Issue 42 - December 2017

Wombat Forestcare Newsletter

Welcome to our summer edition. Why the Hepburn Shire Draft Biodiversity Strategy fails to meet expectations? Read about Powerful Owls and Sulphur-crested Cockatoos competing for hollows, Brush-tail Phascogales and more about the beautiful pea species of the Wombat Forest.
Gayle Osborne (editor) and **Angela Halpin** (design)

Rethinking Biodiversity

Words and image by Alison Pouliot

This article is a modified version of my submission to the Hepburn Shire Council Draft Biodiversity Strategy. I offer it as a way to reimagine a different sort of Biodiversity Strategy – one that considers the conservation of biodiversity as its central purpose.

Biodiversity is complex, messy and unpredictable and can outsmart 'management'.

Twenty-one years ago I came to the Hepburn Shire and climbed Jackson's Lookout. All around me, in every direction I could see bush. The air was thick with the scent of flowering eucalypts and birdcall. My decision to move here was cemented in that moment. During this time, I have been fortunate to work together with traditional owners and scientists; land managers, farmers and property owners; Landcarers and conservationists, specifically in the context of trying to understand and conserve biodiversity. It has been heartening to directly witness the great many people within the Shire who care deeply about its biodiversity.

Growth and subsequent developments in the Shire and the overarching issue of climate change exert new and ongoing pressures on its biodiversity. This amplifies the need for a Biodiversity Strategy, to maximise the best possibility for the Shire's biodiversity to flourish. Council's drafting of a long overdue Strategy is welcomed. However, as I read it, I became gravely concerned that the Strategy's underlying premise is fundamentally flawed.

Within the first pages of the Strategy it is apparent that Council does not have an insightful or even rudimentary concept of biodiversity. An explicit definition of biodiversity should be its starting point, yet nowhere within the Strategy is biodiversity defined. References to 'biodiversity' throughout the document suggest a very narrow conception of what biodiversity is, why it matters, and the interplay of

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ecosystem processes, function and resilience. Moreover, it does not demonstrate understanding of the link between biodiversity conservation and the influence of humans as part of the Shire's biodiversity.

The Shire's Biodiversity Strategy is a vitally important document. It should outline the direction of biodiversity conservation within the Shire, in short and long-term timeframes, across public and private land. It should clearly identify legitimate and realistic conservation objectives and detail how Council intends to achieve them. This requires measurable targets and timeframes, and how progress against targets will be measured. It should also provide a mechanism for regular review of Council's approach to biodiversity conservation, to analyse any failings and provide recommendations for improvement. Moreover, it should convincingly demonstrate Council's commitment to biodiversity conservation. I do not consider that the Strategy has even come close to achieving this.

Council's notion of biodiversity as something to be 'managed and controlled' is fraught. Rather than beginning with biodiversity in all its significances, number one on the list is 'weed management'. To begin with the 'invaders', rather than all the other species, interactions and processes that constitute the bigger picture of biodiversity reflects limited thinking. This is just one example of the discrepancy between Council's claims and its budget allocations. For example, Council has a role to inform landholders of their land management responsibilities, especially those living within close proximity to native bush, waterways and other areas of high biodiversity value. Council acknowledges this in the first sentence of the Executive Summary in saying it aims to 'strengthen the capacity of people in Hepburn Shire to protect, enhance and restore biodiversity'. Yet only 2K has been allocated for 'community knowledge and awareness building' while 192K is budgeted for weed management (plus 20K for 'pests'). I also question whether the 85K assigned to 'fire preparedness' and flood overlays/ management considers biodiversity or just a single species (*Homo sapiens*). I believe Council needs an entirely different paradigm for how it understands and regards biodiversity.

The community can help Council understand that biodiversity is not a 'problem' or an 'issue' or a 'threat'; that it is not just 'weeds' and 'introduced animals'. Council's weed focus distracts from the bigger picture importance of conserving the very species and habitats that 'weed management' supposedly strives to protect. Nor is biodiversity just 'flora and fauna' (represented in the Strategy only by vascular plants and vertebrate animals that collectively represent only a small minority of species diversity). Furthermore, 'significance' should not be assigned only to those species deemed 'threatened' or 'endangered' (i.e. common species contribute greatly to the structure, biomass and dynamics of the Shire's ecosystems and hence are also significant). Biodiversity is also not just 'resources'. It is more than something to just count, map and commodify. Biodiversity is not something to be tolerated so long as it does not interfere with Council's economic aspirations.

The Strategy identifies the importance of protecting the Shire's biodiversity and mentions some threats. However, to be convincing, this requires specifics. Generalised statements about climate change or habitat fragmentation serve to introduce ecological concepts, but are not sufficient for a Shire-scale Strategy. These need to be contextualised within local ecosystems and scenarios. Insufficient detail about specific initiatives prompts one to question whether Council has any real intention of enacting its aims. Replacing platitude statements with precise details would force Council to act responsibly. This means moving beyond lame 'management speak' to the real and everyday language of human life. The Strategy undermines itself with empty rhetoric such as 'the Appendices contains biodiversity maps that show high priority areas of focus which will inform decision makers to develop and implement projects and plans to deliver the strategic objectives and actions in the Biodiversity Strategy where they are most needed'. Did you find that convincing?

The Shire is fortunate to have dynamic and erudite residents concerned about biodiversity who could assist Council to become a leader in biodiversity conservation. However, Council needs to move beyond limited thinking and language to a broader concept of biodiversity that recognises all species; reflects a deep understanding of processes, functions and connectivities; promotes the importance of building ecosystem resilience; and acknowledges biodiversity as fundamental to our wellbeing and existence. This requires a judicious and conceptually sophisticated understanding of biodiversity science that reflects current thinking in conservation.

