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Wombat Forestcare Newsletter

Fungi have been slow to emerge, but suddenly there is a profusion of fruiting bodies of all colours, shapes and sizes: luscious cortinars, tiny Pixie Parasols, colourful corals, cups, discs and jellies. Read about the new Fungi App. Enjoy the winter forest. **Gayle Osborne** (editor) and **Angela Halpin** (design)

Ghosts of the Wombat

Words and images by Alison Pouliot

When was the last time you went for a night wander in the Wombat? Chances are you might have been spotlighting for nocturnal mammals. However, the Wombat also holds other unexpected nighttime delights and what's more, there's no need for a spotlight.

Fungi are well known for their interesting traits such as hallucinogenicity and edibility. One of the more mesmerising, indeed other-worldly traits, is that of luminosity. Although probably not in the Wombat, Aristotle (384–322 BC) was among the first to have reported terrestrial bioluminescence (bios meaning living and Iumen meaning light) in the phenomenon of 'glowing wood' or 'shining wood' (luminescent mycelia in decomposing wood). However, Aboriginal Australians are likely to have known about the luminescence of fungi way before Aristotle's time.

Unsurprisingly, luminous fungi have spurred myriad superstitions and folklore. Early settlers in Australia recorded Aboriginal reactions to what is thought to have been the Ghost Fungus (*Omphalotus nidiformis*). Aboriginal groups are known to respond to fungi in different ways, with some utilising them and others fearing them. Some Aboriginal groups, such as the Kombumerri of southeastern Queensland associated luminous fungi with evil spirits and supernatural activities of Dreamtime ancestors. Likewise, West Australian Aboriginal people referred to the Ghost Fungus as *Chinga*, meaning spirit. Similarly in Micronesia, some people destroyed luminous fungi believing them to be an evil omen, while others used them in body decoration, especially for intimidating enemies. In California, miners believed them to mark the spot where a miner had died.

The Ghost Fungus, *Omphalotus nidiformis* glows a curious green. Photography © Alison Pouliot

How do organisms bioluminescence?

Bioluminescence is a biological process whereby light is emitted by living organisms. The Ghost Fungus contains a light-emitting substance called luciferin (*lucifer* meaning light-bringing). In the presence of oxygen, luciferin is oxidised by an enzyme called luciferase. As a result of this chemical reaction, energy is released as a greenish light. The light from the Ghost Fungus is often quite subtle and usually requires quite dark conditions to see. One needs to allow one's eyes to adjust to the darkness to view it properly, rather than use a torch.

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Ghost Fungi grow throughout the Wombat and are most commonly found in large overlapping clusters around the bases of a variety of trees, commonly *Eucalyptus*, but also *Acacia*, *Hakea*, *Melaleuca*, *Casuarina* and other tree genera as well as understorey species. The large funnel-shaped fruitbodies are variable in form and colour, but are mostly white-to-cream coloured with various shades of brown, yellow, green, grey, purple and black, usually around the centre of the cap. On the underside, the lamellae are white-to-cream coloured and extend down the stipe. This adaptable fungus is thought to be both weakly parasitic and saprobic (recycles organic matter).

Throughout the world about 70 species from nine genera of fungi are known to bioluminesce. Many of these are tropical species, especially from the genus *Mycena*. With some luminous fungi it is the fruiting body that glows, in others the mycelium, while with some all parts glow. Among the more widespread and well known luminous species is the honey fungus (*Armillaria mellea*) found throughout Europe, Asia and North America. The mycelium of this species glows, but given it is mostly beneath the bark layer in wood, it is seldom observed.

Most research into bioluminescence has been with animals. These include many marine animals such as fish, jellyfish, corals and dinoflagellates (plankton) as well as terrestrial organisms including worms, fireflies and other insects. In marine environments, scientists have theorised that bioluminescence could have an ecological role relating to defence, offence, and forms of communication such as warning signalling.

