

# TURTLES IN SCHOOLS

# TERM 3 WORKBOOK

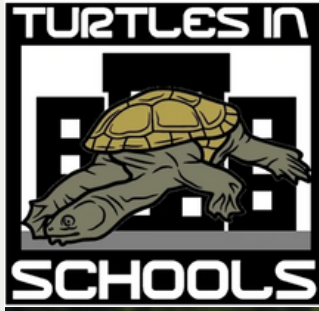


Photo credit: Bellinghen Riverwatch



# 1 Million Turtles

COMMUNITY CONSERVATION PROGRAM

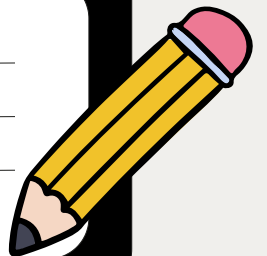
A large white rectangular box with rounded corners and a thick black border. Inside the box, there are three horizontal lines for writing.



Photo credit: Dr James Van Dyke

# TURTLES IN SCHOOLS

Produced by the  
1 Million Turtles Community  
Conservation Program  
and funded by  
The Foundation for National  
Parks and Wildlife.

In the pages that follow, you will find a comprehensive set of lesson plans.

Our initiative is not just about imparting knowledge but fostering a deep connection between students and their natural environment and instilling a sense of responsibility and awareness of freshwater turtles and their conservation.

As we embark on this educational venture, we extend our gratitude to educators, students, and all those who champion the cause of conservation. The Turtles in Schools Program is not just a curriculum; it is a movement to inspire the next generation of environmental custodians.

**Thank you,**

**1 Million Turtles Community  
Conservation Program**

# CULLESON

## TERM THREE

## MACROINVERTEBRATES

- Learning Intentions
- Background
- Activities
- Curriculum Mapping



# Learning Intentions

(1) Define a macroinvertebrate;

(2) Describe how macroinvertebrates can be used to assess wetland health.



**Define**

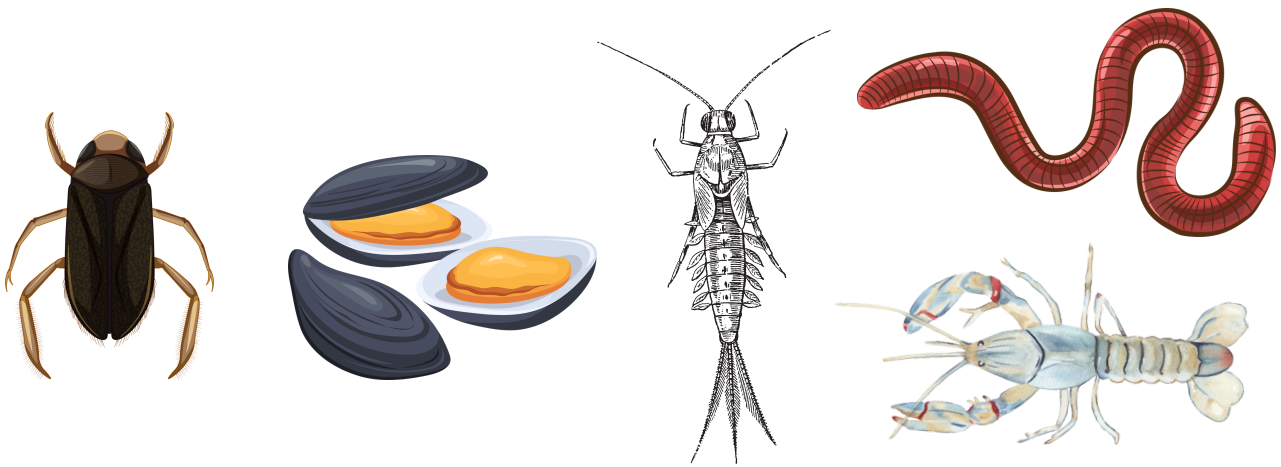


**Describe**

# Background Information

## What are macroinvertebrates?

Macroinvertebrates (also known as water bugs) are small animals without a backbone that are large enough to see without a microscope. Water bugs spend all or part of their life in the water and are a source of food for fish, frogs, birds and freshwater turtles. Some common water bugs are beetles, snails, dragonfly and damselfly nymphs, mayfly and stonefly nymphs, yabbies, shrimp, worms and mussels.