I urge Council to take the issue of biodiversity seriously and appoint a suitably expert person or team to reformulate a genuine strategy with community guidance. I encourage readers to pressure Council to do so. It is not a matter of 'patching up' and making amendments to a conceptually deficient Strategy, but starting again, with a commitment to conserving the Shire's biodiversity as its FIRST priority.

Ultimately, biodiversity cannot be 'managed'. We can only manage our own behaviours and whether we choose to care, or not to care about the very fabric of biodiversity that sustains us. ■

Alison Pouliot is an ecologist with a strong interest in the conservation of the Wombat Forest.

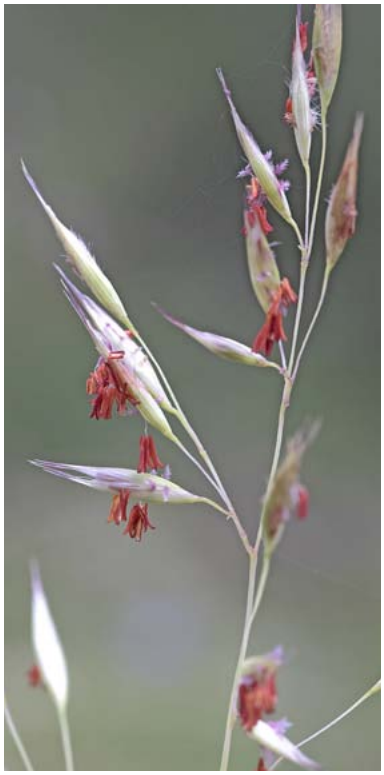
Hepburn Regional Park

Words and images by Gayle Osborne

The Hepburn Regional Park is one of six areas of public land in central Victoria that have been transferred to the Traditional Owners, the Dja Dja Wurrung People, on Aboriginal Title. A process to deliver a joint management plan for the park has commenced.

A Traditional Owner Land Management Board has been established, the Dhelkunya Dja Land Management Board, 'and will be responsible for the delivery of a Joint Management Plan to the Minister for the Appointed Land under the Dja Dja Wurrung Recognition and Settlement Agreement between the State and the Dja Dja Wurrung Clans Aboriginal Corporation.' [1]

The board has engaged the CSIRO to assist with the development of the joint management plan and notes that 'CSIRO have demonstrated outstanding expertise to work with Traditional Owner groups, and with the broader community, to produce innovative and practical strategic plans.' [2]



Left: Tiger Orchid *Diuris sulphurea*.
Right: Red Anther or Silvertop Wallaby Grass *Rytidosperma pallidum*.

For tens of thousands of years, indigenous Australians lived in harmony with the land, managing their harvesting of resources to ensure that their practices were sustainable. The arrival of Europeans changed this; the land and its resources, such as timber, were seen as a supply to be used primarily for themselves and the accumulation of wealth. Public land such as the Wombat State Forest was immediately decimated for timber and gold. The Hepburn Regional Park was intensively mined for gold. This belief in our rights to the resources of public land continues to be held by many people.

As so much of Victoria has been cleared of its native vegetation, these areas of public land are particularly precious. They are natural habitats for many species and should not be threatened by our activities.

The Hepburn Regional Park comprises mainly heathy dry and grassy dry forests. A number of waterways flow through the park. It is especially picturesque in spring; beautiful displays of wildflowers, with large expanses of orchids and lilies among the open grassy areas.

This is where many native plants and animals thrive; over one hundred bird species use the area and native bees and other insects proliferate. The park and neighbouring northern section of the Wombat State Forest provide Brush-tailed Phascogales with ideal habitat. Despite the destructive activities of the past, the park is a functioning ecosystem that contributes to the maintenance of species diversity.

The participation of the Dja Dja Wurrung People in the management of the park is exciting and will hopefully lead to greater respect for the conservation of its natural and cultural values. As with many things that are being reassessed, it is time to consider the appropriateness of the park's name.

Although Native Title grants ownership of some traditional lands to the traditional owners, including the right to active management, the land retains its protected area status, that is, it will remain a National Park, administered by the State government.

Throughout Australia, there are many successful consequences of indigenous joint management for all. The diversity of partnerships can result in improved management, on-ground working relationships, enriched knowledge of indigenous values and opportunities for indigenous employment.

It is an acknowledgement that indigenous Australians have a significant connection to their country. We hope this opportunity to encompass the values of indigenous people will lead to greater respect for our natural environment. ■

