BIOLOGICAL STREAM SURVEY

ROCKLAND COUNTY, NEW YORK
LOTIC SCENE INVESTIGATION (LSI)
2008 STREAM BIOMONITORING WATER QUALITY PROJECT

PREPARED FOR
HUDSON BASIN RIVER WATCH
EAST GREENWICH, NEW YORK

BY
WATERSHED ASSESSMENT ASSOCIATES, LLC
SCHENECTADY, NEW YORK

Table of Contents

List of Figures

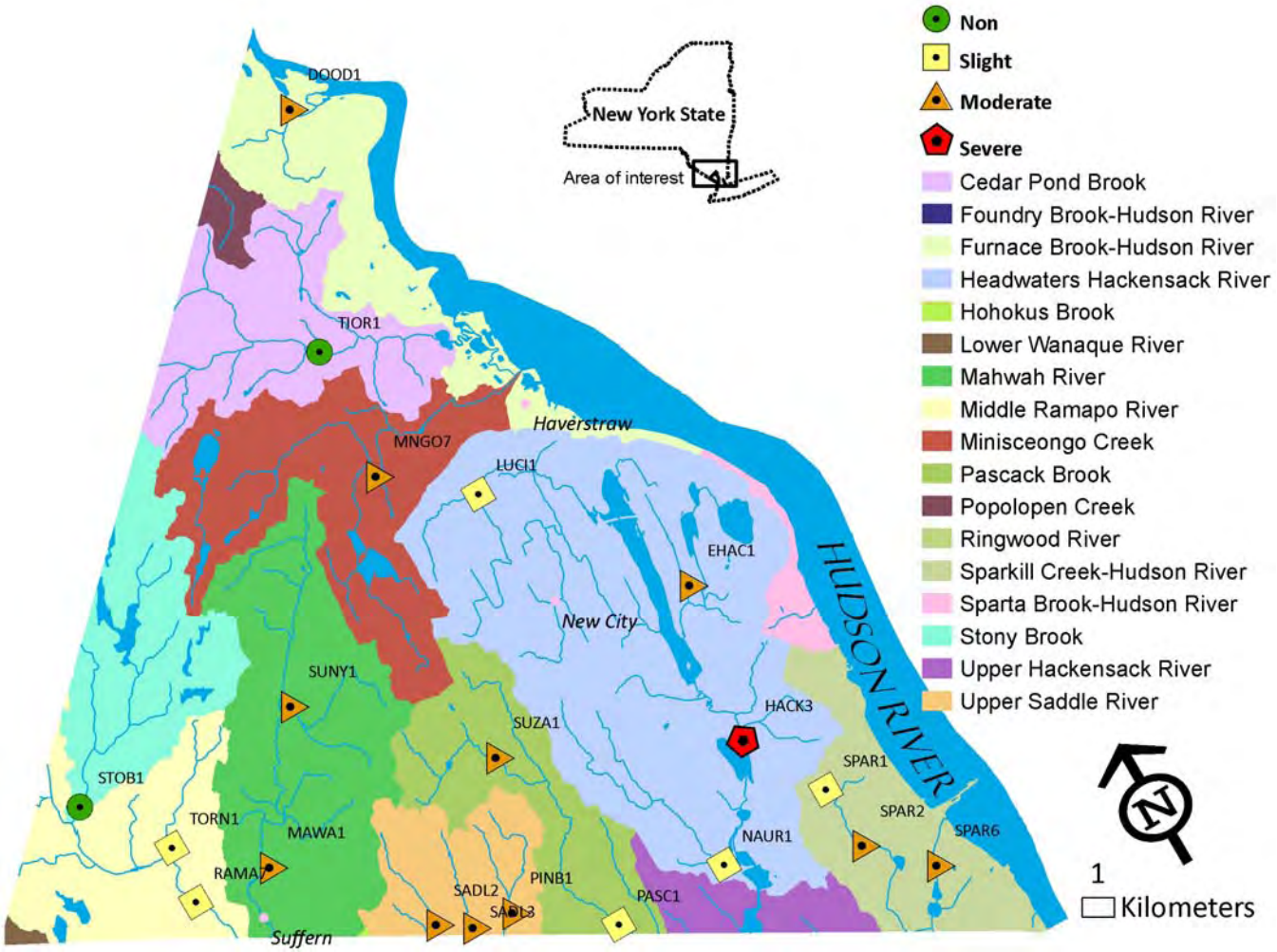
List of Tables

Introduction

This report summarizes the results from the benthic samples collected for Rockland County in 2008. This data is part of an ongoing assessment of Rockland County stream communities since 2006; for a complete project overview, history, rationale, background, project goals, methods, key terminology and interpretation of 2006-2007 data, see Rockland County reports on the Hudson Basin River Watch website http://www.hudsonbasin.org/Bioassessmentreports.htm.

Benthic kick samples were collected at 20 sites in 2008. Five of the stations had been previously sampled in at least one year during 2006-2007; these sites were re-sampled for continuous evaluation of baseline data. The remaining 15 site locations were selected to extend monitoring efforts throughout Rockland County (Figure 1).

Figure 1. Map of 2008 sampling locations in Rockland County, NY. Watershed delineation and watershed names are based on hydrological drainage unit 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).



