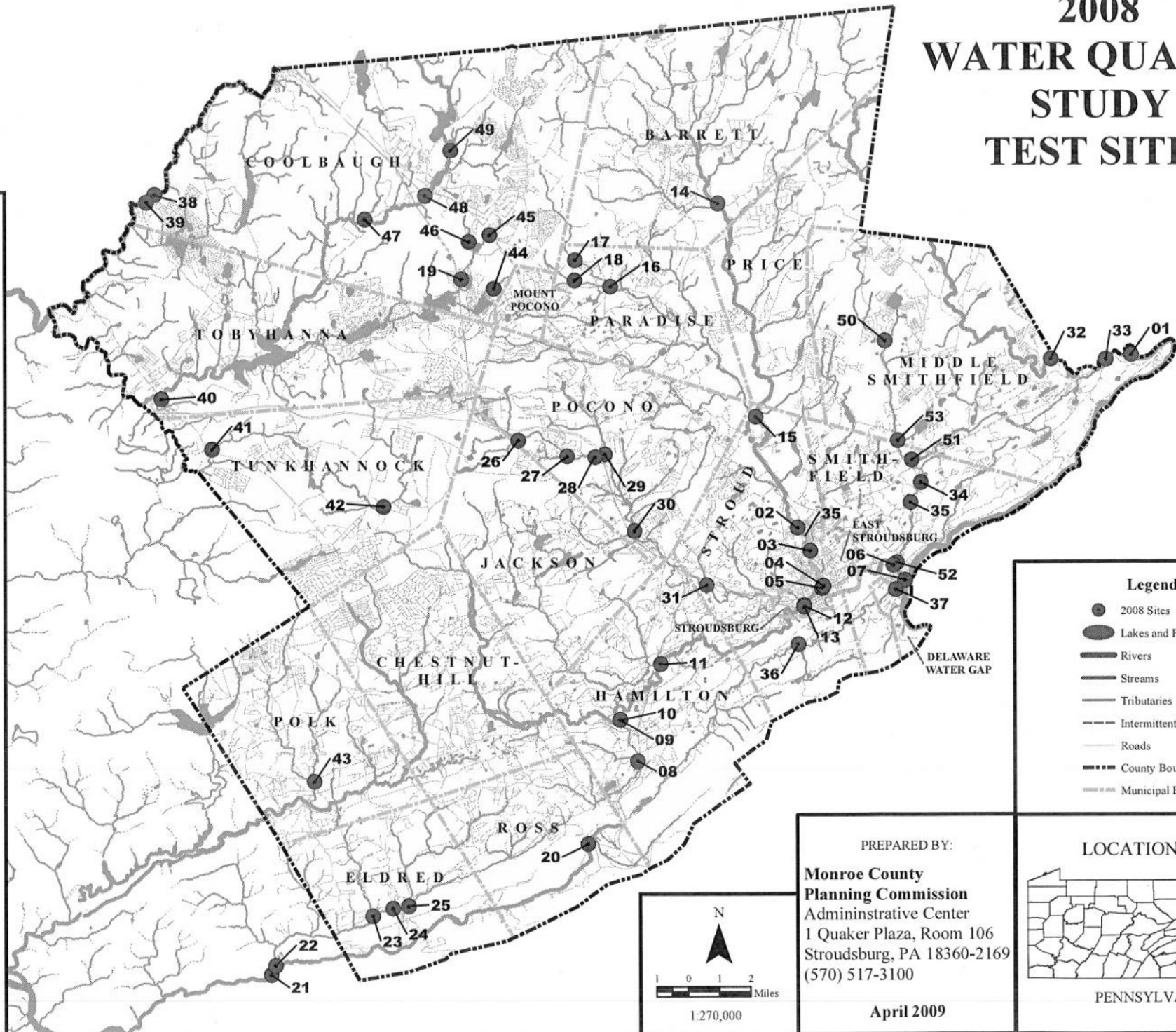


2008 WATER QUALITY STUDY TEST SITES

Site	Site ID
1	BUSHCR08
2	BRODCR14
3	BRODCR16
4	BRODCR17
5	MCMICR30
6	BRODCR18
7	BRODCR13
8	LAKECR02
9	LAKECR01
10	MCMICR32
11	MCMICR33
12	POCOCR14
13	MCMICR20
14	BRODCR01
15	PARACR08
16	DEHOCR04
17	DEHOCR05
18	TANKCR02
19	HAWKRU01
20	AQUACR11
21	AQUACR12
22	BUCKCR07
23	BUCKCR06
24	BUCKCR01
25	BUCKCR05
26	POCOCR20
27	POCOCR16
28	POCOCR17
29	SCOTCR04
30	CRCRPO04
31	POCOCR18
32	BUSHCR10
33	BUSHCR09
34	MARSCR08
35	MARSCR09
36	CHERCRI4
37	CHERCRI1
38	LEHIRI01
39	LEHIRI02
40	TOBYCR14
41	TUNKCR03
42	TUNKCR07
43	DOTTCR04
44	REDRU03
45	CLEARU02
46	DUPURU01
47	TOBYCR01
48	TOBYCR20
49	TOBYCR19
50	MARSCR10
51	MARSCR12
52	MARSCR13
53	MARSCR11

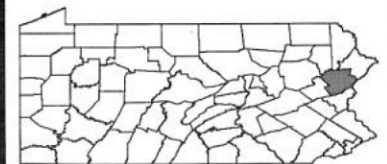


PREPARED BY:

**Monroe County
Planning Commission**
Administrative Center
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April 2009

LOCATION MAP



PENNSYLVANIA

RESULTS

The following pages depict completed site evaluations which consist of the data collected from the 2008 field surveys. This information is utilized to describe and interpret data for the evaluation of the health of the streams according to statistically interpreted results. There are 4 types of parameters presented in the following pages which include the total macroinvertebrate biological scores, surface water parameters, habitat scores and pebble counts. The macroinvertebrates have been statistically analyzed and incorporated into the tables below to examine how these streams compare according to the state wide scoring schemes, and the total adjusted and standardized scoring table is presented. There are two methods for gathering and interpreting macroinvertebrate data, either the riffle-run or multihabitat Aquatic Life Use (ALU) benchmarks, which produces a score for interpretation. Additional information pertaining to the macroinvertebrate data is located in Appendix A. The surface water parameters analyze chemical constituents identified in the surface water samples collected. Additional information pertaining to the surface water parameters is located in Appendix B. The habitat results below describe the instream characteristics as well as the riparian buffer to determine if the area is able to support healthy macroinvertebrate and fish communities. Additional information pertaining to the habitat scores are located in Appendix C. The pebble count represents a numerical description of the conditions identified on the stream floor. Somewhat of a cross-section, this representation aids in identifying which sites have optimal, marginal or poor habitat available for aquatic organisms to colonize. Additional information pertaining to the pebble counts is located in Appendix D. This data is presented according to watersheds and the site identification numbering system.

Aquashicola Creek Watershed

Aquashicola Creek (HO-CWF, MF)

Monroe County Water Quality Study Site Assessment: AQUACR11 – Ross Township

Method- Multihabitat Assessment 10-DFrame Composite.

Location- Immediately upstream of bridge on Mt. Eaton Road.