References

1. & 2. http://www.dhelkunyadja.org.au

Powerful, yet Vulnerable

By Trevor Speirs

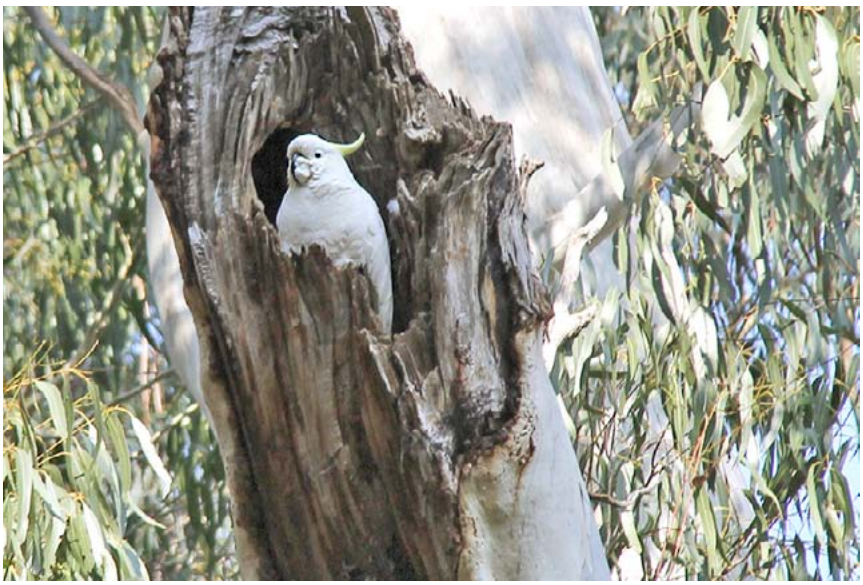
The Powerful Owls in the Wombat Forest have had mixed fortunes during this year's breeding season. Owl breeding starts in Southern Victoria towards the end of autumn through to early winter. It was in early June in the forest southeast of Daylesford when the first signs of probable breeding were seen; copious whitewash and pellets containing small bones found below several trees that were in close proximity to a large hollow-bearing Manna Gum.

It wasn't until mid-September that we knew that the owls were definitely breeding and this was achieved with the use of a Song Meter*, which is a device using new acoustic technology to record bird song and other sounds of the forest. We placed a Song Meter near the large gum for a week and on listening to the recorded data we heard the trilling, especially at dawn and dusk, of one, maybe two, owl chicks (two eggs are usually laid), along with the constant sheep-like bleating of an adult owl, a noise they often emit close to their nest.

What was surprising about this particular nest tree was that there were Sulphur-crested Cockatoos nesting in the very same tree, occupying a hollow just two or three metres above the owl's nest. Two years ago in the forest east of Trentham, owls and cockatoos were observed nesting in trees only fifteen to twenty metres apart; indicating that demand for large hollows is high.

Just out of the breeding hollow, this juvenile Powerful Owl is approximately 55 days old. Photography © Gayle Osborne

In NSW, Birds Australia have documented some disturbing Sulphur-crested Cockatoo behaviour in relation to owls in their Powerful Owl Program [1], which is being conducted in the greater Sydney region. Sulphur-crested Cockatoos have increased markedly in and around Sydney in recent decades and they are having an obvious negative impact on the owls. Between 2011 and 2014 volunteers for the program observed numerous Powerful Owl nests and recorded their successes and failures. Of sixteen confirmed nest failures, two were directly attributed to cockatoos, which occupied the owl's nest before chicks fledged. Another two nest failures were highly suspected of being caused by cockatoos. At several other nest sites, cockatoos were seen moving into hollows, on or around the same day fledglings had vacated them.



A Sulphur-crested Cockatoo surveys visitors to the breeding site. This hollow is just metres above the breeding hollow used by the Powerful Owls. Photography © Gayle Osborne

Sulphur-crested Cockatoos are just one of many bird species whose ranges have changed, or are changing, as a consequence of European settlement and subsequent land management.

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At the site in the Wombat, the cockatoos did not adversely affect the breeding of the Powerful Owls, as an owlet successfully fledged in early October, and shortly after fledging we found the owlet roosting in a Peppermint, with one parent in a Messmate, a short distance from the nest tree. While we were observing them on this occasion they were suddenly attacked, particularly the young owl, by three Pied Currawongs, for about ten minutes. The owls, while certainly perturbed, didn't seem to be injured at all and perhaps the behaviour of the currawongs is understandable as they are an occasional prey of Powerful Owls. Laughing Kookaburras, Ravens, Sulphur-crested Cockatoos, Crimson Rosellas and White-winged Choughs have also been known to mob Powerful Owls.

A week later we realised that there must have been two chicks trilling on the Song Meter when we came across the remains of a dead owlet at the foot of a tree not far from the nest. On first leaving the hollow, young owls engage in "branching", clambering and crawling along branches before eventually flying. This is obviously a very vulnerable time, with factors such as strong winds, heavy rain as well as bird attacks to contend with. This particular owlet appeared to have been eaten, probably by foxes, which have been known to frequent the area below owls' roost and nest trees, eating regurgitated pellets and, no doubt, any young owls that fall to the ground.

Elsewhere in the forest, a pair of Powerful Owls near Lyonville apparently did not breed this winter as no juveniles have been seen or heard with the adult birds this spring. Another pair, northeast of Blackwood, appeared to have started breeding in June, with the same indications as the birds near Daylesford (whitewash etc.) surrounding a large hollow-bearing Mountain Grey Gum, but they abandoned the site some time during July.

In 1996 renowned owl researcher Ed McNabb published his survey results on a number of Powerful Owl pairs in Southern Victoria and he found them to be reliable annual breeders with an average output of 1.4 fledglings per breeding attempt. Of course there are other breeding owl pairs in the Wombat Forest, but of the three observed pairs one successful fledgling from a possible six does suggest a quiet breeding season.

Ed also found that Powerful Owl pairs take a minimum of ninety-five major prey items a year, one every three or four days. This year's seemingly low breeding rate can only be good news for the Greater Gliders, a threatened species, and the Common Ringtail Possums of the Wombat Forest.

