



CARING
FOR
OUR
COUNTRY

Activity - Wonderful Waterbugs

(Grades 4 – 10)

Overview: Healthy wetlands contain an incredibly abundant and diverse community of microscopic animals. This activity focuses on collecting and looking closely at water samples to appreciate the number and variety of waterbugs, or macro-invertebrates that live there. It introduces students to the diversity of tiny animals that live in wetlands, the roles they play in processing nutrients, and their importance as food for larger wetland animals. Dip netting is the best way to discover which types of waterbug are abundant in the water, which can tell us about the health of the wetland. Waterbug Watching provides a snapshot of what lives there and is useful for one-off events, such as community field days, and school projects.

Task: Students use dip nets and containers to collect and sort waterbugs, and identification charts and identify them. Take samples of different areas of the wetland to identify organisms and plants that you find.

Materials needed per team of 3 – 5 students

- fine gauze nets (with 2 m long sting tied to the hand of the user to retrieve net if dropped)
- 1 white plastic square tray
- 4 white ice cream containers
- 2 spoons and 2 brushes
- 2 clear plastic jars
- magnifying glasses
- pencils
- 1 camera
- Bug field sheet to enter results (Pre made field sheet available on line- See below)
- 1 'Bug identification' field guide (Pre made ID cards available on line- See below)



Government of South Australia
Habitats and Wetlands Unit
Wetland Resource Management Team



NRM Education

climate change biodiversity water food air waste transport energy

AQUATIC MACROINVERTEBRATE RECORD SHEET

School: _____

Class conducting the survey: _____

Site name: _____

Date: _____

Start time: _____

Site code: _____

	Common Name	Point A	Point B	Specific Index
Very Sensitive	Blackfly Larvae	0	0	
	Blackfly Pupae	0	0	
	Leatherhead	0	0	
	Slender Shiner	0	0	
	Blue Gill	1	1	
	Shoreline Catfish	0	0	
Sensitive	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
Tolerant	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
Very Tolerant	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
Not Tolerant	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
Other	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
Not Tolerant	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	
	Shore Pygmalion	0	0	

Step 1 Interpreting your results:

Calculate the Signal Score for your site:

POLLUTION INDEX

+

TAXA RICHNESS

Signal Score =

Step 2

Use the signal score to determine the pollution rating your sampling site:

Signal Score	Pollution Rating
Higher than 5	Highly Polluted
More than 4 and up to 5	Mild Pollution
Between 3 and 4	Moderate Pollution
Less than 3	Severe Pollution

Step 3

The pollution indicator graph can suggest possible sources of pollution. Use your SIGNAL SCORE and TAXA RICHNESS to plot a point on the graph. In which quadrant does your point fall?

Quadrant 1

1. Sewage treatment plant

2. Sewage treatment plant

3. Sewage treatment plant

4. Sewage treatment plant

Quadrant 2

1. High chemical use in agriculture

2. High chemical use in agriculture

3. High chemical use in agriculture

4. High chemical use in agriculture

Count the number of macroinvertebrate types. This is the TAXA RICHNESS.

Add up all the sensitivity numbers to calculate the POLLUTION INDEX.

Streamwatch Water Bug Guide

Instream macroinvertebrates or "water bugs" are animals that spend at or just below the surface of a river, stream, channel, ditch, brook, wetland, and so on. They are large enough to be seen without the aid of a microscope or magnifying glass and live for 10 to 60 months.

In local water assessments, monitoring water bugs has been rated from 1 to 5 according to their sensitivity to pollution. They are grouped into four categories. The more sensitive a water bug is to a category, the higher the number assigned to it. The four categories are:

- very sensitive (3, 4 and 5)
- sensitive (1, 3 and 4)
- tolerant (1, 2 and 3)
- very tolerant (2 and 3)

It is important to note that water bugs vary in size depending on their species and stage of development. The water bugs that you collect may be as small as a pin or as large as the size of your fist.

The colour of the water bugs may also vary. For information on how to do a water bug survey see www.streamwatch.org.au

very sensitive

Stonely nymph

Bug value 3

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

Stonely nymph

1

sensitive

Water bug

Bug value 4

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

Water bug

1

tolerant

Dragonfly and Damselfly nymph

Bug value 2

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

Dragonfly and Damselfly nymph

1

very tolerant

Tree bug

Bug value 2

Tree bug

1

Tree bug

1

Tree bug

1

Tree bug

1

Tree bug

1

Tree bug

1

Tree bug

1

Sampling method *and procedure*

- **Collect** – Stop at the collection sites identified along the Discovery trail. Collect your sample from the edgewater close to banks, and amongst water plants in pools. Using a dip net, sweep backwards and forwards just below the surface through any aquatic plants to trap animals attached to the plants or swimming in the water. Do not collect too much material in your net. Empty the contents of the dip net into your bucket or tray. If you don't get many waterbugs then have another go with the dip-net this time trying to collect waterbugs attached to rocks and plants, and hiding in leaf packs.
- **Watch** - Use a magnifying glass to look at microscopic animals in detail. Often the waterbugs are moving, so they are easy to find.
- **Identify** - each type of waterbug by their body shape and general features using the 'Bug identification' field guide.
- **Sort** - Label 4 white ice cream containers with the names, 'worm-like', 'crayfish-like', 'insect-like' and 'animals with shells'. Add stream water to the containers to make it about 1 centimetre deep. Now sort through your sample and use a pipette, spoon or brush to transfer different types of waterbug to the labelled containers based on what they look like. Sort the bugs so similar looking bugs are all placed in the same container.
- **Record** – Use a magnifying glass to look at microscopic animals in closer detail. You can transfer them to clear plastic jars for closer inspection. Identify them using the 'Bug identification' field guide, and record the number and type of different bugs you see onto your 'Bug field sheet'.
 - Can you count the number of legs
 - Describe their body shape
 - Record their body length
 - Can you assess the number of waterbugs from each of the four major groups as either: none, occasional or plentiful
 - Draw one of each type, or take photos with a camera
- **Return** - all the waterbugs, leaf matter and rocks to the wetland at the site where you collected them.
- **Wash** - your hands, clean all your equipment, and collect all rubbish.
- **Further Interpretation** – back in the classroom you can follow the waterwatch guidelines to interpret your waterbug results and gain an insight into the health or pollution in the wetland. <http://www.waterwatch.org.au/publications/module3/waterbug.html>

The variety and number of waterbugs in your sample give you a sense of the health of the stream (see Table 5). Some waterbugs cope well with pollution or changes in their habitat, whilst others are very sensitive and diet.

If you find

 - *Only one or two kinds of animals, e.g. worm-like animals, but many of them, then it suggests = Severe organic pollution.*

- *A variety of animals, but only a few of each kind, and the wetland sample appears clean, then it **suggests** = wetland has undergone flooding or the sample was taken during high flows.*
- *No animals, then it **suggests** = Toxic pollution.*

From: <http://www.waterwatch.org.au>

- **Useful reading:**

For a more detailed description of these methods read 'Water quality and macroinvertebrates in SA and WA', which is also relevant to TAS.

<http://nynrm.sa.gov.au/Portals/7/pdf/LandAndSoil/17.pdf>