BIOLOGICAL STREAM SURVEY

ROCKLAND COUNTY, NEW YORK
LOTIC SCENE INVESTIGATION (LSI)
2016 STREAM BIOMONITORING WATER QUALITY PROJECT

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

Contents

Introduction

This report summarizes the results from the benthic samples collected for Rockland County in 2016. 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 - 2015 data, see Rockland County reports website: http://rocklandgov.com/departments/environmental-resources/protecting-our-streams-and-waterways/

Benthic kick samples were collected at 19 stations during July and August, 2016 by RCSWCD personnel. All of the stations sampled had been previously sampled in at least one year during 2006 – 2015; for trend monitoring. 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, Impact Source Determination (ISD) which assessed the most likely source (type of impact) affecting water quality, and the Nutrient Biotic Index (NBI) indicating the trophic state of the water at a particular station (see Table 3).

Figure 1. Map of 2006 - 2016 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.

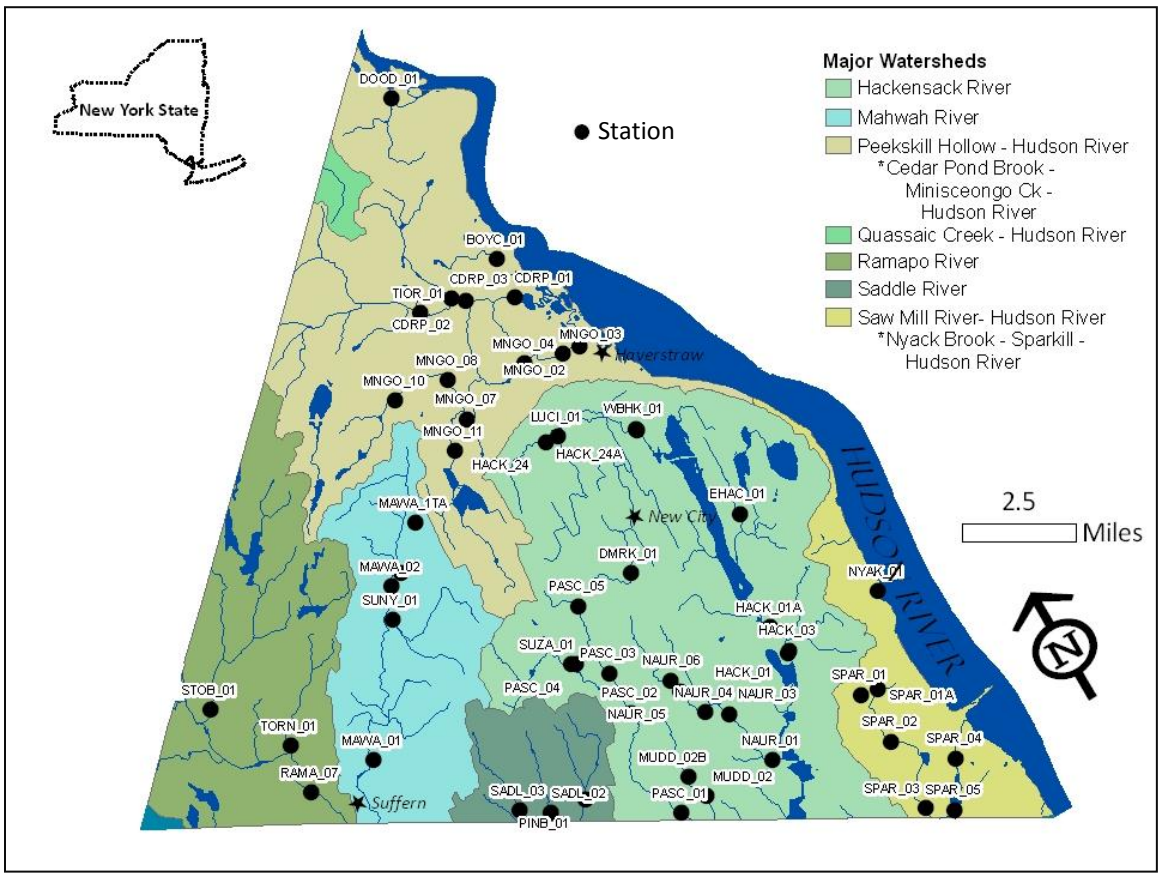
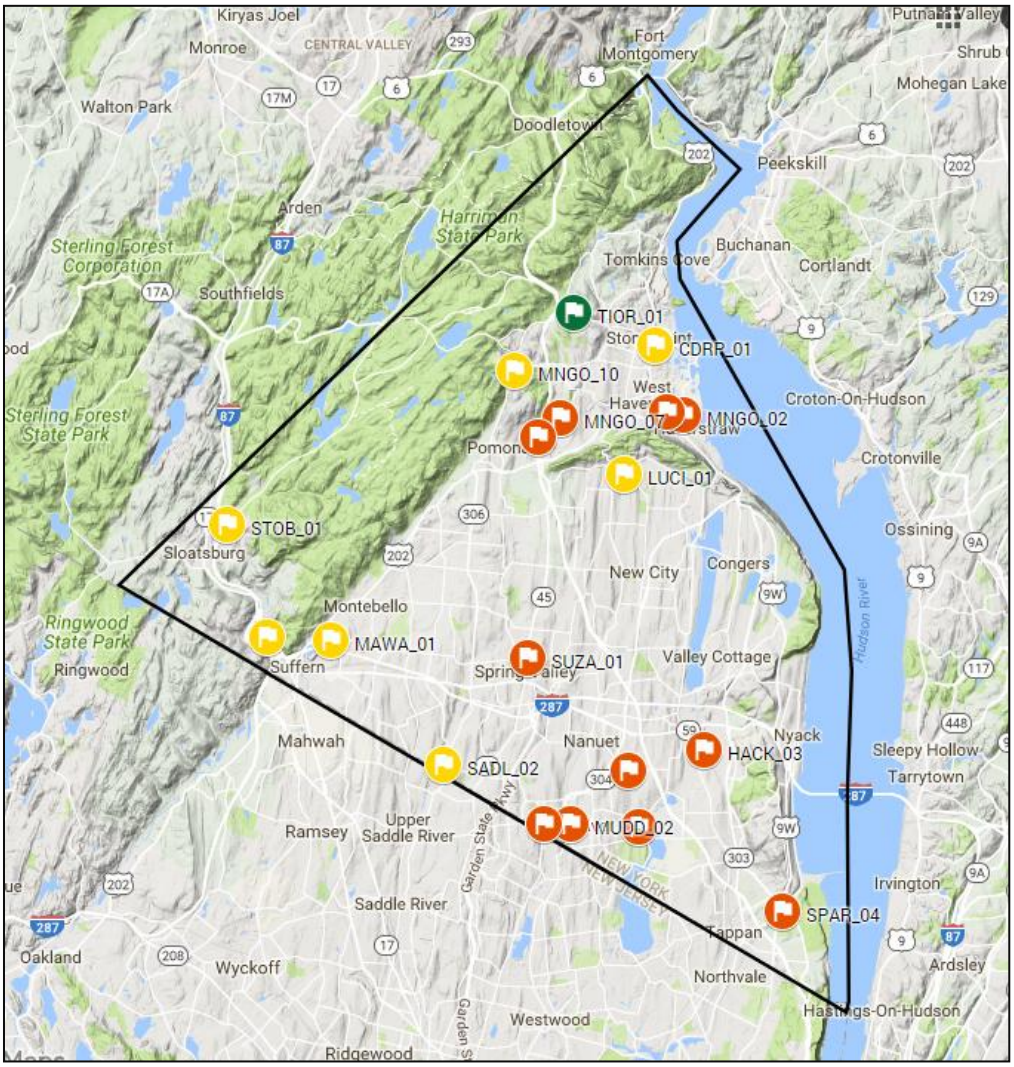


Figure 2. Map of 2016 station locations in Rockland County, NY. Station flag colors of green, yellow, and orange indicate BAP scores equal to non-, slightly, or moderately impacted water quality categories respectively. An interactive map is available to view at this web address: https://drive.google.com/open?id=131Qd74WR3c9XhQxbyfximzF7_7Y&usp=sharing



Summary of Results

The 2016 biological community metrics indicated Rockland County water quality ranged from moderately impacted to non impacted: 1 site was non impacted, 7 sites were slightly impacted, and 11 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 9 stations, improved at 4 stations, and remained the same at 6 stations (Table 2). Of the 9 stations with declining water quality, the BAP dropped into a lower water quality category at all 3 stations (Table 2). Of the four stations with improved water quality two

remained within the same impact category while the other two improved from the moderately to the slightly impacted category (Table 2).