*The Victorian National Parks Association in partnership with Museum Victoria are running a project called "Communities Listening for Nature", which involves installing Song Meters to record bird calls. Wombat Forestcare is participating in this project, which is being co-ordinated by WFC member Lynda Wilson. Four Song Meters are placed in different habitats for three-week periods throughout the year, and the collected data forwarded to Museum Victoria for analysis. ■

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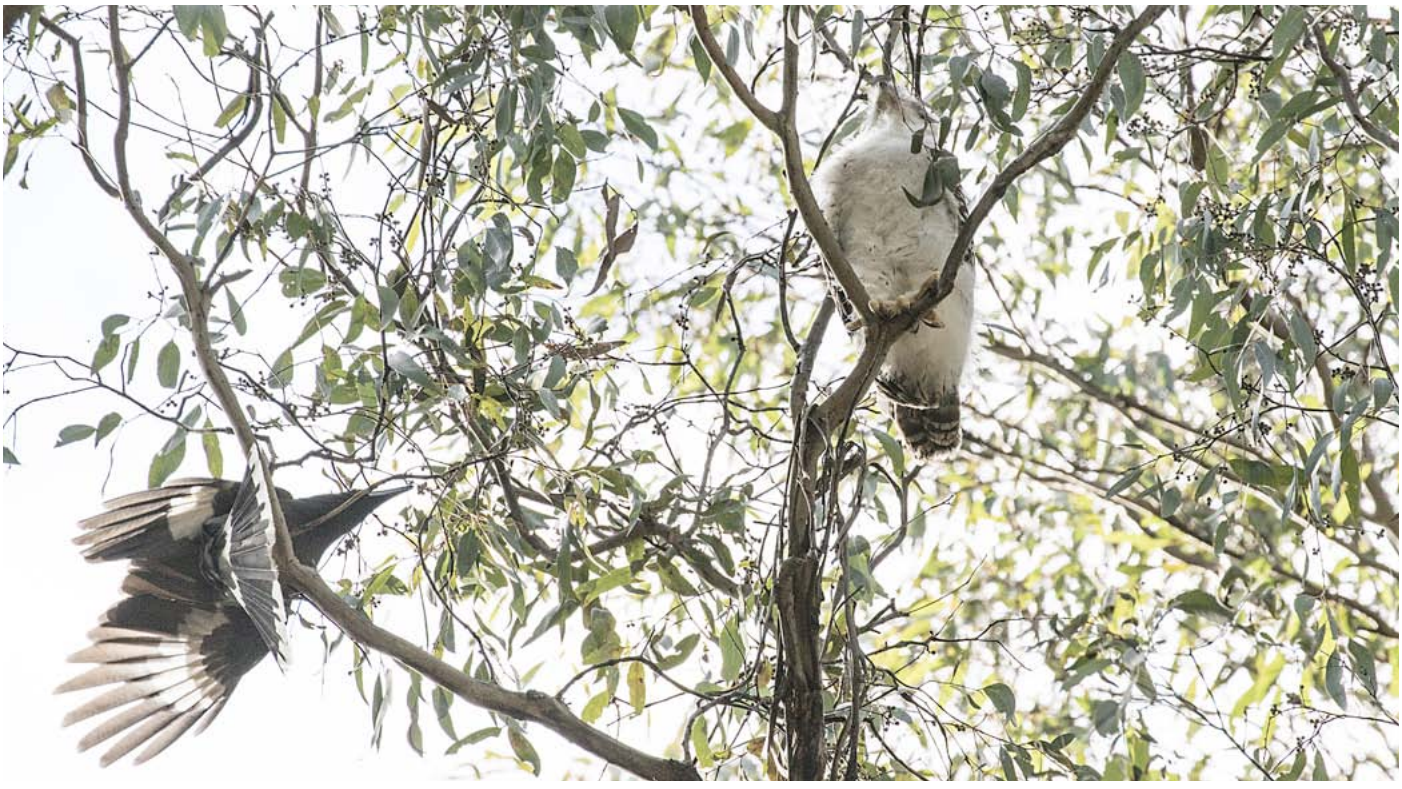
1. The Powerful Owl Project, Birdlife Australia.
2. McNabb, E.G. (1996) Observations on the biology of the Powerful Owl *Ninox strenua* in Southern Victoria, Australian Bird Watcher, 1996 Vol.16 (7), 267-295.

Below: A Pied Currawong mobs the juvenile Powerful Owl. Photography © Gayle Osborne



Egg and Bacon 5,
From the tall to the small – more *Pultenaea* from the forest

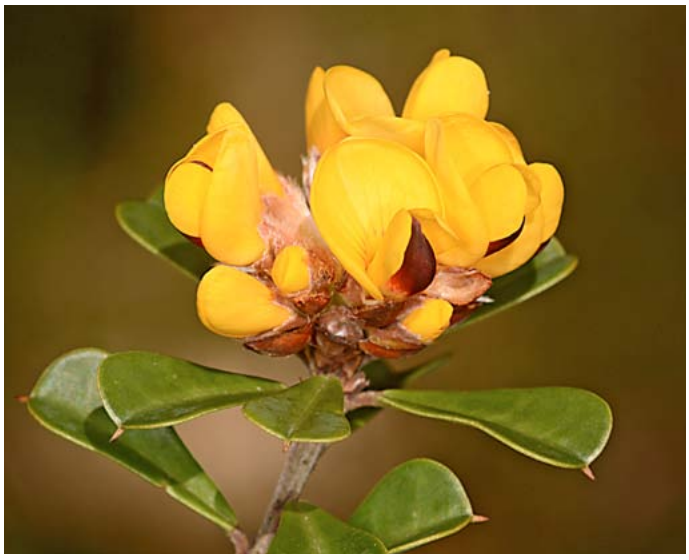
Words and images by John Walter

I have taken the opportunity to examine the developing seeds from our first *Pultenaea* mentioned in the last newsletter and I can confirm that they exactly match the drawings of *P. vrolandii* prepared by Rex Filson and published in Margaret Corrick's comprehensive review of the *Pultenaea* in the *Victorian Naturalist*. This now confirms that we have four rare *Pultenaea* species in this district and we need to arrange a collection for the herbarium to ensure this important additional population of a rare species is recognised.

