

Kids in the Creek Virtual Field Trip

Invertebrate Investigator Station

Purpose: Identify macroinvertebrates and determine whether they are tolerant of pollution or intolerant of pollution, as a way of measuring water quality.

Hypotheses:

After listening to the introduction, answer these questions:

- Is the water quality of the wetland: *good* _____ *okay* _____ *bad* _____?
- Is the water quality of the river: *better than* _____ *the same as* _____ *worse than* _____ the wetland?

Methods: Click on each video link. Watch the video. Use the online tools (see below for links) and/or the identification keys in this worksheet (scroll down to find them) to identify each organism. Use the tolerant/intolerant keys in this worksheet to answer whether the macroinvertebrate is tolerant of pollution. For a bonus, use the chart at the end of the worksheet to decide what feeding group each macroinvertebrate belongs to (shredder, collector, scraper, or predator).

Tip 1: Don't get too fixated on *exactly* which macroinvertebrate species you're looking at! A general name is fine. The first online key (also found in your worksheet by scrolling down) is really helpful for this.

Tip 2: Use the 2 tolerance keys (online, or scroll down in this worksheet) to determine tolerance/intolerance for each organism. The second tolerance key also helps with identifying adult aquatic insects.

Some essential online tools you will be using:

<https://delawarehighlands.org/wp-content/uploads/Stream-Study-Dichotomous-Key.pdf> (single page key with black and white drawings)








<https://3jgs2o4a02n22u73bi2gnd3l-wpengine.netdna-ssl.com/wp-content/uploads/StroudWebsiteMacroKeyFNL.pdf> (PowerPoint-style clickable online key with drawings)













<https://extension.usu.edu/waterquality/macrokey/> (clickable online key with drawings and photos)

<https://www.macroinvertebrates.org/> (clickable online key with photos and drawings)

<https://www.bpa.gov/news/pubs/GeneralPublications/edu-Kids-in-the-creek-bug-card.pdf> (Tolerant/intolerant card)

<https://www.purdue.edu/trails/wp-content/uploads/2019/06/Hoosier-Riverwatch-MacroInvertebrates-Manual-1.pdf#page=12> (Tolerant/intolerant key with some i.d. for adult organisms)

Video	River	Wetland	Name(s)	Tolerant	Intolerant
1 	X		Mayfly, Ephemeropterid, Ephemerella, spiny crawler mayfly		X
2 					
3 					
4 					
5 					
6 					
7 					

8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
Total			Tally up Tolerant vs. Intolerant		

Analysis:

	Wetland/Pond	River
1. CLAIM: Healthy or Polluted?		
2. EVIDENCE that the location is Healthy /Polluted:		
3. How does your evidence (#2) support your claim (#1)? Explain your REASONING:		

Comparison:

How did your original hypotheses compare with your results? How would you answer these questions now?

