Water Flow and Water Temperature in Lozelle and Dowsville Brooks and Water Quality via Total Taxa Richness of Benthic Macroinvertebrate in the Lake Champlain Watershed

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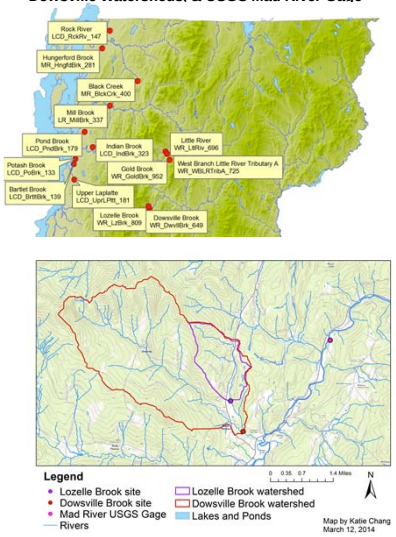
Introduction

The purpose of this study was get to experience using the recent technology of data loggers, which use small digital devices to record stream conditions almost continuously, over extended periods of time. Also, benthic macroinvertebrate (BMI) populations were assessed and compared to land uses in their watershed to determine if land use was impacting water quality.

Materials and Methods

All methods were described in more detail in "Independent Projects for High School Students," available at http://www.uvm.edu/~epscor/new02/?q=node/900. Authorities for BMI identifications were Bouchard (2004) and http://wikieducator.org/Rivers/home.
High school teams project data were available at http://www.uvm.edu/~epscor/new02/?q=node/1080&URL=http://www.uvm.edu/~streams/index_plain.php?Content=pages/download_data.inc&Content=pages/download_data.inc.
The sample sites used for the BMI water quality assessment were Indian Brook, Pond Brook, Dowsville Brook, Lozelle Brook, Little River, Bartlet Brook, Potash Brook, and Gold Brook. USGS Mad River data were obtained from http://waterdata.usgs.gov/vt/nwis/uv?site_no=04288000

Figure 1: Sample Site Locations, Lozelle & Dowsville Watersheds, & USGS Mad River Gage



Results

Figure 2: Comparison of Dowsville Brook Water Level Stage Sensor and Mad River Stage Sensor

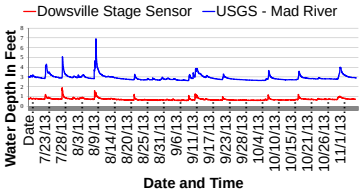


Figure 3: Comparison of Water Temperature For Lozelle and Dowsville Brooks

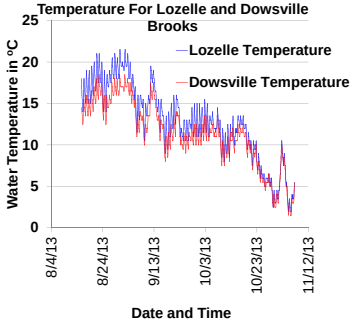


Figure 4: Dowsville Brook - Water Temperature and Water Sensor Depth - 2013

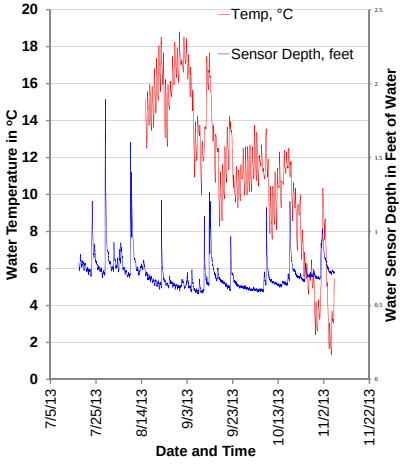


Figure 5 - Percent Agricultural Land Versus Total Taxa Richness

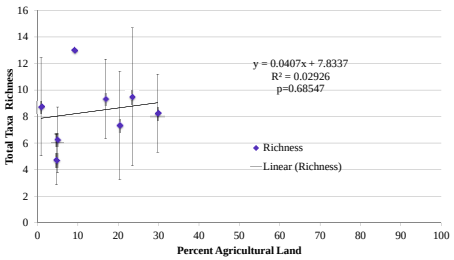


Figure 6 - Percent Urban Land Use Versus Total Taxa Richness

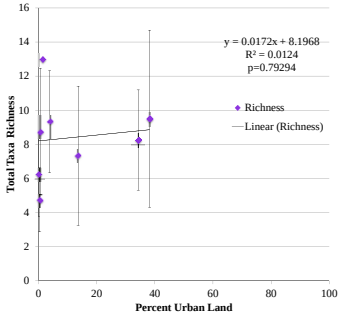
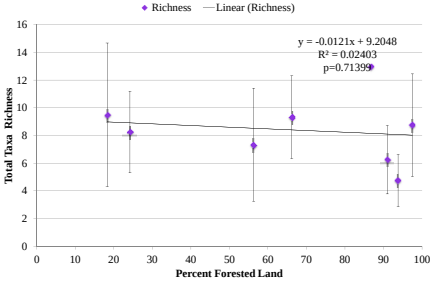


Figure 7 - Percent Forested Land Versus Total Taxa Richness



Discussion

Figure 2 - The Dowsville Brook (DB) water level sensor matched well with and was a good predictor for Mad River USGS water level sensor.

Figure 3 - Lozelle Brook (LB) and DB had similar temperature profiles. From mid-August to mid-October, LB was 2-3°C warmer than DB and its daily temperature cycle of variation was about 3°C compared to a 2°C daily variation for DB. After mid-October the stream temperatures were approximately the same and daily variation was about 2°C. In the study period, the maximum temperature for LB was 21.5°C and maximum temperature for DB was 18.5°C.

Figure 4 - Stream temperature appeared to rise prior to and during rain events. As the stream elevation decreased following the rain event, the stream temperature typically decreased. Nonstorm-event water level appeared to be slowly decreasing from mid-August to mid-October. Nonstorm-event flow appeared to be slightly increasing after mid-October, perhaps due to the loss of leaves on the trees, reduced photosynthesis and reduced transpiration.

Figures 5, 6, and 7. There was no relationship between Total Taxa Richness of the BMI samples and percent forest land-use, percent urban land-use, or percent agricultural land use.

Despite close proximity of the LB and DB sample points, taxa found were different. Of the total 15 taxa found in LB, 9 were not found in DB. Of the total 9 taxa found in DB, 3 were not found in LB.

Literature cited

Bouchard, R. W. Jr. 2004. *Guide to Aquatic Invertebrates of the Upper Midwest.* University of Minnesota, St. Paul, MN.

Acknowledgements

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