



THE COMMUNITY SCIENCE INSTITUTE

BIOMONITORING

Water Quality Report Card

for your favorite stream

Draw a quick sketch of the stream you will evaluate

Write its name here

BY _____

Write your name here

TODAY'S DATE _____

RESULTS no impact possible impact

Check one of these boxes after completing the activities in this book



Partnering with communities to protect water

The following pages will show you the contents of the Community Science Institute's Water Quality Report Card— A Do-It-Yourself tool for exploring water quality by looking at the organisms living in a fast-flowing stream. Directions for printing and making a fun little quarter-page-sized booklet to bring into the field with you can be found on the CSI website. A limited number of already printed booklets are also available from some of our partners, also listed on the website.

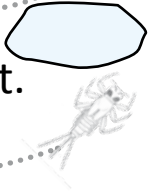
→ Did you know that you can learn a lot about water quality in a stream by observing what lives in it?



Anything that you see moving around underwater amidst the rocks in a creek (that isn't a fish or a salamander) is probably a

**BENTHIC
MACROINVERTEBRATE**

We call them **BMI** for short.



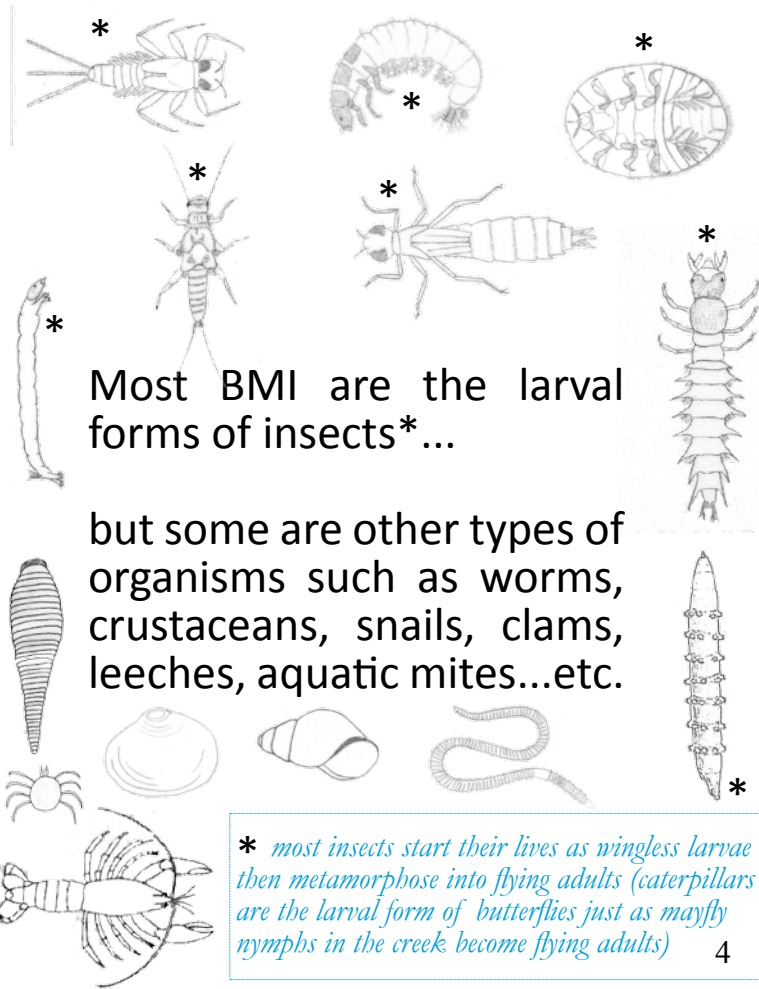
Benthic = Bottom-dwelling

Macro = Big enough to be seen without a microscope

Invertebrate = Animal without a backbone



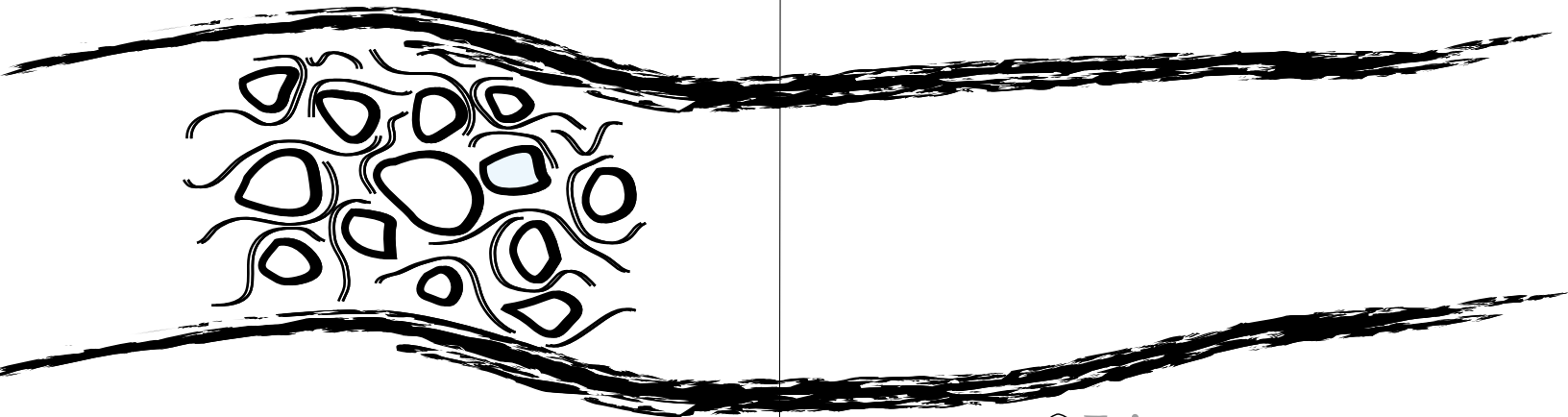
Try turning over some rocks
in your favorite stream to
find some BMI for yourself.



Most BMI are the larval
forms of insects*...

but some are other types of
organisms such as worms,
crustaceans, snails, clams,
leeches, aquatic mites...etc.

** most insects start their lives as wingless larvae then metamorphose into flying adults (caterpillars are the larval form of butterflies just as mayfly nymphs in the creek become flying adults)*

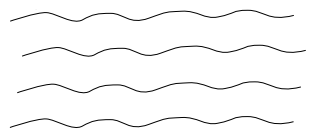


HELPFUL HINT:
The easiest place
to find BMI is in
RIFFLES.

What is a RIFFLE?

Listen

You can often hear them!



Riffles are places in a stream where you can see (and hear) water flowing and bubbling over rocks.

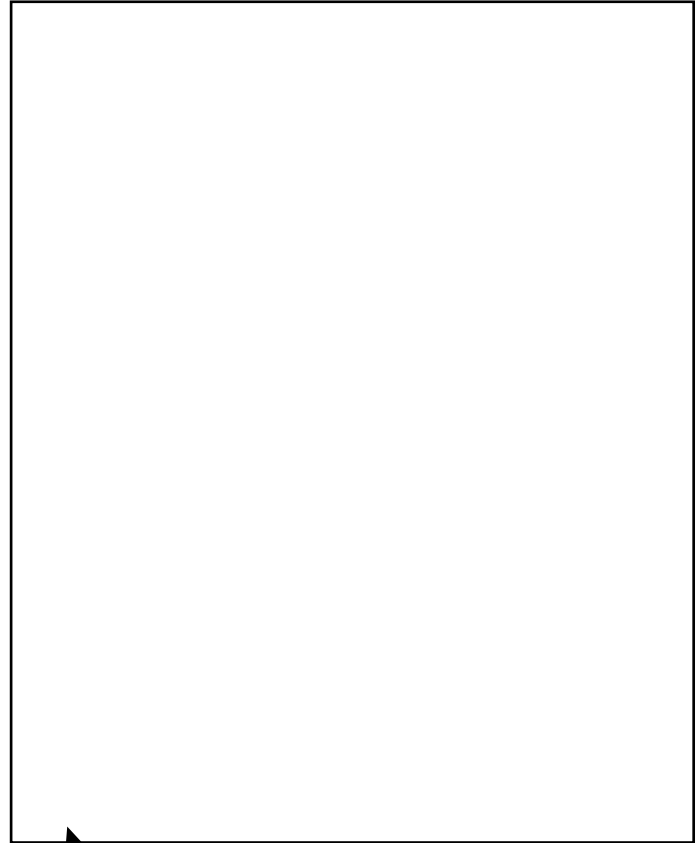


Find a riffle and pick up
one of its rocks slowly.



