

Water Quality and Research Challenges in Duluth Streams

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INTRO: This is Superior Science News. Today's program explores efforts to determine the effects of urbanization on Duluth streams.

When people think of scientists doing research, images of white lab coats, computers, and beakers often spring to mind. But on this warm August day, two graduate students from the University of Minnesota in Duluth take to the outdoors to study the water quality of the city's streams. Jeremy Erickson and LaRae Lehto haul equipment down to Tischer Creek to take samples along the stream. They are looking at stream health.

"If we can see how healthy the streams are, we can know what's going into Lake Superior. So, what I'm interested in is how much ammonia, phosphate, and nitrate are in the streams. The sources of those in the stream would be from fertilizers or waste products. . . ."

Erickson says they're looking at how cities may impact water quality for a Sea Grant-funded project led by Lucinda Johnson at the Natural Resources Research Institute.

"My study is looking at how urbanization is affecting stream metabolism. So I've got nine different streams spanning across a gradient of increasing impervious surface, which includes roads, roofs, pack gravel and so that's where you get that increased runoff."

"You breathe in oxygen. You put out CO₂. The stream is sort of doing the opposite, but we're putting in oxygen into the stream and seeing how well it processes it. It's kind of a similar concept to what you think of metabolism in your body."

Erickson uses propane gas to help identify the metabolism or oxygen levels of the streams while Lehto works step-by-step to identify how fertilizer chemicals move through the food web.

"So what I'm doing is taking an initial level of what those concentrations of nitrate, phosphate, and ammonia are in the stream, and then I'm actually putting in ammonia phosphate into the stream. I'm adding an additional level of that, which is about five to ten times what's currently in the stream. I'm pumping that in to see how that gets taken up as it goes down the stream reach. A really healthy stream will be able to take up those nutrients right

away; the algae and different plants and sediments in the stream will take up those nutrients and process them."

The small amount of the fertilizer trickled into the stream isn't enough to cause damage to the stream or the fish. The chemicals disappear quickly.

Erickson says the environment they work in often makes the research challenging.

"At the beginning of the summer, there are bugs and that wears on you after awhile. Otherwise, the biggest challenges are just having everything go right. Taking enough measurements where quite a few times this summer I've had to go back and re-do it because something didn't work out right or there wasn't enough battery power with something."

"We both just sacrifice tennis shoes. The best part of the day is when you get to put on dry -- you take off your wet shoes and get dry feet for the first time."

"Yeah, I agree."

Not to mention the weather.

"Well, one of the challenges that we find and that has set us back this year is rain. So, we have to look at the streams when they're at a base rate. If we have a big storm or a big rain event, that changes the dynamics of the stream. If it rains a bunch, then all the runoff from the entire watershed comes into the stream and it would skew our results."

"It can be pretty frustrating when you have a week lined up to get all your fieldwork and you end up having to push it off till the next week so it's really tough to make plans to be doing anything else besides fieldwork when you have to work around the weather."

Lehto says it's hard to tell what their data say so far about the streams.

"I only have one data set, and I've analyzed it. But the streams here in Duluth seem to be pretty healthy. We have a gradient of streams, so the streams that we picked are of varying degrees of urbanization. Something like Miller Creek is at the highest end of our spectrum where it flows through the mall area and through Piedmont. So, we hypothesized that that stream will be most impacted."

But sometimes their research defies expectations.

"That waterfall is coming right from the neighborhoods up here in Congdon where everyone has very pretty lawns and a lot of landscaping. I actually find that the base rates of nutrients are a little higher in this stream even though it looks pretty--just because the stream looks really nice doesn't mean that it's completely healthy."

Lehto says residents should be more aware of their surroundings.

"A lot of people don't realize how their everyday activities impact the streams. You think, 'Well, I live two miles from the nearest stream, so what I do in my yard doesn't affect the streams.' But, it really does. The watershed is much bigger for all of these streams than most people think. When all that rainwater washes off your yard and you just had it nicely fertilized or you used chemical weed killers -- that's ending up somewhere."

Lehto says they hope to have results calculated in the next year.

"We kind of are providing a different sort of supplement to the data that's already out there. So, hopefully it will provide a little more information about the streams here in Duluth that doesn't already exist and help provide and overall better understanding of the health of the streams that we're looking at."

For Superior Science News, I'm Marie Zhuikov.

OUTRO: This has been a production of the Minnesota Sea Grant program at UMD and KUWS radio.

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