



Welcome to our spring edition. Birds are busy building nests, wattles are flowering, and the plentiful rains bring the promise of an abundance of wildflowers. Read about how drone surveys are increasing our understanding of populations of arboreal mammals. **Gayle Osborne** (editor) and **Angela Halpin** (design)

Three Nights in the Forest

**Words, maps, and images
(except where noted)
by John Walter**

So, what is it that takes a grown man out into the forest on a near freezing cold night in May to spend the whole night sitting on a chair intently watching a screen in the back of a SUV? Then, what is it that gets him out to do the same thing the next night, and the next? The purpose of this rather lengthy article is to explain just that, but I must say at the outset that I loved every minute of it despite the cold and the long sleepless nights.

This three-night adventure was the culmination of nine years of work by Malmsbury District Landcare Group (MDLG) who has been working in the headwaters of Kangaroo Creek in the Wombat State Forest (WSF) since 2017 and supported landholders to manage gorse outbreaks on their properties downstream of the forest for a decade before that.

I should begin by identifying exactly which Kangaroo Creek I am referring to as I know of four local waterways that go by that name. In this instance I am referring to the one that starts at Little Hampton and flows north into Malmsbury Reservoir along the east side of the Daylesford/Malmsbury Road.

The same area in May 2022 after several rounds of gorse management.



Chinaman Track crossing on Kangaroo Creek in April 2017 before work began.



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In 2017 MDLG received funding from North Central Catchment Management Authority (NCCMA) via what became their Healthy Coliban Catchment program to commence work on gorse control along this waterway and within the State Forest. We started at the Chinaman Track creek crossing area which was overrun by gorse with just one of the patches there covering several hectares. We worked our way downstream to the end of the State Forest north of the Springhill Road at Denver over the next couple of years. Nine years later we still have follow up work to do but have completed multiple treatments of the gorse along this seven-kilometre stretch of waterway and supported numerous nearby landowners to work on their own properties. We have also completed a wide range of biodiversity related works both within the forest and on the adjacent private land.

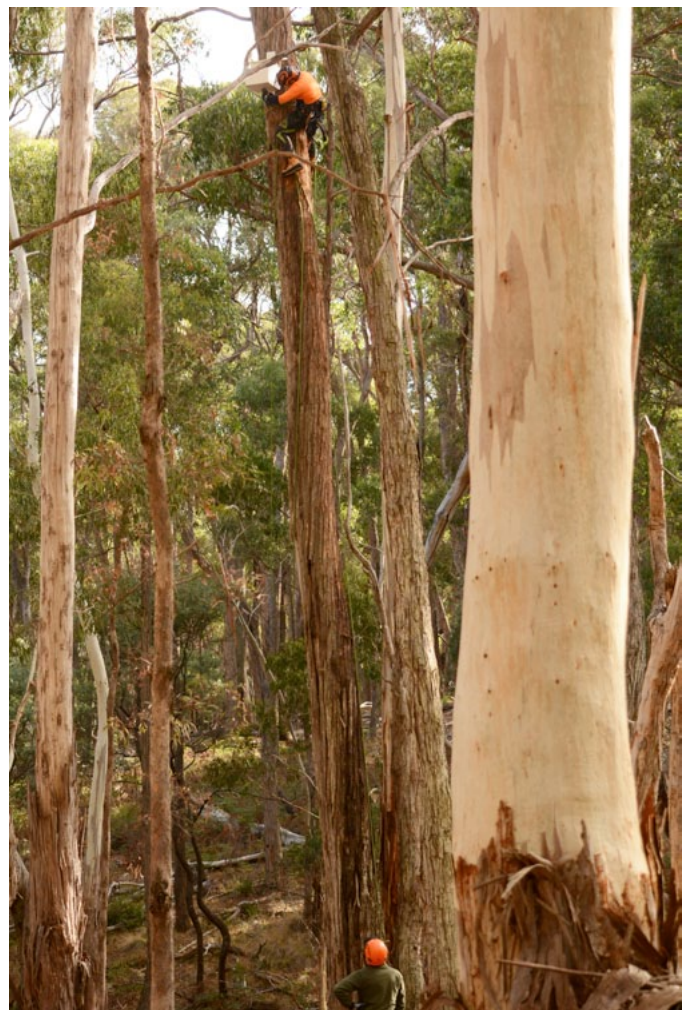
The most exciting component of the biodiversity work has been our focus on the Southern Greater Gliders *Petauroides volans*. The work of Gayle and Wombat Forestcare had alerted me to the presence of these cat-sized gliders further to the south, but in late 2017 we did not know if they extended all the way up to Chinaman Track. A subsequent series of spotlight surveys not only confirmed that they did but also showed that they continued all the way north to the end of the State Forest.

