

Water Quality Assessment of the Lower West Branch of the Susquehanna River

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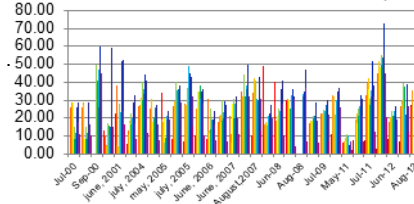


Background & Purpose

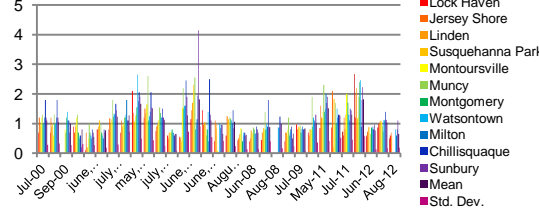
Despite being designated as Pennsylvania's River of the Year for 2005 by the Department of Conservation and Natural Resources, the West Branch of the Susquehanna is not exempt from the stigma surrounding the entire Susquehanna River. Increased concern for its overall health arose when the whole Susquehanna River watershed topped the 2005 list of America's Most Endangered Rivers issued by the American Rivers Organization (www.AmericanRivers.org) as a result of combined sewage overflow (CFO), as well as elevated nitrogen and sediment loads. Our investigation, which began in 1999, sought to emulate a 1996 study by Hughey (PA DEP) to investigate the impact of sewage treatment plants on the water quality of this section of the Lower West Branch.

In addition, student interns monitored twelve sites along a 75-mile stretch of the Lower West Branch of the Susquehanna River between Lock Haven and Sunbury. Sites include: Lock Haven (2 sites- One above dam, one below), Jersey Shore, Linden, Susquehanna State Park (Williamsport), Greevy boat launch (Loyalsock), Muncy, Montgomery, Watsontown, Milton, Chillisauque boat launch (Northumberland), and Marina (Sunbury). Summer interns will continue to monitor these sites on a monthly basis.

Concentration of Alkalinity (ppm)



Concentration of Nitrate (ppm)



Parameter means and standard deviations for the West Branch Susquehanna River at

Parameter	1995 Mean ± Standard Deviation	2000 Mean ± Standard Deviation	2006 Mean ± Standard Deviation	2011 Mean ± Standard Deviation	2012 Mean ± Standard Deviation
pH	7.3 ± 0.28	7.1875 ± 0.33	7.03 ± 0.07	7.06 ± 0.355	6.93 ± 0.43
Alkalinity (ppm)	20 ± 7.62	27.25 ± 8.17	19.16 ± 5.12	29.19 ± 16.75	34.98 ± 16.52
Nitrate (ppm)	0.252 ± 0.36	0.522 ± .34	1.1 ± 0.85	1.32 ± 0.58	0.86 ± 0.24
Nitrite (ppm)	0.00368 ± 0	0.0069 ± 0	0.0052 ± 0	0.006 ± 0.002	0.006 ± 0.001
Orthophosphate (ppm)	0.0108 ± 0.001	0.025 ± 0.001	0.09 ± 0.03	0.086 ± 0.082	0.036 ± .015
Total Phosphorus (ppm)	0.56 ± 0.18	0.44 ± 0.22	0.47 ± 0.13	0.153 ± 0.153	0.17 ± 0.06
Temperature (C)	12.96 ± 7.77	17.775 ± 5.28	24.13 ± 3.92	23.33 ± 3.802	27.86 ± 6.69
Total Dissolved Solids (ppm)	102 ± 9.8	193 ± 6.9	77.2 ± 8.2	36.61 ± 48.125	117.7 ± 29.43
Dissolved Oxygen (ppm)	7.2 ± 0.2	7 ± 1.63	7.47 ± 2.58	7.26 ± 1.66	6.97 ± 10.88

Results

In addition to the evaluation of pH, alkalinity, conductivity, and nutrient levels, interns also focused their efforts on documenting the Biochemical Oxygen Demand (BOD) and coliform bacteria at each site. Macroinvertebrate samples were also collected at suitable sites by use of rock baskets, some of which were equipped with hester-dendy samples. Sites with rock baskets include data for the West Branch (Watontown), North Branch (Danville), and Main stem (Shady Nook) of the Susquehanna river.