Summary of Results

Biological community metrics indicated Rockland County stream water quality ranged from non-impacted to severely impacted in 2008 (Figure 1 and Table 1). In general, Ephemeroptera-Plecoptera-Trichoptera (EPT) richness values were low and the majority of Percent Model Affinity (PMA) values were less than 50% similar to the reference "non-impacted" community structure (Table 1). Biotic assessment profile (BAP) scores ranged from 2.12 (Hackensack River, HACK03) to 8.4 (Cedar Pond Brook, TIOR01) (Table 1). The biotic index scores (BI) were fairly low at the majority of stations, indicating that these Rockland County streams are less likely to be impacted by organic pollution. Based on the 2008 data, overall water quality condition for the County has declined relative to 2006 and 2007 data (Figure 2). However, the locations of the sampling stations shifted from streams originating in predominantly forested watersheds in 2006 and 2007, to stations located in the south and east of Rockland County, where the dominant land use is urbanized (Figure 3).

Figure 2. Percent of sampling stations within each water quality condition category from 2006 to 2008.

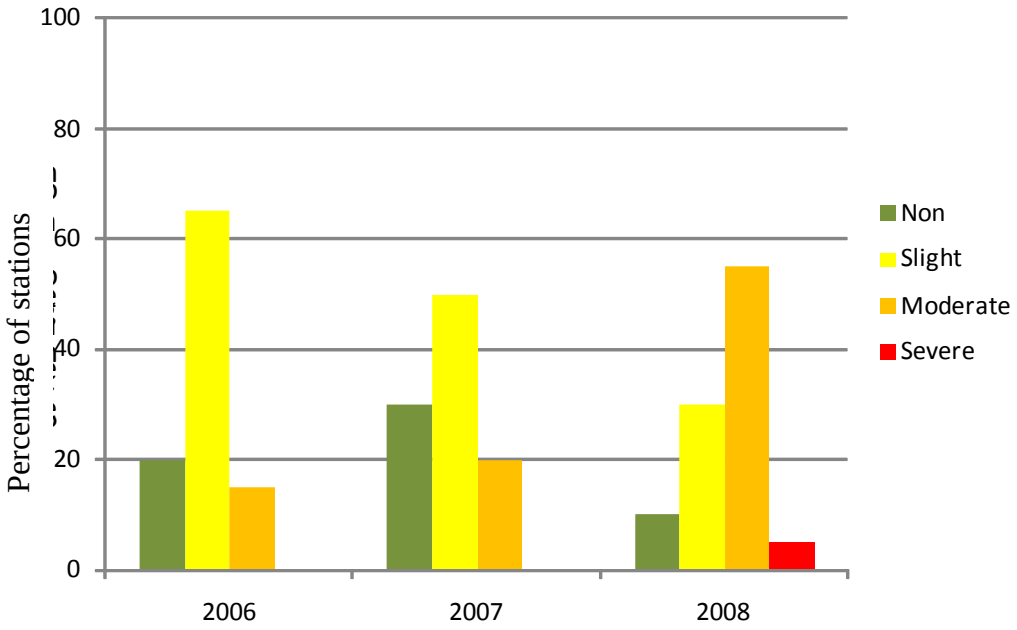


Figure 3. Locations of sampled stations in 2006-2008 in relation to land use (green areas indicate forest and pink to red indicates urbanized/developed areas).

