BIOLOGICAL STREAM SURVEY

ROCKLAND COUNTY, NEW YORK
LOTIC SCENE INVESTIGATION (LSI)
2010 STREAM BIOMONITORING WATER QUALITY PROJECT

PREPARED BY
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SCHENECTADY, NEW YORK

FOR
ROCKLAND COUNTY SOIL AND WATER CONSERVATION DISTRICT
POMONA, NEW YORK

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Introduction

This report summarizes the results from the benthic samples collected for Rockland County in 2010. This project is supported by the Rockland County Soil and Water Conservation District. This data is part of an ongoing assessment of Rockland County stream communities since 2006 (Figure 1); for complete project overview, history, rationale, background, project goals, methods, key terminology and interpretation of 2006-2009 data, see Rockland County reports website:
http://www.co.rockland.ny.us/environ/BiomonitorProject.htm

Benthic kick samples were collected at 20 stations in 2010. Seventeen of the stations had been previously sampled in at least one year during 2006 – 2009; stations are re-sampled periodically for trend monitoring. The three new stations that were assessed were selected to evaluate water quality following a chlorine spill that occurred in July 2009 which resulted in a fish kill (Figure 2). Data was analyzed using New York State Department of Environmental Conservation (NYS DEC) methodology to determine a biological assessment profile (BAP), indicating overall water quality at each test site.

Figure 1. Map of 2006-2010 station locations in Rockland County, NY. Watershed delineation and watershed names are based on hydrological drainage units originated by the U.S. Geological Survey New York Water Science Center and U.S Department of Agriculture, New York State Natural Resources Conservation Service (published in 2008). *Indicates the name of the watershed that it is locally known as.

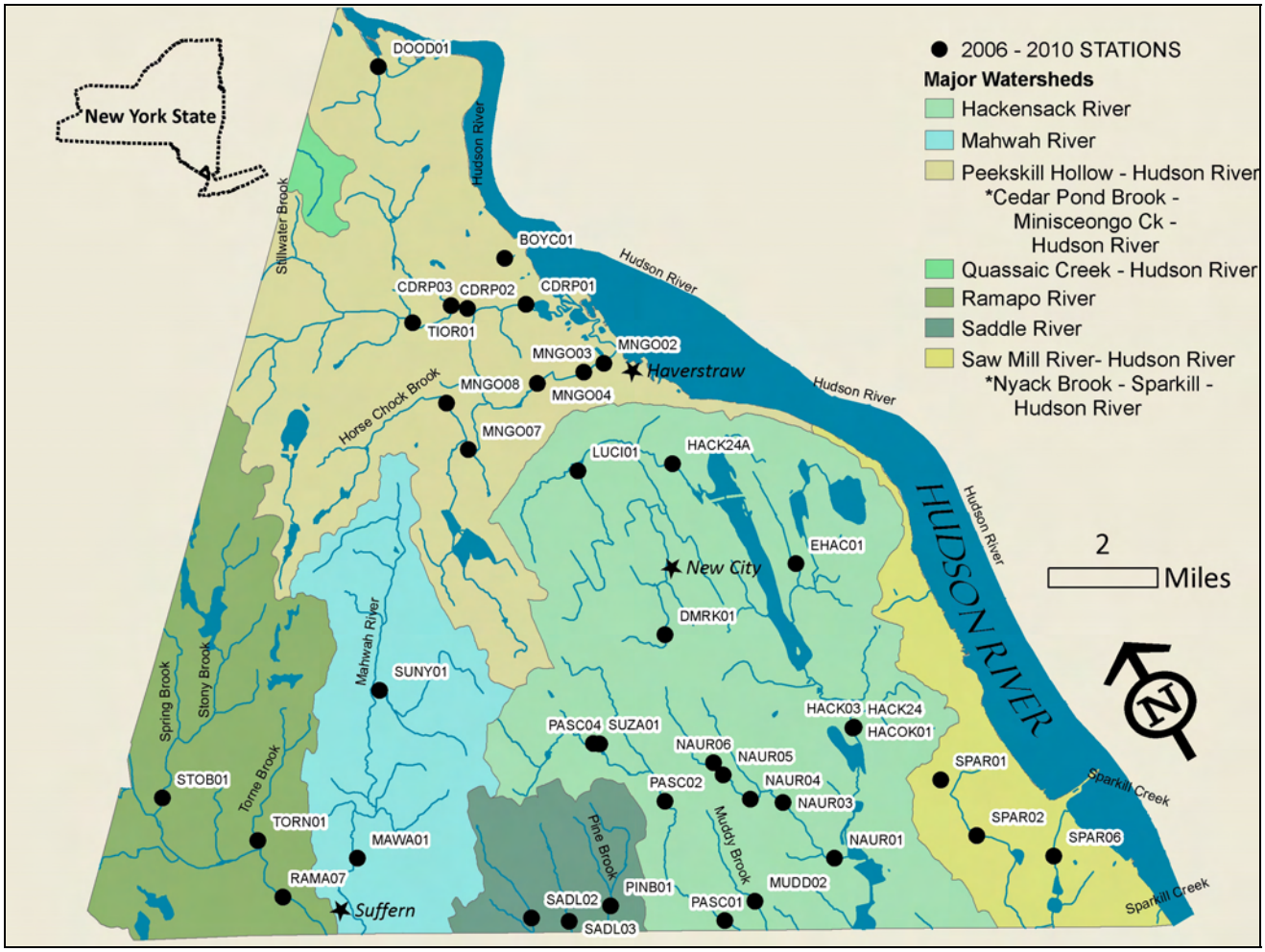
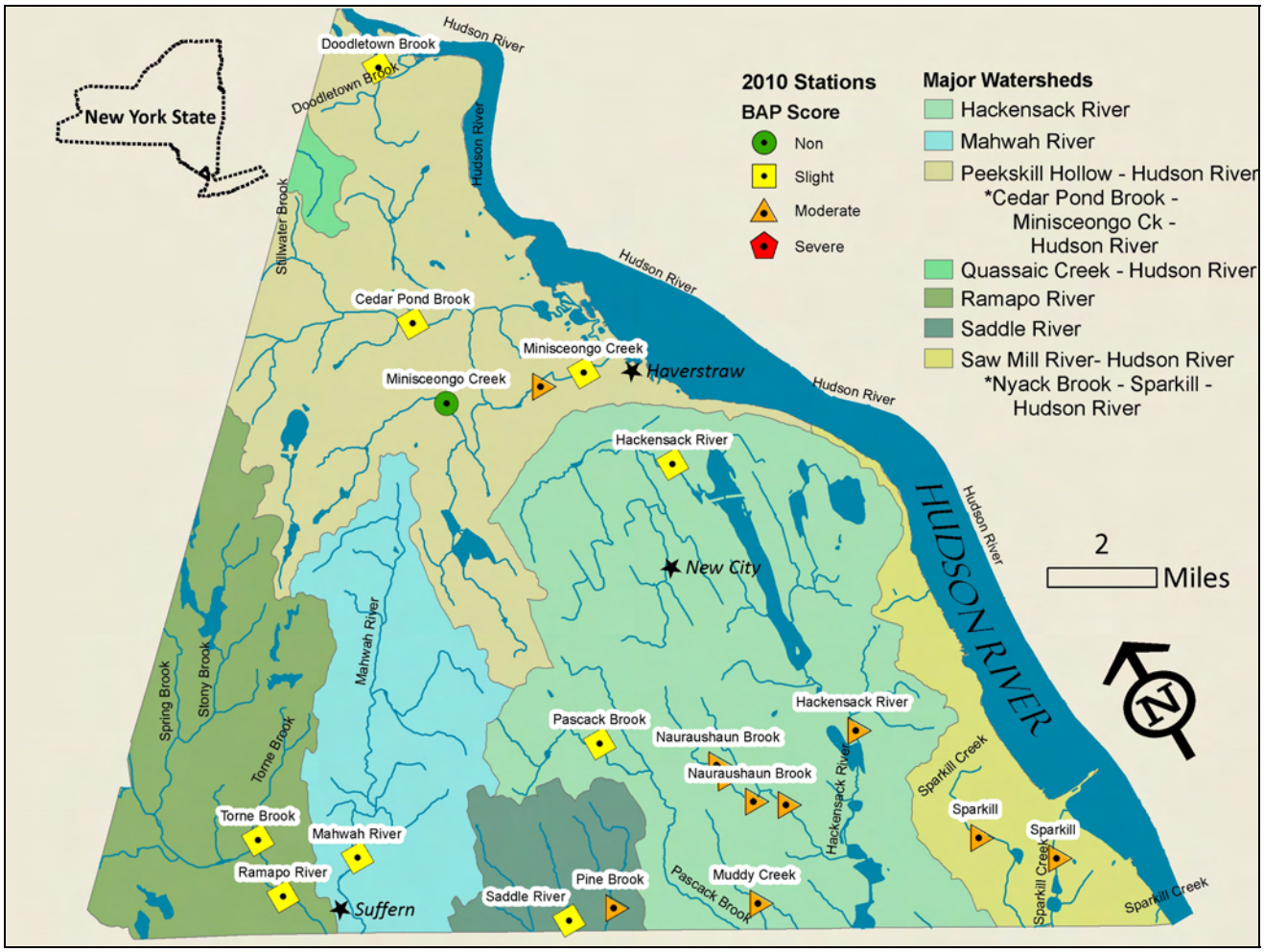


Figure 2. Map of 2010 station locations in Rockland County, NY. Watershed delineation and watershed names are based on hydrological drainage units originated by the U.S. Geological Survey New York Water Science Center and U.S Department of Agriculture, New York State Natural Resources Conservation Service (published in 2008). *Indicates the name of the watershed that it is locally known as.



Summary of Results

The 2010 biological community metrics indicated Rockland County water quality ranged from non-impacted to moderately impacted: 1 site was non-impacted, 9 were slightly impacted, and 10 were moderately impacted (Figure 2 and Table 1).

Comparison of the biological assessment profile (BAP) for each station to prior data shows water quality declined (BAP dropped at least 0.5 points) at 8 stations, improved at 5 stations, and remained the same at 4 stations (Table 2). There was no comparison data available for 3 stations. Of the 8 stations with declining water quality, the BAP dropped enough at six stations to reclassify them into a worse impact category. All 5 stations with improved water quality remained in the same impact category.

