

HOOSIC RIVER 2006 BIOASSESSMENT

HOOSIC RIVER WATERSHED ASSOCIATION WATER QUALITY MONITORING PROGRAM



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WATER QUALITY MONITORING PROGRAM**

Survey dates: September 23 and 24, 2006

Report date: February 13, 2007

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The cover photo was taken downstream of station 01 above Adams, MA just off Route 8.

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Background

The Hoosic River Watershed Association performed a water quality survey to determine current water quality and monitor trends on the Hoosic River over the past two decades.

The Hoosic River travels approximately 70 miles from its source at the Cheshire Reservoir in Massachusetts, through Vermont and New York before entering the Hudson River at Stillwater, NY. The watershed encompasses 720 square miles and includes land used for commercial, industrial, agricultural, and residential purposes. The river is popular for boating, fishing, and swimming. Major threats to the Hoosic's water quality are point and non-point source inputs, siltation, industrial discharges, and stream habitat alterations.

Water quality of the Hoosic River has been documented in several studies over the past two decades. The NYS Department of Environmental Conservation (NYS DEC) conducted a survey in 2004 on a segment of the river in New York. The Vermont Department of Environmental Conservation (VT DEC) and the Massachusetts Department of Environmental Protection (MA DEP) have also conducted water quality surveys in their respective states prior to 2004. An entire watershed study was conducted by the NYS DEC in 1986, which included 15 sampling stations in all three states from the river source to its mouth. The Hoosic River Watershed Association has completed numerous investigations of water temperature variation, bacteria assessments and more recently benthic macroinvertebrate assessments that were conducted in 2001, 2004, and 2005 which included the Hoosic River and three of its tributaries.

In this study, thirteen stations were sampled following the NYS DEC Stream Biomonitoring Unit Quality Assurance Work Plan for biological stream monitoring (Bode et al., 2002).

A map with the station locations is located on appendix I.

Methods

Stations assessed in this study have been previously assessed by the NYS DEC, VT DEC, MA DEP and the Hoosic River Watershed Association. Each station was evaluated for percent canopy cover, current speed, percent of rock, rubble, gravel, sand, and silt, and the embeddedness of the substrate. The depth and width of the stream were also measured.

Water temperature (accuracy $\pm 0.2^{\circ}\text{C}$); specific conductance (range of 0 – 100 mS with a resolution of 4 digits); pH, with a range of 2 to 12 units (accuracy ± 0.2 units); and dissolved oxygen, with a range of 0 to 50 mg/L and an accuracy of ± 0.2 mg/L, were obtained at each station using a Hydrolab Quanta probe following the manufacturer calibration guidelines.

For physical and chemical data see appendix II and III.

Macroinvertebrate samples were collected at each station using an 800-900 micron mesh kick net (9 by 18 inch). Samples were collected by disturbing the substrate by foot

upstream of the net and continuing over a five-meter transect for five minutes as described in the Quality Assurance Work Plan for Biological Stream Monitoring in New York State (Bode et al. 2002). Samples were separately preserved in 95% ethyl alcohol and were then sub-sampled in the lab by randomly selecting 15 cc of detritus from the sample and examining it under a dissecting microscope. Invertebrates larger than 1.5 mm were removed until 100 organisms were obtained for each sample. Macroinvertebrates were identified to genus level to determine the water quality category for each station. Identification to the required taxonomic level was conducted for each sub sample to determine the Impact Source Determination (ISD) described by Riva-Murry et al. (2002).

The metrics used to determine water quality were those recommended by the NYS DEC Stream Biomonitoring Unit with the exception that an all genera level identification was used instead of a combination of genera and species level identification. Identification to genera has been shown to have 100 percent accuracy in properly categorizing water quality in the NYS DEC four tiered method of assessment (J. Kelly Nolan, unpublished data).

The expected variability of single sample macroinvertebrate sampling results is stated in Smith and Bode (2004).

The four community metrics utilized for genera level were: Richness (GR) (Plafkin et al. 1989), EPT richness (EPT) (Lenat, 1987), Hilsenhoff's Biotic Index (BI) (Hilsenhoff, 1987), and Percent Model Affinity (PMA) (Novak and Bode, 1992). See table I.

Table I.

Multi metrics used to determine the Biological Assessment Profile	
Genera Richness (GR)	is the total number of taxa found in the sub-sample. Higher richness values are mostly associated with clean water conditions.
EPT Richness (EPT)	is the number of different species or taxa in the three most pollution sensitive orders: Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies) that are present. Generally, the more EPT taxa, the better the water quality or the better the habitat. However, some pristine headwater streams may be naturally low in richness, due to a relative lack of food (quantity and different types) and generally lower abundance of organisms.
Biotic Index (BI)	is the Hilsenhoff Biotic Index and is calculated by multiplying the number of individuals of each species or taxa by its assigned tolerance value, summing these products, and dividing the total number of individuals. Tolerance values range from intolerant (0) to tolerant (10). High BI values are suggestive of organic (sewage) pollution, while low values indicate a lack of sewage effects.
Percent Model Affinity (PMA)	is a measure of similarity to a model non-impacted community based on percent abundance of seven major groups. The lower the similarity value the greater the impact.
Biological Assessment Profile (BAP)	is the assessed impact for each station. The BAP score is the mean value of the above 4 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-, slightly, moderately, or severely impacted.

The score for each particular metric from each station was used to calculate each station's Biological Assessment Profile (BAP) by converting each metric score to a common scale of 0 – 10. The BAP score categorizes the overall water quality assessment into one of four categories: non-, slightly, moderately, or severely impacted (Bode et al. 2002). See table II.

Table II.

Abridged NYS DEC water quality category definitions	
Non-impacted	Indices reflect very good water quality. The macroinvertebrate community is diverse. Water quality should not be limiting to fish survival or propagation. This level of water quality includes both pristine habitats and those receiving discharges which minimally alter the biota.
Slightly impacted	Indices reflect good water quality. The macroinvertebrate community is slightly but significantly altered from the pristine state. Water quality is usually not limiting to fish survival, but may be limiting to fish propagation.
Moderately impacted	Indices reflect poor water quality. The macroinvertebrate community is altered to a large degree from the pristine state. Water quality often is limiting to fish propagation, but usually not to fish survival.
Severely impacted	Indices reflect very poor water quality. The macroinvertebrate community is limited to a few tolerant species. The dominant species are almost all tolerant, and are usually midges and worms. Often 1-2 species are very abundant. Water quality is often limiting to both fish propagation and fish survival.

Impact Source Determination (ISD) was calculated for each station. ISD compares test station communities to model communities empirically derived from macroinvertebrate data; the greater the similarity of a test station community to a model community, the more likely a particular impact source is affecting the test community. Data is most conclusive if a test community exhibits at least 50% similarity to a model community (Bode et al. 2002). Riva-Murray et al. (2002) found that ISD correlated well with impairment sources inferred from chemical, physical, and watershed characteristics, and biomonitoring results. For further explanation see appendix V.

The Nutrient Biotic Index (NBI) was also calculated for each station. NBI is a new measure of nutrient enrichment and is based on responses of the macroinvertebrate community to effects of increasing nutrient levels. NBI was developed by Smith et al. (2007) for nitrate (NBI-N) and phosphorus (NBI-P). The measure is based on tolerance values that are assigned to each taxon. Values are on a 0 -10 scale with 0 being intolerant and 10 being tolerant. The determined value corresponds to a trophic state of enrichment for both NBI-N and NBI-P. In general cultural eutrophication is indicated with an NBI score above 6.0 (personal communication). Table III lists the corresponding NBI trophic states.

Table III.

Trophic state for NBI	NBI-P	NBI-N
Eutrophic	> 6.0	> 6.0
Mesotrophic	5.5 – 6.0	4.8 – 6.0
Oligotrophic	< 5.5	< 4.8

Appendix III and table IV contain the macroinvertebrate taxa list, BAP, ISD, and NBI results for each station.

Results

The Biological Assessment Profile (BAP) score ranged from non-impacted to slightly impacted water quality (see graph I). Impact Source Determination indicated that impact was secondary to natural or nutrient conditions, or a combination of both, for the majority of sites assessed. Two stations, however, are impacted secondary toxic, organic, or complex sources, or a combination of these. The nutrient biotic index for nitrogen and phosphorus implies the Hoosic River is adversely affected by nutrients at several stations tested, indicating cultural eutrophication and/or a mesotrophic (a transitional) state. See table IV.

The dissolved oxygen concentration ranged from 8.9 to 11.45 mg/l, and dissolved oxygen percent saturation ranged from 92 to 115.5%. Water temperature ranged from 12.62 to 15.94 degrees Celsius; specific conductance ranged from 93 to 352 μ mhos/cm; and pH ranged from 7.72 to 8.66. See appendix II for a chemical summary table.

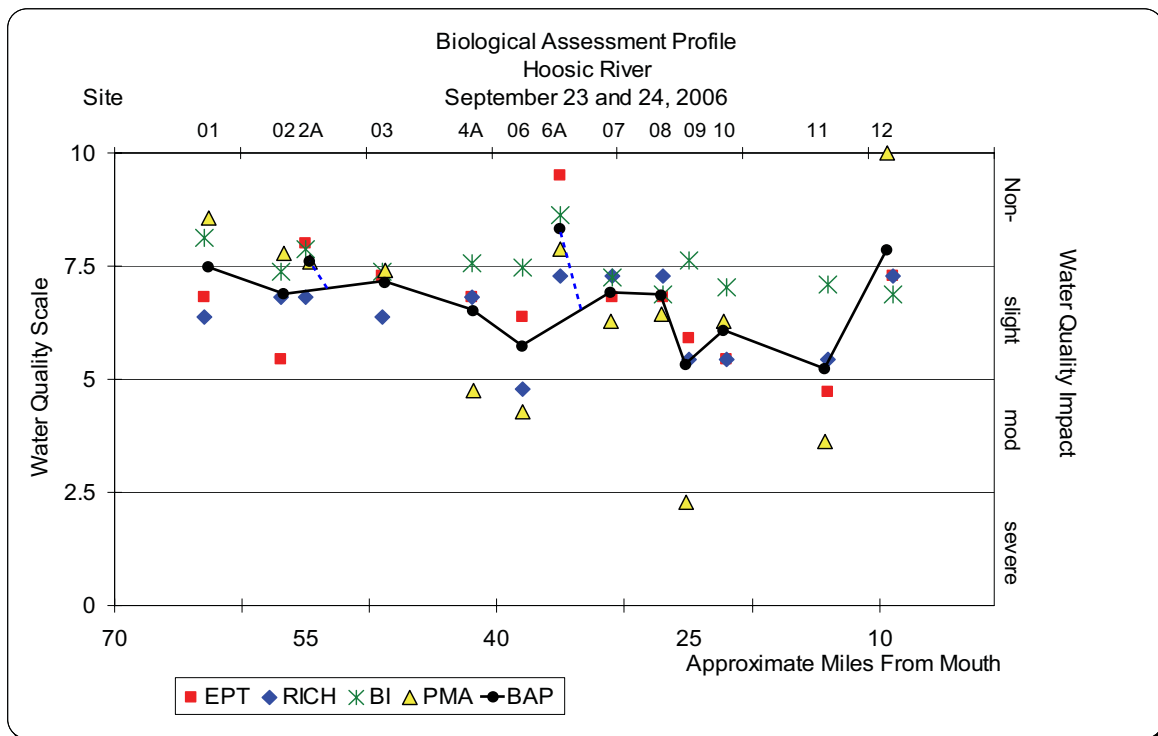


Figure I. The biological assessment profile comprises four contributory indices that are determined from sub-samples of macroinvertebrates collected from each station. The solid line connects the BAP score between each station on the Hoosic River. The dashed lines indicate the tributaries that were assessed and their approximate locations where they enter the Hoosic River.