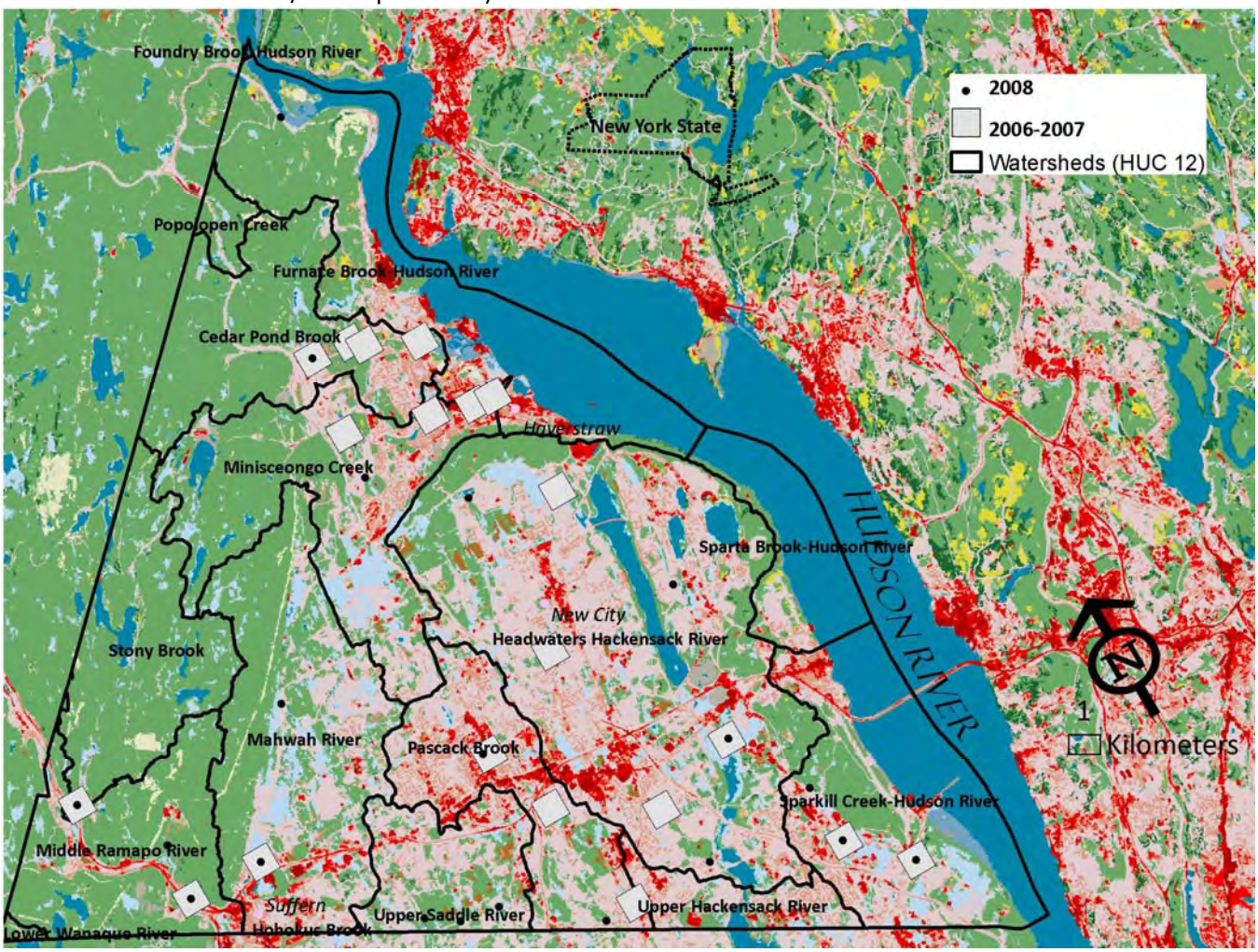


Table 1. Benthic macroinvertebrate metric scores and impact source determination percentages for the 20 stream sites sampled in 2008 throughout Rockland County, NY. Bolded numbers indicate most likely source of impact to stream community. GR= genera richness; BI= biotic index; EPT = Ephemeroptera-Plecoptera-Trichoptera taxa; PMA= percent model affinity; BAP = biotic assessment profile; Nat=natural; NPN = non-point nutrient; Org = organic inputs; imp= impoundment; Mun/Ind = municipal/industrial.*ISD percentages less 50% are less conclusive; ^site was also sampled in 2006-2007.

			Biotic indices					Impact source determination (ISD)						
Location	Stream Name	Date Collected	GR	BI	EPT	PMA	BAP	Nat	NPN	Org	Imp	Mun/Ind	Toxic	Silt
DOOD01	Doodletown Brook	17-Sep-08	12	3.64	8	27	4.72	27	50	28	54	**60**	30	32
EHAC01	East Branch Hackensack River	17-Sep-08	15	6.86	2	45	4.05	18	32	50	**63**	60	42	38
HACK03*	Hackensack River	18-Sep-08	9	6.4	0	35	2.13	10	25	42	49	47	30	28
LUCI01	Unnamed tributary	17-Sep-08	17	4.54	5	53	5.82	52	**74**	41	70	68	51	44
MAWA01^	Mahwah	19-Sep-08	12	5.16	3	34	3.91	47	**54**	32	**54**	32	42	35
MNGO07	Minisceongo Creek	17-Sep-08	8	4.53	3	31	3.24	31	50	60	61	60	**64**	51
NAUR01	Nauraushaun Brook	19-Sep-08	17	5.1	6	53	5.83	34	63	65	64	**70**	49	43
PASC01	Pascack Brook	18-Sep-08	20	4.91	6	42	5.76	30	60	63	**71**	68	41	48
PINB01	Pine Brook	18-Sep-08	13	5.08	4	38	4.37	32	60	**64**	57	59	67	57
RAMA07^	Ramapo River	19-Sep-08	14	3.78	11	42	5.97	41	**61**	47	52	45	35	32
SADL02	Saddle River	18-Sep-08	15	4.4	3	31	4.36	37	61	**62**	**62**	59	52	50
SADL03*	Upper Saddle Brook	18-Sep-08	13	4.77	3	50	4.84	32	46	31	49	44	41	39
SPAR01	Sparkill	18-Sep-08	24	4.97	6	39	6.17	34	54	55	59	**60**	51	47
SPAR02	Sparkill	18-Sep-08	14	4.7	4	37	4.57	30	55	66	64	**68**	51	52
SPAR06^	Sparkill	18-Sep-08	12	5.04	4	47	4.64	31	62	68	66	**73**	48	50
STOB01*^	Stony Brook	19-Sep-08	22	4.21	11	76	8.11	49	41	31	27	26	21	35
SUNY01	Sunny Brook	19-Sep-08	12	4.59	3	39	4.31	35	59	46	69	**71**	52	49
SUZA01	Unnamed tributary	18-Sep-08	17	5.36	4	39	4.84	24	58	66	67	**71**	50	47
TIOR01^	Cedar Pond Brook	17-Sep-08	25	2.87	14	52	8.40	43	57	28	**63**	62	36	28
TORN01	Torne Brook	19-Sep-08	18	4.26	9	44	6.15	27	44	45	48	**50**	44	40

Impact source determination (ISD) values indicate that 60% of the stations are likely impacted by impoundments and municipal/industrial sources at 2008 stations (Table 2). The remaining 2008 stations are likely impacted by non-point source nutrients, organic and toxic sources. Based on 2001 National Land Cover Data (NLCD) the land use of north and southwest Rockland County is largely forested and is generally dominated by developed land throughout the remainder of the county (Figure 3). All stations were located upstream of State Pollution Discharge Elimination Site (SPDES) locations. The 2006 ISD values indicated that most stations were likely impacted by non-point source nutrients and natural conditions; stations in 2007 were evenly distributed into all likely impact categories (Table 2). The discrepancy between 2006 and 2007 ISD values is concerning; in particular the decline of sites impacted by natural sources, although the differences may be a result of natural variation or an event (e.g., weather, construction) that shifted the benthic community structure to reflect different sources of impact.

Table 2. Percent of stations classified within each impact source determination category. *Sites with percentages less than 50% are less conclusive.