Did you see anything scurry or
swim away?

Now look closely at the bottom
of the rock while holding it out of
the water. Anything moving?



Draw a picture of one organism you find here

What can BMI tell us about water quality in a stream?

In New York State, the Department of Environmental Conservation (NYSDEC) has determined that non-impacted streams typically have 5 BMI characteristics in common*.

Non-impacted Stream
is basically another way to say
“Healthy” Stream

Here are the characteristics of healthy streams in New York...

1. Mayflies must be present and numerous; at least 3 species must be present
2. Stoneflies must be present
3. Caddisflies must be present, but not more abundant than mayflies
4. Beetles must be present
5. Aquatic worms must be absent or sparse.

HELPFUL HINT: You might want to bring some equipment to the creek with you for this next part (such as a small paintbrush, white plastic container and magnifying glass). You can brush organisms gently off of the bottoms of rocks into a white container with some water in it and take a closer look at them with a magnifying glass. When the organisms are still on the rocks, they're often camouflaged and hard to see.

1. Mayflies must be present and numerous; at least 3 species must be present.



What do mayflies look like?

3 "tails"

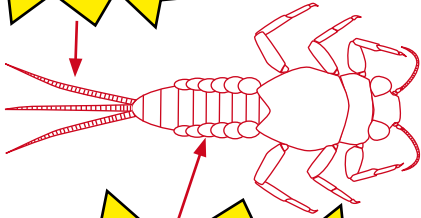


plate-like gills on abdomen



* some species only have 2 "tails" - if you only see 2 tails be sure to check for abdominal gills

Are mayflies easy to find?

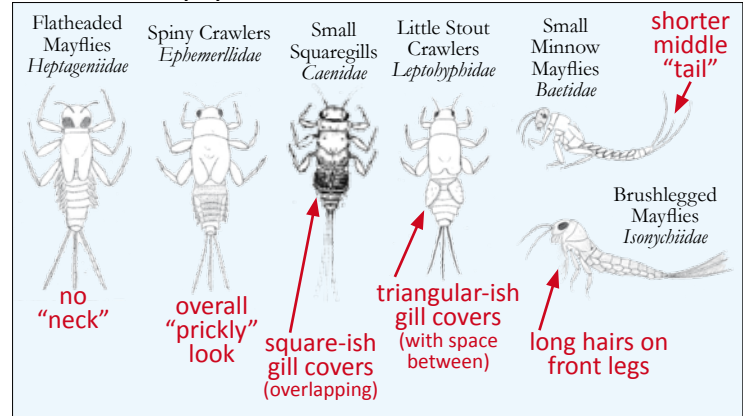
YES

NO

Does it seem like there are at least three different kinds?

Some mayflies have flattened bodies and cling to rocks while others have streamlined, swimming forms. Here's a sampling of some of the different kinds of mayflies.

Common Mayfly Families



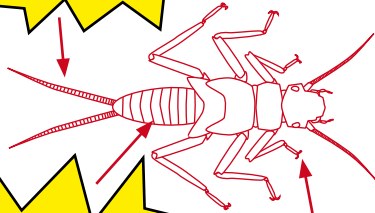
These pictures show mayfly *families* — each mayfly *family* is made up of different mayfly *species*. If you can find 3 different mayfly families, you can confidently answer YES to this question.

2. Stoneflies must be present.



What do stoneflies look like?

