



# Little Critters Toolkit

Yarra Riverkeeper Association



## Acknowledgment of Country



The Yarra Riverkeeper Association acknowledges that the Yarra Catchment is the traditional land and waters of the Wurundjeri Woi-wurrung people of the Kulin nation. We pay our respect to Elders who have cared for country since time began, to the Elders who are healing country today, and to the emerging Elders, who continue the journey of enriching culture. We acknowledge that the river now called the Yarra is traditionally known as the Birrarung and that name has never ceased to be the name of the river.



Photo | Anthony Despotellis



## ● *Introduction*

Bugs are all around us. They contribute significantly to the health of ecosystems but are often discounted and forgotten about in the discussion and focus of our interest in the natural world around us. But, when you consider the ratio of bugs to humans being well over a billion to one, it's pretty easy to understand that, while small in stature, these organisms have a huge impact on the world around us.

This toolkit will help open the door to the world of critters running the show from behind the scenes. A better understanding of conservation and ecological health hinges on understanding life at all levels, doing the jobs we don't even recognise yet.

## Insects, Bugs and Ecosystems

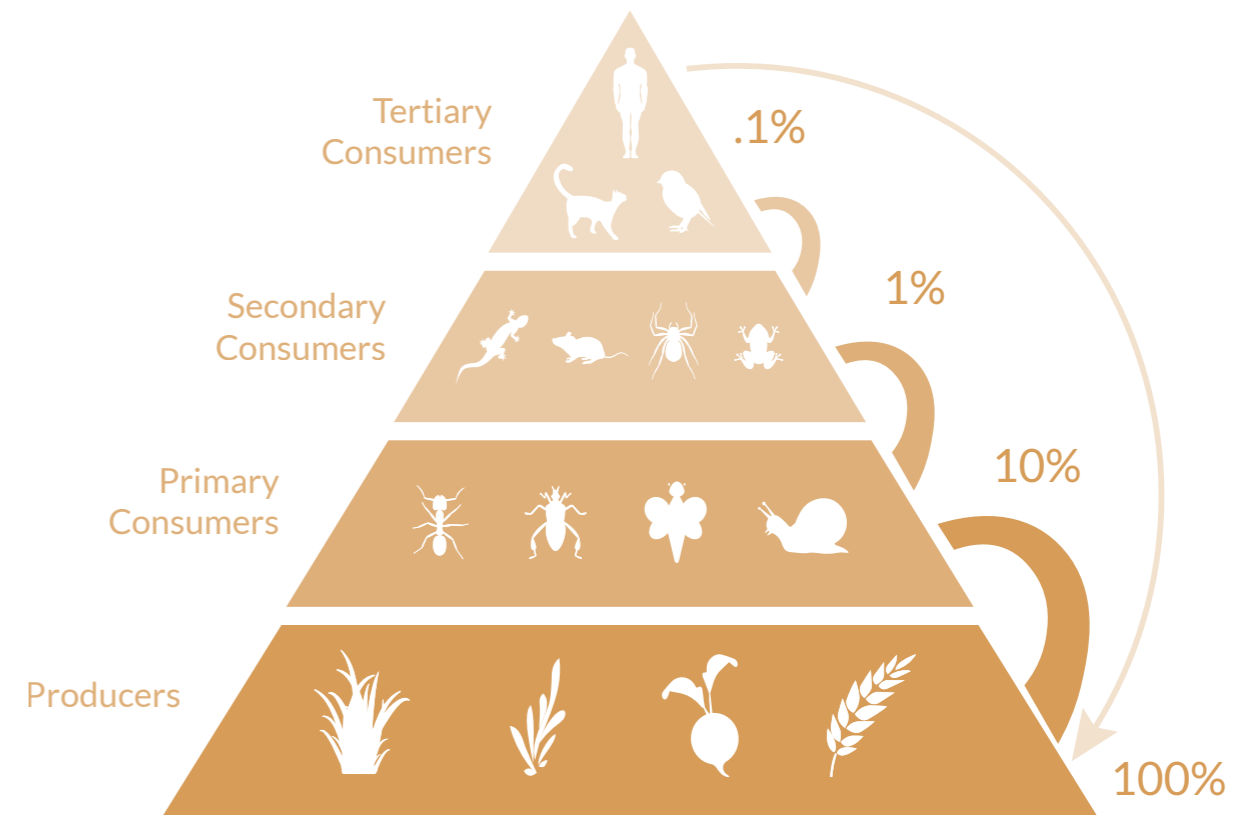
### Energy

Bugs play a huge role in ecosystem balance and maintenance. They fill a number of key roles in ecosystems, including energy and nutrient cycling, pollination and pest control. On top of all of this, many bugs hold significance in different cultures around the world as food sources.