Although fungal bioluminescence has been well documented, little research has been done to establish why fungi bioluminesce. While some experiments have shown that bioluminescence attracts spore-dispersing vectors such as insects to particular fungi, this appears not to be the case with the Ghost Fungus. Researchers who tested whether insects are more readily attracted to the Ghost Fungus concluded that bioluminescence is more likely to be an incidental by-product of metabolism, rather than conferring any selective advantage. Those who find this scientific explanation somewhat unsatisfying might prefer to stick with the theory that these fungi help guide fairies (or perhaps wombats) through the forest at nighttime.

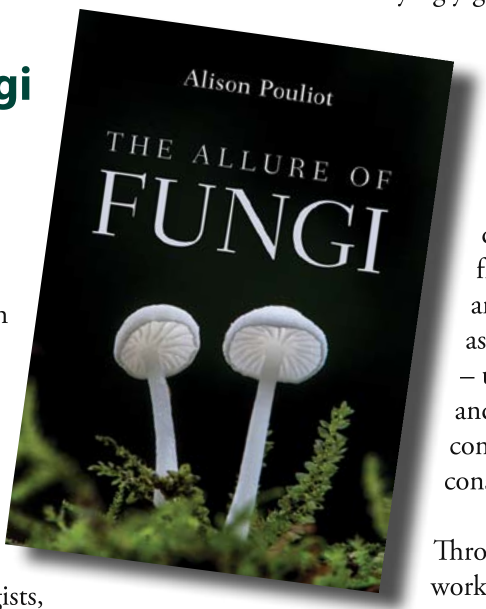
Returning to darkness

We live in the Age of Illumination, plagued by light pollution. Earth's nights are getting brighter and many scientists are concerned about the effects on wildlife as well as how they stymie human appreciation of nature. Artificial lights disorient birds, especially those that migrate at night and other species such as hatching turtles that confuse artificial light with that of the moon. Exposure to artificial light also affects human health. A nighttime wander in the Wombat can reveal the forest's nocturnal activities and reward one with the pleasures of finding ghost fungi. Only in darkness is their magic revealed.

And just something to keep in mind, although the Ghost Fungus looks superficially similar to edible oyster (*Pleurotus*) mushrooms (and were once classified in the same genus), it is toxic. It possesses a powerful emetic that causes nausea and vomitting. And who knows, it might even cause you to glow terrifyingly green (just joking)! ■

The Allure of Fungi

Author: Alison Pouliot



A foray into fungi and how they shape the world.

Australia is a fungal ark. Although little known, fungi provide the links and flows between organisms and ecosystems that underpin a functioning planet.

This book presents fungi through multiple perspectives – those of mycologists and ecologists, foragers and forayers, naturalists and farmers, aesthetes and artists, philosophers and Traditional Owners. It offers a distinctively Australian biological-cultural narrative on fungi, then crosses continents to juxtapose European understanding. It explores how a history of entrenched fears and misconceptions about fungi has led to their near absence in Australian ecological consciousness and biodiversity conservation.

The central thread of the book teases out the dynamism of mycelia (rather than just fungus fruitbodies) literally and allegorically as the anchor from which the book's themes – such as connectivity, indeterminacy and resilience – unfold. It presents mycelia as a framework and catalyst for more imaginative ways to consider environmental issues and the practice of conservation.

Through a combination of text and visual essays working in counterpoint, the author reflects on how aesthetic, ensate experience deepened by scientific knowledge offers the best chance for understanding fungi, the forest and human interactions with them.

Publication due September 2018.
Order at www.publish.csiro.au

Raptor rap

By Trevor Speirs

Brown Goshawk *Accipiter fasciatus*.
Photography © Gayle Osborne.

Australia has three mainland members of the *Accipiter* genus, of which there are about 40 species worldwide, and all three have been recorded here in the Wombat Forest. The most common is probably the Brown Goshawk *Accipiter fasciatus* although because of the goshawks' secretive nature, they are seldom encountered in the forest, apart from during the breeding season when they become particularly vocal. A cryptic bird, the Brown Goshawk sits quietly in foliage from where it launches attacks on prey ranging from birds, reptiles and small mammals such as rabbits. This behaviour is characteristic of all *Accipiters*, which are built for fast and agile flying through forests with their wide, broad wings and shortish tails.

