

By Dylan Kutz, Michael Bilger, Jack Holt

Department of Biology, Susquehanna University, Selinsgrove, PA 17870

## Introduction

- The Susquehanna River has been the center of water quality assessment studies for over a decade. The river spans 747 kilometers and acts as the “mother” river to the Chesapeake Bay.
- Benthic macroinvertebrate communities have long served as biological indicators of the health of large rivers, but can be sensitive to sharp increases in water discharge levels. (Song 2007, Metcalfe 1989).
- In July 2015, the water discharge levels at the USGS gauge by Sunbury, PA rose nearly threefold from the monthly average. (USGS 01554000 Susquehanna River at Sunbury, PA)
- Passive sampling methods (eg. rock baskets, Hester-Dendy multiplate samplers) serve as artificial substrates on which local macroinvertebrate communities can colonize and be assessed at the family level.
- The purpose of this project is to assess the main stem of the Susquehanna River using macroinvertebrate communities utilizing passive methods and multiple metrics (e.g. Bray-Curtis Proportional Similarity, Shannon Diversity Index, Hilsenhoff Index) in comparison to assessments completed in years of average water discharge.

## Site Description:

- All sites are below the Adam T. Bower inflatable dam, with sites 1-4 below low head dams.
- Sites 1-4 are accessible through Shady Nook boat launch in Selinsgrove, PA, which lies approximately seven kilometers below the confluence of the North and West branches of the Susquehanna River.
- Site 5 is located above the Sunbury Generation Power Plant in Shamokin Dam, PA approximately two kilometers away from Shady Nook.
- Sites 1 and 5 receive water from the West branch.
- Sites 2, 3 and 4 receive water from the North branch.
- Site 3 frequently experiences periods of low water flow.
- Site 4 is impacted by acid mine drainage from Shamokin Creek.

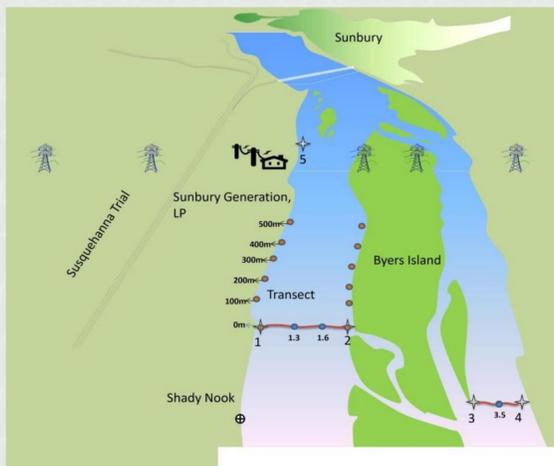


Figure 1: Depiction of the locations of the collections sites on the Susquehanna River. Map provided by Dr. Ahmed Lachhab.

## Abstract:

The Susquehanna River is the main source of the Chesapeake Bay. Benthic macroinvertebrate communities are collected by passive sampling methods to assess water quality. The purpose of this project was to determine the health of the river through macroinvertebrate identification. This monitoring project was part of an assessment which utilized passive sampling for the past seven years. Active sampling could not be accomplished due to the unusually high height of the river. The metrics suggested that increased discharge during June and July altered the biodiversity of macroinvertebrate communities. Consequences of higher than usual discharge rates for these communities are discussed.

## Methods:

The methods used were adapted from the EPA protocol for assessments of non-wadeable streams (Flotemersch et al. 2006).

Passive sampling (Rock Baskets & Hester Dendy samplers)

Rock Baskets and Hester-Dendy samplers were arranged in diamond formation.

Rock baskets were placed on cinder blocks to elevated them from the riverbed.

Site one and two had 2 extra rock baskets laid directly on the substrate.

Five total sites (Twenty-one subsites)

Time Frame: Seven weeks.