Impact Source	2006	2007	2008
Natural	35	15	0
Non-point nutrient	45	15	10
Organics	0	5	5
Impoundment	0	10	20
Municipal/Industrial	0	15	40
Toxins	10	10	10
Siltation	0	5	0
Complex	10	0	0
Inconclusive*	0	25	15

BAP scores classified 10% of the stations as non-impacted, 30% as slightly impacted, 55% as moderately impacted, and 5% as severely impacted (Figure 2). Based on the 2008 data, more than half of Rockland County stream biological communities indicate moderate to severe water quality (Figure 4) and according to NYS DEC the fish community survival and reproduction in these waters are often limited. In 2002-2003, 50% of Rockland County streams were classified as moderately impacted water quality by NY DEC (Figure 4). Water quality was considered slightly impacted for 30% of Rockland County stream communities sampled in 2008, and these conditions may be limiting to fish reproduction. Thirty-three percent of Rockland County streams assessed by NY DEC in 2002 were considered to be slightly impacted (Figure 4). Ten percent of the streams sampled in 2008 indicated non-impacted water quality where fish survival and reproduction should not be limited and may exemplify pristine conditions. In 2002-2003, 17% of Rockland County streams, assessed by NY DEC, were classified as non-impacted. Overall, Rockland County streams assessed in 2008 are more impacted than Rockland County streams assessed by NY DEC in 2002-2003 (Figure 4) and streams assessed in 2006 and 2007 (Figure 2).

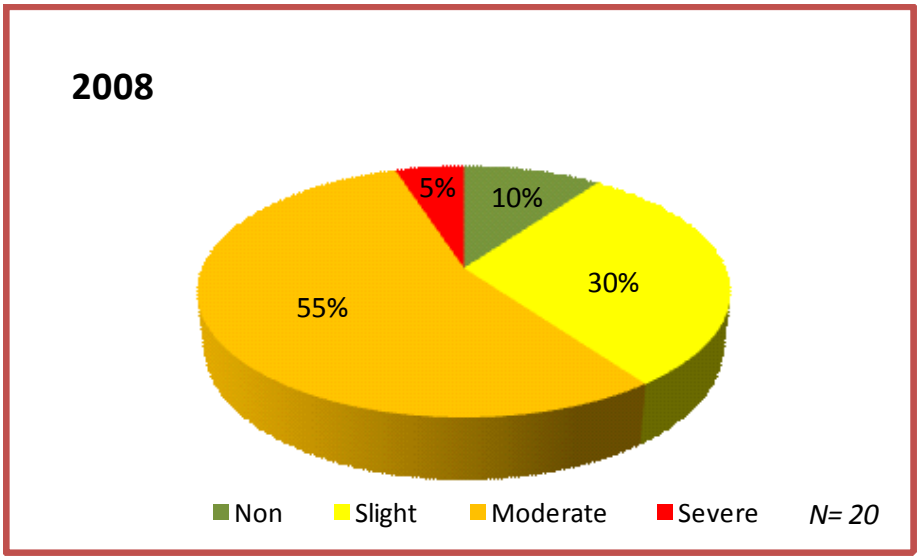
Recommendations

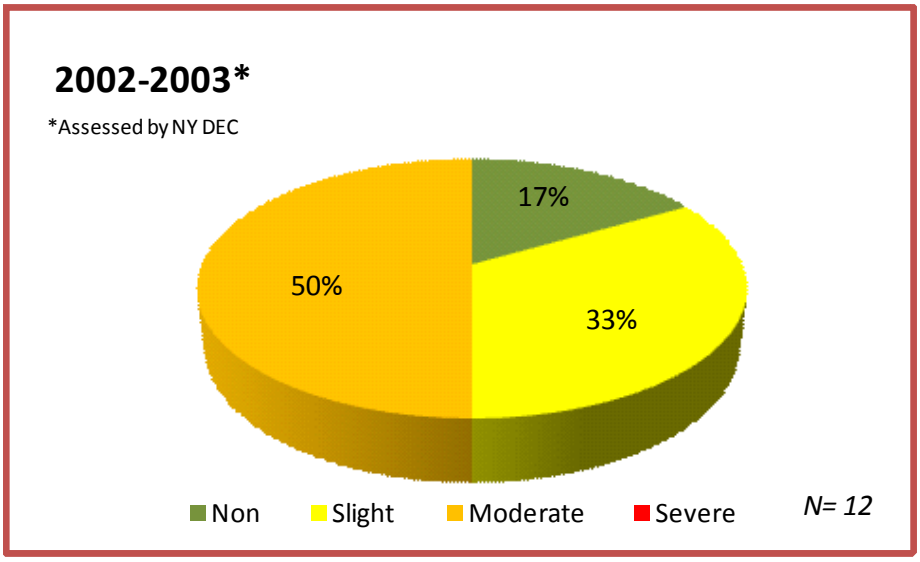
A rotating basin monitoring program is needed to accurately capture water quality condition, detect sequential change, and identify likely sources of impact throughout Rockland County. As evidenced by this report, three years of monitoring data at 35 stations illustrates the variability of water quality condition in Rockland County and depending on the location, how water quality condition for the

County may be interpreted. We recommend a four year rotating monitoring plan. Rockland County basins would be divided into three sections: (1) Popolopen Brook, (2) Upper Hackensack River and Rockland Lake, and (3) Upper Ramapo River, Mahwah River, and Upper Saddle River. Data will be collected from 15 new stations and 5 previously sampled stations each year. Sampling effort in the fourth year will focus on filling data gaps and re-evaluating selected areas of concern.