The bird pictured above was located at its nest along a well-vegetated creek gully in East Trentham. During the breeding season of spring into summer, Brown Goshawks not only become more vocal, but also aggressive, having been known to attack people who have ventured too close to a nest.

The other two *Accipiter* species that have been recorded here are the Grey Goshawk *Accipiter novaehollandiae*, a bird generally of tall forests and which, occurs in two morphs, grey and pure white; and the Collared Sparrowhawk *Accipiter cirrocephalus*, a smaller hawk which, like the Brown Goshawk, inhabits most treed areas including forests, but mainly woodlands and farming areas. A quick look at any bird guide will tell you that the Brown Goshawk and Collared Sparrowhawk are remarkably similar in appearance, with only a slight variation in call, but the latter's squared-off tail is one way to differentiate them, should they stay still long enough.

The last documented record on the Victorian Biodiversity Atlas of a Grey Goshawk in the Wombat Forest was way back in the mid 1990s, south of Spargo Creek, along the Werribee River. This year there have been two sightings by members of WFC, including a photo taken from a phone, around the Little Hampton area. In the two recent observations the bird was eating a rabbit, a staple food nowadays, on or near farmland, and were both of the white morph which predominate in southern Australia.

These current sightings, as well as being very exciting, also raise some intriguing questions. Is it a lone bird, or a pair, possibly breeding in or around the Wombat Forest? Although considered to be inhabitants of deep wet gullies and gallery forests, they are also known to perch high, often in white-trunked gums, on the forest edge overlooking open land. The Wombat Forest is such a large region and these birds can have extensive ranges, which makes discovery difficult but maybe the nearby Coliban and Loddon River valleys could be likely breeding habitats this spring. Although not threatened nationally, in 2003 the Scientific Advisory Committee of the FFG Act found the Grey Goshawk to be in a state of decline in Victoria and it was listed as Vulnerable.

Grey Goshawk (white morph) taken on a mobile phone at Little Hampton.
Photography © David Tiller .

Gippsland naturalist and author David Hollands witnessed a remarkable event in his home district back in the 1970s when a male Grey Goshawk mated with a female Brown Goshawk, successfully producing young over about a 10 year period. Hybridisation isn't uncommon in the bird world, Crimson and Eastern Rosellas being two species known to interbreed, but for these raptors, by all accounts, this was an extremely rare event.*

The history of training goshawks for hunting goes back many centuries in Asia, with the practise arriving in Britain around the beginning of the previous millennium. A keeper of goshawks was known as an austringer, and whereas the falcon and merlin were considered superior and the preserve of the nobility, the humble goshawk and sparrowhawk were deemed more suited to the lower classes, such as yeomen and those of the priesthood. Apparently nuns would walk the streets and attend prayers with a goshawk on their shoulder. You're unlikely to see something that remarkable around Daylesford or Trentham these days, but in the nearby forest with an ounce of luck you might see or hear something just as striking, the beautiful snowy white Goshawk. ■

*David Hollands: *Eagles Hawks and Falcons of Australia*

A Thunderbolt confirmed by a little white latex

Words and images by John Walter

I recently wrote about a *Mycena* species known as *M. thunderboltensis* which was named after the bushranger Captain Thunderbolt. This dark brown species has a white latex in both the cap and the stem and a dark edge to the white gills. As far as I can tell, it has not been recorded since it was first collected in NSW in 1994, however I photographed a species with these characteristics in Blue Gully in 2011. The earlier article covered the 2011 find and referred to a species I had found off Cooper Road that appeared to have the latex in both the stem and cap, but the photographs I took were not sharp enough to positively confirm the material was latex. I returned to the Cooper Road site this year and once again found large numbers of this species on a rotting log and this time I can confirm that the cap, gills and stem all exude a white latex when damaged. Most of my photographs this time were taken with a scientific record approach rather than a picture book composition, but they are an essential part of the collection I have just made for the Herbarium. Taxonomists do not generally name a species based on just one collection unless material is extremely limited, so this new collection is extremely important as it allows our mycologists to develop a greater appreciation of this species.