While we may not be able to observe as easily as some of the larger scale interactions driven by vertebrate wildlife, the complex web of ecological interactions that they control and contribute to are integral to the function of ecosystems. Arthropods, which account for many of the bugs in this toolkit are the most diverse phylum of animals on the planet, add to this that gastropods - also represented in this toolkit - are another one of the most diverse groups of organisms and you can begin to understand why and how they are so entrenched in the function of the world around us.

Bugs are significant primary consumers in ecosystems, feeding on plant matter - the producers - that have converted the Sun's energy into digestible energy through photosynthesis. Bugs make up a large proportion of the primary consumers (the second trophic level) and so are hugely important to the health of food webs and the health of organisms that occupy higher trophic levels. At each trophic level roughly 10% of the energy at the prior level will be carried on. Therefore, if the health of lower trophic levels diminishes and populations of primary consumers reduce, each subsequent trophic level has less consumable energy available.

In addition to the primary consumers, bugs are predatory and act as regulators over their herbivorous peers. This regulative measure helps to stop over consumption of producers (photosynthetic plants) by herbivorous bugs. This then has the flow on effect of allowing enough plants to engage in photosynthesis to create sufficient energy to support the food web at its base.



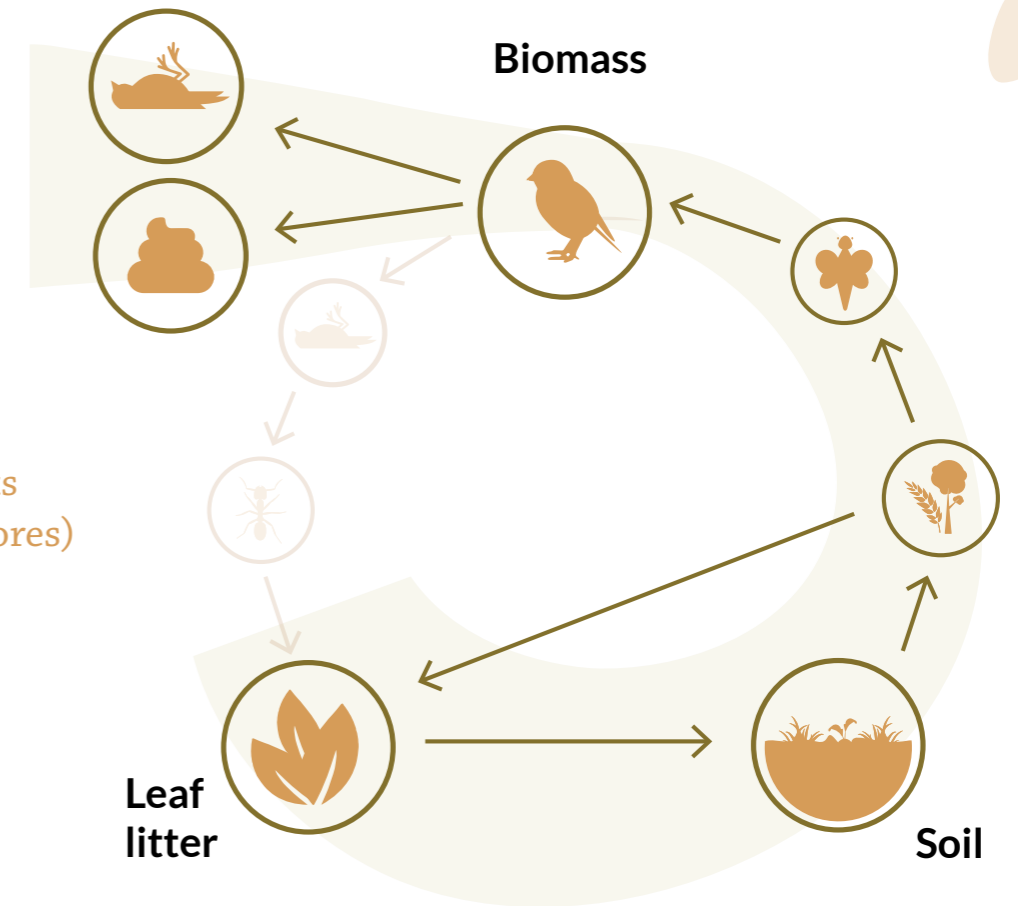
