MHS
GH	G Hounsell, Broulee	RSor	R Soroka, Surfside		P Martin
IJ	I Joyce, Nerrigundah				J Mather, LP
AL	A Loveband, LP				T&A Ross, Kianga
Places		DY	Dalmeny	NP	National Park
BB	Batemans Bay	ERBG	Eurobodalla Botanic Gardens	PDD	Percy Davis Drive, MYA
BBWG	Batemans Bay Water Gardens	FT	Firetrail	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	TN	Tomakin
CO	Congo	MB	Mystery Bay	TS	Tuross
DS	Durras	NA	Narooma	WL	Wallaga Lake

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