

## We All Need to Breathe

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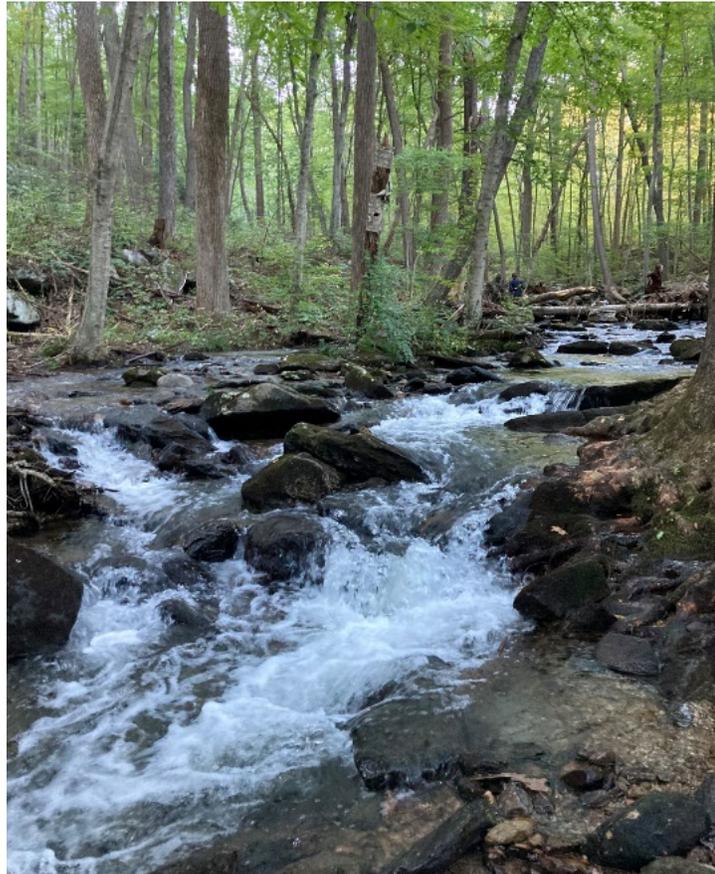
Before I step back into the stream, I take a deep breath and brace myself. The air is cool today, and the water is cold and fast; if I slip and fall, I'll regret it. I don't want to go for a swim today, and I can't breathe underwater. I step off of a rock and wince at the temperature.

The cold is difficult to deal with – my fingers and toes are starting to go numb, which is making it difficult to keep my balance in the swift water. But, as uncomfortable as collecting in these conditions is, both of these factors are important – the turbulence of the swift water helps more oxygen mix in as it rushes downstream and tumbles over rocks, and the cold water holds more oxygen than it would if it was warmer.

Dissolved oxygen is incredibly important for the organisms that live in the stream. Of the organisms we've been mainly catching today, most have clearly adapted and evolved to get the most out of the oxygen in their environment – the container in my hand already contains at least one kind of mayfly (order Ephemeroptera) and several different stonefly (order Plecoptera) nymphs, as well as a bunch of caddisfly larvae (order Trichoptera). Ephemeropterans and trichopterans are identifiable by the gills along their abdomens; plecopteran gills can sometimes be found on the thorax. With multiple or many tiny projecting gills, often shaped like fingers or hairs, these insects increase the surface area on their bodies that can absorb oxygen from the water. And thanks to the cold, turbulent water, there's plenty of it to go around.

Before we leave, I snap a quick photograph to add to the day's collection. In it, the water is white in places from air bubbles as it cascades over rocks in the stream, allowing even more oxygen to dissolve into the water.

I take a last breath of the clear mountain air before getting into the van to leave Fishing Creek. Underwater, the stream's aquatic invertebrates do the same.



Fishing Creek, north of Frederick, MD, on 29-Sep-2021