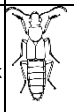
River Detectives at a Distance

Theme for September 2020: Macroinvertebrates

Objective: To appreciate macroinvertebrates for their incredible adaptions, as valuable indicators of waterway health and the building blocks of the aquatic food chain.

The very best way to immerse yourself in the world of waterbugs is to carry out bug sampling. It's awesome fun and we hope that you will be able to experience it at school to make this matrix come to life. SAFETY MESSAGE: Sample collection at waterways can be dangerous and must only be done by an adult or with adult supervision and AT NO TIME MUST ANYONE ENTER THE WATER OR SAMPLE ALONE.

Ways to be Smart	Knowing	Understanding	Applying	Analysing	Creating	Evaluating
Word Smart I learn best by reading, writing & speaking	Research the meanings of the terms 'macro' and 'invertebrate' to define 'macroinvertebrates'. Bugs help us assess water quality as they can be 'sensitive' or 'tolerant'. What do those terms mean ?	Research the meaning of the terms 'nymph' and 'larvae'. Highlight the bugs on the data sheet that belong to these two groups. I wonder what the bugs looks like and where they live when they grow up ? Investigate their life cycle.	 Use the waterbug fact sheets or waterbug flip chart to research a chosen creature. Gather data/images about its name, appearance, habitat, diet, life cycle, movement, sensitivity and adaptions.	Watch the Water Spider V Water Strider video then consider who would win from two other chosen waterbugs. Represent the battle by writing and illustrating a comic strip or film storyboard. Analyse the features that gave bugs their edge.	Present the findings from your waterbug research (left two boxes) in a chosen format; design a poster, make a slide show, film a video, write a non-fiction book or be creative and come up with your own idea.	 Macroinvertebrates may be tiny, but many people argue they are the most important creatures in an aquatic ecosystem. What do you think? Write a persuasive piece of text to justify your opinion.
Number Smart I learn best by working with numbers/science	From your own knowledge or research compile a list/table of aquatic macroinvertebrates, terrestrial macroinvertebrates, aquatic vertebrates and terrestrial vertebrates OR see below	 Waterbugs have some very cool adaptions to help them hunt and avoid being hunted. Check out these videos to learn how water striders walk on water or how beetles breathe under water.	Check out the macroinvertebrate data sheet to learn about the bugs in each sensitivity category and the numerical score attributed to bugs. Practise using it by filling it out with mock survey results.	 Use the formula on the data sheet after sampling (see Body Smart) to calculate the score and assess the health of your waterway. Upload your data to the River Detectives website (class login required)	Dive deeper to investigate the science of water tension. Watch this video and try the experiment then go wild and try seven other amazing surface tension science experiments.	Design a food chain showing the role waterbugs play in the wider web of flora and fauna. Speculate the impact of various scenarios ie. high phosphorus, zero in stream vegetation, stock excluded, drought. What could happen ?
Picture Smart I learn best by drawing and visualising	From your own knowledge or research draw/source pictures of aquatic macroinvertebrates, terrestrial macroinvertebrates, aquatic vertebrates and terrestrial vertebrates OR see above.	We know that macroinvertebrates live in water but did you know there are actually five habitats within freshwater environments ? Read pg 6-7 of this waterbug guide to learn more and then do the activity below.	 Use your handmade net (below) or any net with very fine mesh to scoop a water sample from the banks of a freshwater creek, lake, dam, river or wetland and use this sheet to draw the life you observe.	Use your observations, waterbug fact sheets or the waterbug flip chart to create a scientific waterbug sketch. Label all body parts and any cool adaptions your bug might possess. Pages 8-9 of this booklet explain mouthpart types.	Watch a video about taking great bug phone photos and give it a try. Submit photos in The Waterbug App whilst sampling or post photos of unknown creatures on the Waterbug Face facebook page for help with identification by experts.	Use what you know about waterbug physiology, adaptions, behaviour, habitat and diet to design your own 'invincible macro'. Sketch and label it, make a collage or construct one from disused boxes and containers.
Body Smart I learn best by being active and hands on	 Make your own bug dial to learn about bugs, the way they move, their tolerance, where they live and special features.	Print out the 'All About Waterbugs' cards (picture only). Now print out or draw your own instream habitat poster and use the habitat information with the cards to blue tac the bug pictures in their preferred habitat zone.	Use these instructions to make your own sweep net for waterbug sampling. *Please note kick nets are used whilst standing in shallow water and we do not recommend this method for volunteers. Make the scoop net only.*	 Watch the three-week development of a window sill pond ecosystem; week 1, week 2 and week 3 then make your own and see what you discover. Journal your findings – see two rows below	Watch this video then have a go at waterbug sampling (preferably with your class). Depending on your age you can use a simple i.d chart, a simple key, an advanced key or even the Waterbug App. Record findings on a data sheet.	Conduct class waterbug sampling (see left) at sites along your adopted waterway, at different waterways and at different times of the year and compare and contrast changes in bug diversity and abundance.
People Smart I learn best by working with others	Complete a mind map with friends or family to record everything you collectively know about waterbugs and what you'd like to know about waterbugs. Update the mind map as you complete this matrix to track your learning.	 Prepare another copy of the cards as above. Use the two sets to play Concentration or Snap. Make it more challenging; cut out the fact cards and play Concentration again with a set of pictures and facts and match them.	Use your double set of 'All About Waterbugs' cards to play Fish to practise your identification skills. Use a single set to play Celebrity Head testing the knowledge of all players with insightful questions and factual answers.	Use one set of 'All About Waterbugs' cards and sort them into groups; herbivores/carnivores, legs/no legs, habitat zones, sensitive/tolerant. How else could you classify them ?	Waterbug sampling is such a fun and simple thing to do but many have never had the opportunity. Run a session with your family, grandparents or friends. Reflect on how they react, what they learn and what you teach them.	Use what you've learnt about the amazing adaptions that some waterbugs have developed to survive and thrive. Conduct a debate with others and present evidence to justify why your chosen bug is the coolest bug.
Self Smart I learn best by myself	Watch this video for a fantastic introduction to waterbugs and why they are so important. Add your new knowledge to the mind map above and any questions it has generated for you.	Download the free Waterbug App and start browsing to explore the world of macroinvertebrates. Check out the photo gallery, read about bugs or browse the key/silhouettes that will assist you to identify a bug.	 Keep a journal of sketches and notes to record the life you discover and the changes you observe in your window sill pond ecosystem (above) Try it in other seasons – is there a difference ?	Watch this video that links water quality and waterbugs. From your experience as a River Detective doing water quality monitoring, what changes (other than pollution and micro plastics) might waterbugs be sensitive to ?	 Chill out, put some relaxing music on and have some mindful 'me time' completing one of the beautiful waterbug colouring sheets (scroll down at this link to find a variety to choose from)	Evaluate the data from water quality tests at waterways across the state and use your knowledge of water quality parameters to identify waterways you'd expect to support a high / low diversity and abundance of bugs.

To borrow macroinvertebrate sampling equipment get in touch with your regional River Detectives coordinator. Please adhere to all current COVID-19 advice in remote learning and school-based settings.

Send your efforts to your teacher and it may be shared in the school newsletter or on the Billabong Banter tab of www.riverdetectives.net.au Make sure you have permission from parents first.