Year 6 and 7, lesson plan

Topic	**Macroinvertebrates under the microscope** **Invertebrate:** Invertebrates are animals that neither possess nor develop a vertebral column (commonly known as a backbone or spine). **Macro-invertebrate:** A macroinvertebrate is the term used for invertebrate fauna, includes arthropods (insects, mites, scuds and crayfish), molluscs (snails, limpets, mussels and clams), annelids (segmented worms), nematodes (roundworms), and platyhelminthes (flatworms).
Rationale	Students review what they previously learned searching for water animals at the local water source, and how those animals can indicate if water is polluted or clean. Students understand that different water animals can live in different amounts of pollution. Students learn ways to identify water animals by looking at their features under a microscope.
Desired results	Students observe water animals under microscopes. Students can assess whether the animal has legs and if so how many, as well as other observable features such as a shell or a tail. Students use the Aquatic Macroinvertebrate ID Key to decide which animal each of 6 specimens might be, and record this on the 'Which Water Animal Am I?' worksheet, for each specimen. Students can discuss their answers and any differences.
Some curriculum links	**ACSHE083**. Scientific knowledge is used to solve problems and inform personal and community decisions. Year 5 **ACSIS064**. With guidance, identify questions in familiar contexts that can be investigated scientifically and make predictions based on prior knowledge. Year 4 **ACSIS086**. Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks. Year 5
Learning/ teaching activities	**Class preparation (facilitator)**: Enlarged pictures of water animals that were found in lesson 1. Set up 6 microscopes, 6 samples (either 3 x 2, or 6 x 1) to be observed in petri dishes, tweezers, one laminated Aquatic Macroinvertebrate ID Key per microscope and one set 'Which water animal am I?' worksheets per student. An extra light source is useful if the microscope is not fitted with one. Label each microscope with a Sample number. Have a list of the prepared samples, numbered 1-6, handy for your own reference. Revision of lesson 1 (insert relevant refresher questions here): • We went on an **excursion to** _____ last week. • What did _____ (Indigenous staff/elder teach you about this

place?
- What is _____(name of aquatic ecologist, eg) job?

Talk about pollution:
- What causes pollution? (**write list on the board**).
  Heading- **Pollution in water places.**
  List- **Animal faeces/scats, animal bodies, rubbish, chemicals.**
- In the water sources around _____, pollution is most likely to be caused by animals toileting in or around the water. Just like our own, **animal scats carry germs and can make water unhealthy.**

We were able to tell how polluted the water was by:
- The animals living in it
- How much access large animals had (cows, horses etc- is it fenced?)
- How much human rubbish was in it
Was the water healthy or unhealthy?

Write pollution words on board, as a list on the left-hand side with room to attach water animal enlargements next to the categories on the right)
  Very clean
  Clean
  A bit polluted
  Very polluted
Students select a water animal picture each and stick it to the board with bluetak, in the category that fits its pollution tolerance**.**

Explain the activity:
Today we are going to look at some water bugs under the microscopes. Some of them are very small and hard to see well with your eyes. We will use the key on the table to identify the water animals that are under the microscopes.

Look at the Aquatic Macroinvertebrate ID Key on the smartboard, point out:
- the pictures of the animals
- the names of the animals are coloured on the key
Show students how to use the key:
- Steps 1-6, narrowing down the options as you go through each question about the animal's features (microscopic y/n, shell y/n, legs y/n, 3 pairs y/n, wings y/n, tail/s y/n, and that answering these questions leads you to the group of animals with similar features. Looking at the sizes will help narrow this down further, if the answer is not obvious at this point)

Demonstrate to the students how to key out a **snail and a water scorpion** (use examples in solution, pass around the group-**reminder- do not open Jars**).
Show them on the Aquatic Macroinvertebrate ID Key, and on the worksheet.

Demonstrate using the microscopes (use a small animal)
Show how to **focus t**he microscope-up and down, fine tune with the eye lens.

	Use tweezers to move the animal around or turn them over. Explain the worksheets and how to complete them: • If you're not absolutely sure, don't circle an answer. Some parts are hard to see. You can still have a guess by looking at the pictures. • Use the key to help you, and talk about it with your buddy/ies. • **If you finish** before the other groups, do a drawing of one of your samples on the last page. **Teacher to group students into two or three- 6 groups in total.** Depending on the time available, put out 2 each of 3 different samples, rather than 6 different ones. Rotate the groups around the samples, with a few minutes at each one. Remind to make sure that they are completing the section for the same Sample number. As a class, discuss each sample by number and what students came up with. Talk about its unique features, and also how it might have been hard to choose the right one (if there are conflicting/incorrect answers).
Materials needed	Microscopes x 6 min Torches Dinoscope and computer Macroinvertebrate samples (borrow from an aquatic ecologist) Tweezers Pipettes Sample number labels Laminated copies of 'Aquatic Macroinvertebrate ID Key' (one per microscope) Class set of 'Which water animal am I?' worksheets Macro-invertebrate Key on a USB to put on smartboard
Assignment /followup	*Extension activity:* Students choose one animal to draw and label the parts of its body.

Samples list for activity (example);
Sample 1 – Water flea

Sample 2 – Little basket shell/freshwater mussel

Sample 3 – non-biting midge larvae

Sample 4 – Water boatman

Sample 5 – Backswimmer

Sample 6 – Dragonfly nymph

Which water animal am I?

Circle the correct answer for each question and write the name of the water animal

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Sample 1

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*)   **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Sample 2

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*)   **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Sample 3

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*)   **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Sample 4

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*) **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Sample 5

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*) **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Sample 6

1. **Microscopic** (*I am a…….*)   **Bigger than microscopic** (*go to 2*)

2. **Shell** (*I am a…….*)   **No shell** (*go to 3*)

3. **Legs** (*go to 4*)   **No legs** (*I am a…….*)

4. **More than 3 pairs of legs** (*I am a…*) **3 pairs of legs** (*go to 5*)

5. **No wings** (*go to 6*)   **Wings** (*I am a…….*)

6. **No obvious tail** (*I am a…….*)   **Tail** (*I am a…….*)

What am I? _____

Draw one of the water animals you looked at today.

Label the shell, legs, wings and/or tail.

What is the name of this animal? _____

How sensitive is your animal to pollution?

Very sensitive   Sensitive   Tolerant   Very tolerant