A rotating basin monitoring program of water quality conditions, based on stream benthic communities, will assist Rockland County to better understand the changing conditions of aquatic ecosystems throughout the County provide additional perspective for the allocation of resources to restoration and conservation projects and planned development activities, and aid evaluation of best management practices (BMPs).

Figure 4. Percentage of sites within each water quality impact category based on the biotic assessment scores for 2008 and Rockland County streams assessed in 2002-2003 by NY DEC.





Appendix

A Field Data Summary page for each of the stations sampled was created, including: site location, number, sampling date, physical and chemical data, and site photos. Raw benthic macroinvertebrate data for each station is available upon request.

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

Field Data Summary

Stream name: **Doodletown Brook** Watershed: **Furnace Brook-Hudson River** ID: **DOOD**
Municipality: **Bear Mountain** County/State: **Rockland Co., NY** Station: **01**
Location: **100 meters above route 9W/202 bridge**
Date sampled: **Wednesday, September 17, 2008**
Arrival time at station: **12:09 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.30102**
Longitude: **-73.98603**
Decimal Degrees

Physical Characteristics	
Width (meters)	**10**
Depth (meters)	**0.1**
Current (cm/sec)	**60**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**30**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**30**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**25**
Chemical Measurements	
Temperature (C)	**17.64**
Specific conductance (umhos)	**99**
DO (mg/l)	**8.66**
DO % saturation	**90.7**
Baro pressure (mm)	**766**
pH	**7.27**
Salinity (PSS)	**0.05**
Biological Attributes	
Canopy (%)	**75**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	**Y**
Trichoptera	**Y**
Coleoptera	
Megaloptera	**Y**
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	
Field faunal condition	**Very good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Cedar Pond Brook** Watershed: **Cedar Pond Brook** ID: **TIOR**
Municipality: **Stoney Point** County/State: **Rockland Co., NY** Station: **01**
Location: **Just above CR 106/210 bridge**
Date sampled: **Wednesday, September 17, 2008**
Arrival time at station: **1:06 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.238233**
Longitude: **-74.022150**
Decimal Degrees

Physical Characteristics	
Width (meters)	**12**
Depth (meters)	**0.1**
Current (cm/sec)	**50**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**25**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**25**
Chemical Measurements	
Temperature (C)	**17.23**
Specific conductance (umhos)	**214**
DO (mg/l)	**9.66**
DO % saturation	**100.3**
Baro pressure (mm)	**760**
pH	**7.63**
Salinity (PSS)	**0.1**
Biological Attributes	
Canopy (%)	**60**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	**Y**
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Very good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Minisceongo Creek** Watershed: **Minisceongo Creek** ID: **MNGO**
Municipality: **Thiells** County/State: **Rockland Co., NY** Station: **07**
Location: **Just below Thiells Mt. Ivy Rd. bridge**
Date sampled: **Wednesday, September 17, 2008**
Arrival time at station: **1:53 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.2017**
Longitude: **-74.0283**
Decimal Degrees

Physical Characteristics	
Width (meters)	**6**
Depth (meters)	**0.1**
Current (cm/sec)	**65**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**15**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**30**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**15**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**17.29**
Specific conductance (umhos)	**284**
DO (mg/l)	**10.11**
DO % saturation	**105.4**
Baro pressure (mm)	**756.7**
pH	**7.97**
Salinity (PSS)	**0.14**
Biological Attributes	
Canopy (%)	**55**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	**Y**
Odonata	
Chironomidae	
Simuliidae	
Decapoda	**N**
Gammaridae	**Y**
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Crum Creek** Watershed: **Headwaters Hackensack River** ID: **LUCI**

Municipality: **New City** County/State: **Rockland Co., NY** Station: **01**

Location: **Southern tirbutary to Lake Lucille; Roberts Road behind house #29**

Date sampled: **Wednesday, September 17, 2008**

Arrival time at station: **3:17 PM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.18189**

Longitude: **-73.99913**

Decimal Degrees

Physical Characteristics	
Width (meters)	**7**
Depth (meters)	**0.1**
Current (cm/sec)	**65**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**20**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**30**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**16.47**
Specific conductance (umhos)	**362**
DO (mg/l)	**9.14**
DO % saturation	**93.7**
Baro pressure (mm)	**761**
pH	**7.73**
Salinity (PSS)	**0.17**
Biological Attributes	
Canopy (%)	**50**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	Isopoda
Field faunal condition	**Good**

Notes/observations:

Heavy sand deposits

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

Field Data Summary

Stream name: **East Branch Hackensa** Watershed: **Headwaters Hackensack River** ID: **EHAC**
Municipality: **Valley Cottage** County/State: **Rockland Co., NY** Station: **01**
Location: **Just above Svahan Drive culvert**
Date sampled: **Wednesday, September 17, 2008**
Arrival time at station: **4:17 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.13114**
Longitude: **-73.95028**
Decimal Degrees

Physical Characteristics	
Width (meters)	**2**
Depth (meters)	**0.1**
Current (cm/sec)	**40**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**5**
Rubble (6.35 - 25.4 cm)	**30**
Gravel (0.2 - 6.35 cm)	**30**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**15**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**18.22**
Specific conductance (umhos)	**427**
DO (mg/l)	**5.89**
DO % saturation	**62.5**
Baro pressure (mm)	**760.9**
pH	**7.5**
Salinity (PSS)	**0.21**
Biological Attributes	
Canopy (%)	**40**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	**Y**
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	Isopoda
Field faunal condition	**Very poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Hacensack River** Watershed: **Headwaters Hackensack River** ID: **HACK**
Municipality: **West Nyack** County/State: **Rockland Co., NY** Station: **03**
Location: **Just below Western Highway bridge**
Date sampled: **Thursday, September 18, 2008**
Arrival time at station: **6:45 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.08605**
Longitude: **-73.96227**
Decimal Degrees

