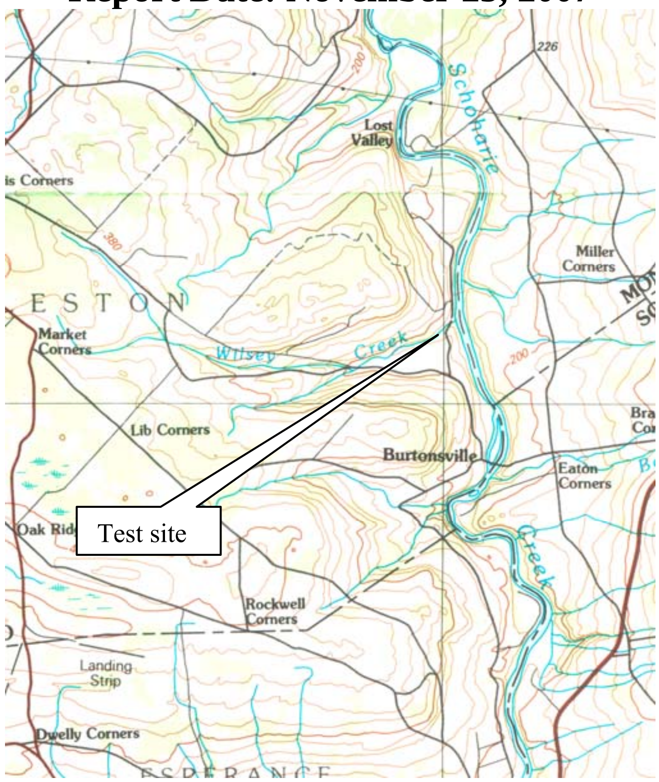
A RAPID BIOASSESMENT OF WILSEY CREEK MONTGOMERY COUNTY, NY

Conducted: November 25, 2006 & November 11, 2007
By:
The Schoharie River Center, Environmental Study Team

Report Date: November 25, 2007



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Summary

A rapid bio-assessment of the Wilsey Creek located in Montgomery County, New York. Testing indicates that there has been a leveling off of water chemistries, the pH of 10.7 in 2006 to 7.9 in 2007. Becoming more neutral. Though the Turbidity remains a constant 1 FAU, the Alkalinity has risen dramatically from 36 mg/L to 140 mg/L. The conductivity has risen from 83µS to 145µS. The level of nitrates has risen from 0.6 mg/L to 0.7 mg/L and the level of ortho-phosphates has also risen from 0.04 mg/L to 0.2 mg/L. Water temperature has dropped from 12°C to 3°C, the level of dissolved oxygen has risen by 1.0 ppm. Through our comparison to last years study of the same site we have seen an overall water quality increase. The water quality ranges from slightly impacted to non-impacted.

Background

The Schoharie River Center's Environmental Study Team performed a rapid bio-assessment of the Wilsey Creek. Water chemistries were performed at one site, while macroinvertebrate samples were taken at two.

Wilsey Creek is tributary 33 to the Schoharie Creek according to NYS DEC's part 879: Schoharie Creek Drainage Basin map J-22se. It is approximately 23 ½ kilometers from the confluence of the Mohawk River, downstream from Burtonsville. Wilsey Creek is about 20 feet wide at the test site. Its riparian consists of mature trees and natural vegetation growing down to the water's edge.

This rapid bio-assessment is important because Wilsey Creek is located away from human impacts and has a habitat similar to that of the Schoharie Creek, providing a model for what the Schoharie Creek could be like without the impact of humans. This is a one-year reassessment of the Wilsey creek comparing our results to last years data. In 2006 a physical, chemical, biological and bacteriological assessment was conducted, however only 65 macro-invertebrates were collected at that time. In order to better determine the current water quality of the site our goal this year was to reassess and collect a full macro-invertebrate sample from the site.

The NYS DEC stream classification of the testing sites is class C waters, designating that the water is suitable for both fish propagation and survival, and for primary and secondary contact recreation.

Near the testing site, the Wilsey Creek is used lightly for recreation - mostly swimming and hiking. There are no municipal sewage treatment plants along the study section. Road runoff and agricultural practices comprise potential pollutants and health hazards within the area.

Results

N 42d 49.320
W 72d 15.905
Date: November 11, 2007

The location of the test site is at the confluence with the Schoharie Creek, approximately 23 ½ kilometers from the confluence with the Mohawk River, downstream from Burtonsville. The creek is about 20 feet wide at the test site. The water velocity was at a slow to moderate level. The riffle size was excellent and well developed. The riparian zone along the creek is excellent, the vegetation being mature and growing right down to the waters edge. The percent cobble embededness was determined to be very good, measuring at <25%.

Water chemistry data for Wilsey Creek was taken on November 11, 2007. It will be compared with data taken on November 25, 2006, with the 2006 data in parentheses.

The temperature of Wilsey Creek was 3°C (12°C). The pH was 7.9 (10.7), which is slightly basic according to the NYS DEC standards. The alkalinity was 140 mg/L (36 mg/L), which is classified as Not Sensitive. The Turbidity was 1 FAU (no change) and the conductivity was 145µS (83µS). The nitrate level measured at 0.7 mg/L (0.6 mg/L), and the Ortho-Phosphate level was 0.2 mg/L
(0.04 mg/L) a 5x increase from last year. The dissolved Oxygen level was12.4 ppm (11.4 ppm).