The variability in water quality, in part, reflects land use in each of the major stream basins. Areas with greater percentage of forested land have been associated with higher water quality scores since 2006 than areas of greater development or agriculture (figure 3). Forested areas usually contain fewer sources of pollutants and superior ability to buffer impacts. Greater impervious surface associated with development

results in more runoff of pollutants; chemicals applied to lawns and crops and livestock waste also impact streams through runoff.

Water quality is also affected by flow rates: high flow tends to dilute pollutants from point source discharges, whereas it tends to increase the amount of runoff from nonpoint sources (urban, residential, or agricultural runoff). The percentage of slightly impacted sites increased and moderately impacted sites declined during high flow years (2006, 2007, and 2009); conversely the percentage of slightly impacted sites fell and moderately impacted sites rose during low flow years (2008 and 2010). This is indicative of primarily a problem with point source contaminants, though each site must be examined individually to determine the specific impact source affecting the site. Sites that are affected primarily by nonpoint source impacts may benefit from analysis for, and initiation of, best management practices that will diminish the continued effect of pollutant run-off. Sites affected by point source impact should be analyzed for pollutant discharge so that remedial measures to diminish or eliminate the discharge can be taken. Continued monitoring throughout the basins is also indicated to ascertain the effects of changing land use and the effectiveness of remedial measures.

In July 2009 a chlorine spill occurred in the Nauraushaun Brook, resulting in a fish kill and an investigation by the NYS DEC. To our knowledge, no immediate benthic macroinvertebrate surveys were completed at that time. NYS DEC had completed a benthic macroinvertebrate survey at one station in 2002, which indicated moderately impacted water quality, and RCSWCD competed surveys in 2006 and 2007 that indicated water quality was slightly and moderately impacted, respectively. The 2006 BAP score (5.3) was barely within the slightly impacted category, and was close to moderately impacted. At the request of RCSWCD, three sites were surveyed above, at, and below the point of the 2009 chlorine spill to assess the benthic macroinvertebrate community in the area of the spill. All three 2010 stations were moderately impacted, as was a fourth station sampled further downstream. If there was an impact to the Nauraushaun Brook secondary to the spill, it does not appear to have lasted. There does appear to be other impacts that are chronically affecting the water quality of the brook.

It is beyond the scope of this study to provide detailed water quality trends at each site, but the Rockland County Water Conservation District (RCWCD) has requested expanded field assessment upstream of each sampling location in 2011 to document site-specific problems and receive recommendations of best management practices that could potentially mitigate the effects of pollutants entering the streams. Additionally, the 2011 report will review all stations assessed since 2006, making similar recommendations, and providing a prioritization of site specific actions that, if implemented, may improve the overall habitat and water quality.

RCSWCD Volunteer Stream Monitoring Data

Volunteer data is included in the appendix of this report, as submitted by RCSWD with alterations to the format for presentation. Several parameters recorded by volunteers may warrant further investigation, including a biotic index of 8.43 at Nanuet on 8/27/08 and a biotic index of 8.84 on the West Branch of the Hackensack on 11/8/08. The biotic index is a measure of benthic macroinvertebrate tolerance to the effects of increasing organic material entering the stream. Biotic index results range from 0 – 10, with higher scores indicating greater impact. Both of the scores above indicate severely impacted water quality.

Also of concern are elevated specific conductance (SC) readings of 1,210 µs/cm at Pascack Brook on 6/21/10, 870 µs/cm at Minisceongo Creek on 7/6/10, and 1,120 µs/cm at Pascack Brook on 9/11/10. Specific conductance, or conductivity, is a measure of the ability of an electrical current to pass through a stream; it is dependent on both the concentration of dissolved electrolytes within the water and water temperature. The NYS DEC has established a “level of concern” when specific conductance in freshwater streams exceeds 800 µs/cm, as these streams are likely moderately biologically impacted.

Figure 3. Percentage of land use and mean BAP scores for years 2006 – 2010 within each major watershed. N = number of samples, dashed line indicates minimum and maximum scores.

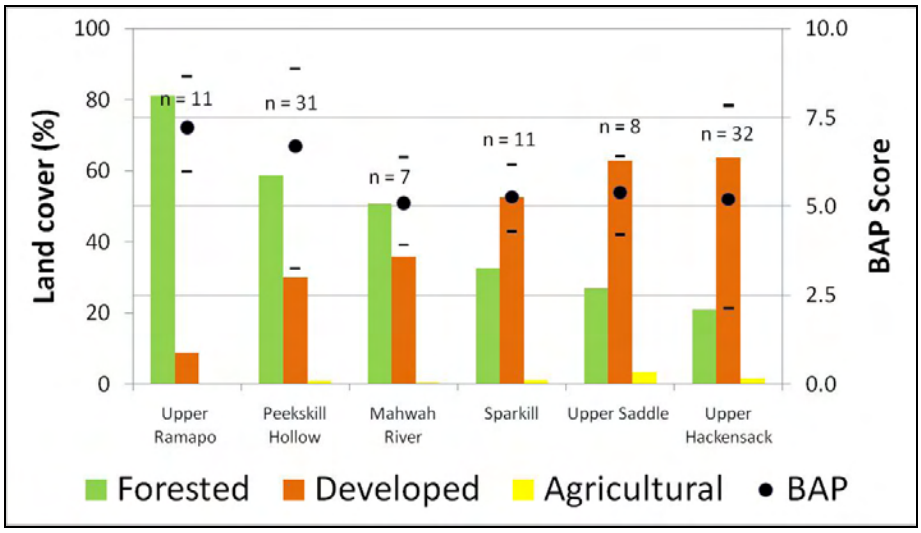


Figure 4. Percent of sampling stations within each water quality condition category from 2006 to 2010. Average flow (ft^3/sec) was calculated from USGS gauging stations in and around Rockland County (Ramapo River, Ramapo, NY; Mahwah, NJ; Suffern, NY; Hackensack River at West Nyack, NY; New Croton Dam Croton-On-Hudson, NY; Mahwah River near Suffern, NY).

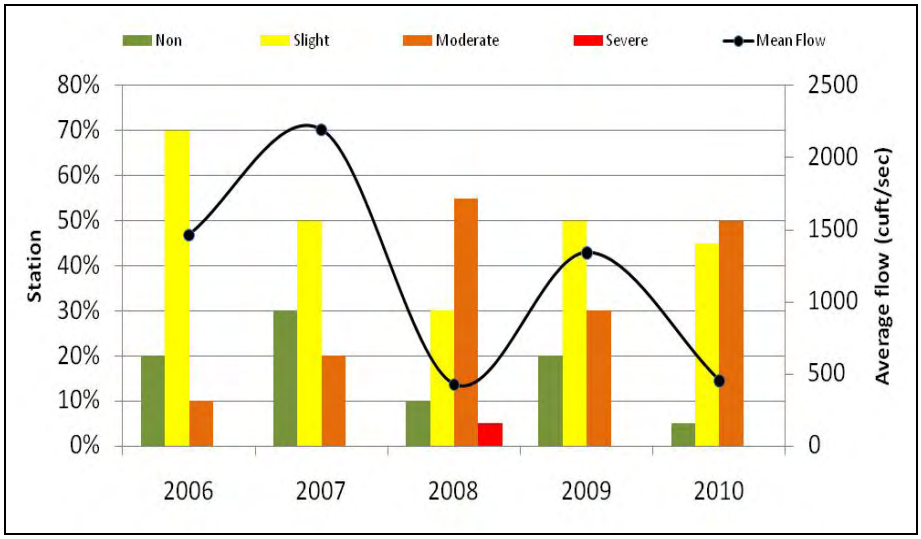


Table 1. Benthic macroinvertebrate metric scores and impact source determination percentages for the 20 stream sites sampled in 2010 throughout Rockland County, NY. Bolded numbers indicate most likely source of impact to stream community. TR= taxa richness; BI= biotic index; EPT = Ephemeroptera-Plecoptera-Trichoptera taxa; PMA= percent model affinity; BAP = biotic assessment profile; Nat=natural; NPN = non-point nutrient; Org = organic inputs; Imp= impoundment; Complex= municipal/industrial/nutrients.*Stations added in 2010; all other stations have been previously sampled at least once during 2006-2009.

		Biotic Metrics					Impact Source Determination (ISD)						
Stream Name	Station	EPT	BI	TR	PMA	BAP	Nat	NPN	Toxic	Org	Complex	Silt	Imp
Cedar Pond Brook	TIOR01	13	4.41	25	47	7.06	50	47	**56**	37	42	42	48
Doodletown Brook	DOOD01	11	3.49	18	38	6.13	38	41	36	41	39	38	47
Hackensack River	HACK01	4	6.77	21	50	4.97	20	27	35	37	**61**	33	**55**
Hackensack River	HACK24A	6	4.81	14	56	5.59	52	58	58	**74**	59	57	56
Mahwah River	MAWA01	9	5.05	19	59	6.38	42	**54**	47	42	**57**	46	54
Minisceongo Creek	MNGO03	7	5.66	18	47	5.35	26	51	46	48	53	48	**60**
Minisceongo Creek	MNGO04	6	5.72	15	30	4.28	30	56	**67**	**63**	58	50	54
Minisceongo Creek	MNGO08	14	3.90	30	70	8.57	49	**50**	37	40	37	41	44
Muddy Creek	MUDD02	3	5.83	14	45	4.35	21	36	51	31	**58**	27	49
Nauraushaun Brook	*NAUR03	3	5.96	14	56	4.77	41	**62**	56	**63**	**65**	47	55
Nauraushaun Brook	*NAUR04	3	5.99	18	53	4.94	43	**61**	51	**56**	52	**56**	55
Nauraushaun Brook	*NAUR05	2	6.31	20	45	4.54	50	41	33	**61**	39	46	**58**
Nauraushaun Brook	NAUR06	2	6.81	22	41	4.37	30	43	45	**50**	41	48	47
Pascack Brook	PASC04	5	5.19	19	44	5.19	37	**57**	52	**57**	**62**	55	**57**
Pine Brook	PINB01	4	5.01	12	35	4.19	38	**65**	54	**69**	59	55	63
Ramapo River	RAMA07	10	4.90	19	59	6.54	50	**59**	51	41	**56**	37	52
Saddle River	SADL03	7	5.34	26	45	6.00	48	**61**	49	**56**	**59**	50	**62**
Sparkill	SPAR02	3	5.86	15	42	4.29	32	51	37	45	**57**	46	**57**
Sparkill	SPAR06	3	5.67	12	46	4.29	33	**63**	58	71	**66**	51	57
Torne Brook	TORN01	12	2.42	23	49	7.37	40	44	28	18	39	19	44

Table 2 Biological Assessment Profile (BAP) scores from 2006-2010, the relative difference between 2010 and the most previous BAP values, and the overall change in water quality status (a difference of ≥±0.5 points).