The variability in water quality is partially a function of land use in each of the major stream basins, which affects the amount and the nature of storm water runoff. In a natural state (grassy or forested areas), rainwater seeps into the ground, where it is filtered, recharges ground water, and contributes to a steady state flow in lotic systems during times of low rainfall. Agricultural alteration of the land increases the amount of water that flows over the surface directly into streams. The result is diminished amounts of available groundwater, significant changes in river flow during wet or dry periods, and the deposition of chemicals such as fertilizer and pesticides and of animal waste directly into rivers and streams. Urban land use, with large imperious surfaces such as roads, parking lots, driveways, and rooftops results in the highest level of runoff, and is therefore the most likely to cause both flooding and stream channel erosion as large volumes of water carry urban contaminants (oil and petroleum products, road salt, industrial chemicals, lawn fertilizers and pesticides, and litter) rapidly into waterways through storm sewers or across imperious surfaces.

Since 2006, areas of Rockland County with a higher percentage of forested land have exhibited higher water quality scores than areas of considerable urban development or agriculture (figure 3). Forested areas usually contain fewer sources of pollutants and superior ability to buffer impacts; pollutants are removed from the water as it filters through the soil. The overall impact from agricultural and urban areas is dependent on numerous variables, including the amount of land dedicated to these uses, the volume of impervious surfaces, type and abundance of industry, abundance of automobiles, and management practices.

Figure 3. Percentage of land use and mean BAP scores for years 2006 – 2016 within each major watershed. N = number of samples, dashed line indicates minimum and maximum scores.

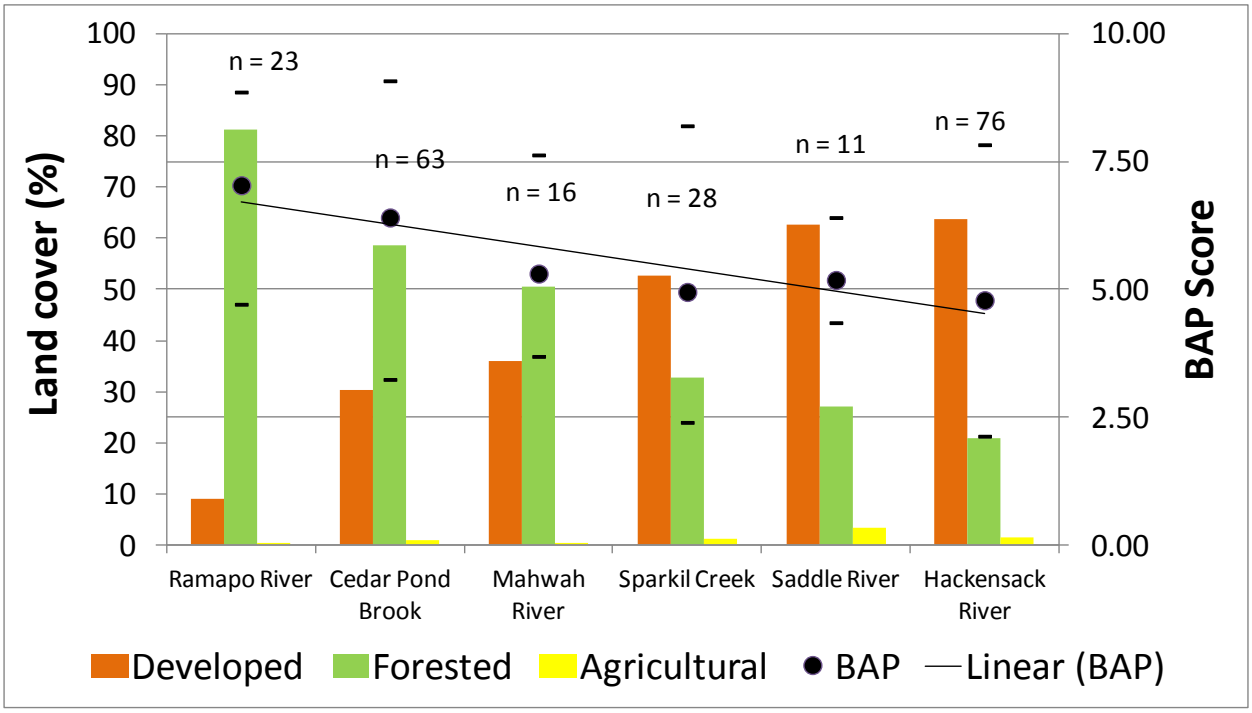


Table 1. Benthic macroinvertebrate metric scores and impact source determination percentages for the 19 stream sites sampled in 2016 throughout Rockland County, NY. Bolded numbers indicate most likely source of impact to stream community. TR= taxa richness; BI= biotic index; EPT = Ephemeroptera-Plecoptera-Trichoptera taxa; PMA= percent model affinity; BAP = biotic assessment profile; Nat=natural; NPN = non-point nutrient; Org = organic inputs; Imp= impoundment; Complex= municipal/industrial/nutrients. NBI-N = Nutrient Biotic Index for nitrogen; NBI-P = Nutrient Biotic Index for phosphorus.

Biotic metrics							Impact Source Determination (ISD)								NBI metrics
Stream name	Station	TR	BI	EPT	PMA	NBI-P	BAP	Imp	Complex	Natural	NPS	Organic	Silt	Toxic	NBI-N
Cedar Pond Brook	CDRP_01	25	5.3	12	49	5.73	6.54	**59**	**59**	50	**56**	52	49	51	5.33
Cedar Pond Brook	TIOR_01A	27	3.9	17	69	5.26	8.15	35	25	49	43	22	30	30	5.41
Minisceongo Creek	MNGO_07	17	5.6	4	47	6.86	4.46	58	58	35	58	**63**	58	**66**	7.23
S.B. Minisceongo Creek	MNGO_11A	9	6.6	2	31	7.28	2.70	55	**55**	19	28	**58**	28	41	8.52
Mahwah River	MAWA_01A	19	5.1	6	54	6.96	5.19	49	48	48	**54**	40	47	45	6.96
Ramapo River	RAMA_07	20	4.9	8	57	6.40	5.84	46	47	52	**61**	40	39	50	6.08
Nauraushaun Brook	NAUR_01	15	5.1	5	57	7.30	4.71	**55**	**57**	41	**54**	**54**	42	47	6.75
Unnamed tributary	SUZA_01	17	6.1	3	50	6.92	4.29	46	49	33	41	45	45	47	7.20
Stoney Brook	STOB_01A	24	4	11	84	6.12	7.39	29	28	**50**	37	35	45	29	6.22
Hackensack River	HACK_03A	22	7	5	48	7.25	4.37	49	**58**	25	37	**62**	47	51	7.93
Chock Brook	MNGO_10A	21	2.8	9	41	6.43	5.90	7	4	23	10	6	4	5	5.89
Minisceongo Creek	MNGO_03	16	5.7	7	35	6.50	4.52	**52**	**52**	19	48	47	32	41	6.41
Minisceongo Creek	MNGO_02	14	5.7	5	34	6.80	3.97	**55**	**56**	26	**55**	51	36	49	6.95
Nauraushaun Brook	NAUR_03	18	5.6	4	48	6.94	4.51	**62**	45	43	**61**	39	44	**62**	7.25
Pascack Brook	PASC_01	18	6.5	4	58	7.04	4.59	**50**	**55**	33	47	**52**	44	**55**	7.55
Sparkill Creek	SPAR_04	21	6.4	5	49	6.83	4.71	48	**63**	27	47	**59**	51	55	7.61
Unnamed tributary	LUCI_01A	28	6.2	7	53	6.90	5.56	41	32	32	37	42	30	48	7.59
Muddy Creek	MUDD_02	14	6.2	2	42	7.13	3.62	**60**	**62**	30	41	44	40	**57**	7.84
Saddle River	SADL_02	22	5.5	4	50	6.29	5.21	**65**	**66**	36	57	**62**	47	48	6.05

Table 2 Biological Assessment Profile (BAP) scores from 2006 - 2016, the relative difference between 2016 and the most previous BAP values, and the overall change in water quality status (a difference of ≥±0.5 points).

		BAP												
Stream Name	Station	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Diff	Change
Cedar Pond Brook	CDRP_01	7.20	8.61		7.56			4.62	8.47	7.63	6.68	6.54	-0.14	No Diff
Hackensack River	HACK_03/A				3.62			3.98				4.37	0.39	No Diff
Crum Creek	LUCI_01/A			5.82				4.73				5.56	0.83	Improve
Mahwah River	MAWA_01/A	5.20	5.07	3.91	5.22	6.38	5.10			6.88		5.19	-1.69	Decline
Minisceongo Creek	MNGO_02	5.31	6.58		6.23				4.96		4.66	3.97	-0.69	Decline
Minisceongo Creek	MNGO_03	5.57	7.14			5.35			4.69			4.52	-0.17	No Diff
Minisceongo Creek	MNGO_07			3.24	6.25			5.18	5.85			4.46	-1.39	Decline
Chock Brook	MNGO_10/A								7.40			5.90	-1.50	Decline
S.B. Minisceongo Creek	MNGO_11/A								4.90			2.70	-2.20	Decline
Muddy Creek	MUDD_02	4.97	4.92		5.09	4.35	4.40	3.49	4.72	4.42	4.49	3.62	-0.87	Decline
Nauraushaun Brook	NAUR_01			5.83				6.19				4.71	-1.48	Decline
Nauraushaun Brook	NAUR_03	5.30	4.97			4.77				3.99		4.51	0.52	Improve
Pascack Brook	PASC_01			5.76			4.30	5.02				4.59	-0.43	No Diff
Ramapo River	RAMA_07	7.29	6.01	5.97	7.58	6.54	6.50	6.98	6.70	5.78	5.99	5.84	0.06	No Diff
Saddle River	SADL_02			4.36	6.41	6.00		4.35				5.21	0.86	Improve
Sparkill Creek	SPAR_04	5.09		4.64	4.54	4.29	4.60	4.20	5.09	4.34	3.96	4.71	0.75	Improve
Stoney Brook	STOB_01/A	8.41	8.66	8.11	8.20			7.40	8.86	8.57	8.58	7.39	-1.19	Decline
Unnamed tributary	SUZA_01			4.84	4.69			4.51				4.29	-0.22	No Diff
Cedar Pond Brook	TORN_01/A	7.11	8.87	8.40		7.06	8.00			9.08		8.15	-0.93	Decline

Table 3. Descriptions of the NYS metrics and BAP scores calculated (adapted from Smith et al. 2009).