Our tall species is one of the most widespread of all the *Pultenaea* and is known as the Large-leaf Bush-pea. The formal name is *P. daphnoides*, named for the similarity of the flower clusters to those of the Daphne. While it is reported to grow up to 2 or 3 metres tall, I have not seen it over 2 metres in this district. The large leaves (30mm or longer) do vary in shape from place to place. Sometimes the leaf tip is more oval and sometimes the tip appears to be cut off leaving a squared end; but it always comes with a short spine-like point. The large leaves are so distinctive that most observers need not resort to the finer details of bracteoles and stipules to identify this species and you can easily recognise it even when it is not flowering.

The first small species is included here as its leaves are superficially similar to the "cut off" leaf form of *P. daphnoides*. The leaves of the Rough Bush-pea, *P. scabra*, are much smaller however (barely 10-12mm) and are scabrous or roughened, having a feel a bit like sandpaper. I have only seen one population of this species near Barkstead, but it is also reliably recorded south west of Trentham and in the far east of the Wombat Forest in the upper reaches of Jacksons Creek. While my text books tell me it can grow up to one metre in height, all the Barkstead population are substantially smaller than this with the largest plant being less than 1/3 this size. I suspect this is partly due to browsing by the local Wallaby population as all the plants show signs of nipped off stems. Once again, the leaf shape, combined with its rough texture, makes this an easy species to identify in the field.

P. scabra is also a variable species and like *P. daphnoides*, the leaf shape can be quite varied. The images shown here of both species depict the leaf as you would most likely find it in our local forests. Visitors to the Grampians or eastern Victoria or New South Wales will find the leaf may be quite different in those localities, and here you might find the bracteoles help with identification. In *P. daphnoides* the silky hairy bracteoles are attached a little over half way up from the base of the silky hairy calyx. *P. scabra* has short hairy bracteoles with a papery margin that attach about midway up from the calyx base according to Corrick, but in our Barkstead population, they attach very near the base.



Pultenaea daphnoides showing:
Top: Typical terminal rosette of leaves with buds.
Centre: Leaf profile with the point angling downwards.
Bottom: Daphne-like terminal flower cluster.

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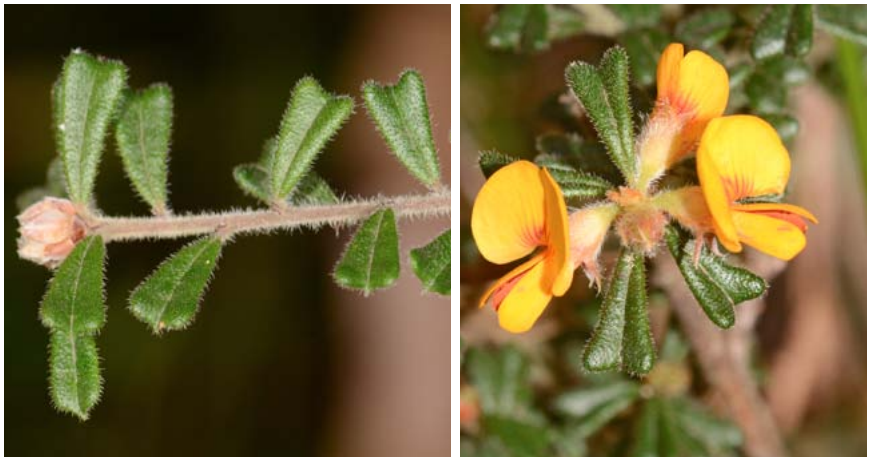
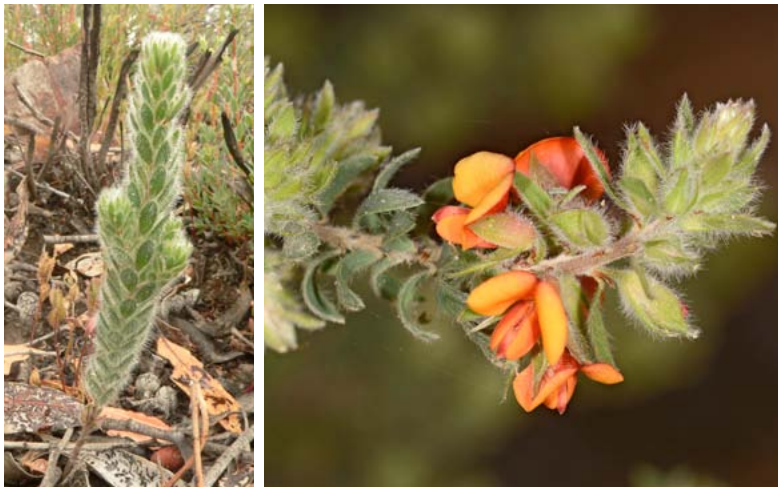
The Dwarf Bush-pea carries the species name *humilis*, which means low or low-growing. *Pultenaea humilis* is recorded in the Wombat Forest to the west of Blackwood and also occurs locally around Creswick, Macedon and in the dryer forests north of Glenlyon. In the Fryers Ranges it is a small, bushy shrub growing to around 40cm while the plants at Lauriston Nature Conservation Reserve are much smaller, reaching 15-20cm when it is left to grow for long enough between the fuel reduction burns. There is also a prostrate population at the Taradale Cemetery but this may be a forced adaptation due to the occasional mowing.