The next major advancement was the introduction of Greater Glider nestboxes by Biolinks Alliance on private land adjoining the most northerly portion of the WSF, two kilometres north of the Springhill Road. I was approached by Biolinks Alliance in late 2020 who advised they had funding for a Greater Glider project and were seeking potential sites where they could establish a demonstration project around enhancing the habitat for Greater Gliders and engaging with local landholders. The aim was to work on private land adjacent to known glider habitat and increase the awareness of residents and demonstrate how the habitat quality on their land could be improved for the long-term benefit of the gliders. I was able to connect Biolinks Alliance with several of our members who lived adjacent to Kangaroo Creek at Denver. These same properties connected to the northernmost portion of the WSF via the creek.

The Biolinks Alliance website notes that the glider population in this area is significant should a wildfire occur further south in the WSF that impacts on the core glider population there. They decided to install 10 purpose-designed nestboxes in a bush patch on one of the private landholdings to improve the habitat for Southern Greater Gliders and also introduced nestboxes for other species. Gayle reported on this work in the June 2022 Newsletter and their subsequent installation of cameras on each nestbox in late 2022 confirmed they were being used by Greater Gliders.



Tree climbers and ground crew carrying some of the nest boxes and climbing gear into the gully in the Wombat State Forest.



Installation of nestbox 19 nears completion.

The success of this work by Biolinks Alliance provided the inspiration for Malmsbury Landcare to undertake its own Southern Greater Glider nestbox project and in 2023 we sought funding to establish our *At home with Biodiversity* project. This project allowed us to install a total of 23 Southern Greater Glider nestboxes, 14 on private property and 9 within the WSF. We had previously identified a

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small number of the gliders in a side gully off Kangaroo Creek in the State Forest and later we located a sizeable area of food trees on the adjoining private land which had been recently purchased by a member and placed under a Trust for Nature covenant. This private property appeared to be suitable habitat for the gliders, however there were not a lot of obvious hollows. The plan was to use the nest boxes to connect the two areas and increase the denning sites in the new area and provide a dispersal pathway for the juvenile gliders, particularly the young males who are driven out of the home territory by the dominant male each year. With time we hoped that the new area on the private covenanted property would become part of the normal range for this species bolstering their overall population in the area.

The boxes were installed on the private land in late 2024 and in the State Forest in early 2025 once the appropriate permits had been arranged with DEECA. In the meantime, our *At Home with Biodiversity* project has also completed camera trap surveys on 15 properties with 89 individual camera setups being placed and 93 different fauna species recorded. We had also completed flora surveys on 12 properties recording 217 different species, five spotlight surveys and a total of 4 light sheet surveys for insects, recording over 700 species.

While all this activity was interesting and exciting, I knew that we did not have a comprehensive understanding of the fauna population and distribution within our key target area, which is the state forest portion to the north of the Springhill Road. Spotlight surveys only allow coverage of a small area on any given night, and ease of access tends to skew the locations towards certain areas with little or no coverage on the more distant or more difficult areas. Duplication of survey areas and movement of the animals means you end up with many duplicate records and hence have no real understanding on what the population of any given species is.

The idea of using a drone to survey a larger area was raised with me in 2024, but at that stage the cost seemed to be prohibitive, so the idea was shelved for a while. Fortunately, the Upper Campaspe Landcare Network offered some initial funding to each of its member groups in early 2026 to promote the use of drones in natural resource management work and this was the trigger for MDLG to conduct a drone fauna survey of over 250 hectares of State Forest and adjoining private land.

This survey allowed us to accurately measure the population of Southern Greater Gliders across our target area and clearly see what parts of the forest were the most attractive to this species. It did not stop there however as 30 different fauna species were recorded over the three nights and many of the arboreal species also had their distribution mapped.



