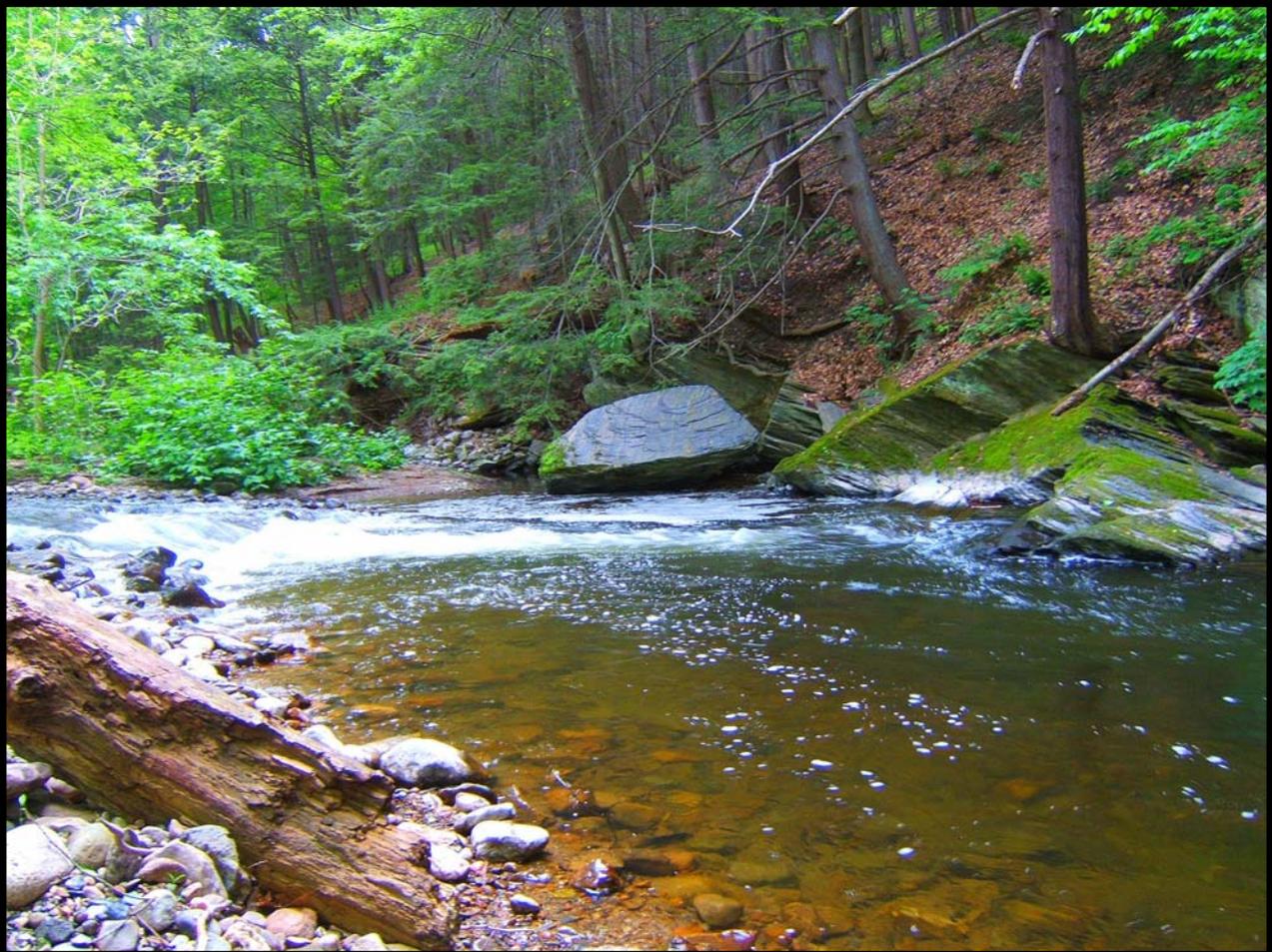


MARTINS-JACOBY WATERSHED ASSOCIATION

2008 Macroinvertebrate Study
Martins Creek (03 May 2008)



**MARTINS-JACOBY WATERSHED ASSOCIATION
PRELIMINARY STUDY of MACROINVERTEBRATES
MAIN STEM & EAST BRANCH, MARTINS CREEK
NORTHAMPTON COUNTY, PA
03 MAY 2008**

Submitted by: Joseph Dziedzina

Fieldwork & Data Compiled by: Joseph & Taylor Dziedzina

The accompanying report is a preliminary field study of the aquatic insects found throughout the main stem and east branch of the Martins Creek, the largest stream located within the Martins-Jacoby Watershed in northeastern Northampton County, PA.