Biological Indices for Wilsey creek show that the family richness, which was 13 (17), was slightly impacted , and non-impacted for the Family Biotic Index which was 2.98 (2.98). EPT richness measured as 10 (15) which is non- impacted, and Percent Model Affinity was 65% (60%), with a sample size of 100 insects.

<u>Wilsey Creek test site</u>

N 42d 49.320
W 72d 15.905

East View

West View

North View

South View

Discussion

Our assessment of the Wilsey Creek indicates that water quality has changed since last year, when we began consistently studying the creek.

There were several chemical factors that changed between November 2006 and November 2007. Several outside factors, including weather conditions, easily explain the changes. Other changes cannot be as easily explained. Last year when the study began, high levels of pH were found indicating a very basic environment that may have affected the life of macroinvertebrates in the creek. This year the pH was lower and much closer to neutral than the year before, making the environment better for macroinvertebrates. Due to the increased neutrality of the pH the alkalinity increased from 36 mg/L to 140 mg/L, allowing the pH to remain stable. Conductivity increased from 83µS to 145µS, a change that may be explained by a faulty meter; which was recalibrated a few weeks later. Within a year, nitrates increased by 0.1mg/L and phosphates increased by 0.16 mg/L a five-fold increase, this increase could be due to increased runoff from the adjacent road and an upstream horse farm. Dissolved oxygen increased by 1ppm, due to the decreased water temperature, decreased water temperature increases the amount of oxygen that can be dissolved in the water.

In addition to chemical changes, biological changes were also measured on the Wilsey Creek between 2006 and 2007. Changes in the chemical conditions of the creek affect the biological conditions. The incomplete sample of macroinvertebrates in 2006 (65 macros collected) also may account for the differences in that this was not a statically valid sample. In 2007 over 100 macroinvertebrates were collected assessed . The Biological Assessment Profile increased from "slightly impacted"(2006) to "non-impacted"(2007) which could be due to the larger sample that was identified. Family Richness decreased, however, from "non-impacted" to "slightly impacted," which could be due to the weather (low water conditions) and the cold water temperature. The Family-EPT richness, Family Biotic Index, and Percent Model Affinity remained essentially the same between the two years.

Conclusions

1. The chemical and biological tests show that the Wilsey Creek is slightly to non impacted, with good water quality
2. Further studies should be conducted upstream of the testing site, at the source of the creek, at the mouth of the creek, and downstream from the test site, below the bridge.
3. Water quality monitoring should be continued throughout the year in all seasons.

RATIONALE OF DATA COLLECTED AND METHODS

Physical

The *physical survey* is essential to a stream study because aquatic fauna often have specific habitat requirements independent of water composition, and alterations in these conditions affect the overall quality of a water body (Giller and Malmqvist, 1998). Additionally, the physical characteristics of a stream affect stream flow, volume of water within the channel, water temperature, and absorbed radiant energy from the sun.

Testing sites are evaluated for: stream size and gradient; surrounding land use; presence/absence of upstream damns; algal or weed growth; presence/absence of oily film, grease globules, or unusual odor or color; riffle size; substrate size; presence/absence of shelter for fish; flow pattern; channel alteration; stream bank cover and stability; disruption of riparian bank cover; width of riparian vegetation zone; and the presence of litter. Habitat condition was scored as excellent, good, fair, or poor (see physical survey/habitat assessment data sheets for scoring parameters). Site photos were taken of the upstream area, downstream area, and banks of each testing site, and are included in the attached physical survey/habitat assessment sheets.

Water temperature directly affects both the nature of aquatic fauna and species diversity; temperature tolerance is organism specific, and the reproductive cycle (including timing of insect emergence and annual productivity) will vary within different temperature ranges. Temperature can also affect organisms indirectly as a consequence of oxygen saturation levels. As water temperatures rise, the metabolism of aquatic organisms increases, with an attendant increase in their oxygen requirements. At higher water temperatures, however the oxygen carrying capacity of water decreases because of a diminished affinity of water for oxygen.

Optimal water temperature ranges and lethal limits of water temperature vary among different organisms. The ratio of Plecoptera to Ephemeroptera (individuals and numbers of species) has been found to drop as the annual range of temperature increase (Hynes, 1970). The optimal temperature range for brook trout is 11-16º Celsius with an upper lethal limit of 24º Celsius (Hynes, 1970). NYS DEC does not have a water quality standard for water temperature.

Temperature was recorded by grab samples with a glass thermometer.

Turbidity, or the cloudiness of the water, is caused by multiple factors such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton, and other microscopic organisms. Because of the ability of trout to sight feed is restricted at turbidity levels above 50 Nephelometric Turbidity Units (NTU), salmonid displacement will occur above this level. A turbidity of less than10 NTU is recommended for trout propagation (Watersheds, 1994).

The Hach DR 890 colorimeter was used in this study, which measures turbidity in Formazin Attenuation Units (FAU) (The equivalency ratio is 1FAU/1NTU).

NYS DEC does not have a numeric standard for turbidity.

