What lives in a stream and why? Using biological monitoring to find problems in a watershed.

MINNESOTA POLLUTION CONTROL AGENCY

This station is brought to you by the Minnesota Pollution Control Agency—or the MPCA, for short. This state government agency has a mission to protect and improve the environment and human health.

All around the state, the MPCA checks on the water to make sure it's healthy. It's like going to a doctor for a check-up, but for the water!

Water temperature and chemistry are one way to check on the water's health. Finding and tallying what lives in a stream is another way. This is called biological monitoring.

Biological monitoring is like being a detective. If the living things don't match what we'd expect to find in a stream, river, or lake there could be a problem. It's a clue that we need to collect more data and information about a watershed to determine where pollution is coming from and what to do about it.

With your class, watch this 3-minute video that shows biologists doing this work--collecting insects from streams in Minnesota. After the video you are going to investigate two streams using the worksheets below, just like these biologists would do at their job.

With your teacher, you'll discuss your results and do some wondering about why you found what you found.

- BIOMONITORING VIDEO: https://www.youtube.com/watch?v=28j4D5o2RqQ

What lives in a stream? Student activity sheets

Introduction

Imagine you collected samples of aquatic insects from two different streams, just like the people in the video.

In each stream, you swept through the water with a net and you overturned rocks to see what was there. You found the organisms pictured on the next two pages. They were sent to a lab to be identified. Now, you get to tally them.

Some of these organisms die if there is pollution in the water—they are *sensitive*! Others are *somewhat tolerant* of pollution. A few are *tolerant*—they can survive just about anywhere. Use this information to fill out your bar graphs.

Sensitive	***Somewhat tolerant***	***Tolerant***
Golden stonefly Mayfly Northern case maker caddisfly Wood frog	Scuds Crayfish Dragonfly (larvae)	Leeches Midge (larvae)

First: Make a bar graph of the number of intolerant, somewhat tolerant, and tolerant organisms in Stream A. Then do the same for Stream B.

Second: After making your bar graphs, write one or more sentences using each prompt.

I notice….

I wonder….

I think maybe….

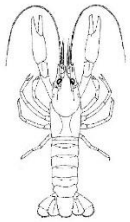
Stream A: Very few roads nearby

Most of this watershed is forested.

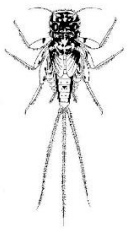
You found:

Northern case maker caddisfly (larvae)

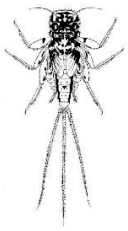
Northern case maker caddisfly (larvae)



Crayfish (adult)



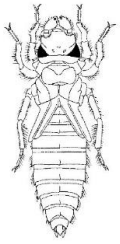
Mayfly (larvae)



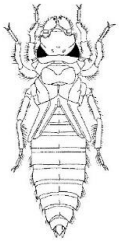
Mayfly (larvae)

Golden stonefly (larvae)

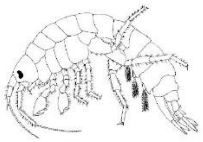
Golden stonefly (larvae)



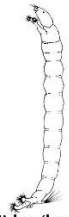
Dragonfly (larvae)



Dragonfly (larvae)



Scuds(adult)



Midge (larvae)

Make a bar graph of the number of intolerant, somewhat tolerant, and tolerant organisms in Stream A.

8			
7			
6			
5			
4			
3			
2			
1			
	Sensitive species	Somewhat tolerant species	Tolerant species

Stream B: Lots of roads nearby

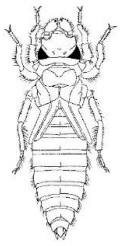
More than 18% of the watershed is covered in paved roads.

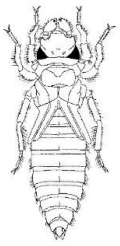
You found:

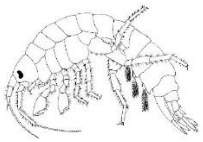

Northern case maker caddisfly (larvae)

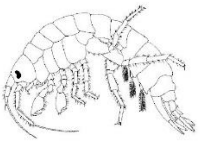

Leeches (adult)

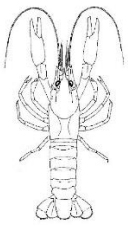

Leeches (adult)


Dragonfly (larvae)


Dragonfly (larvae)


Scuds(adult)


Scuds(adult)


Crayfish (adult)


Midge (larvae)


Midge (larvae)


Golden stonefly (larvae)

Make a bar graph of the number of intolerant, somewhat tolerant, and tolerant organisms in Stream B.

8			
7			
6			
5			
4			
3			
2			
1			
	Sensitive species	Somewhat tolerant species	Tolerant species

Discussion of results – teacher outline

By looking at what lives in a stream, we can get clues about the water quality. Let's hear from a few students about their observations. Call on students to share I notice, I wonder, and I think maybe statements. *Some observations may include: more sensitive species in Stream A, a frog lives in Stream A but not B, there more tolerant species in Stream B. Some may wonder what is causes the differences, or what the streams look like.*

Some of you wondered or thought maybe the roads were part of the problem. What could you do next to investigate that? *Discuss real-life ways students or professionals could do that work.*

This is something that scientists have done some investigating about, too. They've found that road salt, used for de-icing in the winter, has a big impact on streams and lakes in Minnesota. Studies around the country have found that as salt levels increase, streams begin to lose their most sensitive species. Caddisfly, stoneflies, and mayflies are among the first things to disappear. Amphibians and fish follow shortly after.[1]

You might not think of salt as a pollutant because we eat it. But when salt dissolves in water it never comes out. Salts dissolve in water. They do not settle out and they are difficult to remove.

As water gets more salty, it is not a good place for Minnesota insects, fish and plants to live. It takes only 1 teaspoon of salt to permanently pollute 5 gallons of water. At higher levels, humans can also start to taste the salt, and most people don't want to drink water that has a salty taste.

We are going to watch a 2-minute news story. Listen for clues about some of the answers to your questions, also some solutions for this problem:

https://www.youtube.com/watch?time_continue=111&v=SoyyqG8JL3s&feature=emb_logo

Prevention is really important for salt/chloride pollution. What do we do about this problem? What are your ideas?

Possible ideas:

- Shovel right away after snow, and use an ice scrapper so you don't need to use salt at home (or as much)
- Use only what you need to break apart ice
- Have winter maintenance professionals learn best ways to use salt – there is an MPCA Smart Salting training certificate. Ask your city employees to take this and only hire companies that have this training.
- Adjust expectations in the winter – travel slowly, wear good footwear, etc.

You and the grownups around you can make a big difference for keeping salt out of water! By doing these things, we are protecting the diversity of life in Minnesota.

[1] https://www.pca.state.mn.us/sites/default/files/wq-ws1-27.pdf