Discussion

Based on the benthic macro-invertebrate community, the water quality of the Hoosic River is slightly impacted and shows a steady decline in water quality from the most upstream station (01) to station 06. Station 2A (the North branch) contributes non-impacted water to the Hoosic River, which is perceptible in the subsequent rise of the BAP score at station 03. Impact Source Determination (ISD) indicates water quality is most consistent with one, or a combination of, the following: a natural community structure (stations 01, 02, 03, 6A), one affected by nutrients (2A, 03, 4A, 06), one affected by siltation (06). See figure I.

Water quality results at stations 01, 02, 03, and 04 are similar to those of the NY DEC 1985 report, but there has been a marked improvement in water quality at stations 4A and 06. An \$8.4 million clean-up at the Pownal Tannery, a designated Superfund site, was completed in 2004, and the Town of Pownal wastewater treatment plant was completed in 2006, which diminished the use of local, aging septic systems. It is possible that these actions effected positive change at sites 4A and 06. See figures I and II.

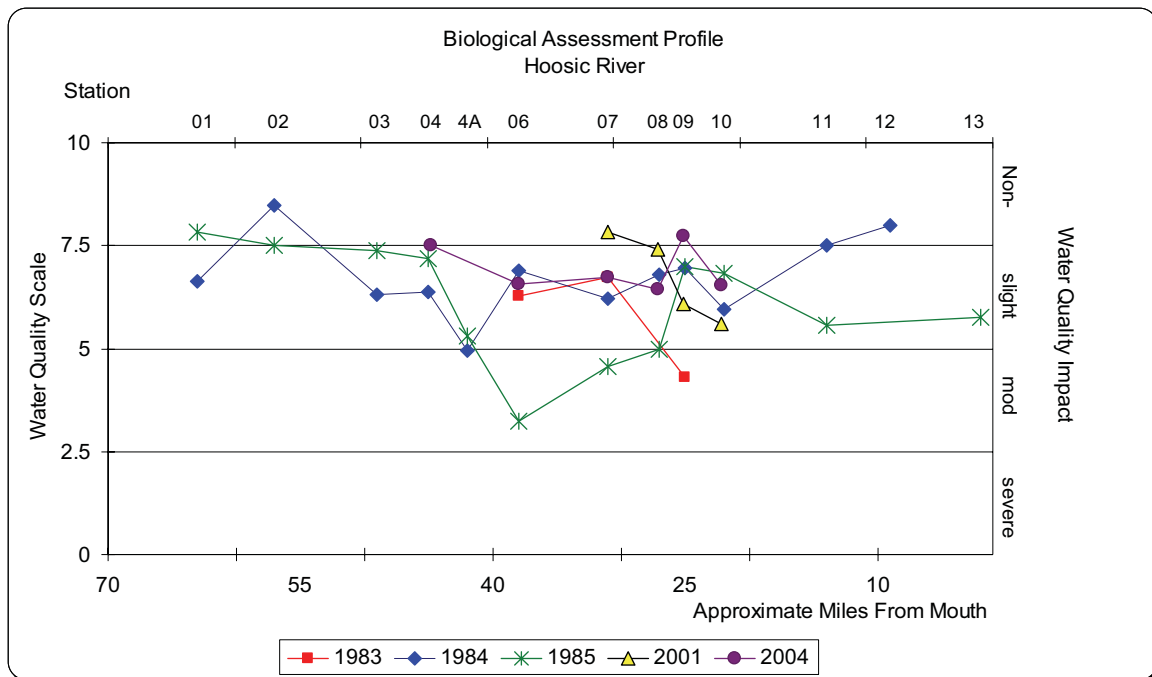


Figure II. Depicts the biological assessment profile scores for stations on the main stem of the Hoosic River for years 1983, 84, 85, 2001 and 2004 assessed by NYS DEC.

Stations 01, 02, 03, 4A and 06 demonstrate slightly impacted water quality. According to the NYS DEC, slightly impacted water is usually not limiting to fish survival, but may be limiting to fish propagation.

At station 07 there is a noticeable improvement in the BAP score compared to station 06, although the water quality remains slightly impacted. The improved water quality at station 07 is likely a result of the non-impacted water (station 6A) from the Little Hoosic River that enters the Hoosic River between these stations. The little Hoosic River at

station 6A has consistently been assessed as non-impacted in prior surveys. Simpson and Bode (1985) state that the Little Hoosic provides a “model ceiling or background fauna that the Hoosic River could achieve if pollutional stress were absent”.

Continuing down the river, the BAP score at station 08 is similar to that of station 07, but the ISD at station 08 suggests a community structure affected by multiple stressors, including toxins (see figure I and table IV). Station 08 is located approximately 0.2 miles below the Oak Mitsui plant in Hoosic Falls, NY.

Although station 09 remains slightly impacted, a dramatic decline in water quality is evident here compared to the upstream stations 07 and 08.

A similar decline was documented by the NYS DEC after copper sulfate spills from the Oak Mitsui industrial plant in 1983 and 2001 (Bode et al, 2001). The 2001 spill released several thousand gallons of copper sulfate and affected more than 10 miles of the river, killing thousands of fish. The released copper reportedly flushed through the system quickly, and in accordance with DEC policy, the area was not restocked with fish, but allowed to undergo natural recovery. Oak Mitsui eventually paid the state \$190,000 for natural resource damages.

A follow up NYS DEC survey was conducted in December 2004, documenting a full recovery of water quality at station 09.

Currently, however, the benthic macro-invertebrate community changes at station 09 are similar to those reported by the NYS DEC in 1983 and 2001, with decreases in the abundance of Ephemeroptera and Chironomid (Mayfly and Midge) taxa when compared to the upstream station 07. ISD for station 09 is consistent with a macro-invertebrate community structure adversely affected by nutrients, toxins, organics, and complex industrial inputs.

Based on these results, the 2006 survey indicates that sometime after December, 2004 an episode occurred resulting in another significant impact on the benthic macro-invertebrate community in this portion of the river.

Oak Mitsui announced in 2005 that it had re-opened the Hoosick Falls manufacturing plant, which had been idle since 2001, as a copper research and development facility. It is unknown whether the company is currently discharging into the river.

The slight increase in the BAP score seen at station 10 may be related to the water from the Walloomsac River mitigating the effect of pollutants as it enters the Hoosic above station 10.

The subsequent decline in water quality at station 11 is most likely related to the impoundment located just above this station. ISD indicates the most likely stressors to the benthic macroinvertebrate community are nutrients, complex, and impoundment effects.

The water quality at station 12 dramatically increases and falls in the non-impacted category, a category not attained by any other station on the Hoosic's main stem. This same dramatic increase was observed by NYS DEC in its 1984 survey; the water quality improvement was attributed to the multiple impoundments occurring in this section of the Hoosic River. These impoundments appear to act as a sink trap, providing time for pollutants to settle out of the water column, thus improving its water quality (Simpson and Bode, 1985).

The results of this study and a letter of concern were provided to NYS DEC in December, 2006 (Appendix VII). No reply from the DEC on any intended action has been received at this time.

The Hoosic River Watershed Association, as part of its mission, plans to continue to assess the Hoosic River and its tributaries with specific plans to conduct follow-up assessments in and around Hoosic Falls, NY.

Citations:

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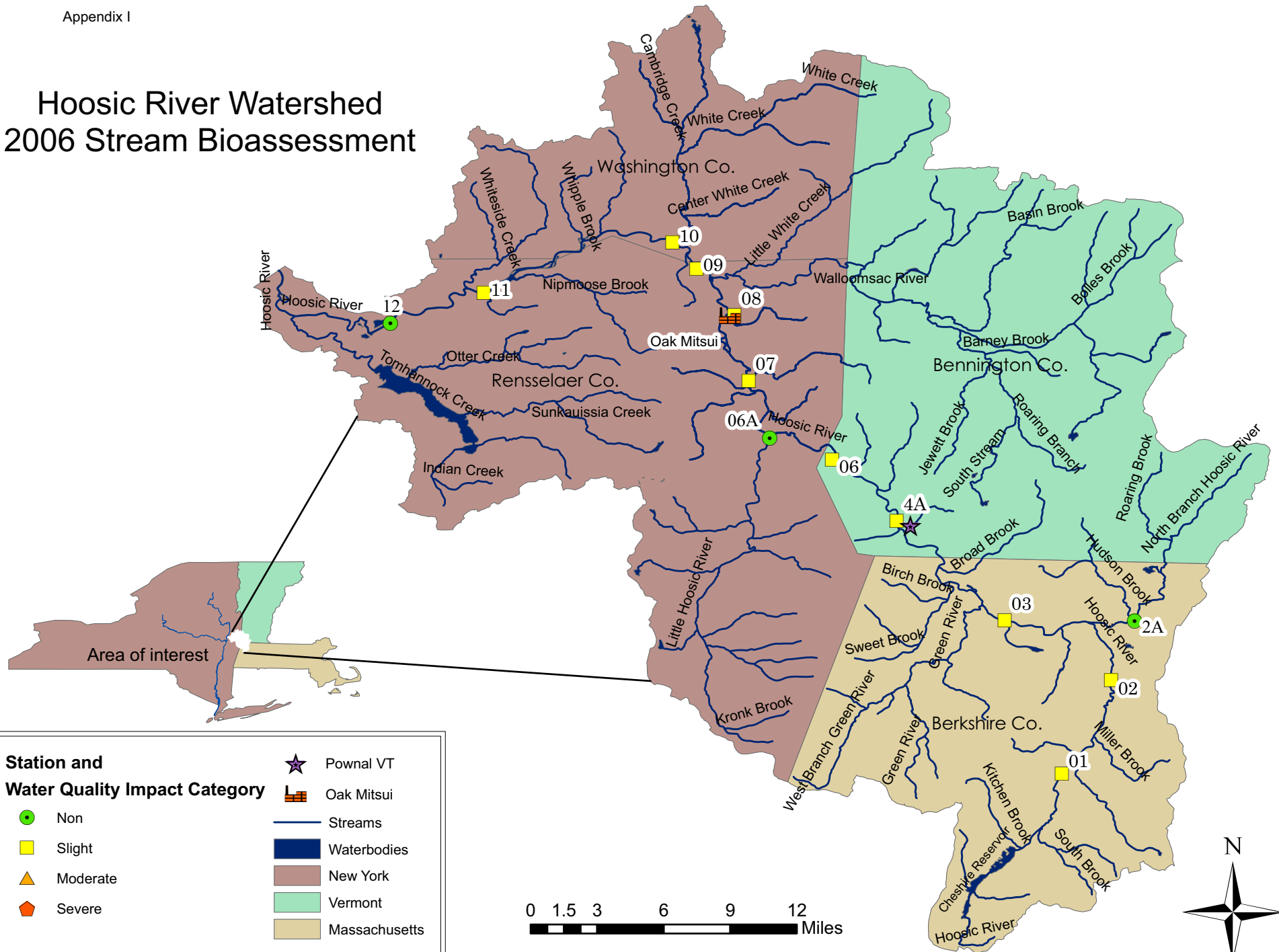
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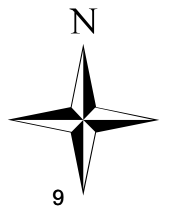
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Hoosic River Watershed 2006 Stream Bioassessment



Station and Water Quality Impact Category		★ Pownal VT
● Non	▤ Oak Mitsui	— Streams
■ Slight		■ Waterbodies
▲ Moderate		■ New York
◆ Severe		■ Vermont
		■ Massachusetts