Southern Greater Glider after emerging from nestbox 23.



Alex's drone taking off for another run.

As a bonus I was also fortunate enough to observe a Southern Greater Glider emerge from one of our newly installed nestboxes in the transition area between the WSF and the private covenanted land on the second evening before the drone survey began for the night. I then turned around and saw a second animal in a tree next to a nestbox on the private land so now we have proof of their use by these gliders. This was very exciting as we had never recorded Southern Greater Gliders this far away from Kangaroo Creek before and they were clearly using our nestboxes as stepping stones to explore new areas as both these animals were picked up by the drone later that night even further away from their previously known habitat.

So now you know why I was out in the forest in May, but why was I having so much fun? *continued next page ...*



Drone survey in full swing! Gayle, Trevor and Lynda, joined us for a while on the third night to review the survey process. Alex has the controller in hand, and I am next to him wrapped up in all my wet weather gear and 2 pairs of heavy woollen socks in an effort to keep warm. Photography © Lynda Wilson.



Southern Greater Gliders, standard colour form and grey colour form.

The drone was operated by Alex, our very experienced contractor from Modern Ecology, and is equipped with all the navigation gear you would expect and carries additional controlled direction spotlights, a thermal imaging camera and two high resolution zoom cameras. It follows a predetermined flight path approximately 15 to 20 metres above the canopy with the view from the thermal image camera being replicated on our screens back at the car. The operator and any assistants have their eyes glued to the screen looking out for hotspots that might indicate an animal.

A spotlight is activated and the screen view is switched to the 3x zoom camera when a hot spot is located, and you quickly make an ID of the animal in question, perhaps switching to the 7x zoom camera if needed. Many species were geolocated while some others were just counted and the camera footage of all was recorded for future use. This survey method produces a very different response by the animals to normal ground-based spotlighting. Normal spotlighting interrupts the animal's natural behaviour, and they either sit watching you intently or attempt to move to a more secure area away from the light. By contrast, the animals viewed from the drone mostly just kept on feeding and completely ignored the interruption. Occasionally one might briefly look up and then just as quickly return to feeding, with the one exception being one of the foxes. It kept on moving along its path while regularly taking a look up at the drone as though monitoring its movements.

It is quite an experience watching our fauna behaving naturally in the forest at night with Southern Greater Gliders munching on the eucalyptus leaves, Krefft's Gliders *Petaurus notatus* licking the sap from their chew sites on the tree's bark or feeding on the blossom of the Mountain Gum *Eucalyptus dalrympleana*, and Feather-tailed Gliders *Acrobates* sp. hunting for insects through the canopy of the Messmates *Eucalyptus obliqua*. This last species was especially interesting to me as it is a common widespread species (actually two very similar species) that is only rarely seen. Most records of feathertails are of dead animals found beneath a tree, not a live animal actively feeding or hunting. Unfortunately, I cannot show you the very interesting video footage we captured of them in the newsletter, but I have already done several presentations to local conservation groups and have more scheduled in so perhaps you can catch one of these.

Other species of interest included the numerous Koalas *Phascolarctos cinereus*, the Grey-headed Flying Foxes *Pteropus poliocephalus* also feeding on the Mountain Gum blossom and the Powerful Owl *Ninox strenua* with an Eastern Ring-tailed Possum *Pseudocheirus peregrinus* in its talons for supper.

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Our hero species the Eastern Ring-tailed Possum.



Distribution of Krefft's Glider (formerly Sugar Glider) – 60 records.



Krefft's Glider.



The survey area with the Wombat State Forest marked in red and the two private properties in green and blue. Note Denver and Spring Hill (circled).

The ringtails were the most recorded species of the survey with their 83 records making up almost 15% of the total survey records. While this number is very pleasing in that it takes the hunting pressure off the Southern Greater Gliders which are also a prey species for the Powerful Owl, it is also surprising as other survey techniques would suggest a much lower population than this. Our total spotlighting records in the area are just 7 records over 9 separate spotlight surveys with records made in only 4 of the 9 surveys. Likewise, we made only 7 records in our camera surveys out of a total of 53 individual camera setup sites. It is interesting that most of our spotlight records

were made in the same area as where we saw the Powerful Owl and its prey.