Stream---name	Station	BAP2006	BAP2007	BAP2008	BAP2009	BAP2010	Diff	Change
Cedar Pond Brook	TIOR01	7.11	9.12	8.4	---	7.06	-1.34	Decline
Doodletown Brook	DOOD01	---	---	4.72	7.96	6.13	-1.83	Decline
Hackensack River	HACK24A	3.93	6.01	---	---	5.59	-0.42	No change
Hackensack River	HACOK01	7.83	4.02	---	---	4.97	0.95	Improve
Mahwah River	MAWA01	5.15	5.07	3.91	5.22	6.38	1.16	Improve
Minisceongo Creek	MNGO03	6.31	7.14	---	---	5.35	-1.79	Decline
Minisceongo Creek	MNGO04	5.57	5.51	---	---	4.28	-1.23	Decline
Minisceongo Creek	MNGO08	5.31	7.61	---	---	8.57	0.96	Improve
Muddy Creek	MUDD02	4.97	4.92	---	5.09	4.35	-0.57	Decline
Nauraushaun Brook	NAUR03	5.3	4.97	--	---	4.77	-0.2	No change
Nauraushaun Brook	NAUR04	---	---	---	---	4.94	---	N/A
Nauraushaun Brook	NAUR05	---	---	---	---	4.54	---	N/A
Nauraushaun Brook	NAUR06	---	---	---	---	4.37	---	N/A
Pascack Brook	PASC04	6.39	4.85	---	---	5.19	0.34	No change
Pine Brook	PINB01	---	---	4.37	4.99	4.19	-0.8	Decline
Ramapo River	RAMA07	7.29	6.01	5.97	7.58	6.54	-1.04	Decline
Saddle River	SADL03	---	---	4.84	5.34	6	0.66	Improve
Sparkill	SPAR02	---	---	6.17	---	4.29	-1.88	Decline
Sparkill	SPAR06	4.73	5.89	4.64	4.6	4.29	-0.31	No change
Torne Brook	TORN01	---	---	6.15	---	7.37	1.22	Improve

Appendix

A Field and Lab Data Summary page was created for each of the stations sampled, including: site location, number, sampling date, physical and chemical data, and site photos as well as the taxa identified for each sub-sample.

Field Data Summary

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

Waterbody: **Cedar Pond Brook** Station: **TIOR01** Latitude: **41.23816**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **WAA00089** Longitude: **-74.02227**
County: **Rockland** Coll Date: **8/11/2010** Field Crew: **kms, cmf**
State: **NY** Site description: **Just above Cty Rte 160/210 bridge (long term site)**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**6**
Current (cm/sec):	**35**
Canopy (%):	**10**
Substrate	
Rock (%):	**15**
Rubble (%):	**30**
Gravel (%):	**25**
Sand (%):	**15**
Silt (%):	**15**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**7.66**
DO sat. (%):	**86**
Temperature (C):	**21**
Spec. Conduct. (umhos):	**415**
Baro pressure:	**755.1**
pH:	**7.57**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**13**
Total taxa richness:	**25**
Biotic index:	**4.41**
Percent model affinity:	**47**
Biological assessment profile:	**7.06**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Cedar Pond Brook** | Station: **TIOR01** | Latitude: **41.23816**
River Basin: **Peekskill Hollow/Hudson** | WAA Site ID: **W00089** | Longitude: **-74.02227**
County: **Rockland** | Coll Date: **8/11/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10530**

Order	Family	Final Determination	Total #
Ephemeroptera	Baetidae	Plauditus sp.	9
	Ephemerellidae	Ephemerella sp.	1
	Isonychiidae	Isonychia sp.	1
	Leptophlebiidae	Paraleptophlebia sp.	1
Plecoptera	Perlidae	Acroneuria sp.	1
Coleoptera	Elmidae	Promoresia tardella	1
Trichoptera	Hydropsychidae	Ceratopsyche morosa	4
		Ceratopsyche sparna	5
		Cheumatopsyche sp.	3
		Hydropsyche betteni	6
	Hydroptilidae	Hydroptila sp.	5
	Lepidostomatidae	Lepidostoma sp.	2
	Philopotamidae	Chimarra aterrima	1
		Dolophilodes sp.	9
Diptera	Chironomidae	Dicrotendipes sp.	1
		Microtendipes rydalensis gr.	2
		Polypedilum aviceps	16
		Rheotanytarsus sp.	1
		Tanytarsus sp.	2
		Cricotopus bicinctus	19
		Cricotopus/Orthocladius complex	2
		Thienemannimyia gr. spp.	4
		Microtendipes pedellus gr.	1
	Tipulidae	Antocha sp.	1
	Muscidae	Muscidae	2

Metric Results

Taxa Richness: **25**
EPT Richness: **13**
Biotic Index: **4.41**
PMA: **47**
BAP Score: **7.06**

Field Data Summary

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

Waterbody: **Doodletown Brook** Station: **DOOD01** Latitude: **41.3012**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **WAA00080** Longitude: **-73.98679**
County: **Rockland** Coll Date: **8/11/2010** Field Crew: **kms, cmf**
State: **NY** Site description: **Above Washington Ave bridge, upstream of swimming hole.**

Physical Characteristics

Depth (meters):	**0.1**
Width (meters):	**8**
Current (cm/sec):	**40**
Canopy (%):	**80**
Substrate	
Rock (%):	**55**
Rubble (%):	**30**
Gravel (%):	**5**
Sand (%):	**5**
Silt (%):	**5**
Embeddedness (%):	**10**

Chemical Measurements

DO (mg/L):	**6.6**
DO sat. (%):	**70**
Temperature (C):	
Spec. Conduct. (umhos):	**151**
Baro pressure:	**759.9**
pH:	**7.7**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	**Y**
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	**Diptera**
Field Faunal Condition:	**Good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**11**
Total taxa richness:	**18**
Biotic index:	**3.49**
Percent model affinity:	**38**
Biological assessment profile:	**6.13**
Water quality category:	**Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Doodletown Brook** Station: **DOOD01** Latitude: **41.3012**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **W00080** Longitude: **-73.98679**
County: **Rockland** Coll Date: **8/11/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10536**

Order	Family	Final Determination	Total #
Ephemeroptera	Heptageniidae	Epeorus sp.	1
		Maccaffertium sp.	1
Plecoptera	Peltoperlidae	Tallaperla sp.	21
	Perlidae	Paragnetina media	1
Megaloptera	Corydalidae	Nigronia serricornis	1
Coleoptera	Elmidae	Promoresia tardella	18
		Stenelmis sp.	1
	Psephenidae	Psephenus herricki	2
Trichoptera	Glossosomatidae	Glossosoma sp.	1
	Hydropsychidae	Ceratopsyche sparna	18
		Cheumatopsyche sp.	2
		Diplectrona modesta	2
		Hydropsyche betteni	16
	Philopotamidae	Dolophilodes sp.	1
	Rhyacophilidae	Rhyacophila fuscula	3
Diptera	Chironomidae	Polypedilum aviceps	1
	Simuliidae	Simulium sp.	5
	Tipulidae	Tipula sp.	5

Metric Results

Taxa Richness: **18**
EPT Richness: **11**
Biotic Index: **3.49**
PMA: **38**
BAP Score: **6.13**

Field Data Summary

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

Waterbody: **Hackensack**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **HACK24A**
WAA Site ID: **WAA00076**
Coll Date: **8/11/2010**
Site description: **Just above Haverstraw Rd. bridge**

Latitude: **41.17162**
Longitude: **-73.9021**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.4**
Width (meters):	**6**
Current (cm/sec):	**40**
Canopy (%):	**70**
Substrate	
Rock (%):	**5**
Rubble (%):	**40**
Gravel (%):	**30**
Sand (%):	**10**
Silt (%):	**15**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**6.6**
DO sat. (%):	**76**
Temperature (C):	**23**
Spec. Conduct. (umhos):	**451**
Baro pressure:	**757**
pH:	**7.4**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Good**
Overall Habitat:	**Adequate**

Multi-metric Scores

EPT richness:	**6**
Total taxa richness:	**14**
Biotic index:	**4.81**
Percent model affinity:	**56**
Biological assessment profile:	**5.59**
Water quality category:	**Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Hackensack River**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **HACK24A**
WAA Site ID: **W00076**
Coll Date: **8/11/2010**
Sample Type: **Benthic sample**

Latitude: **41.17162**
Longitude: **-73.9021**
Coll Method: **kick**
WAA Lab #: **10527**

Order	Family	Final Determination	Total #
Decapoda	Cambaridae	Orconectes sp.	2
Isopoda	Asellidae	Caecidotea sp.	4
Ephemeroptera	Baetidae	Baetis intercalaris	3
	Heptageniidae	Maccaffertium modestum	21
		Stenacron interpunctatum	2
Coleoptera	Elmidae	Ancyronyx variegatus	1
		Microcylloepus sp.	1
		Stenelmis sp.	19
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	19
		Hydropsyche betteni	23
	Philopotamidae	Chimarra aterrima	1
Diptera	Chironomidae	Polypedilum flavum	2
		Tanytarsus sp.	1
	Tipulidae	Tipula sp.	1

Metric Results

Taxa Richness: **14**
EPT Richness: **6**
Biotic Index: **4.81**
PMA: **56**
BAP Score: **5.59**

Field Data Summary

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

Waterbody: **Hackensack River**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **HACK01**
WAA Site ID: **WAA00065**
Coll Date: **8/11/2010**
Site description: **Below Western highway bridge**

Latitude: **41.08542**
Longitude: **-73.96308**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**20**
Current (cm/sec):	**20**
Canopy (%):	**0**
Substrate	
Rock (%):	**20**
Rubble (%):	**20**
Gravel (%):	**20**
Sand (%):	**20**
Silt (%):	**20**
Embeddedness (%):	**30**

Chemical Measurements

DO (mg/L):	**4.29**
DO sat. (%):	**51**
Temperature (C):	**24.96**
Spec. Conduct. (umhos):	**437**
Baro pressure:	**758**
pH:	**3.97**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	**Y**
Diatoms:	**Y**
Algae-suspended:	**Y**
Algae-filamentous:	**Y**
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	**Y**
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Poor**

Multi-metric Scores

EPT richness:	**4**
Total taxa richness:	**21**
Biotic index:	**6.77**
Percent model affinity:	**50**
Biological assessment profile:	**4.97**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Hackensack River**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **HACK01**
WAA Site ID: **W00065**
Coll Date: **8/11/2010**
Sample Type: **Benthic sample**