0 1.5 3 6 9 12 Miles



Water Chemistry and Temperature

Hoosic River

<i>Station</i>	<i>Date</i>	<i>Time</i>	<i>Temp. (C)</i>	<i>SC (umhos)</i>	<i>DO (mg/L)</i>	<i>DO % Sat.</i>	<i>pH</i>	<i>Sal. (PSS)</i>
HOOS 01	9/23/2006	9:12 AM	14.19	234	9.45	94.8	8	0.11
HOOS 02	9/23/2006	10:36 AM	14.39	352	9.42	93.3	8.02	0.17
HOOS 2A	9/23/2006	11:23 AM	12.62	93	10.02	97.1	7.86	0.05
HOOS 03	9/23/2006	12:16 PM	13.78	301	10.03	99.3	8.15	0.14
HOOS 4A	9/23/2006	1:55 PM	14.33	279	11.45	115.5	8.66	0.13
HOOS 06	9/23/2006	3:01 PM	14.75	282	11.08	111.6	8.26	0.13
HOOS 07	9/24/2006	8:34 AM	15.33	269	10.25	105.3	8.07	0.13
HOOS 08	9/24/2006	9:48 AM	15.56	272	10.56	112	7.9	0.13
HOOS 09	9/24/2006	10:42 AM	15.6	261	10.3	108.3	8.1	0.12
HOOS 10	9/24/2006	11:45 AM	15.94	265	10.95	113.3	8.16	0.13
HOOS 11	9/24/2006	12:17 PM	15.77	255	8.95	92	7.72	0.12
HOOS 12	9/24/2006	1:40 PM	16.6	254	8.9	92.8	8	0.12

Little Hoosic River

<i>Station</i>	<i>Date</i>	<i>Time</i>	<i>Temp. (C)</i>	<i>SC (umhos)</i>	<i>DO (mg/L)</i>	<i>DO % Sat.</i>	<i>pH</i>	<i>Sal. (PSS)</i>
LHOO 06A	9/23/2006	3:43 PM	14.7	150	10.33	104.2	7.93	0.07

Table IV. Hoosic River 2006 Impact Source Determination (ISD), Biological Assessment Profile (BAP), and Nutrient Biotic Index for Phosphorus and Nitrogen (NBI-P and NBI-N) score results.

Hoosic River	9/23/2006	9/23/2006	9/23/2006	9/23/2006	9/23/2006	9/23/2006	9/23/2006
Station	01	02	2A	03	4A	06	6A
ISD							
NATURAL	64	48	51	55	48	50	61
NUTRIENTS	50	34	57	58	66	52	54
TOXIC	41	24	46	48	50	36	38
ORGANIC	38	28	34	51	57	30	41
COMPLEX	33	19	46	51	53	27	42
SILTATION	46	28	38	57	50	41	43
IMPOUNDMENT	37	21	43	52	52	40	44
BAP	7.47	6.86	7.58	7.11	6.49	5.72	8.32
GR	19	20	20	19	20	16	21
EPT	9	6	11	10	9	8	14
BI	3.88	4.59	4.11	4.59	4.44	4.52	3.37
PMA	75	67	65	64	48	45	68
NBI-P	5.15	6.50	5.45	5.89	5.94	6.71	5.17
NBI-N	4.88	6.66	4.56	4.98	5.65	6.70	4.44

Hoosic River	9/24/2006	9/24/2006	9/24/2006	9/24/2006	9/24/2006	9/24/2006
Station	07	08	09	10	11	12
ISD						
NATURAL	47	53	49	53	34	50
NUTRIENTS	66	58	60	46	61	44
TOXIC	47	54	57	39	44	42
ORGANIC	53	49	60	40	55	32
COMPLEX	57	39	55	34	60	36
SILTATION	60	53	54	43	41	33
IMPOUNDMENT	55	50	53	40	59	35
BAP	6.91	6.86	5.32	6.06	5.22	7.86
GR	21	21	17	17	17	21
EPT	9	9	7	6	5	10
BI	4.71	5	4.37	4.87	4.48	4.99
PMA	57	58	36	57	41	80
NBI-P	5.57	6.22	6.21	6.08	6.22	5.91
NBI-N	5.28	6.00	5.87	3.99	5.40	4.56

Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just off of Rt. 8**Station: **01**Municipality: **Adams****Berkshire Co., MA**Date sampled: **23-Sep-06**Arrival time at station: **9:12 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright**

Width (meters)	11.9
Depth (meters)	0.16
Current (cm/sec)	60
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)	20
Silt (0.004 - 0.06 cm)	5
Embeddedness (%)	25

Chemical Measurements

Temperature (C)	14.19
Specific conductance (umhos)	234
DO (mg/l)	9.45
DO % saturation	94.8
Baro pressure (mm)	738
pH	8
Salinity (PSS)	0.11

Biological Attributes

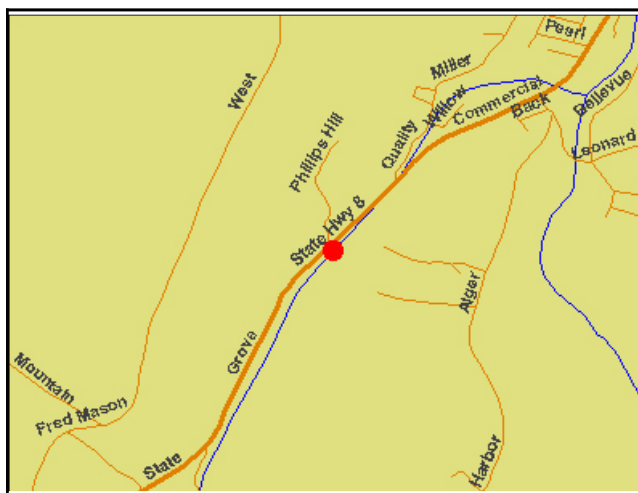
Canopy (%)	45
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	Y
Macrophytes	

Occurance of macroinvertebrates

Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	Y
Megaloptera	Y
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	

Faunal condition**Very good**

Notes/observations:



Scale: 1.6 kilometers

Latitude: 42° 36.217

Longitude: 73° 08.167

NAD83

Deg. Min.



STREAM SITE: Hoosic River 01
 LOCATION: Just off route 8
 DATE: 23 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

NEMERTEA

Prostoma graecense 2
 Undetermined Oligochaeta 3

ARTHROPODA

INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	8
	Baetidae	Acentrella sp.	15
		Baetis sp.	6
	Heptageniidae	Stenonema sp.	17
	Ephemerellidae	Ephemerella sp.	4
PLECOPTERA	Perlidae	Paragnetina sp.	2
COLEOPTERA	Psephenidae	Psephenus herricki	3
	Elmidae	Optioservus sp.	8
		Promoresia sp.	1
MEGALOPTERA	Corydalidae	Nigronia serricornis	2
TRICHOPTERA	Philopotamidae	Chimarra sp.	4
	Hydropsychidae	Hydropsyche sp.	18
	Rhyacophilidae	Rhyacophila sp.	1
DIPTERA	Chironomidae	Brillia sp.	1
		Cricotopus sp.	1
		Eukiefferiella sp.	2
		Rheotanytarsus sp.	2

ISD

NATURAL 64
 NUTRIENTS 50
 TOXIC 41
 ORGANIC 38
 COMPLEX 33
 SILTATION 46
 IMPOUNDMENT 37

BAP

7.47

GR

19

EPT

9

BI

3.88

PMA

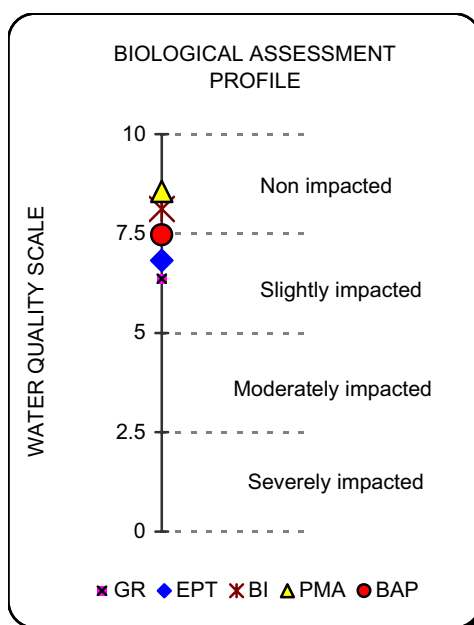
75

NBI-P

5.15

NBI-N

4.88



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just below Rt. 8A bridge**Station: **02**Municipality: **North Adams** **Berkshire Co., MA**Date sampled: **23-Sep-06**Arrival time at station: **10:36 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,**Physical Characteristics **Tim Wright**

Width (meters)	8.8
Depth (meters)	0.25
Current (cm/sec)	36
Substrate (%)	
Rock (>25.4 cm or bedrock)	
Rubble (6.35 - 25.4 cm)	20
Gravel (0.2 - 6.35 cm)	45
Sand (0.06 - 2.0 cm)	20
Silt (0.004 - 0.06 cm)	15
Embeddedness (%)	25

Chemical Measurements

Temperature (C)	14.39
Specific conductance (umhos)	352
DO (mg/l)	9.42
DO % saturation	93.3
Baro pressure (mm)	743
pH	8.02
Salinity (PSS)	0.17

Biological Attributes

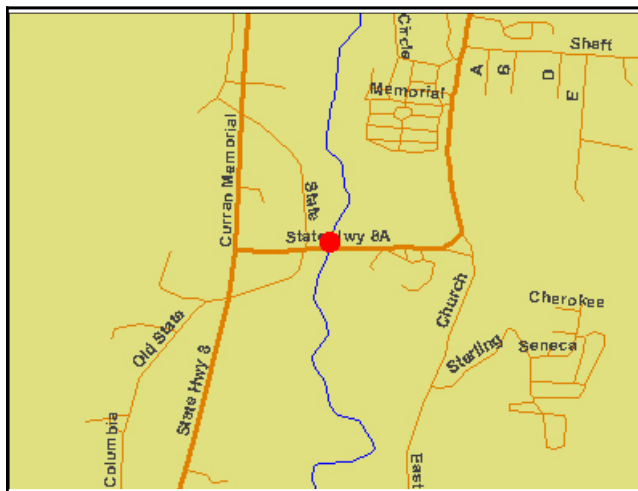
Canopy (%)	45
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	Y
Macrophytes	

Occurance of macroinvertebrates

Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	Y
Megaloptera	
Odonata	Y
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	Diptera

Faunal condition**Very good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 39.900

Longitude: 73° 06.233

NAD83

Deg. Min.



