

## WATER BUG SURVEY

### Objectives

To assist students to gain an understanding of the different types of water bugs in the waterway and how they help determine the health of the waterway.

### Duration

45 minutes—1 hour depending on the time available.

### Group Size

20 –30 students (equipment for 5 groups).

### Materials

All materials included with the Water bug kit:

- 5 nets on poles
- 5 buckets
- 5 large white sorting trays
- 20 ice cube trays
- 30 plastic spoons
- 12 pipettes
- 6 whiteboard markers
- 5 clear clip boards
- 10 A3 Water bug Detective Guides
- 5 A3 Water bug Survey Calculation Sheets
- 5 small hand held nets
- 5 magnifying glasses
- Pencil case with 20 paint brushes
- 1 A3 Gambusia/ Macroinvertebrates sheet
- 1 A4 Buglopedia

- 1 Waterbug Book
- 1 Fishes of the Murray-Darling Basin
- 1 What fish is this? Booklet
- 1 Roll paper towel

### Background

#### What is a water bug?

A water bug or aquatic macroinvertebrate is an animal with no backbone that spends all or part of its life in water and is large enough to see with your eye (ie. without a microscope).

Water bugs include worms, snails, mites, bugs, beetles, dragonflies and yabbies. They do not include tadpoles or small fish as they have a backbone.

#### Why are they important?

Aquatic animals like fish, frogs and birds rely on water bugs as their main source of food.

The greater the variety of water bugs in a waterway, the more chance there is of animals higher up the food chain living in that waterway.

Water bugs are also important for breaking down leaf litter and other organic matter within a water way.

#### Why are they a good measure of waterway health?

Water bugs are a good measure of the health of a waterway because they:

- Live in the waterway for months or years meaning they provide an indication of past and present conditions

- Are a major part of the food chain
- Cannot escape pollution easily
- Have different tolerance level to changes in a waterway
- Can provide an indication of the health of your waterway depending on the type and number of water bugs present

## Do you need a licence to sample water bugs?

Sampling of water bugs is possible without a licence as long as the sampling involves catch and release. This means that all animals (including water bugs, fish and other animals caught) must be released at the site where sampling occurred as soon as the sampling is finished.

If fish or yabbies/crayfish are caught during sampling, please return them to the waterway immediately as they do not survive well in the buckets or trays provided.

## Sampling Information

### Water bug Habitats

Habitats are places where animals live and eat. Water bugs live in different habitats within waterways. When a habitat is missing from a waterway, the number of different types of water bugs will be reduced.

### Where to sample

Sample a range of habitats within the waterway. This includes under stones, logs, and tree roots, and in vegetation and moving and still water. Samples must be collected from the edge of the waterway (due to Work Health and Safety issues related to students entering waterways).

### When to sample

For the best representation of the health of the waterway, water bug samples should be conducted in Spring and Autumn.

### Bugs in sample area

Aim to collect at least 50 water bugs per sampling area and as many types as possible. It is not possible

to calculate the stream pollution index unless you have 50 water bugs.

## Preparation for Sampling

There is enough equipment in the kit for five groups of students. Before beginning the session prepare the activity by laying out all the equipment in groups on a flat area not too far from the waterway. Each group will need the following items:

- 1 net
- 1 bucket
- 1 large white sorting tray
- 4 ice cube trays
- 5 spoons
- 2 pipettes
- 1 whiteboard marker
- 1 clip board
- 2 A3 Water bug Detective Guides
- 1 A3 Water bug Survey Calculation Sheet

All other equipment is optional.

This activity is easier to manage if you have already used buckets to half fill large white sorting trays and ice cube trays with water for the students.

## Handling Water bugs

It is important to remember that water bugs are living things and have feelings. Therefore water bugs should be handled with care and treated with respect.

