River RoundUp and Swollen Creeks

Dick Chase, May 2011

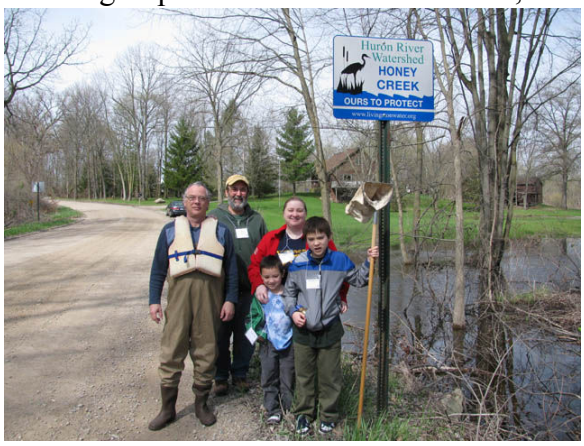
I had volunteered for several insect hunts since I retired from Ford Research. I signed up for this spring's River RoundUp with my longtime friend, Bruce Artz, a colleague from Ford Research with whom I'd carpooled for more than a quarter of a century. Over the past few years, Bruce has worked as collector, and I've been team leader on several Huron River Watershed Council (HRWC) outings. This spring, we talked a mutual friend, John Paglione, into signing up for our team. John, only recently retired, had joined Bruce and me this past February when we went back to Traver Creek to see if we could find stoneflies when none had turned up in January's Stonefly Search. We had no luck finding stonefly larvae in the second search, either, and we hoped that River RoundUp would prove a more interesting outing for John. It did, in more ways than we expected.

Having had a career in the physical sciences – I did vehicle exhaust emission research for Ford – I was surprised to find out how HRWC measures stream quality when I first volunteered. From my background and experience, I would have leaned toward instrument-based techniques to measure the oxygen, temperature, conductivity, and chemical composition of the stream. But these are expensive. And they're esoteric enough to require specially qualified individuals, eliminating most of the people interested in volunteering to improve the quality of the river.

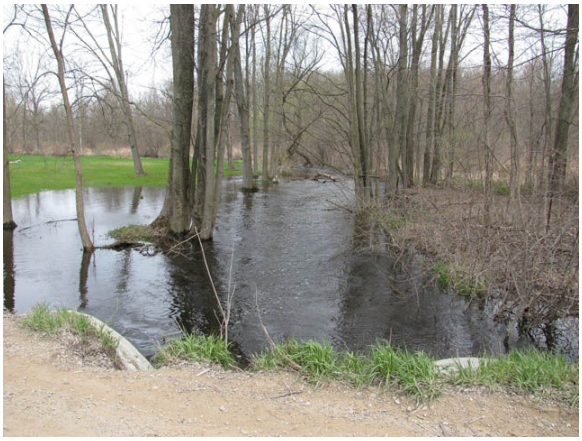
But there's another way to measure stream quality. It's to let the insects do that evaluation. A wide range of insect larvae can live in the local streams and creeks. But some – notably, certain stoneflies, mayflies, and caddisflies – are especially sensitive to such things as pollutants and oxygen level. Their presence or absence tells a lot about stream quality. And it requires no special skill – except on the part of the collector (who receives hands-on training) – to participate in rounding them up.

So about 20 years ago, HRWC embarked on a program of collecting benthic macroinvertebrates – small creatures without backbones (invertebrates) that are big enough to see with the naked eye (the macro part) and that live in the streambed (benthic). Under the direction of Joan Martin (who just retired from HRWC in April this year), the organization amassed a wealth of data based on these collections. We were hoping to continue that tradition.

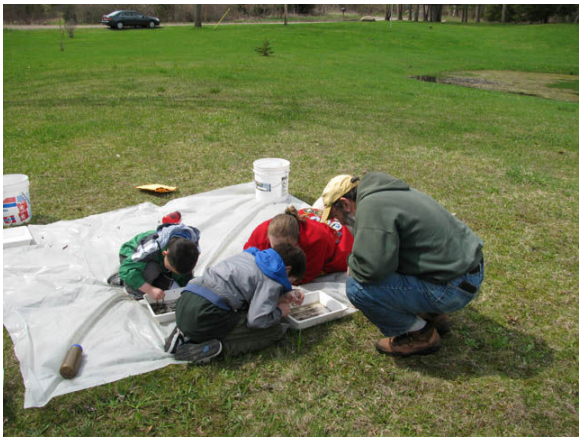
We arrived at the NEW Center Building (where HRWC has its offices) a little before 10 AM on Saturday morning (April 30) for orientation. The first group of teams had met at 8:30, and they were already out in the field. Teams usually have five or more members. Bruce, John, and I were joined by Colleen Kim and her two sons, Michael and Ryan, to form Team #19. Teams collect insect larvae at two sites, and ours were to be Honey Creek at Darwin Road and Arms Creek at Walsh Road, both between Dexter and Pinckney. HRWC's Paul Steen and Jason Frenzel reminded all of us of our duties, and we left for our sites. In the picture at the right are (left to right) Bruce, John, Ryan, Colleen, and Michael, standing on Darwin Road by the sign at Honey Creek, ready to collect macroinvertebrates.