STREAM SITE: Hoosic River 02
 LOCATION: Just below Rt. 8A bridge
 DATE: Sept. 23, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

NEMERTEA

EPT RICHNESS: Prostoma graecense 4
 ARTHROPODA Undetermined Oligochaeta 4

INSECTA

EPHEMEROPTERA	Baetidae	Acentrella sp.	3
DESCRIPTION:		Baetis sp.	10
	Ephemerellidae	Ephemerella sp.	5
COLEOPTERA	Psephenidae	Psephenus herricki	1
	Elmidae	Optioservus sp.	40
TRICHOPTERA	Hydropsychidae	Hydropsyche sp.	5
	Glossosomatidae	Glossosoma sp.	1
	Goeridae	Goera sp.	1
DIPTERA	Tipulidae	Dicranota sp.	1
		Hexatoma sp.	1
	Athericidae	Atherix sp.	4
	Empididae	Hemerodromia sp.	2
	Chironomidae	Diamesa sp.	8
		Cricotopus sp.	1
		Parametriochnemus sp.	2
		Tvetenia sp.	1
		Microtendipes pedellus gr.	3
		Rheotanytarsus sp.	3

ISD

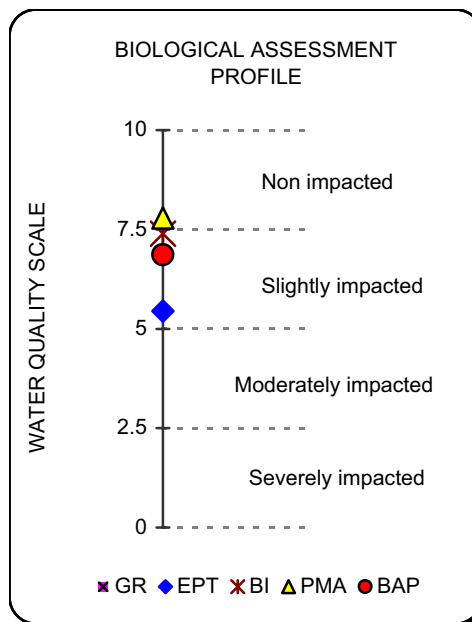
NATURAL	48
NUTRIENTS	34
TOXIC	24
ORGANIC	28
COMPLEX	19
SILTATION	28
IMPOUNDMENT	21

BAP 6.86

GR	20
EPT	6
BI	4.59
PMA	67

NBI-P	6.50
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NBI-N	6.66
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Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just off Beaver St.**Station: **2A**Municipality: **North Adams** **Berkshire Co., MA**Date sampled: **23-Sep-06**Arrival time at station: **11:23 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,**Physical Characteristics **Tim Wright**

Width (meters)	11.9
Depth (meters)	0.3
Current (cm/sec)	80
Substrate (%)	
Rock (>25.4 cm or bedrock)	35
Rubble (6.35 - 25.4 cm)	30
Gravel (0.2 - 6.35 cm)	20
Sand (0.06 - 2.0 cm)	10
Silt (0.004 - 0.06 cm)	5
Embeddedness (%)	25

Chemical Measurements

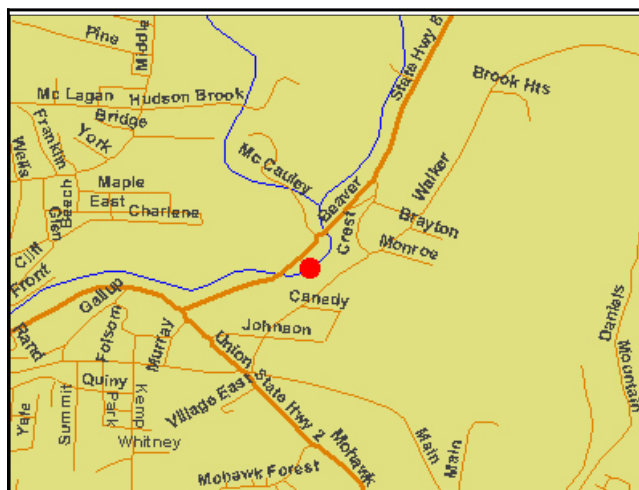
Temperature (C)	12.62
Specific conductance (umhos)	93
DO (mg/l)	10.02
DO % saturation	97.1
Baro pressure (mm)	739
pH	7.86
Salinity (PSS)	0.05

Biological Attributes

Canopy (%)	25
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	
Megaloptera	Y
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	

Faunal condition**Very good**

Notes/observations:



Scale: 1.6 kilometers

Latitude: 42° 42.217

Longitude: 73° 05.317

NAD83

Deg. Min.



STREAM SITE: Hoosic River 02A
 LOCATION: Just off Beaver St.
 DATE: 23 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ANNELIDA
 OLIGOCHAETA

Undetermined Oligochaeta 1

ARTHROPODA
 INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	1
	Baetidae	Acentrella sp.	3
		Baetis sp.	12
	Heptageniidae	Stenonema sp.	2
	Leptophlebiidae	Undetermined Leptophlebiidae	4
	Ephemerellidae	Ephemerella sp.	3
PLECOPTERA	Perlidae	Agnetina sp.	3
COLEOPTERA	Psephenidae	Psephenus herricki	1
	Elmidae	Optioservus sp.	4
TRICHOPTERA	Philopotamidae	Dolophilodes sp.	7
	Hydropsychidae	Cheumatopsyche sp.	8
		Hydropsyche sp.	29
	Hydroptilidae	Leucotrichia sp.	1
DIPTERA	Empididae	Undetermined Empididae	1
	Chironomidae	Diamesa sp.	1
		Cardiocladius obscurus	2
		Cricotopus sp.	1
		Tvetenia sp.	12
		Polypedilum aviceps	4

ISD

NATURAL 51
 NUTRIENTS **57**
 TOXIC 46
 ORGANIC 34
 COMPLEX 46
 SILTATION 38
 IMPOUNDMENT 43

BAP

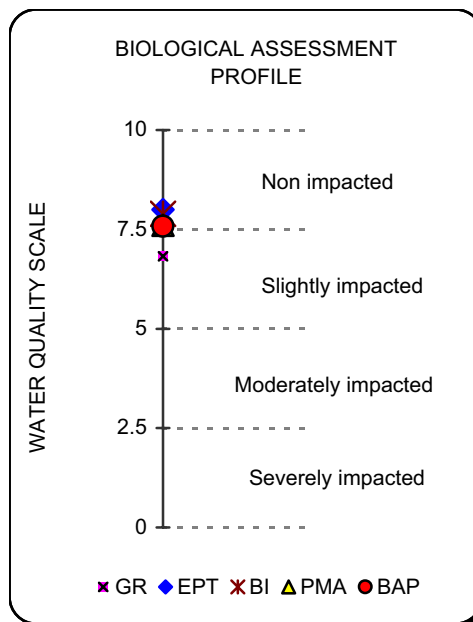
GR 20
 EPT 11
 BI 4.11
 PMA 65

NBI-P

5.45

NBI-N

4.56



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just below the end of Galvin Rd.**Station: **03**Municipality: **North Adams** **Berkshire Co., MA**Date sampled: **23-Sep-06**Arrival time at station: **12:16 PM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,**Physical Characteristics **Tim Wright**

Width (meters)	22
Depth (meters)	0.4
Current (cm/sec)	60
Substrate (%)	
Rock (>25.4 cm or bedrock)	20
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)	5
Embeddedness (%)	25

Chemical Measurements

Temperature (C)	13.78
Specific conductance (umhos)	301
DO (mg/l)	10.03
DO % saturation	99.3
Baro pressure (mm)	744
pH	8.15
Salinity (PSS)	0.14

Biological Attributes

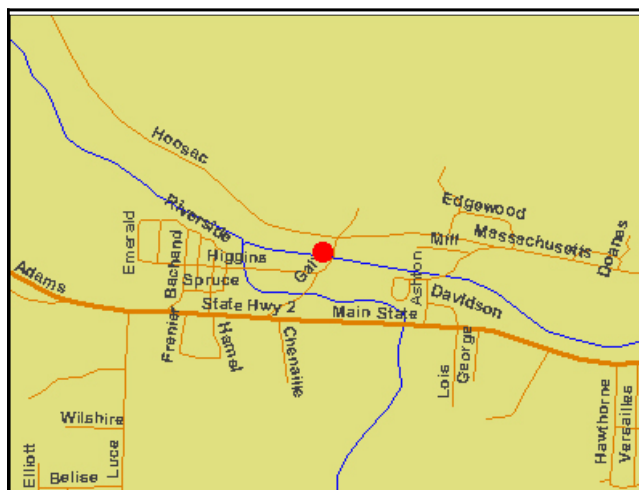
Canopy (%)	20
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	

Occurance of macroinvertebrates

Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	Diptera

Faunal condition**Very good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 42.233

Longitude: 73° 10.400

NAD83

Deg. Min.



STREAM SITE: Hoosic River 03
 LOCATION: Just below the end of Galvin Rd.
 DATE: 23 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ANNELIDA
 OLIGOCHAETA

Undetermined Oligochaeta 1

ARTHROPODA
 INSECTA

EPHEMEROPTERA	Baetidae	Acentrella sp.	1	
		Baetis sp.	10	
	Heptageniidae	Epeorus (Iron) sp.	1	
		Stenonema sp.	6	
		Ephemerellidae	Ephemerella sp.	1
		Psephenidae	Psephenus herricki	2
	Elmidae		Optioservus sp.	7
		TRICHOPTERA	Philopotamidae	Stenelmis sp.
	Chimarra sp.			2
	Hydropsychidae		Cheumatopsyche sp.	6
Hydropsyche sp.			25	
Rhyacophilidae			Rhyacophila sp.	1
DIPTERA	Hydroptilidae	Leucotrichia sp.	2	
	Athericidae	Atherix sp.	5	
	Chironomidae	Cardiocladius sp.	6	
		Cricotopus trifascia gr.	3	
		Cricotopus sp.	4	
		Eukiefferiella sp.	6	

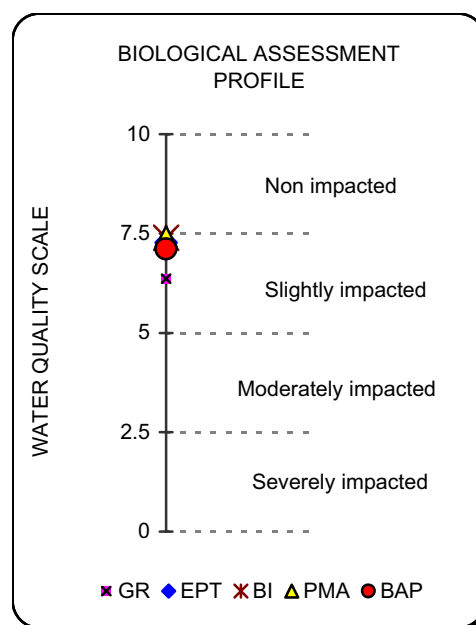
ISD

NATURAL	55
NUTRIENTS	58
TOXIC	48
ORGANIC	51
COMPLEX	51
SILTATION	57
IMPOUNDMENT	52

BAP

GR	19
EPT	10
BI	4.59
PMA	64

NBI-P	5.89
NBI-N	4.98



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just below Main St. bridge**Station: **4A**Municipality: **Pownal**

Bennington Co., VT

Date sampled: **23-Sep-06**Arrival time at station: **1:55 PM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,**Physical Characteristics **Tim Wright**Width (meters) **20**Depth (meters) **0.3**Current (cm/sec) **45**

Substrate (%)

Rock (>25.4 cm or bedrock) **5**Rubble (6.35 - 25.4 cm) **35**Gravel (0.2 - 6.35 cm) **40**Sand (0.06 - 2.0 cm) **15**Silt (0.004 - 0.06 cm) **5**Embeddedness (%) **30**Chemical MeasurementsTemperature (C) **14.33**Specific conductance (umhos) **279**DO (mg/l) **11.45**DO % saturation **115.5**Baro pressure (mm) **746**pH **8.66**Salinity (PSS) **0.13**Biological AttributesCanopy (%) **15**

Aquatic vegetation

Algae suspended

Algae filamentous **Y**Diatoms **Y**

Macrophytes

Occurance of macroinvertebrates

Ephemeroptera **Y**Plecoptera **Y**Trichoptera **Y**Coleoptera **Y**Megaloptera **Y**

Odonata

Chironomidae

Simuliidae

Decapoda

Gammaridae

Mollusca

Oligochaeta

Other macroinvertebrates **Diptera****Faunal condition** **Very good**

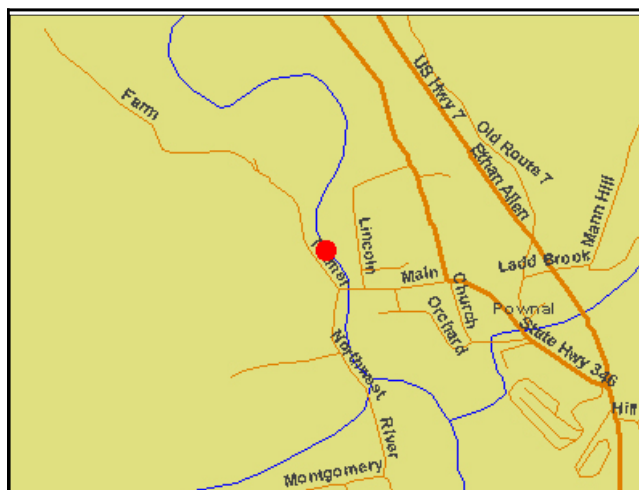
Notes/observations:



Flow



Flow



Scale: 1.6 kilometers

Latitude: 42° 46.135

Longitude: 73° 14.631

NAD83

Deg. Min.