The main purpose of this exercise was an attempt to establish some type of methodology and set parameters for future macro-studies to be performed throughout the watershed by myself and others. Also this was to be the trial run for the tools, labor, and time required to perform a study of this nature.

It should be noted that my daughter and I are not biologists (aquatic or other) and no lab analysis was involved. All species were identified and recorded in the field to the best of our abilities... having said that, we did try to follow protocols set forth by others in similar studies to the greatest extent possible. I am adept at identifying most common coldwater species of aquatic insects and the habitats they prefer but I could NOT have pulled any of this off without the aid of my daughter... an aspiring biologist with uncommon focus regarding field collection and data entry.

Attached are the following for review and discussion;

- Description of tools, collection methods, and sample stations
- Description of summary table and terminology
- List of references
- Table: Summary of Results
- Topo Map: Location of Sample Stations

In closing I would like to thank John Mauser and the MJWA for the opportunity to perform this study... may it aid in some small way the efforts being put forth in the Martins-Jacoby Watershed.

Warmest regards,

Joseph N. Dziedzina

Tools Used in Sampling Process

- Pitchfork: Just a simple "garden variety" 4-pronged type, used for dislodging rocks gravel from stream bed during sampling.
- Screen: Fiberglass screening (mesh size unknown) as that used to repair screen windows fastened to a pair of wooden broom handles, used for catching the dislodged organisms.
- Stream thermometer: Used for recording water temperature.
- Yard stick: Used for measuring current speed.
- Thin-bladed knife or spatula: Used for coaxing specimens off of the screen.
- 3-ring Binder: Used for recording data... we kept our tally sheets in here, as well as some "cheat sheets" (pictures of various nymphs), maps, notes, and other reference material.
- Several small jars: These would be used to take specimens home for further analysis or identification... although we did not use them on this trip.
- Other misc. items: Camera, hand towels, magnifying glass, reference books, and a small shallow dish (for photographing specimens streamside).

Method of Collection

We sampled riffle areas where surface speeds exceeded 0.3 ft/sec using a "kick/screen" method where as my daughter would position herself in the current flow facing upstream with the broom handles held firmly to the stream bed and net stretched between them... then I would disturb the substrate from approximately 4 feet upstream down to the base of the net using the pitchfork as well as my wading shoes. Once the clouded water filtered through the screening area my daughter would raise it in with slow, upstream scooping motion.

Back on the shoreline I would spread the net out and sweep back and forth from top-to-bottom examining and identifying the contents. I would call out the organisms as I removed them from the net while my daughter recorded them on a pre-prepared tally sheet.

Using this method we were able to spend less than 45 minutes at each station and each sample contained better than 100 specimens.

As per methods used on other studies of this nature, we ONLY sampled riffle areas as the species that live here are typically the least tolerant of poor water quality. While sampling runs and pools (as well as the riffles) would give a better indication of the overall insect diversity, it might also upset the results as many of the organisms found here are highly tolerant of poor water quality.

Sampling Stations

Our goal was to get a representative sample from several points along the main stem and east branch of the Martins Creek from the mouth at the Delaware River up to the outflow of Minsi Lake.

Given the short amount of time that we had to put this plan together, we did not pre-scout the locations or secure landowner permission to enter certain areas, thus we only sampled areas where I felt comfortable entering the stream without upsetting property owners. In hindsight, I would have liked to have squeezed in 1 or 2 more stations and had better spacing between stations 1 and 4. The area just below the mouth of Waltz Creek would have been nice to sample, but we just didn't know how to get back there or have the time to secure landowner permission.

Listed below are the stations where we sampled;

Station 1

- Location: 1000 feet downstream of the Route 611 bridge over Martins Creek (directly across from the fire station).
- Water Temperature: 53° F
- Current Speed: 1.0 ft/sec
- Bottom Content: Good mix of football-sized rocks and large gravel (very little silt)
- Time of Sample: 11:15 hours
- Note: Huge numbers of little black stonefly adults (*Capnia* sp.) covering the rocks along the shoreline.

Station 2

- Location: First major riffle above the 2nd sharp bend in the stream (and road that follows it). This is the bend just above the dam (lower end of the stocked area).
- Water Temperature: 54° F
- Current Speed: 0.75 ft/sec
- Bottom Content: Good mix of football-sized rocks and gravel (more silt present than at station 1)
- Time of Sample: 12:05 hours
- Note: Still seeing large numbers of black stoneflies among the shoreline rocks and in the air... numerous *Phoebe's* working the pool and snapping them up on the wing.