Metrics Used: Hilsenhoff Biotic Index, Shannon Diversity Index, %EPT, Bray-Curtis Similarity Index

## Results:

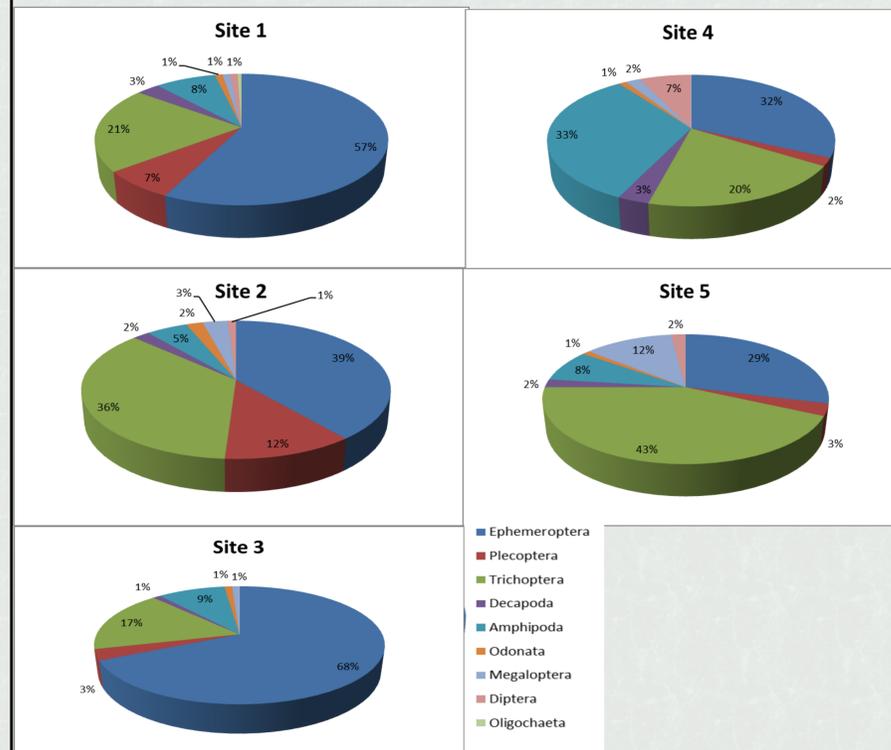


Figure 2: Percent of taxa by taxonomic order identified at each site.



Figure 11: Hilsenhoff biotic index for Sites 1-5 rock baskets.

Table 1: Comparison of water discharge levels of June and July from 2014, 2015, and the mean discharge levels.

Year	June Discharge (ft <sup>3</sup> s <sup>-1</sup> )	July Discharge (ft <sup>3</sup> s <sup>-1</sup> )
2014	10,780	11,390
2015	23,840	51,080
Mean 1938-2015	20,600	11,700

Table 2: Shannon Diversity Index for summer 2015 and comparison of %EPT from 2014.

Site	SDI/ SDI Max 2015	%EPT 2014	%EPT 2015
1	1.25/1.94	93%	85%
2	1.31/1.94	55%	87%
3	0.57/1.94	85%	88%
4	0.92/1.61	83%	64%
5	1.36/2.08	95%	75%

## Discussion:

The most common EPT taxa collected were Heptageniid and Isonychiid mayflies, along with Hydropsychid caddisflies. Hilsenhoff Biotic Indexes were approximately 3.5 for each site, Site 4 bearing the highest biotic index (Figure 7).

Heightened discharge levels may have lowered %EPT from last year's analysis, possibly better conditions for Amphipod survival (Holomuzki & Hoyle 1990).

Sites 3 and 4 possess lowest SDIs, Site 3 typically low water level, Site 4 affected by acid-mine drainage (Tables 1 and 2).

Hilsenhoff Biotic Index comparable to previous analysis performed at sites, but ratios of taxa present different permutation (Figure 2).

Hester Dendy samplers are being processed, will likely present more Oligochaeta, Gastropoda, and Chironomidae.

## Acknowledgements:

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References available upon request.