Physical Characteristics	
Width (meters)	**40**
Depth (meters)	**0.2**
Current (cm/sec)	**40**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**10**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**20**
Embeddedness (%)	**75**
Chemical Measurements	
Temperature (C)	**19.6**
Specific conductance (umhos)	**383**
DO (mg/l)	**5.37**
DO % saturation	**58.9**
Baro pressure (mm)	**762**
pH	**7.58**
Salinity (PSS)	**0.18**
Biological Attributes	
Canopy (%)	**15**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	**Y**
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	**Y**
Gammaridae	**Y**
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	
Field faunal condition	**Good**

Notes/observations:

Heavy siltation noted

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

Field Data Summary

Stream name: **Sparkill** Watershed: **Sparkill Creek-Hudson River** ID: **SPAR**

Municipality: **Blauvelt** County/State: **Rockland Co., NY** Station: **01**

Location: **Just above Greenbush Road**

Date sampled: **Thursday, September 18, 2008**

Arrival time at station: **7:33 AM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.06222**

Longitude: **-73.94583**

Decimal Degrees

Physical Characteristics	
Width (meters)	**2.5**
Depth (meters)	**0.1**
Current (cm/sec)	**50**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**30**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**25**
Chemical Measurements	
Temperature (C)	**15.03**
Specific conductance (umhos)	**299**
DO (mg/l)	**9.31**
DO % saturation	**92**
Baro pressure (mm)	**760**
pH	**7.91**
Salinity (PSS)	**0.14**
Biological Attributes	
Canopy (%)	**80**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	**Y**
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Sparkill** Watershed: **Sparkill Creek-Hudson River** ID: **SPAR**
Municipality: **Orangetown** County/State: **Rockland Co., NY** Station: **06**
Location: **Just below New Street bridge**
Date sampled: **Thursday, September 18, 2008**
Arrival time at station: **8:34 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.029416**
Longitude: **-73.925583**
Decimal Degrees

Physical Characteristics	
Width (meters)	**6**
Depth (meters)	**0.2**
Current (cm/sec)	**55**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**25**
Rubble (6.35 - 25.4 cm)	**30**
Gravel (0.2 - 6.35 cm)	**20**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**15.69**
Specific conductance (umhos)	**567**
DO (mg/l)	**6.48**
DO % saturation	**65.5**
Baro pressure (mm)	**764**
pH	**7.65**
Salinity (PSS)	**0.28**
Biological Attributes	
Canopy (%)	**30**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	**Y**
Decapoda	
Gammaridae	**Y**
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Poor**

Notes/observations:

Water has a milky cast

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

Field Data Summary

Stream name: **Sparkill** Watershed: **Sparkill Creek-Hudson River** ID: **SPAR**

Municipality: **Orangetown** County/State: **Rockland Co., NY** Station: **02**

Location: **In park just below foot bridge**

Date sampled: **Thursday, September 18, 2008**

Arrival time at station: **9:17 AM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.04472**

Longitude: **-73.94527**

Decimal Degrees

Physical Characteristics	
Width (meters)	**6.5**
Depth (meters)	**0.15**
Current (cm/sec)	**75**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**20**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**30**
Chemical Measurements	
Temperature (C)	**15.38**
Specific conductance (umhos)	**661**
DO (mg/l)	**8.78**
DO % saturation	**88**
Baro pressure (mm)	**764**
pH	**7.75**
Salinity (PSS)	**0.32**
Biological Attributes	
Canopy (%)	**20**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Pascack Brook** Watershed: **Pascack Brook** ID: **PASC**
Municipality: **Pearl River** County/State: **Rockland Co., NY** Station: **01**
Location: **Just above W. Washington Ave., bridge**
Date sampled: **Thursday, September 18, 2008**
Arrival time at station: **10:18 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.0597**
Longitude: **-74.0361**
Decimal Degrees

Physical Characteristics	
Width (meters)	**12**
Depth (meters)	**0.15**
Current (cm/sec)	**65**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**30**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**20**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**30**
Chemical Measurements	
Temperature (C)	**15**
Specific conductance (umhos)	**625**
DO (mg/l)	**9.56**
DO % saturation	**94.9**
Baro pressure (mm)	**760**
pH	**8.03**
Salinity (PSS)	**0.31**
Biological Attributes	
Canopy (%)	**80**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	**Y**
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Pine Brook** Watershed: **Upper Saddle River** ID: **PINB**

Municipality: **Chestnut Ridge** County/State: **Rockland Co., NY** Station: **01**

Location: **Just above Pinebrook Rd., bridge**

Date sampled: **Thursday, September 18, 2008**

Arrival time at station: **11:09 AM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.07867**

Longitude: **-74.06771**

Decimal Degrees

Physical Characteristics	
Width (meters)	**4**
Depth (meters)	**0.1**
Current (cm/sec)	**45**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**20**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**30**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**30**
Chemical Measurements	
Temperature (C)	**16.22**
Specific conductance (umhos)	**448**
DO (mg/l)	**7.76**
DO % saturation	**79.1**
Baro pressure (mm)	**757**
pH	**7.92**
Salinity (PSS)	**0.22**
Biological Attributes	
Canopy (%)	**70**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	**Y**
Mollusca	
Oligochaeta	
Other macroinvertebrates	Isopoda
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Saddle River** Watershed: **Upper Saddle River** ID: **SADL**

