Cedar Pond Brook

Rockland County, NY

Application of Stream Biological Impairment Criteria

Sample Date: September 2017
Report Date: August 2018

Prepared for
ROCKLAND COUNTY SOIL WATER CONSERVATION DISTRICT

Prepared by

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Background

This study was performed to provide baseline biological data and assess impact to macroinvertebrate communities at two road crossing culverts on Cedar Pond Brook. Biological impairment criteria developed by the New York State Department of Environmental Conservation Stream Biomonitoring Unit (NYS DEC SBU) (Bode et al. 1990), used to assess potential impact of point and non-point source discharges on resident benthic macroinvertebrates, were applied to communities above and below the culverts.

Road crossing culverts, depending on their construction, can fragment the benthic macroinvertebrate and other aquatic communities by physically altering the stream channel and natural flow patterns. The physical alteration that culverts may have upon the stream is seen in geomorphic changes within, upstream, and downstream of the structure. These alterations include the retention of fine sediments during high discharge events with increased accumulation of fine sediments downstream or upstream of the culvert, and the creation of pools just below the culvert. Culvert replacement has become a focus of restoration activity in the United States.

In September 2017, replicate benthic macroinvertebrate samples were collected by Rockland County Soil and Water Conservation District. The data was collected and analyzed in anticipation of future road crossing culvert upgrades and will be used to document any improvements in resident benthic community structure. Sample collection, sample processing, metric calculation, and stream biological impairment criteria analysis followed NYS DEC SBU procedures (Bode et al. 2002, Bode et al. 1990). Sites for assessment were selected by Rockland County Soil Water Conservation District.

Methods

Upstream/Reference Site Selection

The selected reference site was approximately 1 mile below a small pond from which the stream originates and approximately 0.3 mile from the first culvert. Reference sites are ideally located upstream from the potential impact of the investigative sites. Where upstream conditions do not meet reference site criteria (e.g. recently disturbed areas, areas of dense

macrophyte growth, areas within one mile of an impoundment release), a reference site may be selected in a comparable watershed (Bode et al. 1990).

The Above Sherwood culvert station was located 0.3 miles downstream from the Reference station. The Below Sherwood culvert station was located 110 feet downstream from the Above Sherwood Culvert station.

The Above Church Street culvert station was located approximately 325 feet downstream from the Below Sherwood culvert station, and the Below Church Street culvert station was located approximately 325 feet downstream from the Above Church culvert station (Figure 1).

Reference and investigative sites must meet habitat comparability criteria. The median substrate particle size between the sites cannot deviate by more than 3 phi units; substrate embeddedness cannot differ by more than 50%; current velocity should be within 30-150 cm/s and velocity cannot differ by more than 50% between the sites; and canopy cover cannot differ by more than 50% between the sites. In addition, both sites must be sampled using the same collection method (Bode et al. 1990). The habitat comparability criteria were satisfied between all sites (Table 2 and 4).

Field Collection

Three replicate macroinvertebrate samples were collected from five sites in Cedar Pond Brook (Figure 1), following methods outlined by NYS SBU (Bode et al. 2002). An additional fourth replicate was also collected in case of replicate similarity concerns. Ambient water quality parameters were collected (dissolved oxygen, temperature, specific conductance, salinity, and pH) and qualitative habitat assessments were performed concurrently with macroinvertebrate collections (Bode et al. 2002).

Sorting and Organism Identification

Sample sorting and identification followed NYS DEC laboratory methods (Bode et al. 2002). The subsamples were rinsed with tap water in a U.S. number 40 standard sieve to remove fine particles and the remaining material was placed in a 12 x18 pan and evenly distributed with water. A small amount of the sample was randomly removed with a spatula and placed in a Petri dish with water. These portions were then examined under a dissecting microscope to separate organisms from debris (Bode et al. 2002). Macroinvertebrates were then placed in vials containing 70% alcohol. This sorting procedure was repeated for each subsample until 100 organisms were removed. Organisms were identified to lowest taxonomic resolution as outlined in the NYS DEC SBU Quality Assurance Work Plan (QAWP) (Bode et al. 2002), unless specimens were immature or damaged,

and enumerated using a dissecting microscope. Oligochaetes and chironomids were slide-mounted in CMCP-10 mounting medium and viewed using a compound microscope.

Replicate Similarity

There must be at least 50% similarity between replicates in order to accurately assess any type of biological impairment (Bode et al. 1990). Bray-Curtis cluster analyses were performed on all taxa abundances (square root transformed) to reveal similarities between replicate samples for all sites. A dendrogram was generated using the Bray-Curtis cluster analysis to visually determine replicate similarity.

Macroinvertebrate Metrics and Impairment Criteria Analysis

The following metrics were calculated for each replicate, then averaged for numerical comparison among sites: Taxa richness, biotic index, species dominance, EPT richness, and percent model affinity.

Violation of one or more of the criteria (Table 1), based on averaged metric results, between the suspected impacted and downstream sites, and between impacted and reference sites indicates provisional impairment (Bode et al. 1990). If metric results suggest provisional impairment, then a Student's T-test is performed to determine if the results are statistically significant (α=0.05). If the test results are statistically significant then biological impairment is indicated (Bode et al. 2002). Biological impairment criteria is used in this study to assess the influence that physical habitat due to culvert design may have on benthic macroinvertebrate community structure.

Results

Replicate Similarity

Similarity analysis results between replicate samples did not meet the required ≥50% similarity at the Reference station, Above Sherwood culvert, and Below Church culvert stations despite the processing of all four replicate samples. (Figures 2a and 3a). Therefore the three most similar replicate samples at these stations were used in the analysis.

Macroinvertebrate Parameters and Impairment Criteria Analysis

The following parameters were calculated for each replicate, and then averaged for comparison: Species richness, biotic index, species dominance, EPT richness, and percent model affinity (Table 3 and 5).

Mean metric results for the Above Sherwood culvert site and the Below Sherwood culvert site, when compared to the Reference site, indicated that there is provisional biological impairment based on the EPT richness, biotic index, and species dominance metrics. Biological impairment was confirmed at the Below Sherwood culvert site compared to the Reference site using Student's T-test of significance for EPT richness and the biotic index with $p = <0.025$ and $p = <0.002$ respectively. Species mean metric results for the Above Church culvert site and the Below Church culvert site, when compared to the Reference site, indicated that there is provisional biological impairment based on the species dominance metric. Biological impairment was confirmed at the Below Church culvert site compared to the Reference Site using Student's T-test of significance ($p = <0.005$ for species dominance).

Ambient Water Quality Parameters

Temperature, dissolved oxygen, dissolved oxygen saturation, specific conductance, and pH results were consistent among all sites, despite the sample collection occurring on different days during the month (Table 7).

Discussion

The Reference station community structure consisted of a diverse group of riffle riverine benthic macroinvertebrates including the Plecoptera Tallaperla sp. and Sweltsa sp.; the Ephemeroptera *Baetis flavistriga* and *Baetis tricaudatus*; the Trichoptera *Cheumatopsyche sp*., *Chimarra aterrima*, *Dolophilodes sp*., *Polycentropus sp*., *Glossosoma sp*. and *Hydropsyche betteni;* and the Chironomidae *Diamesa sp., Parametriocnemus sp.,* and *Chaetocladius sp*. (Table 6). Several of these species are indicative of cold headwater streams. The Reference community structure was most similar, as would be expected, to the Above Sherwood culvert station with minimal changes occurring in the community structure between these stations. The Bray Curtis similarity and non-metric multi-dimensional scaling (NMS) (Figures 2 a and b) provide a visual of the community similarity and grouping between these two stations. A significant difference in the community structure at the

Below Sherwood culvert station is evident, however, with a complete loss of the Plecoptera and Ephemeroptera, and both a complete loss of some Trichoptera and a significant reduction in the total number of individual Trichoptera compared to the Above and Reference stations (Table 6). The community at the Below Sherwood culvert station shifts to a more sluggish pool habitat community that is dominated by the Chironomidae family, which includes *Cricotopus bicinctus, Cricotopus/Orthcladius Complex groups, Microtendipes pedellus gr., Paratanytarsus sp.* and *Dicrotendipes sp.* Biological impairment is indicated based on the decrease of EPT richness and the increase in the biotic index metric scores.