2 "tails"



NO plate-like gills on abdomen

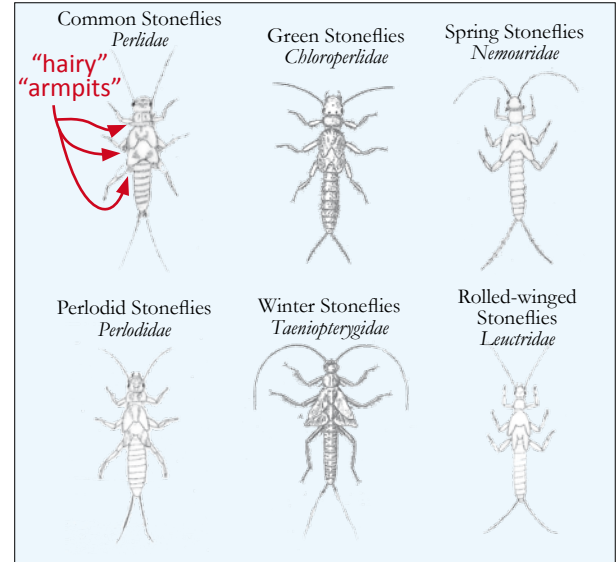
2 claws on the end of each leg

Do you see any stoneflies?

YES

NO

Some Common Stonefly Families



Different kinds of stoneflies are usually harder to tell apart (even just to family) than mayflies, but there usually aren't as many of them either. Just finding one is enough to answer YES to this question. Counting "tails" is usually the easiest way to tell the difference between stoneflies and mayflies. The most common stonefly family (common stoneflies) have finely-branched gills where each of their legs attach making them easy to recognize (it looks like they have hairy armpits).

3. Caddisflies must be present, but not more abundant than mayflies.

What do caddisflies look like?

extremely short antennae
(invisible to the naked eye)

soft body with sclerotized head and plate on prothorax
(sometimes on meso- and meta-thorax too)

abdomen ends in a pair of prolegs with hooks

* some construct cases of mineral or plant materials

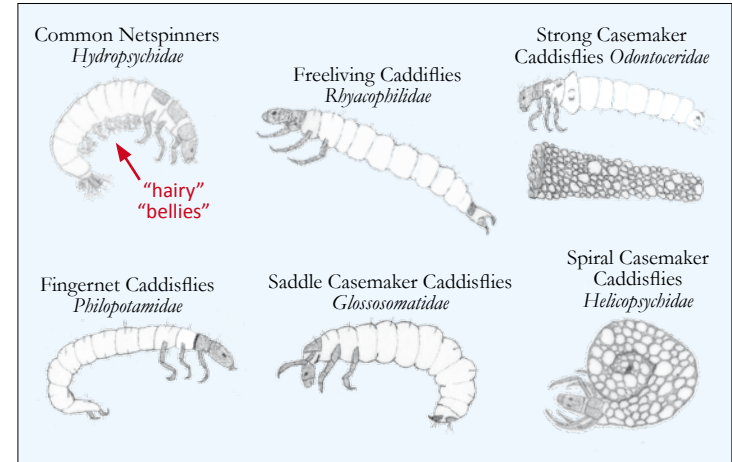
Do you see any caddisflies?

YES

NO

Are there fewer caddisflies than mayflies?

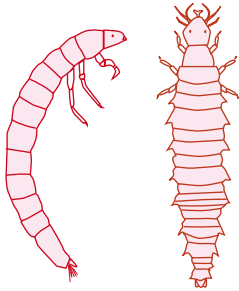
Some Common Caddisfly Families



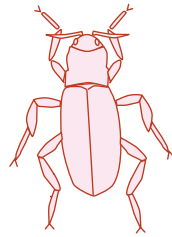
Different kinds of caddisflies can be even harder to tell apart than stoneflies, but the most common family (Common Netspinners) are quite easy to identify to family due to the branched gills on the ventral part of their abdomens (“hairy bellies”).