## LESSON PLAN

### Introduction (5 minutes)

Ask students if they know what an aquatic macroinvertebrate is? Explain that an aquatic macroinvertebrate is also known as a water bug and can be better understood by breaking up the words:

- Aquatic—water
- Macro—large enough to see with the unaided eye (ie. without a microscope)
- Invertebrate—animal without a backbone

So, an aquatic macroinvertebrate (or water bug) is an animal with no backbone that spends all or part of its life in water and is large enough to see with your eye.

Explain that water bugs are important for understanding how healthy the waterway is. Water bugs have different sensitivities to changes in the waterway. This means that some bugs are very tolerant to poor water quality and others are very sensitive.

Therefore, by identifying, sorting and counting the water bugs in the waterway, we can get a good idea of how healthy the waterway is.

### Setting the Scene (10 minutes)

Explain and demonstrate to students how to prepare for, and collect a water bug sample:

1. Collect clean water from the waterway using a bucket and pour into the large white sorting tray until about half full and a small amount of water into the ice cube trays
2. To collect a water bug sample, use the net to make a short upward-sweeping motion to sweep the net through the water.
3. Stop regularly to transfer the water bugs gently into the tray. Turn the net inside out, lay it in the water in the tray and gently move it around to release water bugs from the net.
4. Where it is difficult to lie the tray flat at the water's edge, transfer the water bugs into the bucket and gently pour the water with water bugs into the trays.
5. Sample as many different habitats as possible (rocks, logs, tree roots, vegetation etc) along 10 metres of stream.
6. Conduct the sampling for 5-10 minutes making sure to rinse any mud or fine silt from the net so the sample is free of sediment.
7. Gently spread the sample out in the tray and look for water bugs.
8. Using plastic spoons, pipettes and paintbrushes (optional) transfer the water bugs to the ice cube trays, placing different types of bugs into different cubes
9. Using the A3 water bug Detective Guides and the help of the teacher, identify the different water bugs.
10. Use the A3 water bug Survey Calculation Sheets and whiteboard markers to record the number of each different bug found and the total number of bugs.

### Activity (30 minutes)

1. Divide the students into 5 groups
2. Direct the groups to move to the equipment already laid out as of 'Preparation for Sampling' on page 2 and begin conducting sampling and water bug identification.
3. Assist the students where necessary with collection and identification.
4. If you are limited for time with the students you could have previously collected water bugs for each group and placed them in the large sorting trays. This would mean students would go straight to identification.

### Calculating Waterway Health (10 minutes)

If you have time, assist the students to calculate the Stream Pollution Index (SPI) to give an indication of the health of the waterway (this could also be done in the class at a later stage by recording numbers onto A4 printed handouts).

1. Use the A3 laminated survey calculation sheet and whiteboard markers (one each per group).
2. Fill in the details at the top of the sheet.
3. Follow the instructions on the sheet to calculate the Stream Pollution Index (it may help to have a calculator handy).
4. Use this number to give an indication of stream quality (waterway health).

### Conclusion (5 minutes)

After students have participated in the activity, find out what they have learnt by asking questions.

For example:

- What is an aquatic macroinvertebrate?

- Why are they a good measure for the health of the waterway?
- Why are they important?
- What was your favourite bug and why?
- What water bugs did you find?
- What did the water bugs tell you about the health of the waterway?

## Equipment Care

After use of the equipment, please ensure that it is washed, dried and returned to the kit. Please let the education officer know if any equipment is lost or damaged by phoning 03 5880 1415 or on return of the kit.

## Extension Activity

Refer to lesson plan and worksheets—'Freshwater Macroinvertebrate Extension Activity'

## More information

To find out more about water bugs go to the water bug section of the NSW Waterwatch website as follows:

<http://www.environment.nsw.gov.au/waterwatch/macroinvertebrates/index.htm>

For more information about the lesson plan contact Sandy Dellwo, Land Services Officer – Education on 03 5880 1415.

## Acknowledgements

This activity has been adapted from the Water bug section of the Junior Waterwatch Manual developed by the Department of Environment, Climate Change and Water NSW as follows:

<http://www.environment.nsw.gov.au/resources/waterwatch/JnrFieldmanual/20090498JuniorFieldManualSection07.pdf>

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