We found a completely different story when it came to the Mountain Brush-tailed Possums *Trichosurus cunninghami*. While we only had one prior spotlight record, we had 84 records on the cameras and yet we only found 8 animals in the drone survey. This is most likely due to the interest that these animals pay to baited camera points. They can return to the same camera and perhaps visit more than one camera many times a night, creating an impression that their numbers are greater than they really are.

The drone also provided us with more accurate data on the Southern Greater Glider population of the target area. On the first night Alex asked me how many Greater Gliders I thought we would find in the survey. My best estimate based on our previous research was 20 to 25 gliders. The most I had recorded in one transect in this area was 9 gliders with no more than 6 in the other main sector plus I knew of a couple of small outlier populations and assumed there would be some completely unknown to us. Our final drone survey tally was 46 Southern Greater Gliders, almost double my expectations.

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This does not mean of course that the population is 46. A small number of the animals recorded on the first night might also have been recorded on the second, albeit feeding in a different location. Similarly, some animals may have been resting in their den site when the flyover occurred and were not recorded at all. An example of this is a grey morph Greater Glider which I photographed under spotlight before the drone survey commenced on the third night, but it did not feature at all among the drone survey animals.

We have learnt a lot about this population of Southern Greater Gliders thanks to the drone survey, and it has also raised many questions like:

Why did we find 18 Southern Greater Gliders in an area that has only produced 5 animals in the past?

A follow up survey is now planned for five years' time, but I am not sure that I can wait that long to spend another three nights in the forest.

I cannot close without including an image of the energy balls of the forest, that is the tiny Feather-tailed Glider. We recorded 47 of these little guys in the survey and while they are a little bit smaller than a mouse, they are only half their weight. The image opposite was recorded within our survey area in 2024 by user JZ01 who posted it on iNaturalist. JZ has kindly allowed us to reproduce it here. We also recorded 20 Grey-headed Flying Foxes feeding in

or flying over our survey area and the 13 Koalas was a comforting find as many locals have expressed their concerns that they are no longer seeing Koalas around.

Malmsbury Landcare greatly appreciates the NCCMA and Coliban Water for their foresight in establishing the Heathy Coliban Catchment project. This project has not only provided a substantial amount of funding for our ongoing work along Kangaroo Creek, it has also given us the confidence to proceed with a project of this size knowing that there was an opportunity for ongoing funding and that an initial investment would not be wasted when the funding dried up after just a year or two. ■



Feather-tailed Glider. Image from iNaturalist user JZ01.



Distribution of Koala.



Koala.

Pellets and Bones

By Trevor Speirs

A study in the 1980s by renowned owl expert Rod Kavanagh documented a major decline in Greater Glider *Petaurus volans* numbers due to predation by Powerful Owls *Ninox strenua* in a patch of mature forest in south-east NSW. Rod's study block was only 100 hectares and the mean numbers of gliders dropped from 119 to 9 over a 4 year period. The study area was unaffected by forest management practices like logging and burning and there was no apparent drop in breeding rates or any obvious disease affecting the gliders. Understandably, Rod concluded that the Greater Glider population decline was in all probability due to predation by the owls.

A pair of breeding Powerful Owls *Ninox strenua* will have a home range of anywhere between several hundred to several thousand hectares, the size being largely dependent on the quality of the available habitat. It has long been believed that owls will "harvest" an area of prey items within their range before moving on to another area. This practice will ensue that the prey species in a particular area will be able to recover by the time the owls return.

There are several ways of establishing which prey Powerful Owls are consuming. One of these can be by observing owls at roost trees where their previous night's catch is often being held in their large talons, usually slumped over a branch. On the odd occasion a large bird like a currawong or cockatoo will have been taken but arboreal mammals will nearly always be the prey of choice. Inspecting regurgitated owl pellets is another reliable way of determining what's on the menu. Like diurnal raptors, owls have difficulty digesting mammal fur and bones and this will frequently be ejected in the form of a pellet which will lay below a roost tree. Owl pellets come in different shapes and sizes; Sooty and Masked Owl pellets are black and shiny while Powerful and Barking Owls are grey and generally drier, except when fresh. All pellets can be subjected to insect attack and can disintegrate quickly, and this will sometimes just leave small pockets of bones under a roost tree. Barking Owl pellets are particularly friable and break up quickly especially in wet weather.