The Above Church culvert station benthic macroinvertebrate community rebounds to a community similar to that of the Reference station, with the reappearance of all except the Plecopteran *Tallaperla sp*. and Chironomidae *Chaetocladius sp*., and *Parametriocnemus sp* (Table 6). An increase in the abundance, compared to the reference station, of the filter feeding Trichopteran *Cheumatopsyche sp*. occurs, however, at both Church culvert stations. This abundance (i.e. dominance) increase indicates biological impairment at the Below Church culvert station based on the species dominance metric scores.

In summary, the application of stream biological impairment criteria analysis indicates that the Below Sherwood and Below Church culvert stations are biologically impaired relative to the Reference station. The culverts are probably influencing the resident benthic macroinvertebrate community structure, as one would expect no significant differences between any of these stations, which are all within less than a half mile of the reference station. It is reasonable to expect that an improved culvert design at each location will result in improvement of the biological impairment and that a robust, diverse riffle benthic macroinvertebrate community would flourish at each station.

Literature Cited

Bode, R.W., M.A. Novak, L.A. Abele. 1990. Biological impairment criteria for flowing waters in New York State. Stream Biomonitoring Unit, Division of Water, New York State Department of Environmental Conservation, Albany, NY.

Smith, A.J. 2018. Quality assurance work plan for biological stream monitoring in New York State. Stream Biomonitoring Unit, Division of Water, New York State Department of Environmental Conservation, Albany, NY.

Clesceri, L.S., A.E. Greenberg, and A.D. Eaton, editors. 1998. Standard methods for examination of water and wastewater, 20th edition. American Public Health Association, Washington, D.C.

Environmental Protection Agency. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600/R-93/100).

Hilsenhoff, W.L. 1987. An improved biotic index of organic stream pollution. *Great Lakes Entomol*. 20:31-39.

Tables and Figures

Table 1. Descriptions of the metrics calculated for each replicate sample and criteria required to indicate impairment

Metric	Description	**Impairment Criteria (**difference between reference and impacted sites**)**
Taxa Richness	Taxa richness is the total number of unique species or taxa found in the sub-sample. Higher taxa richness values are generally associated with undisturbed sediment conditions	-8
EPT Richness	EPT richness is the total number of taxa represented by Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These groups are composed largely of mostly clean water taxa and their presence usually indicates good water quality conditions.	-4
Biotic Index	Biotic Index, or the Hilsenhoff Biotic Index (Hilsenhoff 1987), is calculated by multiplying the number of individuals of each species or taxa by its assigned tolerance value to organic material in the substrate, summing these products, and dividing by the total number of individuals. Tolerance values range from intolerant (0) to tolerant (10). High biotic index values are suggestive of organically enriched condition, while low values indicate naturally occurring, ambient conditions.	+1.5
Percent model affinity	Percent model affinity measures the similarity to a model non-impacted community based on the abundance of 7 taxa groups (Bode et al. 2002). Kick sample model community is composed of 40% Ephemeroptera, 5% Plecoptera, 10% Trichoptera, 10% Coleoptera, 20% Chironomidae, 5% Oligochaeta, and 10% Other.	-20
Species dominance	Species dominance is a measure of community balance, or how evenly the most numerous species contribute to the community. High dominance values indicate unbalanced communities strongly dominated by one or more numerous species.	+15

Table 2. Cedar Pond Brook habitat comparability criteria results Sherwood culvert.

Station	Referecnce Site	Above Sherwood Culvert	Below Sherwood Culvert	Difference Ref & Above	Difference Ref & Below	Criteria	Meets criteria
Current (cm/sec)	6.71	2.39	14.67	4.32	7.96	<50%	Yes/Yes
Canopy (%)	90	90	79	0	11	<50%	Yes/Yes
Embeddedness (%)	25	25	25	0	0	<50%	Yes/Yes
% Rock	0.15	0.19	0.19				
% Rubble	0.10	0.20	0.29				
% Gravel	0.52	0.36	0.30				
% Sand	0.22	0.16	0.14				
% Silt	0.01	0.09	0.08				
Median particle size	-2.905	-2.995	-3.505	0.09	0.6	≤3 units	Yes/Yes

Table 3. Summary of the average community metric results for Cedar Pond Brook Sherwood culvert.

Location	Site	N	EPT Richness	Biotic Index	Taxa Richness	Percent Model Affinity	Species Dominance
Reference	5.17	3	7.33	4.88	22.00	45.00	27.67
Above Sherwood	4.89	3	9.00	5.68	22.67	48.00	25.00
Below Sherwood	4.85	3	3.00	6.91	20.67	41.00	45.33
	Criteria		-4	+1.5	-8	-20	+15
	Biological Impact		Yes	Yes	No	No	Yes

Table 4. Cedar Pond Brook habitat comparability criteria results Church culvert.

Station	Referecnce Site	Above Church Culvert	Below Church Culvert	Difference Ref & Above	Difference Ref & Below	Criteria	Meets criteria
Current (cm/sec)	6.71	3.45	6.75	3.26	0.04	<50%	Yes/Yes
Canopy (%)	90	90	60	0	30	<50%	Yes/Yes
Embeddedness (%)	25	50	50	25	25	<50%	Yes/Yes
% Rock	0.15	0.09	0.07				
% Rubble	0.10	0.32	0.41				
% Gravel	0.52	0.43	0.43				
% Sand	0.22	0.12	0.06				
% Silt	0.01	0.04	0.03				
Median particle size	-2.905	-3.59	-4.2	0.685	1.295	≤3 units	Yes/Yes

Table 5. Summary of the average community metric results for Cedar Pond Brook Church culvert.

Location	Site	N	EPT Richness	Biotic Index	Taxa Richness	Percent Model Affinity	Species Dominance
Reference	5.17	3	7.33	4.88	22.00	45.00	27.67
Above Church	4.79	3	10.00	4.61	20.33	43.67	35.00
Below Church	4.77	3	6.67	5.11	24.67	48.67	48.33
	Criteria		-4	+1.5	-8	-20	+15
	Biological Impact		No	No	No	No	Yes

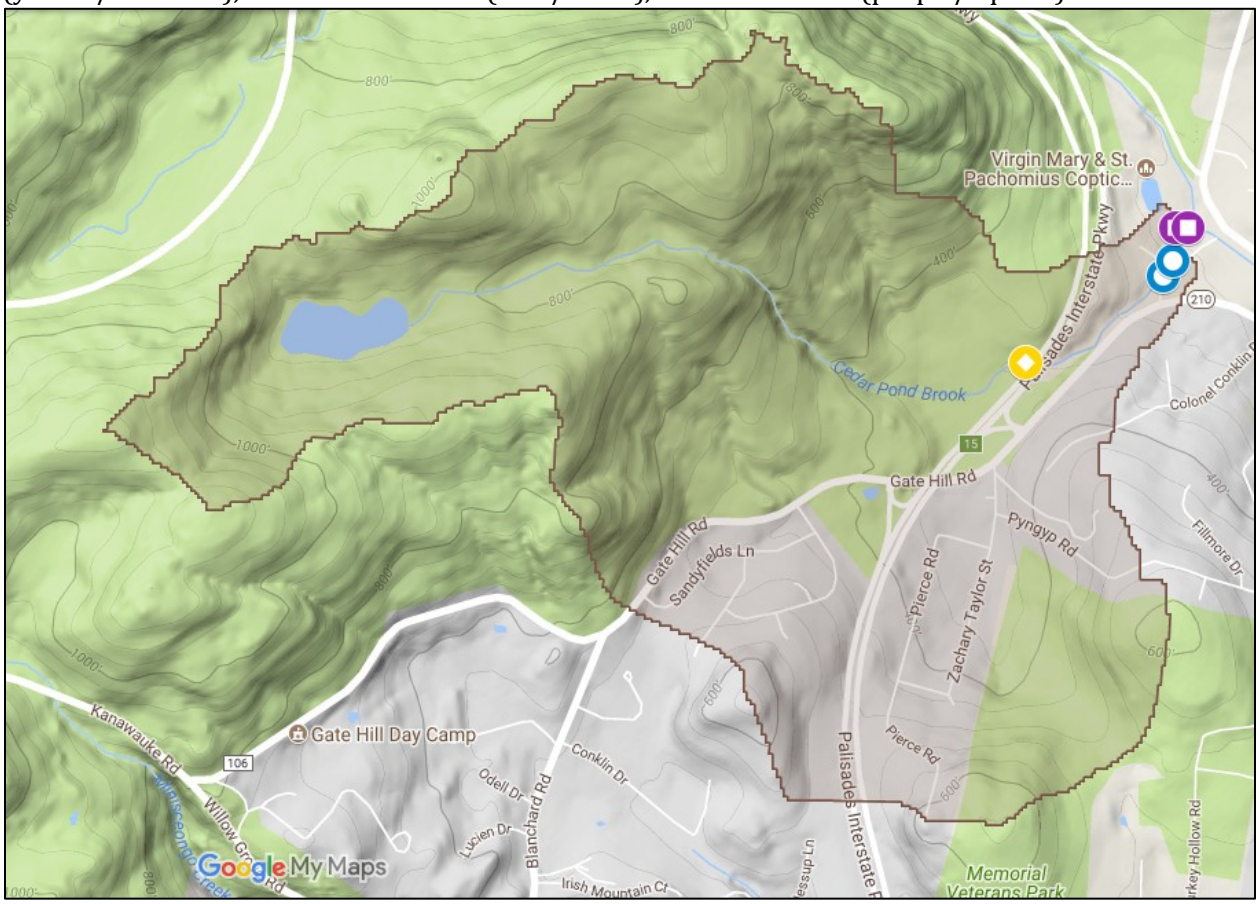
Table 6. Abbreviated benthic macroinvertebrate taxa list.