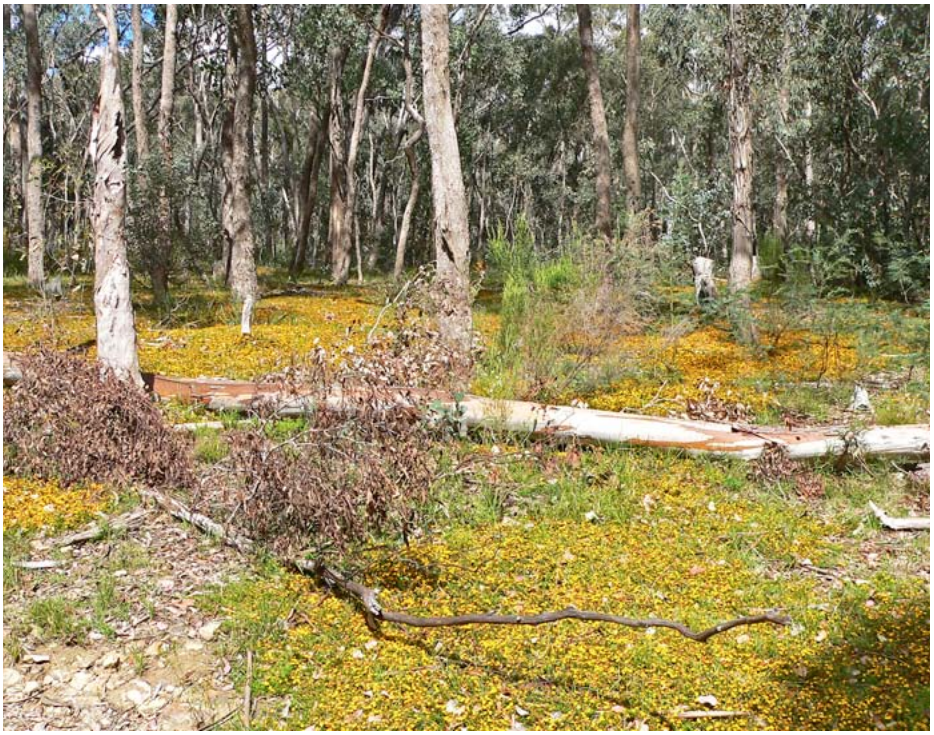
Stem, leaves and flowers of *Pultenaea scabra*. The rough surface on the leaves is caused by tubercles or wart-like projections.

The leaves on *P. humilis* could be compared to the leaves of *P. vrolandii* in that the upper surface is glabrous (hair free) and the underside is hairy, and the leaf margins are slightly incurved. On closer examination however, you will see that the hairs on *P. humilis* are quite long and stand erect whereas those on *P. vrolandii* (see last issue) tend to lie flat along the leaf. The leaf tips are also different with the tip of *P. humilis* curving towards the growing end of the branch and the opposite happening in *P. vrolandii*. Of course, the two species are also very different is size as well.



Hairy young seedling of *Pultenaea humilis* on left and flowering stem on right. Note the leaves to the left of the flowers curving towards the branch tip.

The truly low growing *Pultenaea* of the district is the Matted Bush-pea, *P. pedunculata* which forms a large prostrate mat. Individual plants can stretch out to 2 metres in diameter and in some locations the plants grow so close together they give the appearance of a carpet cloaking the woodland floor. The many small flowers form on long silky peduncles (stems) so they sit in a layer just above the foliage. The growth habit alone is enough to identify this plant although you might confuse small plants that are not in flower with the Cranberry Heath *Astroloma humifusum*. Looking for stipules at the leaf base will quickly help you sort out any confusion as the presence of stipules will confirm its identity as a pea and not a heath.



Large mats of *Pultenaea pedunculata* on Green Gully Road.

While this species is widespread throughout central Victoria, there are few records within the Wombat Forest. There is a healthy population ranging from the ridge tops near Bryces Flat through to Shepherds Flat and the similarly dryer forest/ woodlands north of Glenlyon have many significant populations.

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The language of botany can be tiresome and a burden to many, but I love its precision. Every part of a plant has a precise name, but even here, I find that patterns of usage can change over time. In traditional usage, the name of the stem of single flowers was a peduncle, and this was (and still is) also the name of the single stem that supports an inflorescence or grouping of flowers. The stems of the individual flowers in the inflorescence were (and still are) called pedicels. It seems that in the current usage of the term pedicel, it has been altered to also include the stems of single flowers that are not part of an inflorescence. When W J Hooker first described *P. pedunculata* in 1828, the key feature was clearly the peduncles on the flowers prompting Hooker to write "It is distinguished from all the others of the Genus by its pedunculated flowers …".[1] If Hooker was to name the species today he might well call it *P. pedicelata*, but then, that would not distinguish it from all the other *Pultenaea*. ■

Flowers of *P. pedunculata* held just above the leaves on peduncles.

As the flower fades and the seedpods develop the peduncles droop, hiding the seedpods well below the foliage.

References

General texts include H B Williamsons "A Revision of the Genus *Pultenaea*", published in five parts between 1920 and 1928 in the *Proceedings of the Royal Society of Victoria*, Margaret Corrick's "Bush-Peas of Victoria – genus *Pultenaea*" published in 24 parts between 1976 and 1990 in the *Victorian Naturalist*, and Corrick also prepared the section on *Pultenaea* published in 1996 in the *Flora of Victoria Vol 3*, and R P J de Kok et al "A revision of *Pultenaea* (Fabaceae)" published in four parts between 2002 and 2005 in *Australian Systematic Botany*

1. Hooker W J (1828) *Curtis's botanical magazine Vol 55*, Plate and text species 2859, labelled *Pultenaea pedunculata*

Brush-tailed Phascogale (Tuan)

By Lois Blackhirst

In June this year I attended a talk by Jessica Lawton on the Brush-tailed Phascogale *Phascogale tapoatafa*. Jess is a PhD candidate at LaTrobe University whose study focuses on the conservation biology and landscape ecology of the Brush-tailed Phascogale. Her comprehensive research and huge collection of fascinating and endearing photographs inspired me to research this elusive mammal further.