Percent cobble embeddedness, is the degree to which gravel-sized and larger particles are surrounded by sand-sized and smaller particles, is an indicator of a stream's ability to support trout survival and propagation. If deposition of sediment occurs in a spawning area, it can be detrimental to trout reproduction. Trout eggs require a well-oxygenated environment; the eggs are laid in permeable gravel beds with many open places to allow continuous bathing of the eggs with cool, oxygenated water. Sediment deposition destroys this environment by clogging these open spaces, leading to oxygen deprivation and buildup of metabolic waste. When cobble embeddedness reaches 50-60%, a stream loses its salmonid fry. Furthermore, although habitat quality is still considered fair for trout survival (though not propagation) at 50-75% embeddedness changes in the bethnic macroinvertebrate fauna population, on which trout feed; begin to occur (Harvey, 1989).

Velocity was calculated at the time of macroinvertebrate collection because an optimal macroinvertebrate collection site has a velocity between 0.l45 and 0.75 meter/second. Velocity was determined by averaging the time it takes a float to travel a marked distance midstream and near each bank, and dividing the distance of the course by the average time.

Chemical

Dissolved Oxygen (DO) level is a function of water turbulence, diffusion, and plant respiration. The NYS DEC standard for dissolved oxygen for this class C stream is 5 mg/L (see appendix V).

A significant drop in DO concentration can occur over a 24-hour period, particularly if a waterbody contains a large amount of plant growth. Oxygen is released into the water as a result of plant photosynthesis during daylight; dense plant growth within a stream can therefore elevate the DO level significantly. At night photosynthesis ceases and DO may drop to levels maintained by diffusion and turbulence. A pre-dawn DO level will, in this case, reflect the lowest DO concentration in a 24 hour period and thus provide important data on the overall health of the system.

DO was measured using the modified Winkler titration with microburet method.

It is also important to consider *percent oxygen saturation*, since dissolved oxygen levels vary inversely with water temperature. Percent saturation is the maximum level of dissolved oxygen that would be present in the water at a specific temperature in the absence of other influences, and is determined by calculating the ratio of measured dissolved oxygen to maximum dissolved oxygen for a given temperature. (The calculation is also standardized to altitude or barometric pressure.)

Percent oxygen saturation falls when something other than temperature, such as dissolved solids or bacterial decomposition, affects oxygen levels. Trout are particularly sensitive to slight drops in oxygen saturation and will migrate away from streams when oxygen saturation falls. Similarly, certain macroinvertebrates are sensitive to varying saturation levels, and because the ability of these organisms to migrate away from the changing conditions is limited, a drop in saturation can be lethal. Saturation levels can significantly fluctuate during a 24-hour period depending on the amount of nutrients entering the water system, the densities of plankton, aquatic plants, and algae in the water, and the amount of light for photosynthesis.

During daylight, oxygen saturation levels can increase to supersaturation levels in streams with dense vegetation and high levels of photosynthesis. Supersaturation of water with oxygen produces the potential for gas bubble trauma (over-inflated swim bladder, exophthalmia, and bubbles in gill lamellae) in fish and other aquatic organisms. During the night, when photosynthesis ceases and plants continue to utilize oxygen for respiration, dissolved oxygen concentration and saturation levels can drop critically low.

A healthy stream contains near 100 percent oxygen saturation at any given temperature (Hynes, 1970).

NYS DEC has not adopted percent oxygen saturation as a water quality standard. The US EPA recommends a maximum of 110% oxygen saturation for the protection of aquatic life. The assessment was included in this study because of our belief that it is vital to the complete evaluation of the health of a stream.

Conductivity is a measure of the ability of an electrical current to pass through a stream; it is dependent on both the concentration of dissolved electrolytes within the water and water temperature. When inorganic ions are dissolved in water, conductivity increases. Organic ions, such as phenols, oil, alcohol and sugar, can decrease conductivity (EPA, 1997). Warmer water is also more conductive and, therefore, conductivity is reported for a standardized water temperature of 25 degrees Celsius. Measurements are reported in microsiemens per centimeter (µS/cm).

In the United States, freshwater stream conductivity readings vary greatly from 50-1,500µS/cm. The Conductivity of most streams remains relatively constant, however, unless an extraneous source of contamination is present. A failing septic system would raise conductivity because of its chloride, phosphate, and nitrate content, while an oil spill would lower conductivity.

Conductivity between 150 and 500µS/cm is considered a good mixed-fisheries range (EPA, 1997). A Corning conductivity meter was used to measure conductivity. NYS DEC does not have a standard for conductivity.

The *pH* and *alkalinity* are measures of a stream's acidity and its buffering capacity, or ability to neutralize acidic influences and resist changes in pH. A desirable pH for salmonid is 6.5-8.5. An alkalinity of greater than 20 ppm helps to protect a stream from pH altering influences (such as acid rain). An Oakton pH test meter and the Lamotte alkalinity test kit direct reading titrate method were used to obtain pH and alkalinity, respectively. The NYS DEC standard for pH is 6.5-8.5. No standard has been established for alkalinity.