STREAM SITE: Hoosic River 04A
 LOCATION: Just below Main St. bridge
 DATE: Sept. 23, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ARTHROPODA INSECTA

EPHEMEROPTERA	Baetidae	Acentrella sp.	1
		Baetis sp.	3
	Heptageniidae	Stenonema sp.	1
	Ephemerellidae	Ephemerella sp.	6
	Caenidae	Caenis sp.	3
PLECOPTERA	Perlidae	Agnetina sp.	1
COLEOPTERA	Psephenidae	Psephenus herricki	3
	Elmidae	Optioservus sp.	12
		Stenelmis sp.	13
MEGALOPTERA	Corydalidae	Corydalis cornutus	1
		Nigronia serricornis	1
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	22
		Hydropsyche sp.	21
		Hydroptilidae	1
DIPTERA	Athericidae	Atherix sp.	1
	Chironomidae	Cardiocladius sp.	4
		Cricotopus sp.	1
		Eukiefferiella sp.	1
		Orthocladius sp.	1
		Undetermined Chironomini	3

ISD

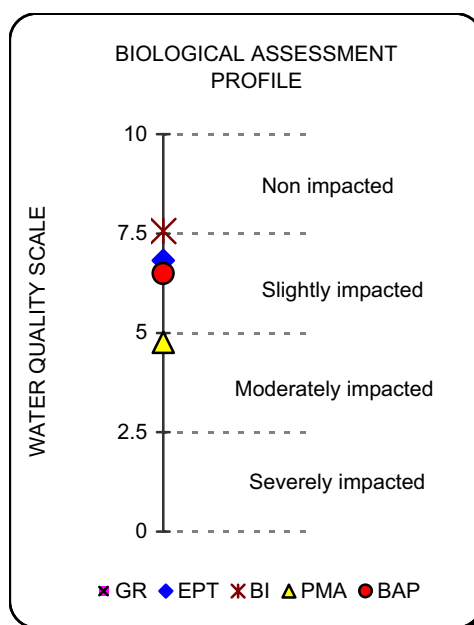
NATURAL	48
NUTRIENTS	66
TOXIC	50
ORGANIC	57
COMPLEX	53
SILTATION	50
IMPOUNDMENT	52

BAP

GR	20
EPT	9
BI	4.44
PMA	48

NBI-P 5.94

NBI-N 5.65



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just above Rt. 346 bridge**Station: **06**Municipality: **Pownal**

Bennington Co., VT

Date sampled: **23-Sep-06**Arrival time at station: **3:01 PM**Field personnel involved: **J. Kelly Nolan, Tim Wright**Physical Characteristics

Width (meters)	30
Depth (meters)	0.45
Current (cm/sec)	60
Substrate (%)	
Rock (>25.4 cm or bedrock)	20
Rubble (6.35 - 25.4 cm)	35
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)	14.75
Specific conductance (umhos)	282
DO (mg/l)	11.08
DO % saturation	111.6
Baro pressure (mm)	747
pH	8.26
Salinity (PSS)	0.13

Biological Attributes

Canopy (%)	10
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	

Occurance of macroinvertebrates

Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	Diptera

Faunal condition**Very good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 48.530

Longitude: 73° 17.153

NAD83

Deg. Min.



STREAM SITE: Hoosic River 06
 LOCATION: Just above Route 346 bridge
 DATE: 24 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ARTHROPODA
INSECTA

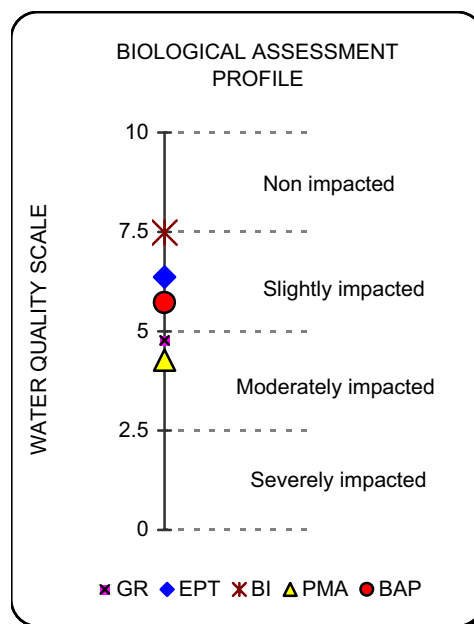
EPHEMEROPTERA	Baetidae	Acentrella sp.	1
		Baetis sp.	3
		Caenis sp.	4
PLECOPTERA	Perlidae	Undetermined Perlidae	1
	Pteronarcidae	Pteronarcys sp.	1
COLEOPTERA	Elmidae	Optioservus sp.	40
		Stenelmis sp.	18
		Cheumatopsyche sp.	3
TRICHOPTERA	Hydropsychidae	Hydropsyche sp.	12
		Leucotrichia sp.	2
DIPTERA	Hydroptilidae	Atherix sp.	2
	Athericidae	Undetermined Empididae	1
	Empididae	Diamesa sp.	4
	Chironomidae	Cardiocladius obscurus	4
		Cricotopus trifascia gr.	3
		Eukiefferiella sp.	1

ISD

NATURAL	50
NUTRIENTS	52
TOXIC	36
ORGANIC	30
COMPLEX	27
SILTATION	41
IMPOUNDMENT	40

BAP	5.72
GR	16
EPT	8
BI	4.52
PMA	45

NBI-P	6.71
NBI-N	6.70



Field Data Summary

Stream name: **Little Hoosic River**Watershed: **Hoosic**ID: **LHOO**Location: **Just below Rt. 346 bridge**Station: **06A**Municipality: **North Petersburg Rensselaer Co., NY**Date sampled: **23-Sep-06**Arrival time at station: **3:43 PM**Field personnel involved: **J. Kelly Nolan, Tim Wright**Physical Characteristics

Width (meters)	12.3
Depth (meters)	0.3
Current (cm/sec)	86
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)	14.7
Specific conductance (umhos)	150
DO (mg/l)	10.33
DO % saturation	104.2
Baro pressure (mm)	747
pH	7.93
Salinity (PSS)	0.07

Biological Attributes

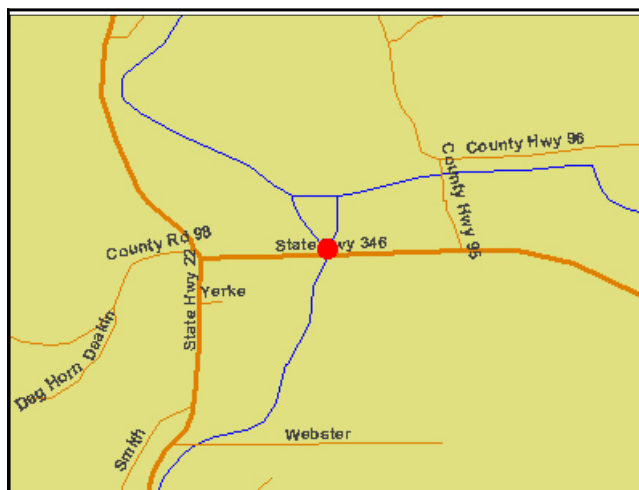
Canopy (%)	45
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	Y
Macrophytes	

Occurance of macroinvertebrates

Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	Y
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	Y
Other macroinvertebrates	Diptera

Faunal condition**Very good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 49.390

Longitude: 73° 19.594

NAD83

Deg. Min.



STREAM SITE: Little Hoosic River 06A
 LOCATION: Just below Route 346 bridge
 DATE: Sept. 23, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ANNELIDA
 OLIGOCHAETA

Undetermined Oligochaeta 2

ARTHROPODA
 INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	6
	Baetidae	Acentrella sp.	8
		Baetis sp.	5
	Heptageniidae	Stenonema sp.	12
	Ephemerellidae	Ephemerella sp.	6
PLECOPTERA	Perlidae	Agnetina sp.	1
		Paragnetina sp.	1
	Perlodidae	Isogenoides sp.	6
COLEOPTERA	Elmidae	Optioservus sp.	5
		Stenelmis sp.	1
TRICHOPTERA	Philopotamidae	Chimarra sp.	1
	Hydropsychidae	Cheumatopsyche sp.	9
		Hydropsyche sp.	19
DIPTERA	Glossosomatidae	Glossosoma sp.	5
	Brachycentridae	Brachycentrus sp.	4
	Limnephilidae	Undetermined Limnephilidae	1
	Tipulidae	Hexatoma sp.	1
	Simuliidae	Simulium sp.	1
	Chironomidae	Cricotopus sp.	3
		Tvetenia sp.	3

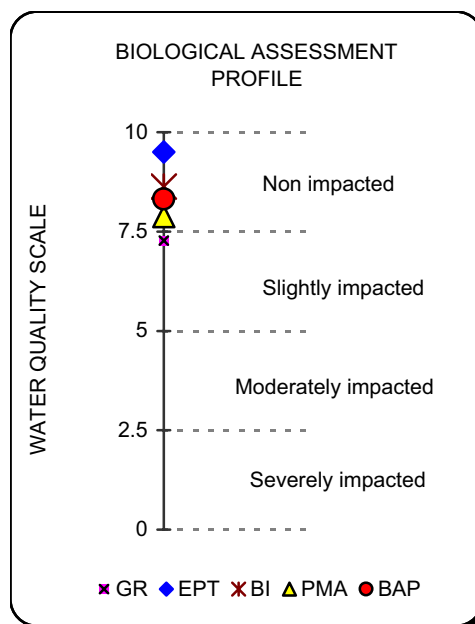
ISD

NATURAL	61
NUTRIENTS	54
TOXIC	38
ORGANIC	41
COMPLEX	42
SILTATION	43
IMPOUNDMENT	44

BAP

GR	21
EPT	14
BI	3.37
PMA	68

NBI-P	5.17
NBI-N	4.44



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **400 meters below Rt. 7 bridge**Station: **07**Municipality: **Hoosick Falls** **Rensselaer Co., NY**Date sampled: **24-Sep-06**Arrival time at station: **8:34 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	30
Depth (meters)	0.2
Current (cm/sec)	110
Substrate (%)	
Rock (>25.4 cm or bedrock)	10
Rubble (6.35 - 25.4 cm)	55
Gravel (0.2 - 6.35 cm)	20
Sand (0.06 - 2.0 cm)	10
Silt (0.004 - 0.06 cm)	5
Embeddedness (%)	40

Chemical Measurements

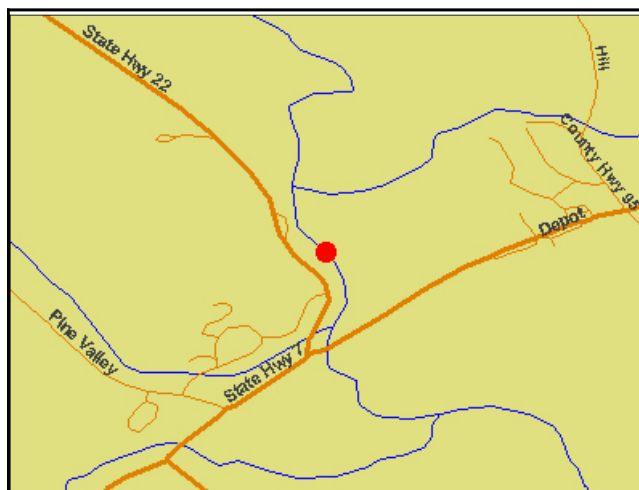
Temperature (C)	15.33
Specific conductance (umhos)	269
DO (mg/l)	10.25
DO % saturation	105.3
Baro pressure (mm)	741
pH	8.07
Salinity (PSS)	0.13

Biological Attributes

Canopy (%)	10
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	
Megaloptera	Y
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	

Faunal condition**Very good**

Notes/observations:

Flow
↓↑
Flow

Scale: 1.6 kilometers

Latitude: 42° 51.626

Longitude: 73° 20.421

NAD83

Deg. Min.