Metric	Description	Sample Type	Predicted response to impact
Taxa Richness (TR)	Species richness is the total number of unique species or taxa found in the subsample. Higher species richness indicates higher water quality.	Kick	Decrease
Ephemeroptera-Trichoptera-Plecoptera (EPT) Richness	EPT Richness is the total number of taxa of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) found in a subsample. These are considered to be mostly clean-water organisms, and their presence may indicate good water quality.	Kick	Decrease
Hilsenhoff's Biotic Index (BI)	Biotic index is calculated by multiplying the number of individuals of each species or taxa by its assigned tolerance value, 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 communities.	Kick	Increase
Percent Model Affinity (PMA)	This is a measure of similarity to a model non-impacted community based on percent abundance in 7 major groups to measure similarity to a kick sample community of 40% Ephemeroptera, 5% Plecoptera, 10% Trichoptera, 10% Coleoptera, 20% Chironomidae, 5% Oligochaeta, and 10% Other. The lower the similarity value the greater the impact.	Kick	Decrease
Biological Assessment Profile (BAP)	BAP is the assessed impact for each station. The BAP score is the mean value of the above metrics after converting each metric score to a common scale of 0-10. The higher the BAP score, the better the assessed impact category. There are four impact categories in NYS: non-, slight, moderate, or severe impact. The NYS impact categories and representative BAP scores are; Non-Impact 7.51 – 10, Slight Impact 5.01-7.5, Moderate Impact 2.51- 5, Severe Impact 0- 2.5.	Kick	Decrease

Table 4. Nutrient Biotic Index (NBI) Ranges and trophic state.

Trophic state for NBI	NBI
Eutrophic	6.01-10
Mesotrophic	5.01-6
Oligotrophic	0-5

Appendix

A Lab Data Summary page was created for each of the stations sampled, including: site location, number, sampling date, and taxa identified and counts for each sub-sample.

Lab Data Summary

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

Waterbody: **Cedar Pond Brook**
Station: **CDRP 01** Replicate: **1**
Collection Date: **7/21/2016** Subsample size: **100** WAA Lab ID: **680.2-001**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Optioservus sp.	1
		Oulimnius latiusculus	2
DIPTERA	Chironomidae	Cricotopus bicinctus	2
		Cricotopus trifascia gr.	9
		Eukiefferiella pseudomontana gr.	4
		Micropsectra sp.	3
		Polypedilum aviceps	1
		Polypedilum flavum	4
		Rheotanytarsus exiguus gr.	3
		Rheotanytarsus pellucidus	1
		Tvetenia vitracies	9
EPHEMEROPTERA	Baetidae	Acentrella turbida	3
		Baetis intercalaris	5
		Plauditus sp.	2
	Ephemerellidae	Serratella serrata	1
MEGALOPTERA	Corydalidae	Corydalus cornutus	1
PLECOPTERA	Perlidae	Acroneuria sp.	1
		Perlesta sp.	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	11
		Ceratopsyche morosa	19
		Cheumatopsyche sp.	5
	Lepidostomatidae	Lepidostoma sp.	3
	Philopotamidae	Chimarra aterrima?	6
	Rhyacophilidae	Rhyacophila fuscula	1
TRICLADIDA		Undetermined Turbellaria	2

Lab Data Summary

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

Waterbody: **Cedar Pond Brook**
Station: **TIOR 01A** Replicate: **1**
Collection Date: **7/21/2016** Subsample size: **100** WAA Lab ID: **680.2-002**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Oulimnius latiusculus	1
	Psephenidae	Psephenus herricki	11
DIPTERA	Chironomidae	Micropsectra/Tanytarsus Complex	1
		Parametriocnemus sp.	1
		Polypedilum aviceps	12
		Rheocricotopus sp.	1
		Rheotanytarsus pellucidus	2
		Thienemannimyia gr. spp.	9
		Tvetenia bavarica gr.	1
EPHEMEROPTERA	Caenidae	Caenis sp.	7
	Ephemerellidae	Serratella serrata	9
	Heptageniidae	Leucrocuta sp.	2
		Maccaffertium sp.	1
	Isonychiidae	Isonychia sp.	1
	Leptophlebiidae	Paraleptophlebia sp.	3
ODONATA	Gomphidae	Undetermined Gomphidae	1
PLECOPTERA	Leuctridae	Leuctra sp.	8
	Perlidae	Acroneuria sp.	1
		Perlesta sp.	1
TRICHOPTERA	Brachycentridae	Micrasema sp.	1
	Hydropsychidae	Ceratopsyche bronta	2
		Ceratopsyche morosa	1
		Ceratopsyche sparna	4
		Cheumatopsyche sp.	9
		Hydropsyche betteni	1
	Lepidostomatidae	Lepidostoma sp.	1
	Philopotamidae	Chimarra aterrima?	8

Lab Data Summary

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

Waterbody: **Chock Brook**
Station: **MNGO 10A** Replicate: **1**
Collection Date: **8/3/2016** Subsample size: **75** WAA Lab ID: **680.2-011**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Stenelmis sp.	1
	Psephenidae	Psephenus herricki	18
DECAPODA	Cambaridae	Cambarus sp.	2
DIPTERA	Chironomidae	Dicrotendipes sp.	1
		Stenochironomus sp.	1
		Thienemannimyia gr. spp.	1
		Trissopelopia sp.	1
	Tipulidae	Dicranota sp.	2
		Hexatoma sp.	2
EPHEMEROPTERA	Baetidae	Procloeon sp.	4
	Ephemerellidae	Eurylophella funeralis	2
	Heptageniidae	Maccaffertium sp.	1
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	2
MEGALOPTERA	Corydalidae	Nigronia serricornis	8
ODONATA	Gomphidae	Stylogomphus albystilus	5
PLECOPTERA	Chloroperlidae	Sweltsa sp.	5
	Leuctridae	Leuctra sp.	5
	Perlidae	Acroneuria sp.	11
TRICHOPTERA	Lepidostomatidae	Lepidostoma sp.	1
	Leptoceridae	Mystacides sepulchralis	1
	Molannidae	Molanna sp.	1

Lab Data Summary

Watershed Assessment Associates
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Waterbody: **Hackensack River**
Station: **HACK 03A** Replicate: **1**
Collection Date: **8/15/2016** Subsample size: **100** WAA Lab ID: **680.2-010**

Order	Family	Final Determination	Total #
AMPHIPODA	Gammaridae	Gammarus sp.	12
	Talitridae	Hyalella sp.	4
COLEOPTERA	Elmidae	Ancyronyx variegatus	1
DIPTERA	Chironomidae	Cricotopus sp.	1
		Dicrotendipes sp.	6
		Endochironomus subtendens	1
		Glyptotendipes sp.	1
		Polypedilum flavum	1
		Polypedilum illinoense	5
		Rheotanytarsus sp.	2
		Tanytarsus sp.	5
		Thienemannimyia gr. spp.	4
EPHEMEROPTERA	Baetidae	Callibaetis sp.	1
	Caenidae	Caenis sp.	1
ISOPODA	Asellidae	Caecidotea sp.	19
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	3
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	11
		Hydropsyche betteni	1
	Hydroptilidae	Hydroptila sp.	2
TRICLADIDA		Undetermined Turbellaria	4
TUBIFICIDA	Tubificidae	Branchiura sowerbyi	4
		Undet. Tubificidae w/o cap. setae	11

Lab Data Summary

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

Waterbody: **Mahwah River**
Station: **MAWA 01A** Replicate: **1**
Collection Date: **7/27/2016** Subsample size: **100** WAA Lab ID: **680.2-005**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Optioservus sp.	13
		Oulimnius latiusculus	4
		Stenelmis sp.	7
DECAPODA	Cambaridae	Orconectes sp.	1
DIPTERA	Chironomidae	Cricotopus/Orthocladius Complex	1
		Diamesa sp.	6
		Parametriocnemus sp.	2
		Polypedilum flavum	30
		Rheotanytarsus sp.	1
		Thienemannimyia gr. spp.	2
	Simuliidae	Simulium sp.	2
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Baetis intercalaris	6
	Heptageniidae	Leucrocuta sp.	1
	Isonychiidae	Isonychia sp.	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	14
		Hydropsyche betteni	1
	Philopotamidae	Chimarra aterrima?	5
VENEROIDEA	Sphaeriidae	Sphaerium sp.	1