## What can macroinvertebrates tell us about the health of our water bodies?

The presence of different water bugs within a water body can serve as an indicator of its overall health. Water bugs exhibit diverse tolerances to alterations in the aquatic environment, such as changes in temperature, turbidity and pH. The SIGNAL (Stream Invertebrate Grade Number - Average Level) score associated with a water bug signifies the species' level of tolerance.

SIGNAL scores:

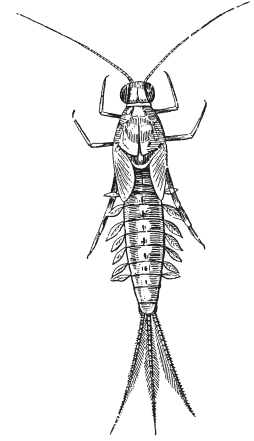
- A SIGNAL score of 6-10 indicates the species is very sensitive to changes in their environment.
- A SIGNAL score of 1-5 indicates the species is very tolerant of environmental change.

# Macroinvertebrate SIGNAL scores:

SIGNAL scores are indicated in the brackets.

Garland, I. and Coleman, K. (2020) Waterbug Blitz Education Resource for Australia Schools. National Waterbug Blitz, NSW.

**Very Sensitive Bugs** - Stonefly nymph (10), Mayfly nymph (9)



**Sensitive Bugs** - Alderfly larvae (8), Caddisfly larvae (8), Riffle beetle & larvae (7), Water mite (6).

**Tolerant Bugs** - Beetle larvae (5), Dragonfly nymph (4), Water strider (4), Whirligig beetle and larvae (4), Freshwater yabby (4), Damselfly nymph (3), Fly larva and pupa (3), Midge larva and pupa (3), Freshwater mussel (3), Nematode (3), Freshwater sandhopper (3), Freshwater shrimp (3), Water scorpion/Needle bug (3).



**Very Tolerant Bugs** - Diving beetle (2), Flatworm (2), Hydra (2), Water treader (2), Freshwater worm (2), Freshwater slater (2), Waterboatman (2), Backswimmer (2), Bloodworm (1), Leech (1), Mosquito larva and pupa (1), Freshwater snail (1).



## Anatomy of a Macroinvertebrate

**Head:** The eyes, mouth, and antennae are located on the head.

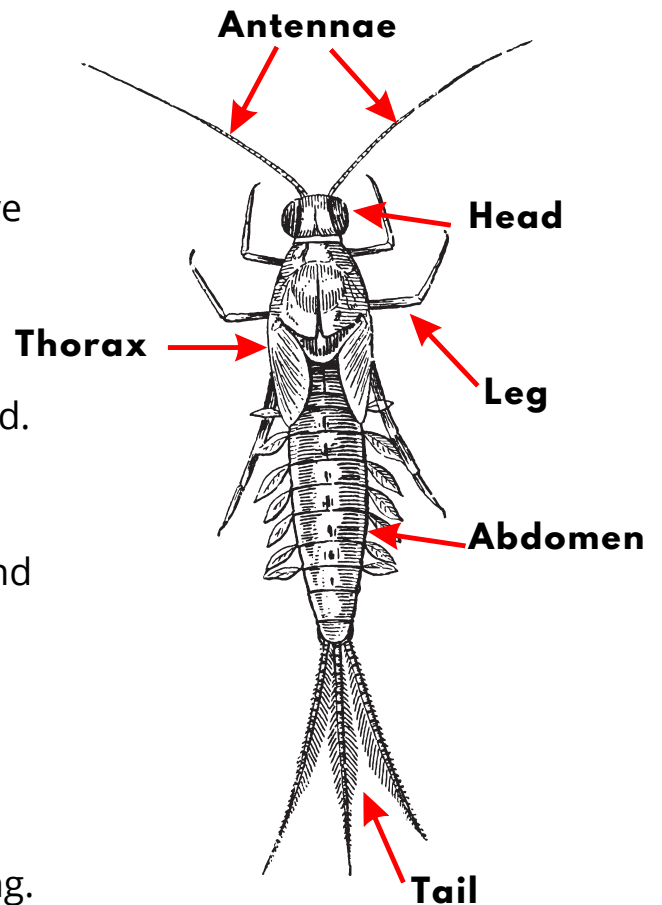
**Thorax:** The thorax is the middle part of a macroinvertebrate's body, kind of like their middle section. This is where their legs are attached.

**Abdomen:** The abdomen is the back part of a macroinvertebrate's body, behind the thorax. Inside the abdomen, they have their digestive system and sometimes even their breathing parts.

**Tail:** Some macroinvertebrates have a tail-like structure at the end of their abdomen. It helps them swim and move through the water.

**Antennae:** Antennae are like little feelers on the macroinvertebrate's head. They use them to sense things around them. With their antennae, macroinvertebrates can detect food, find mates, and even feel vibrations in the water.

**Legs:** Macroinvertebrates have legs attached to their thorax, and they use them for walking, crawling, or swimming.



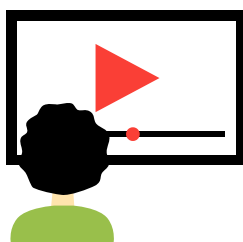
## Classroom Activity

### ACTIVITY 1 -

(1A) Watch the following video. The video gives an overview of macroinvertebrates and how to identify different organisms.

Link to video: <https://www.youtube.com/watch?v=HtE70kzYDPM> [Copy and paste into browser]

(1B) Complete the Video Reflection worksheet.



**Video**

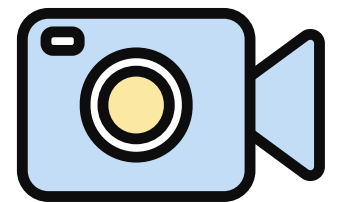


**Discuss**

# Video Reflection

Three things I learnt while watching

**3**



Two questions I have from the video

**2**



One fact I found most interesting

**1**





# Classroom Activity

## ACTIVITY 2 -

(2A) Explain the importance of macroinvertebrates and how they are used to assess wetland health.



## ACTIVITY 3 -

(3A) Explore the National Waterbug Blitz website.

Link to website: <https://www.waterbugblitz.org.au/> (Copy and paste into browser).

(3B) Explore the websites content, including the *Meet the Bugs* page and *How to Video*.

Link to video:

[https://www.waterbugblitz.org.au/cb\\_pages/resources.php?category\\_id=3915](https://www.waterbugblitz.org.au/cb_pages/resources.php?category_id=3915) (Copy and paste into browser).

(3C) Complete the Video Reflection worksheet.



# Macroinvertebrates

Explain the importance of macroinvertebrates and how they are used to assess wetland health

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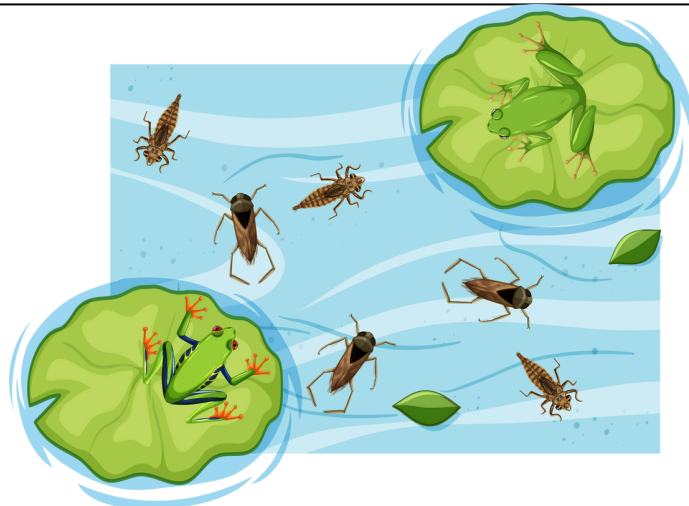
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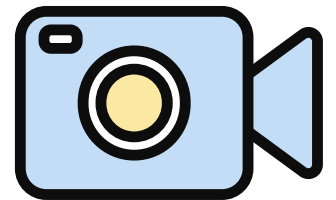
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# Video Reflection

Three things I learnt while watching

**3**



Two questions I have from the video

**2**



One fact I found most interesting

**1**



# Classroom Activity

## ACTIVITY 4 -

(4A) In Lesson 4, you will be visiting your local wetland and will be sampling macroinvertebrates from the same sites you sampled during your water quality experiment.

(4B) Prior to the wetland visit, you will need to design your own experimental design. In small groups, brainstorm potential research questions related to macroinvertebrate presence at the wetland. Think about factors that could affect the macroinvertebrates that you see (i.e. human activities).

(4C) Select one of the research questions and develop a hypothesis and experimental design. Your experimental design should include:

- Identification of sampling sites within the wetland. You can use the same sites you selected for your water quality testing.
- Hypothesis.
- Prediction of the expected outcomes based on your hypothesis.



# Macroinvertebrate Monitoring

**Research question:**

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**Hypothesis:**

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**GPS coordinates of site(s):**

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**Expected outcomes:**

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