4. Beetles must be present

➔ What do beetles look like?



larvae have jointed legs and often have dark, stiff bodies



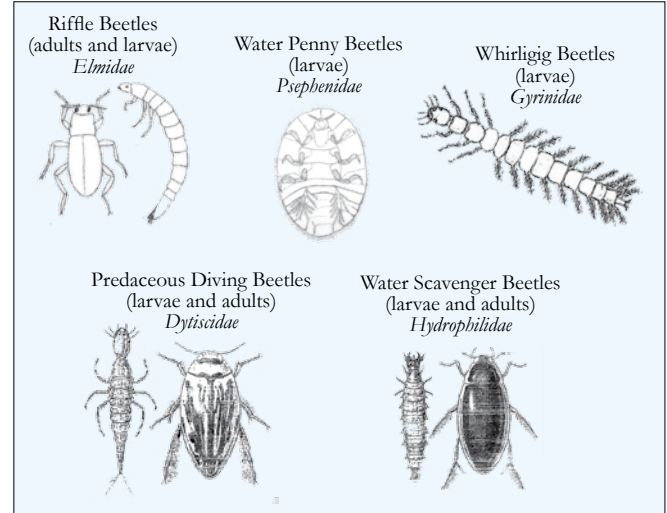
adults usually have hard, black bodies and are distinctly oval in shape

Do you see any beetles (larvae or aquatic adults)?

YES

NO

Some Common Beetle Families

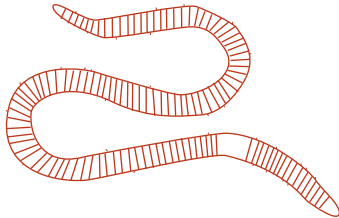


Unlike mayflies, stoneflies and caddisflies whose adults are winged insects, you may find some adult beetles living in creeks alongside their young larvae.

5. Aquatic worms must be absent or sparse.



What do aquatic worms look like?



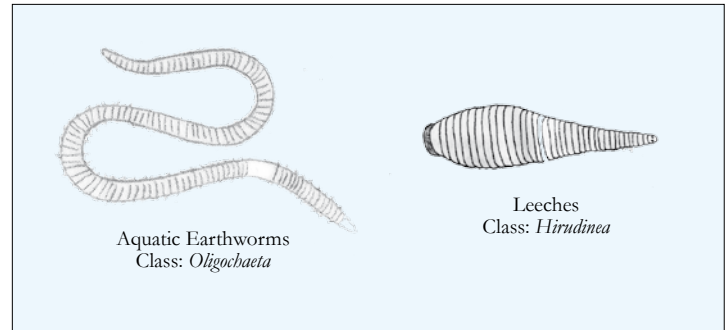
they all have segmented bodies

Are aquatic worms absent or sparse?

YES

NO

Some Common Aquatic Worms

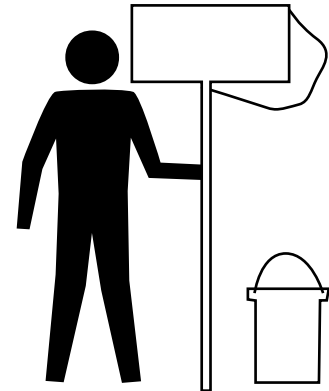


Look back at the 7 questions you answered....

If you answered **yes** to all of them, that's fantastic! It means that your stream probably has pretty good water quality and is supporting a diversity of life.



If you answered **no** to any of them, it means that your stream *might* be impacted, but needs further study to know for sure.



LET US KNOW WHAT YOU FOUND!

SEND US YOUR RESULTS. You can scan or photograph the front page of this book and e-mail or snail mail it to us. If you're up for sharing any photographs of your experience, that would be great too. Send us a photo of you at the creek you evaluated and we'll post it in the young scientist section of our website.