Armed with the legendary late Barbara Triggs' excellent guide book "*Tracks, scats and other traces: A field guide to Australian mammals*" identifying discarded mammal bones can be done with some success, even for an



Powerful Owl with Greater Glider prey. Photography © Gayle Osborne.



Above and below: Powerful Owl pellet.



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amateur. The bones most easily identified in a Powerful Owl pellet, in the Wombat at least, are the humerus and femur of the Eastern Ring-tailed Possum *Pseudocheirus peregrinus* and the Greater Glider. Occasionally, the much smaller bones of the Kreft's Glider *Petaurus notatus*, previously known as the Sugar Glider, might also be found and a single Powerful Owl pellet will generally only contain the remains of one species of prey. The jaw bone of both the Ring-tailed Possum and Greater Glider are very similar, but these will often be broken which can make for an uncertain ID. Surprisingly, although the glider is a larger and heavier animal, the jaw bone of the ringed-tailed is several millimetres longer. Analysis of hair/fur found in a pellet is another method used for identification but needs more expertise for an accurate ID.

After reading Rod Kavanagh's NSW study, I've been regularly inspecting Powerful Owl pellets in the Wombat, in an effort to roughly ascertain which is the owls' main prey species. Overwhelmingly, the majority of bones which I have found and successfully identified over the last decade are those of the Eastern Ring-tailed Possum. Of these bones the humerus is usually the most likely to be still intact, opposed to the femur which is often snapped in half. In the case of observations of Powerful Owls with prey at roost trees, again it is generally a ring-tailed possum, but as Gayle's photo shows, the Greater Glider certainly does fall victim. These observations tally with several scientific studies over the years of the diet of the Powerful Owl which have concluded that the Eastern Ring-tailed Possum is the optimal prey size for this apex predator. Powerful Owls in the Wombat and Lerderderg Forests would also benefit from lack of competition from Sooty Owls, found mainly east of Melbourne, which also show a strong preference for the smaller ring-tailed possum.

At nearby Hanging Rock, the reserve's 2015 environmental management plan reported that Greater Gliders were present in the reserve, but according to a 2018 ABC report the gliders apparently vanished from the reserve around the middle of that decade. As Powerful Owls are known to frequent the reserve they might be responsible for the gliders' disappearance but obviously there could be several other factors at play. It is a little unclear but apparently there were two separate families of gliders inhabiting the southern section of the reserve with approximate population numbers unknown. The Hanging Rock reserve is quite small, less than 70 hectares, and is mainly surrounded by cleared land making the risk of localised extinction high for a sedentary species like the Greater Glider. Fortunately, the much larger Wombat/Lerderderg forest of around 60,000 hectares, and which importantly has very good densities of Eastern Ring-tailed Possums, the likelihood of a sudden decline in Greater Glider numbers, due to Powerful Owl predation at least, would have to be considered low. ■



Ring-tailed Possum humerus.



Ring-tailed Possum femur.

References

- Kavanagh, R. P. (1988). The impact of predation by the powerful owl, *Ninox strenua*, on a population of the greater glider, *Petauroides volans*. *Australian Journal of Ecology*, 13(4), 445–450.
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Everyone needs a home

Words and images by Gayle Osborne

I have written about how decaying logs provide habitat for fungi, mosses and lichens as well as small mammals and reptiles, but an incredible range of creatures are hidden under the wood as it decomposes. Some creatures decompose the wood; others use the space below the log to build nests and protect their larvae and others prey on small organisms.

As a fallen dead tree or large limb slowly breaks down, it transforms into a living ecosystem providing habitat for many species. These dark, damp micro-habitats provide essential moisture and shelter for a diverse community of invertebrates, reptiles and frogs.

Over time, the decaying wood becomes a porous material called humus. Humus mixes with the soil, adding carbon, nutrients and aiding moisture retention. Most of the environmental benefits of fallen timber are lost in planned burns, either with the burning of fallen logs or the destruction of the humus layer when the leaf litter is burnt.

The decomposers

Millipedes are slow-moving invertebrates that constantly graze on decaying wood.

