

BUGS AND WATER QUALITY

In this activity, we'll investigate how the bugs that live in our water can be used to tell us about water quality.

First, we'll look at why and how we can use bugs for evaluating water quality. Next we'll learn which species are tolerant and intolerant of pollution, and then we'll practice with a few examples!



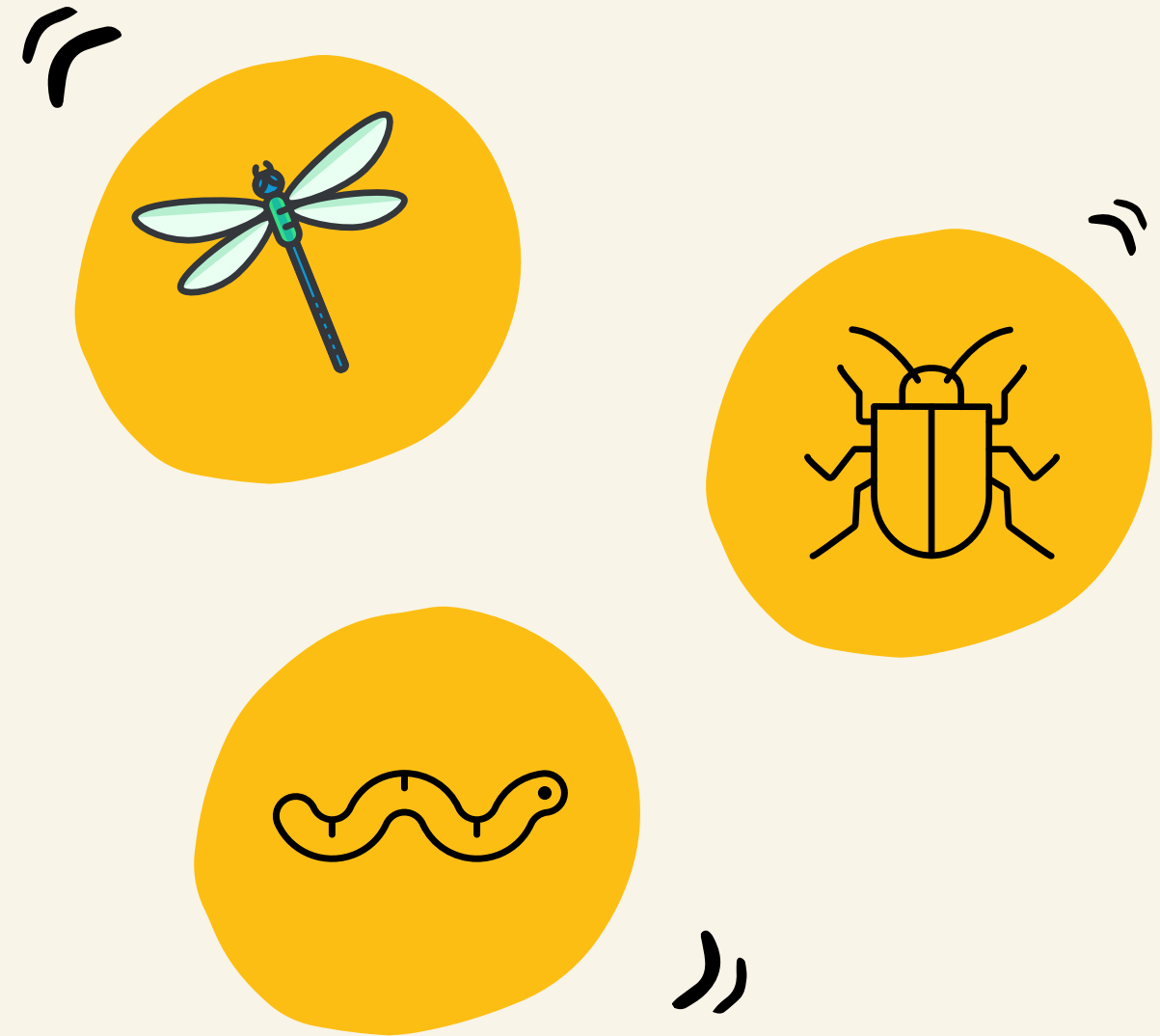
Why do we use bugs to look at water quality?

- They can be caught easily.
- It is not expensive to collect them (they are returned to their habitat afterwards!)
- They spend most or all of their lifecycle in the water.
- They are easy to identify.
 - If you want to learn how to identify them, check out the bug identification activity!
- We know which species can live in polluted water, and which species cannot.



How do we use bugs to look at water quality?

- Bugs are collected from the water using a special tool called a dip net. Samples can be taken from multiple locations around the water so we can get a good idea of which bugs are living in it
- Bugs are identified using a dichotomous key
- Types and numbers of bugs are recorded
- Different types of bugs are considered pollution tolerant, moderately tolerant, or pollution intolerant.