Lab Data Summary

Watershed Assessment Associates
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Waterbody: **Minisceongo Creek**
Station: **MNGO 07** Replicate: **1**
Collection Date: **7/25/2016** Subsample size: **100** WAA Lab ID: **680.2-003**

Order	Family	Final Determination	Total #
AMPHIPODA	Crangonyctidae	Crangonyx sp.	1
	Gammaridae	Gammarus sp.	1
COLEOPTERA	Elmidae	Optioservus sp.	1
		Oulimnius latiusculus	3
		Stenelmis sp.	23
	Psephenidae	Psephenus herricki	2
DIPTERA	Chironomidae	Diamesa sp.	1
		Parametriocnemus sp.	1
		Polypedilum flavum	5
		Tanytarsus sp.	3
		Thienemannimyia gr. spp.	1
EPHEMEROPTERA	Baetidae	Baetis intercalaris	6
ISOPODA	Asellidae	Caecidotea sp.	2
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	11
		Cheumatopsyche sp.	14
		Hydropsyche betteni	13
TRICLADIDA		Undetermined Turbellaria	12

Lab Data Summary

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

Waterbody: **Minisceongo Creek**
Station: **MNGO 03** Replicate: **1**
Collection Date: **8/3/2016** Subsample size: **100** WAA Lab ID: **680.2-012**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Oulimnius latiusculus	3
		Stenelmis sp.	1
DIPTERA	Chironomidae	Dicrotendipes sp.	7
		Microtendipes pedellus gr.	1
		Tvetenia vitracies	1
	Empididae	Hemerodromia sp.	1
	Tipulidae	Antocha sp.	7
EPHEMEROPTERA	Baetidae	Baetis intercalaris	2
ISOPODA	Asellidae	Caecidotea sp.	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	27
		Ceratopsyche morosa	14
		Ceratopsyche sparna	1
		Cheumatopsyche sp.	23
		Hydropsyche betteni	5
	Hydroptilidae	Hydroptila sp.	2
TRICLADIDA		Undetermined Turbellaria	4

Lab Data Summary

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

Waterbody: **Minisceongo Creek**
Station: **MNGO 02** Replicate: **1**
Collection Date: **8/3/2016** Subsample size: **100** WAA Lab ID: **680.2-013**

Order	Family	Final Determination	Total #
AMPHIPODA	Gammaridae	Gammarus sp.	6
BASOMMATOPHOR	Physidae	Physella sp.	1
COLEOPTERA	Elmidae	Ancyronyx variegatus	1
		Stenelmis sp.	5
	Psephenidae	Psephenus herricki	1
DIPTERA	Chironomidae	Diamesa sp.	1
	Empididae	Hemerodromia sp.	1
EPHEMEROPTERA	Baetidae	Baetis flavistriga	5
		Baetis intercalaris	1
ISOPODA	Asellidae	Caecidotea sp.	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	29
		Ceratopsyche morosa	27
		Cheumatopsyche sp.	18
TRICLADIDA		Undetermined Turbellaria	3

Lab Data Summary

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

Waterbody: **Muddy Creek**
Station: **MUDD 02** Replicate: **1**
Collection Date: **8/9/2016** Subsample size: **100** WAA Lab ID: **680.2-018**

Order	Family	Final Determination	Total #
AMPHIPODA	Gammaridae	Gammarus sp.	32
COLEOPTERA	Elmidae	Stenelmis sp.	13
DECAPODA	Cambaridae	Orconectes sp.	3
DIPTERA	Chironomidae	Cricotopus/Orthocladius Complex	2
		Cryptochironomus sp.	1
		Microtendipes pedellus gr.	1
		Stictochironomus sp.	1
		Thienemannimyia gr. spp.	2
ISOPODA	Asellidae	Caecidotea sp.	14
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	21
	Hydroptilidae	Hydroptila sp.	2
TRICLADIDA		Undetermined Turbellaria	3
TUBIFICIDA	Tubificidae	Undet. Tubificidae w/ cap. setae	3
		Undet. Tubificidae w/o cap. setae	2

Lab Data Summary

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

Waterbody: **Nauraushaun Brook**
Station: **NAUR 01** Replicate: **1**
Collection Date: **7/28/2016** Subsample size: **100** WAA Lab ID: **680.2-007**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Stenelmis sp.	9
DIPTERA	Chironomidae	Diamesa sp.	11
		Microtendipes pedellus gr.	1
		Parametriocnemus sp.	1
		Polypedilum illinoense	1
		Rheotanytarsus exiguus gr.	1
		Thienemannimyia gr. spp.	3
	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	13
EPHEMEROPTERA	Baetidae	Baetis intercalaris	10
TRICHOPTERA	Hydropsychidae	Ceratopsyche sparna	22
		Cheumatopsyche sp.	20
		Hydropsyche betteni	1
	Philopotamidae	Chimarra aterrima?	3
TRICLADIDA		Undetermined Turbellaria	3

Lab Data Summary

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

Waterbody: **Nauraushaun Brook**
Station: **NAUR 03** Replicate: **1**
Collection Date: **8/3/2016** Subsample size: **100** WAA Lab ID: **680.2-014**

Order	Family	Final Determination	Total #
ARHYNCHOBDELLID	Erpobdellidae	Undetermined Erpobdellidae	1
COLEOPTERA	Elmidae	Stenelmis sp.	34
DIPTERA	Chironomidae	Diamesa sp.	1
		Microtendipes pedellus gr.	1
		Paratanytarsus sp.	1
		Stictochironomus sp.	2
		Thienemannimyia gr. spp.	1
	Tipulidae	Antocha sp.	2
		Tipula sp.	1
EPHEMEROPTERA	Baetidae	Baetis intercalaris	10
ODONATA	Coenagrionidae	Argia sp.	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	4
		Hydropsyche betteni	17
	Philopotamidae	Chimarra aterrima?	10
TRICLADIDA		Undetermined Turbellaria	11
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1
	Tubificidae	Undet. Tubificidae w/o cap. setae	1
VENEROIDEA	Sphaeriidae	Pisidium sp.	1

Lab Data Summary

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

Waterbody: **Pascack Brook**
Station: **PASC 01** Replicate: **1**
Collection Date: **8/5/2016** Subsample size: **100** WAA Lab ID: **680.2-015**

Order	Family	Final Determination	Total #
AMPHIPODA	Crangonyctidae	Crangonyx sp.	4
	Gammaridae	Gammarus sp.	1
COLEOPTERA	Elmidae	Stenelmis sp.	12
DECAPODA	Cambaridae	Orconectes sp.	1
DIPTERA	Chironomidae	Diamesa sp.	4
		Polypedilum flavum	8
		Stictochironomus sp.	15
		Thienemannimyia gr. spp.	1
	Tipulidae	Antocha sp.	1
EPHEMEROPTERA	Baetidae	Baetis sp.	3
ISOPODA	Asellidae	Caecidotea sp.	14
LUMBRICIDA	Lumbricina	Undetermined Lumbricina	4
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	8
		Cheumatopsyche sp.	11
		Hydropsyche betteni	3
TRICLADIDA		Undetermined Turbellaria	8
VENEROIDEA	Sphaeriidae	Pisidium sp.	1

Lab Data Summary

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

Waterbody: **Ramapo River**
Station: **RAMA 07** Replicate: **1**
Collection Date: **7/27/2016** Subsample size: **100** WAA Lab ID: **680.2-006**

Order	Family	Final Determination	Total #
COLEOPTERA	Elmidae	Macronychus glabratus	1
		Optioservus sp.	9
		Oulimnius latiusculus	2
		Stenelmis sp.	4
	Psephenidae	Psephenus herricki	4
DIPTERA	Chironomidae	Cardiocladius obscurus	1
		Polypedilum flavum	2
	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	2
EPHEMEROPTERA	Baetidae	Baetis intercalaris	19
	Heptageniidae	Maccaffertium modestum	2
	Isonychiidae	Isonychia sp.	3
HOPLONEMERTEA	Tetrastemmatidae	Prostoma graecense	1
ISOPODA	Asellidae	Caecidotea sp.	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche bronta	18
		Ceratopsyche sparna	1
		Cheumatopsyche sp.	12
	Philopotamidae	Chimarra aterrima?	2
		Chimarra obscura	6
TRICLADIDA		Undetermined Turbellaria	9

Lab Data Summary

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

Waterbody: **S.B. Minisceongo Creek**
Station: **MNGO 11A** Replicate: **1**
Collection Date: **7/25/2016** Subsample size: **100** WAA Lab ID: **680.2-004**