Latitude: **41.08542**
Longitude: **-73.96308**
Coll Method: **kick**
WAA Lab #: **10540**

Order	Family	Final Determination	Total #
		Turbellaria	1
Haplotaxida	Naididae	Limnodrilus hoffmeisteri	5
Rhynchobdellida	Glossiphoniidae	Glossiphoniidae	3
Amphipoda	Gammaridae	Gammarus sp.	32
Decapoda	Cambaridae	Orconectes sp.	2
Isopoda	Asellidae	Caecidotea sp.	11
Ephemeroptera	Baetidae	Callibaetis sp.	1
	Caenidae	Caenis sp.	2
Megaloptera	Sialidae	Sialis sp.	3
Coleoptera	Elmidae	Stenelmis sp.	2
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	11
	Hydroptilidae	Hydroptila sp.	2
Diptera	Ceratopogonidae	Bezzia/Palpomyia sp.	1
	Chironomidae	Cryptochironomus sp.	2
		Dicrotendipes sp.	2
		Endochironomus subtendens	12
		Glyptotendipes sp.	1
		Tanytarsus sp.	1
		Cricotopus bicinctus	1
		Clinotanypus sp.	2
		Thienemannimyia gr. spp.	3

Metric Results

Taxa Richness: **21**
EPT Richness: **4**
Biotic Index: **6.77**
PMA: **50**
BAP Score: **4.97**

Field Data Summary

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

Waterbody: **Mahwah River**
River Basin: **Ramapo**
County: **Rockland**
State: **NY**

Station: **MAWA01**
WAA Site ID: **WAA00083**
Coll Date: **8/12/2010**
Site description: **Just below Haverstraw Rd. bridge**

Latitude: **41.12407**
Longitude: **-74.1351**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**5**
Current (cm/sec):	**40**
Canopy (%):	**70**
Substrate	
Rock (%):	**0**
Rubble (%):	**40**
Gravel (%):	**25**
Sand (%):	**20**
Silt (%):	**15**
Embeddedness (%):	**15**

Chemical Measurements

DO (mg/L):	**5.7**
DO sat. (%):	**67**
Temperature (C):	**23**
Spec. Conduct. (umhos):	**732**
Baro pressure:	**752.2**
pH:	**7.5**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	**hirudinea**
Field Faunal Condition:	**Good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**9**
Total taxa richness:	**19**
Biotic index:	**5.05**
Percent model affinity:	**59**
Biological assessment profile:	**6.38**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Mahwah River**
River Basin: **Ramapo**
County: **Rockland**
State: **NY**

Station: **MAWA01**
WAA Site ID: **W00083**
Coll Date: **8/12/2010**
Sample Type: **Benthic sample**

Latitude: **41.12407**
Longitude: **-74.1351**
Coll Method: **kick**
WAA Lab #: **10538**

Order	Family	Final Determination	Total #
Veneroida	Pisidiidae	Musculium transversum	1
Lumbriculida	Lumbriculidae	Lumbriculidae	1
Amphipoda	Gammaridae	Gammarus sp.	33
Ephemeroptera	Baetidae	Baetis intercalaris	1
	Caenidae	Caenis sp.	1
	Heptageniidae	Leucrocuta sp.	1
		Maccaffertium terminatum	4
	Isonychiidae	Isonychia bicolor	1
Plecoptera	Perlidae	Paragnetina media	1
Megaloptera	Corydalidae	Corydalus cornutus	1
Coleoptera	Elmidae	Optioservus trivittatus	4
		Stenelmis sp.	9
	Psephenidae	Psephenus herricki	5
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	16
		Hydropsyche betteni	1
	Philopotamidae	Chimarra aterrima	1
Diptera	Chironomidae	Polypedilum flavum	15
		Natarsia sp.	1
		Thienemannimyia gr. spp.	3

Metric Results

Taxa Richness: **19**
EPT Richness: **9**
Biotic Index: **5.05**
PMA: **59**
BAP Score: **6.38**

Field Data Summary

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

Waterbody: **Minisceongo Creek** Station: **MNGO03** Latitude: **41.20372**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **WAA00077** Longitude: **-73.9787**
County: **Rockland** Coll Date: **8/11/2010** Field Crew: **kms, cmf**
State: **NY** Site description: **Near RR bridge; access at end of Delloro & Joesph St.**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**4**
Current (cm/sec):	**40**
Canopy (%):	**5**
Substrate	
Rock (%):	**0**
Rubble (%):	**30**
Gravel (%):	**25**
Sand (%):	**25**
Silt (%):	**20**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**10.5**
DO sat. (%):	**122**
Temperature (C):	**22.7**
Spec. Conduct. (umhos):	**788**
Baro pressure:	**758**
pH:	**7.69**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**7**
Total taxa richness:	**18**
Biotic index:	**5.66**
Percent model affinity:	**47**
Biological assessment profile:	**5.35**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Minisceongo Creek** Station: **MNGO03** Latitude: **41.20372**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **W00077** Longitude: **-73.9787**
County: **Rockland** Coll Date: **8/11/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10541**

Order	Family	Final Determination	Total #
Hoplonemertea	Tetrastemmatidae	Prostoma sp.	1
		Turbellaria	1
Amphipoda	Gammaridae	Gammarus sp.	2
Ephemeroptera	Baetidae	Baetis intercalaris	3
Coleoptera	Elmidae	Stenelmis sp.	3
	Psephenidae	Psephenus herricki	1
Trichoptera	Hydropsychidae	Ceratopsyche bronta	25
		Ceratopsyche morosa	12
		Ceratopsyche sparna	3
		Cheumatopsyche sp.	7
		Hydropsyche betteni	7
	Hydroptilidae	Leucotrichia pictipes	1
Diptera	Chironomidae	Dicrotendipes sp.	1
		Cricotopus bicinctus	1
		Cricotopus intersectus gr.	4
		Tvetenia vitracies	2
		Cricotopus trifascia gr.	15
	Tipulidae	Antocha sp.	11

Metric Results

Taxa Richness: **18**
EPT Richness: **7**
Biotic Index: **5.66**
PMA: **47**
BAP Score: **5.35**

Field Data Summary

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

Waterbody: **Minisceongo Creek** Station: **MNGO04** Latitude: **41.20722**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **WAA00078** Longitude: **-73.99551**
County: **Rockland** Coll Date: **8/11/2010** Field Crew: **kms, cmf**
State: **NY** Site description: **Just off Church St.**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**9**
Current (cm/sec):	**40**
Canopy (%):	**30**
Substrate	
Rock (%):	**40**
Rubble (%):	**20**
Gravel (%):	**15**
Sand (%):	**10**
Silt (%):	**15**
Embeddedness (%):	**10**

Chemical Measurements

DO (mg/L):	**8.25**
DO sat. (%):	**98**
Temperature (C):	**24.2**
Spec. Conduct. (umhos):	**733**
Baro pressure:	**755.9**
pH:	**7.84**
Salinity (PSS):	

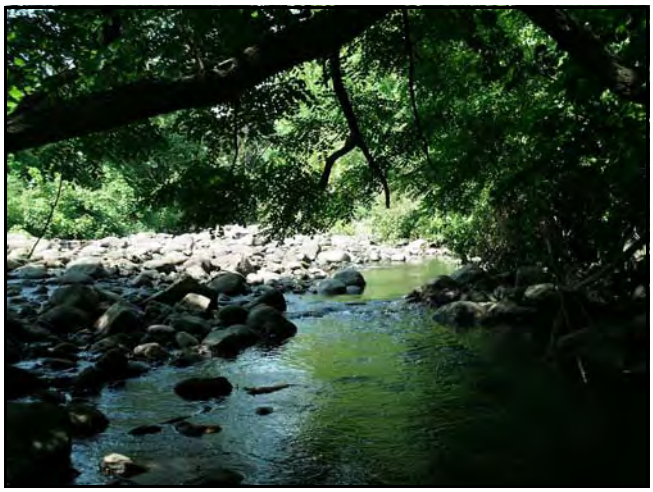
Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	**Y**
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Adequate**

Multi-metric Scores

EPT richness:	**6**
Total taxa richness:	**15**
Biotic index:	**5.72**
Percent model affinity:	**30**
Biological assessment profile:	**4.28**
Water quality category:	**Moderately impacted**

Flow



Flow

Lab Data Summary

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

Waterbody: **Minisceongo Creek** Station: **MNGO04** Latitude: **41.20722**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **W00078** Longitude: **-73.99551**
County: **Rockland** Coll Date: **8/11/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10524**

Order	Family	Final Determination	Total #
Hoplonemertea	Tetrastemmatidae	Prostoma sp.	1
		Turbellaria	8
Amphipoda	Gammaridae	Gammarus sp.	2
Isopoda	Asellidae	Caecidotea sp.	4
Megaloptera	Corydalidae	Corydalus cornutus	1
Coleoptera	Elmidae	Microcylloepus sp.	1
		Stenelmis sp.	21
	Psephenidae	Psephenus herricki	1
Trichoptera	Hydropsychidae	Ceratopsyche bronta	1
		Ceratopsyche morosa	5
		Ceratopsyche sparna	4
		Cheumatopsyche sp.	4
		Hydropsyche betteni	30
	Philopotamidae	Chimarra aterrima	15
Diptera	Tipulidae	Antocha sp.	2

Metric Results

Taxa Richness: **15**
EPT Richness: **6**
Biotic Index: **5.72**
PMA: **30**
BAP Score: **4.28**

Field Data Summary

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

Waterbody: **Minisceongo Creek** Station: **MNGO08** Latitude: **41.21524**
River Basin: **Peekskill Hollow/Hudson** WAA Site ID: **WAA00079** Longitude: **-74.02628**
County: **Rockland** Coll Date: **8/11/2010** Field Crew: **kms, cmf**
State: **NY** Site description: **Just above Storrs Rd bridge**

Physical Characteristics

Depth (meters):	**0.2**
Width (meters):	**3**
Current (cm/sec):	**40**
Canopy (%):	**30**
Substrate	
Rock (%):	**0**
Rubble (%):	**20**
Gravel (%):	**50**
Sand (%):	**20**
Silt (%):	**10**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**7.8**
DO sat. (%):	**91**
Temperature (C):	**22.7**
Spec. Conduct. (umhos):	**381**
Baro pressure:	**749.7**
pH:	**7.7**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	**Y**
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	**Y**
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Very good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**14**
Total taxa richness:	**30**
Biotic index:	**3.9**
Percent model affinity:	**70**
Biological assessment profile:	**8.57**
Water quality category:	**Non impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Minisceongo Creek** | Station: **MNGO08** | Latitude: **41.21524**
River Basin: **Peekskill Hollow/Hudson** | WAA Site ID: **W00079** | Longitude: **-74.02628**
County: **Rockland** | Coll Date: **8/11/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10533**