STREAM SITE: Hoosic River 07
 LOCATION: Aprox. 400 meters below Route 7 bridge
 DATE: Sept., 24, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

NEMERTEA

		Prostoma graecense	1
	Ancylidae	Ferrissia sp.	1

ARTHROPODA

INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	1
	Baetidae	Acentrella sp.	1
		Baetis sp.	1
		Heterocloeon sp.	1
	Ephemerellidae	Ephemerella sp.	2
	Caenidae	Caenis sp.	13
COLEOPTERA	Elmidae	Optioservus sp.	14
		Stenelmis sp.	8
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	16
		Hydropsyche sp.	24
	Hydroptilidae	Leucotrichia sp.	1
DIPTERA	Tipulidae	Antocha sp.	2
	Chironomidae	Cardiocladius obscurus	3
		Cricotopus sp.	3
		Orthocladius sp.	1
		Parametrioctenus sp.	1
		Tvetenia sp.	4
		Tanytarsus sp.	1
		Undetermined Chironomidae	1

ISD

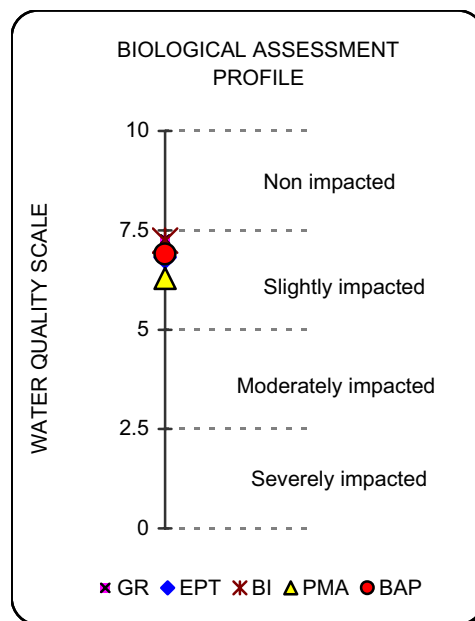
NATURAL	47
NUTRIENTS	66
TOXIC	47
ORGANIC	53
COMPLEX	57
SILTATION	60
IMPOUNDMENT	55

BAP

	6.91
GR	21
EPT	9
BI	4.71
PMA	57

NBI-P	5.57
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NBI-N	5.28
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Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Below Church St. bridge**Station: **08**Municipality: **Hoosick Falls** **Rensselaer Co., NY**Date sampled: **24-Sep-06**Arrival time at station: **9:48 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	30
Depth (meters)	0.13
Current (cm/sec)	50
Substrate (%)	
Rock (>25.4 cm or bedrock)	5
Rubble (6.35 - 25.4 cm)	30
Gravel (0.2 - 6.35 cm)	40
Sand (0.06 - 2.0 cm)	15
Silt (0.004 - 0.06 cm)	10
Embeddedness (%)	40

Chemical Measurements

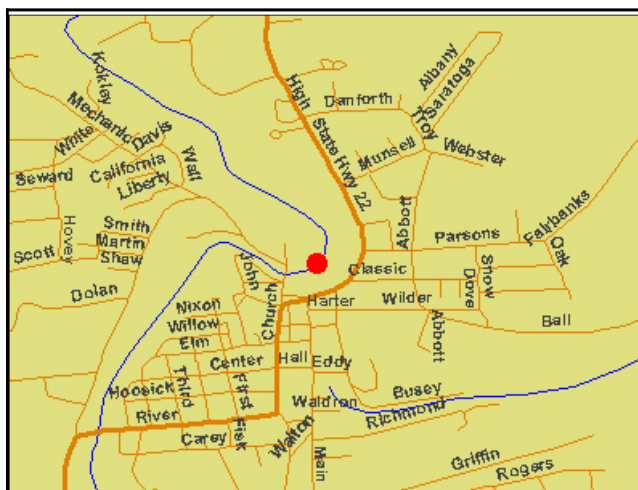
Temperature (C)	15.56
Specific conductance (umhos)	272
DO (mg/l)	10.56
DO % saturation	112
Baro pressure (mm)	744
pH	7.9
Salinity (PSS)	0.13

Biological Attributes

Canopy (%)	10
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	
Trichoptera	Y
Coleoptera	
Megaloptera	Y
Odonata	
Chironomidae	
Simuliidae	
Decapoda	Y
Gammaridae	
Mollusca	
Oligochaeta	Y
Other macroinvertebrates	

Faunal condition **Good**

Notes/observations:



Scale: 1.6 kilometers

Latitude: 42° 54.203

Longitude: 73° 20.979

NAD83

Deg. Min.



STREAM SITE: Hoosic River 08
 LOCATION: Below Church St., bridge
 DATE: 24 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

NEMERTEA

Prostoma graecense 2
 Undetermined Oligochaeta 2

ARTHROPODA

INSECTA

EPHEMEROPTERA	Baetidae	Baetis sp.	6
	Heptageniidae	Stenonema sp.	1
	Ephemerellidae	Ephemerella sp.	2
	Caenidae	Caenis sp.	2
COLEOPTERA	Elmidae	Optioservus sp.	8
		Stenelmis sp.	13
MEGALOPTERA	Corydalidae	Corydalis cornutus	2
TRICHOPTERA	Philopotamidae	Chimarra sp.	4
	Hydropsychidae	Cheumatopsyche sp.	9
		Hydropsyche sp.	10
	Hydroptilidae	Hydroptila sp.	1
	Helicopsychidae	Helicopsyche borealis	1
DIPTERA	Empididae	Undetermined Empididae	1
	Chironomidae	Potthastia longimana gr.	2
		Cardiocladius sp.	10
		Cricotopus trifascia gr.	18
		Cricotopus sp.	1
		Eukiefferiella sp.	3
		Tvetenia sp.	2

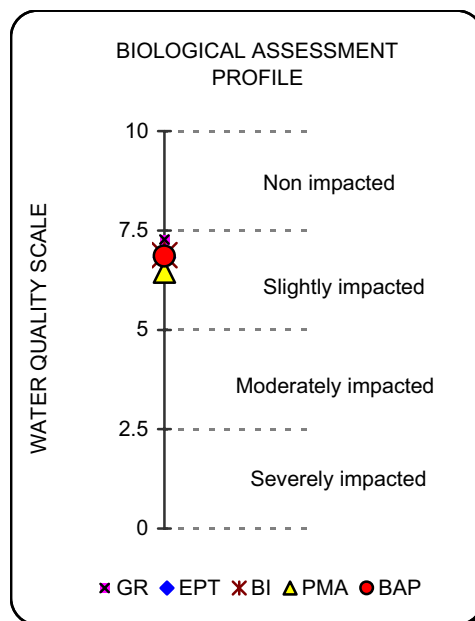
ISD

NATURAL 53
 NUTRIENTS 58
 TOXIC 54
 ORGANIC 49
 COMPLEX 39
 SILTATION 53
 IMPOUNDMENT 50

BAP

6.86
 GR 21
 EPT 9
 BI 5
 PMA 58

NBI-P 6.22
 NBI-N 6.00



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **End of Markers Rd.**Station: **09**Municipality: **Hoosick Falls** **Rensselaer Co., NY**Date sampled: **24-Sep-06**Arrival time at station: **10:42 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	40
Depth (meters)	0.4
Current (cm/sec)	100
Substrate (%)	
Rock (>25.4 cm or bedrock)	5
Rubble (6.35 - 25.4 cm)	45
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)	15.6
Specific conductance (umhos)	261
DO (mg/l)	10.3
DO % saturation	108.3
Baro pressure (mm)	743
pH	8.1
Salinity (PSS)	0.12

Biological Attributes

Canopy (%)	5
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	

Faunal condition**Very good**

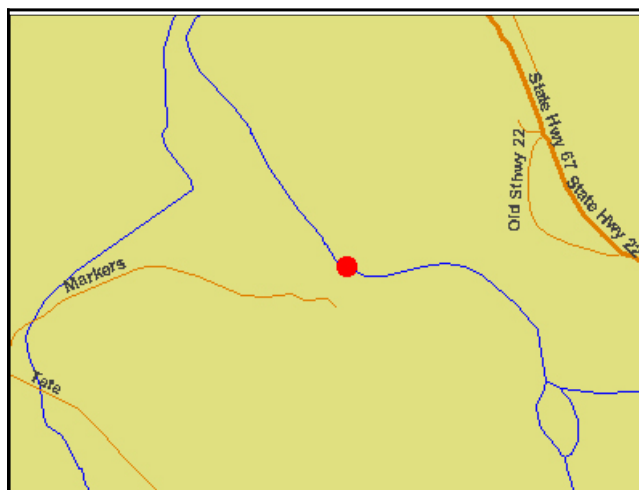
Notes/observations:



Flow



Flow



Scale: 1.6 kilometers

Latitude: 42° 56.014

Longitude: 73° 22.464

NAD83

Deg. Min.



STREAM SITE: Hoosic River 09
 LOCATION: At the end of Markers Rd.
 DATE: 24 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ANNELIDA
 OLIGOCHAETA

Undetermined Oligochaeta 1

ARTHROPODA

CRUSTACEA

DECAPODA

Cambaridae

Undetermined Cambaridae 1

INSECTA

EPHEMEROPTERA

Baetidae

Acentrella sp. 1

Baetis sp. 1

Ephemerellidae

Ephemerella sp. 2

Caenidae

Caenis sp. 1

COLEOPTERA

Psephenidae

Psephenus herricki 2

Elmidae

Optioservus sp. 17

Stenelmis sp. 20

TRICHOPTERA

Philopotamidae

Chimarra sp. 1

Hydropsychidae

Cheumatopsyche sp. 7

Hydropsyche sp. 37

DIPTERA

Tipulidae

Antocha sp. 2

Chironomidae

Diamesa sp. 4

Cardiocladius obscurus 1

Cricotopus trifascia gr. 1

Tvetenia sp. 1

ISD

NATURAL 49

NUTRIENTS 60

TOXIC 57

ORGANIC 60

COMPLEX 55

SILTATION 54

IMPOUNDMENT 53

BAP 5.32

GR 17

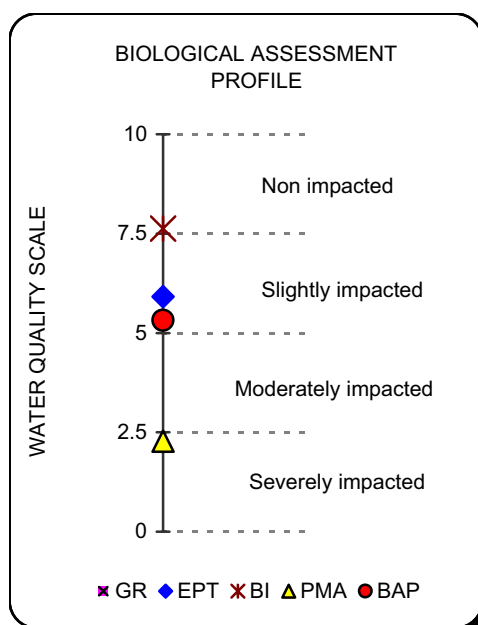
EPT 7

BI 4.37

PMA 36

NBI-P 6.21

NBI-N 5.87



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just above the RR bridge**Station: **10**Municipality: **Eagle Bridge** **Rensselaer Co., NY**Date sampled: **24-Sep-06**Arrival time at station: **11:45 AM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	40
Depth (meters)	0.64
Current (cm/sec)	100
Substrate (%)	
Rock (>25.4 cm or bedrock)	20
Rubble (6.35 - 25.4 cm)	40
Gravel (0.2 - 6.35 cm)	25
Sand (0.06 - 2.0 cm)	10
Silt (0.004 - 0.06 cm)	5
Embeddedness (%)	25

Chemical Measurements

Temperature (C)	15.94
Specific conductance (umhos)	265
DO (mg/l)	10.95
DO % saturation	113.3
Baro pressure (mm)	744
pH	8.16
Salinity (PSS)	0.13

Biological Attributes

Canopy (%)	5
Aquatic vegetation	
Algae suspended	
Algae filamentous	
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	Y
Trichoptera	Y
Coleoptera	Y
Megaloptera	Y
Odonata	
Chironomidae	
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	

Faunal condition**Very good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 57.060

Longitude: 73° 23.403

NAD83

Deg. Min.