Station 3

- Location: Approximately 0.25 miles above 3rd sharp stream bend in the area known as Monahan's Meadow... 1st major riffle at the head of the "deer stand" pool.
- Water Temperature: 54° F
- Current Speed: 1.8 ft/sec
- Bottom Content: Scattered football-sized rocks with fine gravel filling in to about 2/3 of the stone height.
- Time of Sample: 12:50 hours
- Note: Clouds of tiny cream-colored midges in the air... along with a few tan craneflies.

Station 4

- Location: Riffle just above the bridge where Flicksville Road crosses the stream.
- Water Temperature: 55° F
- Current Speed: 1.2 ft/sec
- Bottom Content: Very dark (almost black) stones and large rocks... the moss is very thick here... lots of it loaded up the net during sampling.
- Time of Sample: 13:25 hours
- Note: Lots of scattered debris here (garbage bags, scrap lumber, etc.). Area is about 0.5 miles downstream of sewage treatment plant.

Station 5

- Location: Approximately 1000 feet upstream of the Route 512 bridge above the town of Bangor.
- Water Temperature: 53° F
- Current Speed: 1.4 ft/sec
- Bottom Content: Rusty orange ledge rock, very little silt or gravel... water has a tannic color.
- Time of Sample: 14:00 hours
- Note: Baetis were hatching when we arrived... flocks of swallows coursing about and picking them off. Baetis were still coming off during sampling... had two hatch right in the collection net.

Station 6

- Location: First riffle downstream of the bridge where Fox Gap Road crosses the stream.
- Water Temperature: 54° F
- Current Speed: 1.3 ft/sec
- Bottom Content: Very dark stream here... blackish rocks and tannic water. Very little silt or gravel.
- Time of Sample: 14:45 hours
- Note: Found a dead rainbow trout here at the bridge... only noted because it was a real good-looking fish (other than the fact it was dead); large fins, large eye, big spots, deep red stripe, slim & trim... didn't look like typical hatchery product.

Station 7

- Location: Riffle just above bridge where Lake Minsi Drive crosses the stream.
- Water Temperature: 59° F
- Current Speed: 0.9 ft/sec
- Bottom Content: Scattered rocks buried in gravel and silt... bottom has a deep reddish-brown silt layer very evident when disturbed.
- Time of Sample: 15:30 hours
- Note: Warmwater pond weeds (lily pads) growing in the slower areas downstream of the bridge... found a dead largemouth bass during sampling.

Summary Table and Terminology

Following this section is a tabulated list of all organisms collected across all seven (7) stations. These organisms have been categorized among four (4) separate groups; Ephemeroptera (Mayflies), Plecoptera (Stoneflies), Trichoptera (Caddisflies), and other organisms not fitting into the above categories. In addition to the numbers of specimens at each station along with the associated totals for each, you will see a number of other data entries as follows;

Biotic Index (BI)

A Most aquatic species have a number assigned to them which represents their tolerance to organic pollutants. The BI scale is 0-10 with lower numbers representing lower tolerances for pollutants. I have filled in the BI numbers in the right-most column in the Summary Table... the majority of these numbers are accurately referenced from other reports of similar nature; however, some assumptions had to be made where "groups" of organisms covered individual organisms with varying BI numbers. In each case I tried to take the average of the likely species to appear and rounded up. In other words, these numbers are for reference purposes only and should be taken with a grain of salt unless analyzed by trained professionals in a laboratory environment.

The overall Biotic Index for each sample station (bottom table on the summary sheet) is calculated by multiplying the numbers of individual species by their assigned BI number... the sum of these numbers is then divided by the total number of organisms for that station. The resulting Biotic Index is judged against the table in Figure 1 below indicating the quality of the water and degree of organic pollution.

Figure 1: Table of Biotic Index Values (*Hilsenhoff, 1987*)

Biotic Index Range	Water Quality	Degree of Organic Pollution
0.00 – 3.50	Excellent	None apparent
3.51 – 4.50	Very Good	Possible, slight
4.51 – 5.50	Good	Some
5.51 – 6.50	Fair	Fairly significant
6.51 – 7.50	Fairly Poor	Significant
7.51 – 8.50	Poor	Very significant
8.51 – 10.00	Very Poor	Severe

EPT Index

The insect orders of Ephemeroptera (Mayflies), Plecoptera (Stoneflies), Trichoptera (Caddisflies) are grouped together for an EPT Index. These insects are generally considered to be pollution sensitive, thus higher totals of EPT's among the total numbers of species collected represents healthy biotic conditions.

Percent Mayflies

Many environmental agencies view the percent contribution of mayflies in collection samples as an indication of high water quality. Mayflies are one of the least tolerant orders with regards to pollution.