Order	Family	Final Determination	Total #
Ephemeroptera	Baetidae	Acentrella turbida	1
		Baetis intercalaris	2
		Procloeon sp.	1
	Heptageniidae	Maccaffertium ithaca	6
		Maccaffertium modestum	3
	Isonychiidae	Isonychia sp.	7
Odonata	Aeshnidae	Boyeria vinosa	1
	Gomphidae	Stylogomphus albistylus	1
	Calopterygidae	Calopteryx sp.	1
Plecoptera	Leuctridae	Leuctra sp.	2
	Perlidae	Acroneuria abnormis	4
		Perlesta sp.	1
Coleoptera	Elmidae	Optioservus ovalis	1
		Stenelmis sp.	2
	Psephenidae	Psephenus herricki	14
Trichoptera	Hydropsychidae	Ceratopsyche bronta	6
		Cheumatopsyche sp.	3
		Hydropsyche betteni	14
	Lepidostomatidae	Lepidostoma sp.	2
	Philopotamidae	Chimarra aterrima	2
Diptera	Chironomidae	Phaenopsectra/Tribelos sp.	1
		Polypedilum aviceps	6
		Polypedilum flavum	3
		Paratanytarsus sp.	2
		Tvetenia paucunca	1
		Tvetenia vitracies	3
		Thienemannimyia gr. spp.	5
		Microtendipes pedellus gr.	2
		Polypedilum illinoense gr.	1
	Tipulidae	Antocha sp.	2

Metric Results

Taxa Richness: **30**
EPT Richness: **14**
Biotic Index: **3.90**
PMA: **70**
BAP Score: **8.57**

Field Data Summary

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

Waterbody: **Muddy Creek**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **MUDD02**
WAA Site ID: **WAA00086**
Coll Date: **8/12/2010**
Site description: **Below bridge, adjacent to muffler shop (long term site)**

Latitude: **41.06008**
Longitude: **-74.02371**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.25**
Width (meters):	**3**
Current (cm/sec):	**40**
Canopy (%):	**0**
Substrate	
Rock (%):	**0**
Rubble (%):	**0**
Gravel (%):	**50**
Sand (%):	**25**
Silt (%):	**25**
Embeddedness (%):	**10**

Chemical Measurements

DO (mg/L):	**6.66**
DO sat. (%):	**77**
Temperature (C):	**22.8**
Spec. Conduct. (umhos):	**932**
Baro pressure:	**754.1**
pH:	**7.7**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	**Y**
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Poor**

Multi-metric Scores

EPT richness:	**3**
Total taxa richness:	**14**
Biotic index:	**5.83**
Percent model affinity:	**45**
Biological assessment profile:	**4.35**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Muddy Creek** | Station: **MUDD02** | Latitude: **41.06008**
River Basin: **Hackensack** | WAA Site ID: **W00086** | Longitude: **-74.02371**
County: **Rockland** | Coll Date: **8/12/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10542**

Order	Family	Final Determination	Total #
		Turbellaria	4
Veneroida	Pisidiidae	Pisidium sp.	1
Amphipoda	Gammaridae	Gammarus sp.	33
Isopoda	Asellidae	Caecidotea sp.	13
Ephemeroptera	Baetidae	Baetis intercalaris	3
Coleoptera	Elmidae	Stenelmis sp.	18
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	1
		Hydropsyche betteni	1
Diptera	Chironomidae	Polypedilum flavum	1
		Chaetocladius sp.	1
		Cricotopus bicinctus	14
		Orthocladius sp.	1
		Thienemannimyia gr. spp.	6
		Microtendipes pedellus gr.	3

Metric Results

Taxa Richness: **14**
EPT Richness: **3**
Biotic Index: **5.83**
PMA: **45**
BAP Score: **4.35**

Field Data Summary

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

Waterbody: **Nauraushaun Brook**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **NAUR06**
WAA Site ID: **WAA00092**
Coll Date: **8/12/2010**
Site description: **Below culvert, adjacent to Rte 33 (N. Middletown Rd) and Rte 59; stream exits shopping plaza**

Latitude: **41.09728**
Longitude: **-74.01141**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.25**
Width (meters):	**3**
Current (cm/sec):	**35**
Canopy (%):	**10**
Substrate	
Rock (%):	**0**
Rubble (%):	**10**
Gravel (%):	**10**
Sand (%):	**20**
Silt (%):	**30**
Embeddedness (%):	**25**

Chemical Measurements

DO (mg/L):	**4.5**
DO sat. (%):	**53**
Temperature (C):	**22.9**
Spec. Conduct. (umhos):	**1290**
Baro pressure:	**752.9**
pH:	**7.8**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	**Y**
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	**Y**
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Very Poor**

Multi-metric Scores

EPT richness:	**2**
Total taxa richness:	**22**
Biotic index:	**6.81**
Percent model affinity:	**41**
Biological assessment profile:	**4.37**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Nauraushaun Brook** Station: **NAUR06** Latitude: **41.09728**
River Basin: **Hackensack** WAA Site ID: **W00092** Longitude: **-74.01141**
County: **Rockland** Coll Date: **8/12/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10532**

Order	Family	Final Determination	Total #
Hoplonemertea	Tetrastemmatidae	Prostoma sp.	2
		Turbellaria	9
Haplotaxida	Naididae	tubificoid Naididae w/o capilliform setae	15
Ephemeroptera	Baetidae	Baetis intercalaris	2
Coleoptera	Haliplidae	Peltodytes sp.	1
Trichoptera	Hydropsychidae	Hydropsyche betteni	3
Diptera	Ceratopogonidae	Bezzia/Palpomyia sp.	2
		Ceratopogoninae	1
	Chironomidae	Chironomus sp.	1
		Cryptochironomus sp.	1
		Phaenopsectra/Tribelos sp.	2
		Polypedilum flavum	2
		Tanytarsus sp.	6
		Cricotopus bicinctus	26
		Nanocladius sp.	1
		Orthocladius sp.	7
		Thienemannimyia gr. spp.	2
		Polypedilum illinoense gr.	7
	Tipulidae	Limonia sp.	3
		Tipula sp.	4
	Empididae	Hemerodromia sp.	2
	Ephydridae	Ephydridae	1

Metric Results

Taxa Richness: **22**
EPT Richness: **2**
Biotic Index: **6.81**
PMA: **41**
BAP Score: **4.37**

Field Data Summary

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

Waterbody: **Nauraushaun Brook**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **NAUR05**
WAA Site ID: **WAA00091**
Coll Date: **8/12/2010**
Site description: **Below culvert within apartment parking lot**

Latitude: **41.09264**
Longitude: **-74.01007**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.2**
Width (meters):	**4**
Current (cm/sec):	**35**
Canopy (%):	**20**
Substrate	
Rock (%):	**5**
Rubble (%):	**20**
Gravel (%):	**20**
Sand (%):	**25**
Silt (%):	**30**
Embeddedness (%):	**50**

Chemical Measurements

DO (mg/L):	**7.96**
DO sat. (%):	**94**
Temperature (C):	**23.2**
Spec. Conduct. (umhos):	**1113**
Baro pressure:	**752.7**
pH:	**7.9**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	
Mollusca:	
Oligochaeta:	**Y**
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Very Poor**

Multi-metric Scores

EPT richness:	**2**
Total taxa richness:	**20**
Biotic index:	**6.31**
Percent model affinity:	**45**
Biological assessment profile:	**4.54**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Nauraushaun Brook** | Station: **NAUR05** | Latitude: **41.09264**
River Basin: **Hackensack** | WAA Site ID: **W00091** | Longitude: **-74.01007**
County: **Rockland** | Coll Date: **8/12/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10534**

Order	Family	Final Determination	Total #
Hoplonemertea	Tetrastemmatidae	Prostoma sp.	1
		Turbellaria	3
Veneroida	Pisidiidae	Pisidium sp.	1
Basommatophora	Ancylidae	Ferrissia sp.	1
Lumbriculida	Lumbriculidae	Lumbriculidae	5
Rhynchobdellida	Glossiphoniidae	Glossiphoniidae	1
Amphipoda	Crangonyctidae	Crangonyx sp.	1
	Gammaridae	Gammarus sp.	1
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	11
		Hydropsyche betteni	1
Diptera	Chironomidae	Chironomus sp.	7
		Dicrotendipes sp.	3
		Polypedilum flavum	2
		Tanytarsus sp.	41
		Cricotopus bicinctus	6
		Orthocladius sp.	3
		Thienemannimyia gr. spp.	1
		Microtendipes pedellus gr.	1
		Polypedilum illinoense gr.	8
	Tipulidae	Limonia sp.	2

Metric Results

Taxa Richness: **20**
EPT Richness: **2**
Biotic Index: **6.31**
PMA: **45**
BAP Score: **4.54**

Field Data Summary

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

Waterbody: **Nauraushaun Brook**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **NAUR04**
WAA Site ID: **WAA00090**
Coll Date: **8/12/2010**
Site description: **At Pearl River Elks Club below foot bridge, near Elks Dr and Allison Rd**

Latitude: **41.083**
Longitude: **-74.00588**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**3**
Current (cm/sec):	**35**
Canopy (%):	**15**
Substrate	
Rock (%):	**5**
Rubble (%):	**15**
Gravel (%):	**50**
Sand (%):	**10**
Silt (%):	**20**
Embeddedness (%):	**15**

Chemical Measurements

DO (mg/L):	**7.5**
DO sat. (%):	**88**
Temperature (C):	**23.2**
Spec. Conduct. (umhos):	**899**
Baro pressure:	**753.9**
pH:	**7.9**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	**Y**
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	**Planaria**
Field Faunal Condition:	**Poor**
Overall Habitat:	**Adequate**

Multi-metric Scores

EPT richness:	**3**
Total taxa richness:	**18**
Biotic index:	**5.99**
Percent model affinity:	**53**
Biological assessment profile:	**4.94**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Nauraushaun Brook** Station: **NAUR04** Latitude: **41.083**
River Basin: **Hackensack** WAA Site ID: **W00090** Longitude: **-74.00588**
County: **Rockland** Coll Date: **8/12/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10539**