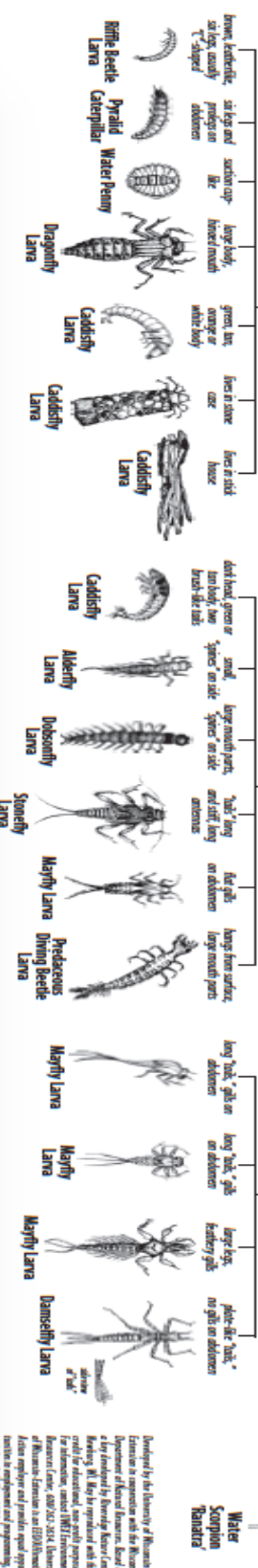
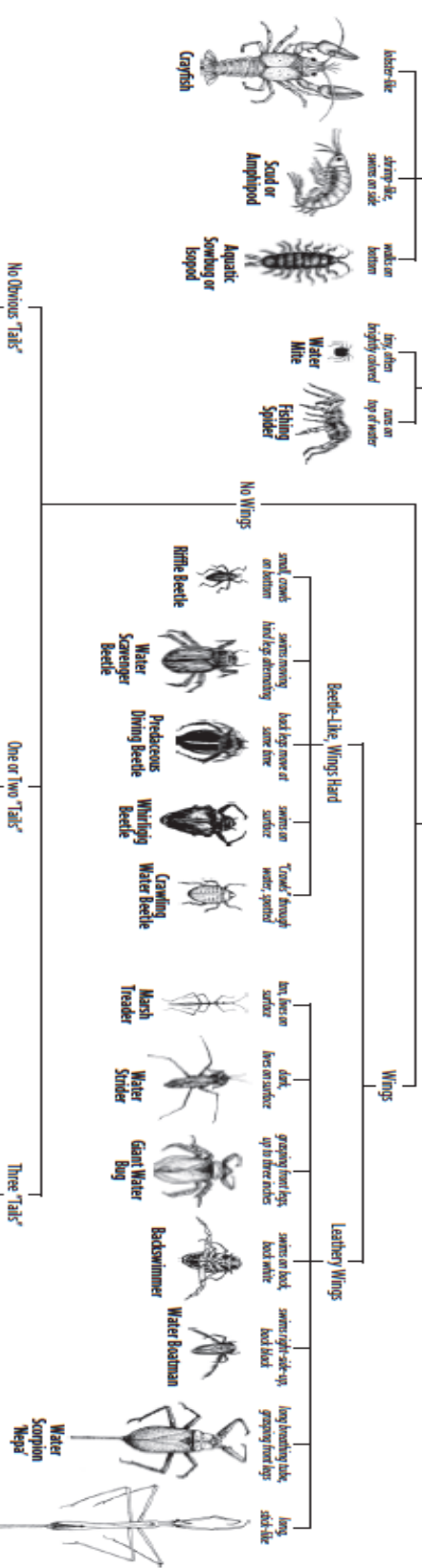
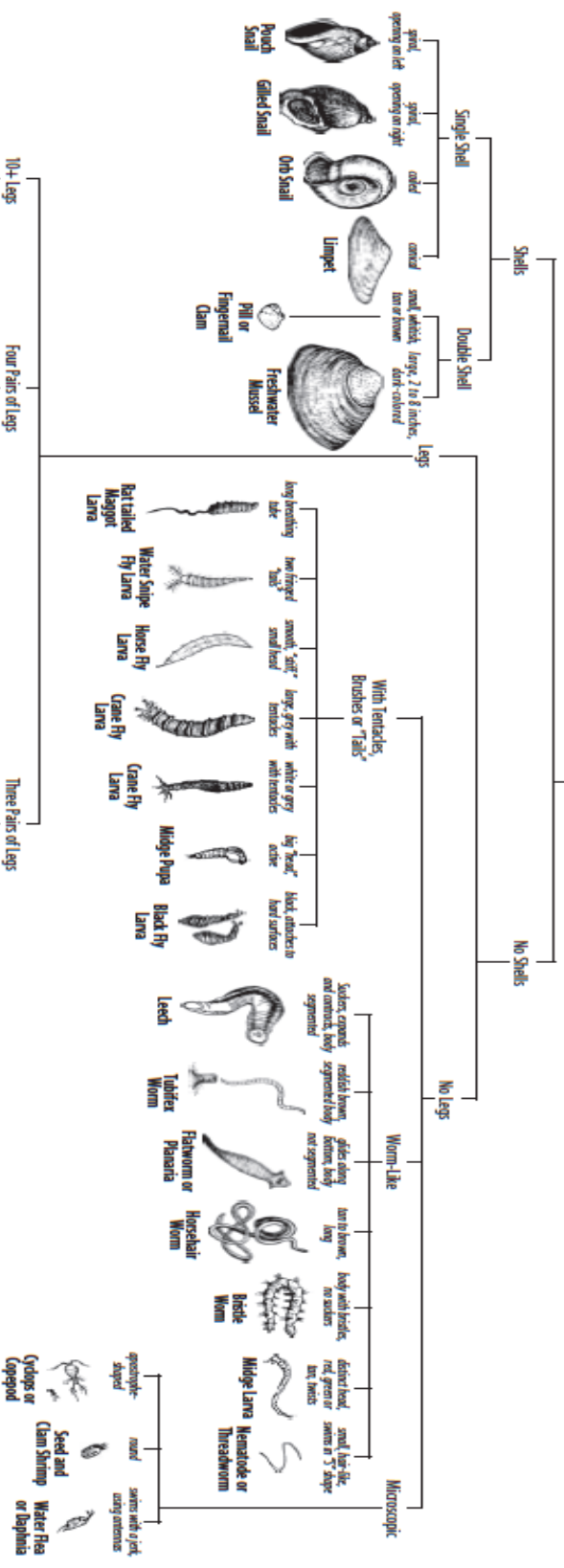
- Is the water quality of the wetland: *good* _____ *okay* _____ *bad* _____?
- Is the water quality of the river: *better than* _____ *the same as* _____ *worse than* _____ the wetland?