What is a Brush-tailed Phascogale? Many people haven't heard of them and some of us only discovered them recently. It is a small rat-sized carnivorous marsupial, with a black brush tail from the family Dasyuridae, which includes quolls and Tasmanian devils. The Brush-tailed Phascogale is a nocturnal mammal and is mostly arboreal. It nests in tree hollows, ideally between ground level and eleven metres above ground (Menkhorst, 1995). The ideal nest is a tree hollow lined with feathers, bark and fur which has a small entrance with a roomy inner area.

The phascogale's legs are perfectly adapted to tree climbing. Each foot has five claws. On each long back foot there is an opposing 'thumb' which helps grip when climbing. The back foot joints can rotate to 180 degrees, facilitating movement under pressure in any direction.

Agile and shy are the words most used for this creature. They spiral round tree trunks, pop in and out of hollows and are hardly ever seen. They can climb or forage facing up or down a tree trunk, digging under the bark for invertebrates as well as feeding on small birds, rats mice, lizards and eucalypt nectar (Traill and Coates 1993). The phascogale communicates by tapping its forefeet on a branch (Menkhorst, 2001) and some suggest the rapping may be answered by a nearby phascogale (Parish, 1997).

Phascogales are recorded in a band across the forests of Central Victoria with concentrations of sightings in the Brisbane Ranges, near Euroa, and around Mount Alexander. They have been captured on camera in current Wombat Forestcare and VNPA surveys. They are solitary and shy creatures except when breeding and rearing young so the frequency or lack of sightings does not necessarily mean a stable or an absent population.

The isolated forests of East Gippsland have had few or no sightings in recent years, however Belcher (1994) reported that a phascogale hair was found in a Spot-tailed quoll scat at Mount Stradbroke near Suggan Buggan. What are the chances?

Female phascogales only ovulate once a year. The breeding season lasts for three weeks between May and July and mating goes on for several vigorous hours. The males' immune systems are exhausted by this effort and they usually die before their young are born 30 days later. The female has eight teats and skin flaps develop around them rather than having a fully formed pouch. The young stay attached to the teats for about 48 days and then remain in the nest until weaning at five months. Females live for one or two breeding years and very occasionally three.

Jess pointed out in her talk, that when at least half a population dies every year, then it is prone to local extinction. Their home range is large; over 100 ha for males and 20 to 70 ha for females (Menkhorst, 1995). The phascogale is listed as threatened under the *Flora and Fauna Guarantee Act 1988*. Some of the threats are habitat clearance and disturbance, mining, logging and firewood collection, which not only diminish habitat size but also affect the availability of nest hollows and insect and bark dwelling food sources. Drought, fire, foxes, cats, fox baits and other poisons add to the list (Terry, Kent and Patrick, 2015).

Talking to older country locals you may hear less sympathetic tales. Along with their larger relatives the quolls, phascogales had a reputation for raiding hen houses and aviaries. Many early farmers and country people killed them readily. Charles Barrett (1954) called it a pouched rat or tree rat which, 'shows fight when cornered ... entering the poultry yard like a thief in the night ... killing fowls with a bite in the neck and sucking their blood.' Dr Marion Manton counters, 'There is no doubt that they raid poultry yards when they live close to man but . . . they probably also do a great deal of good by taking mice and quantities of pest insects as well.'

The Argus newspaper in Melbourne, 1941, featured and correctly named the Brush-tailed Phascogale in its nature column. It had been brought in with a load of wood to the Waterloo Hotel in Bendigo from which it 'leapt like a cork from a popgun.' It is a complimentary article, describing the 'alert, sharp-faced little climber with its glossy black bottle-brush tail' which makes 'Morse code alarm signals, usually performed during nocturnal rambles, by means of tapping smartly against the boughs.'

I have never had problems with a phascogale taking my hens and I find it hard to imagine this furry tree dweller as a villain. Foxes on the other hand...

As with most PhD studies, Jess's collection of data and her generous sharing of information is only the first part of her study on the factors affecting phascogale communities. As she continues her analysis we look forward to hearing her discoveries. ■

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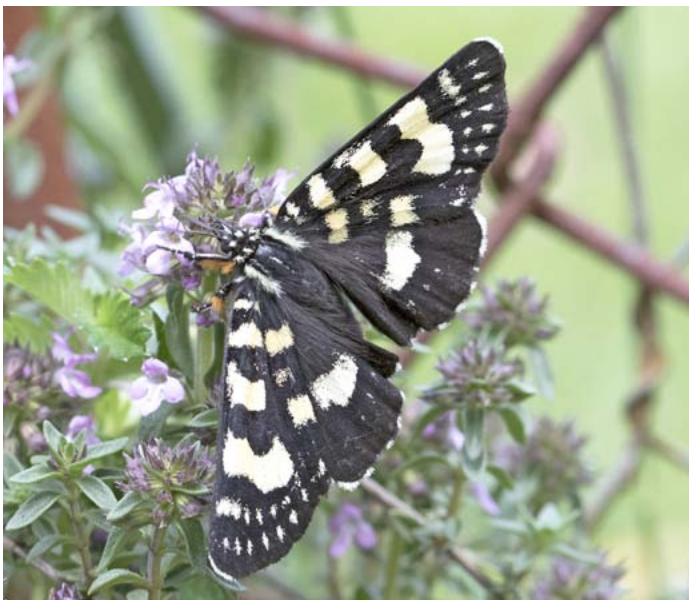
Below: Brush-tailed Phascogale captured on camera