Municipality: **Monsey** County/State: **Rockland Co., NY** Station: **02**

Location: **Just above Hiiiside Ave bridge**

Date sampled: **Thursday, September 18, 2008**

Arrival time at station: **12:58 PM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.08078**

Longitude: **-74.08292**

Decimal Degrees

Physical Characteristics	
Width (meters)	**6**
Depth (meters)	**0.1**
Current (cm/sec)	**65**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**25**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**20**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**20**
Embeddedness (%)	**60**
Chemical Measurements	
Temperature (C)	**17.57**
Specific conductance (umhos)	**627**
DO (mg/l)	**8.73**
DO % saturation	**91.4**
Baro pressure (mm)	**760**
pH	**7.79**
Salinity (PSS)	**0.31**
Biological Attributes	
Canopy (%)	**40**
Aquatic vegetation	
Algae suspended	
Algae filamentous	**Y**
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	**Y**
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	Hiruridae
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

Field Data Summary

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

Stream name: **Upper Saddle Brook** Watershed: **Upper Saddle River** ID: **SADL**
Municipality: **Monsey** County/State: **Rockland Co., NY** Station: **03**
Location: **Just off Cherry Lane**
Date sampled: **Thursday, September 18, 2008**
Arrival time at station: **2:12 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.08668**
Longitude: **-74.0938**
Decimal Degrees

Physical Characteristics	
Width (meters)	**6**
Depth (meters)	**0.1**
Current (cm/sec)	**50**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**25**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**15**
Sand (0.06 - 2.0 cm)	**30**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**60**
Chemical Measurements	
Temperature (C)	**16.37**
Specific conductance (umhos)	**546**
DO (mg/l)	**9.02**
DO % saturation	**91.3**
Baro pressure (mm)	**759**
pH	**8.17**
Salinity (PSS)	**0.27**
Biological Attributes	
Canopy (%)	**85**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	**Y**
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Poor**
Notes/observations:	

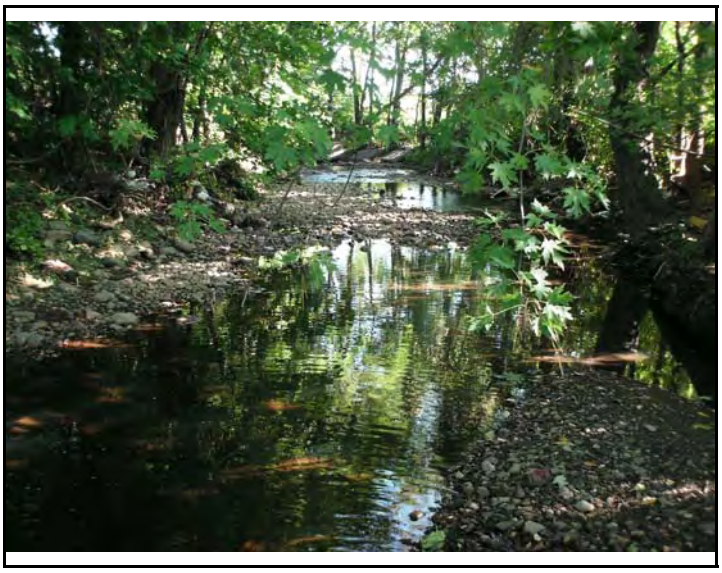
Watershed Assessment Associates
Environmental Services / Biomonitoring / Invertebrate Taxonomy / Professional Training

Field Data Summary

Stream name: **Unnamed tributary** Watershed: **Passaic Brook** ID: **SUZA**
Municipality: **Spring Valley** County/State: **Rockland Co., NY** Station: **01**
Location: **East of Lake Suzanne; Just below North Main Street bridge**
Date sampled: **Thursday, September 18, 2008**
Arrival time at station: **4:08 PM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.11794**
Longitude: **-74.04364**
Decimal Degrees

Physical Characteristics	
Width (meters)	**8**
Depth (meters)	**0.1**
Current (cm/sec)	**50**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**10**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**35**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**15**
Embeddedness (%)	**70**
Chemical Measurements	
Temperature (C)	**18.22**
Specific conductance (umhos)	**578**
DO (mg/l)	**7.78**
DO % saturation	**83**
Baro pressure (mm)	**756**
pH	**7.95**
Salinity (PSS)	**0.28**
Biological Attributes	
Canopy (%)	**45**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	**Y**
Gammaridae	**Y**
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	
Field faunal condition	**Good**



Notes/observations:

Abundant liter noted in the area

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

Field Data Summary

Stream name: **Sunny Brook** Watershed: **Mahwah River** ID: **SUNY**
Municipality: **Antrim** County/State: **Rockland Co., NY** Station: **01**
Location: **Just below Haverstraw Road bridge**
Date sampled: **Friday, September 19, 2008**
Arrival time at station: **6:57 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.15924**
Longitude: **-74.09836**
Decimal Degrees

Physical Characteristics	
Width (meters)	**3**
Depth (meters)	**0.1**
Current (cm/sec)	**50**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**15**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**25**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**17.92**
Specific conductance (umhos)	**444**
DO (mg/l)	**5.97**
DO % saturation	**63.1**
Baro pressure (mm)	**763**
pH	**7.58**
Salinity (PSS)	**0.21**
Biological Attributes	
Canopy (%)	**35**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	**Y**
Decapoda	**Y**
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Nauraushaun Brook** Watershed: **Headwaters Hackensack River** ID: **NAUR**
Municipality: **Pearl River** County/State: **Rockland Co., NY** Station: **01**
Location: **Just below Sickletown Road bridge**
Date sampled: **Friday, September 19, 2008**
Arrival time at station: **8:19 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.0589**
Longitude: **-73.9919**
Decimal Degrees