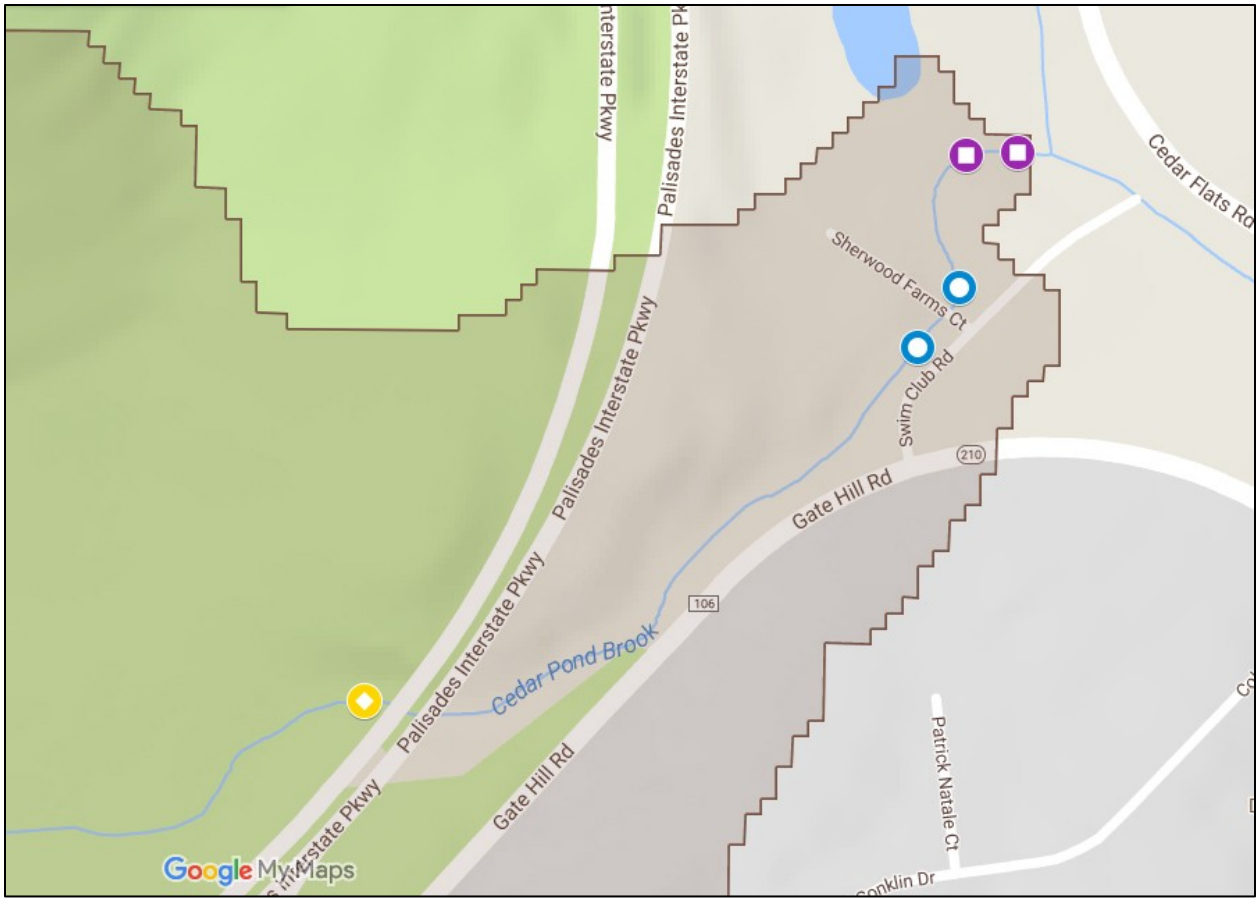
Taxon/Station	Reference	Above Sherwood culvert	Below Sherwood culvert	Above Church culvert	Below Church culvert
Baetis flavistriga	4	10		10	19
Baetis tricaudatus	1	1		9	1
Chaetocladius sp.	2	1			
Cheumatopsyche sp.	71	48	3	105	145
Chimarra aterrima?	27	13		24	6
Diamesa sp.	22	13	1	8	2
Dolophilodes sp.	7	2		19	1
Glossosoma sp.	3	12		10	
Hydropsyche betteni	17	26	1	11	2
Parametriocnemus sp.	1				
Polycentropus sp.	4	10	2	2	2
Sweltsa sp.	1	2		2	1
Tallaperla sp.	1				

Table 7. Ambient water quality parameters

Station	Date	Temp (deg C)	Spec Cond (µS/cm)	pH	DO (mg/L)	DO % Sat	Salinity
Reference Station	9/11/2017	14.22	632	8.01	10.29	105	0.31
Above Sherwood	9/7/2017	16.45	574	8.04	9.33	95.7	0.28
Below Sherwood	9/26/2017	19.41	755	8.03	8.79	95.8	0.37
Above Church	9/20/2017	19.12	702	8.08	9.12	98.8	0.34
Below Church	9/21/2017	19.6	711	8.14	9.16	100.1	0.35

Figure 1. Maps of Cedar Pond Brook watershed and benthic survey locations: Reference station (yellow/diamond), Sherwood stations (blue/circle), Church stations (purple/square).

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Palisades Interstate Pkwy
Palisades Interstate Pkwy
Cedar Flats Rd
Sherwood Farms Ct
Swim Club Rd
Gate Hill Rd
210
106
Cedar Pond Brook
Gate Hill Rd
Patrick Natale Ct
Google My Maps

Figure 2. a.) Bray-Curtis dendrogram of community structure similarity (at genus/species level) for Cedar Pond Brook among replicated benthic samples at the Reference station, Above and Below Sherwood culvert. Dashed red lines indicate a statistically significant similarity between replicate samples (SIMPROF test). b.) Bi-plots with dendogram similarity overlays resulting from non-metric multidimensional scaling (NMS) ordination of macroinvertebrates of each replicate sample.