The percent mayflies on the Summary Table overview was calculated by taking the total number of mayfly species collected divided by the total number of organisms collected.

Reference Material

General approach to sampling, reporting, and report formatting were based on a study of *Benthic Macroinvertebrates in the Paradise Creek Headwaters (11 April 1999)* submitted by *Donald L. Baylor* on behalf of Aquatic Resource Consulting for the Brodhead Watershed Association (BWA). That report is available on-line for those interested.

Macroinvertebrate, Data Interpretation Guidance Manual (Richard A. Lillie, Stanley W. Szczytko, and Michael A. Miller on behalf of Wisconsin Dept. of Natural Resources, 2003).

Mayfly species identification based in large part on descriptions and color palettes found in the book, *Hatches II (Al Caucci and Bob Nastasi, 1986).*

Caddisfly species identification based in large part on descriptions and illustrations found in the book *Caddisflies (Gary LaFontaine, 1981).*

Stonefly species identification based in large part to the species descriptions and fantastic macro-photography available on-line by *Jason Neuswanger at TroutNut.com.*

Other references (too numerous to list) were also accessed on-line to cross reference information regarding Biotic Index, biotic tolerance values, EPT Index, and Percent Mayflies... as well as countless photographs of nymphal/larval stages of mayflies, caddisflies, and stoneflies provided by professionals and amateurs alike.

Attachments

---Summary of results

---Map Locating Sample Stations

SUMMARY OF RESULTS
MACROINVERTEBRATE STUDY, 03 MAY 2008
MAIN-STEM & EAST BRANCH of MARTINS CREEK, NORTHAMPTON COUNTY, PA

SPECIES	STATION							Totals	BI
	1	2	3	4	5	6	7		
EPEHEMEROPTERA (MAYFLIES)									
Ephemerella subvaria	16	19	5	5	7	4		56	1
Ephemerella invaria/rotunda	32	18	7	5	8	14	1	85	1
Ephemerella dorothea	24	10	10	15	27	15		101	1
Ephemerella (species)	3	1	2		1	4		11	1
Drunella cornuta		1	1	1	10	15		28	0
Baetis (species)	27	11	17	8	12	4		79	6
Epeorus (species)	5	2			1		1	9	3
Paraleptophlebia (species)	3	8	1	1	4	2		19	1
Pseudocloen (species)	15	7	2	6	8	6		44	5
Stenonema rubrum	4					5	5	14	4
Stenonema vicarium		1						1	1
Stenonema fuscum								0	1
Stenonema (species)	1					5	3	9	4
Isonychia (species)						1		1	5
Other (unidentified)	3		2				8	13	3
PLECOPTERA (STONEFLIES)									
Capnia (Little Black)	2	4		3	6	3		18	2
Strophopteryx (Early Brown)								0	3
Sweltsa (Sallfly)						2		2	0
Acroneuria (Golden Stone)						1		1	0
Paragnetina (Embossed Stone)				2	1			3	0
Other (unidentified)				1				1	1
TRICHOPTERA (CADDISFLIES)									
Apatania (species)	13	4	3	1	3	2		26	1
Glossosoma (species)	1	7	2	1	7	3	4	25	1
Hydropsyche/Chumatopsyche (species)	21	7	15	21	13	6	19	102	5.5
Chimarra (species)				12				12	4
Rhyacophila (species)	1		1	3	3			8	1
Brachycentrus (species)	1	2	1					4	1
Other (unidentified)								0	4
OTHER ORGANISMS (Non-EPT)									
Beetles (Coleoptera sp.)	4	2	6	6	2	1		21	5
Aquatic Earthworm (Oligochaeta sp.)	3	17	2	5	2	1		30	8
Scud (Aphipod sp.)		1	1	1				3	6
Dragonfly Nymph (Odonata sp.)			2				1	3	8
Crane-fly Larva (Tipulidae sp.)			1	2				3	3
Midge Larva (Chironomidae sp.)			25	32		32		89	6
Fly Larva (resembling black fly, darker)							68	68	8

OVERVIEW

CATEGORY	STATION							Totals
	1	2	3	4	5	6	7	
NUMBER OF ORGANISMS COLLECTED	179	122	106	131	115	126	110	889
NUMBER OF SPECIES COLLECTED	19	18	20	20	17	20	9	32
EPT INDEX	17	15	14	15	15	17	7	25
BIOTIC INDEX	3.01	3.08	4.28	4.23	2.47	3.07	6.55	3.73
PERCENT MAYFLIES	74.3%	63.9%	44.3%	31.3%	67.8%	59.5%	16.4%	52.9%

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