Physical Characteristics	
Width (meters)	**12**
Depth (meters)	**0.2**
Current (cm/sec)	**70**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**30**
Rubble (6.35 - 25.4 cm)	**20**
Gravel (0.2 - 6.35 cm)	**30**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**14.54**
Specific conductance (umhos)	**592**
DO (mg/l)	**9.49**
DO % saturation	**93.5**
Baro pressure (mm)	**771**
pH	**7.94**
Salinity (PSS)	**0.29**
Biological Attributes	
Canopy (%)	**65**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	**Y**
Gammaridae	
Mollusca	
Oligochaeta	**Y**
Other macroinvertebrates	Isopoda
Field faunal condition	**Poor**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Mahwah River** Watershed: **Mahwah River** ID: **MAWA**
Municipality: **Antrim** County/State: **Rockland Co., NY** Station: **01**
Location: **100 meters above Montebello Rd bridge**
Date sampled: **Friday, September 19, 2008**
Arrival time at station: **9:27 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.1242**
Longitude: **-74.1361**
Decimal Degrees

Physical Characteristics	
Width (meters)	**12**
Depth (meters)	**0.1**
Current (cm/sec)	**45**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**10**
Rubble (6.35 - 25.4 cm)	**35**
Gravel (0.2 - 6.35 cm)	**20**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**15**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**14.29**
Specific conductance (umhos)	**872**
DO (mg/l)	**8.77**
DO % saturation	**85.9**
Baro pressure (mm)	**765**
pH	**8.23**
Salinity (PSS)	**0.43**
Biological Attributes	
Canopy (%)	**55**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	**Y**
Odonata	
Chironomidae	
Simuliidae	
Decapoda	**Y**
Gammaridae	**Y**
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Ramapo River** Watershed: **Middle Ramapo River** ID: **RAMA**

Municipality: **Hillburn** County/State: **Rockland Co., NY** Station: **07**

Location: **Just above Forth Street bridge**

Date sampled: **Friday, September 19, 2008**

Arrival time at station: **9:59 AM**

Field personnel: **J. Kelly Nolan**

Latitude: **41.125**

Longitude: **-74.165**

Decimal Degrees

Physical Characteristics	
Width (meters)	**45**
Depth (meters)	**0.1**
Current (cm/sec)	**75**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**5**
Rubble (6.35 - 25.4 cm)	**45**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**10**
Embeddedness (%)	**40**
Chemical Measurements	
Temperature (C)	**15.72**
Specific conductance (umhos)	**372**
DO (mg/l)	**9.24**
DO % saturation	**93.1**
Baro pressure (mm)	**766**
pH	**7.98**
Salinity (PSS)	**0.18**
Biological Attributes	
Canopy (%)	**20**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	**Y**
Trichoptera	**Y**
Coleoptera	**Y**
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	**Y**
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Very good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Torne Brook** Watershed: **Middle Ramapo River** ID: **TORN**
Municipality: **Sloatsburg** County/State: **Rockland Co., NY** Station: **01**
Location: **Just across from landfill**
Date sampled: **Friday, September 19, 2008**
Arrival time at station: **10:23 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.14162**
Longitude: **-74.16201**
Decimal Degrees

Physical Characteristics	
Width (meters)	**2.5**
Depth (meters)	**0.1**
Current (cm/sec)	**45**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**25**
Rubble (6.35 - 25.4 cm)	**25**
Gravel (0.2 - 6.35 cm)	**25**
Sand (0.06 - 2.0 cm)	**20**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**25**
Chemical Measurements	
Temperature (C)	**13.58**
Specific conductance (umhos)	**88**
DO (mg/l)	**7.75**
DO % saturation	**74.6**
Baro pressure (mm)	**765**
pH	**8.16**
Salinity (PSS)	**0.04**
Biological Attributes	
Canopy (%)	**65**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	
Plecoptera	**Y**
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	**Y**
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Very good**
Notes/observations:	

Flow

Flow

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

Field Data Summary

Stream name: **Stony Brook** Watershed: **Stony Brook** ID: **STOB**
Municipality: **Sloastburg** County/State: **Rockland Co., NY** Station: **01**
Location: **Just above Sevens Lakes Rd bridge**
Date sampled: **Friday, September 19, 2008**
Arrival time at station: **11:09 AM**
Field personnel: **J. Kelly Nolan**

Latitude: **41.1647**
Longitude: **-74.1836**
Decimal Degrees

Physical Characteristics	
Width (meters)	**12**
Depth (meters)	**0.15**
Current (cm/sec)	**65**
Substrate (%)	
Rock (>25.4 cm or bedrock)	**10**
Rubble (6.35 - 25.4 cm)	**35**
Gravel (0.2 - 6.35 cm)	**35**
Sand (0.06 - 2.0 cm)	**15**
Silt (0.004 - 0.06 cm)	**5**
Embeddedness (%)	**25**
Chemical Measurements	
Temperature (C)	**15.32**
Specific conductance (umhos)	**72**
DO (mg/l)	**9.28**
DO % saturation	**93**
Baro pressure (mm)	**764**
pH	**7.99**
Salinity (PSS)	**0.23**
Biological Attributes	
Canopy (%)	**80**
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	**Y**
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	**Y**
Plecoptera	**Y**
Trichoptera	**Y**
Coleoptera	
Megaloptera	
Odonata	**Y**
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	
Field faunal condition	**Very good**
Notes/observations:	

Flow

Flow