## Nutrients

Nutrient cycling is also an extremely important process that relies upon the existence and actions of our little friends. The sheer mass of bugs on the planet is testament to how many interactions that they are having in the world around us. Without the continual ingestion and breaking down of decaying matter that bugs engage in, the nutrient cycling capacity of ecosystems would be greatly reduced. Nutrient cycling by bugs occurs both through detritivorous consumption of dead and decaying matter as well as through regular consumption of biomass in an environment.

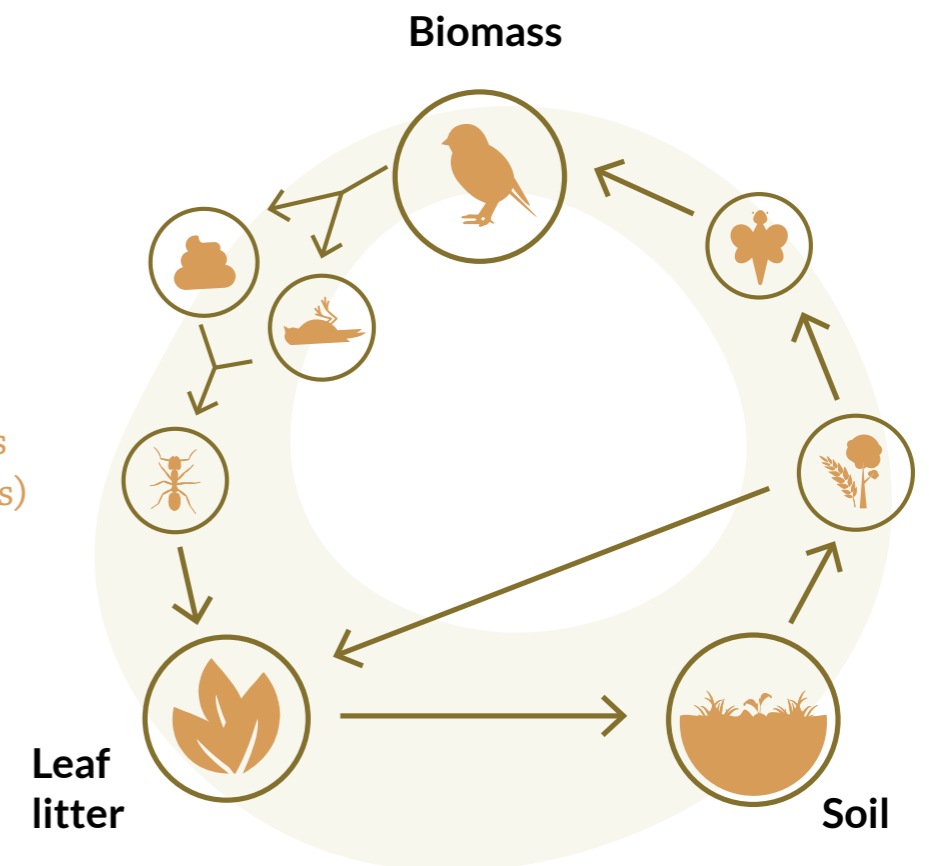
## Pollination

Pollination is often talked about in terms of honey bees and the importance it holds for agricultural systems. However, pollination goes far beyond the farm gate and is engaged in by many more species than just our European visitors. Not only do ecosystems depend on pollination by bugs but many species of plants have in fact coevolved with different species of particular bugs, creating codependent relationships between species. It is for this reason that pollination and diversity in the bug world are so intricately linked. No one species can pollinate everything and without sufficient biodiversity in buglife the biodiversity in plant life suffers.

No insects  
(Detritivores)



With insects  
(Detritivores)





## Pest Control

Bugs also provide great benefits to ecological balance (and to the economy) through pest control. When there is a balance between the various types of bugs, the ecosystem receives the services that it needs without being over taxed by herbivorous bugs.