I recently started posting some of my images on the NatureShare website (mostly moths so far) and have also created four fungi groups, each with six species to start them off. I expect to have the time in a couple of weeks to populate these with as many fungi species as I can. The group that is of most interest here is called "Wombat Forest – Fungi" and the others are "Drummond & nearby forests – Fungi", "Macedon Ranges – Fungi" and "Otway Ranges – Fungi". My idea is to start building a reference site for all our Wombat Forest species with quality images that can be used to help others identify their fungal finds. This is separate from the iNaturalist project as the images I upload into the Wombat Forest group must have been taken in the Wombat Forest. In a few years we should have a comprehensive list of the fungi species found in the Wombat for everyone to share.
https://natureshare.org.au/collections/5a9225c1ed2a89ad3200086b

The concentric ridges on the cap seem to be a feature of the species at Cooper Road but I did not notice them on the Blue Gully population.

The burning issue of igniting the Wombat

Words and images by Alison Pouliot

The long term impacts of fire on the Wombat's biodiversity are largely unknown.
Photography © Alison Pouliot

The Wombat Forest is extraordinarily complex. It is both resilient and fragile. Our efforts to understand it increase its potential to flourish. I am fortunate to interact with a great range of people in the course of my work, who know the forest from different perspectives and experiences. Each interaction provides an opportunity and a new lens with which to understand the forest and environmental issues.

One issue that repeatedly arises is that of prescribed burning. As I've travelled through the forests of four states this autumn, I've been struck by the deep and widespread concern about what are known as prescribed burns, or 'fuel reduction burns'. These burns are used as a 'fire management or hazard management tool', for reducing the amount of 'fuel' in a given area, based on the assumption that they lessen the risk and impact of wildfire. I repeatedly hear stories from people including farmers and fire fighters, fire ecologists and other scientists, Aboriginal elders, conservationists, landholders and others who are concerned about the effectiveness of and environmental damage caused by inappropriate prescribed burning. Many consider that the cumulative effect of regular, repeated and inappropriate burning poses as serious a threat to biodiversity as the high intensity wildfires it supposedly ameliorates. Others say that in most ecosystem types, prescribed burning is unlikely to have any effect at all on the extent of wildfire. I hear numerous accounts of the lack of regeneration due to inappropriate burns. Meanwhile Melbournians grow ever more irritated by excessive levels of smoke. And most agree that there is nothing even remotely 'ecological' about prescribed burns, with some suggesting that individuals should be held accountable for the destruction caused by prescribed burns and criminally charged.

Failure of the Royal Commission?
The Victorian Bushfires Royal Commission following the 2009 Black Saturday bushfires recommended an annual 'burn target' of 5% of public land (approximately 390,000 hectares). This has since been replaced with a target of reducing bushfire risk to 70% or less. The 2017-2018 Victorian budget to 'reduce bushfire risk, refurbish forest-based assets and protect our forests and wildlife through better compliance and enforcement' is a staggering $309.4 million. Yet DELWP's fire simulation software tool – that might be effective for aiding wildfire control – is considered by many to be a very blunt tool for risk reduction.

Many experts consider that the Commission has failed in its aims of protecting life and property, as well as having perpetuated biodiversity loss. Their first hand experiences of the impacts of prescribed burns echo the concerns of the Royal Commission's independent monitor, Neil Comrie, who has consistently argued that targets are not achievable or sustainable and have potentially adverse environmental outcomes.