Water quality data can be found at the Clean Water Institute webpage (<http://www.lycoming.edu/cwi/>).

Macroinvertebrate Density (org/m²) Data from River Study

Site:	Summer 2012	
	Watontown	Danville
Rock Basket Density (org/m ²):		
Left Bank (org/m ²)	N/A	1263.2 ± 1392.44
Center (org/m ²)	1594.4 ± 163.78	2017.3 ± 2400.30
Right Bank (org/m ²)	983.3 ± 652.82	3377.8 ± 2291.71
Hester-Dendy Density (org/m ²):		
Left Bank (org/m ²)	N/A	1830 ± 296.98
Center (org/m ²)	1605 ± 558.61	2815 ± 827.31
Right Bank (org/m ²)	N/A	N/A
Grand Mean (org/m²) ± Std. Deviation		
Rock Basket Density (org/m ²):	1288.9 ± 345.80	2219.4 ± 1071.67
Hester-Dendy Density (org/m ²):	1458.3 ± 171.34	2561.7 ± 643.55

*Density calculation is a work in progress at this time. Values labeled N/A are being determined within the next month.

Additional monitoring has been made possible through use of sonde dataloggers placed at Milton and Danville sites. This equipment is shared by Susquehanna River Heartland Coalition for Environmental Studies.

In 2012, Zebidiah Buck completed a guide to common Macroinvertebrates in the West Branch and Tributaries. The contents listed below are separated by family.

- Order Amphipoda:**
 - 1. Family Gammaridae
 - a. Gammarus
- Order Gastropoda:**
 - 1. Pleuroceridae
 - a. Lymnaeidae
- Order Coleoptera:**
 - 1. Elmidae
 - a. Stenelmis
- Order Isopoda:**
 - 1. Asellidae
- Order Psephenidae:**
 - a. Psephenus
- Order Megaloptera:**
 - 1. Sialidae
 - a. Sialis
 - 2. Corydalidae
 - a. Croydalus
- Order Diptera:**
 - 1. Chironomidae
 - 2. Simuliidae
 - a. Argia
 - 3. Tipulidae
 - Zygoptera (sub-order)
- Order Ephemeroptera:**
 - 1. Caenidae
 - a. Caenis
 - 2. Isonychiidae
 - a. Isonychia
 - 3. Heptageniidae
 - a. Stenonema
 - b. Maccaffertium
 - c. Heptagenia
 - d. Stenacron
 - e. Leucrocra
 - 4. Batidae
 - a. Baetis
 - b. Acentrella
 - 5. Tricorythidae
 - a. Tricorythodes
 - 6. Potamanthidae
 - a. Anthopotamus
 - 7. Ephemerellidae
 - 8. Leptophlebiidae
 - 9. Ephemeridae
- Order Plecoptera:**
 - 1. Leuctridae
 - a. Leuctra
 - 2. Perlodidae
 - 3. Taeniopterygidae
 - 4. Isoperla
 - 5. Perlidae
 - a. Neoperla
 - Order Trichoptera:**
 - 1. Hydropsychidae
 - a. Cheumatopsycha
 - b. Hydropsyche
 - 2. Lepidostomatidae
 - a. Chimarra
 - 3. Philopotamidae
 - a. Polycentropeidae
 - a. Neureclipsis
 - 5. Rhyacophilidae

Conclusion

Although a large amount of data has been collected, the surveying of the West Branch of the Susquehanna is a work in progress. Efforts will be taken to compile all macroinvertebrate and water chemistry data and determine relationships to water quality based on correlations between the two. Efforts will be continued with the Danville and Shady Nook sites as well.