Order	Family	Final Determination	Total #
Hoplonemertea	Tetrastemmatidae	Prostoma sp.	1
		Turbellaria	24
Lumbriculida	Lumbriculidae	Lumbriculidae	1
Ephemeroptera	Baetidae	Baetis intercalaris	2
Coleoptera	Elmidae	Stenelmis sp.	16
Trichoptera	Hydropsychidae	Hydropsyche betteni	21
	Hydroptilidae	Hydroptila sp.	1
Diptera	Chironomidae	Polypedilum flavum	6
		Paratanytarsus sp.	1
		Tanytarsus sp.	9
		Cricotopus bicinctus	3
		Thienemannimyia gr. spp.	1
		Cricotopus trifascia gr.	1
		Polypedilum illinoense gr.	3
		Cricotopus tremulus gr.	5
	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	3
	Empididae	Hemerodromia sp.	1

Metric Results

Taxa Richness: **18**
EPT Richness: **3**
Biotic Index: **5.99**
PMA: **53**
BAP Score: **4.94**

Field Data Summary

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

Waterbody: **Nauraushaun Brook**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **NAUR03**
WAA Site ID: **WAA00087**
Coll Date: **8/12/2010**
Site description: **Just below Townline bridge**

Latitude: **41.0786**
Longitude: **-73.9974**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**4**
Current (cm/sec):	**40**
Canopy (%):	**80**
Substrate	
Rock (%):	**10**
Rubble (%):	**25**
Gravel (%):	**30**
Sand (%):	**25**
Silt (%):	**10**
Embeddedness (%):	**15**

Chemical Measurements

DO (mg/L):	**6.52**
DO sat. (%):	**76**
Temperature (C):	**22.8**
Spec. Conduct. (umhos):	**838**
Baro pressure:	**755**
pH:	**7.85**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	**Hirudinea**
Field Faunal Condition:	**Good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**3**
Total taxa richness:	**14**
Biotic index:	**5.96**
Percent model affinity:	**56**
Biological assessment profile:	**4.77**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Nauraushaun Brook** Station: **NAUR03** Latitude: **41.0786**
River Basin: **Hackensack** WAA Site ID: **W00087** Longitude: **-73.9974**
County: **Rockland** Coll Date: **8/12/2010** Coll Method: **kick**
State: **NY** Sample Type: **Benthic sample** WAA Lab #: **10529**

Order	Family	Final Determination	Total #
		Turbellaria	9
Veneroida	Pisidiidae	Pisidium sp.	1
Amphipoda	Gammaridae	Gammarus sp.	2
Ephemeroptera	Baetidae	Baetis intercalaris	16
Odonata	Coenagrionidae	Argia sp.	1
Coleoptera	Elmidae	Stenelmis sp.	11
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	8
		Hydropsyche betteni	36
Diptera	Chironomidae	Thienemannimyia gr. spp.	1
		Microtendipes pedellus gr.	1
		Polypedilum illinoense gr.	8
	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	2
	Empididae	Hemerodromia sp.	3

Metric Results

Taxa Richness: **14**
EPT Richness: **3**
Biotic Index: **5.96**
PMA: **56**
BAP Score: **4.77**

Field Data Summary

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

Waterbody: **Pascack Brook**
River Basin: **Hackensack**
County: **Rockland**
State: **NY**

Station: **PASC04**
WAA Site ID: **WAA00093**
Coll Date: **8/12/2010**
Site description: **Just off Memorial Park Dr, below bridge**

Latitude: **41.11691**
Longitude: **-74.0418**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.4**
Width (meters):	**6**
Current (cm/sec):	**40**
Canopy (%):	**15**
Substrate	
Rock (%):	**0**
Rubble (%):	**10**
Gravel (%):	**25**
Sand (%):	**50**
Silt (%):	**15**
Embeddedness (%):	**0**

Chemical Measurements

DO (mg/L):	**7.8**
DO sat. (%):	**92**
Temperature (C):	**23**
Spec. Conduct. (umhos):	**787**
Baro pressure:	**748**
pH:	**7.8**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	**Y**
Algae-filamentous:	**Y**
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Good**
Overall Habitat:	**Very Poor**

Multi-metric Scores

EPT richness:	**5**
Total taxa richness:	**19**
Biotic index:	**5.19**
Percent model affinity:	**44**
Biological assessment profile:	**5.19**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Pascack Brook** | Station: **PASC04** | Latitude: **41.11691**
River Basin: **Hackensack** | WAA Site ID: **W00093** | Longitude: **-74.0418**
County: **Rockland** | Coll Date: **8/12/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10535**

Order	Family	Final Determination	Total #
		Turbellaria	1
Haplotaxida		Lumbricina	1
Lumbriculida	Lumbriculidae	Lumbriculidae	3
Ephemeroptera	Baetidae	Baetis intercalaris	4
Coleoptera	Elmidae	Stenelmis sp.	1
Trichoptera	Hydropsychidae	Ceratopsyche bronta	2
		Cheumatopsyche sp.	35
		Hydropsyche betteni	2
	Hydroptilidae	Hydroptila sp.	6
Diptera	Ceratopogonidae	Atrichopogon sp.	1
	Chironomidae	Polypedilum flavum	17
		Polypedilum halterale gr.	2
		Tanytarsus sp.	3
		Cricotopus bicinctus	6
		Nanocladius sp.	1
		Orthocladius sp.	6
		Thienemannimyia gr. spp.	5
		Polypedilum illinoense gr.	1
	Empididae	Empididae	3

Metric Results

Taxa Richness: **19**
EPT Richness: **5**
Biotic Index: **5.19**
PMA: **44**
BAP Score: **5.19**

Field Data Summary

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

Waterbody: **Pine Brook**
River Basin: **Saddle**
County: **Rockland**
State: **NY**

Station: **PINB01**
WAA Site ID: **WAA00085**
Coll Date: **8/12/2010**
Site description: **Just above Reservior Rd bridge**

Latitude: **41.07839**
Longitude: **-74.06716**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.2**
Width (meters):	**2**
Current (cm/sec):	**30**
Canopy (%):	**70**
Substrate	
Rock (%):	**20**
Rubble (%):	**25**
Gravel (%):	**30**
Sand (%):	**15**
Silt (%):	**10**
Embeddedness (%):	**25**

Chemical Measurements

DO (mg/L):	**3.64**
DO sat. (%):	**43**
Temperature (C):	**23.8**
Spec. Conduct. (umhos):	**749**
Baro pressure:	**751.2**
pH:	**7.78**
Salinity (PSS):	

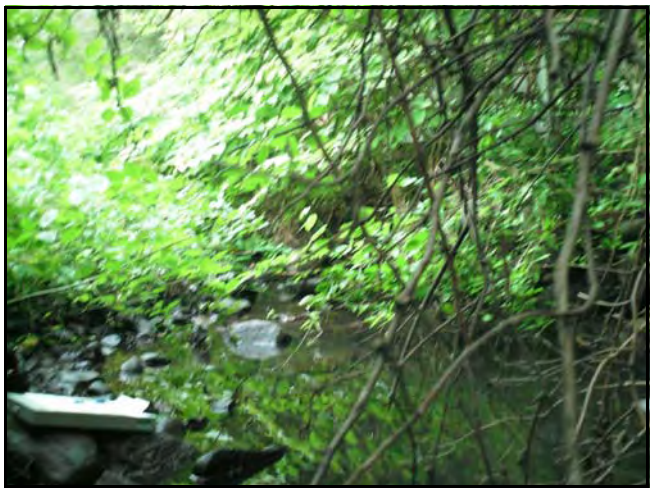
Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Good**
Overall Habitat:	**Poor**

Multi-metric Scores

EPT richness:	**4**
Total taxa richness:	**12**
Biotic index:	**5.01**
Percent model affinity:	**35**
Biological assessment profile:	**4.19**
Water quality category:	**Moderately impacted**

Flow



Flow

Lab Data Summary

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

Waterbody: **Pine Brook**
River Basin: **Saddle**
County: **Rockland**
State: **NY**

Station: **PINB01**
WAA Site ID: **W00085**
Coll Date: **8/12/2010**
Sample Type: **Benthic sample**

Latitude: **41.07839**
Longitude: **-74.06716**
Coll Method: **kick**
WAA Lab #: **10528**

Order	Family	Final Determination	Total #
Amphipoda	Gammaridae	Gammarus sp.	1
Decapoda	Cambaridae	Orconectes sp.	2
Isopoda	Asellidae	Caecidotea sp.	1
Ephemeroptera	Heptageniidae	Stenacron interpunctatum	5
Megaloptera	Corydalidae	Nigronia serricornis	1
Coleoptera	Elmidae	Macronychus glabratus	6
		Stenelmis sp.	17
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	40
		Hydropsyche betteni	5
	Philopotamidae	Chimarra aterrima	17
Diptera	Chironomidae	Polypedilum flavum	3
		Thienemannimyia gr. spp.	2

Metric Results

Taxa Richness: **12**
EPT Richness: **4**
Biotic Index: **5.01**
PMA: **35**
BAP Score: **4.19**

Field Data Summary

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

Waterbody: **Ramapo River**
River Basin: **Ramapo**
County: **Rockland**
State: **NY**

Station: **RAMA07**
WAA Site ID: **WAA00082**
Coll Date: **8/12/2010**
Site description: **Just above Lowland Rd bridge (long term site)**

Latitude: **41.12517**
Longitude: **-74.16488**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**10**
Current (cm/sec):	**30**
Canopy (%):	**15**
Substrate	
Rock (%):	**0**
Rubble (%):	**10**
Gravel (%):	**60**
Sand (%):	**15**
Silt (%):	**15**
Embeddedness (%):	**25**

Chemical Measurements

DO (mg/L):	**6.6**
DO sat. (%):	**79**
Temperature (C):	**24.3**
Spec. Conduct. (umhos):	**644**
Baro pressure:	**752.8**
pH:	**7.68**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	**Y**
Algae-filamentous:	**Y**
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	**Y**
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**10**
Total taxa richness:	**19**
Biotic index:	**4.9**
Percent model affinity:	**59**
Biological assessment profile:	**6.54**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Ramapo River** | Station: **RAMA07** | Latitude: **41.12517**
River Basin: **Ramapo** | WAA Site ID: **W00082** | Longitude: **-74.16488**
County: **Rockland** | Coll Date: **8/12/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10531**