Often species are able to become pest species because they are not regulated properly within the ecosystem which they are occupying. This is no different in the world of bugs. Natural ecosystems regulate themselves through ecological balances restricting and bolstering the relative abundance of different species. For this reason, biodiversity plays an important role in buglife. Without sufficient predator species in an ecosystem controlling the abundance of herbivorous bugs, the amount of plant life consumed by these organisms can become excessive to the point of degradation of the base energy source in a given ecosystem food web.

## Culture

Outside of their role in protecting and enhancing the health of the environment and ecosystems, many bugs hold positions of significance in cultures all around the world. Insects and other bugs have been used for many years by Aboriginal Australians as a food source but also as medicines, bait and adornments. They have also been linked to proliferation of common language between first nations peoples.

In addition to their practical uses, many bugs are also intertwined with cultural beliefs of first nation peoples around Australia and feature in many stories of the Aboriginal Dreaming.



## Gallery of Wildlife

## Insects

	Common Name	Scientific Name
p14	Bogong Moth	Agrotis infusa
	Huntsman Spider	Sparassidae family
	Cabbage White Butterfly	Pieris rapae
	Plague Soldier Beetle	Chauliognathus lugubris
p16	European Wasp	Vespula germanica
	Aurora Bluetail	Ischnura aurora
	C Shinning Cockroach	Drymaplaneta communis
	Leopard Slug	Limax maximus
p18	Bull Ant	Myrmecia genus
	Southern Riffle Darner	Notoaeshna sagittata
	Transverse Ladybird	Coccinella transversalis
	Common Garden Snail	Cornu aspersum
p20	Blow Fly	Lucilia cuprina
	Lesser Water Strider	Veliidae microvelia
	European Honey Bee	Apis mellifera
	Diving Beetle	Dytiscidae family



Photo Donald Hobern

### Bogong Moth Agrotis infusa



#### Appearance

Bogong moths are generally dark in colour, usually having a dark stripe on either wing leading to a light spot. They generally have a wingspan between 40-50mm and a body length between 25-35mm

#### Biography

The Bogong moth holds indigenous cultural significance as a historical food source during the summer. The Bogong migrates long distances during spring toward the Australian Alps where they remain dormant in torpor over the summer and then return to the lowlands during the cooler months to mate. Bogong moths are an important food source to the critically endangered Mountain Pygmy Possum (*Burramys parvus*); however, due to their recently recorded potential for arsenic accumulation there are concerns about their interaction with agricultural land.



Photo Dirk Daniel Mann

### Cabbage White Butterfly Pieris rapae



#### Appearance

Cabbage White Butterflies have white to pale grey wings with black tips and two dark eye-spots on the forewing and another single spot at the back wing, have small bodies and can have wingspans of up to 50mm.

#### Biography

Believed to have originated in either Europe or Asia, the Cabbage White Butterfly has become very widely spread across the globe. After it was accidentally introduced to Australia, it was found that the caterpillar stage of this species had become a pest to agricultural production.



Photo Survival.org

### Huntsman Spider Sparassidae family



#### Appearance

Huntsman spiders are often brown and grey in colour and have eight eyes orientated in two rows of four

#### Biography

Huntsman spiders are well known for their size and often being found inside the home. They get their name in homage to their speed when tracking down prey. They are generally not aggressive towards humans although in some cases can inflict harm. Female huntsman spiders can be particularly aggressive when defending their eggs.



Photo Hopenfox

### Plague Soldier Beetle Chauliognathus lugubris



#### Appearance

A small beetle whose head and outer wings are dark green-black with a yellow-orange underside as well as a stripe of orange behind their head. They generally growing up to between 1.5-2cm.

#### Biography

These little beetles are quite common throughout the yarra catchment and are often also found in backyards. They are not harmful to ecosystems and in fact often act as biological controls for a number of species such as aphids, grasshoppers and caterpillars that can be harmful to plants when they are able to feed without regulation.







Photo Dragonflypix

**Aurora Bluetail**  
*Ischnura aurora*



Native

### Appearance

The male Aurora Bluetail and female look different, particularly in colour. The male has a bright orange abdomen with a black tip highlighted by the characteristic blue markings, the thorax of the male is dark with bright green stripes. The female has a broad black stripe that runs the length of the abdomen and a shiny-black thorax with two orange stripes.