In most fresh water streams, *nitrates* and *phosphates* are in short supply and are therefore the nutrients that limit plant growth. Because of this, even small excess amounts of these substances can significantly impact a stream. Typically, natural levels of nitrate nitrogen (NO_3-N) are <1.0 mg/l. Phosphorus (P) levels of >0.05 mg/l indicate that impact is likely; at levels >0.1 mg/l impact is certain. Increased levels of these nutrients often indicate that sewage, animal manure, fertilizer, and other types of contamination from commercials sites, residential homes, or farms are entering the system.

These nutrients affect aquatic organisms indirectly when elevated levels increase plant proliferation and, ultimately, decaying plant material in the stream. Bacteria that decompose this material require oxygen, depleting the dissolved oxygen. Excessive plant growth also physically changes the substrate on which macroinvertebrates live, altering the diversity of the macroinvertebrate community on which trout feed.

It has been documented that nitrate levels are highest just before dawn due to plant inactivity (Stevenson et al., 1996). Plant uptake of nitrates during daylight due to plant metabolism can lower the levels in the water column; at night when plant activity ceases, nitrate levels increases. Pre-dawn nitrate levels will therefore indicate the maximum nitrates present in a 24-hour period.

Nitrates (NO_3-N) and Phosphates (P) were measured using the Hach DR 890 colorimeter by chromotropic acid method and ascorbic acid reduction method, respectively. NYS DEC does not have a numeric standard for nitrates or phosphates.

Biological

Macroinvertebrates are collected by kick net and the specimens are preserved. Pollution-sensitive *macroinvertebrates*, a food source for trout, require similar chemical parameters as trout. The relative numbers of different macroinvertebrate groups indicate the overall health of an ecosystem. Perhaps more importantly, macroinvertebrate data demonstrate the effects of problems that may not be detected by chemical testing.

The NYS DEC Stream Biomonitoring Unit has utilized stream biological monitoring and water quality analysis since 1972 but the biological profiles and water quality assessments are not a part of the state's standards. They serve as a "decision threshold" to determine the need for further studies.

The Environmental Protection Agency recommends that states and tribes with biomonitoring experience adopt biological criteria into water quality standards to provide a quantitative assessment of a waterway's designated and supportive use. Currently only five states have done so; NY is not one of these states. Biological assessment was included in this study because of our belief that it is vital to the complete evaluation of the health of a stream.

The four family indices, or metrics, that are recommended by the NYS DEC Biomonitoring Unit to provide a biological profile and overall stream water quality assessment are as follows:

1. Family richness: The total number of families found in the sample.
2. EPT richness: The number of families in the three most pollution sensitive orders –Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies) – that are present.
3. Biotic index: The product of the quantity of a particular macroinvertebrate found and its assigned biotic value (pollution tolerance value).
4. Percent model affinity, PMA: A comparison of the number of identified macroinvertebrates to a New York model "non-impacted" community, based on percent abundance in seven major groups.

A Biological Assessment Profile, as outlined by the DEC, is obtained from the four metrics by converting each metrics score to a 0-10 water quality scale and calculating their mean. The mean score identifies the water quality impact as: non-, slightly, moderately, or severely impacted. [For definitions of each category, see appendix VI]. The DEC surmises the ability of each of the above water qualities to support fish and their propagation, but a particular family or species of fish is not identified. This is significant because trout are sensitive to small amounts of pollutants and slight ecological changes, whereas bass or carp, having a higher tolerance to pollutants and ecological changes, are not.

It is prudent to remember that an index is a means to convey information about the status of a waterbody, but should not be used exclusive of its component metrics and data (EPA, 1999).

The HBRW Rapid Biological Assessment includes the above indices and:

1. <u>Organism Density Per Sample:</u> An estimate of the total number of individuals in the sample.
2. <u>EPT/EPT + Chironomidae:</u> A measure of the ratio of the intolerant EPT orders to the generally tolerant Diptera family Chironomidae.
3. <u>Percent Contribution of Dominant Family:</u> The percentage of the sample made up of the most abundant family.
4. <u>Percent Composition of Major Groups:</u> The percent of the sample comprised of selected major groups.

[For complete definitions of indices see appendix VII]

Bacteriological

Coliforms are a group of bacteria that include fecal coliforms and other non-fecal bacteria that are widespread in the environment. They are found in the feces of both warm- and cold- blooded animals; they commonly live alongside numerous other pathogenic organisms present in fecal material, and serve as an indicator that these organisms might also be present in the water. Fecal material can pose a health risk, cause cloudy water with an unpleasant odor, and decrease dissolved oxygen as bacteria decompose the material.

Fecal coliforms are a subset of total coliforms; they are more specific to feces but not necessarily fecal in origin. They can originate from textile, pulp, and paper mill wastes (Behar, 1997). *E. Coli* is a fecal coliform specific to fecal material from humans and other warm-blooded animals. It is an indicator of health risk from water contact. (See NYS DEC standards)

The Micro Laboratories Coliscan Membrane method was used to determine total coliforms and E. Coli.