Many species of termites can be found under decaying wood where they feed mainly on the timber. Single-celled protozoa or bacteria inside the termite gut break down complex wood cellulose into digestible sugars.

Shiny black Bess Beetles live in small family groups inside decaying logs. They chew through rotting wood and communicate with each other using squeaking sounds

Slaters (also known as woodlice) are scavengers and decomposers of damp, decaying wood.

Fungi play an important role in the decomposition of the wood as only fungi can break down the lignin. Lignin is a complex organic polymer that hardens and reinforces the secondary cell walls of vascular plants, acting as a natural structural glue.

The shelterers

Earthworms, slugs & snails are soft-bodied, legless creatures that use the constant moisture under the log to survive without drying out.

Some beetle species spend their larval stages and early adult lives inside or beneath decaying logs. Other beetle species use the cool, damp microclimate under fallen logs as daytime shelter before hunting other invertebrates at night.

There are ant colonies that use the space beneath logs to build nests and protect their larvae.

Some damp-forest and burrowing frogs hide under rotting logs to keep their skin moist during dry periods.

The predators

Attracted by the abundance of small detritivores, several types of carnivores call rotting logs home.

Centipedes are fast-moving, venomous hunters that actively chase down smaller insects.

Some species of spiders build webbed nests or silk-lined burrows beneath rotting logs. This dark, moist, and protected microhabitat provides excellent shelter from predators, prevents dehydration, and serves as a prime hunting ground for targeting crawling insects.

Scorpions feed on spiders, centipedes, millipedes and even other scorpions.

Terrestrial flatworms (land planarians) hunt and feed on earthworms, small insects, slaters, snails and slugs. They cover their prey with a sticky mucus to immobilise them before secreting digestive enzymes to dissolve and digest them.

Carnivorous snails hunt other snails, slugs, earthworms, insect larvae, and small soft-bodied invertebrates.

Termites are an important food item for mammals such as echidnas, for many lizards and many invertebrates. The winged termite swarms that occur during mating provide a fattening food source for many birds and microbats.

In the attempt to clear the forest floor of fallen timber, to remove a perceived fire risk, we need to recognise that we are destroying entire ecosystems. Invertebrates play an important role in the food chain for very many species that we care about. Termites are not only a rich food source for echidnas, but also for lizards and other invertebrates and for many birds when they fly in great swarms to mate.

One of the most remarkable features of life on earth is the interdependency of all species in order to exist. We could lose a linchpin invertebrate species and fail to understand why some species of birds, mammals and reptiles are declining. This is known as a trophic cascade, where the loss of a single, seemingly minor species can trigger a domino effect that collapses an entire ecosystem.

We take great enjoyment in watching an echidna snuffling around seeking out ant nests or overturning a log to get access to worms or a termite nest. Do we know if there is adequate food to sustain our echidnas? Some bush properties have been cleared of all litter and logs, large areas of the forest are regularly burnt in the department's planned burn regime, destroying the fallen logs and domestic firewood collectors strip the firewood coupes of all sizeable logs before they have a chance to become habitat. What is the tipping point for the creatures that depend on the inhabitants of these damp, dark realms for sustenance?

We need to shift from a belief that we need to clean up the forest and, instead, celebrate fallen logs as vital habitats for hundreds of species. ■

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Everyone needs a home - continued

Words and images by Gayle Osborne



Millipede



Australian Wood Cockroach
Panesthia australis



Centipede



Hogg's planarian *Caenoplana hoggii*



Australian Dampwood Termite
Porotermes adamsoni



Earthworm



Woodland Gound Beetle (Genus *Notonomus*)



Scorpion



Genus *Austrothyrida* a member of
Cannibal Snails (Family Rhytididae)

Wombat Forestcare

research • education • action

Wombat Forestcare Inc. is dedicated to preserving the biodiversity and amenity of the Wombat State Forest, Central Victoria, Australia, by utilising the skills and resources of the community.

By becoming a member you will have input into our activities and projects, and give support to caring for our forests. For memberships and further information contact Gayle Osborne, (03) 5348 7558 or email info@wombatforestcare.org.au

Membership fees: \$15 single and \$20 family. Visit our website - www.wombatforestcare.org.au

The Wombat Forestcare newsletter is proudly produced on the land of the Djaara people.