STREAM SITE: Hoosic River 10
 LOCATION: Just above RR bridge
 DATE: Sept., 24, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

ANNELIDA
 OLIGOCHAETA

	Undetermined Oligochaeta	1
Ancylidae	Ferrissia sp.	1

ARTHROPODA
 INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	9
	Baetidae	Baetis sp.	13
	Heptageniidae	Stenonema sp.	7
LEPIDOPTERA	Pyrilidae	Petrophila sp.	1
COLEOPTERA	Psephenidae	Ectopria nervosa	1
	Elmidae	Optioservus sp.	4
		Promoresia sp.	2
		Stenelmis sp.	9
		Cheumatopsyche sp.	5
TRICHOPTERA	Hydropsychidae	Hydropsyche sp.	11
DIPTERA	Hydroptilidae	Leucotrichia sp.	31
	Simuliidae	Simulium sp.	1
	Chironomidae	Cardiocladius obscurus	1
		Cricotopus trifascia gr.	1
		Tvetenia sp.	2

ISD

NATURAL	53
NUTRIENTS	46
TOXIC	39
ORGANIC	40
COMPLEX	34
SILTATION	43
IMPOUNDMENT	40

BAP

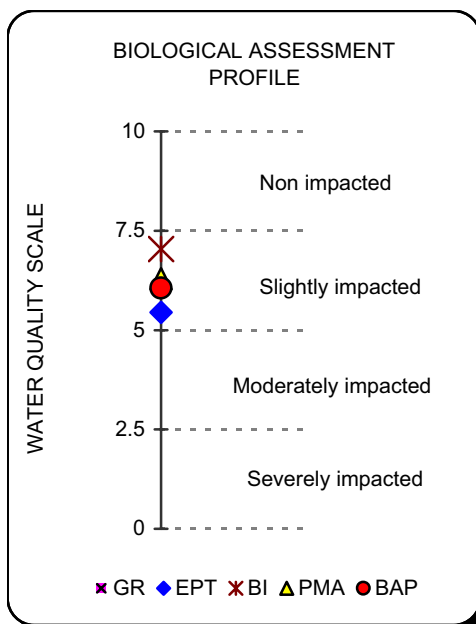
	6.06
GR	17
EPT	6
BI	4.87
PMA	57

NBI-P

6.08

NBI-N

3.99



Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just above Bridge St. bridge**Station: **11**Municipality: **Johnsonville**

Rensselaer Co., NY

Date sampled: **24-Sep-06**Arrival time at station: **12:17 PM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	50
Depth (meters)	0.4
Current (cm/sec)	100
Substrate (%)	
Rock (>25.4 cm or bedrock)	10
Rubble (6.35 - 25.4 cm)	40
Gravel (0.2 - 6.35 cm)	30
Sand (0.06 - 2.0 cm)	10
Silt (0.004 - 0.06 cm)	10
Embeddedness (%)	40

Chemical Measurements

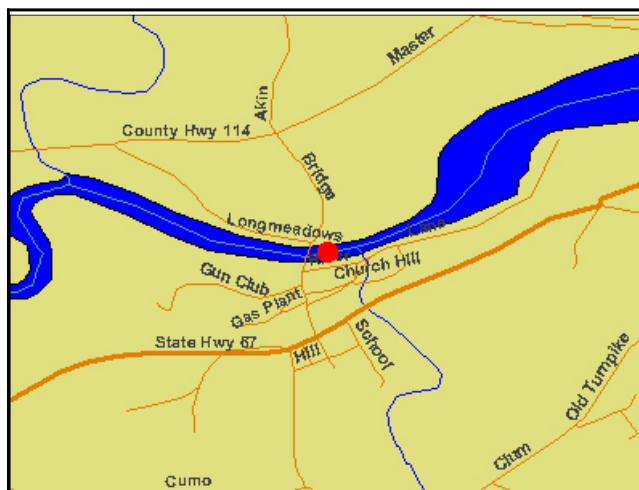
Temperature (C)	15.77
Specific conductance (umhos)	255
DO (mg/l)	8.95
DO % saturation	92
Baro pressure (mm)	746
pH	7.72
Salinity (PSS)	0.12

Biological Attributes

Canopy (%)	5
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	
Trichoptera	Y
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	
Simuliidae	
Decapoda	Y
Gammaridae	
Mollusca	
Oligochaeta	Y
Other macroinvertebrates	

Faunal condition **Good**

Notes/observations:

Flow
↓↑
Flow

Scale: 1.6 kilometers

Latitude: 42° 55.081

Longitude: 73° 30.783

NAD83 Deg. Min.



STREAM SITE: Hoosic River 11
 LOCATION: Just above Bridge St., bridge
 DATE: Sept., 24, 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

MOLLUSCA
GASTROPODA

Ancylidae	Ferrissia sp.	3
Sphaeriidae	Undetermined Sphaeriidae	6

ARTHROPODA

CRUSTACEA

ISOPODA	Asellidae	Caecidotea sp.	1
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INSECTA

EPHEMEROPTERA	Isonychiidae	Isonychia sp.	3
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Baetidae	Baetis sp.	5
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LEPIDOPTERA	Pyralidae	Petrophila sp.	1
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COLEOPTERA	Elmidae	Optioservus sp.	1
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		Stenelmis sp.	7
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MEGALOPTERA	Sialidae	Sialis sp.	1
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TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	36
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		Hydropsyche sp.	28
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	Hydroptilidae	Leucotrichia sp.	2
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DIPTERA	Simuliidae	Simulium sp.	1
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	Chironomidae	Thienemannimyia gr. spp.	1
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		Cardiocladius sp.	1
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		Orthocladius sp.	1
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		Polypedilum flavum	2
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ISD

NATURAL	34
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NUTRIENTS	61
-----------	----

TOXIC	44
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ORGANIC	55
---------	----

COMPLEX	60
---------	----

SILTATION	41
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IMPOUNDMENT	59
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BAP	5.22
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GR	17
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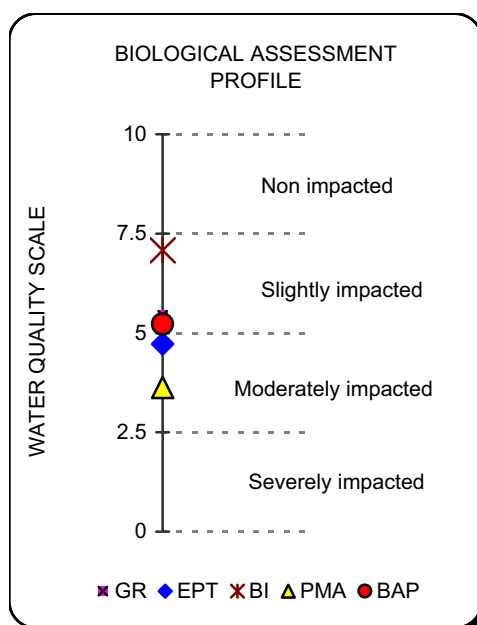
EPT	5
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BI	4.48
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PMA	41
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NBI-P	6.22
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NBI-N	5.40
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Field Data Summary

Stream name: **Hoosic River**Watershed: **Hoosic**ID: **HOOS**Location: **Just off S. River Rd.**Station: **12**Municipality: **Valley Falls**

Rensselaer Co., NY

Date sampled: **24-Sep-06**Arrival time at station: **1:40 PM**Field personnel involved: **J. Kelly Nolan, Ariel Heyman,****Physical Characteristics** **Tim Wright, Jarrad Wood**

Width (meters)	80
Depth (meters)	0.3
Current (cm/sec)	103
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 (%)	25

Chemical Measurements

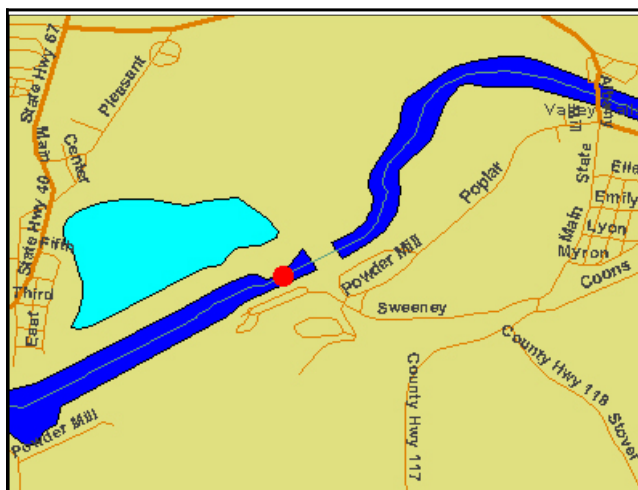
Temperature (C)	16.6
Specific conductance (umhos)	254
DO (mg/l)	8.9
DO % saturation	92.8
Baro pressure (mm)	745
pH	8
Salinity (PSS)	0.12

Biological Attributes

Canopy (%)	5
Aquatic vegetation	
Algae suspended	
Algae filamentous	Y
Diatoms	Y
Macrophytes	
Occurance of macroinvertebrates	
Ephemeroptera	Y
Plecoptera	
Trichoptera	Y
Coleoptera	
Megaloptera	
Odonata	
Chironomidae	Y
Simuliidae	
Decapoda	
Gammaridae	
Mollusca	
Oligochaeta	
Other macroinvertebrates	

Faunal condition**Good**

Notes/observations:

Flow
↓Flow
↑

Scale: 1.6 kilometers

Latitude: 42° 53.882

Longitude: 73° 34.436

NAD83

Deg. Min.