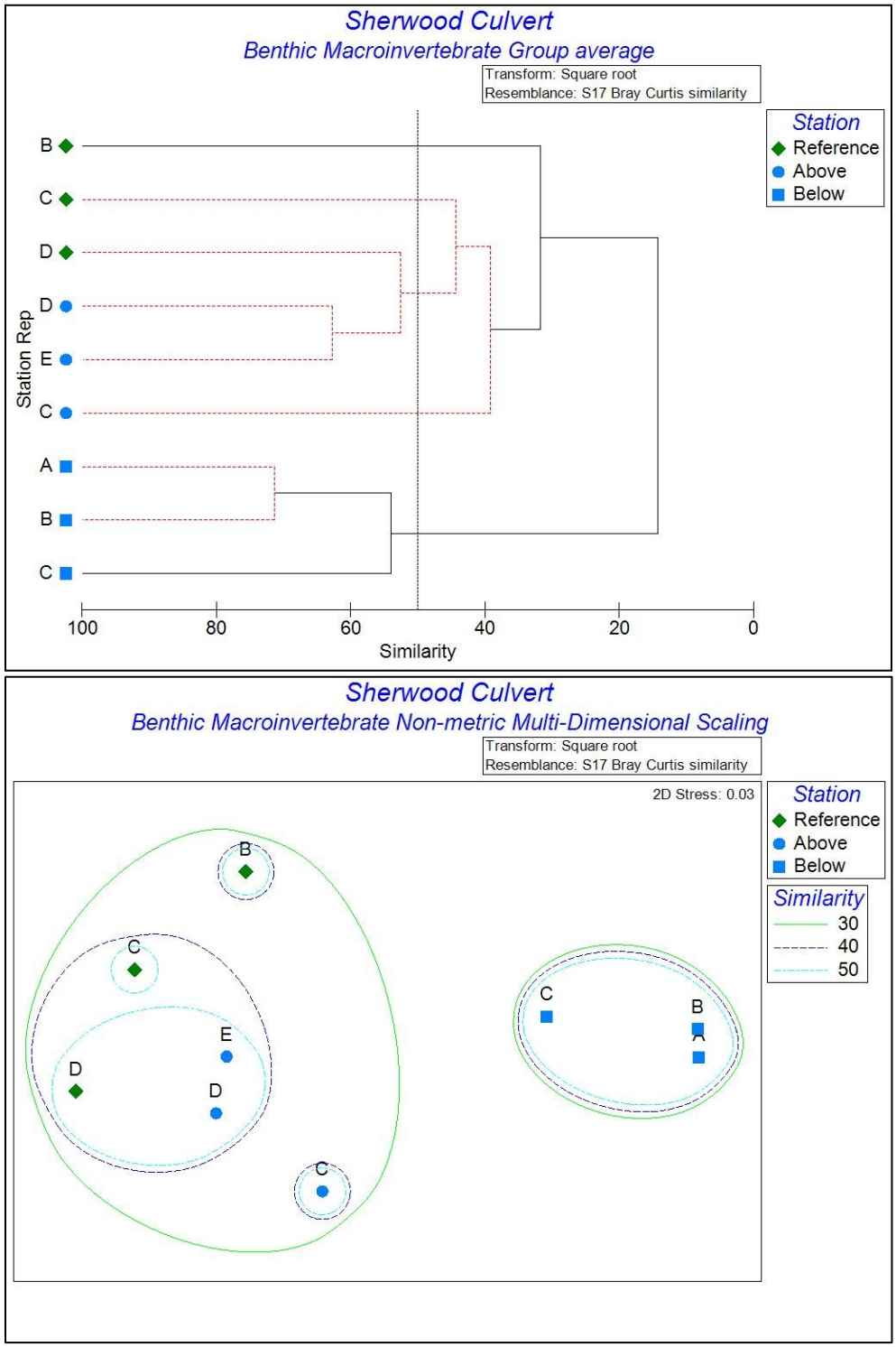
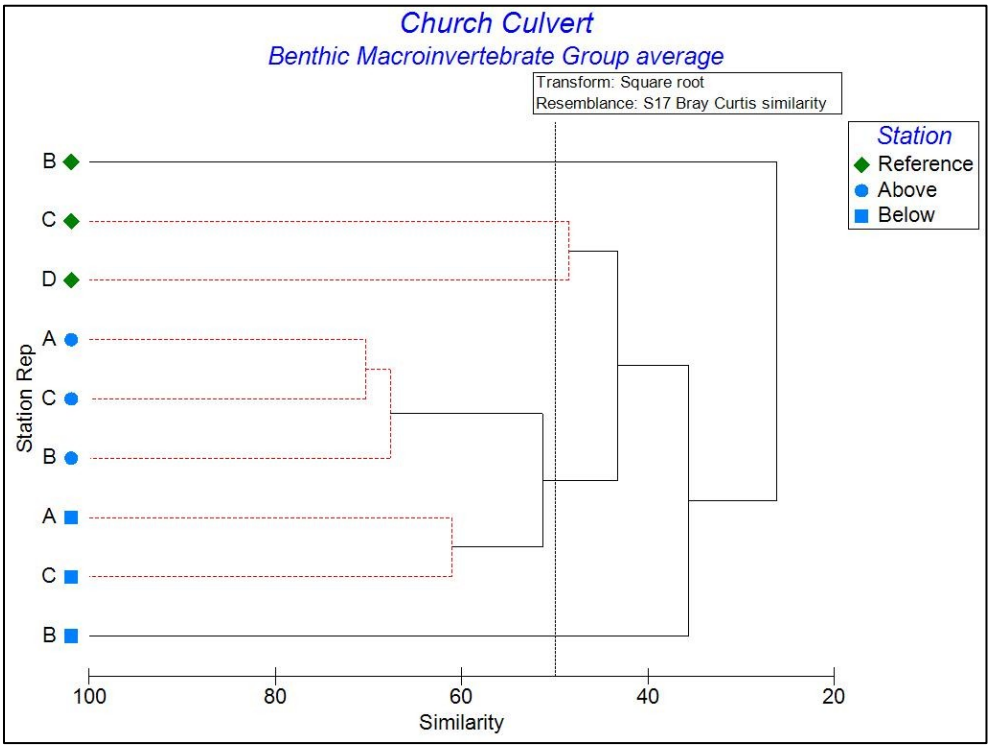
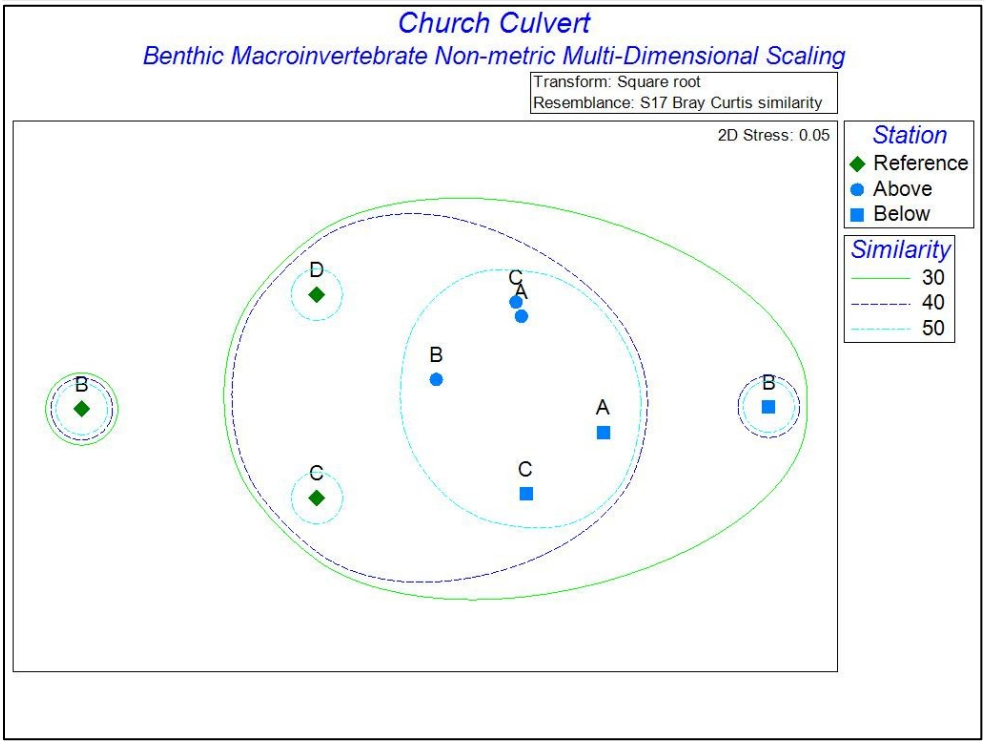


Figure 3. a.) Bray-Curtis dendrogram of community structure similarity (at genus/species level) for Cedar Pond Brook among replicated benthic samples at the Reference station, Above and Below Church culvert. Dashed red lines indicate a statistically significant similarity between replicate samples (SIMPROF test). b.) Bi-plots with dendogram similarity overlays resulting from non-metric multidimensional scaling (NMS) ordination of macroinvertebrates of each replicate sample.