Habitat Summary	
Substrate for Macroinvertebrates	14
Pool Variability	11
Channel Alteration	13
Sediment Deposition	12
Channel Flow Status	19
Condition of Banks	18
Bank Vegetative Protection	20
Riparian Vegetative Zone Width	15
Pool Substrate Characterization	15
Total Habitat Score	137

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	8	47.06	47.06
Taxa Richness	$(\text{Observed value} / 31) \times 100$	21	67.74	67.74
Beck4	$\text{Observed value} / 22 \times 100$	8	36.36	36.36
Shannon Diversity	$\text{Observed value} / 2.43 \times 100$	2.35867612458599	0.97	97.06
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	2	18.18	18.18
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	4	66.67	66.67
Average of adjusted normalized core metric scores = Total Biological Score				55.51

Surface Water Parameters	
Volume of Flow	0.81
Water Temperature	14.79
Dissolved Oxygen	10.42
pH (Field)	7.48
Specific Conductance	289
Total Hardness	125
Total Alkalinity (CaCO3)	99
Nitrogen	1.3
Nitrate (NO3)	1.29
Nitrite (NO2)	0.006
Chloride	14.2
TDS (Total Dissolved Solids)	145
Fecal Coliform	250 EST
pH (Lab)	7.25

Pebble Count		
Pebble Type	Axis of Particle size (mm)	Count
Fine Sand	> 0.125 - 0.25	2
Medium Sand	> 0.25 - 0.5	7
Coarse Sand	> 0.5 - 1	13
Very Coarse Sand	> 1 - 2	20
Very Fine Gravel	> 2 - 4	26
Fine Gravel	> 4 - 6	18
Fine Gravel	> 6 - 8	6
Medium Gravel	> 8 - 11	5
Medium Gravel	> 11 - 16	2
Coarse Gravel	> 16 - 23	1
Total Count		100

This site rated as optimal for habitat with a score of 137 out of a total score of 180. The total macroinvertebrate biological score is 55.51, which attained the benchmark of 55 ALU for designation. The surface water parameters were within acceptable limits, except fecal coliform. The average pebble count particle size is represented as the D-50, for this site it is 2.5 mm. The total macroinvertebrates collected at this site was 201.

Aquashicola Creek (HQ-CWF, MF)

Monroe County Water Quality Study Site Assessment: AQUACR12 – Lower Towamensing Township, Carbon County

Method- Riffle/Run Assessment 6 D-Frame Composite.

Location- Approximately 538 yards upstream of confluence with Buckwha Creek.

Habitat Summary	
Instream Cover	13
Substrate for Macroinvertebrates	18
Channel Alteration	20
Sediment Deposition	17
Channel Flow Status	20
Condition of Banks	16
Bank Vegetative Protection	20
Grazing or Other Disruptive Pressure	15
Riparian Vegetative Zone Width	14
Embeddedness	15
Velocity/Depth Regimes	17
Frequency of Riffles	17
Total Habitat Score	202

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score Maximum = 1.000
Modified Beck's Index	Observed value / 39	6	0.154	0.154
EPT Taxa Richness	Observed value / 23	12	0.522	0.522
Total Taxa Richness	Observed value / 35	23	0.657	0.657
Shannon Diversity Index	Observed value / 2.90	2.44003422842926	0.841	0.841
Hilsenhoff Biotic Index	(10 - Observed value) / (10 - 1.78)	3.86528497409326	0.746	0.746
Percent Intolerant Individuals	Observed value / 92.5	69.5652173913043	0.752	0.752
Average of adjusted standardized core metric scores * 100 = IBI Score				61.2

Surface Water Parameters	
Volume of Flow	11.32
Water Temperature	18.33
Dissolved Oxygen	9.87
pH (Field)	8.05
Specific Conductance	189
Total Hardness	87
Total Alkalinity (CaCO3)	75
Nitrogen	0.21
Nitrate (NO3)	0.21
Chloride	6.74
TDS (Total Dissolved Solids)	95
Fecal Coliform	210 EST
pH (Lab)	7.41