Water Chemistry Values for Wilsey Creek Comparing 2006-2007

Indicator	Site 1 11/18/07	Site 1 11/11/06
Temperature (˚C)	3°C	12°C
PH	7.9	10.7
Alkalinity (mg/L $CaCO_3$)	140 mg/L	36 mg/L
Dissolved Oxygen (mg/L)	12.4ppm	11.4ppm
Nitrate (mg/L)	0.7 mg/L	0.6 mg/L
Orthophosphate As PO_4 (mg/L)	0.02 mg/L	0.04 mg/L
Conductivity (uS/cm)	145 uS/cm	83 uS/cm
Turbidity (FAU)	1 FAU	1 FAU

NYS DEC FAMILY-LEVEL MACROINVERTIBRATE INDICIES

1. *Family richness:* This is the total number of Macroinvertebrate families found in a riffle kick sample. Expected ranges for 100-organism sub samples of kick samples in most streams in New York State are: greater than 12, non-impacted; 9-12, slightly impacted; 6-8, moderately impacted; less than 6, severely impacted
2. *Family EPT richness:* EPT denotes the orders of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Tricoptera). These are considered to be mostly clean-water organisms, and their presence generally is correlated with good water quality (Lenat, 1987). The number of EPT families found in a 100-organism sub sample is used for this index. Expected ranges from most streams in New York State are: greater than 7, non-impacted: 4-7 slightly impacted; 1-3, moderately impacted; and 0, severely impacted.
3. *Family biotic index:* The family-level Hilsenhoff Biotic Index is a measure of the tolerance of the organisms in the sample to organic pollution (sewage inputs, animal wastes) and low dissolved oxygen levels. It is calculated by multiplying the number of individuals in each family by its assigned tolerant value, summing these products, and dividing by the total number of individuals. On a 1-10 scale, tolerant values range from intolerant (0), to tolerant (10). Values are listed in Hilsenhoff (1988); additional values are listed in the Quality Assurance document (Bode et al., 1996). Ranges for the levels of impact are: 0-4.50, non-impacted; 4.51-6.50, slightly impacted; 6.51-8.50, moderately impacted; and 8.51-10.00, severely impacted
4. *Percent Model Affinity:* This is a measure of similarity to a model non-impacted community based on percent abundance in 7 major groups (Novak and Bode, 1992). Percentage similarity is used to measure similarity to a community of 40% Ephemeroptera, 5% Plecoptera, 10% Tricoptera, 10% coleopteran, 20% Chironomidae, 5% Oligochaeta, and 10% Other. Ranges for the level of impact are: >64, non-impacted; 50-64, slightly impacted; 35-49, moderately impacted; and >35, severely impacted.

Non-impacted: Indices reflect very good water quality. The Macroinvertebrate community is diverse, usually with at least 12 families in riffle habitats. Mayflies, stoneflies, and Caddiflies are well represented; EPT family richness is greater than 7. the biotic index values 4.50 or less. Percent model affinity is greater than 64. Water quality should not be limited 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 food water quality. The Macroinvertebrate community is slightly but significantly altered from the pristine state. Family richness usually is 6-8. Mayflies and stoneflies may be restricted, with EPT values of 4-7. the biotic index value is 4.51-6.50. Percent model affinity is 50-64. water quality is usually not limited to fish survival, but may limiting to fish propagation.

Moderately Impacted: Indices reflect poor water quality. The Macroinvertebrate community is altered to a large degree from the pristine state. Family richness usually is 6-8. Mayflies and stoneflies are rare or absent, caddisflies are often restricted; EPT richness is 1-3. the biotic index value is 6.51-8,50. the percent model affinity value is 35 –49. 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 families. Family richness is less then 6. Mayflies, Stoneflies, and caddisflies are rare or absent; EPT richness is 0. The biotic index value is greater than 8.51. Percent Model affinity is less than 35. 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.

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HBRW Family Level Benthic Macroinvertebrate Data Analysis Sheet

Site- Wilsey Creek

Date Sampled: 11/11/07

Date of Lab Work 11/18/07

River/Stream/County: Wilsey Creek

Name(s) Becca, Billy, Ben, Jesse

	1	2	3	Mean
# Squares Picked				#####
Total # Squares in Tray Grid				12
Replicate #	1	2	3	

I	II	III	IV	V	VI	VII	VIII
Families in Major Groups	T (1)	D (2)	D	D	$\bar{D}$	T x $\bar{D}$	% (3)
EPHEMEROPTERA (E)							
Baetidae	6	1			1	6	0.01
Baetiscidae	4	0			0	0	0
Caenidae	6	0			0	0	0
Ephemerellidae	2	35			35	70	0.35
Ephemeridae	4	0			0	0	0
Heptageniidae	3	12			12	36	0.12
Leptophlebliidae	4	8			8	32	0.08
Metretopodidae	2	0			0	0	0
Oligoneuriidae	2	0			0	0	0
Polymitarcylidae	2	0			0	0	0
Potomanthidae	4	0			0	0	0
Siphlonuridae	7	0			0	0	0
Tricorythldae	4	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal E					56	144	0.56
PLECOPTERA (P)							
Capniidae	3	0			0	0	0
Chloroperlidae	0	3			3	0	0.03
Leuctridae	0	0			0	0	0
Nemouridae	2	0			0	0	0
Peltoperlidae	0	2			2	0	0.02
Perlidae	3	14			14	42	0.14
Perlodidae	2	0			0	0	0
Pteronarcyidae	0	0			0	0	0
Taeniopterygidae	2	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal P					19	42	0.19
MEGALOPTERA (M)							
Corydalidae	4	6			6	24	0.06
Sialidae	4	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal M					6	24	0.06
LEPIDOPTERA (L)							
Pyralidae	5	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal L					0	0	0
COLEOPTERA (C)							
Dryopidae	5	0			0	0	0
Elmidae	5	0			0	0	0
Gyrinidae	4	0			0	0	0
Haliplidae	5	0			0	0	0
Psephenidae	4	2			2	8	0.02
		0			0	0	0
Other		0			0	0	0
Subtotal C					2	8	0.02
ODONATA (O)							
Aeshnidae	5	0			0	0	0
Calopterygidae	6	0			0	0	0
Coenagrionidae	8	0			0	0	0
Cordulegastridae	3	0			0	0	0
Corduliidae	2	0			0	0	0
Gomphidae	4	0			0	0	0
Lestidae	9	0			0	0	0
Libellulidae	2	0			0	0	0
Macromiidae	2	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal O					0	0	0
AMPHIPODA (A)							
Crangonyctidae	6	0			0	0	0
Gammaridae	6	0			0	0	0
Talitridae	8	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal A					0	0	0

