# Exploring Volunteer Accuracy in the RBV Program

NRCA Student: Grace Berthiaume[1]
Community Partners: Patricia Young[2], Meghan Lally[3]
[1]Portland High School; [2]Salmon River Watershed; [3]CT DEEP

## Riffle Bioassessment by Volunteers (RBV)

The RBV Program is a monitoring program that uses macroinvertebrates as bioindicators of water quality. In the program, volunteers are trained in a 1-2 day workshop by local RBV coordinators, and collect samples during the fall season. The RBV program depends on volunteers with highly variable expertise. Volunteers attempt to make a field identification of each macroinvertebrate taxa, which are categorized as "most wanted", "moderately wanted", and "least wanted". Local RBV coordinators then send a voucher containing representative macroinvertebrates to the Department of Energy and Environmental Protection (DEEP). DEEP's RBV coordinator reviews the submitted voucher and produces the official list of macroinvertebrate identifications for the monitoring location. If four or more of the "most wanted" taxa are present, DEEP is able to confidently say that the location monitored is a healthy stream segment.



**Fig 1:** Water quality in a local riffle is tested using the RBV method.

## Study Objectives

The main objective of this study was to analyze volunteer macroinvertebrate identifications from watersheds throughout Connecticut and compare it with the DEEP staff identifications. To understand how volunteers are identifying macroinvertebrates, and to what extent the RBV training is preparing volunteers for identification, this study hopes to determine:

1. Which organisms are commonly checked off by volunteers but are not found during DEEP's official review?
2. Which organisms are commonly found in the voucher during DEEP's official review, but not checked off by the volunteer?
3. Did the redesigned field identification cards, introduced in 2016 and co-designed by DEEP and NRCA Alum Jake Renkert (Fig 3), improve volunteer identification accuracy?

## Methods

- The original volunteer-identified data from three watersheds: Salmon River watershed, Niantic River watershed, and Thames River watershed was compared to the official DEEP-identified matching records.

- The two sets of data were analyzed to identify the differences between what was identified by the volunteers and what was found in in the official DEEP voucher.

- Organisms with differences greater than five between volunteer and state identifications of organism occurrence for the 2014 and 2015 years were marked as significant; the same organisms were analyzed in 2016 and 2017 to look for improvements (Fig 2) after the introduction of the new identification cards (Fig 3).



**Fig 2:** The graphs above display the differences between volunteer ( ) and state ( ) identifications of macroinvertebrates from 2014 through 2017. ➡ indicates organisms with discrepancies between volunteer and state identifications that are greater than five. ➡ indicates organisms whose state and volunteer discrepancies then decreased to less than five after the introduction of the new field identification cards in 2016 (Fig 3).



**Fig 3:** The identification cards before (left) and after (right) redesign. NRCA Alumni, Jake Renkert ('15), was responsible for DEEP's Field Identification Card redesign as his community project.

## Major Findings

This study revealed that from these three watersheds:

1. The organisms that are consistently identified by volunteers but not found in the official voucher include: brush-legged mayfly, saddle-case caddisfly, cornucopia caddisfly, plant-case caddisfly, dobsonfly, and dragonfly.
2. The organisms that are consistently found in the state voucher but not identified by volunteers are: non biting midge, crane fly, and small miscellaneous stonefly.
3. The organisms for which the discrepancy between state and volunteer data decreased below five after the new field cards include: the two-tailed flathead mayfly, free living caddisfly, and aquatic snipe fly.

## Conclusions

In this study, a threshold of five occurrences of volunteer vs. state identification disagreement was used to flag organism types that were incorrectly identified. It is important to note that there were other organisms that did not meet this threshold, and that were consistently identified by volunteers, yet not found in state data. For example, the body-builder mayfly. The RBV program currently directs volunteers to sample in the fall, and these mayflies are typically only present in spring samples. Volunteers most likely misidentify this organism because they hope to find enough organisms (four or more from the "most wanted" section) to indicate good water quality.

Our findings in this study will hopefully give RBV coordinators the knowledge they need to best prepare volunteers for sampling. With an understanding of the most commonly misidentified organisms, trainers can focus on qualities of the organisms other than looks and color - like size, active season, and key behaviors.