Order	Family	Final Determination	Total #
Amphipoda	Gammaridae	Gammarus sp.	1
Ephemeroptera	Baetidae	Baetis intercalaris	11
	Heptageniidae	Leucrocuta sp.	1
	Isonychiidae	Isonychia sp.	10
Plecoptera	Perlidae	Paragnetina media	4
Coleoptera	Elmidae	Promoresia elegans	1
	Psephenidae	Psephenus herricki	5
Trichoptera	Glossosomatidae	Glossosoma sp.	1
	Hydropsychidae	Ceratopsyche bronta	17
		Cheumatopsyche sp.	15
		Hydropsyche betteni	8
	Hydroptilidae	Leucotrichia pictipes	2
	Philopotamidae	Chimarra aterrima	8
Diptera	Chironomidae	Cardiocladius obscurus	3
		Cricotopus bicinctus	1
		Orthocladius sp.	3
		Tvetenia vitracies	1
		Cricotopus trifascia gr.	7
	Empididae	Hemerodromia sp.	1

Metric Results

Taxa Richness: **19**
EPT Richness: **10**
Biotic Index: **4.90**
PMA: **59**
BAP Score: **6.54**

Field Data Summary

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

Waterbody: **Saddle River**
River Basin: **Saddle**
County: **Rockland**
State: **NY**

Station: **SADL03**
WAA Site ID: **WAA00084**
Coll Date: **8/12/2010**
Site description: **Just above Svahan Dr. culvert (long term site)**

Latitude: **41.08094**
Longitude: **-74.083**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.2**
Width (meters):	**4**
Current (cm/sec):	**40**
Canopy (%):	**15**
Substrate	
Rock (%):	**10**
Rubble (%):	**25**
Gravel (%):	**35**
Sand (%):	**15**
Silt (%):	**15**
Embeddedness (%):	**40**

Chemical Measurements

DO (mg/L):	**7.8**
DO sat. (%):	**83**
Temperature (C):	**18.4**
Spec. Conduct. (umhos):	**671**
Baro pressure:	**752.3**
pH:	**7.46**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	**Y**
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	**Y**
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Adequate**

Multi-metric Scores

EPT richness:	**7**
Total taxa richness:	**26**
Biotic index:	**5.34**
Percent model affinity:	**45**
Biological assessment profile:	**6**
Water quality category:	**Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Saddle River** | Station: **SADL03** | Latitude: **41.08094**
River Basin: **Saddle** | WAA Site ID: **W00084** | Longitude: **-74.083**
County: **Rockland** | Coll Date: **8/12/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10526**

Order	Family	Final Determination	Total #
		Turbellaria	2
Haplotaxida	Naididae	tubificoid Naididae w/o capilliform setae	3
Ephemeroptera	Baetidae	Baetis intercalaris	7
Coleoptera	Elmidae	Stenelmis sp.	1
Trichoptera	Glossosomatidae	Glossosoma sp.	1
	Hydropsychidae	Ceratopsyche sparna	7
		Cheumatopsyche sp.	12
		Hydropsyche betteni	17
	Hydroptilidae	Hydroptila sp.	4
	Philopotamidae	Chimarra aterrima	6
Diptera	Chironomidae	Polypedilum aviceps	6
		Polypedilum flavum	7
		Cladotanytarsus sp.	2
		Micropsectra sp.	1
		Paratanytarsus sp.	1
		Tanytarsus sp.	5
		Diamesa sp.	3
		Cricotopus sp.	1
		Eukiefferiella devonica gr.	1
		Orthocladius sp.	2
		Parametriocnemus sp.	1
		Rheocricotopus robacki	1
		Tvetenia sp.	2
		Thienemannimyia gr. spp.	5
	Tipulidae	Antocha sp.	1
		Dicranota sp.	1

Metric Results

Taxa Richness: **26**
EPT Richness: **7**
Biotic Index: **5.34**
PMA: **45**
BAP Score: **6.00**

Field Data Summary

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

Waterbody: **Sparkill**
River Basin: **Saw Mill/Hudson**
County: **Rockland**
State: **NY**

Station: **SPAR02**
WAA Site ID: **WAA00088**
Coll Date: **8/11/2010**
Site description: **Below Rte 340 bridge**

Latitude: **41.04548**
Longitude: **-73.9446**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.3**
Width (meters):	**4**
Current (cm/sec):	**40**
Canopy (%):	**60**
Substrate	
Rock (%):	**10**
Rubble (%):	**10**
Gravel (%):	**45**
Sand (%):	**10**
Silt (%):	**25**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**6.8**
DO sat. (%):	**75**
Temperature (C):	**20.8**
Spec. Conduct. (umhos):	**718**
Baro pressure:	**758**
pH:	**7.16**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Poor**
Overall Habitat:	**Adequate**

Multi-metric Scores

EPT richness:	**3**
Total taxa richness:	**15**
Biotic index:	**5.86**
Percent model affinity:	**42**
Biological assessment profile:	**4.29**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Sparkill** | Station: **SPAR02** | Latitude: **41.04548**
River Basin: **Saw Mill/Hudson** | WAA Site ID: **W00088** | Longitude: **-73.9446**
County: **Rockland** | Coll Date: **8/11/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10537**

Order	Family	Final Determination	Total #
		Turbellaria	4
Haplotaxida		Lumbricina	1
Ephemeroptera	Baetidae	Baetis tricaudatus	1
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	13
		Hydropsyche betteni	11
Diptera	Chironomidae	Phaenopsectra sp.	1
		Polypedilum flavum	3
		Micropsectra sp.	18
		Tanytarsus sp.	3
		Cricotopus bicinctus	1
		Parametriocnemus sp.	1
		Thienemannimyia gr. spp.	8
		Polypedilum illinoense gr.	29
	Tipulidae	Tipula sp.	4
	Empididae	Empididae	2

Metric Results

Taxa Richness: **15**
EPT Richness: **3**
Biotic Index: **5.86**
PMA: **42**
BAP Score: **4.29**

Field Data Summary

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

Waterbody: **Sparkill**
River Basin: **Saw Mill/Hudson**
County: **Rockland**
State: **NY**

Station: **SPAR06**
WAA Site ID: **WAA00066**
Coll Date: **8/11/2010**
Site description: **Just below Thiells Mt. Ivy Rd bridge (long term site)**

Latitude: **41.0294**
Longitude: **-73.92567**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.4**
Width (meters):	**5**
Current (cm/sec):	**20**
Canopy (%):	**60**
Substrate	
Rock (%):	**20**
Rubble (%):	**30**
Gravel (%):	**20**
Sand (%):	**5**
Silt (%):	**25**
Embeddedness (%):	**40**

Chemical Measurements

DO (mg/L):	**6.4**
DO sat. (%):	**62**
Temperature (C):	**21.8**
Spec. Conduct. (umhos):	**674**
Baro pressure:	**759.4**
pH:	**7.03**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	**Diptera**
Field Faunal Condition:	**Poor**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**3**
Total taxa richness:	**12**
Biotic index:	**5.67**
Percent model affinity:	**46**
Biological assessment profile:	**4.29**
Water quality category:	**Moderately impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Sparkill** | Station: **SPAR06** | Latitude: **41.0294**
River Basin: **Saw Mill/Hudson** | WAA Site ID: **W00066** | Longitude: **-73.92567**
County: **Rockland** | Coll Date: **8/11/2010** | Coll Method: **kick**
State: **NY** | Sample Type: **Benthic sample** | WAA Lab #: **10525**

Order	Family	Final Determination	Total #
		Turbellaria	18
Amphipoda	Gammaridae	Gammarus sp.	1
Isopoda	Asellidae	Caecidotea sp.	1
Ephemeroptera	Baetidae	Baetis intercalaris	3
Coleoptera	Elmidae	Stenelmis sp.	15
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	24
		Hydropsyche betteni	21
Diptera	Chironomidae	Polypedilum flavum	10
		Xenochironomus xenolabis	1
		Cricotopus sp.	1
		Parametriocnemus sp.	1
	Tipulidae	Antocha sp.	4

Metric Results

Taxa Richness: **12**
EPT Richness: **3**
Biotic Index: **5.67**
PMA: **46**
BAP Score: **4.29**

Field Data Summary

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

Waterbody: **Torne Brook**
River Basin: **Ramapo**
County: **Rockland**
State: **NY**

Station: **TORN01**
WAA Site ID: **WAA00081**
Coll Date: **8/12/2010**
Site description: **Across from landfill, approx. 30-40 m above foot bridge**

Latitude: **41.14276**
Longitude: **-74.16171**
Field Crew: **kms, cmf**

Physical Characteristics

Depth (meters):	**0.15**
Width (meters):	**1.5**
Current (cm/sec):	**40**
Canopy (%):	**75**
Substrate	
Rock (%):	**10**
Rubble (%):	**40**
Gravel (%):	**30**
Sand (%):	**10**
Silt (%):	**10**
Embeddedness (%):	**20**

Chemical Measurements

DO (mg/L):	**5.7**
DO sat. (%):	**66**
Temperature (C):	**21.9**
Spec. Conduct. (umhos):	**177**
Baro pressure:	**751.1**
pH:	**7.38**
Salinity (PSS):	

Biological Attributes

Aquatic vegetation	
Macrophytes:	
Diatoms:	**Y**
Algae-suspended:	
Algae-filamentous:	
Occurrence of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	**Y**
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	**Y**
Odonata:	
Chironomidae:	
Simuliidae:	
Decapoda:	
Gammaridae:	
Mollusca:	
Oligochaeta:	
Other macro's:	
Field Faunal Condition:	**Very good**
Overall Habitat:	**Good**

Multi-metric Scores

EPT richness:	**12**
Total taxa richness:	**23**
Biotic index:	**2.42**
Percent model affinity:	**49**
Biological assessment profile:	**7.37**

Water quality category: **Slightly impacted**

Flow

Flow

Lab Data Summary

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

Waterbody: **Torne Brook**
River Basin: **Ramapo**
County: **Rockland**
State: **NY**

Station: **TORN01**
WAA Site ID: **W00081**
Coll Date: **8/12/2010**
Sample Type: **Benthic sample**

Latitude: **41.14276**
Longitude: **-74.16171**
Coll Method: **kick**
WAA Lab #: **10543**