### Biography

The aurora bluetail is a species of damselfly native to Australia. They are predatory, carnivorous insects that are particularly adept at preying on other flying insects due to the flying capabilities of damselflies in general. They are most commonly found in areas close to fresh water as the early nymph stage of their lifecycle is aquatic.



All insects have three body segments; the head, thorax and abdomen.



Photo Bugwood.org

**Common Shining Cockroach**  
*Drymaplaneta communis*



Native

### Appearance

The common shining cockroach generally grow to several centimeters in length and have a shiny brown-black body with pale stripes running down either side of their back.

### Biography

The common shining cockroach may cause most of us to recoil in disgust; however, they are a native insect to Australia, particularly within the south-east. They commonly live in the bush and can commonly be found under the bark of eucalyptus trees and the surrounding leaf litter. Dry periods during the millennium drought brought a population boom, driving these and many other types of cockroaches towards people's homes. Common shining cockroaches do not carry many diseases and are not considered a pest in Australian ecosystems.



**European Wasp**  
*Vespula germanica*



Introduced

### Appearance

The European wasp has a predominantly yellow abdomen with black markings along the dorsal side and a black thorax. Their legs are yellow and their antennae are black. They are roughly 2cm in length.

### Biography

European wasps tend to have an aggressive nature accompanied by a painful stinger that may cause allergic reactions. They are a relatively recent pest to have arrived in Australia, first being recorded in Tasmania in the mid 20th century and on the mainland later in the 20th century. European wasps have a tangible negative impact in a number of areas including horticulture, apiculture and outdoor tourism as well as creating issues for animal health and biodiversity. They do, however, provide a benefit in the form of pest control in some agricultural systems.



Photo Robert Bennett

**Leopard Slug**  
*Limax maximus*



Introduced

### Appearance

Leopard slugs have pale bodies, usually brown-grey, with dark spots and stripes that run the entire length of their bodies. They are a relatively large species of slug growing up to 20cm in length

### Biography

Originally coming from Europe, the Leopard slug has been accidentally introduced to a number of regions around the world. They are the largest terrestrial slug in all of Australia and while they are predominantly herbivores, they also engage in a detritivorous diet, eating the remains of other dead animals and slugs. While they are an introduced species, leopard slugs are not widely considered a pest in Australia.





**Bull Ant**  
Myrmecia genus



### Appearance

Bull ants are different between casts. Workers vary in range across the genus growing to between 8-40mm in size, however all tend to have characteristically large mandibles. Queen bull ants are usually slightly larger than workers and have considerably more ovarioles to accommodate their much higher egg laying rates, and almost always have wings.

### Biography

Bull ants can tend to inspire some negative opinions among people due to their highly aggressive nature and their painful stings. However, as with many of the creatures in this toolkit, bull ants provide many ecosystem services contributing significantly to plant seed dispersion, the dynamics of local food systems and some bull ant species are even known to engage in pollination of flowering plant species. Bull ants also play a large role in nutrient cycling in ecosystems.



Photo JJ Harrison

**Transverse Ladybird**  
Coccinella transversalis



### Appearance

The transverse ladybird is a small beetle ranging from 3.8mm-6.7mm in length. They are generally bright orange to red with a black head, dorsal stripe and lobed markings on either side.

### Biography

The transverse ladybird is an important species for maintaining the health of plants as they are a predator species to many smaller insects which feed upon plant matter. They are particularly important to agricultural systems where they prey on a number of highly significant crop pests including many species of aphids.

A ladybird might eat more than 5,000 insects in its lifetime!



Photo Reiner Richter

**Southern Riffle Darter Dragonfly**  
Notoaeshna sagittata



### Appearance

The southern riffle darter dragonfly is a relatively large species of Australian dragonfly, and grow to be larger than 50mm in length. They are often black or dark brown with characteristic yellow markings running up the abdomen and the thorax.

### Biography

Southern riffle darter dragonflies are often found around fast flowing streams and rivers. during the nymph stage of their lifecycle, they use spurts of water to rapidly move themselves.



Photo Nadine Doerlé

**Common Garden Snail**  
Cornu aspersum



### Appearance

The common garden snail has grey skin and a hard whorl shaped shell on their back that are patterned and often brown and light brown in colouring. They have long upper tentacles which hold their eyes and shorter lower tentacles which are a vessel for the olfactory senses of the snail.