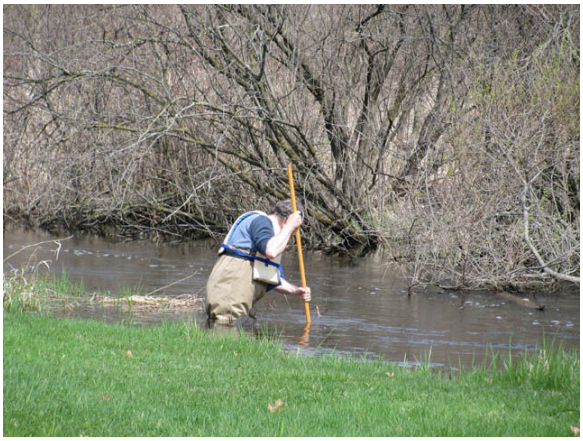
It had been a very wet April. In excess of five inches of rain fell, far more than the average of 1.85 inches for April. And a thunderstorm had delivered 1.3 inches of that rain on Wednesday night. The ground was saturated and all the creeks in the watershed were swollen. Honey Creek was no exception. The picture at the right is looking upstream from Darwin Road. The normal creek bank runs along a line about a third of the way from the left side of the picture, but water is flowing and standing well beyond that bank, covering part of the field.

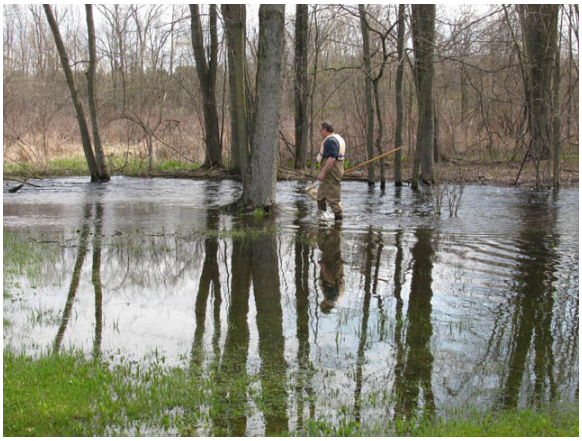


Our first task was to find a dry spot for the team to work. We spread a plastic sheet on a high place in the field while Bruce collected a water sample (to be checked for conductivity back at the NEW Center Building). Using the D-net that Michael was holding in the group picture, Bruce collected a couple of quick samples to get the group started. With the debris from the net spread out in white trays (for easy visibility) and water added, the rest of the team began looking for moving organisms, while Bruce began a more serious sampling of a number of habitats.



Below on the right, Bruce is walking close to the normal creek bank but far from the edge of the standing water. As he moved upstream (left), he found several points at which he could safely enter the stream. When he did so, the water reached the top of his legs. He was able to find several habitats (such as in-stream vegetation, leaf packs, logs, rocks), although it appeared that gravel areas had been scoured strongly by the high flows.

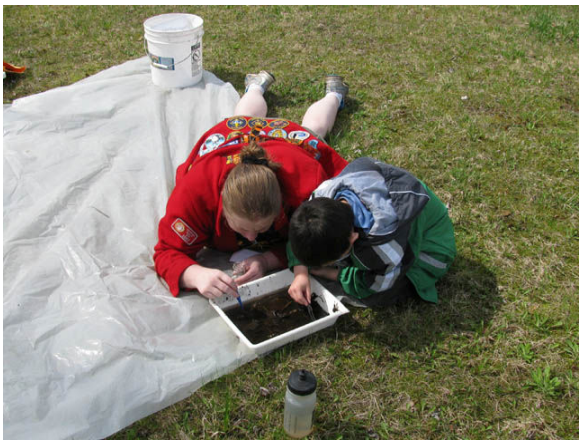




We were impressed with the variety of specimens being collected. The pickers were surprised at the cases constructed by caddisfly larvae to disguise and protect themselves. Some used blades of grass and other vegetation. Others used sticks. We did not notice caddisflies using small pebbles, something we'd seen in the past, perhaps because the flow had moved them from where they normally would have been found.