Appendix A: Field and Benthic Data Summary Sheets

Stream Field Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

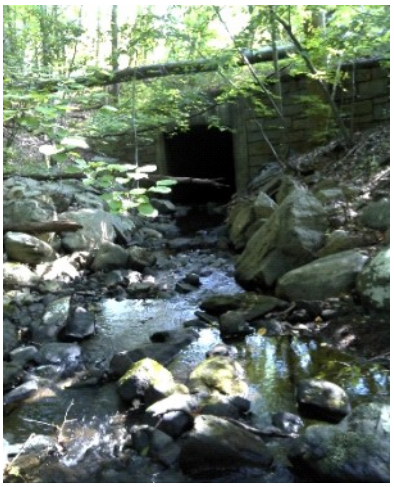
Waterbody: **Cedar Pond Brook** Latitude: **41.23801**
River Basin: **Cedar Pond** Station: **Upstream Reference** Longitude: **-74.03084**
County/State: **Rockland/NY** Coll Date: **9/11/2017** Field Crew: **N. Laible**
Site description:

Physical Characteristics	
Depth (meters):	**0.062**
Width (meters):	**2.95**
Current (cm/sec):	**6.71**
Canopy (%):	**90**
Substrate	
Rock (%):	**10**
Rubble (%):	**60**
Gravel (%):	**5**
Sand (%):	**15**
Silt (%):	**10**
Embeddedness (%):	

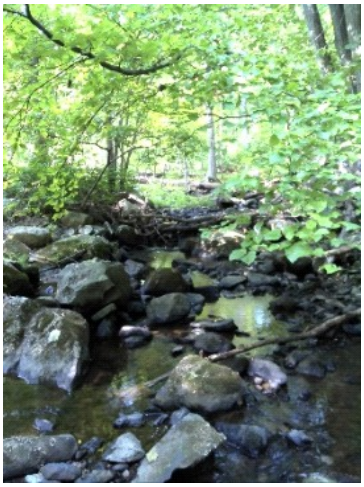
Chemical Measurements	
DO (mg/L):	**10.29**
DO sat. (%):	**105**
Temperature (C):	**14.22**
Spec. Conduct. (umhos):	**632**
Baro pressure:	
pH:	**8.01**
Salinity (PSS):	**0.31**

Biological Attributes	
Aquatic vegetation	
Macrophytes:	
Diatoms:	**Yes**
Algae-suspended:	**No**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**x**
Plecoptera:	
Trichoptera:	**x**
Coleoptera:	**x**
Megaloptera:	**x**
Odonata:	**x**
Chironomidae:	**x**
Simuliidae:	
Decapoda:	**x**
Gammaridae:	
Mollusca:	
Oligochaeta:	**x**
Other macro's:	
Field Faunal Condition:	**Good**

Flow



Flow



Notes/observations::

Upstream of PIP inlet entering Harriman State Park

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Reference_A**
WAA ID: **680.3-001**

Latitude: **41.23801**
Longitude: **-74.03084**
Collection Date: **9/11/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	1
	Planorbidae	Undetermined Planorbidae	1
COLEOPTERA	Elmidae	Microcylloepus pusillus	1
		Microcylloepus pusillus	10
DIPTERA	Chironomidae	Chaetocladius sp.	1
		Rheotanytarsus pellucidus	1
		Tanytarsus sp.	1
		Diamesa sp.	3
EPHEMEROPTERA	Baetidae	Baetis flavistriga	1
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	3
ODONATA	Aeschnidae	Boyeria vinosa	1
	Calopterygidae	Calopteryx sp.	3
TRICHOPTERA	Brachycentridae	Brachycentrus sp.	1
	Leptoceridae	Mystacides sp.	2
	Psychomyiidae	Lype diversa	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	3

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Reference_B**
WAA ID: **680.3-002**

Latitude: **41.23801**
Longitude: **-74.03084**
Collection Date: **9/11/2017**

Order	Family	Final Determination	Total #
		Boyeria grafiana	2
COLEOPTERA	Elmidae	Stenelmis sp.	1
		Ancyronyx sp.	1
		Microcylloepus pusillus	1
	Hydrophilidae	Undetermined Hydrophilidae	1
DIPTERA	Chironomidae	Diamesa sp.	11
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	7
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	8
ODONATA	Gomphidae	Undetermined Gomphidae	6
TRICHOPTERA	Hydropsychidae	Hydropsyche betteni	1
		Cheumatopsyche sp.	8
	Leptoceridae	Mystacides sp.	1
		Oecetis sp.	1
	Polycentropodidae	Polycentropus sp.	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	3
	Naididae	Undetermined Naididae	1

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Reference_C**
WAA ID: **680.3-003**

Latitude: **41.23801**
Longitude: **-74.03084**
Collection Date: **9/11/2017**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Microcylloepus pusillus	2
DECAPODA	Cambaridae	Cambarus sp.	1
DIPTERA	Chironomidae	Chaetocladius sp.	1
		Polypedilum aviceps	1
		Rheotanytarsus pellucidus	1
		Thienemannimyia gr. spp.	1
		Diamesa sp.	5
	Simuliidae	Simulium sp.	3
	Tipulidae	Tipula sp.	1
EPHEMEROPTERA	Baetidae	Baetis flavistriga	2
		Baetis tricaudatus	1
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	8
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	4
ODONATA	Aeschnidae	Boyeria vinosa	2
	Calopterygidae	Calopteryx maculata	1
	Cordulegastridae	Cordulegaster sp.	2
	Gomphidae	Hagenius sp.	2
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
	Nemouridae	Undetermined Nemouridae	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	1
	Hydropsychidae	Cheumatopsyche sp.	28
		Ceratopsyche sp.	6
	Philopotamidae	Dolophilodes sp.	4
		Chimarra aterrima?	15
	Polycentropodidae	Polycentropus sp.	3
TRICLADIDA		Undetermined Turbellaria	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1
VENEROIDEA	Pisidiidae	Pisidium sp.	1

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Reference_D**
WAA ID: **680.3-019**

Latitude: **41.23801**
Longitude: **-74.03084**
Collection Date: **9/11/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Fossaria sp.	1
	Planorbidae	Gyraulus sp.	1
COLEOPTERA	Elmidae	Macronychus glabratus	6
		Stenelmis sp.	1
	Psephenidae	Ectopria sp.	1
DIPTERA	Chironomidae	Diamesa sp.	6
		Tvetenia bavarica gr.	1
		Chaetocladius sp.	1
		Parametriocnemus sp.	1
	Simuliidae	Simulium sp.	3
EPHEMEROPTERA	Baetidae	Baetis flavistriga	2
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	2
ODONATA	Calopterygidae	Calopteryx sp.	1
	Gomphidae	Undetermined Gomphidae	1
PLECOPTERA	Peltoperlidae	Tallaperla sp.	1
RHYNCHOBDELLIDA		Undetermined Hirudinea	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	2
	Hydropsychidae	Cheumatopsyche sp.	35
		Hydropsyche betteni	16
	Philopotamidae	Dolophilodes sp.	3
		Chimarra aterrima?	12
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	2

0 = taxon identified in large/rare scan

Stream Field Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

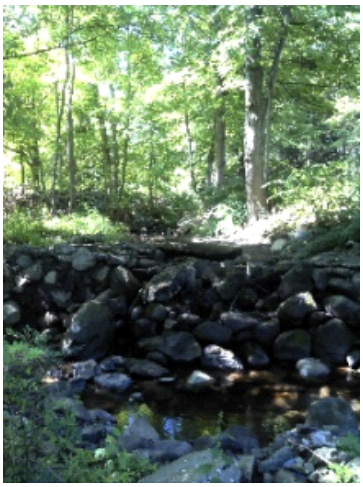
Waterbody: **Cedar Pond Brook** Latitude: **41.24**
River Basin: **Cedar Pond** Station: **Above Sherwood** Longitude: **-74.02664**
County/State: **Rockland/NY** Coll Date: **9/7/2017** Field Crew: **N. Laible**
Site description:

Physical Characteristics	
Depth (meters):	**0.34**
Width (meters):	**3.3**
Current (cm/sec):	**2.39**
Canopy (%):	**90**
Substrate	
Rock (%):	**10**
Rubble (%):	**60**
Gravel (%):	**15**
Sand (%):	**5**
Silt (%):	**10**
Embeddedness (%):	