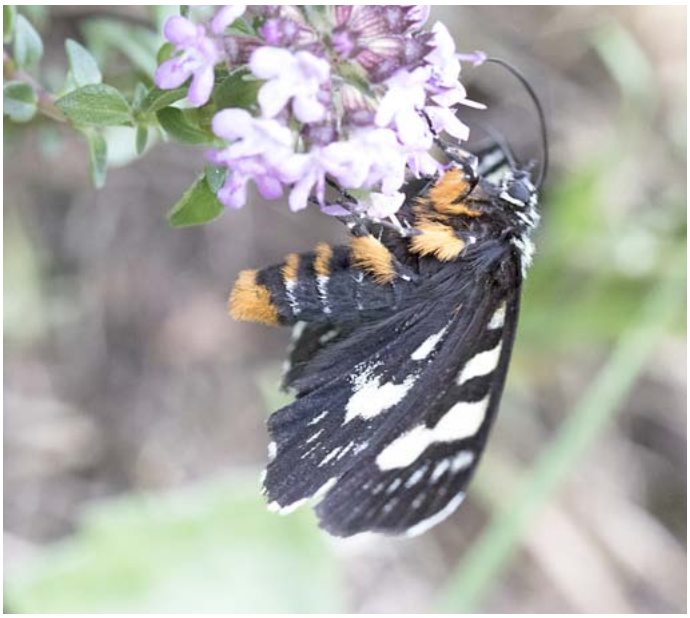
Nature Page

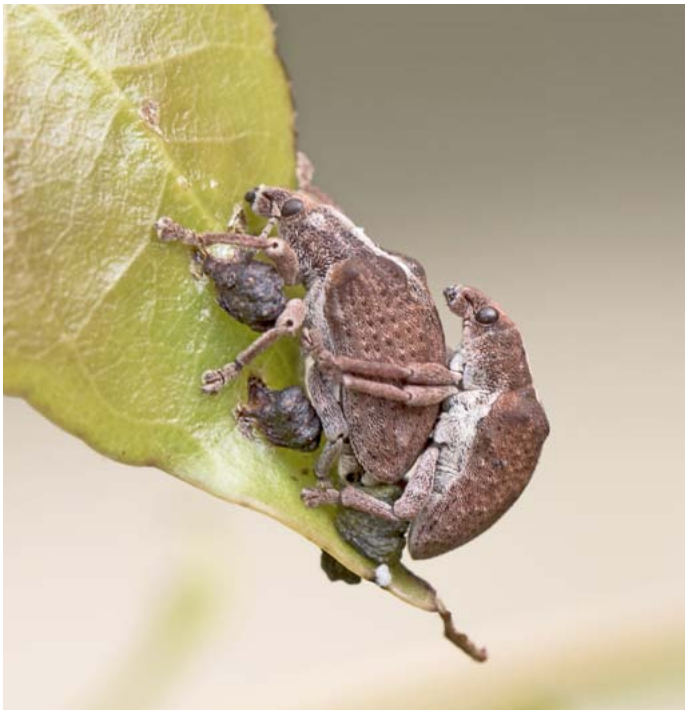
Words and images by Gayle Osborne

Insects and spiders proliferate in the warmer weather, many seeking nectar from flowering plants. The diversity of insect species is astonishing, more than 86,000 species found in Australia. We do not have to search far to find an amazing diversity of insects.

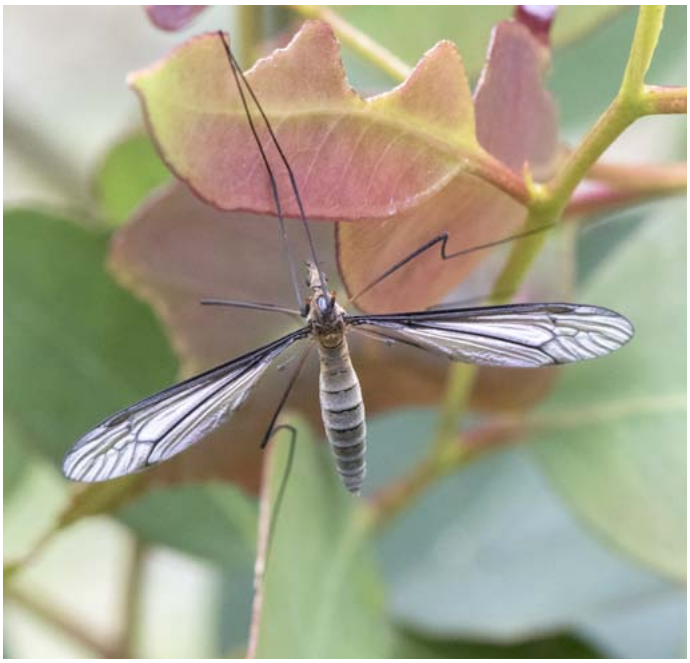


All butterflies fly by day, and most moths at night, but two families of moths do fly by day: *Uraniidae* and *Agaristinae.* This beautiful day flying moth is *Phalaenoides tristifica.*





Weevils feed on plant foliage and are part of the beetle family; their distinguishing feature is a rostrum, an elongated snout that extends the mouthparts. These weevils are *Leptopius quadridens.*



Resembling a large mosquito, crane flies are a delicate insect. They have long slender legs and exquisite wings and are absolutely harmless. There are more than 700 crane fly species in Australia. Probably *Leptotarsus Macromastix humilis.* ■