Order	Family	Final Determination	Total #
AMPHIPODA	Gammaridae	Gammarus sp.	31
COLEOPTERA	Elmidae	Stenelmis sp.	12
DIPTERA	Chironomidae	Polypedilum flavum	1
		Xenochironomus xenolabis	1
ISOPODA	Asellidae	Caecidotea sp.	38
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	8
		Hydropsyche betteni	1
TRICLADIDA		Undetermined Turbellaria	5
VENEROIDEA	Sphaeriidae	Pisidium sp.	3

Lab Data Summary

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

Waterbody: **Saddle River**
Station: **SADL 02** Replicate: **1**
Collection Date: **8/9/2016** Subsample size: **100** WAA Lab ID: **680.2-019**

Order	Family	Final Determination	Total #
AMPHIPODA	Crangonyctidae	Crangonyx sp.	1
COLEOPTERA	Elmidae	Stenelmis sp.	7
	Psephenidae	Psephenus herricki	3
DIPTERA	Chironomidae	Cricotopus bicinctus	1
		Micropsectra sp.	7
		Parametriocnemus sp.	1
		Polypedilum aviceps	3
		Polypedilum flavum	1
		Polypedilum illinoense	1
		Rheotanytarsus exiguus gr.	1
		Thienemanniella sp.	1
		Thienemannimyia gr. spp.	1
		Tvetenia bavarica gr.	1
	Muscidae	Undetermined Muscidae	1
	Simuliidae	Simulium sp.	1
	Tipulidae	Antocha sp.	1
		Tipula sp.	2
EPHEMEROPTERA	Baetidae	Baetis flavistriga	2
TRICHOPTERA	Hydropsychidae	Ceratopsyche sparna	15
		Cheumatopsyche sp.	33
		Hydropsyche betteni	1
TRICLADIDA		Undetermined Turbellaria	15

Lab Data Summary

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

Waterbody: **Sparkill Creek**
Station: **SPAR 04** Replicate: **1**
Collection Date: **8/5/2016** Subsample size: **100** WAA Lab ID: **680.2-016**

Order	Family	Final Determination	Total #
AMPHIPODA	Gammaridae	Gammarus sp.	8
COLEOPTERA	Elmidae	Stenelmis sp.	4
DIPTERA	Chironomidae	Cricotopus/Orthocladius Complex	1
		Micropsectra/Tanytarsus Complex	1
		Parametriocnemus sp.	2
		Paratanytarsus sp.	1
		Polypedilum flavum	8
		Polypedilum illinoense	2
		Rheocricotopus sp.	1
		Rheotanytarsus exiguus gr.	1
		Stenochironomus sp.	1
		Thienemannimyia gr. spp.	1
EPHEMEROPTERA	Heptageniidae	Stenacron interpunctatum	1
ISOPODA	Asellidae	Caecidotea sp.	21
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	25
		Hydropsyche betteni	4
	Hydroptilidae	Hydroptila sp.	1
	Leptoceridae	Mystacides sepulchralis	4
TRICLADIDA		Undetermined Turbellaria	2
TUBIFICIDA	Tubificidae	Undet. Tubificidae w/o cap. setae	8
VENEROIDEA	Sphaeriidae	Pisidium sp.	3

Lab Data Summary

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

Waterbody: **Stoney Brook**
Station: **STOB 01A** Replicate: **1**
Collection Date: **8/15/2016** Subsample size: **100** WAA Lab ID: **680.2-009**

Order	Family	Final Determination	Total #
BASOMMATOPHOR	Ancylidae	Ferrissia sp.	6
	Physidae	Physella sp.	1
COLEOPTERA	Elmidae	Oulimnius latiusculus	3
	Psephenidae	Psephenus herricki	7
DIPTERA	Chironomidae	Parametriocnemus sp.	1
		Polypedilum aviceps	8
		Rheotanytarsus exiguus gr.	1
		Tvetenia bavarica gr.	1
EPHEMEROPTERA	Baetidae	Baetis intercalaris	1
		Plauditus sp.	1
	Heptageniidae	Maccaffertium sp.	19
		Maccaffertium vicarium	7
	Isonychiidae	Isonychia sp.	5
LUMBRICIDA	Lumbricina	Undetermined Lumbricina	6
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	7
ODONATA	Gomphidae	Undetermined Gomphidae	1
PLECOPTERA	Chloroperlidae	Undetermined Chloroperlidae	1
	Perlidae	Acroneuria abnormis	4
TRICHOPTERA	Hydropsychidae	Ceratopsyche sp.	4
		Cheumatopsyche sp.	3
	Philopotamidae	Chimarra aterrima?	5
	Psychomyiidae	Lype diversa	1
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1
VENEROIDEA	Sphaeriidae	Pisidium sp.	6

Lab Data Summary

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

Waterbody: **Unnamed tributary**
Station: **SUZA 01** Replicate: **1**
Collection Date: **8/15/2016** Subsample size: **100** WAA Lab ID: **680.2-008**

Order	Family	Final Determination	Total #
AMPHIPODA	Crangonyctidae	Crangonyx sp.	5
ARHYNCHOBDELLID	Erpobdellidae	Undetermined Erpobdellidae	4
COLEOPTERA	Elmidae	Stenelmis sp.	8
DECAPODA	Cambaridae	Orconectes sp.	2
DIPTERA	Chironomidae	Polypedilum flavum	6
		Polypedilum illinoense	2
		Tanytarsus sp.	2
		Thienemannimyia gr. spp.	3
	Simuliidae	Simulium sp.	15
EPHEMEROPTERA	Baetidae	Baetis intercalaris	7
ISOPODA	Asellidae	Caecidotea sp.	19
LUMBRICIDA	Lumbricina	Undetermined Lumbricina	1
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	7
		Hydropsyche betteni	4
TRICLADIDA		Undetermined Turbellaria	12
VENEROIDEA	Corbiculidae	Corbicula fluminea	2

Lab Data Summary

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

Waterbody: **Unnamed tributary**
Station: **LUCI 01A** Replicate: **1**
Collection Date: **8/5/2016** Subsample size: **100** WAA Lab ID: **680.2-017**

Order	Family	Final Determination	Total #
AMPHIPODA	Crangonyctidae	Crangonyx sp.	5
COLEOPTERA	Elmidae	Macronychus glabratus	2
		Stenelmis sp.	18
DECAPODA	Cambaridae	Orconectes sp.	2
DIPTERA	Chironomidae	Chaetocladius sp.	2
		Diamesa sp.	2
		Polypedilum aviceps	1
		Polypedilum flavum	1
		Stictochironomus sp.	3
		Thienemannimyia gr. spp.	1
	Empididae	Hemerodromia sp.	1
	Psychodidae	Pericoma sp.	1
	Tipulidae	Antocha sp.	1
		Tipula sp.	1
EPHEMEROPTERA	Baetidae	Baetis intercalaris	9
	Heptageniidae	Maccaffertium sp.	1
ISOPODA	Asellidae	Caecidotea sp.	30
LUMBRICIDA	Lumbricina	Undetermined Lumbricina	1
LUMBRICULIDA	Lumbriculidae	Undetermined Lumbriculidae	4
MEGALOPTERA	Corydalidae	Nigronia serricornis	1
ODONATA	Aeschnidae	Boyeria sp.	1
TRICHOPTERA	Hydropsychidae	Ceratopsyche sparna	2
		Cheumatopsyche sp.	3
	Leptoceridae	Mystacides sepulchralis	1
	Philopotamidae	Chimarra aterrima?	1
	Polycentropodidae	Polycentropus sp.	1
TRICLADIDA		Undetermined Turbellaria	3
TUBIFICIDA	Enchytraeidae	Undetermined Enchytraeidae	1

Stream Field Data Summary

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

Waterbody: **Nauraushaun Brook** Latitude: **41.07863**
River Basin: **Hackensack River** Station: **NAUR_03** Longitude: **-73.9974**
County: **Rockland Co., NY** Coll Date: **8/3/2016** Field Crew: **N. Laible; C. Beers**
Site description: **65 Townline Road Bridge; downstream of bridge**

Physical Characteristics

Depth (meters):	**0.1**
Width (meters):	**5.7**
Current (cm/sec):	**53.81**
Canopy (%):	**84**
Substrate	
Rock (%):	**2**
Rubble (%):	**10**
Gravel (%):	**33**
Sand (%):	**50**
Silt (%):	**5**
Embeddedness (%):	**24**

Chemical Measurements

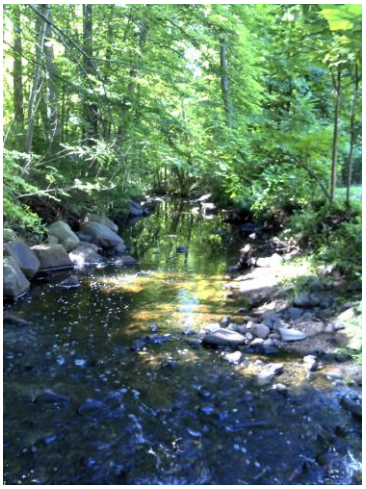
DO (mg/L):	**11.31**
DO sat. (%):	**133.2**
Temperature (C):	**24.11**
Spec. Conduct. (umhos):	**727**
Baro pressure:	**762.9**
pH:	**7.68**
Salinity (PSS):	**0.35**