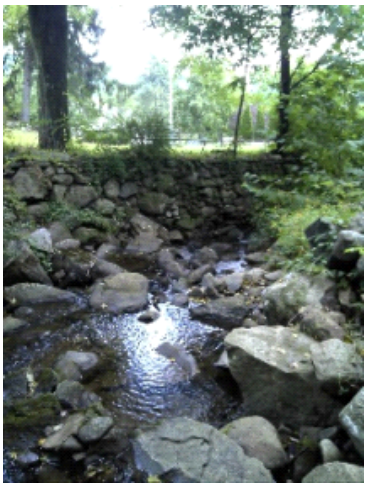
Chemical Measurements	
DO (mg/L):	**9.33**
DO sat. (%):	**95.7**
Temperature (C):	**16.45**
Spec. Conduct. (umhos):	**574**
Baro pressure:	
pH:	**8.04**
Salinity (PSS):	**0.28**

Biological Attributes	
Aquatic vegetation	
Macrophytes:	
Diatoms:	**Yes**
Algae-suspended:	**No**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**x**
Plecoptera:	**x**
Trichoptera:	**x**
Coleoptera:	**x**
Megaloptera:	**x**
Odonata:	**x**
Chironomidae:	**x**
Simuliidae:	
Decapoda:	**x**
Gammaridae:	
Mollusca:	**x**
Oligochaeta:	**x**
Other macro's:	
Field Faunal Condition:	**Very Good**

Flow



Flow



Notes/observations::

Kick samples are taken side by side (A & B upstream; C & D downstream; E downstream); Virgol Renda used to see larger fish on his property but the size of fish has decreased over the years.

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Sherwood_A**
WAA ID: **680.3-004**

Latitude: **41.24**
Longitude: **-74.02664**
Collection Date: **9/7/2017**

Order	Family	Final Determination	Total #
DIPTERA	Ceratopogonidae	Atrichopogon sp.	1
	Chironomidae	Rheotanytarsus pellucidus	3
		Parametriocnemus sp.	1
		Rheotanytarsus exiguus gr.	1
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Centroptilum sp.	2
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	2
ISOPODA	Asellidae	Caecidotea sp.	1
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	7
ODONATA	Aeschnidae	Boyeria vinosa	1
	Gomphidae	Hagenius sp.	1
OSTRACODA		Undetermined Ostracoda	3
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	4
	Leptoceridae	Oecetis sp.	1
		Mystacides sp.	2
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	4

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Sherwood_B**
WAA ID: **680.3-005**

Latitude: **41.24**
Longitude: **-74.02664**
Collection Date: **9/7/2017**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Microcylloepus pusillus	2
		Stenelmis sp.	1
		Oulimnius sp.	1
	Psephenidae	Psephenus herricki	4
		Ectopria sp.	1
DECAPODA	Cambaridae	Cambarus sp.	0
DIPTERA	Chironomidae	Thienemannimyia gr. spp.	1
	Simuliidae	Simulium sp.	2
	Tipulidae	Tipula sp.	1
		Antocha sp.	1
EPHEMEROPTERA	Baetidae	Baetis flavistriga	7
		Baetis tricaudatus	1
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	3
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	2
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	1
ODONATA	Gomphidae	Stylogomphus sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	2
	Hydropsychidae	Cheumatopsyche sp.	36
		Ceratopsyche sp.	2
		Ceratopsyche alhedra	1
	Philopotamidae	Chimarra aterrima?	10
TRICLADIDA		Undetermined Turbellaria	4
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	16

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Sherwood_C**
WAA ID: **680.3-006**

Latitude: **41.24**
Longitude: **-74.02664**
Collection Date: **9/7/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	1
	Planorbidae	Undetermined Planorbidae	1
COLEOPTERA	Elmidae	Oulimnius sp.	1
	Psephenidae	Psephenus herricki	8
DIPTERA	Chironomidae	Undetermined Tanytarsini	1
		Parakiefferiella sp.	1
	Tipulidae	Antocha sp.	3
EPHEMEROPTERA	Baetidae	Baetis flavistriga	3
		Baetis tricaudatus	1
		Centroptilum sp.	2
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	1
ISOPODA	Asellidae	Caecidotea sp.	2
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	1
ODONATA	Gomphidae	Stylogomphus sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	2
	Hydropsychidae	Cheumatopsyche sp.	24
		Ceratopsyche sparna	5
	Philopotamidae	Chimarra aterrima?	3
	Polycentropodidae	Polycentropus sp.	2
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	14
	Naididae	Nais sp.	1

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Sherwood_D**
WAA ID: **680.3-017**

Latitude: **41.24**
Longitude: **-74.02664**
Collection Date: **9/7/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Ancylidae	Ferrissia sp.	1
	Planorbidae	Helisoma sp.	1
		Micromenetus sp.	1
COLEOPTERA	Elmidae	Macronychus glabratus	3
	Psephenidae	Ectopria sp.	2
		Psephenus herricki	3
DIPTERA	Chironomidae	Tanytarsus sp.	2
		Chaetocladius sp.	1
		Cricotopus bicinctus	1
		Rheotanytarsus pellucidus	2
		Diamesa sp.	10
	Tipulidae	Tipula sp.	1
EPHEMEROPTERA	Baetidae	Baetis sp.	1
		Baetis flavistriga	1
ISOPODA	Asellidae	Caecidotea sp.	1
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	1
ODONATA	Aeschnidae	Boyeria vinosa	1
	Gomphidae	Stylogomphus sp.	2
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	4
	Hydropsychidae	Hydropsyche betteni	15
		Cheumatopsyche sp.	19
	Lepidostomatidae	Lepidostoma sp.	1
	Philopotamidae	Dolophilodes sp.	2
		Chimarra aterrima?	8
	Polycentropodidae	Polycentropus sp.	4
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	11

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Sherwood_E**
WAA ID: **680.3-018**

Latitude: **41.24**
Longitude: **-74.02664**
Collection Date: **9/7/2017**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Oulimnius sp.	1
		Macronychus glabratus	3
	Psephenidae	Ectopria sp.	2
		Psephenus herricki	4
DIPTERA	Chironomidae	Thienemannimyia gr. spp.	1
		Rheotanytarsus pellucidus	2
		Diamesa sp.	3
		Stenochironomus sp.	1
EPHEMEROPTERA	Baetidae	Baetis flavistriga	6
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	2
ODONATA	Gomphidae	Undetermined Gomphidae	2
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	6
	Hydropsychidae	Cheumatopsyche sp.	5
		Hydropsyche betteni	11
	Leptoceridae	Mystacides sp.	1
	Philopotamidae	Chimarra aterrima?	2
		Chimarra obscura	1
	Polycentropodidae	Polycentropus sp.	4
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	21

0 = taxon identified in large/rare scan

Stream Field Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

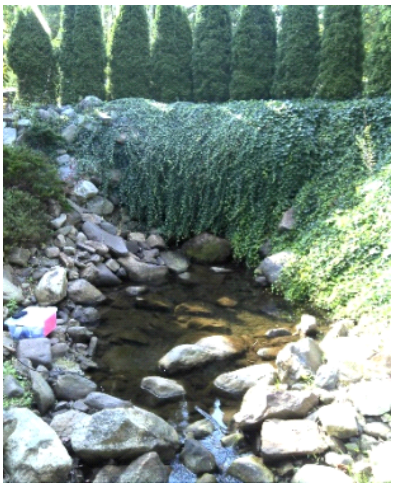
Waterbody: **Cedar Pond Brook** Latitude: **41.24037**
River Basin: **Cedar Pond** Station: **Below Sherwood** Longitude: **-74.02646**
County/State: **Rockland/NY** Coll Date: **9/26/2017** Field Crew: **N. Laible**
Site description:

Physical Characteristics	
Depth (meters):	**0.267**
Width (meters):	**3.8**
Current (cm/sec):	**14.67**
Canopy (%):	**70**
Substrate	
Rock (%):	**40**
Rubble (%):	**30**
Gravel (%):	**10**
Sand (%):	**10**
Silt (%):	**10**
Embeddedness (%):	

Chemical Measurements	
DO (mg/L):	**8.79**
DO sat. (%):	**95.8**
Temperature (C):	**19.41**
Spec. Conduct. (umhos):	**755**
Baro pressure:	
pH:	**8.03**
Salinity (PSS):	**0.37**

Biological Attributes	
Aquatic vegetation	
Macrophytes:	
Diatoms:	**Yes**
Algae-suspended:	**Yes**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**x**
Plecoptera:	
Trichoptera:	**x**
Coleoptera:	
Megaloptera:	**x**
Odonata:	**x**
Chironomidae:	**x**
Simuliidae:	**x**
Decapoda:	**x**
Gammaridae:	
Mollusca:	**x**
Oligochaeta:	**x**
Other macro's:	**x**
Field Faunal Condition:	**Good**

Flow



Flow

Notes/observations::

Collected using net jab/ sweep method for 5 minutes and sweep motion to collect macros. Method used at samples A,B, C, and D. ; slow moving stream.