### Biography

The common garden snail is one of the most wide spread pests in all of Australia. The reason that these snails have been so successful in Australia is due to our relatively mild winters allowing them to breed all year round, coupled with the lack of a major predator in Australian ecosystems.





Photo  
Graham Wise

### Blow Fly Lucilia cuprina



#### Appearance

The blow fly has a metallic appearance with large red eyes and can be up to 1cm in length

#### Biography

Also known as the "Australian Sheep Fly", these flies are a significant problem in agriculture causing sheep strike and other health issues for animals in production systems as well as those outside of production systems. They prefer the warmer weather and so are generally only seen during the summer months.

The majority of all recorded extinctions have occurred on islands with invasive species as the primary causes



Photo  
DPIRD

### European Honey Bee Apis mellifera



#### Appearance

European honey bees are up to 2cm long with black and yellow-orange banded stripes.

#### Biography

European Honey bees have become prevalent all across Australia since they were first successfully introduced in the 1820's. They were brought to Australia to produce honey and to contribute to local ecosystems by providing pollinating services. There are growing concerns that European honey bees' dominance in Australia is leading to reduced prevalence of Australian native bees. European honey bees do still play an important role in pollination around Australia and are considered highly important - if not integral - to agricultural systems across Australia.



Photo  
Gilles San Martin

### Lesser Water Strider Veliidae microvelia



#### Appearance

Lesser water striders are quite small growing to be around 2mm long and with a relatively flat body.

#### Biography

These little critters live on the edges of the banks of slow flowing waterways. They are able to move across the surface of the water due to a covering of very fine, hydrophobic hairs that cover their feet. Lesser water striders are predatory and tend to feed predominantly on aquatic snails that they track down by sensing the movements in the water.



### Diving Beetles Dytiscidae family



#### Appearance

Generally grow up to 1cm in length, tend to have long legs and often have two tails coming off the end of the abdomen section of their body.

#### Biography

Diving beetles usually live close to the banks of rivers on top of the water. They are able to trap air pockets under their wings in order to allow them to spend more time under water when hunting for prey.



## How can we help?

As the number of bugs continues to fall year in and year out, we must look to our own behaviours to try to save these little critters that contribute so much to ecosystems, ecology and even our economy. Some good ways to help out insects on an individual level is to:

- Plant native plant in your garden, so many of Australia's insects have developed along side and in partnership with Australian plants and so it's very important to maintain these sources of food, habitat and natural interaction for them;
- Avoid using pesticides and artificial fertilizers in your garden where possible, these products kill and interrupt the ecological interaction of bugs within natural environments even when other benefits such as native plants are being used; and,
- Avoid using tools like bug zappers and bug tapes that indiscriminately kill bugs and so diminish the numbers of beneficial species as well;
- As always, when possible trying to be a responsible consumer and selecting for products such as organically produced foods and fibres and supporting businesses and organisations that aim to use good practices, holds potential to shift the balance of our impact on our little friends.

## Documenting Insects

Now that we know what we're looking for, it can also be helpful to record sightings and collect data. YRKA runs an online resource for this called the Yarra Catchment Atlas where people can submit photos of bugs (and other animals and occurrences) that they find along the Yarra River. Another great resource for data collection is iNaturalist. This is a great (free) app for download that helps with identification and recording of sighted bugs.

Yarra Catchment Atlas

[www.yarraatlas.org.au](http://www.yarraatlas.org.au)

iNaturalist

[www.inaturalist.org](http://www.inaturalist.org)

## Appendix

### Common Terms

**Biodiversity:** the variety of animal and plant life in a given area or habitat of interest (maintaining high levels of biodiversity are important to maintaining resilience)

**Biomass:** the total quantity or weight of organisms in a given area or volume.

**Circadian Rhythm:** the physical, mental and behavioural changes that follow a daily cycle, usually in response to light and darkness

**Conservation status:** is a tiered, indication tool for the current population health for a species

**Diurnal:** refers to something that is done or active during daylight. With regard to circadian rhythms, nocturnal refers to an organism that is predominantly active during the day

**Ecosystem:** a biological community of interacting organisms and their physical environment

**Ecosystem Services:** the many and variable benefits provided to humans by the environment  
**Resilience:** the capacity of an ecosystem to absorb disturbances

**Habitat:** the natural home or environment of an animal, plant or any other organism

**Introduced:** an organism that is not native to the place or area where it is considered introduced and has been accidentally or deliberately transported to the new location by human activity.