Order	Family	Final Determination	Total #
Haplotaxida		Lumbricina	1
Ephemeroptera	Baetidae	Acentrella turbida	1
	Leptophlebiidae	Paraleptophlebia sp.	1
Odonata	Gomphidae	Gomphidae	1
Plecoptera	Leuctridae	Leuctra sp.	3
	Chloroperlidae	Chloroperlidae	3
	Perlidae	Acroneuria abnormis	11
	Pteronarcyidae	Pteronarcys sp.	5
Megaloptera	Corydalidae	Nigronia serricornis	6
Coleoptera	Elmidae	Optioservus ovalis	1
		Oulimnius latiusculus	1
		Stenelmis sp.	1
	Psephenidae	Psephenus herricki	5
Trichoptera	Glossosomatidae	Glossosoma sp.	6
	Hydropsychidae	Ceratopsyche sparna	1
		Cheumatopsyche sp.	15
	Philopotamidae	Chimarra aterrima	2
		Dolophilodes sp.	19
	Rhyacophilidae	Rhyacophila fuscula	1
Diptera	Chironomidae	Polypedilum aviceps	3
		Parametriocnemus sp.	3
		Microtendipes pedellus gr.	8
	Tipulidae	Dicranota sp.	2

Metric Results

Taxa Richness: **23**
EPT Richness: **12**
Biotic Index: **2.42**
PMA: **49**
BAP Score: **7.37**

Date Collected	5/20/2006	6/27/2006	8/17/2006	10/26/2006	5/20/2007	6/16/2007	6/21/2007	6/24/2007
Stream name	Mahwah River	Sparkill Creek	Trib to Hackensack River	Mahwah River	Timp Brook	Sparkill Creek	Pascack Brook	Timp Brook
Latitude/Longitude	---	---	---	---	N41 15.971 W074 00.007	N41 01.250' W73 56.844'	N 41 04.078' W 74 02.398'	N41 15.971 W074 00.007
Air Temp. (C)	---	21	23	9	20	23	80 F	68F
Water Temp. (C)	12	18	20	9	16	16	62 F	60F
pH	8	7.6	7.8	7.9	8.4	7.4	7.8	8.8
Alkalinity	0	0	0	0	0	160	0	0
DO mg/l	11	9	11	---	8	7	12	8
% O2 Sat.	104	95	120	---	72	---	---	---
Nitrate-N (mg/L)	2.2	0.4	0.9	0.9	N/A	1.6	---	---
PO4 (mg/L)	0.19	0.03	0.18	0.57	0.02	0.27	---	---
SC (µS/cm)	---	490	---	---	---	---	---	---
Velocity (m/sec)	---	---	---	---	0.6*	0.13	0.102	30?
Biotic index	---	---	---	---	---	6.43	---	---
Turbidity [FAU]?	---	---	---	---	---	---	---	---
Comments	---	---	---	---	* Only surface veloc.	---	---	---

Date Collected	7/4/2007	7/22/2007	7/25/2007	8/26/2007	9/7/2007	9/17/2007	9/28/2007	11/6/2007
Stream name	Mahwah River	Minisceongo Creek	Demarest Kill	Nauraushaun Brook	Nauraushaun Brook	Pascack Brook	Demarest Mill	Mahwah River
Latitude/Longitude	N41 08.750' W74 006.862'	---	---	N41 03.955' W73 59.729	N41 04.07' W73 59.717'	41 03.59 74 02.190	---	N41 08.750' W74 006.862'
Air Temp. (C)	23	24	84F	28	27	24	23	28
Water Temp. (C)	17	20	70F	22	18	20	20	19
pH	8.4	7.8	7.7	8.1	8	8.2	7.3	8
Alkalinity	0	0	---	---	---	40ppm?	---	---
DO mg/l	5	11	12	11	13	9	10	9
% O2 Sat.	---	120	---	125	---	---	---	95
Nitrate-N (mg/L)	1	0.4*	1.8	1	0.9	---	2.6	0.5
PO4 (mg/L)	0.13	0.19	0.25	0.17	0.14	---	1.79	0.7
SC (µS/cm)	---	---	---	---	---	---	---	---
Velocity (m/sec)	2.42*	0.21	0.142	0.21*	0.26	0.204	---	0.36
Biotic index	---	4.84	4.87	5.8	5.09	---	---	5.97
Turbidity [FAU]?	---	---	---	---	---	---	---	---
Comments	* Only surface veloc.	*may be incorrect, did not use all of reagent	---	* Only surface veloc.	---	---	---	---

Date Collected	3/29/2008	5/3/2008	5/6/2008	5/25/2008	6/14/2008	6/16/2008	7/2/2008	7/15/2008
Stream name	Crum Creek	Cedar Pond	Nauraushaun Brook	Mahwah River	Crum Creek	Minisceongo Creek	Demarest Kill	Pascack Brook
Latitude/Longitude	---	---	N41 04.07’ W73 59.717’	N41 08.750’ W74 006.862’	---	---	N41 03.955’ W73 59.729	N 41 04.078' W 74 02.398'
Air Temp. (C)	5.3	---	19	23	24	22	23	72F
Water Temp. (C)	5.2	51F	17	17	18.5	21	21	18
pH	8	8.2	8.2	7.8	7.6	7.4	7.1	8.3
Alkalinity	-	---	0	---	-	-	0	-
DO mg/l	14	13.5	13	10	9	11	9	11
% O2 Sat.	110	120	---	100	95	120	105	115
Nitrate-N (mg/L)	-	1.4	0.2	0.8	1.5	0	1.1	1.7
PO4 (mg/L)	0.3	0.16	0.24	0.22	0.4	0	0	0.23
SC (µS/cm)	-	-	-	-	-	-	-	-
Velocity (m/sec)	0.37	0.393	0.33*	0.39	0.13	0.165	0.25	0.3
Biotic index	-	---	6	4.11	3.33	6.01	4.16	4.8
Turbidity [FAU]?	-	---	---	5	---	7	2	5
Comments	---	---	* stream veloc = surface, not u-water	---	---	---	---	---

Date Collected	7/19/2008	7/23/2008	8/2/2008	8/10/2008	8/23/2008	8/24/2008	8/27/2008	10/25/2008	11/8/2008
Stream name	Sparkill Creek	Nauraushaun Brook	Cedar Pond	Minisceongo Creek	E. Hackensack	Crum Creek	Nanuet	Crum Creek	West Branch Hackensack
Latitude/Longitude	N41 01.250' W73 56.844'	N41 04.07’ W73 59.713’	N41 13 675 W73 59.176	N41.11 '52 W74.02 '22	N41.10’.995 W74..00’.84	N41.10’.528 W74.0’.022	N41.05’330 W74.00’203	N41 10.941 W73 59.962	N41 11.1 W73 59.6
Air Temp. (C)	28	23	23	28	21	22	18	10	14
Water Temp. (C)	23	23	19	20	20	17	17	8.5	12
pH	7.8	7.3	7.1	7.1	7.1	7.2	7.4	7	7.1
Alkalinity	-	0	-	120	-	-	-	0	0
DO mg/l	6	8	9	20	10	10	8	12	10
% O2 Sat.	70%	91	95	120	110	100	80	100	90
Nitrate-N (mg/L)	2	0.3	0?	0.17	2.5	1.4	1.3	2.4	2
PO4 (mg/L)	0.33	0.17	0.04	0.12	0.25	0.19	0.14	0.28	0.09
SC (µS/cm)	-	-	-	-	-	-	-	-	-
Velocity (m/sec)	0.24	0.43	0.213	0.105	0.155	0.03	0.018	2.89	---
Biotic index	5.6	5.2	3.66	6.5	4.6	4.4	8.43	3.95	8.84
Turbidity [FAU]?	7	10	3	5	9	3	3	17	9
Comments	---	---	---	---	---	---	---	---	---

Date Collected	3/17/2009	6/6/2009	6/8/2009	8/20/2009	8/30/2009	6/6/2010	4/14/2007	6/13/2009	6/13/2009
Stream name	Nauraushaun	Sparkill Creek	Sparkill Creek	Naurashaun Brook	Lake Lucille	Naurashaun Brook	Sparkill Creek	Hackensack West Branch	Crum Creek
Latitude/Longitude	---	---	---	---	N41 10.991' W074 00.141'	N41 04.078' W073'59.720'	Tappan Park	West Branch Site	N41.10'520 W74.00'032
Air Temp. (C)	10	---	---	23	21	20	9	2	21
Water Temp. (C)	9	14	19	22	16	16	6	15	18
pH	---	8.3	7.5	7.3	7.1	8.3	7	7.8	7.1
Alkalinity	---	50	160	90	180	210	>20	0	80
DO mg/l	---	10	7.5	9	9	8	---	10	12
% O2 Sat.	---	---	---	90	90	80	---	---	---
Nitrate-N (mg/L)	---	0.5	1.5	0.8	1.3	1	10	1.2	0.4
PO4 (mg/L)	---	---	---	0.28	0.04	0.22	---	---	0.12
SC (µS/cm)	---	---	---	420	470	---	250	---	250
Velocity (m/sec)	0.32	---	---	0.6	0.09	0.2752	0.4	0.23	0.204
Biotic index	5.86	---	---	5.46	5.6	5.02	---	5.04	4
Turbidity [FAU]?	---	0	371	18	3	1	---	3	47
Comments	---	---	---	---	---	---	---	---	---

Date Collected	8/15/2009	6/21/2010	7/6/2010	7/10/2010	7/17/2010	7/19/2010	7/29/2010	9/11/2010
Stream name	Demarest Mill Stream	Pascack Brook	Minisceongo Creek	Hackensack West Branch	Mahwah River	Pascack Brook	Naurashaun Brook	Pascack Brook
Latitude/Longitude	---	N41 05'41.8" W74 01'57"	---	illeg	10 Piltz Rd. Pomona	N41 05.698' W74 01.959'	N41 04.074 W73 59.717	Blue Heron Drive
Air Temp. (C)	24.5	---	---	---	29	30.5	27	21
Water Temp. (C)	20	22	---	20	15	23	22	18
pH	7.55	7.85	8.1	8	7.1	7.55	8.1	7.8
Alkalinity	---	~160	---	0	0	100	---	---
DO mg/l	[10 drops]	6	6	7	5	6.5	7	7
% O2 Sat.	---	---	---	79	---	---	55	70
Nitrate-N (mg/L)	1.7	1.4	---	1.1	1.2	1.65	33	1.7
PO4 (mg/L)	0.82	0	---	0	0.01	0.41	0.35	0.19
SC (µS/cm)	520	1210	870	530	300	---	---	1120
Velocity (m/sec)	0.21	0.28	---	illeg	~0	2.21	[0.16]	0.21
Biotic index	5.45	5.2	---	[3.3]	4.3	5.2	5.35	5.4
Turbidity [FAU]?	2	9	---	60	78	41	2	5
Comments	---	---	---	---	---	---	---	---