I	II	III	IV	V	VI	VII	VIII
Families in Major Groups	T	D	D	D	$\bar{D}$	T x $\bar{D}$	%
TRICHOPTERA (T)							
Brachycentridae	2	0			0	0	0
Glossosomatidae	1	0			0	0	0
Helicopsychidae	3	0			0	0	0
Hydropsychidae	5	10			10	50	0.1
Hydroptilidae	6	1			1	6	0.01
Lepidostomatidae	1	0			0	0	0
Leptoceridae	4	0			0	0	0
Limnephilidae	4	0			0	0	0
Molannidae	6	0			0	0	0
Odontoceridae	0	0			0	0	0
Philopotamidae	3	0			0	0	0
Phryganeidae	4	4			4	16	0.04
Polycentropodidae	6	0			0	0	0
Psychomyiidae	2	0			0	0	0
Rhyacophilidae	1	0			0	0	0
Sericostomatidae	3	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal T					15	72	0.15
DIPTERA (D)							
Athericidae	4	0			0	0	0
Blephariceridae	0	0			0	0	0
Ceratopogonidae	6	0			0	0	0
Chironomidae	6	0			0	0	0
Tipulidae	4	2			2	8	0.02
Empididae	6	0			0	0	0
Simuliidae	5	0			0	0	0
Tabanidae	5	0			0	0	0
		0			0	0	0
		0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal D					2	8	0.02
ISOPODA (I)							
Asellidae	8	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal I					0	0	0
DECAPODA (I)							
Cambaridae	6	0			0	0	0
Astacidae	6	0			0	0	0
Other		0			0	0	0
Subtotal I					0	0	0
OTHER							
Oligochaeta	9	0			0	0	0
Hirudinea	7	0			0	0	0
Gastropoda	7	0			0	0	0
Pelecypoda	6	0			0	0	0
Turbellaria	6	0			0	0	0
Nemertea	8	0			0	0	0
Other		0			0	0	0
Subtotal Other					0	0	0
TOTALS					100	298	1

Organism Density/Sample Unit	#####
EPT Richness	10
Total Family Richness	13
EPT/EPT+Chironomidae Ratio	1.00
Biotic Index	2.98
% Contribution of Dominant Family	35%
% Model Affinity	65%

% COMPOSITION OF MAJOR GROUPS

EPHEMEROPTERA	56%
PLECOPTERA	19%
TRICHOPTERA	15%
CHIRONOMIDAE	0%
OTHER DIPTERA	2%
COLEOPTERA	2%
ODONATA	0%
MEGALOPTERA	6%
LEPIDOPTERA	0%
AMPHIPODA	0%
ISOPODA	0%
OLIGOCHAETA	0%
GASTROPODA	0%
PELECYPODA	0%
OTHER	0%

EPT RICHNESS = RE+RP+RT

# Ephemeroptera Families	4
# Plecoptera Families	3
# Trichoptera Families	3
EPT Richness (Total)	10

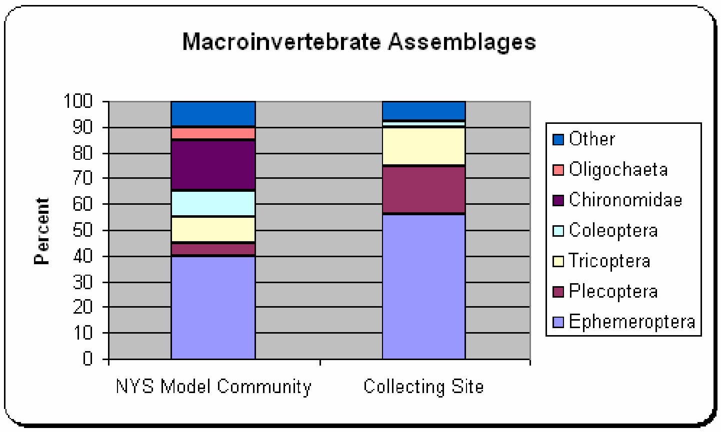
Codes:

(1) T = Hilsenhoff pollution tolerance- NYS DEC adjusted values

(2) D = Density

(3) % = percent composition

Ephemeroptera	40	56
Plecoptera	5	19
Tricoptera	10	15
Coleoptera	10	2
Chironomidae	20	0
Oligochaeta	5	0
Other	10	8