Biological Attributes

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

Flow

Flow



Stream Field Data Summary

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

Waterbody: **Cedar Pond Brook** Latitude: **41.24063**
River Basin: **Cedar Pond Brook** Station: **TIOR_01A** Longitude: **-74.02443**
County: **Rockland Co., NY** Coll Date: **7/21/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Cedar Flats Road; upstream of pipeline construction**

Physical Characteristics	
Depth (meters):	**0.07**
Width (meters):	**9.7**
Current (cm/sec):	**21.2**
Canopy (%):	**92**
Substrate	
Rock (%):	**10**
Rubble (%):	**30**
Gravel (%):	**50**
Sand (%):	**2**
Silt (%):	**8**
Embeddedness (%):	**22**

Chemical Measurements	
DO (mg/L):	**10.52**
DO sat. (%):	**112.8**
Temperature (C):	**18.8**
Spec. Conduct. (umhos):	**361**
Baro pressure:	**768.4**
pH:	**6.82**
Salinity (PSS):	**0.17**

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

Flow

Flow

Stream Field Data Summary

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

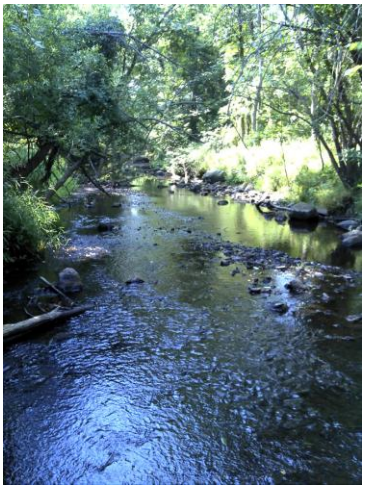
Waterbody: **Minisceongo Creek** Latitude: **41.20159**
River Basin: **Cedar Pond Brook** Station: **MNGO_07** Longitude: **-74.02831**
County: **Rockland Co., NY** Coll Date: **7/25/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Below Thiells Mt. Ivy Bridge**

Physical Characteristics	
Depth (meters):	**0.07**
Width (meters):	**7.1**
Current (cm/sec):	**34.48**
Canopy (%):	**77**
Substrate	
Rock (%):	**2.5**
Rubble (%):	**10**
Gravel (%):	**25**
Sand (%):	**60**
Silt (%):	**2.5**
Embeddedness (%):	**39**

Chemical Measurements	
DO (mg/L):	**11.11**
DO sat. (%):	**131.5**
Temperature (C):	**23.85**
Spec. Conduct. (umhos):	**651**
Baro pressure:	**760.5**
pH:	**7.74**
Salinity (PSS):	**0.32**

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

Flow



Flow

Stream Field Data Summary

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

Waterbody: **S.B. Minisceongo Creek** Latitude: **41.19599**
River Basin: **Cedar Pond Brook** Station: **MNGO_11** Longitude: **-74.03949**
County: **Rockland Co., NY** Coll Date: **7/25/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Burgess Meredith Town Park**

Physical Characteristics

Depth (meters):	**0.048**
Width (meters):	**8.8**
Current (cm/sec):	**30.99**
Canopy (%):	**94**
Substrate	
Rock (%):	**10**
Rubble (%):	**10**
Gravel (%):	**40**
Sand (%):	**20**
Silt (%):	**20**
Embeddedness (%):	**39**

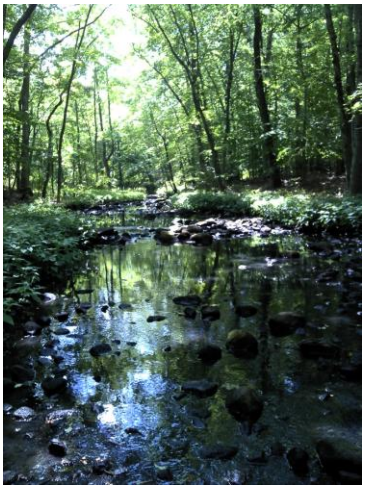
Chemical Measurements

DO (mg/L):	**6.78**
DO sat. (%):	**81.3**
Temperature (C):	**24.11**
Spec. Conduct. (umhos):	**799**
Baro pressure:	**760.5**
pH:	**7.26**
Salinity (PSS):	**0.39**

Biological Attributes

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

Flow



Flow

Stream Field Data Summary

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

Waterbody: **Mahwah River** Latitude: **41.12236**

River Basin: **Mahwah River** Station: **MAWA_01** Longitude: **-74.1385**

County: **Rockland Co., NY** Coll Date: **7/27/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Off Montebello Road; upstream of bridge at Brooklands Park; original site**

Physical Characteristics

Depth (meters):	**0.11**
Width (meters):	**9.8**
Current (cm/sec):	**53.57**
Canopy (%):	**81**
Substrate	
Rock (%):	**5**
Rubble (%):	**60**
Gravel (%):	**20**
Sand (%):	**10**
Silt (%):	**5**
Embeddedness (%):	**49**

Chemical Measurements

DO (mg/L):	**9.79**
DO sat. (%):	**117.2**
Temperature (C):	**24.58**
Spec. Conduct. (umhos):	**734**
Baro pressure:	**761.4**
pH:	**YSI probe**
Salinity (PSS):	**0.36**

Biological Attributes

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

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Ramapo River** Latitude: **41.12515**

River Basin: **Ramapo River** Station: **RAMA_07** Longitude: **-74.1645**

County: **Rockland Co., NY** Coll Date: **7/27/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Upstream of 4th Street Bridge**

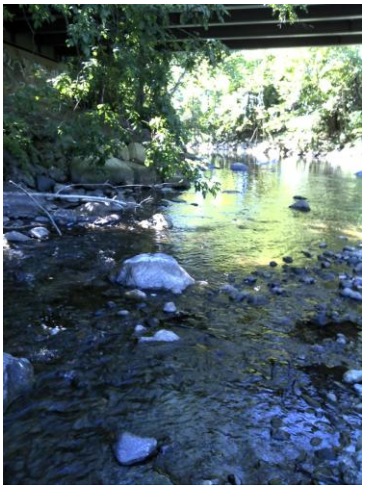
Physical Characteristics	
Depth (meters):	**0.134**
Width (meters):	**21**
Current (cm/sec):	**78.95**
Canopy (%):	**71**
Substrate	
Rock (%):	**20**
Rubble (%):	**30**
Gravel (%):	**40**
Sand (%):	**5**
Silt (%):	**5**
Embeddedness (%):	**44**

Chemical Measurements	
DO (mg/L):	**11.64**
DO sat. (%):	**136.4**
Temperature (C):	**24.75**
Spec. Conduct. (umhos):	**764**
Baro pressure:	**761.4**
pH:	**8.36**
Salinity (PSS):	**0.37**

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

Flow

Flow



Stream Field Data Summary

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

Waterbody: **Nauraushaun Brook** Latitude: **41.05876**
River Basin: **Hackensack River** Station: **NAUR_01** Longitude: **-73.99191**
County: **Rockland Co., NY** Coll Date: **7/28/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Below Sickletown Road Bridge**

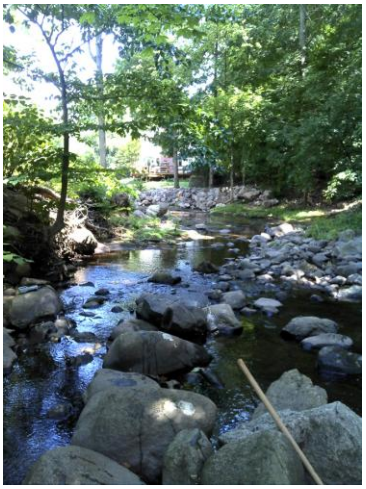
Physical Characteristics	
Depth (meters):	**0.106**
Width (meters):	**10.9**
Current (cm/sec):	**32.75**
Canopy (%):	**88**
Substrate	
Rock (%):	**15**
Rubble (%):	**40**
Gravel (%):	**20**
Sand (%):	**20**
Silt (%):	**5**
Embeddedness (%):	**34**

Chemical Measurements	
DO (mg/L):	**9.24**
DO sat. (%):	**107.4**
Temperature (C):	**22.85**
Spec. Conduct. (umhos):	**565**
Baro pressure:	**761.4**
pH:	**8.97**
Salinity (PSS):	**0.27**

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

Flow

Flow



Stream Field Data Summary

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

Waterbody: **Minisceongo Creek** Latitude: **41.2029**
River Basin: **Cedar Pond Brook** Station: **MNGO_02** Longitude: **-73.97199**
County: **Rockland Co., NY** Coll Date: **8/3/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Off Call Hallow Road; follow path to riffle**