Send your results to:

adrianna@communityscience.org

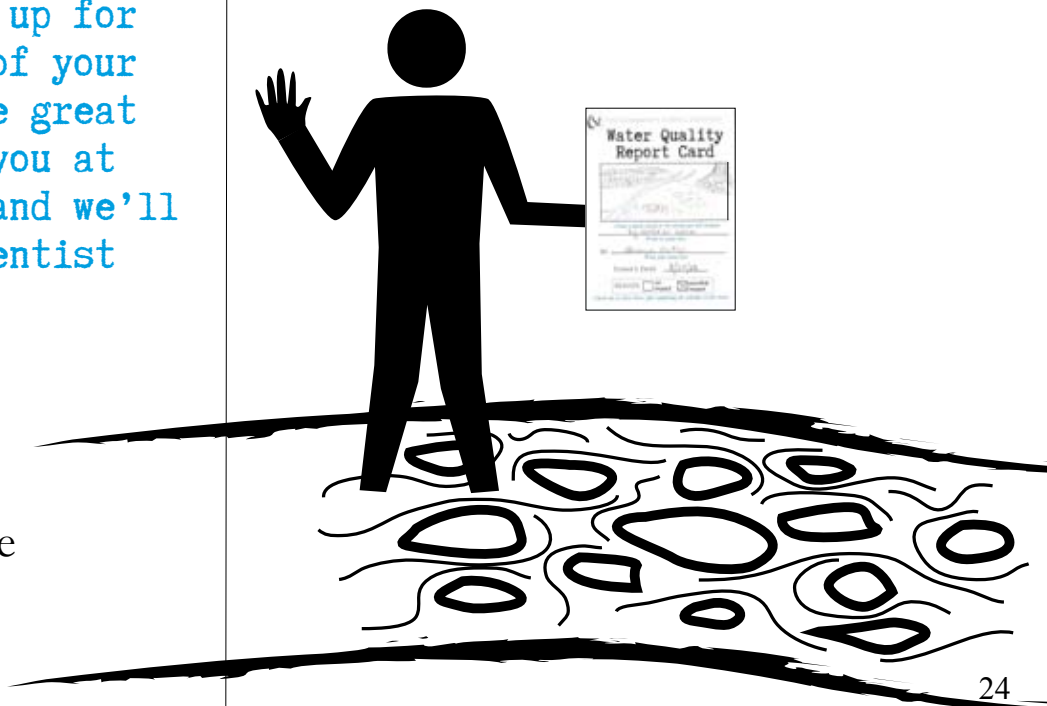
or

Community Science Institute

Young Scientists

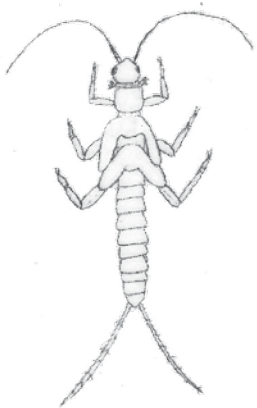
95 Brown Rd, Ste 283

Ithaca, NY 14850



Just for Fun

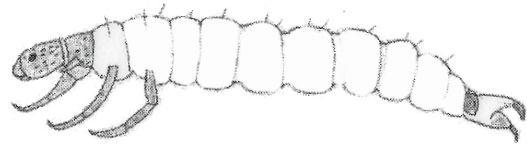
Color the following benthic macroinvertebrates and identify them as either Mayflies, Stoneflies or Caddisflies.



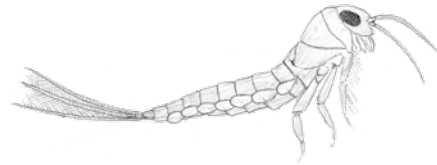
1. _____



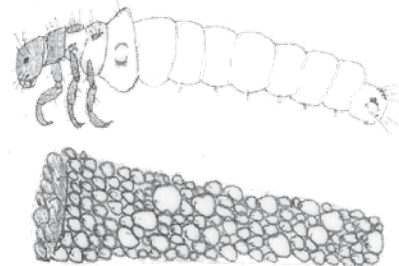
2. _____



3. _____



4. _____



5. _____



Thanks for caring about streams and water quality and for taking the time to find out more about the health of this particular stream!

If you'd like to learn about volunteer biomonitoring opportunities with the Community Science Institute, including how to further investigate water quality in your stream using BMI...

Check out our website at www.communityscience.org or e-mail adrianna@communityscience.org