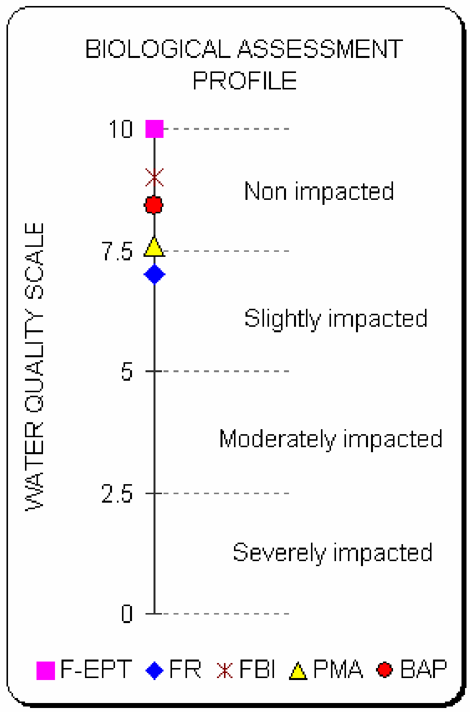


CONVERSION WORKSHEET FOR BIOLOGICAL ASSESSMENT PROFILE

F-EPT		*10 scale*
	>10	10.0
10	>7	10.0
	>2	4.0
	>0	1.3
	0	0.0
FR		
	>15	10.0
	>13	-0.6
13	>9	7.0
	>6	-1.3
	<7	0.0
	0	0.0
FBI		
	<2	10.0
2.98	<4.51	9.0
	<5.51	12.5
	<7.01	14.2
	>7	8.3
PMA		
	>90	10.0
65	>64	7.6
	>49	-2.9
	>34	-3.0
	<35	-3.4
	<20	0.0

Chart title	BIOLOGICAL ASSESSMENT PROFILE
Yaxis	WATER QUALITY SCALE
Wilsey Creek 11-18-07	

	10 scale
F-EPT	10
FR	7
FBI	9
PMA	7.6
BAP	8.4



HBRW Family Level Benthic Macroinvertebrate Data Analysis Sheet

Site wilsey creek				
Date Sampled: 5/ 13/06				
Date of Lab Work 5/ 21/06				
Replicate #	1	2	3	

River/Stream/County:				
Name(s)				
	1	2	3	Mean
# Squares Picked				#####
Total # Squares in Tray Grid				12
Replicate #	1	2	3	

I Families in Major Groups	II T (1)	III D (2)	IV D	V D	VI D̄	VII T x D̄	VIII % (3)
EPHEMEROPTERA (E)							
Baetidae	6	2			2	12	0.031
Baetiscidae	4	0			0	0	0
Caenidae	6	0			0	0	0
Ephemerellidae	2	23			23	46	0.354
Ephemeridae	4	0			0	0	0
Heptageniidae	3	2			2	6	0.031
Leptophlebiidae	4	0			0	0	0
Metretopodidae	2	0			0	0	0
Oligoneuriidae	2	0			0	0	0
Polymitarcylidae	2	0			0	0	0
Potomanthidae	4	0			0	0	0
Siphlonuridae	7	1			1	7	0.015
Tricorythidae	4	3			3	12	0.046
		0			0	0	0
Other		1			1	0	0.015
Subtotal E					32	83	0.492
PLECOPTERA (P)							
Capniidae	3	1			1	3	0.015
Chloroperlidae	0	1			1	0	0.015
Leuctridae	0	1			1	0	0.015
Nemouridae	2	0			0	0	0
Peltoperlidae	0	0			0	0	0
Perlidae	3	12			12	36	0.185
Perlodidae	2	6			6	12	0.092
Pteronarcyidae	0	0			0	0	0
Taeniopterygidae	2	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal P					21	51	0.323
MEGALOPTERA (M)							
Corydalidae	4	0			0	0	0
Sialidae	4	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal M					0	0	0
LEPIDOPTERA (L)							
Pyralidae	5	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal L					0	0	0
COLEOPTERA (C)							
Dryopidae	5	0			0	0	0
Elmidae	5	0			0	0	0
Gyrinidae	4	0			0	0	0
Haliplidae	5	0			0	0	0
Psephenidae	4	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal C					0	0	0
ODONATA (O)							
Aeshnidae	5	0			0	0	0
Calopterygidae	6	0			0	0	0
Coenagrionidae	8	0			0	0	0
Cordulegastridae	3	0			0	0	0
Corduliidae	2	0			0	0	0
Gomphidae	4	0			0	0	0
Lestidae	9	0			0	0	0
Libellulidae	2	0			0	0	0
Macromiidae	2	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal O					0	0	0
AMPHIPODA (A)							
Crangonyctidae	6	0			0	0	0
Gammaridae	6	0			0	0	0
Talitridae	8	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal A					0	0	0