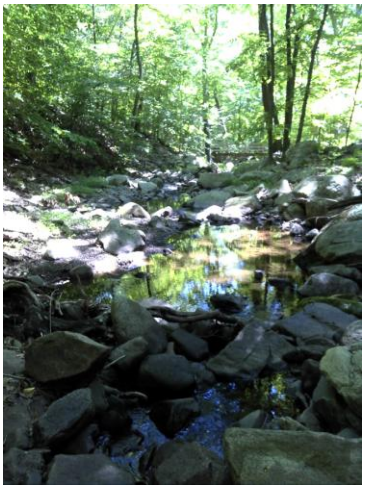
Physical Characteristics	
Depth (meters):	**0.08**
Width (meters):	**8.1**
Current (cm/sec):	**57.14**
Canopy (%):	**97**
Substrate	
Rock (%):	**60**
Rubble (%):	**5**
Gravel (%):	**30**
Sand (%):	**3**
Silt (%):	**2**
Embeddedness (%):	**39**

Chemical Measurements	
DO (mg/L):	**9.44**
DO sat. (%):	**104.5**
Temperature (C):	**20.64**
Spec. Conduct. (umhos):	**148**
Baro pressure:	**762.9**
pH:	**7.04**
Salinity (PSS):	**0.07**

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

Flow

Flow



Stream Field Data Summary

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

Waterbody: **Cedar Pond Brook** Latitude: **41.22691**
River Basin: **Cedar Pond Brook** Station: **CDRP_01** Longitude: **-73.98487**
County: **Rockland Co., NY** Coll Date: **7/21/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Above Lowland Hill Bridge in Lowland Park**

Physical Characteristics	
Depth (meters):	**0.07**
Width (meters):	**14.4**
Current (cm/sec):	**44.11**
Canopy (%):	**55**
Substrate	
Rock (%):	**5**
Rubble (%):	**30**
Gravel (%):	**10**
Sand (%):	**5**
Silt (%):	**5**
Embeddedness (%):	**28**

Chemical Measurements	
DO (mg/L):	**13.29**
DO sat. (%):	**152.2**
Temperature (C):	**22.02**
Spec. Conduct. (umhos):	**632**
Baro pressure:	**768.4**
pH:	**8.22**
Salinity (PSS):	**0.31**

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

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Chock Brook** Latitude: **41.2825**

River Basin: **Cedar Pond Brook** Station: **MNGO_10** Longitude: **-74.05144**

County: **Rockland Co., NY** Coll Date: **8/3/2016** Field Crew: **N. Laible; C. Beers**

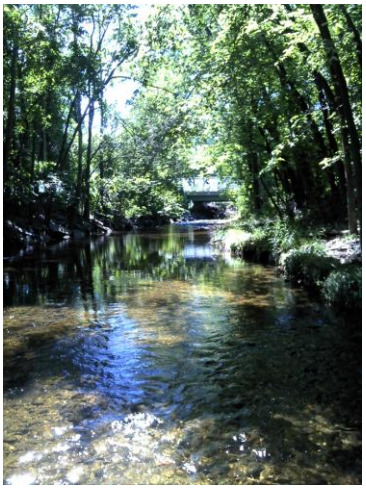
Site description: **Below Samsondale Ave. Bridge; across from West Haverstraw Community**

Physical Characteristics	
Depth (meters):	**0.18**
Width (meters):	**14.8**
Current (cm/sec):	**40.54**
Canopy (%):	**88**
Substrate	
Rock (%):	**5**
Rubble (%):	**25**
Gravel (%):	**40**
Sand (%):	**25**
Silt (%):	**5**
Embeddedness (%):	**40**

Chemical Measurements	
DO (mg/L):	**14.18**
DO sat. (%):	**172.1**
Temperature (C):	**25.02**
Spec. Conduct. (umhos):	**681**
Baro pressure:	**762.9**
pH:	**8.93**
Salinity (PSS):	**0.33**

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

Flow



Flow

Stream Field Data Summary

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

Waterbody: **Unnamed tributary** Latitude: **41.11757**

River Basin: **Hackensack River** Station: **SUZA_01** Longitude: **-74.04356**

County: **Rockland Co., NY** Coll Date: **8/15/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Halfway between HACK_01 and HACK_03. Original sites lacked riffles.**

Physical Characteristics	
Depth (meters):	**0.15**
Width (meters):	**30**
Current (cm/sec):	**30.8**
Canopy (%):	**7**
Substrate	
Rock (%):	**0**
Rubble (%):	**25**
Gravel (%):	**25**
Sand (%):	**30**
Silt (%):	**20**
Embeddedness (%):	**18**

Chemical Measurements	
DO (mg/L):	**6.53**
DO sat. (%):	**84.4**
Temperature (C):	**27.22**
Spec. Conduct. (umhos):	**575**
Baro pressure:	
pH:	**7.08**
Salinity (PSS):	**0.28**

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

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Unnamed tributary** Latitude: **41.17571**
River Basin: **Hackensack River** Station: **LUCI_01A** Longitude: **-74.00101**
County: **Rockland Co., NY** Coll Date: **8/5/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Upstream West Washington Ave Bridge**

Physical Characteristics

Depth (meters):	**0.12**
Width (meters):	**7.9**
Current (cm/sec):	**59.7**
Canopy (%):	**81**
Substrate	
Rock (%):	**20**
Rubble (%):	**30**
Gravel (%):	**40**
Sand (%):	**5**
Silt (%):	**5**
Embeddedness (%):	**22**

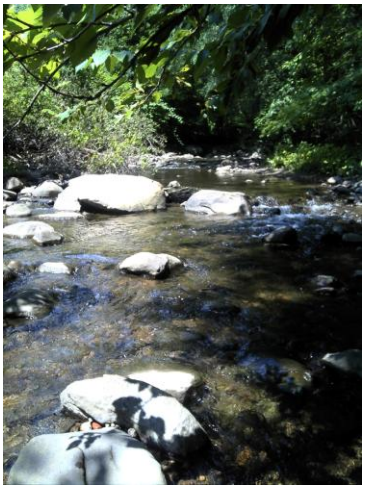
Chemical Measurements

DO (mg/L):	**12.08**
DO sat. (%):	**138.2**
Temperature (C):	**22.07**
Spec. Conduct. (umhos):	**655**
Baro pressure:	**762.9**
pH:	**7.89**
Salinity (PSS):	**0.32**

Biological Attributes

Aquatic vegetation	
Macrophytes:	**No**
Diatoms:	**Yes**
Algae-suspended:	**Yes**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	**Y**
Mollusca:	
Oligochaeta:	**Y**
Other macro's:	**Isopoda; Planarian**
Field Faunal Condition:	**Poor**

Flow



Flow

Stream Field Data Summary

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

Waterbody: **Pascack Brook** Latitude: **41.05957**

River Basin: **Hackensack River** Station: **PASC_01** Longitude: **-74.03607**

County: **Rockland Co., NY** Coll Date: **8/5/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Upstream of Valentine Ave Bridge**

Physical Characteristics

Depth (meters):	**0.162**
Width (meters):	**8**
Current (cm/sec):	**47.81**
Canopy (%):	**36**
Substrate	
Rock (%):	**10**
Rubble (%):	**10**
Gravel (%):	**0**
Sand (%):	**20**
Silt (%):	**60**
Embeddedness (%):	**54**

Chemical Measurements

DO (mg/L):	**6.4**
DO sat. (%):	**74.8**
Temperature (C):	**23.15**
Spec. Conduct. (umhos):	**612**
Baro pressure:	**762.9**
pH:	**7.22**
Salinity (PSS):	**0.30**

Biological Attributes

Aquatic vegetation	
Macrophytes:	**Yes**
Diatoms:	**Yes**
Algae-suspended:	**Yes**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	**Y**
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	
Decapoda:	**Y**
Gammaridae:	**Y**
Mollusca:	**Y**
Oligochaeta:	
Other macro's:	**Isopoda; water flea; Planarian**
Field Faunal Condition:	**Poor**

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Sparkill Creek** Latitude: **41.02929**

River Basin: **Nyack Brook - Spar** Station: **SPAR_04** Longitude: **-73.92548**

County: **Rockland Co., NY** Coll Date: **8/5/2016** Field Crew: **N. Laible; C. Beers**

Site description: **End of Woodhaven Drive; downstream of Old Mill in Kennedy Dells County**

Physical Characteristics

Depth (meters):	**0.134**
Width (meters):	**14.8**
Current (cm/sec):	**37.52**
Canopy (%):	**96**
Substrate	
Rock (%):	**10**
Rubble (%):	**5**
Gravel (%):	**15**
Sand (%):	**20**
Silt (%):	**50**
Embeddedness (%):	**54**

Chemical Measurements

DO (mg/L):	**10.83**
DO sat. (%):	**123.8**
Temperature (C):	**22.23**
Spec. Conduct. (umhos):	**462**
Baro pressure:	**762.9**
pH:	**7.76**
Salinity (PSS):	**0.22**

Biological Attributes

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

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Muddy Creek** Latitude: **41.06001**

River Basin: **Hackensack River** Station: **MUDD_02** Longitude: **-74.02358**

County: **Rockland Co., NY** Coll Date: **8/9/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Aamco Parking Lot; off West Washington Ave**

