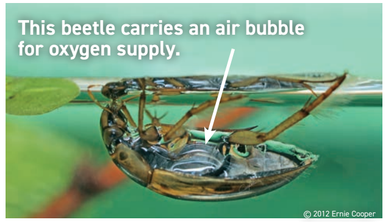
How can these animals live underwater?

Macroinvertebrates, like all animals, require oxygen to live. Most types that live fully underwater use gills to obtain oxygen dissolved in the water. The gills are continuously moved back and forth to "capture" oxygen. Other individuals utilize breathing tubes that extend from their body up to the water surface. Still others get their oxygen by attaching an air bubble to the body for an oxygen supply while they are swimming, similar to a diver with a scuba tank.

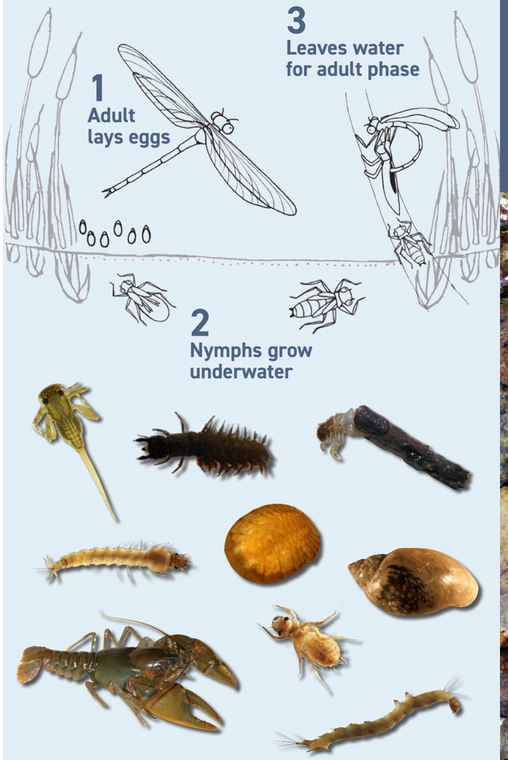


What do macroinvertebrates do in the stream?

Macroinvertebrates spend their time looking for food and staying safe from predators. They have many different adaptations to accomplish these tasks and occupy locations in the stream where they function best. Some hang tightly to rocks while others swim freely or crawl around. Some build cases to protect themselves, and others make nets to catch food. Macroinvertebrates are a very diverse group of animals.

What exactly is a macroinvertebrate?

Aquatic benthic macroinvertebrates include crayfish, mussels, snails, worms, leeches, and numerous insects. Aquatic refers to the stream environment where these animals live; benthic refers to the bottom of the stream; macro means these animals are visible with the naked eye; and invertebrate means these are animals without a backbone. Aquatic macroinvertebrates develop underwater. Some, like mussels and leeches, never leave the water habitat. In contrast, insect macroinvertebrates use the water as a nursery, developing underwater for weeks or even years before they emerge from the water as an adult. The adult phase is relatively short, lasting from only a few hours to a month or so. For example, a dragonfly nymph spends months developing underwater before crawling out of the water to spend a few weeks as a winged adult that will lay the eggs for a new generation.



Introduction

The waters of West Fork White River are home to a wide assortment of animals. Some of them are fairly easy to see, like raccoons, turtles, and fish. But by far the most abundant animals in the creek are living on the stream bottom, where they are not easily seen. These animals are called aquatic benthic macroinvertebrates, and they are at home among the rocks and logs on the bottom of streams.

Macroinvertebrates are interesting for several reasons. Their specific behaviors include being laid-back net builders, free-floating opportunists, and aggressive hunters. These animals are busy feeding themselves from a range of food in the stream and, in turn, they are an important food source for fish. Many types of fishing flies and baits look like macros. Macroinvertebrates are also good indicators of the overall health of a stream. The number and variety of macros present tells us about the quality of both the water and the nearby surroundings.

The West Fork of the White River begins in Lynn, IN, near Winchester. This warm water stream meanders throughout Randolph County before entering Delaware County, passing through Muncie for approximately nine miles. A majority of this stretch is sampled annually by the Bureau of Water Quality to assess the health of White River's fish, macroinvertebrate, and mussel communities. Let's take a look at some of the clean water species they encounter during their biological monitoring.

Resources

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Check out our other brochures to learn more about the many creatures that call White River home.