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Sherwood_A**
WAA ID: **680.3-007**

Latitude: **41.24037**
Longitude: **-74.02646**
Collection Date: **9/26/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	8
	Physidae	Undetermined Physidae	1
	Planorbidae	Undetermined Planorbidae	4
COLEOPTERA	Elmidae	Oulimnius sp.	2
DIPTERA	Chironomidae	Dicrotendipes sp.	50
		Paratanytarsus sp.	6
		Cricotopus/Orthocladius Complex	6
		Microtendipes pedellus gr.	2
		Cricotopus bicinctus	2
		Tanytarsus sp.	1
		Rheotanytarsus exiguus gr.	1
	Ephydridae	Undetermined Ephydridae	2
	Tipulidae	Tipula sp.	1
EPHEMEROPTERA	Ephemerellidae	Eurylophella sp.	2
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	5
ISOPODA	Asellidae	Caecidotea sp.	1
ODONATA	Gomphidae	Stylogomphus sp.	1
TRICHOPTERA	Leptoceridae	Mystacides sp.	3
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	2

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Sherwood_B**
WAA ID: **680.3-008**

Latitude: **41.24037**
Longitude: **-74.02646**
Collection Date: **9/26/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	8
	Physidae	Physella sp.	3
	Planorbidae	Undetermined Planorbidae	2
COLEOPTERA	Elmidae	Oulimnius sp.	2
	Psephenidae	Psephenus herricki	1
DIPTERA	Chironomidae	Cricotopus bicinctus	1
		Cricotopus/Orthocladius Complex	2
		Microtendipes pedellus gr.	3
		Paratanytarsus sp.	3
		Dicrotendipes sp.	57
		Tanytarsus sp.	1
	Ephydridae	Undetermined Ephydridae	1
EPHEMEROPTERA	Ephemerellidae	Serratella deficiens	1
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	7
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	1
TRICHOPTERA	Leptoceridae	Mystacides sp.	5
	Polycentropodidae	Polycentropus sp.	1
VENEROIDEA	Pisidiidae	Undetermined Pisidiidae	1

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Sherwood_C**
WAA ID: **680.3-009**

Latitude: **41.24037**
Longitude: **-74.02646**
Collection Date: **9/26/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Fossaria sp.	7
	Physidae	Physella sp.	1
	Planorbidae	Undetermined Planorbidae	1
COLEOPTERA	Elmidae	Oulimnius sp.	1
	Psephenidae	Psephenus herricki	1
DECAPODA	Cambaridae	Cambarus sp.	1
DIPTERA	Chironomidae	Dicrotendipes sp.	18
		Sublettea sp.	1
		Diamesa sp.	1
		Cricotopus bicinctus	29
		Microtendipes pedellus gr.	4
		Cricotopus/Orthocladius Complex	4
		Paratanytarsus sp.	2
		Tanytarsus sp.	1
	Tipulidae	Antocha sp.	5
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	8
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	1
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	2
ODONATA	Calopterygidae	Undetermined Calopterygidae	1
TRICHOPTERA	Hydropsychidae	Hydropsyche betteni	1
		Cheumatopsyche sp.	3
	Leptoceridae	Mystacides sp.	4
	Polycentropodidae	Polycentropus sp.	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1
VENEROIDEA	Pisidiidae	Undetermined Pisidiidae	1

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Sherwood_D**
WAA ID: **680.3-016**

Latitude: **41.24037**
Longitude: **-74.02646**
Collection Date: **9/26/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Fossaria sp.	4
		Stagnicola sp.	3
	Planorbidae	Gyraulus sp.	4
		Helisoma sp.	2
		Micromenetus sp.	2
COLEOPTERA	Elmidae	Macronychus glabratus	3
DIPTERA	Chironomidae	Dicrotendipes sp.	29
		Cricotopus bicinctus	6
		Paratanytarsus sp.	3
		Tribelos sp.	2
		Cricotopus/Orthocladius Complex	2
		Micropsectra sp.	1
		Microtendipes pedellus gr.	30
ODONATA	Gomphidae	Undetermined Gomphidae	1
PLECOPTERA	Nemouridae	Ostrocerca sp.	3
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	1
	Leptoceridae	Mystacides sp.	4

0 = taxon identified in large/rare scan

Stream Field Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

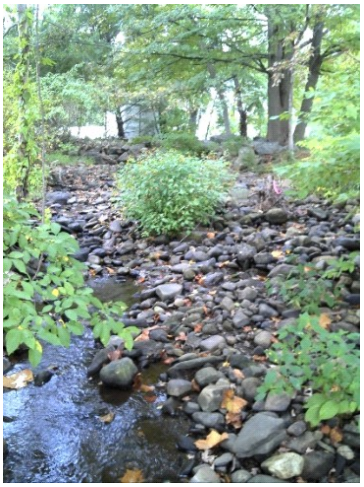
Waterbody: **Cedar Pond Brook** Latitude: **41.24114**
River Basin: **Cedar Pond** Station: **Above Church** Longitude: **-74.02615**
County/State: **Rockland/NY** Coll Date: **9/20/2017** Field Crew: **N. Laible**
Site description:

Physical Characteristics	
Depth (meters):	**0.068**
Width (meters):	**2.25**
Current (cm/sec):	**3.45**
Canopy (%):	**90**
Substrate	
Rock (%):	**10**
Rubble (%):	**50**
Gravel (%):	**20**
Sand (%):	**15**
Silt (%):	**5**
Embeddedness (%):	

Chemical Measurements	
DO (mg/L):	**9.12**
DO sat. (%):	**98.8**
Temperature (C):	**19.12**
Spec. Conduct. (umhos):	**702**
Baro pressure:	
pH:	**8.08**
Salinity (PSS):	**0.34**

Biological Attributes	
Aquatic vegetation	
Macrophytes:	
Diatoms:	**Yes**
Algae-suspended:	**No**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**x**
Plecoptera:	
Trichoptera:	**x**
Coleoptera:	**x**
Megaloptera:	**x**
Odonata:	**x**
Chironomidae:	
Simuliidae:	**x**
Decapoda:	
Gammaridae:	
Mollusca:	**x**
Oligochaeta:	**x**
Other macro's:	
Field Faunal Condition:	**Good**

Flow



Flow

Notes/observations::

A lot of leaves in sample; adjacent to Coptic Church.; Samples A & B are more upstream of C & D.

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Church_A**
WAA ID: **680.3-010**

Latitude: **41.24114**
Longitude: **-74.02615**
Collection Date: **9/20/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	1
COLEOPTERA	Elmidae	Oulimnius sp.	1
	Psephenidae	Psephenus herricki	15
DIPTERA	Chironomidae	Diamesa sp.	1
		Cricotopus/Orthocladius Complex	1
	Simuliidae	Simulium sp.	2
	Tipulidae	Antocha sp.	1
EPHEMEROPTERA	Baetidae	Baetis tricaudatus	5
		Acentrella ampla	1
		Baetis flavistriga	1
	Isonychiidae	Isonychia sp.	2
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	1
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	4
	Hydropsychidae	Cheumatopsyche sp.	35
		Hydropsyche betteni	3
	Lepidostomatidae	Lepidostoma sp.	1
	Philopotamidae	Dolophilodes sp.	9
		Chimarra aterrima?	7
	Rhyacophilidae	Rhyacophila sp.	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	7

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Church_B**
WAA ID: **680.3-011**

Latitude: **41.24114**
Longitude: **-74.02615**
Collection Date: **9/20/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	6
COLEOPTERA	Elmidae	Stenelmis sp.	2
		Oulimnius sp.	2
		Oulimnius sp.	1
	Psephenidae	Psephenus herricki	8
DIPTERA	Chironomidae	Diamesa sp.	7
		Rheotanytarsus pellucidus	1
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Baetis tricaudatus	2
		Baetis flavistriga	6
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	1
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	1
ODONATA	Aeschnidae	Boyeria vinosa	1
	Gomphidae	Stylogomphus sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	4
	Hydropsychidae	Hydropsyche betteni	3
		Cheumatopsyche sp.	24
	Philopotamidae	Chimarra aterrima?	13
		Dolophilodes sp.	5
	Polycentropodidae	Polycentropus sp.	1
	Rhyacophilidae	Rhyacophila sp.	1
TRICLADIDA		Undetermined Turbellaria	2
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	6