Physical Characteristics

Depth (meters):	**0.07**
Width (meters):	**2.5**
Current (cm/sec):	**46.01**
Canopy (%):	**27**
Substrate	
Rock (%):	**0**
Rubble (%):	**10**
Gravel (%):	**20**
Sand (%):	**30**
Silt (%):	**40**
Embeddedness (%):	**24**

Chemical Measurements

DO (mg/L):	**9.55**
DO sat. (%):	**111.2**
Temperature (C):	**22.64**
Spec. Conduct. (umhos):	**1032**
Baro pressure:	**762.9**
pH:	**7.23**
Salinity (PSS):	**0.51**

Biological Attributes

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

Flow

Flow

Stream Field Data Summary

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

Waterbody: **Saddle River** Latitude: **41.081**

River Basin: **Saddle River** Station: **SADL_02** Longitude: **-74.0831**

County: **Rockland Co., NY** Coll Date: **8/9/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Upstream of Hillside Ave Bridge**

Physical Characteristics

Depth (meters):	**0.118**
Width (meters):	**4.5**
Current (cm/sec):	**43.8**
Canopy (%):	**76**
Substrate	
Rock (%):	**10**
Rubble (%):	**20**
Gravel (%):	**40**
Sand (%):	**30**
Silt (%):	**0**
Embeddedness (%):	**22**

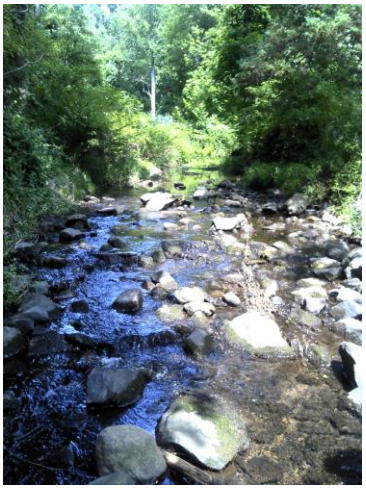
Chemical Measurements

DO (mg/L):	**13.31**
DO sat. (%):	**144.6**
Temperature (C):	**19.83**
Spec. Conduct. (umhos):	**799**
Baro pressure:	**762.9**
pH:	**7.63**
Salinity (PSS):	**0.39**

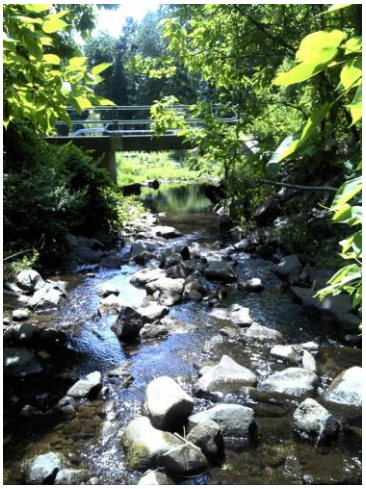
Biological Attributes

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

Flow



Flow



Stream Field Data Summary

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

Waterbody: **Hackensack River** Latitude: **41.08593**

River Basin: **Hackensack River** Station: **HACK_03A** Longitude: **-73.96325**

County: **Rockland Co., NY** Coll Date: **8/15/2016** Field Crew: **N. Laible; C. Beers**

Site description: **Access via apartment complex parking lot with fence missing.**

Physical Characteristics

Depth (meters):	**0.08**
Width (meters):	**4.6**
Current (cm/sec):	**46.66**
Canopy (%):	**94**
Substrate	
Rock (%):	**5**
Rubble (%):	**25**
Gravel (%):	**25**
Sand (%):	**5**
Silt (%):	**40**
Embeddedness (%):	**43**

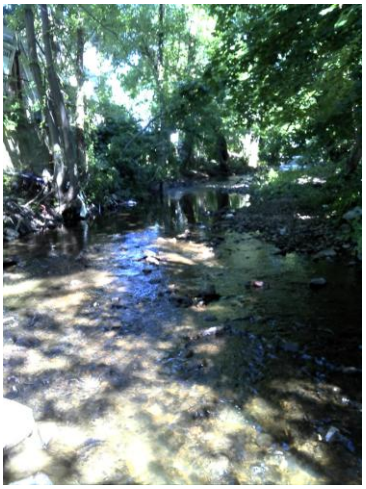
Chemical Measurements

DO (mg/L):	**7.04**
DO sat. (%):	**85.5**
Temperature (C):	**25.15**
Spec. Conduct. (umhos):	**475**
Baro pressure:	
pH:	**7.52**
Salinity (PSS):	**0.23**

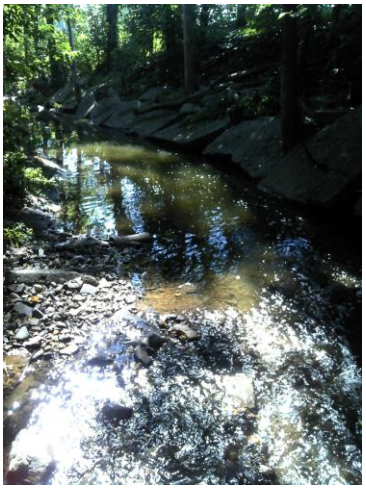
Biological Attributes

Aquatic vegetation	
Macrophytes:	**No**
Diatoms:	**Yes**
Algae-suspended:	**No**
Algae-filamentous:	**Yes**
Occurance of macroinvertebrates	
Ephemeroptera:	**Y**
Plecoptera:	
Trichoptera:	**Y**
Coleoptera:	
Megaloptera:	
Odonata:	
Chironomidae:	**Y**
Simuliidae:	**Y**
Decapoda:	**Y**
Gammaridae:	
Mollusca:	**Y**
Oligochaeta:	**Y**
Other macro's:	**Isopoda; Planarian**
Field Faunal Condition:	**Poor**

Flow



Flow



Stream Field Data Summary

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

Waterbody: **Stoney Brook** Latitude: **41.16672**

River Basin: **Ramapo River** Station: **STOB_01A** Longitude: **-74.18018**

County: **Rockland Co., NY** Coll Date: **8/15/2016** Field Crew: **N. Laible; C. Beers**

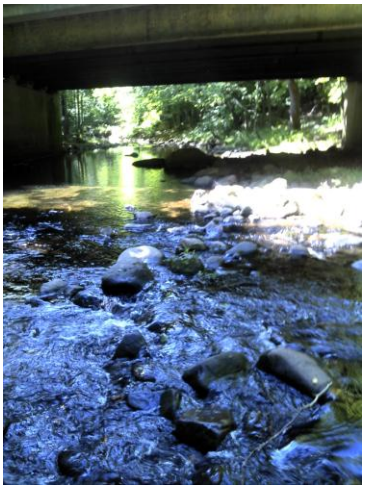
Site description: **Under NYS Thruway Bridge near Harriman State Park Sign, off Seven Lakes**

Physical Characteristics	
Depth (meters):	**0.18**
Width (meters):	**14.1**
Current (cm/sec):	**40.93**
Canopy (%):	**91**
Substrate	
Rock (%):	**20**
Rubble (%):	**30**
Gravel (%):	**45**
Sand (%):	**0**
Silt (%):	**5**
Embeddedness (%):	**29**

Chemical Measurements	
DO (mg/L):	**8.41**
DO sat. (%):	**101.1**
Temperature (C):	**24.56**
Spec. Conduct. (umhos):	**86**
Baro pressure:	
pH:	**6.67**
Salinity (PSS):	**0.04**

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

Flow



Flow

Stream Field Data Summary

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

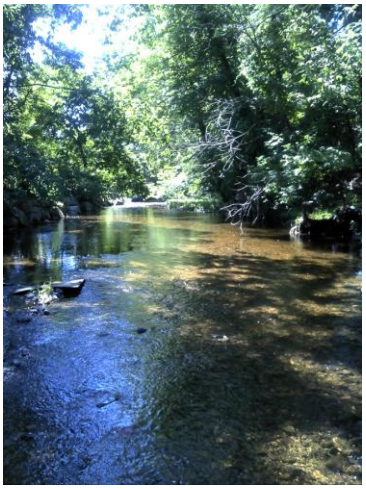
Waterbody: **Minisceongo Creek** Latitude: **41.20383**
River Basin: **Cedar Pond Brook** Station: **MNGO_03** Longitude: **-73.97923**
County: **Rockland Co., NY** Coll Date: **8/3/2016** Field Crew: **N. Laible; C. Beers**
Site description: **Through O&R path on Joseph's Street; under bridge**

Physical Characteristics	
Depth (meters):	**0.21**
Width (meters):	**13.6**
Current (cm/sec):	**66.37**
Canopy (%):	**75**
Substrate	
Rock (%):	**2**
Rubble (%):	**35**
Gravel (%):	**40**
Sand (%):	**8**
Silt (%):	**20**
Embeddedness (%):	**57**

Chemical Measurements	
DO (mg/L):	**14.34**
DO sat. (%):	**174.1**
Temperature (C):	**25.01**
Spec. Conduct. (umhos):	**677**
Baro pressure:	**762.9**
pH:	**8.81**
Salinity (PSS):	**0.33**

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

Flow



Flow