

# Researching stream health

by Joyce Chau and Brian Kielstra

Headwaters are the smallest streams in a watershed. In fact, if you add them up, they represent 70% to 80% of the total stream length in a watershed!

Headwater streams move important nutrients, sediment, and organic material downstream. Since most water eventually ends up downstream, it makes sense to have a good understanding and protection of headwaters.

Headwater streams are often disregarded during urbanization. As a result, streams are being altered or lost with an insufficient grasp of the environmental impact of those changes.

Rot is usually something people try to avoid or get rid of. This wasn't the case for thirty Rot Squad volunteers who got down and dirty last spring to measure rot!

Our trained citizen scientists measured rot (or decomposition) rate in headwater streams across southern York Region this past April. Rot rate can be recorded by placing small cotton strips (artist's canvas) in streams, leaving them for about three weeks, and then testing how much they decompose.

EcoSpark and the University of British Columbia recruited an awesome team of volunteers to join the Rot Squad. The goal was to crowdsource data to determine if rot rate could be a successful measure for stream and ecosystem health, potentially informing and improving land use decisions. With funding from the Ontario Trillium Foundation and in-kind support from the Toronto and Region Conservation Authority, we developed a citizen science protocol, secured the equipment, identified headwater streams, trained volunteers – and the Rot Squad was born.

EcoSpark is an environmental charity whose mission is to empower communities to take an active role in protecting and sustaining their local environment. We specialize in sparking environmental protection through education, citizen science, and civic engagement. For the Rot Squad, EcoSpark partnered with Brian Kielstra, an aquatic ecology PhD student from the University of British Columbia. His research focuses on the impacts of headwater stream loss on downstream ecosystems.

The Rot Squad visited forty streams in total, ten of which were in King Township. We learned that rot rate was both the highest and lowest in disturbed headwater streams (i.e., agricultural and urban sites) and modest in undisturbed sites (forested sites). This may be attributed to higher levels of nutrients in disturbed sites leading to a high rot rate. On the other hand, higher levels of pollution in disturbed sites

might lead to a low rot rate. Forested sites had less variable rot rates and may provide a healthy range for this indicator. These preliminary results show a lot of potential in using rot to determine ecosystem health.

Not only was this a great way to collect new data in headwater streams, it was also a lot of fun!

One volunteer wrote: “the most fun I had was getting out into the field because it allowed me to put into practice the training we received earlier on in the day and it was very fun working with the rest of my Rot Squad crew.”

It was also an eye-opening experience. For many, it was their first time learning about headwater streams, wearing waders, and exploring streams. Another volunteer said, “it was interesting to see how each stream differed. This was a great opportunity to learn about how data is collected and how streams are analyzed.”

We were amazed by the dedication of the volunteers. Our 30 Rot Squad volunteers contributed 340 volunteer hours in April 2017. Some even came out three consecutive Saturdays in April! “Yes, great organization, great people, great volunteers, great food. I would volunteer again,” said a volunteer.

We look forward to recruiting more Rot Squads in the future. This will contribute more data to better understand the power of rot in determining stream health across different land uses. It will also increase the capacity of people to be actively involved in protecting our precious headwater streams.

Joyce Chau is the Executive Director of EcoSpark. Brian Kielstra is an aquatic/landscape ecology PhD student from the University of British Columbia (UBC), working with Dr. John Richardson. His research focuses on the cumulative impacts of headwater stream loss on downstream ecosystems. Brian is interested in how ecosystems are quantified and understanding how they are impacted by patterns and processes occurring at different scales.

UBC and EcoSpark partnered for this new citizen science project to test rot as an indicator and the feasibility of collecting data through citizen science.

## Why York Region?

There is a tremendous amount of growth in York Region. According to the 2017 Growth Plan, the region's population is expected to reach 1,790,000 by 2041. Current growth is already having impacting watershed health. A 2013 report from the Conservation Authorities Moraine Coalition showed that surface water quality in the Oak Ridge Moraine received the lowest grades in York Region, ranging from “C” to “F”.

King Township is blessed with a beautiful and bucolic environment with most of its lands within the protected Oak Ridges Moraine and Greenbelt. However, despite these protective policies, surface water quality in King Township was graded mostly “D” in the same report.



Rot Squad volunteers placed canvass strips in headwater streams to allow researchers to assess the various test strips' rot rates. For more information on EcoSpark visit [ecospark.ca](http://ecospark.ca)