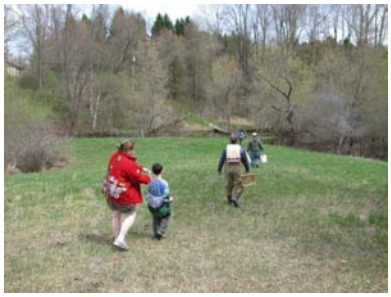
In one of his sweeps, Bruce caught a crayfish, shown in the net in the picture to the right. We weren't surprised to find crayfish in the creek. The field nearby was full of crayfish burrows, easily noticed from the chimney mounds of mud pellets in a dozen or more places. Crayfish meet the definition of macroinvertebrates, but HRWC doesn't collect them as part of their program. Besides, this fellow wouldn't fit in the specimen bottle. We put it back in the stream.

The pickers were busy finding the smaller specimens. That often takes close observation. Here Colleen and Ryan look through a particularly mucky sample

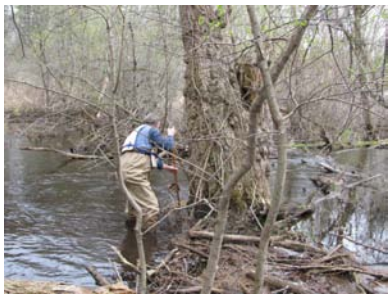


With three jars of specimens after about 45 minutes, we carefully packed up the sampling equipment, loaded it into the cars, and headed for the second site, Arms Creek at Walsh Road.

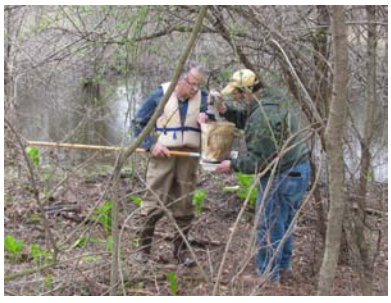
Arms Creek was even deeper and more heavily flooded than was Honey Creek. We found the nearby driveway described in the instruction sheet and parked the cars. This time finding the area of the creek to be sampled was a little trickier. Here we are walking much too far downstream. We soon realized our error when we consulted the map and the satellite picture again. We finally zeroed in on the correct area and set up the staging area under trees near the creek.



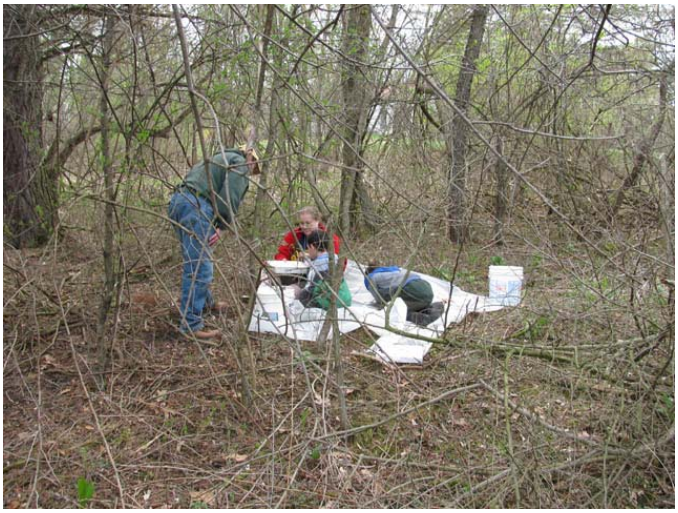
We tried to find a place where Bruce could enter the creek, but wherever he checked the depth with the D-net pole, he found that the water would top his chest-high waders. Instead, Bruce used the net to get samples from under logs and along the submerged creek bank.



Specimens were fewer and harder to find here and brush along the creek made it harder to get samples back to the pickers. Here John is rinsing the bottom of the net into a tray to ensure that any larvae Bruce captured are transferred out of the net.



We did have some success in finding specimens from sweeps along the submerged vertical creek banks. Here the pickers are examining three trays of possible specimens.



I was really impressed with the focus and determination that the two boys brought to the task. They were quite successful at finding and capturing elusive larvae. And they seemed to be having a good time doing it.

After packing everything up, we filled out evaluation sheets back at the cars. Colleen and the boys headed home, and Bruce, John, and I left for the NEW Center Building. We had a treat as we started out along Walsh Road. Two male turkeys were approaching the road as we passed. We stopped and watched as they crossed the road behind us.