Conclusions and considerations:

<p>1. <i>How is sampling macroinvertebrates different from other tests for water quality? What are the pros and cons of this method?</i></p>	
<p>2. <i>How can you personally use what you have learned in this lesson?</i></p>	
<p>3. <i>How is what you learned about macroinvertebrates relevant to salmon?</i></p>	

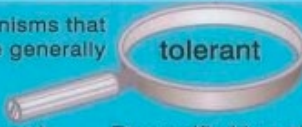
Key to Macroinvertebrate Life in the River

(Sizes of illustrations are not proportional.)



Developed by the University of Minnesota—Twin Cities in cooperation with the Wisconsin Department of Natural Resources. Based on a key first published by Kenneth Murray Lane, Biology 410, Dept. of Biology, University of Minnesota, 1967. Revised and updated by the author, 2008. For information, contact: IRIE Environmental Resources Center, 608/542-3454, University of Minnesota, 100 University Avenue, SE, 55455-1000. IRIE is a nonprofit organization and provides rapid response to environmental and scientific inquiries, including field and lab requirements.

Aquatic organisms that are generally **tolerant** to water pollution.



Graneyfly Nymph



Damselfly Nymph



Crayfish



Midge



Dragonfly Nymph



Sideswimmer



Leech



Snail



Aquatic Worms



Mosquito Larva



Bivalves

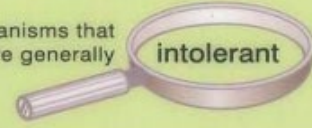


www.bpa.gov

Education/Teacher Resource link/Curricula link

Kids in the Creek

Aquatic organisms that are generally **intolerant** to water pollution.



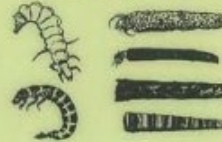
Mayfly Nymphs



Stonefly Nymphs



Caddisfly Larvae



Salmonfly Nymph



Dobsonfly Larva



Riffle Beetle



Penny Beetle Larva



We can tell how healthy a stream has been over time by studying the diversity of organisms that live in it.

DOE/BP-3120

Macroinvertebrate Identification Key

GROUP 1 – Very Intolerant of Pollution

Stonefly Nymph: 2 tails long antennae

Mayfly Nymph: 3 tails fluttering gills

Riffle Beetle Adult & Larva: very small & hard shell

Caddisfly Larva: makes a case from twigs, rocks, leaves

Dobsonfly Larva: large head & 2 pinchers

Water Penny Larva: top, bottom, looks like a suction cup

Right-Handed Snail: must be alive to count

GROUP 2 – Moderately Intolerant of Pollution

Damselfly Nymph: 3 paddle-like (feathery) tails

Dragonfly Nymph: no tails large eyes

Scud: flattened side-ways & swims on side

Crayfish: looks like a mini-lobster

Sowbug: flattened top to bottom (looks like a pill bug)

Crane fly: caterpillar-shaped, ringed

Clam/Mussel: must be alive to count

GROUP 3 – Fairly Tolerant of Pollution

Midge Larva: small, but visible head intense wiggler

Planaria: 2 eye spots & very small

Black Fly Larva: one end is swollen

Leech: flattened & segmented

GROUP 4 – Very Tolerant of Pollution

Aquatic Worms: segmented "earthwormy"

Left-Handed Snail: must be alive to count

Rat-tailed Maggot

Blood Midge Larva: bright red