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Church_C**
WAA ID: **680.3-012**

Latitude: **41.24114**
Longitude: **-74.02615**
Collection Date: **9/20/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Planorbidae	Helisoma sp.	1
		Undetermined Planorbidae	1
COLEOPTERA	Elmidae	Stenelmis sp.	1
	Psephenidae	Psephenus herricki	16
DIPTERA	Chironomidae	Cricotopus/Orthocladius Complex	1
		Rheotanytarsus pellucidus	1
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Baetis tricaudatus	2
		Baetis flavistriga	3
ODONATA	Cordulegastridae	Cordulegaster sp.	1
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
TRICHOPTERA	Glossosomatidae	Glossosoma sp.	2
	Hydropsychidae	Cheumatopsyche sp.	46
		Hydropsyche betteni	5
	Philopotamidae	Dolophilodes sp.	5
		Chimarra aterrima?	4
	Polycentropodidae	Polycentropus sp.	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	7

0 = taxon identified in large/rare scan

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Above_Church_D**
WAA ID: **680.3-020**

Latitude: **41.24114**
Longitude: **-74.02615**
Collection Date: **9/20/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Physidae	Undetermined Physidae	1
COLEOPTERA	Hydrophilidae	Undetermined Hydrophilidae	1
	Psephenidae	Psephenus herricki	18
DIPTERA	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	1
EPHEMEROPTERA	Baetidae	Baetis intercalaris	3
		Baetis flavistriga	7
	Isonychiidae	Isonychia sp.	2
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	1
ODONATA	Gomphidae	Stylogomphus sp.	2
TRICHOPTERA	Apataniidae	Apatania sp.	1
	Glossosomatidae	Glossosoma sp.	1
	Hydropsychidae	Cheumatopsyche sp.	40
		Hydropsyche betteni	8
	Philopotamidae	Chimarra aterrima?	3
		Dolophilodes sp.	3
	Polycentropodidae	Polycentropus sp.	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	6

0 = taxon identified in large/rare scan

Stream Field Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook** Latitude: **41.24116**
River Basin: **Cedar Pond** Station: **Below Church** Longitude: **-74.02585**
County/State: **Rockland/NY** Coll Date: **9/21/2017** Field Crew: **N. Laible**
Site description:

Physical Characteristics	
Depth (meters):	**0.058**
Width (meters):	**2.5**
Current (cm/sec):	**6.75**
Canopy (%):	**60**
Substrate	
Rock (%):	**10**
Rubble (%):	**60**
Gravel (%):	**12**
Sand (%):	**13**
Silt (%):	**5**
Embeddedness (%):	

Chemical Measurements	
DO (mg/L):	**9.16**
DO sat. (%):	**100.1**
Temperature (C):	**19.6**
Spec. Conduct. (umhos):	**711**
Baro pressure:	
pH:	**8.14**
Salinity (PSS):	**0.35**

Biological Attributes	
Aquatic vegetation	
Macrophytes:	
Diatoms:	**Yes**
Algae-suspended:	**Yes**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**x**
Plecoptera:	
Trichoptera:	**x**
Coleoptera:	**x**
Megaloptera:	**x**
Odonata:	**x**
Chironomidae:	**x**
Simuliidae:	**x**
Decapoda:	
Gammaridae:	
Mollusca:	**x**
Oligochaeta:	**x**
Other macro's:	**x**
Field Faunal Condition:	**Good**

Flow

Flow

Notes/observations::

Low flow, culvert outlet, collected downstream of scour pool; Samples A & B are located closer to the outlet structure while C &D were collected further downstream of outlet. Stream site was covered with filamenous algae.

Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Church_A**
WAA ID: **680.3-013**

Latitude: **41.24116**
Longitude: **-74.02585**
Collection Date: **9/21/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	4
	Planorbidae	Undetermined Planorbidae	3
COLEOPTERA	Elmidae	Oulimnius sp.	1
	Psephenidae	Ectopria sp.	1
		Psephenus herricki	7
DIPTERA	Chironomidae	Rheocricotopus sp.	4
		Diamesa sp.	1
		Cricotopus/Orthocladius Complex	2
		Cricotopus bicinctus	2
	Empididae	Hemerodromia sp.	3
	Ephydridae	Undetermined Ephydridae	1
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Baetis intercalaris	1
		Baetis flavistriga	3
	Isonychiidae	Isonychia sp.	1
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	3
ISOPODA	Asellidae	Caecidotea sp.	1
ODONATA	Aeschnidae	Boyeria vinosa	1
	Gomphidae	Undetermined Gomphidae	1
PLECOPTERA	Chloroperlidae	Sweltsa sp.	1
TRICHOPTERA	Hydropsychidae	Hydropsyche betteni	2
		Cheumatopsyche sp.	50
	Polycentropodidae	Polycentropus sp.	2
TRICLADIDA		Undetermined Turbellaria	2
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1

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Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Church_B**
WAA ID: **680.3-014**

Latitude: **41.24116**
Longitude: **-74.02585**
Collection Date: **9/21/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	3
		Pseudosuccinea columella	1
	Physidae	Physella sp.	4
	Planorbidae	Helisoma anceps	3
COLEOPTERA	Elmidae	Microcylloepus pusillus	2
	Psephenidae	Psephenus herricki	2
DIPTERA	Chironomidae	Rheocricotopus sp.	3
		Dicrotendipes sp.	1
		Paratanytarsus sp.	2
		Cricotopus/Orthocladius Complex	4
		Cricotopus bicinctus	6
		Thienemannimyia gr. spp.	1
	Empididae	Hemerodromia sp.	4
	Tipulidae	Antocha sp.	1
		Tipula sp.	1
EPHEMEROPTERA	Baetidae	Acerpenna sp.	1
		Baetis flavistriga	1
	Ephemerellidae	Eurylophella sp.	1
	Isonychiidae	Isonychia sp.	3
HOPLONEMERTEA	Tetrastemmatidae	Undetermined Nemertea	2
ODONATA	Aeschnidae	Boyeria vinosa	1
	Cordulegastridae	Cordulegaster sp.	1
TRICHOPTERA	Apataniidae	Apatania sp.	1
	Hydropsychidae	Cheumatopsyche sp.	48
	Philopotamidae	Dolophilodes sp.	1
TUBIFICIDA	Naididae	Undetermined Naididae	1
VENEROIDEA	Pisidiidae	Undetermined Pisidiidae	1

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Lab Data Summary

Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Waterbody: **Cedar Pond Brook**
Station: **Below_Church_C**
WAA ID: **680.3-015**

Latitude: **41.24116**
Longitude: **-74.02585**
Collection Date: **9/21/2017**

Order	Family	Final Determination	Total #
BASOMMATOPHORA	Lymnaeidae	Stagnicola sp.	1
	Planorbidae	Undetermined Planorbidae	1
		Helisoma sp.	1
COLEOPTERA	Elmidae	Oulimnius sp.	1
	Psephenidae	Psephenus herricki	4
DIPTERA	Chironomidae	Rheotanytarsus exiguus gr.	1
		Rheocricotopus sp.	2
		Cricotopus bicinctus	2
		Diamesa sp.	1
	Empididae	Hemerodromia sp.	3
	Simuliidae	Simulium sp.	3
EPHEMEROPTERA	Baetidae	Baetis flavistriga	15
		Baetis tricaudatus	1
	Isonychiidae	Isonychia sp.	3
LUMBRICULIDA	Lumbriculidae	Lumbriculus sp.	1
MEGALOPTERA	CORYDALIDAE	Nigronia sp.	1
ODONATA	Aeschnidae	Boyeria vinosa	1
	Cordulegastridae	Cordulegaster sp.	0
TRICHOPTERA	Hydropsychidae	Ceratopsyche sp.	1
		Cheumatopsyche sp.	47
	Philopotamidae	Chimarra aterrima?	6
TRICLADIDA		Undetermined Turbellaria	2
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	2

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