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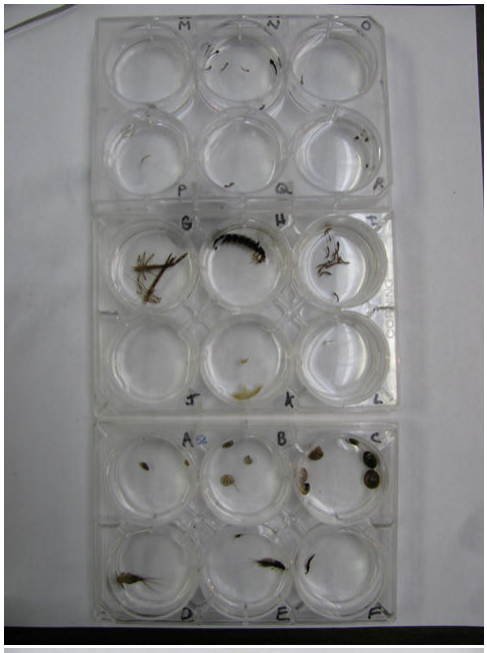
And that brings us to Bug ID Day. It was held on Sunday of the next weekend. I was curious to see how we did, so I volunteered for the noon start time. HRWC has worked out the process over the years until it runs extremely smoothly. Volunteers do the bulk of the sorting, paperwork, and cleanup. A few special experts step in after the sorting step to check the sorting and to identify the bugs in each lettered compartment and Petri dish. The volunteers then count the number of each kind of bug and tally the results.



The two pictures here give an idea of the range of macroinvertebrates collected and the kinds of sorting dishes used. The multicompartment holders, labeled A to R, hold the smaller bugs ranging from tiny midge larvae (in cell L) to a pair of large broad-winged damselfly larvae (in cell G).

The Petri dish at the right holds seven northern caddisflies. The cases are obvious in the picture, and the caddisflies inside are visible in a couple of the specimens.

When I was done, I put all the specimens back into a single sample jar with alcohol, shown on the next page. All of these specimens, as the label inside the jar shows, were from Arms Creek. (Note the largest scud – *Amphipoda* – that I've ever seen. It's the light colored, shrimp-like crustacean on the left side of the jar, half way up. It's also in cell K in the picture above.)

So how did the two sites check out? Well, we got more kinds of bugs from Honey Creek (21) than we did from Arms Creek (14), as we had thought was the case while we did the collecting. But there were surprises. Honey Creek did not score as well on quality as it had in the years since 2008. It had only 7 families of mayflies, stoneflies, and caddisflies, compared with the average value of 10.5. And none of the families were in the highly sensitive category, compared with the average value of 3.8.

I had a minor surprise. I had thought that none of the caddisflies from Honey Creek had constructed their protective cases with pebbles. But one had indeed used both pebbles and sticks, something that wasn't obvious in the field and didn't show up until I took the more careful look at the specimens that Bug ID Day provides.

Then there were the results from Arms Creek. Despite the lower number of macroinvertebrate families, it scored slightly better than its average in number of families of mayflies stoneflies, and caddisflies (5 compared with 4.5). But two of those families were in the sensitive category, much better than the average value of 0.5.

There was another surprise here, too. During the time I had been volunteering, I had not recalled seeing mosquito larvae among our specimens. There are almost always lots of black fly and midge larvae, but mosquito larvae were usually nonexistent. For example, Honey Creek this year had 18 black fly larvae, 15 midge larvae, and no mosquito larvae. There were black fly and midge larvae at Arms Creek, too, but in addition, the sample contained 7 mosquito larvae.

Where did they come from? It's hard to say. Mosquito larvae prefer stagnant conditions. But conditions on April 30 were far from stagnant. Creek flow was high and fast. One suggestion that seems plausible is that the high flows reached stagnant pools in or beside the creek bed and carried the mosquito larvae from them downstream to where we found them.

There are other questions that the results raise. Why were this year's results from Honey Creek worse, and those from Arms Creek better, than their average results? At this point, we are not certain. The high flows may have had something to do with what we found. It will be interesting to see if the entire set of data from this year shows some pattern attributable to the high flows. The differences, though, may have simply been statistical variation. Or there may have been quality changes in both creeks over time.

Most likely, we will have to wait until the next set of measurements at these sites to decide if what we found is part of a trend. That's one of the hard parts of investigating nature. There are always uncertainties, and scientists must cultivate temperaments that can cope with uncertainties. Although science has given us an amazing understanding of the world around us, there are always unanswered questions. Luckily, there are also new measurements that can help answer those questions. That's where next year's River RoundUp comes in.