I Families in Major Groups	II T	III D	IV D	V D	VI D̄	VII T x D̄	VIII %
TRICHOPTERA (T)							
Brachycentridae	2	0			0	0	0
Glossosomatidae	1	0			0	0	0
Helicopsychidae	3	0			0	0	0
Hydropsychidae	5	5			5	25	0.077
Hydroptilidae	6	2			2	12	0.031
Lepidostomatidae	1	0			0	0	0
Leptoceridae	4	0			0	0	0
Limnephilidae	4	0			0	0	0
Molannidae	6	0			0	0	0
Odontoceridae	0	0			0	0	0
Philopotamidae	3	0			0	0	0
Phryganeidae	4	0			0	0	0
Polycentropodidae	6	1			1	6	0.015
Psychomyiidae	2	0			0	0	0
Rhyacophilidae	1	1			1	1	0.015
Sericostomatidae	3	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal T					9	44	0.138
DIPTERA (D)							
Athericidae	4	0			0	0	0
Blephariceridae	0	0			0	0	0
Ceratopogonidae	6	0			0	0	0
Chironomidae	6	2			2	12	0.031
Tipulidae	4	1			1	4	0.015
Empididae	6	0			0	0	0
Simuliidae	5	0			0	0	0
Tabanidae	5	0			0	0	0
		0			0	0	0
		0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal D					3	16	0.046
ISOPODA (I)							
Asellidae	8	0			0	0	0
		0			0	0	0
Other		0			0	0	0
Subtotal I					0	0	0
DECAPODA (I)							
Cambaridae	6	0			0	0	0
Astacidae	6	0			0	0	0
Other		0			0	0	0
Subtotal I					0	0	0
OTHER							
Oligochaeta	9	0			0	0	0
Hirudinea	7	0			0	0	0
Gastropoda	7	0			0	0	0
Pelecypoda	6	0			0	0	0
Turbellaria	6	0			0	0	0
Nemertea	8	0			0	0	0
Other		0			0	0	0
Subtotal Other					0	0	0
TOTALS					65	194	1

Organism Density/Sample Unit	#####
EPT Richness	15
Total Family Richness	17
EPT/EPT+Chironomidae Ratio	0.97
Biotic Index	2.98
% Contribution of Dominant Family	35%
% Model Affinity	60%

% COMPOSITION OF MAJOR GROUPS	
EPHEMEROPTERA	49%
PLECOPTERA	32%
TRICHOPTERA	14%
CHIRONOMIDAE	3%
OTHER DIPTERA	2%
COLEOPTERA	0%
ODONATA	0%
MEGALOPTERA	0%
LEPIDOPTERA	0%
AMPHIPODA	0%
ISOPODA	0%
OLIGOCHAETA	0%
GASTROPODA	0%
PELECYPODA	0%
OTHER	0%

EPT RICHNESS = RE+RP+RT

# Ephemeroptera Families	6
# Plecoptera Families	5
# Trichoptera Families	4
EPT Richness (Total)	15

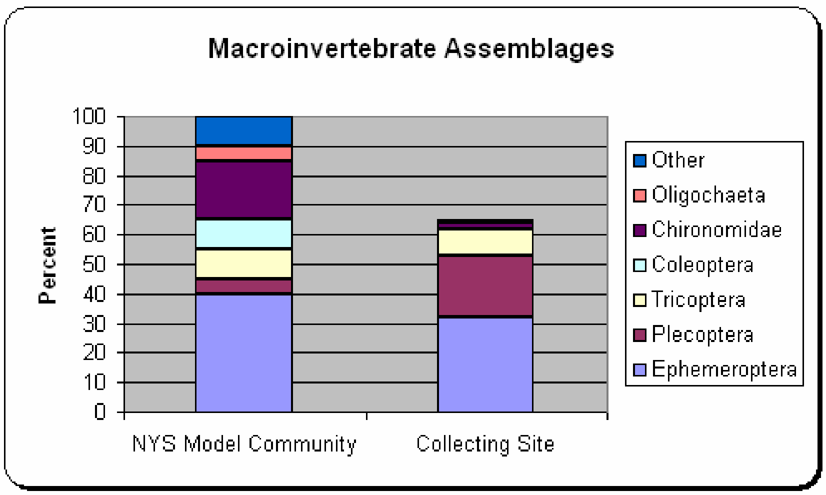
Codes:

(1) T = Hilsenhoff pollution tolerance- NYS DEC adjusted values

(2) D = Density

(3) % = percent composition

Ephemeroptera	40	32
Plecoptera	5	21
Tricoptera	10	9
Coleoptera	10	0
Chironomidae	20	2
Oligochaeta	5	0
Other	10	1



CONVERSION WORKSHEET FOR BIOLOGICAL ASSESSMENT PROFILE

F-EPT		10 scale
15	>10	10.0
	>7	1.7
	>2	4.0
	>0	1.3
	0	0.0
FR		
17	>15	10.0
	>13	-0.6
	>9	0.5
	>6	-1.3
	<7	0.0
	0	0.0
FBI		
	<2	10.0
2.98	<4.51	9.0
	<5.51	12.5
	<7.01	14.2
	>7	8.3
PMA		
	>90	10.0
	>64	1.3
60	>49	6.8
	>34	-3.0
	<35	-3.4
	<20	0.0

Chart title	Wilsey Creek 11-11-06
Yaxis	WATER QUALITY SCALE

	10 scale
F-EPT	10
FR	10
FBI	9
PMA	7.6
BAP	6.8