DIFFERENT SPECIES, DIFFERENT TOLERANCE

Different species are able to live in habitats with different levels of pollution



Pollution Intolerant

Bugs that are pollution intolerant, like this mayfly larvae, need a habitat with good, clean, healthy water in order to survive. They cannot live in places with pollution.



Moderately Tolerant

A moderately tolerant bug can live in places with moderate (or medium) levels of pollution.



Figure 5

Pollution Tolerant

A pollution tolerant bug, like this water boatman, can live in water that is polluted.

POLLUTION INTOLERANT BUGS

Bugs that are pollution intolerant need a habitat with good, clean, healthy water in order to survive. They cannot live in places with pollution.



Mayfly larvae



Figure 2

Stonefly larvae



Figure 1

Caddisfly larvae

MODERATELY TOLERANT BUGS

A moderately tolerant bug can live in places with moderate (or medium) levels of pollution.



Dragonfly larvae



Cranefly larvae



Damselfly larvae



Aquatic Sowbug

POLLUTION TOLERANT BUGS

A pollution tolerant bug can live in water with higher levels of pollution.



Figure 5

Water boatman



Figure 3

Pouch snail



Figure 4

Leech

HEALTHY OR NOT?

Beyond looking at which species are present, we also look at how many (abundance) and the variety (biodiversity) of bugs in a body of water.

For example, a sample with a large number and good variety of pollution intolerant and moderately tolerant species would indicate healthy water. On the other hand, a sample with only a very few pollution tolerant species would tell us that the water is not very healthy.



LET'S PRACTICE!

You have taken a sample from your local stream and you find these bugs, what does this sample tell you about the water quality at this location?



Mayfly larvae



Pouch snail

Figure 3



Stonefly larvae

Figure 2



Dragonfly larvae



Damselfly larvae



Aquatic Sowbug



Caddisfly larvae

Figure 1

Do you think the water is very healthy, somewhat healthy, or not very healthy?

Answers are on the next slide!

ANSWER

Based on our sample, we can tell that the water is very healthy!

We have 3 bugs that are pollution intolerant, 3 that are moderately tolerant, and 1 that is pollution tolerant. This sample has a wide variety of different bugs, which is a good sign. Since we have the bugs that cannot tolerate pollution, we know the water is very healthy. If the water had medium or high levels of pollution, those 3 species would not be able to live there. It may be a little tricky that our sample included species that are moderately tolerant and tolerant of pollution, because although they can live in water with different levels of pollution, they can live in clean, healthy water, too!

Let's try another example!

LET'S PRACTICE!

You have taken a sample from your local stream and you find these bugs, what does this sample tell you about the water quality at this location?



Figure 3

Pouch snail



Figure 5

Water boatman



Figure 3

Pouch snail



Figure 3

Pouch snail



Figure 3

Pouch snail



Figure 3

Pouch snail



Figure 3

Pouch snail

Do you think the water is very healthy, somewhat healthy, or not very healthy?

Answers are on the next slide!

ANSWER

Based on our sample, we can tell that the water is not very healthy.

The only bugs in our sample from this location are those that can handle living in polluted water. Since we do not see any of the bugs that are moderately tolerant or intolerant of pollution, we can tell that this water isn't very healthy. We also don't see very many different species, we have a lot of snails and one water boatman.

Fun fact about water boatmen - they do not have gills, so they breathe air just like we do! Because they don't need to have oxygen in the water, water boatmen can live in water with very low levels of oxygen.

Let's try another example!

LET'S PRACTICE!

You have taken a sample from your local stream and you find these bugs, what does this sample tell you about the water quality at this location?



Figure 5

Water boatman



Figure 3

Pouch snail



Figure 4

Leech



Dragonfly larvae



Damselfly larvae



Aquatic Sowbug



Cranefly larvae

Do you think the water is very healthy, somewhat healthy, or not very healthy?

Answers are on the next slide!

ANSWER

Since we only have bugs that can live in medium and high levels of pollution, we can tell that this water is only somewhat healthy. We have a pretty good collection of the moderately tolerant and tolerant bugs, but we do not see any of the pollution intolerant bugs.

REFERENCES

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- Figure 3 MDC Staff. (2016). *Lunged Aquatic Snail (Pulmonate Pond Snail)* [Digital image]. Missouri Department of Conservation. Retrieved from <https://nature.mdc.mo.gov/discover-nature/field-guide/lunged-aquatic-snails-pulmonate-pond-snails>
- Figure 4 Rathbert, J. (2012). *Leech* [Digital image]. Missouri Department of Conservation. Retrieved from <https://nature.mdc.mo.gov/discover-nature/field-guide/leeches>
- Figure 5 Rathbert, J. (2012). *Water Boatman (Viewed From Above)* [Digital image]. Missouri Department of Conservation. Retrieved from <https://nature.mdc.mo.gov/discover-nature/field-guide/water-boatmen>