Muncie
SANITARY DISTRICT
BUREAU OF WATER QUALITY
STORMWATER MANAGEMENT

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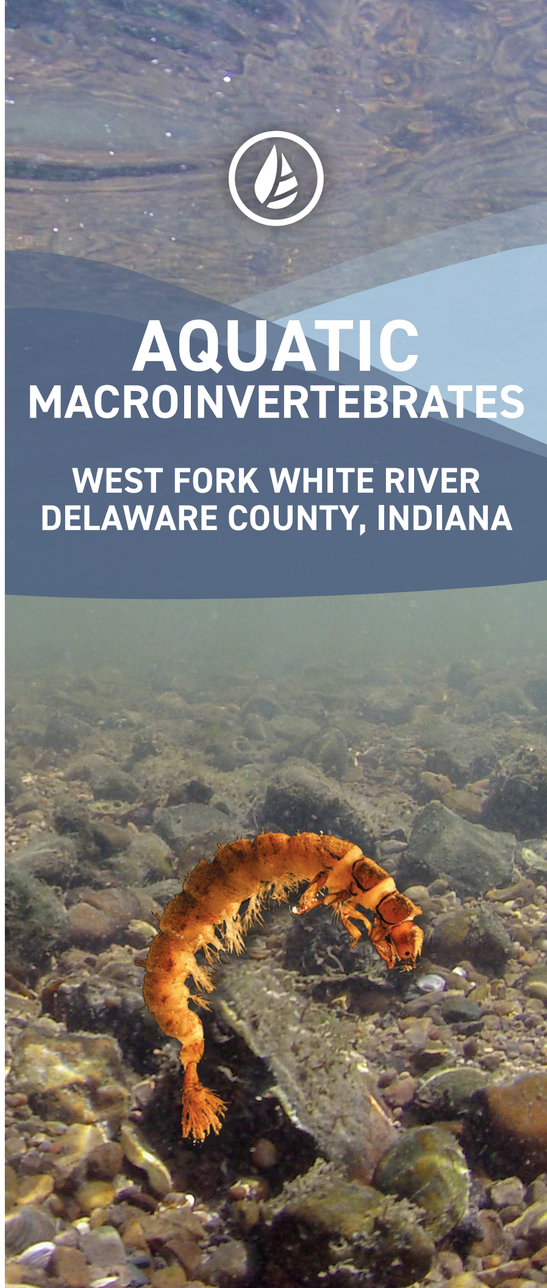
AQUATIC MACROINVERTEBRATES

WEST FORK WHITE RIVER DELAWARE COUNTY, INDIANA



Macroinvertebrates of West Fork White River, Delaware County, Indiana

*Macros below are not to scale (adult length in millimeters)

INTOLERANT

Mayfly Nymph
Grows up to 4–15 mm

Dobsonfly Larva
Grows up to 25–90 mm

Caddisfly Larva
Grows up to 10–30 mm

Water Penny
Grows up to 3–10 mm

FAIRLY TOLERANT

Black Fly Larva
Grows up to 3–15 mm

Leech
Grows up to 4–450 mm

Midge Larva
Grows up to 2–15 mm

Intolerant macroinvertebrates need cleaner water

Macroinvertebrates are good indicators of overall stream health for several reasons. They live in the water for all or most of their lifespan. They are small animals and do not move very far, which makes them easy to collect and examine. The most important reason is that macroinvertebrates have varying sensitivity to water pollution. Some macroinvertebrates do not tolerate pollution and will only live in clean water. Others can tolerate some pollution. Still others are not sensitive and will tolerate pollution as a normal condition.

These photographs are macroinvertebrates that can be found in West Fork White River in Delaware County, Indiana, grouped according to their pollution tolerance. Cleaner water increases macroinvertebrate diversity (the number and types of animals present), while polluted water decreases macroinvertebrate diversity.

Very Tolerant macroinvertebrates can live in polluted water

One method for evaluating the health of the stream is to collect macroinvertebrates and sort them into groups based on their pollution tolerance. If most of the collected macroinvertebrates are in the group that does not tolerate pollution, the water is clean. If the collection shows mostly macroinvertebrates that tolerate pollution, the water may be polluted. Macroinvertebrates sampling for water quality evaluation is used by a wide range of investigators from research scientists to school groups.

MODERATELY INTOLERANT

Crayfish
Grows up to 10–150 mm

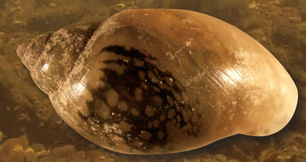
Dragonfly Nymph
Grows up to 20–68 mm

Damselfly Nymph
Grows up to 13–25 mm

VERY TOLERANT

Blood Midge Larva
Grows up to 2–30 mm

Left-Handed Snail
Grows up to 5–20 mm



Mosquito Larva
Grows up to 4–18 mm