

Determining False Negatives in Volunteer Collected Data: the River Raisin Experience

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ABSTRACT

The River Raisin is a 150 mile long, 1,072 square mile river system in southeast Michigan. The watershed is about 65% agricultural and 11% urbanized with the remainder in various natural and semi-natural states. We are now entering our seventh year of collecting and sorting stream insects to the family level. We started with 13 sites across the watershed and in the last few years have expanded that number to 20. These sites are located from the headwaters to the mouth of the river, including the various sub-watersheds. These stream searches have been volunteer events, with people from the community given the training and appropriate equipment. Taxa recovered were identified to the family level in the lab with the aid of professional entomologists.

Determining false negatives (a team finding an absence of macroinvertebrates even when they are present) is an area of great concern for monitoring groups. I use a variety of metrics to determine if a particular site is indeed truly more depopulated (and thus likely impacted by an impairment) than the initial studies indicated.

KEYWORDS

Macroinvertebrate monitoring, Data assessment, Michigan, Volunteer monitoring, stream health

INTRODUCTION

The River Raisin is a 150 mile long river system in southeast Michigan. It is 1,072 square miles in area and is about 65% agricultural and 11% urbanized. The remainder of the watershed is in various natural and semi-natural states. We are now entering our seventh year of collecting and sorting stream insects to the family level. We started with 13 sites across the watershed. In the last few years we have expanded that number to 20, from the headwaters and various sub-watersheds to the mouth of the river. These stream searches have been volunteer events, with people from the community given the training and appropriate equipment. Taxa recovered were identified to the family level in the lab with the aid of professional entomologists.

These family level identifications were plugged them into a rating system developed by the Michigan Clean Water Corp (MiCorps). Averaging all sites for a given year allows for a determination of stream health for the entire watershed. The results suggest that, at least a gross level, the river is not as healthy as it was when this monitoring program was first established. There are most likely multiple causes for this decline.

A high score tells us that creatures that are sensitive to pollutants were present on a particular sampling event. Low scores are more ambiguous to deal with; either the animals were there and

not collected, they were not there at all, or they were there in relatively lower densities than in previous sampling events and thus missed. River gage height and the rate of flow on a given day are also variables that can impact data collection.

There are three basic patterns among the individual sites: stable, declining and erratic. The Upper Raisin has been relatively stable through the sampling, even showing an uptick in the rating scale the last several stream searches. The Lower Raisin started with ratings in the 'good' category. More recently the pattern has been in the 'poor' to 'fair' range. An erratic (up and down) pattern is observed at some of our other sites. This pattern is less worrisome than a decline, but the cause of the variance needs to be identified.

Determining false negatives is an area of great concern for monitoring groups. In this paper I outline how using a variety of metrics can help determine data quality. A change of >10 MiCorp index points between two consecutive stream searches will trigger a closer examination of a site. Next, I look at how the numbers of total invertebrate taxa, insect taxa, EPT (Ephemeroptera, Plecoptera, Trichoptera) and certain specific sensitive groups varied between the searches, paying particular attention to sharp swings in any of these. I also consider the total number of invertebrates recovered at a site. In the past we have had samples returned with fewer than 20 insects, indicating the team was not thorough in its search. Further, I then look at what families of insects were recovered for the two searches involved in the data swing. The finding of no hydropsychids (a family of tolerant caddisflies) or other benthic invertebrates suggests that the search team did not pull out cobble. The absence of taxa normally associated with emergent vegetation is also indicative of a poor search, particularly if families have been recovered there in the past.

These data, in combination with stream gauge records and continuing ecological assessments of each of our sites, can help us eliminate historical findings of poor search results. This is particularly important when detecting an unusually poor finding for a given site. It is also useful information to bring to our stream search training sessions so as to better educate our volunteers on what to look for and what mistakes to avoid.