STREAM SITE: Hoosic River 12
 LOCATION: Just off South River Rd.
 DATE: 24 September 2006
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100

PLATYHELMINTHES
 TURBELLARIA

Planariidae	Undetermined Turbellaria	2
Physidae	Undetermined Physidae	4

ARTHROPODA
 INSECTA

EPHEMEROPTERA	Baetidae	Acentrella sp.	2	
		Baetis sp.	18	
		Heterocloeon sp.	10	
		Stenonema sp.	2	
LEPIDOPTERA	Heptageniidae	Petrophila sp.	7	
	Pyrilidae	Optioservus sp.	1	
COLEOPTERA	Elmidae	Stenelmis sp.	7	
		Chimarra sp.	2	
TRICHOPTERA	Philopotamidae	Cheumatopsyche sp.	1	
		Hydropsyche sp.	13	
		Macrostemum sp.	2	
		Rhyacophilidae	Rhyacophila sp.	1
DIPTERA	Hydroptilidae	Leucotrichia sp.	4	
		Chironomidae	Thienemannimyia gr. spp.	1
		Cardiocladius obscurus	2	
		Orthocladius sp.	1	
		Microtendipes pedellus gr.	17	
		Phaenopsectra sp.	1	
		Tanytarsus sp.	2	

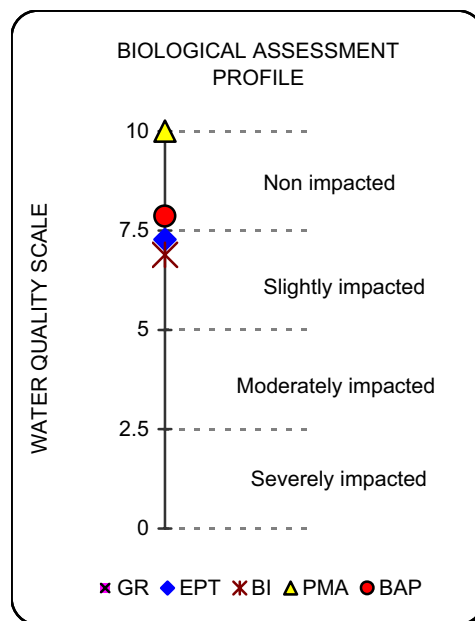
ISD

NATURAL	50
NUTRIENTS	44
TOXIC	42
ORGANIC	32
COMPLEX	36
SILTATION	33
IMPOUNDMENT	35

BAP

GR	21
EPT	10
BI	4.99
PMA	80

NBI-P	5.91
NBI-N	4.56



Hoosic River Watershed***Benthic Macroinvertebrate Taxa******September 23 and 24, 2006***

<i>PHYLUM</i>	<i>CLASS</i>	<i>ORDER</i>	<i>FAMILY</i>	<i>GENUS/SPECIES</i>
ANNELIDA	OLIGOCHAETA			<i>Undetermined Oligochaeta</i>
ARTHROPODA	CRUSTACEA	DECAPODA	Cambaridae	<i>Undetermined Cambaridae</i>
		ISOPODA	Asellidae	<i>Caecidotea sp.</i>
	INSECTA	COLEOPTERA	Elmidae	<i>Optioservus sp.</i>
				<i>Promoresia sp.</i>
				<i>Stenelmis sp.</i>
			Psephenidae	<i>Ectopria nervosa</i>
				<i>Psephenus herricki</i>
				<i>Atherix sp.</i>
				<i>Brillia sp.</i>
				<i>Cardiocladius obscurus</i>
				<i>Cardiocladius sp.</i>
				<i>Cricotopus sp.</i>
				<i>Cricotopus trifascia gr.</i>
				<i>Diamesa sp.</i>
				<i>Eukiefferiella sp.</i>
				<i>Microtendipes pedellus gr.</i>
				<i>Orthocladius sp.</i>
				<i>Parametriocnemus sp.</i>
				<i>Phaenopsectra sp.</i>
				<i>Polypedilum aviceps</i>
				<i>Polypedilum flavum</i>
				<i>Potthastia longimana gr.</i>
				<i>Rheotanytarsus sp.</i>
				<i>Tanytarsus sp.</i>
				<i>Thienemannimyia gr. spp.</i>
				<i>Tvetenia sp.</i>

Hoosic River Watershed***Benthic Macroinvertebrate Taxa******September 23 and 24, 2006***

<i>PHYLUM</i>	<i>CLASS</i>	<i>ORDER</i>	<i>FAMILY</i>	<i>GENUS/SPECIES</i>
ARTHROPODA	INSECTA	DIPTERA	Chironomidae	<i>Undetermined Chironomidae</i>
				<i>Undetermined Chironomini</i>
			Empididae	<i>Hemerodromia sp.</i>
				<i>Undetermined Empididae</i>
			Simuliidae	<i>Simulium sp.</i>
			Tipulidae	<i>Antocha sp.</i>
				<i>Dicranota sp.</i>
				<i>Hexatoma sp.</i>
				<i>Acentrella sp.</i>
				<i>Baetis sp.</i>
		EPHEMEROPTERA		<i>Heterocloeon sp.</i>
			Baetidae	
				<i>Caenis sp.</i>
			Caenidae	
			Ephemerellidae	<i>Ephemerella sp.</i>
			Heptageniidae	<i>Epeorus (Iron) sp.</i>
				<i>Stenonema sp.</i>
			Isonychiidae	<i>Isonychia sp.</i>
			Leptophlebiidae	<i>Undetermined Leptophlebiidae</i>
		LEPIDOPTERA	Pyralidae	<i>Petrophila sp.</i>
		MEGALOPTERA	Corydalidae	<i>Corydalus cornutus</i>
				<i>Nigronia serricornis</i>
				<i>Sialis sp.</i>
		PLECOPTERA	Sialidae	<i>Agnetina sp.</i>
			Perlidae	<i>Paragnetina sp.</i>
				<i>Undetermined Perlidae</i>
		TRICHOPTERA	Perlodidae	<i>Isogenoides sp.</i>
			Pteronarcidae	<i>Pteronarcys sp.</i>
			Brachycentridae	<i>Brachycentrus sp.</i>

Hoosic River Watershed***Benthic Macroinvertebrate Taxa******September 23 and 24, 2006***

<i>PHYLUM</i>	<i>CLASS</i>	<i>ORDER</i>	<i>FAMILY</i>	<i>GENUS/SPECIES</i>
ARTHROPODA	INSECTA	TRICHOPTERA	Glossosomatidae	<i>Glossosoma sp.</i>
			Goeridae	<i>Goera sp.</i>
			Helicopsychidae	<i>Helicopsyche borealis</i>
			Hydropsychidae	<i>Cheumatopsyche sp.</i>
				<i>Hydropsyche sp.</i>
				<i>Macrostemum sp.</i>
				<i>Hydroptila sp.</i>
				<i>Leucotrichia sp.</i>
			Limnephilidae	<i>Undetermined Limnephilidae</i>
			Philopotamidae	<i>Chimarra sp.</i>
				<i>Dolophilodes sp.</i>
MOLLUSCA	GASTROPODA		Rhyacophilidae	<i>Rhyacophila sp.</i>
			Ancylidae	<i>Ferrissia sp.</i>
			Physidae	<i>Undetermined Physidae</i>
			Sphaeriidae	<i>Undetermined Sphaeriidae</i>
NEMERTEA	PELECYPODA			<i>Prostoma graecense</i>
PLATYHELMINTHES	TURBELLARIA		Planariidae	<i>Undetermined Turbellaria</i>

NYS DEC Methods for Impact Source Determination

Definition: Impact Source Determination (ISD) is the procedure for identifying types of impacts that exert deleterious effects on a waterbody. While the analysis of benthic macroinvertebrate communities has been shown to be an effective means of determining severity of water quality impacts, it has been less effective in determining what kind of pollution is causing the impact. Impact Source Determination uses community types or models to ascertain the primary factor influencing the fauna.

Development of methods: The method found to be most useful in differentiating impacts in New York State streams was the use of community types, based on composition by family and genus. It may be seen as an elaboration of Percent Model Affinity (Novak and Bode, 1992), which is based on class and order. A large database of macroinvertebrate data was required to develop ISD methods. The database included several sites known or presumed to be impacted by specific impact types. The impact types were mostly known by chemical data or land use. These sites were grouped into the following general categories: agricultural nonpoint, toxic-stressed, sewage (domestic municipal), sewage/toxic, siltation, impoundment, and natural. Each group initially contained 20 sites. Cluster analysis was then performed within each group, using percent similarity at the family or genus level. Within each group four clusters were identified, each cluster usually composed of 4-5 sites with high biological similarity. From each cluster a hypothetical model was then formed to represent a model cluster community type; sites within the cluster had at least 50 percent similarity to this model. The method was tested by calculating percent similarity to all the models, and determining which model was the most similar to the test site. New models are developed when similar communities are recognized from several streams.

Use of ISD methods: Impact Source Determination is based on similarity to existing models of community types. The model that exhibits the highest similarity to the test data denotes the likely impact source type, or may indicate “natural”, lacking an impact. In the graphic representation of ISD, only the highest similarity of each source type is identified, and similarities that are within 5% of the highest. Similarities less than 50% are considered less conclusive. The determination of impact source type is used in conjunction with assessment of severity of water quality impact to provide an overall assessment of water quality.

Limitations: These methods were developed for data derived from 100-organism subsamples of traveling kick samples from riffles of New York State streams. Application of the methods for data derived from other sampling methods, habitats, or geographical areas would likely require modification of the models.

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Glossary

Anthropogenic: caused by man

Assessment: a diagnosis or evaluation of water quality

Benthic: located on the bottom of a body of water or in the bottom sediments or pertaining to bottom-dwelling organisms

Benthos: organisms occurring on or in the bottom substrate of a waterbody

Biomonitoring: the use of biological indicators to measure water quality

Cultural eutrophication: the enrichment of water bodies by the addition of nutrients as a result of human activities

Diel cycle: referring to the 24 hr day

Eutrophic: enriched in dissolved nutrients (as phosphates or nitrates) that stimulates the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen

Impact: a change in the physical, chemical, or biological condition of a waterbody

Impairment: a detrimental effect caused by an impact

Index: a number, metric, or parameter derived from sample data used as a measure of water quality

Intolerant: unable to survive poor water quality

Macroinvertebrate: a larger-than-microscopic invertebrate animal that lives at least part of its life in aquatic habitats

Mesotrophic: having a moderate amount of dissolved nutrients

Non point source: diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet)

Oligotrophic: having a deficiency of plant nutrients that is usually accompanied by an abundance of dissolved oxygen

Periphyton: are algae that grow on a variety of submerged substrates, such as rocks, plants or debris, in lakes or streams

Point source: a stationary location or fixed facility from which pollutants are discharged or emitted. Also, any single identifiable source of pollution, e.g., a pipe, ditch, ship, ore pit, factory smokestack

Rapid bioassessment: a biological diagnosis of water quality using field and laboratory analysis designed to allow assessment of water quality in a short turn-around-time; usually involves kick sampling and laboratory subsampling of the sample

Station: a sampling site on a waterbody

Stenotherm: organisms having a very narrow thermal tolerance and preferring cooler temperatures

Survey: a set of sampling conducted in succession along a stretch of stream

Tolerant: able to survive poor water quality



Hoosic River Watershed Association

PO Box 667, Williamstown, MA, 01267

www.hoorwa.org

Fred Siever
New York State Department of Environmental Conservation
1150 N. Westcott Road
Schenectady, NY 12306-2014

December 15, 2006

Dear Mr. Siever:

We are writing to direct your attention to a recurrent drop in water quality on the Hoosic River in and below Hoosic Falls, New York. The DEC documented a similar drop in water quality here in 2001 as a result of a copper sulfate spill; a subsequent DEC study showed full recovery in water quality by 2004. Our data indicate that sometime after December, 2004 an episode occurred resulting in another significant impact on the river. We feel that the situation is urgent enough to make contact with you before completing our formal report so that you are aware of the situation and able to plan any necessary action.

The Hoosic River Watershed Association (HooRWA) is an organization dedicated to the restoration, conservation and enjoyment of the Hoosic River. As part of our monitoring program, we surveyed 13 stations along the Hoosic River during 2006. Each station was previously surveyed by the NYS DEC Stream Biomonitoring Unit. The HooRWA survey indicated a background non-point source nutrient enrichment of the Hoosic River among stations 3 through 9, with a significant change occurring between stations 8 and 9 in and below Hoosic Falls, respectively.

The water quality change is evident by a drop in the Biological Assessment Profile Score (BAP) between these sites, and according to the Impact Source Determination (ISD), the most likely impact sources affecting station 9 include toxins, organics, and complex municipal/industrial discharges. Additionally, the 2006 benthic macroinvertebrate community structure changes between stations 8 and 9 are similar to the changes that occurred at these sites in the 2001 DEC survey. As previously noted, the DEC subsequently verified complete recovery at these sites in a 2004 follow up survey, indicating that an episode occurred after 12/04 resulting in an impact between these two stations.

Please find enclosed a site map, our physical, chemical, and biological data, and the multi-metric results. Our collecting and reporting follows the NYS DEC Stream Biomonitoring Unit's Quality Assurance Work Plan for biological stream monitoring in NYS.

We look forward to hearing from you after you have reviewed this data. Our Monitoring Coordinator is available to answer any questions that you might have.

Sincerely,

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