**Native:** a species that normally lives and thrives in a particular ecosystem

**Nocturnal:** refers to something that is done or active at night. With regard to circadian rhythms, nocturnal refers to an organism that is predominantly active during the night

**Wildlife:** a general term for all wild animals that have not been domesticated or tamed and are usually living in a natural environment

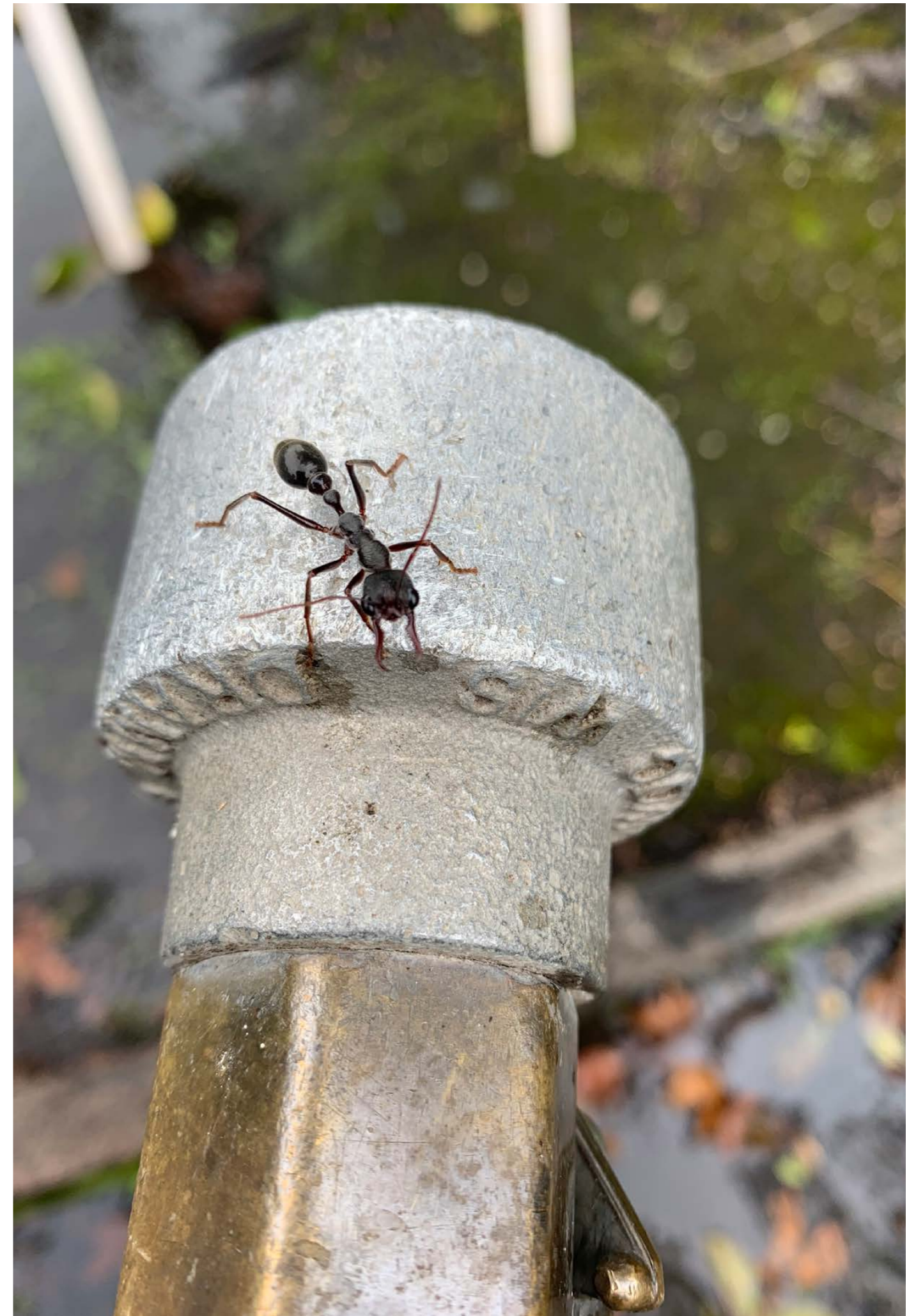


Photo  
Tom Frawley



Photo  
Neil Howard

Special thanks to:

