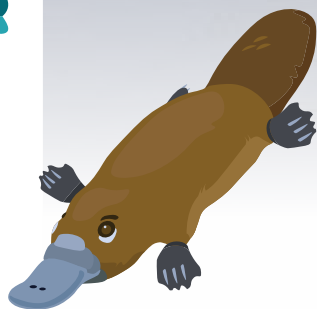
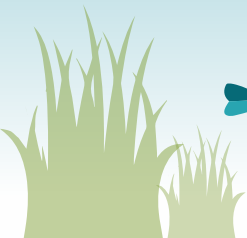
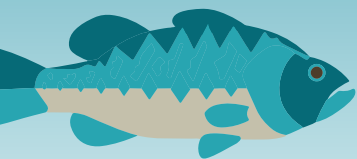


Healthy Waterways Toolkit

The Yarra River

Yarra
Riverkeeper
Association



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Acknowledgment of Country

The Yarra Riverkeeper Association acknowledges that the lands and waterways of the Yarra Catchment and beyond, are the unceded territories of the Wurundjeri Woi-wurrung people. We pay our respect to their Ancestors, who cared for Country since time began, and to all Wurundjeri Woi wurrung community, to all the Kulin Nation, to all Traditional Owners, who continue to speak and care for their Country. We acknowledge that the river now called the Yarra has always been known as the Birrarung by its custodians.



Nankeen Night Heron
Image: Geoff Whalan from Flickr

Introduction

This toolkit aims to provide a basic understanding of factors and heros that make a healthy waterway. It will share knowledge about:

- Waterway Health
- Bioindicators / Keystone species
- Sustainable Fishing
- Introduced species
- 32 Species Profiles on some of the species that make a healthy (and not so healthy) waterway

By no means is this Toolkit the be all and end all of key species in Victoria. It is a stepping stone for increasing or shared knowledge and community engagement with the landscapes we as Victorians share with so many unique and special species.

Waterway Health

What makes a waterway healthy?

Many things!

Firstly, a waterway can be healthy when it is allowed to be. This means that if we take care not to damage them, they would look after themselves.

However, some things that are signs of healthy waterways:

Natural (uncontrolled) water flows,

Fish and other aquatic life can migrate up and downstream for reproduction

Little amounts of pollution

Lots of native trees and plants growing beside and in the waterway, to help keep the water cool and secure the river banks

Native vegetation creating food and resting/ hiding places for insects and birds and fish.

A diversity of aquatic macroinvertebrates to recycle instream plant matter and form a part of an energy pyramid.

Diverse and thriving life at all stages of the food chain.

Riparian Zones

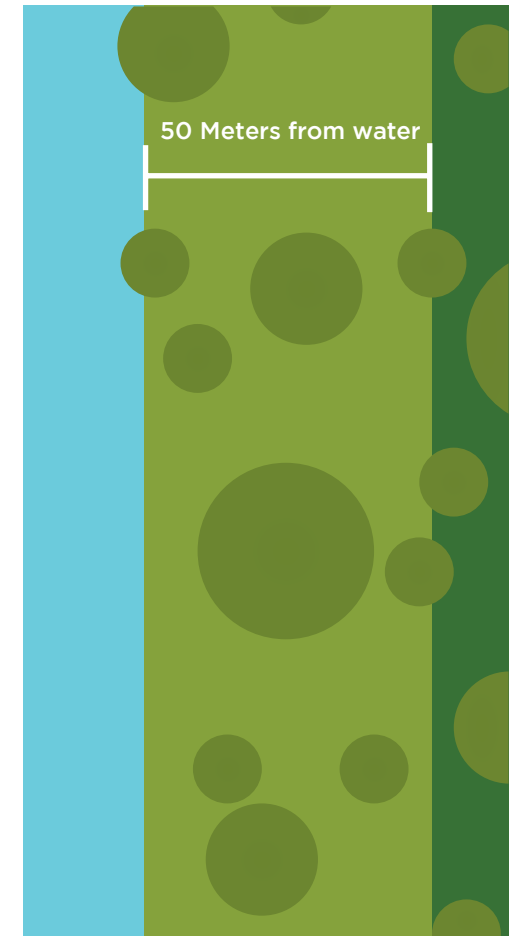
The Riparian Zone is an area that includes in the waterway, on the banks and the adjacent land extending at least 50 metres either side of the waterway.

Results for riparian vegetation in Victoria, show that **21 of 29 river basins had less than 50 per cent** of their assessed river length with riparian vegetation in good condition.

Australia State of the environment, 2016

Why is this area important?

- Plants in the Riparian Zone supply food and shelter and are corridors between habitats for a variety of wildlife.
- Trees and grasses in riparian zones (big trees, plants, reeds and grasses).
- Provide shade to cool the water
- Provide roosting and hiding places for birds, insects and animals
- Provide food for aquatic macro invertebrates and other animals
- Stabilize the riverbank
- Reduce damage from floodwater velocity to banks.
- Instream plants (reeds/rushes, water ribbons etc) provide shelter and hiding places for fish and aquatic macro invertebrates
- Food for fish and aquatic macro invertebrates



WATER

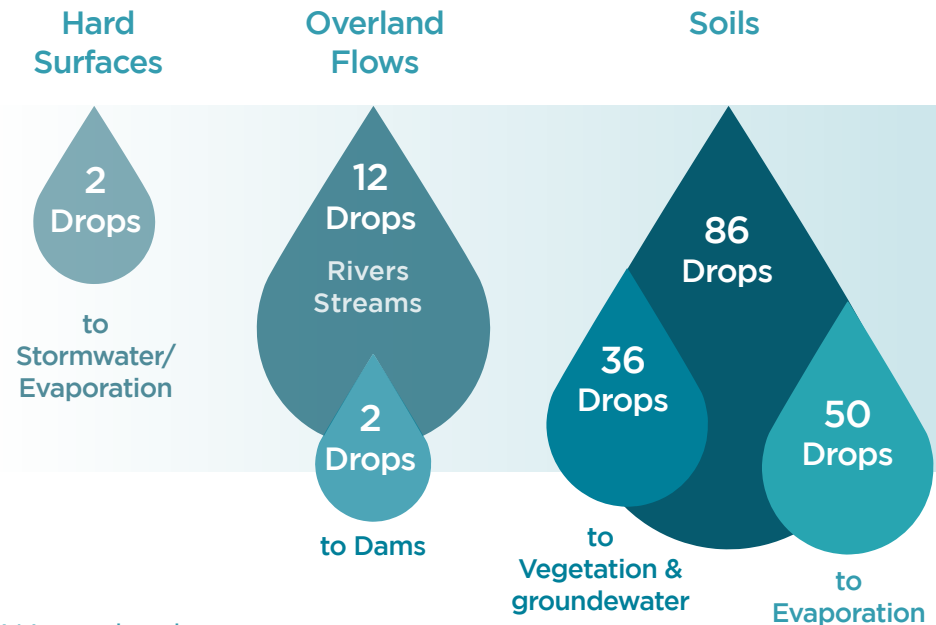
The Magic Molecule



Water is a truly magical substance. It covers over 70% of our planet and makes up 65% of our bodies! Without water, life on earth would never have been possible. It has a few key properties which make it so magical;

On average, of each 100 drops of rain that fall in Australia, they fall on:

- Water is polar, it has a slightly positive and slightly negative sides. This property has earned water the title of a **universal solvent** as it is able to dissolve many polar and ionic substances. This is **how water is able to carry nutrients through ecosystems**.
- It takes a lot of energy to change the temperature of water. This is how ocean temperatures are able to **stay relatively constant through day and night**.
- Did you know that most rain first forms as snow within clouds? As the snowflakes fall through warmer air they form raindrops, taking with them dust or smoke which is in the atmosphere.



Water droplets & the environment

Water moves through our environment in many ways. It moves through soils, overland flows and across hard surfaces.

Thinking about water in this way allows us to better understand the ecosystem services our environment provides for us. **The vegetation around us not only stores water** but also filters out contaminants so organisms like ourselves stay healthy.

By protecting and enriching the plants around us **more water is able to stay in our environment for longer periods**.

This is especially helpful as **climate change is projected to reduce rainfall by up to 30% in Victoria**.

In addition to reduced rainfall, climate change is projected to make rainfall more infrequent and increase the storms - **making plants our first line of defense** in slowing water movement across our landscape.

One of the big challenges the Yarra River and many of its tributaries face is storm events causing erosion. **Plants play a key role in this also as they slow water flow and are able to assist in stabilising riverbanks**.

Bioindicators

A bioindicator is an organism such as a plant or animal which can be monitored to represent the health of an ecosystem.

Bioindicators are typically animals and plants which are more sensitive to environmental changes (nutrients, gases, temperature etc). The expression canary in a coal mine is one example of a bioindicator. Canaries are more sensitive to carbon monoxide than humans which allowed humans warning when air in mines became unsafe.

When we look at waterways, waterbugs (or macroinvertebrates), are vital. They are fantastic biological indicators as each these insects and stage in their life cycles (juvenile/adult) have different tolerances to pollution and changes to water properties.

One of the more sensitive organisms are the stonefly nymph which can only be found in healthy ecosystems. On the other hand, fly larvae and crabs are able to withstand streams with degraded conditions.

Keystone Species

You can think about a keystone species as the glue which holds the ecosystem together, without which the ecosystem would take a very different shape!

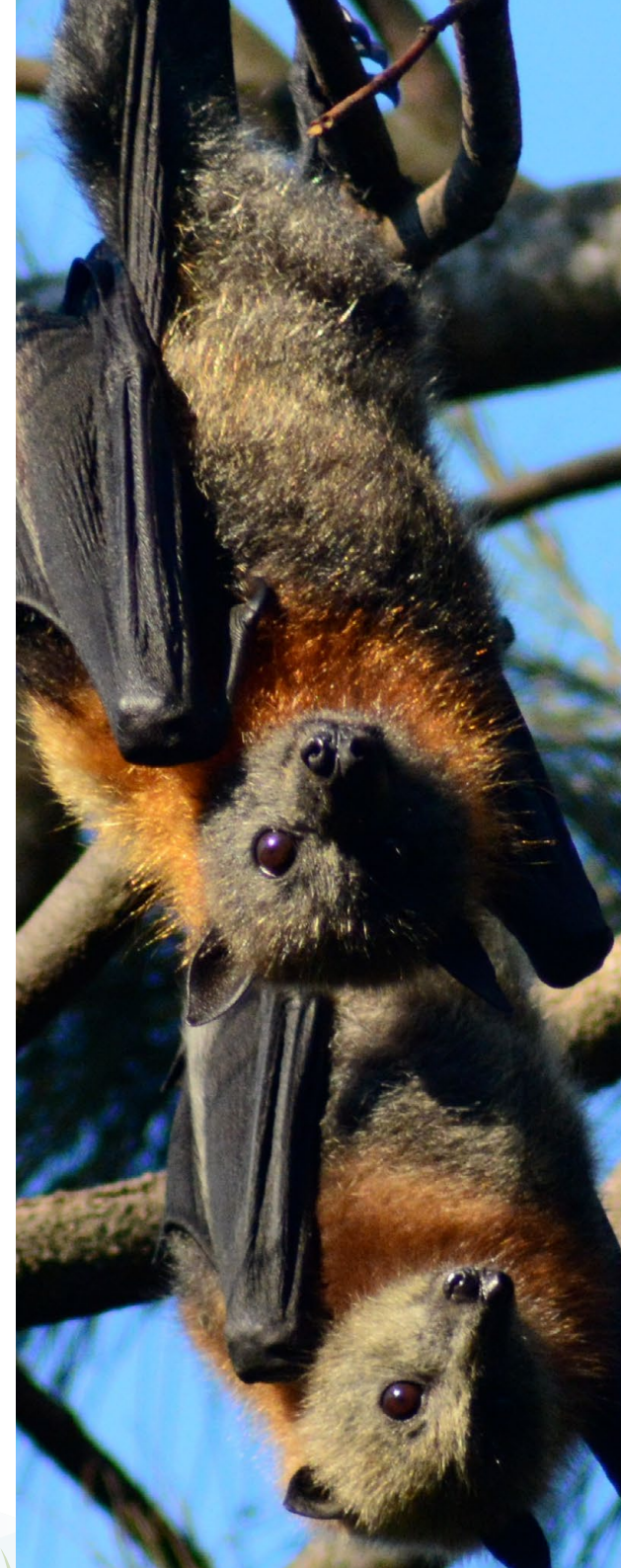
They can take many shapes depending on the ecosystem and may not be the largest or most abundant organism in an ecosystem.

Keystone species almost always play a critical ecological role in an ecosystem and their removal would drastically alter the entire ecosystem, or cause it to no longer exist entirely! This is why scientists monitor any changes of these organisms and the pivotal roles they play in ecosystems.

Discover!

If you would like to see water insects for yourself, all you need is a bucket and fine net.

A few sweeps of the net through the water and water plants should provide a good sample of the macroinvertebrates in a waterway. Pour the net into your bucket of water and see what you can find!



Energy Pyramid

When thinking about ecosystems it's helpful to think about the system in terms of energy transfer.

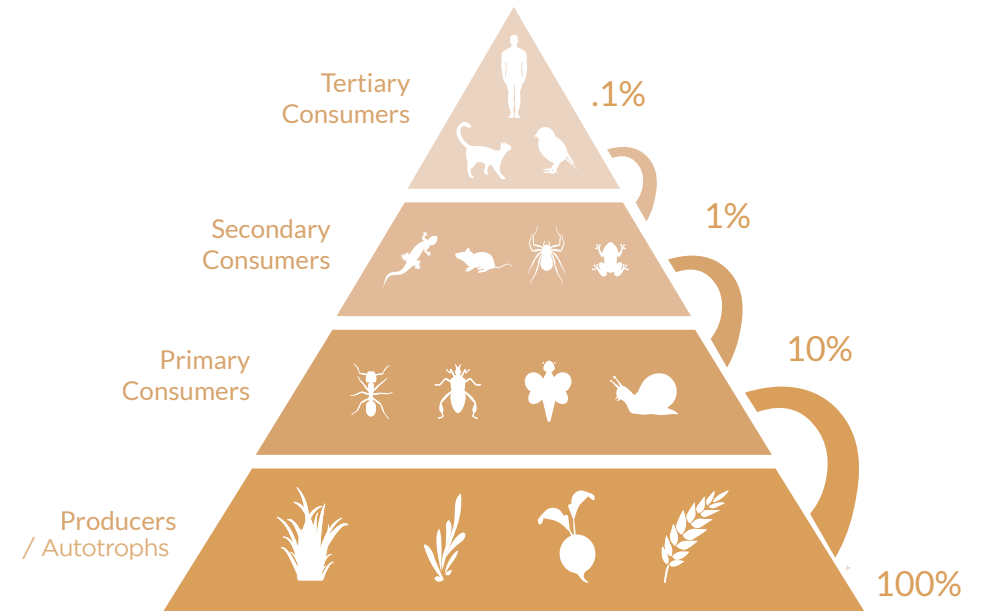
Every organism has their place in our ecosystems, because they are all a part of the trophic / energy pyramid.

At the base of the energy pyramid are **autotrophic** organisms (**plants and algae**) which are able to use **energy from the sun, carbon dioxide from the air, and water and nutrients** from the environment to produce sugars (**glucose**). They also produce oxygen as a by-product which is helpful for breathing animals.

All levels above **autotrophs** are reliant on other organisms for energy and are called **heterotrophs**.

Trophic Cascades

The trophic cascade or food chain is the feeding relationships between organisms in an ecosystem. This chain links organisms through the transfer of energy from producer, prey and predator.



Energy Pyramid

Each level up the trophic cascade **reduces** the pool of organisms by approximately **90%** as energy is 'lost' from the system.

If you start with 100 units of energy each time an organism feeds, 90 of these units are 'lost' as heat used to power normal activities like breathing and digesting. The remaining 10 units of energy are stored in the organism's tissue.



Threats to Waterways

SOME threats to waterway health

Introduced plants growing in the riparian zone and in the water

Bank erosion

Clearing of native vegetation

Introduced fish

Stormwater pollution - including lawn clippings, leaves from deciduous trees, domestic animal faeces (other pollutants: fertiliser, pesticides, herbicides, heavy metals that wash off roads)

Incorrect disposal of litter from waterway activities
- picnic litter, fishing litter

Blue green algal blooms - can be dangerous to health so do not eat fish, swim or allow your pets in waterways that have been closed due to algal blooms

Help reduce threats

SOME things we can do to minimise threats mentioned - left.

Community awareness and education around:

- 1** Staying on paths and in designated fishing spots and correctly disposing of your litter
- 2** Being a responsible pet owner, correctly enclosing and cleaning up after your pet. Not disposing of aquarium plants or animals down the drain or directly into the waterway
- 3** Being a responsible gardener. Containing lawn clippings, leaves, fertilizers and pesticides to your property and preventing garden plant escapees.
- 4** Being a responsible fisher, we will address this point in the info we supply re the fish



What you Can do?

Get out and enjoy this healthy waterway.

Sit quietly and enjoy the space. - nature sit

Learn about fishing rules, read the Victorian Recreational Fishing Guide, and go fishing!

Observe plants, birds and insects in and around the Yarra

Canoe/kayak on the river

Walk beside the river

Photograph the river

Get actively involved in caring for the Yarra

Pick up litter

Join 'friends of' groups

Report sightings of State Prohibited Weeds **136 186**

Report suspected illegal Fishing behaviours and gear (including opera house nets) - call **13 FISH**

Become a citizen scientist

Collect data for and/ or contribute your observations to:

Yarra Catchment Atlas

Birdlife Australia

Aus MAP plastic pollution

Red Map- Unusual fish sightings

Melbourne Waterwatch (water quality and macro invertebrate surveys)

Australian Biodiversity Atlas



Sustainable Fishing

Fishing is a fun and healthy activity that anyone, regardless of their gender, culture, age or ability can do!

Fishing helps us connect to nature, unplug from the electronic world and de-stress and relax.

Fishing helps us to tune into and enjoy the natural world.

Fishing teaches us patience and sometimes rewards us for a fish for dinner.

Responsible fishers always take a friend, take time to look at the fish they catch, their fishing spots and the environment.

Rules: Download the free Victorian Recreational Fishing Guide App to find out the rules and buy a Recreational Licence.

Following the rules means we can all share the resource equally and protect the fish populations

If you spot anyone breaking the fishing rules, please call 13FISH and report them.

13FISH: This is a 24 hour reporting number. Fisheries Officers may or may not attend but all information gathered is important and will underpin further action

Remember: Share the space with other river users, clean up after yourself and dispose of unwanted gear in an appropriate bin.

Protected freshwater Fish in the Yarra (Flora fauna guarantee Act)

Australian grayling

Macquarie Perch

Tasmanian mudfish,

Yarra pygmy perch (thought to be extinct in the Yarra)

Eastern dwarf galaxias



Image: Mick Stanic from Flickr

Profile Gallery

The following profiles are a small selection of the flora and fauna that make our Yarra a healthy waterway.

There are species representing many levels of the food chain, from plants up to snakes and large birds. A key part of the profiles is how they help their ecosystem or how they impact it.

On the right are various icons that represent an insight into the species and its role in the ecosystem. In the boxes are the main foods they eat, or species they create a home for.

Enjoy the wonderful selection of photographs that will help you get up close and personal with the flora and fauna of the Yarra!

Icon Guide



Species List

PLANTS 22



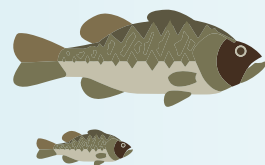
Swamp Paperbark	Melaleuca ericifolia
Manna Gum	Eucalyptus viminalis
Common Reed	Phragmites australis
River Red Gum	Eucalyptus camaldulensis
Water Ribbons	Cynnogeton procerum
Parrots Feather	Myriophyllum aquaticum

INSECTS 30



Mayfly	Atalophlebia
Water Strider	Veliidae microvelia
Dragonfly	Odonata
Backswimmer	Notonectidae
Water Boatman	Corixidae

FISH 36



Black Bream	Acanthopagrus butcheri
Yabby	Cherax destructor
Estuary Perch	Percalates colonorum
Short Finned Eel	Anguilla australis
Long Finned Eel	Anguilla reinhardtii
Eastern Gambusia	Gambusia holbrooki
Common Galaxia	Galaxias maculatus
Mulloway	Argyrosomus japonicus
European Carp	Cyprinus carpio

46 BIRDS



Superb Fairy-wren	Malurus cyaneus
Spotted Pardalote	Pardalotus punctatus
Little Pied Cormorant	Microcarbo melanoleucos
Azure Kingfisher	Ceyx azureus
Nankeen Night Heron	Nycticorax caledonicus

52 Reptiles Mammals Amphibians



Red-bellied Black Snake	Galaxias maculatus
Growling Grass Frog	Ranoidea raniformis
Blue Tongued Lizard	Tiliqua scincoides
Rakali	Hydromys chrysogaster
European Rabbit	Oryctolagus cuniculus
Grey-Headed Flying Fox	Pteropus poliocephalus
Platypus	Ornithorhynchus anatinus

Plants



What sets Earth apart from other planets is its ability to sustain life. Plants are considered a critical resource because of the many ways they support life on Earth.

They release oxygen into the atmosphere, absorb carbon dioxide, provide habitat and food for wildlife and humans, and regulate the water cycle. Because of the many ways plants help the environment, their importance should not be forgotten.

Plants with roles in the ecosystem are called ecological services. They keep us and the rest of the ecosystem alive!

Swamp Paperbark *Melaleuca ericifolia*



Image: John Tann from Flickr



Image: Josh S Jackson from Flickr



Image: John Tann from Flickr

Description

Swamp Paperbark is a tall shrub or small tree with bark that is papery.

The leaves are dark green and straight. The tree flowers in spring in large amounts.

Swamp Paperbark form dense thickets that make for wonderful, **protected habitat** and shelter for wildlife, these thickets also help **stabilise steep banks**.

Aboriginal Use of Paper bark:

Indigenous peoples used the Paper Bark for:

- Paintings,
- wrappings for babies,
- blankets & bandages & roofing.

They also used the **oil** from leaves as **medicine**, the **stems and roots** for **clubs** and **drank** the **tree's nectar**.

Habitat & food for:



Bees Birds Butterflies Frogs Insects



Large Habitat Provider



Indigenous Food Source



Least Concern

Manna Gum

Eucalyptus viminalis



Image: Visible Procrastinations from Flickr



Image: Alan Couch, Flickr



Image: Tatters from Flickr

Description

Manna Gum is often found near waterways. It often has rough bark at the base of the tree and smooth, white bark on the rest of the trunk.

The leaves are narrow and the flowers are white - in groups of 3 or 7. The Manna Gum flowers mostly in summer.

Aboriginal Use of Manna Gum:

Indigenous peoples used wood from the Manna Gum to make **shields and bowls**.

The tree also produces a sweet white **edible sap**.

Habitat & food for



Bees Birds Butterflies Mammals Insects

Eucalyptus viminalis is a favourite food source for Koalas.

Eucalyptus trees provide **hollows for birds** and mammals to nest in, gumnuts for food for birds, and the flowers are enjoyed by many **insects and birds**.



Large Habitat Provider



Indigenous Food Source



Near Threatened

Common Reed

Phragmites australis



Image: Anthony Despotellis



Image: Achim, Flickr



Image: Andreas Rockstein, Flickr

Description

The Common Reed can be found growing alongside many of Melbourne's waterways.

It grows **1-3m tall**, has long, leaves that taper to a point, and have a fluffy, plume-like seed heads.

The reeds provides **food** and **nesting habitat for waterbirds**. It grows very quickly and can take over areas if not contained.

Aboriginal Use of reed:

Indigenous peoples used reed stems for:

- **Spears and ornaments**
- **Underground stems can be ground and roasted to make damper.**

and leaves / flowers for:

- **Weaving baskets.**
- **Making Torches by wrapping paperbark around the flower heads.**

Habitat & food for



Birds Frogs Frogs Insects



Large Habitat Provider



Indigenous Food Source



Least Concern

River Red Gum

Eucalyptus camaldulensis



Image: Ikor1 from Flickr



Image: Forest and Kim Starr from Flickr



Image: Denisbin from Flickr

Description

The Red River Gum has a **thick trunk** and heavy, **twisting branches**. It's bark is smooth and mottled which drops off in irregular patches.

It flowers in summer and produces lots of nectar which is **loved by bees**.

The Red River Gum provides **important food, shade and habitat** for many species. Branches dropped into waterways create **habitat for fish**, and hollows for many other animals.

The wood is a brilliant red colour and is commonly used as stumps, fence posts, sleepers, and firewood.

Aboriginal Use of Manna Gum:

Indigenous peoples used the bark of the River Red Gum to:

- Make **canoes**,
- Craft **spear-throwers, boomerangs and shields**

Habitat & food for



Bees Birds Butterflies Mammals Insects



Large Habitat Provider



Near Threatened



Image: Doug Beckers from Flickr

Water Ribbons

Cycnogeton procerum



Image: Harry Rose from Flickr



Image: Friends of Ciltern from Flickr



Image: Harry Rose from Flickr

Description

Water Ribbon is a herb that grows in slow flowing rivers and wetlands. It can grow in depths up to 2m and withstand extended periods of drought.

They like full sun/semi shade spots along the Yarra tributaries and adjoining wetlands.

Water-ribbons provide **habitat for frog species** as well as many other aquatic species who inhabit root networks during spawning events.

Aboriginal Use of Water Ribbons:

Tubers were used as a food source by local indigenous, either baked or eaten raw.

bulbous roots were traditionally used as a valuable starchy vegetable, with a crunchy texture and flavour reminiscent of bamboo shoots or water chestnuts. Edible green seeds.

Habitat & food for



Frogs

Birds

Fish

Insects



Habitat Provider



Indigenous Food Source



Least Concern

Parrots Feather

Myriophyllum aquaticum



Image: Carnat Joel from Flickr



Image: Jens V. Flickr

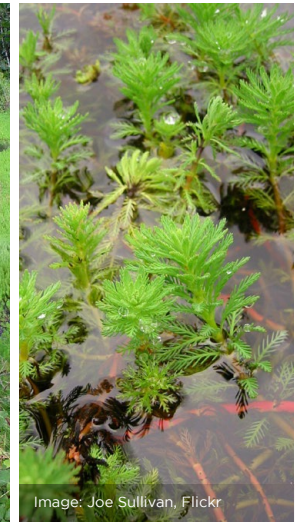


Image: Joe Sullivan, Flickr

Description

Considered **highly invasive** and now naturalised in some parts of Victoria, Parrot's feather is one to watch out for!

Originating from South America this aquatic/semi-aquatic herb has stems up to 2m long and flowers during spring and summer.

This plant is dioecious, meaning male and female reproductive organs are on different plants.

This species is highly adaptable and able to **spread through broken stem fragments** which can root.

Both Queensland and New South Wales have significant infestations of this weed, causing **blockages to creeks, drains and channels and even shading out algae.**

Parrots feather can cause **animals to drown**, reduces light and water flow and can **change water temperature** and dissolved oxygen levels.

Habitat & food for



Insects

Yabbies



Habitat Provider



Weed



Least Concern

Insects



While all organisms in the ecosystem are essential, the role played by insects is particularly vital. Often under-appreciated and viewed as a nuisance, insects are the world's largest workforce.

Insects are responsible for the pollination of about 80% of trees and bushes on the entire planet. Plants invest significant amounts of energy in the formation of attractive blooms full of nectar.

According to National Geographic, there are about 1.4 billion insects for every human on Earth, and all of them play a crucial role in the ecosystem.

Mayfly Atalophlebia



Image: Patrick kavanagh from Flickr



Image: Jeremy from Flystream



Image: Juvenile, Heath Warwick from Museums

Image: Unkn
All rights res

Description

Mayfly spend most of their lives as juveniles (nymphs). They hang around still or slow-flowing water and sometimes on aquatic plants or logs.

The juveniles feed on aquatic plants and other associated organisms by scraping algae and detritus from underwater stones and vegetation.

Juvenile mayfly have gills along the sides of their abdomen, which look similar to fine leaves. They use these to breathe underwater.

Adult mayflies do not feed. They emerge from the water and have only a **short adult life ranging from a few hours up to a day or two** depending on the species.

Fossil records show Mayfly are estimated to be **47.8 million years old!**

Mayfly are a food source for many fish.

MAIN DIET



Aquatic Plants



Algae



Mostly Day active



Least Concern

Water Strider

Veliidae microvelia



Image: John Tann from Flickr



Image: John Tann from Flickr



Image: Gilles San Martin from Wikimedia

Description

Found at the edge of the channel and in slow-flowing water throughout the Yarra.

The adults have winged and wingless forms and live on the surface of the water, using **hydrophobic hairs on their feet to stay afloat**.

Water striders have a needle-like or straw-like beak, which they use to **pierce the prey's body and suck out its juices**.

They are active predators and use the ripples to detect small insects trapped on the water surface. **They are good at eating mosquito larvae.**

Many individuals, sometimes from different species, often **combine their efforts to overpower a much larger prey**.

MAIN DIET



Water
Insects



Other
Larvae



Mostly Day active



Least Concern

Dragon Fly

Odonata



Image: Ed Dunens from Flickr



Image: David Cook from Flickr



Image: Jean and Fred from Flickr

Description

Juvenile: Dragonfly larvae are aquatic. They have 6 legs, wing buds kept along their body, large eyes and gills.

Dragonflies spend **most of their life** as larvae (up to 5 years) and only a matter of days or weeks as adults.

Dragonfly larvae are fully carnivorous, and larvae have a powerful jaw which can extend extremely fast to catch food.

Adult: Adult dragonflies can be a variety of colours and can fly up to **50km per hour**. Dragonflies are also carnivorous using their legs to catch other small flying insects to eat.

There are nearly 80 species of Dragonfly in Victoria and the conservation status varies, with **some listed as endangered**.

Dragonflies are important as the adults **hunt mosquitoes and other small insects**, and the juveniles are important food for other aquatic insectivores including fish.

MAIN DIET



Worms



Tadpole



Water
Insects



Other
Larvae



Mostly Day active



Least Concern

Backswimmer

Notonectidae



Image: Jon Sullivan from Flickr

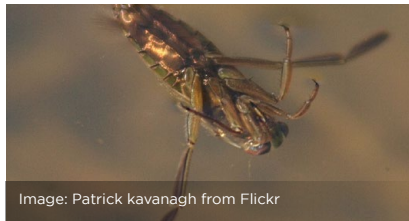


Image: Patrick kavanagh from Flickr



Image: Eleftherios Katsillis from Flickr

Description

Backswimmers are aquatic insects that received their name from the way they swim. They swim on their back by moving their long, hairy hind legs.

They grow up to 20mm long and have large eyes that occupy most of the head.

Backswimmers have two thin channels covered in hair on the underside of their abdomen, used to **trap air bubbles for breathing**.

When this oxygen source is depleted, the backswimmer rises to the surface to capture a new air bubble.

They can **inflict a painful bite**, very similar to a mosquito bite.

Backswimmers are resilient and can tolerate unhealthy water, but adults can fly to new habitat if the water quality declines too much.

They **help to control** populations of aquatic insects and are a **great food source** for many fish and wildlife.

MAIN DIET



Tadpoles

Small fish

Water Insects

Other Larvae



Mostly Day active



Least Concern

Lesser Water Boatman

Corixidae



Image: Ben Sale from Flickr



Image: S. Rae from Flickr



Image: S. Rae from Flickr

Description

Lesser Water Boatmen's front legs are used for scooping organic matter into the mouth and the long back legs are shaped like oars and help the water boatmen to swim.

Water boatmen feed mainly on plant material but will eat other insects such as mosquito larvae and other aquatic insects.

Water boatmen do not have gills and need to **regularly surface for air**. They are usually found in slow moving water or ponds where aquatic vegetation can be found.

Males attract females by producing sounds. Being such a small creature, the **sound from the water boatmen is surprisingly loud**.

They are also strong fliers enabling them to **move between different bodies of water**, or cling to objects, including fish.

Water boatmen contribute to the ecosystem as they **control populations of aquatic insects** and are a **source of food for other animals**.

MAIN DIET



Worms

Tadpoles

Water Insects

Other Larvae



Mostly Day active

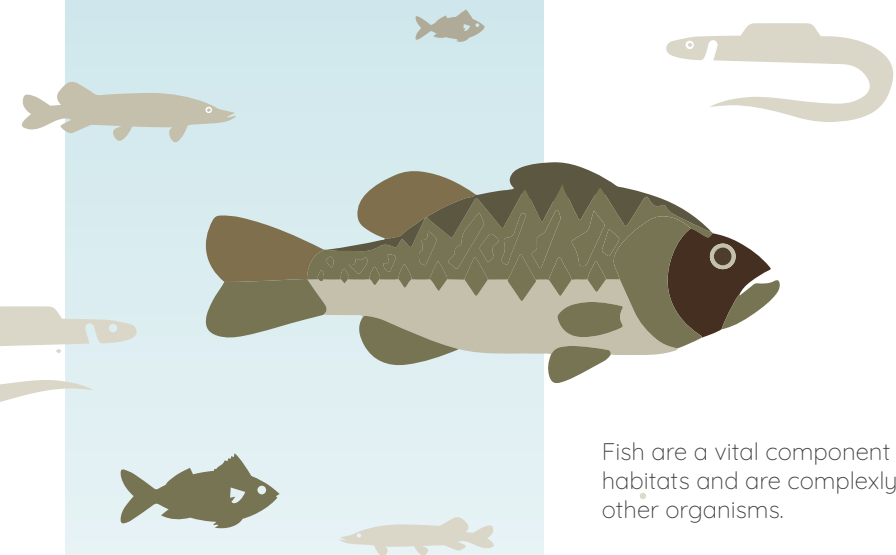


Indicator Species



Least Concern

Underwater



Fish are a vital component of water habitats and are complexly related to other organisms.

Fish play an important role in nutrient cycles because they:

Store a large amount of ecosystem nutrients in their bodies

Move nutrients further than other aquatic animals, and

Excrete nutrients in dissolved forms that are readily available to primary producers.

Less fish affects the entire waterway!
Fishing responsibly ensures there is fish for everyone and the environment.

Black Bream *Acanthopagrus butcheri*



Image: Mark Madden, Fishbase



Image: VFA



Image: Andrew Green, Reef Life Survey

Description

Black Bream can be found in a variety of depths from the shallow margins to the deeper holes near jetties, bridge pylons, and along the drop offs near weed beds, rock walls, reefs and mudflats.

Black bream can live for over 30 years and exceed 60 cm in length.

Black bream's main predators include:

- Pelicans
- Little black cormorants & great cormorant
- Sharks
- Rays
- Large predatory fish
- Mulloway

Breeding season: August - January,

During breeding, schools of mature fish migrate upstream with the advancing salt wedge, and females can produce between **1-3 million eggs** and hatch in about 2 days.

MAIN DIET



Algae
Juveniles



Yabbies



Small
fish



Worms



Day & Night active



Least Concern

Yabby

Cherax destructor



Image: VFA



Image: Corbie from Inaturalist



Image: Livestock Industries / CSIRO

Description

Yabbies are found in many waterways. They can survive dry conditions for many years by burrowing in creek beds, dams and banks, and lying dormant.

This process can weaken the soil and collapse it, thus its scientific name "destructor".

Yabbies feed on algae and plant remains, and any fish or animal remains they find. Yabbies are in the **middle of the food chain**.

Predators:

- Platypus,
- Rakali,
- Water birds
- Australian freshwater fish

Yabbies are an **essential part** of the food chain because they help to break down dead plant or animal matter.

The word "**yabby**" comes from the **Wemba Wemba language** (yabij) and were a **food source** for indigenous peoples.

MAIN DIET



Night active



Vulnerable in Victoria

Estuary perch

Percalates colonorum



Image: VFA



Image: Rudie H. Kuiter, from Fishes of Australia



Image: Tarmo A. Raadik, Arthur Rylah Institute

Description

Estuary perch are most common in estuaries and lower freshwater reaches of coastal rivers and streams.

Fish can reach 45 cm in length and up to 1.8 kg in weight.

Estuary perch are a mid level predator and eat **common galaxias** (pg 43)

Estuary Perch's main predators include:

- Pelicans
- Little black cormorants & great cormorant
- Sharks
- Rays
- Large predatory fish
- Mulloway

Eggs are laid on **submerged rocks and beds of aquatic plants** and spawn in salt water during July - December.

Estury perch have **been affected** by instream structures, flood mitigation work and pollution in the water.

MAIN DIET



Day & Night active



Least Concern

Short Finned Eel

Anguilla australis

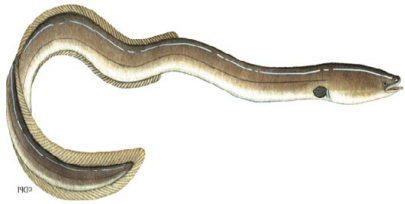


Image: VFA



Image: David Paul, Museums Victoria



Image: Lek Khauv from Inaturalist

Description

Eels have an olive-green, heavily mottled back and sides and a silvery-white to pale yellow belly.

The top fin of the Short fin Eel starts just before the bottom fin, and do not grow as large as long finned eels.

Short Finned Eels are commonly caught at night with pieces of fish & worms on hooks.

Freshwater predators:

- Herons and other water birds,
- Big fishes

During their marine migration:

- Whales
- Sharks.

While migrating upstream, eels can **leave the water** and travel short distances over moist ground. To stay alive, eels can **absorb 50% of the oxygen** they need through the skin.

Eels are top order predators who can shape freshwater ecosystems, and have **strong significance to indigenous people**.

MAIN DIET



Aquatic plants

Fish

Frogs

Crustaceans



Day & Night active



Top Order Predator



Vulnerable

Long Finned Eel

Anguilla reinhardtii



Image: VFA



Image: David Paul, Museums Victoria



Image: Sascha Schultz from Inaturalist

Description

Long finned eels are closely related and very similar to the Short-finned Eel, however, the top fin starts much closer to the head on the Long-finned eel.

The Long finned eel is Australia's largest freshwater eel.

Eels must be cooked to destroy the toxins in their blood which is toxic to humans and other mammals. The toxin derived from eel blood was used in research to discover anaphylaxis.

Freshwater eels undertake a huge migration to the Coral Sea to mate and then die. **Some eels having to travel in excess of 3,000 kilometres to get there!**

MAIN DIET



Aquatic plants

Fish

Frogs

Crustaceans

LEARN MORE ABOUT EEL'S TRAVELS



Day & Night active



Top Order Predator



Vulnerable

Eastern Gambusia

Gambusia holbrooki



Image: Schizoform from Flickr



Image: Gunther Schmida from Flickr



Image: Smithsonian Environmental Research Centre from Flickr

Description

Eastern Gambusia prefer warm, gently flowing or still waters, and are usually found amongst aquatic vegetation near the water's edge.

They can survive in:

- Water temperatures almost 0 to 38°C,
- Water with low dissolved oxygen levels
- And in freshwater and saltwater.

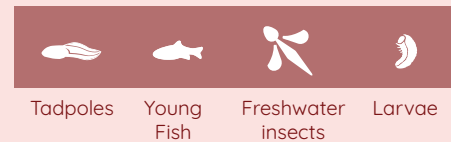
Gambusia are a **noxious species** in Victoria, and must not be used as live bait, or be moved between waterways.

In 1925, this native of North and Central America was intentionally introduced to Australia to control mosquito populations.

Eastern Gambusia is invasive on every continent except Antarctica. The species is in almost plague proportions in parts of Australia, and has had a significant impact on the **decline** of at least **9 fish species** and more than **10 frog species** in Australia.

They compete with native fishes for habitat and food, and are **very aggressive**.

MAIN DIET



Tadpoles

Young Fish

Freshwater insects

Larvae



Day & Night active



Pest

Common Galaxias

Galaxias maculatus



Image: Shaun Lee from Wikimedia Commons



Image: David Paul, Museums Victoria



Image: David Paul, Museums Victoria

Description

The Common Galaxias is widespread in waterways and grows up to 190mm in size.

It can be green to amber in colour and features a variable covering of spots and blotches on its back and sides.

Despite their small mouth they're **carnivorous** and will feed from the surface, mid-water, or the bottom of a waterway.

Common Galaxias are eaten by **waterbirds**, **Esturay Perch**, **Trout** and other fish.

The galaxias species are, in general, threatened by human activities such as intensive agriculture and land change.

These activities have removed vegetation from stream banks that are needed for spawning to **protect** eggs from the sun.

Introduced trout share the same diet as Common Galaxias, and not only **compete for food**, but also **eat them**. In areas where trout live, common galaxias are scarce, and move to stretches of streams and rivers that are less suitable for introduced trout.

MAIN DIET



Crustaceans

Aquatic Insects

Other insects



Day & Night active



Least Concern

Mulloway

Argyrosomus japonicus



Image: VFA



Image: Rudie Kuitert / Aquatic Photographics



Image: Chris Davey from Flickr

Description

In Australia, mulloway live around the southern and eastern coastline and are mostly silver with a blue/grey, green, or bronze coloured back.

Mulloway and their juveniles **hang around in the Yarra estuary**, and are a top predator for many fish species. Mulloway are carnivores **and change their diet as they grow**.

The Mulloway is fast growing, reaching up to 168 cm (23 y old) in Australia and are a highly prized catch for fishermen.

Mulloway have **very large ear bones that were collected to make jewellery**. One of their common names 'Jew fish' are thought to be derived from Jewel fish.

Mulloway is an aboriginal word meaning 'the greatest one'.

MAIN DIET



Yabbies

Fish

Prawns

Squid



Day & Night active



Top Order Predator



Endangered

European Carp

Cyprinus carpio

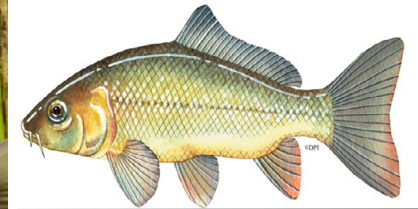


Image: VFA



Image: Patrick kavanagh from Flickr



Image: Dwayne Madden from Flickr

Description

Carp is a **noxious aquatic pest** species in Victoria. Carp can grow to more than 1 m in length and exceed **60 kg in weight!**

The carp is omnivorous and can **adapt its feeding** behaviour and diet to suit the environment. The carp is native to Asia but it has been spread by man to all continents except Antarctica.

Carp can survive in:
**Water temperatures (5-32°C),
Very low oxygen levels,
And clear to very dirty water**

Carp can negotiate flood flows in rivers and jump barriers up to 1 metre in height.

It is illegal to possess, transport or release live carp, or use live carp (including all forms of carp and goldfish) as fishing bait. If caught Carp must not be returned to the water alive.

Carp are allowed to be fished and eaten, and are widely enjoyed by many people, with a variety of methods of preparation and cooking.

MAIN DIET



Small plants

Dead animals

Insects



Day & Night active



Pest

Birds



Native birds have an important positive relationship with plants in their homes.

While the birds receive nectar or fruit from the tree or plant it visits, the tree or plant benefits by having their seeds spread. Once a seed has passed through the digestive tract of a bird, it will often be dropped far away. Many native trees cannot reproduce and grow without birds.

Birds can also be top order predators, on the top half of the energy pyramid and eating a wide variety of animals insects and plants.

Superb Fairy-wren Malurus cyaneus



Image: Patrick kavanagh from Flickr



Image: Patrick kavanagh from Flickr



Image: Patrick kavanagh from Flickr

Image: Ian C
All rights reserved

Description

The Superb Fairy-wren is one of several small bird species revealed by the Aussie Backyard Bird Count to be in population **decline over the last eight years**.

Adult male Superb Fairy-wren's steal the good looks with their rich blue and black feathers above and on the throat.

Females and young birds are mostly brown with a dull red-orange area around the eye, brown bill and tail

The Superb Fairy-wren searches mostly on the ground for their food but may also take from low bushes.

They play an important role in turning over the soil and **keeping insects under control**.

Our environment needs the Superb Fairy-wren and other small birds for their contribution to **maintaining healthy soils**

We can't take them for granted and assume they will always be there.

MAIN DIET



Spiders



Yabbies



Flies



Centipedes



Mostly Day active



Least Concern

Spotted Pardalote

Pardalotus punctatus



Image: Patrick kavanagh from Flickr

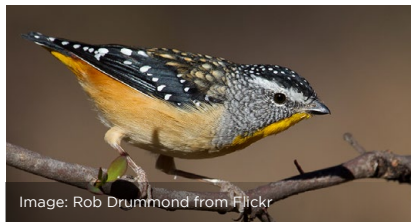


Image: Rob Drummond from Flickr



Image: Patrick kavanagh from Flickr

Description

One of Australia's smallest birds, the tiny Spotted Pardalote **weighs on average 8g**.

It is mostly found in eucalypt forests and woodlands but also in parks and gardens that feature a well- established canopy.

The Spotted Pardalote can be hard to see and is often detected by its call. Male Spotted Pardalote's have a black head where females do not.

The population of Spotted Pardalote's in Victoria is currently listed as secure, however, like other small bird species they are **losing diverse habitat** which leads to a decline.

The Spotted Pardalote helps **keep the number of psyllids** on eucalyptus trees **under control** where they live.

Too many psyllids on a young eucalypt can look unsightly and effect its growth and development. The Spotted Pardalote in good numbers will **help ensure eucalyptus trees continue their life cycle**.

MAIN DIET



Sap

Insects

Honeydew



Mostly Day active



Least Concern

Little Pied Cormorant

Microcarbo melanoleucos



Image: Graham Winterflood from Flickr



Image: Lip Kee Yap from Flickr



Image: Sascha Wenninger from Flickr

Description

The Little Pied Cormorant is one of the most common of Australia's waterbirds, occurring on water bodies of almost any size.

Although Little Pied Cormorants will catch **fish**, more often they take **yabbies** and other crustaceans which are captured during brief dives beneath the water.

Dive times are short, around 15 to 20 seconds, with recovery times on the surface of 5 to 10 seconds unless prey are being swallowed.

Caught prey is brought to the surface or back to the nearby bank, where the claws of the crayfish are shaken off before its

body is eaten. Shrimps form a large part of their diet in winter months.

Little Pied Cormorants breed either in colonies or, less commonly, in single pairs.

The nest is a flat platform of sticks, lined with green leaves and is usually placed in a tree. **Both adults** share in egg incubation and care of the young.

MAIN DIET



Fish

Yabbies

Insects



Mostly Day active



Least Concern

Azure Kingfisher

Ceyx azureus



Image: Brian McCauley from Flickr



Image: Birds as poetry from Flickr



Image: Birds as poetry from Flickr

Description

The Azure kingfisher inhabits the vegetation beside **waterways and other wetlands**, where it often perches on low, overhanging branches, searching for prey.

The Kingfisher catches its prey by **diving from overhanging perches** into the water. It is not unusual for them to hit their prey against the perch before swallowing it head first.

The Azure kingfisher is most commonly seen along the banks of well vegetated, slow-flowing rivers.

It is a solitary bird that is occasionally seen in pairs and nests in a **burrow built into the river bank**.

To help conserve the Azure kingfisher it is recommended that **cats are kept in at night**

Azure Kingfishers often watch Platypuses foraging underwater and catch any food items that are disturbed.

Human activities that cause artificial flooding of waterways can **drown nests** and the introduction of European Carp **competes for food resources**.

MAIN DIET



Fish Crustaceans Frogs Insects



Day active



Least Concern -
Decreasing

You may glimpse a rare sighting along the Yarra River, which provides an important habitat and linkages through the landscape.

Nankeen Night Heron

Nycticorax caledonicus



Image: Audiodam from Flickr



Image: Juvenile, birds as poetry from Flickr



Image: patrick kavanagh from Flickr

Description

The nankeen night heron is a medium-sized bird. They're a **night-time hunter** that quietly moves in shallow water looking for prey.

They tend to leave roosts shortly after sunset and are most active from **dusk to dawn**.

Nankeen night herons breed in colonies alongside egrets and cormorants in trees above water.

In Boroondara, Nankeen night herons may be glimpsed perched on a branch or log in water in Willsmere-Chandler Park, at the wetland in Burke Road South Reserve or **along the Yarra River corridor**.

We can help by walking along tracks and keeping our dogs on leads when close to nesting and roosting places around billabongs and waterways.

Drainage of wetlands, and interruption of river flows **disrupts the breeding activity** of Nankeen Night Herons.

MAIN DIET



Fish Crustaceans Insects Frogs



Nocturnal



Vulnerable in Victoria

Reptiles, Amphibians & Mammals



Mammals, reptiles and amphibians have important roles in the food webs of every ecosystem.

Mammals are important members of food chains and food webs, as plant eating or and as predators. Many mammals are ecosystem engineers that create, modify, or destroy habitat.

Reptiles and Amphibians represent a wide part of the energy pyramid, from tadpoles to snakes. They are important predators, keeping pest populations low, and can be used as temperature indicators because of their sensitivity to change.

Red Bellied Black Snake *Galaxias maculatus*



Image: Scott Eipper from Flickr



Image: Phillippsw from Flickr



Image: Tony Morris from Flickr

Description

Red belly black snakes are **opportunistic** predators and carnivores.

They hunt both on land (**including up trees**) and in water, being able to fully submerge. Red belly balck snakes can be **underwater** for up to 23 minutes.

Red belly balck snakes are venomous and use it to hunt their prey, however is not as dangerous as other snakes.

They are of a moderate size and the head is often not distinct, lacking a clear neck.

Predators:

Feral cats
Laughing kookaburras
Falcons and other raptors

The Red-bellied Black Snake's preferred habitat has been particularly **vulnerable to urban development** and a **widespread decline in frogs**, which are its preferred prey, has occurred.

According to The Australian Snakebite Project, 2005–2015, the snake's numbers appear to have **declined**.

MAIN DIET



Small mammals

Reptiles

Flies

Frogs



Day active



Least Concern

Growling Grass Frog

Ranoidea raniformis

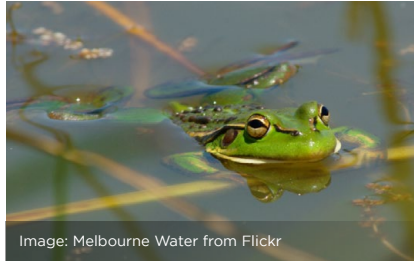


Image: Melbourne Water from Flickr



Image: Catching the eye from Flickr



Image: David Bryant, Department of Environment & Primary Industries from Flickr

Description

The Growling Grass Frog was once common but **declined suddenly** from about 1990 and was declared endangered in 2002 due to significant decline.

The Growling Grass Frog calls, feeds and moves around after dark, and are known as a 'sit-and-wait' predator.

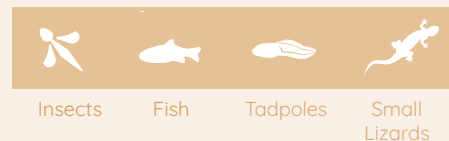
They're most active in the warmer months between September to March where they like to bask in the sun.

In winter they're largely inactive and prefer to shelter on the land under rocks, logs, thick vegetation, or in vegetation, often a long way from waterbodies.

Growling Grass Frogs need still or slow-moving water with **emergent vegetation around the edges** and mats of floating and submerged plants.

Frogs are an **important indicator of environmental change** whether it's pollution, climate change or habitat change. Their disappearance is an **early indicator** something is wrong with the environment.

MAIN DIET



Day active Endangered Indicator Species

Without tadpoles, streams will clog with algae & animals that rely on frogs for food will disappear. A healthy frog population helps keep mosquitos down!

Eastern Blue Tongue

Tiliqua scincoides scincoides



Image: Kerry - Kazredracer from Flickr



Image: Halina from Flickr

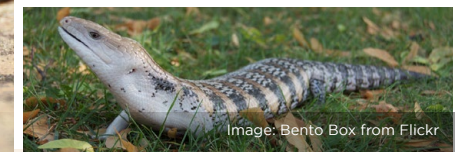


Image: Bento Box from Flickr

Description

Eastern blue tongues are large thick headed skinks that can reach up to 56cm.

They are known for their distinctive 'blue' tongue which **they extend when threatened**.

Eastern blue tongues are fairly bulky with thick necks and bodies. They are diurnal omnivores, meaning they eat both plant and animal matter during the day.

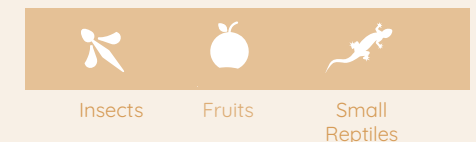
Eastern blue tongues are found not only around the garra but also in urban areas.

Blue tongues are able to lose their tails and then regrow it! This helps blue tongues in escaping predators as forfeiting their tail may offer the lizard an opportunity to escape.

Unfortunately, blue-tongues will eat snails and slugs poisoned by snail baits and **can be poisoned themselves**.

Blue tongues **help control insects** and molluscs, helping to protect local flora.

MAIN DIET



Predators:

- Feral cats
- Laughing kookaburras
- Snakes
- Falcons & other raptors



Day active



Least Concern

Rakali

Hydromys chrysogaster



Image: Ed Dunens from Flickr



Image: Robert Anderson from Flickr

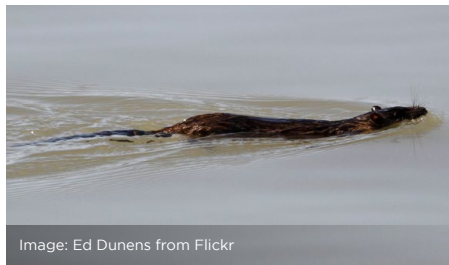


Image: Ed Dunens from Flickr

Description

Rakali are a large Australian rodent that lives in burrows on the banks of rivers and lakes.

Rakali **need healthy riparian vegetation** and solid river banks, with minimal erosion for their habitats.

Rakali are highly territorial, marking their home ranges with a strong scent and their fur repels water, drying quickly once animals exit the water.

Natural predators:

- Raptorial birds,
- Cats,
- Snakes,
- Large fish

Rakali play an **important role in ecosystems**. One way is by dispersing fungi spores which assist plants to get water and nutrients from the soil. Rakali **eat the fungi and spread it** around the soil through their droppings.

During the 1930-40s, rakali were **almost hunted to extinction** as their waterproof fur was used by upper-class Australians for coats and hats.

MAIN DIET



Insects Fish Crustaceans Birds Frogs



Nocturnal



Least Concern

European rabbit

Oryctolagus cuniculus



Image: Henri Quatre from Flickr



Image: Fra298 from Flickr



Image: Back from the Brink, Flickr

Description

Rabbits are mostly active from late afternoon to the early morning. Rabbits stay above ground during the night unless disturbed.

The warren is the key to the success of rabbits in Australia. It not only provides protection from predators but also protection from environmental extremes.

The impact of rabbits on the Australian environment has been disastrous. At present, there are at least 304 Australian threatened fauna and flora species that may be adversely affected by competition and land degradation by rabbits.

Consequently, competition and land

degradation caused by rabbits has been listed as a key threatening process to threatened species conservation

Rabbits selectively feed on young plants, which can severely affect the regeneration. In some instances, the impact created by rabbits on vegetation is often replaced with noxious or unpalatable weed species.

MAIN DIET



Grasses Berries



Mostly Night active



Pest



Least Concern

Grey-headed flying-fox

Pteropus poliocephalus



Image: Mansour Vahedi from Flickr



Image: Rodger Colloirick from Flickr



Image: Brie321 from Flickr

Description

Grey-headed flying foxes exhibit strong social habits. These nocturnal animals form large roosts known as colonies by day, typically in exposed tree branches

Flying foxes use their eyes and ears to navigate unlike bats.

The greatest threats to flying foxes are :

- Shooting - legally and illegally.
- Land clearing resulting in mass-starvation events.
- Grey-headed flying foxes are often killed from flying into power lines.
- Flying fox camp disturbances & dispersal
- Backyard fruit tree entanglement.

Flying fox populations are particularly **important to native species of hard woods** because of they distribute seeds and are **responsible for pollination**.

Hundreds of years of evolution have made these plant species highly **dependent on the grey headed flying fox's** migratory corridor and sub-colonies for their reproduction.

MAIN DIET



Sap Nectar Honeydew Fruit



Nocturnal



Keystone species



Least Concern

Platypus

Ornithorhynchus anatinus



Image: Phillipsw from Flickr



Image: Patric Tomkins from Flickr



Image: Gavin Edmondstone from Flickr

Description

The platypus is a most unusual and beautiful animal. They have thick fur that keeps them warm underwater and extra skin on their feet to help them swim. Their bill is smooth, flexible and rubbery, and feels like suede with lots of sensors.

If Platypus territories overlap, they will **feed at different times to avoid each other**. They spend much time in water, store fat in

their tails and waddle onto the banks of the river to dig burrows.

They spend a lot of time hunting for food, up to **10 to 12 hours** and males have a venomous spike on it back foot - which has enough poison to cause severe pain for a human

Their largest threat is loss of habitat due to land clearance and water pollution. Snakes, goannas, water rats & foxes prey on Platypus.

MAIN DIET



Insect Larvae Yabbies Flies Worms

Platypus are typically one of the **first species to return to a waterbody** when the quality starts to improve. They let scientists and researchers know that the health of the environment is starting to get better.



Nocturnal



Indicator Species



Near Threatened

Lidded yabby traps are deadly for the platypus. Once the platypus goes in they only have a couple of minutes to live, because they can't get out to breathe.

Final Words

We hope you have enjoyed reading about and looking at a small selection of the beautiful flora and fauna that inhabit Melbourne's waterways.

As mentioned, this is a starting point, a introduction to the many connections that have formed between thousands of plants and animals in our ecosystems.

The Yarra Riverkeeper Association in partnership with the [Victorian Fisheries Authority](#) and supported by the [Environmental Restoration Fund](#), hope this document has sparked a curiosity, or fuelled an existing one, to know more about our local wonders.

Please continue to get involved (pg 15) and support the many organisations and government agencies that are actively retoring our habitats and safeguarding our waterways for future generations.



Further Reading

If you wish to know more about the life of our waterways, have a look through these links:

Climate Change:

www.climatechangeinaustralia.gov.au/en/

General:

Victorian Fisheries Authority
<https://vfa.vic.gov.au/>

Melbourne Water
www.melbournewater.com.au/

City of Yarra
www.yarracity.vic.gov.au/the-area/biodiversity-and-wildlife-in-yarra

Animals + Plants

<https://www.inaturalist.org/>

<https://animalia.bio/>

<https://fishesofaustralia.net.au/>

www.swifft.net.au/cb_pages/threatened_fauna_x_local_government_area.php

<https://greentumble.com/how-do-plants-help-the-environment/>

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Water and the Environment