The first priority of bushfire management on public land is the protection of human life and property. The protection of biodiversity receives only scant and token attention. However, many people question whether prescribed burning really increases human safety at all, or is focused on meeting targets. It is well accepted that during bushfires most homes (c.a. 90%) are lost due to ember attack. Fire scientists and ecologists have repeatedly told us that in order to protect humans prescribed burns should be focused directly around houses, not forests uninhabited by humans. Moreover, broad scale approaches to burning do not apply to the great complexities and variation within Australia's ecosystem and climate types. Fire intensity is influenced by air temperature, weather, moisture levels and the nature and amount of organic matter. Rate of spread of a fire is influenced by

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topography, wind speed, vegetation type and moisture levels along with other factors. Grasslands, sclerophyll forests, temperate rainforests and other ecosystems all function in very different ways, including in their adaptations to fire. Enormous variation also occurs within the one ecosystem type. I am not a fire scientist and recognise the detailed assessments, preparation and planning necessary to determine burning regimes, yet too often it appears that burns are not tailored specifically to local ecologies, climates and situations.

The destruction of stags (standing dead trees) through prescribed burns means the loss of vital habitat for gliders, birds and numerous other animals that rely on hollows as habitat. Photography © Alison Pouliot

Are burns effective?

Opinions inevitably vary regarding the effectiveness of burns but the bottom line is that peer-reviewed scientific research shows that prescribed burns have a short term effect, reducing so-called 'fuel loads' for only about three years. Repeated burning at this interval is not only impossible, especially given the ever narrowing burning window due to human-induced climate change, but more significantly, the frequency of such burns on biota is largely unknown but likely to be severe. Moreover, while such burns could have some effect on controlling moderate level fires, their effectiveness with more severe fires is negligible. In some situations they actually *increase* wildfire risk by favouring the regeneration of species that are more volatile and increasing regenerating biomass.

Burning has significant effects on the species composition of forest ecosystems. Frequent low intensity burns alter species composition especially in understorey plants and leaf litter inhabiting species. Changes to these habitats affect bird species that prefer shrubby undergrowth and dense leaf litter layers. This knowledge is only the tiniest piece in the jigsaw and whether species are being locally eliminated due to frequent burning in the Wombat is largely unknown. Approximately 1,500 hectares of the forest were burned this autumn. Over time, the gradual continued pressures on biota from frequent fires have a cumulative effect. Although sometimes difficult to detect and quantify, the loss of habitat and age structure reduces biodiversity, which in turn reduces forest resilience. What does this mean in real terms? It means that the forest has less capacity to respond to and recover from other stresses such as drought. It is a gradual weakening of its ability to 'cope'; to support its diversity of species and be self-sustaining. Simple and politically motivated solutions such as inappropriate fuel reduction burning should NEVER be applied to complex systems and issues.

So what is 'fuel'?

Just for a moment, let's take a look at the misnomer of 'fuel'. Fuel is organic matter. Leaves, sticks, branches and other parts of plants – but also animals and fungi – that naturally accumulate. It is habitat for an incredibly diverse range of organisms that underpin the functioning of terrestrial ecosystems. It is also those organisms themselves – both dead and living. Several ecologists I've spoken with consider the notion of 'fuel load' to be 'conceptually questionable' especially in forest ecosystems. I suggest we move beyond the reductionist notion of habitat as fuel that reduces the complexity of these ecosystems and their organisms to something akin to diesel, to legitimately recognise their ecological significance.

Within these habitats fungi form mutually beneficial relationships with the great majority of plants. In these relationships the trees provide sugars produced through photosynthesis to the fungi. In return, fungi increase the absorptive area of plant root systems, enabling them to explore more of the subterrain in search of food and water. Fungi also solubilise (make absorbable) a great range of nutrients otherwise not available to plants. Moreover, fungi provide a connective network of interactions within and across plant species. These interactions are especially important when trees are stressed as in the case of exposure to fire, drought or other environmental or human-induced stresses.

The majority of fungi that inhabit leaf litter are recyclers (also known as saprobes or saprophytes). They break down

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complex organic molecules into their constituent parts through the secretion of enzymes, and in the process known as pedogensis, create soils. Mycelium in soils provides a supportive architecture that allows water to gently percolate, as well as aerating soils making them inhabitable for other organisms. It is these intricate and abundant interactions that are fundamental to the resilience and health of terrestrial environments.

What's more, water is retained by fungi in leaf litter. Slide your hand under some leaf litter and then compare an area where leaf litter has been burned or removed. Which is wetter? Yet in all of the justifications for burning, how often do you hear these arguments about the importance of leaf litter in both retaining moisture and retaining fungi and their interactions with plants?

Pyronema omphalodes can appear within days of a fire and like other pyrophilous fungi, is an early coloniser of burnt habitats. Photography © Alison Pouliot

Like animals and plants, fungi can tolerate particular conditions, beyond which they die. Australia's biota is adapted to the extremes and vagaries of our highly variable climate, but increased, repeated and more extensive exposure to fire potentially has detrimental accumulative effects that are not well understood. Consider what happens to the invertebrate food source of State-listed (*FFG Act*) species such as the Brush-tailed Phascogale when leaf litter is destroyed. Therefore, it would be wise to take a precautionary approach in our attempts to 'manage' Australian ecosystems, including the use of fire.

Realigning values

Conservationists and environmental groups are often subjected to ridicule, even bullying, for their concern about the impacts of prescribed burns. Commonly portrayed as sentimental and uninformed, my experience is exactly the opposite. The people I've encountered are often not outright opposed to fire as a management tool. More often they question the reasoning, insight and preparation behind the prescribing of burns and the lack of inclusion of biological and ecosystem values. They often live in close association with these ecosystems over an extended time. They have personally witnessed and observed first hand the changes wrought by inappropriate burning regimes. All advocate the need for solid science and local understanding as opposed to reactive politics in managing local environments. Moreover, there is suggestion that prescribed burning where there are nationally-listed species, such as the Greater Glider, could be breaching the *Environment Protection and Biodiversity Conservation Act 1999*.

One underlying problem between fire agencies and those opposed to inappropriate burns is a misalignment of values. The extent of prescribed burning is determined by an assessment of the risk to the things that we value in the landscape. There is a gross oversight that biodiversity underpins a functioning planet, and that 'biodiversity' and 'ecology' comprise more than one species (*Homo sapiens*). Human lives and property take precedent. Of course nobody wants human lives and property to be destroyed by wildfire. So we need to begin by considering why we expose ourselves to fire-prone situations and locations with the expectation that all other biota will acquiesce when humans and their property are threatened. We need to accept the risks involved in where we choose to live and take responsibility accordingly.

There is no simple answer to the issue of fuel reduction burning. As I mentioned at the beginning of this piece, the Wombat Forest is extraordinarily complex. And fire is a complex issue that requires comprehensive, evidence-based understanding. The Wombat and other forests are also under stress from climate change and other human-induced changes. Burning stressed ecosystems seems not just counterintuitive, but reckless and foolhardy. Managing fire requires extensive knowledge of all the ecological factors and variables as well as the risks. Current asset-focused approaches fall woefully short of what is required to sustain our forests. Even the best intentions and most informed planning can still go awry. We live in one of the most variable and unpredictable climates in the world and conditions frequently exceed predictions. Efforts to maintain a state of continuous safety could in fact reduce people's capacity to deal with unexpected hazards. Only when we accept rather than attempt to control the vagaries of our climate and landscape will we fully appreciate our precious continent.

Let's not play with fire. ■

Thanks to Lynda Wilson, Jim Blackney, Gayle Osborne and Taryna Kruger for their contributions to this article.

Fire and aquatic ecosystem health

By David Tiller

Introduction
Fire is a natural part of our landscape. Most biological communities in south-eastern Australia, including aquatic communities, are adapted to a fire regime. This does not, however, mean that there will be no changes in water quality, habitat or biological composition following a fire.
What physically transpires after fire in upland tall forests of south-eastern Australia is the removal of groundcover, including leaf litter, bark, shrubs and the biota that inhabits this habitat. In hot fires, the mid-story and canopy can also be removed.

Potential effects of fire on aquatic systems
The removal of groundcover exposes the soil to erosion. In addition to the sediment mobilised by erosion, ash, unburnt carbon, plant nutrients (phosphorus and nitrogen) and other products of burning, such as polycyclic aromatic hydrocarbons (PAHs) may also be mobilised by rainfall and enter streams and wetlands.

The effects from these contaminants on waterways will include:

- Sediment covering habitat including rocks and logs and the filling in of pools, and smothering of benthic (bottom-dwelling) organisms and habitat,
- High turbidity reducing light penetration and therefore photosynthesis,
- Lowered dissolved oxygen levels in the water column as unburnt carbon increases oxygen demand and,
- Toxicity from the chemical products of burning, including PAHs.

The removal of the mid-story and canopy near waterways increases the light reaching the stream, increasing the potential for photosynthesis, while also warming the water. Higher turbidity may negate the increased light levels but as the water is darker it will increase heat absorption.

These changes in water quality and the physical structure of the habitat are likely to result in substantial changes in aquatic plant and animal community composition and diversity.

Duration of effects
Aquatic systems are very resilient, that is, they should bounce back quickly. They have to deal with floods, drought and fire on a regular basis and if an organism is not tolerant of these fluctuations in a specific location it will not be found there. Research has demonstrated the ability of aquatic ecosystems to recover naturally within a year or two from most short-lived disturbances. Refugia are very important in the process of recovery. If the magnitude of the impact is high and extensive, then refugia may be absent or remote and recovery may take a long time. Fish populations in well-connected streams with diverse habitat are capable of surviving and recovering after catastrophic natural events such as wildfires, whereas the impact on small, isolated fish populations may be devastating.

The time required for the water quality effects to diminish and for habitat to return will depend on the magnitude and extent of the impact and the post-fire climate.

The major post-fire risk is sedimentation. Sediment in streams will be remobilised when there are substantial flow events. Eventually the sediment will be "flushed out" but the time this takes will depend on the magnitude, duration and frequency of flow events. In a major study of fire effects following widespread wildfires in northeast and eastern Victoria in 2003, post-fire sediment slugs in several catchments, including the Ovens River, resulted in major sedimentation events. Some of these events killed fish and reduced invertebrate numbers to very low levels, even eliminating them in places. In each of these catchments there was substantial removal of sediment within a year and almost complete removal within three years. This corresponded to the recovery in the aquatic ecosystem. Not all of the 2003 fires resulted in major impacts on water quality or the aquatic ecosystem and half of the streams assessed did not decline in condition. These findings demonstrate the importance of catchment condition, fire burning patterns and pre and post-fire climate in determining the extent of impacts on the aquatic ecosystem.

Turbidity levels will vary according to the extent and duration of sediment re-mobilisation from the bed and banks of the stream and catchment sources. Once the catchment has re-vegetated and the sediment in streams has been largely removed, turbidity levels should return to pre-fire levels.


Sediment slug in the Ovens River at Whorouly 2003 (Source EPA Victoria)

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Werribee River near source in Wombat Forest.
Photography © Lynda Wilson

The impacts from toxicity and low dissolved oxygen will be very short term, primarily for the period of time the initial slug of sediment and ash pass, and is likely to return to non-harmful levels in hours, if not a few days.

How will the impacts of fires and recovery be influenced by climate change? A drying climate is likely to result in more frequent and intense fires. In combination with potentially extreme rainfall events impacts will magnify and recovery may be delayed and more frequent fires may ultimately change aquatic ecosystems permanently.

Potential effects of fire on streams in Wombat State Forest
The effects of hot wildfires on stream ecosystems in the Wombat State Forest would be no different to those seen elsewhere in Victoria. The effects of cool hazard reduction burns will have much less physical, chemical and ecological impacts on streams. Nonetheless, some effects will no doubt occur and the level of impact will be related to all those factors described above, in particular the patchiness of fire, the intensity of fire, proximity to streams, condition of refugia, intensity and duration of rainfall after the fire. In addition, fire effects will be compounded by general catchment condition and other catchment impacts such as those associated with sewage effluent, agriculture, mining and forestry practices. ■

Further reading

Australian Academy of Science (1981). *Fire and the Australian biota*. Australian Academy of Science, Canberra

EPA (2006). *The health of streams in north-eastern Victoria in the three years following the 2003 bushfires*. EPA publication no. 1061

Lyon and O'Connor (2008). *Smoke on the water: Can riverine fish populations recover following a catastrophic fire-related sediment slug?* Austral Ecology 33, 794–806

Lost Fungi – Australia's rarest fungus seen again

Words and image by John Walter

Auriscalpium sp. "Blackwood" is, in my view, Australia's rarest fungus, as the entire known population occurs on just one tree near Blackwood in the Wombat Forest. It was first located by the Field Naturalists Club of Victoria fungi group in 2005, but it has not been seen on their visits since 2014. I visited the site on June 9 and was very excited to see them again and confirm they were still surviving. A nearby tree fell down a few years ago which would have changed the light and microclimate for this one-off population. This coincided with an apparent absence of specimens whenever I visited, so I have been concerned that this species may have been lost. The image opposite, however, tells a different story. While it still survives on this single tree, we must still count this species as being highly susceptible to disappearing forever. We need observers out in the forest examining the eastern side of Narrow-leaved Peppermint trunks *Eucalyptus radiata*. The ideal trees will be on a west to north-west facing slope in shady wet gullies at around 600 metres elevation. We should search from June through to late July. I used this technique several years ago to locate a second population of the rare *Sarcodon* species. After identifying a site with the same conditions as the main *Sarcodon* location, I called in and found a specimen within 15 minutes. I have also used this technique to locate flora species in the past.

The cap of *Auriscalpium* sp. "Blackwood" above is only 10mm across and the largest seen in wetter years is 20mm.

Putting Victoria's fungal biodiversity on the map

Words and images by Gayle Osborne

It is staggering that there is so little government support for a kingdom that underpins life on earth. There are a handful of mycologists employed in government institutions and none at Victoria's Arthur Rylah Institute for Environmental Research.

It is estimated that there are between 50,000 and 250,000 species of fungi in Australia, with only about 12,000 described. Added to this there is not a comprehensive database of their locations.

Fungimap has been in operation since 1996 and targets 100 distinctive Australian species that are representative of the main fungal groups and are easily identifiable in the field. This has led to the submission of over 100,000 target species' distribution records.

Amateur naturalists, now known as citizen scientists, have for generations, recorded, described and lodged specimens with herbaria. Their important records of species and locations are often in notebooks and need to be added to the Atlas of Living Australia database.

In an exciting new development Fungimap is now linked to iNaturalist, via a free platform. iNaturalist is a global citizen science project and online social network of naturalists, citizen scientists, and biologists. Access is available via its website (on your computer) and from a mobile phone. Fungimap is a project hosted by iNaturalist.

To see the records already submitted and to join visit https://www.inaturalist.org/projects/fungimap-australia

The project has only recently been launched and Wombat Forestcare was chosen to test its introduction to the community. A training day conducted by Dr. Sapphire McMullan-Fisher from Fungimap was held at Blackwood in May. Most of us were only able to recognise a few species and struggled to absorb the amount of information. A few of us followed this up with a field trip and got into the swing of it.

Unless you are a naturalist with a good knowledge of fungi, getting started can be a challenge, but you quickly realise that with access to fungus guides and the Internet, you can start submitting images of recognisable species, either to species name, or at least genus. Images can be submitted with no identification other than 'fungi including lichens' in the hope that other contributors can name them.

Once submitted to the website and the identification is confirmed by two members of the iNaturalist site, the record will then be periodically added to the Atlas of Living Australia database.

Not everything can be identified from images. For example, the Rooting Shank, Genus *Oudemansiella* is frequently seen in the Wombat, however, it belongs to a group of nine related species that are only separable microscopically.

There are more than 400 fungi species in the Wombat, many of them look similar and others need spore prints and microscopic examination for identification. Sapphire's advice is to start with the ones you know.

Do you live near the Wombat Forest and would like to contribute to Fungimap? Get in touch. info@wombatforestcare.org.au

Clear images and a view of the gills are needed to aid identification. *Cortinarius persplendidus.* Photography © Gayle Osborne

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