Pebble Count		
Pebble Type	Axis of Particle size (mm)	Count
Silt/Clay	< 0 - 0.062	3
Very Fine Sand	0.062 - 0.125	1
Medium Sand	> 0.25 - 0.5	1
Coarse Sand	> 0.5 - 1	1
Very Coarse Sand	> 1 - 2	3
Very Fine Gravel	> 2 - 4	2
Fine Gravel	> 4 - 6	2
Fine Gravel	> 6 - 8	2
Medium Gravel	> 8 - 11	9
Medium Gravel	> 11 - 16	7
Coarse Gravel	> 16 - 23	9
Coarse Gravel	> 23 - 32	4
Very Coarse Gravel	> 32 - 45	14
Very Coarse Gravel	> 45 - 64	12
Small Cobble	> 64 - 90	16
Medium Cobble	> 90 - 128	7
Very Large Cobble	> 180 - 256	7
Total Count		100

This site rated as optimal for habitat with a score of 202 out of a total score of 240. The total macroinvertebrate biological score is 61.2, which did not attain the benchmark of 80 ALU for HQ designation. The surface water parameters were within acceptable limits, except fecal coliform. The average pebble count particle size is represented as the D-50, for this site it is 37 mm. The total macroinvertebrates collected at this site was 193.

Macroinvertebrate Sample Summary

Station ID: 20080805-0815-AQUACR11 (Latitude: 40° 52' 27.95" Longitude: -75° 19' 55.27")

Method: 10-DFrame Composite, 200 subsample

Location: Immediately upstream of bridge on Mt. Eaton Road.

Shannon Diversity Index:
2.36

Taxa Richness: 21

EPT Taxa Richness: 8

Mayfly Taxa: 4

Caddisfly Taxa: 2

Beck4: 8

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
Amphipoda	Class Oligochaeta	2	10	CG	Ephemeroptera	Genus Tricorythodes	6	4	CG
	Genus Gammarus	51	4	CG	Isopoda	Genus Caecidotea	13	6	CG
Coleoptera	Genus Lutrochus	1	6	UK	Megaloptera	Genus Sialis	1	6	PR
	Genus Optioservus	39	4	SC	Odonata	Genus Boyeria	4	2	PR
Diptera	Genus Stenelmis	11	5	SC	Plecoptera	Genus Leuctra	12	0	SH
	Family Chironomidae	29	6	CG		Genus Suwallia	2	0	CG
	Genus Chrysops	2	7	PR	Pulmonata	Genus Physinae	5	8	SC
	Genus Simulium	2	6	FC	Trichoptera	Genus Hydatophylax	1	2	SH
Ephemeroptera	Genus Acerpenna	2	6	CG		Genus Mystacides	2	4	CG
	Genus Caenis	9	7	CG	Veneroida	Genus Pisidium	4	8	FC

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	8	47.06	47.06
Taxa Richness	$(\text{Observed value} / 31) \times 100$	21	67.74	67.74
Beck4	$(\text{Observed value} / 22) \times 100$	8	36.36	36.36
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	2.36	97.12	97.12
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	2	18.18	18.18
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	4	66.67	66.67
Average of adjusted normalized core metric scores = Total Biological Score				55.52

Macroinvertebrate Sample Summary

Station ID: 20080805-0900-AQUACR12 (Latitude: 40° 49' 07.05" Longitude: -75° 31' 33.09")

Method: 6-DFrame Composite, 200 subsample

Location: Approximately 538 yards upstream of confluence with Buckwha Creek.

Modified Beck's Index: 6

Total Taxa: 23

EPT Taxa Richness: 12

Shannon Diversity: 2.44

Hilsenhoff Biotic Index: 3.87

Percent Intolerant

Individuals: 69.57%

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
Basommatophora	Genus Ferrissia	1	7	CG	Ephemeroptera	Genus Serratella	9	2	CG
Coleoptera	Family Scirtidae	1	8	SC		Genus Stenonema	13	3	SC
	Genus Optioservus	17	4	SC		Genus Tricorythodes	2	4	CG
	Genus Promoresia	2	2	SC	Megaloptera	Genus Nigronia	10	2	PR
	Genus Stenelmis	1	5	SC	Odonata	Family Gomphidae	1	4	PR
Diptera	Family Chironomidae	22	6	CG	Trichoptera	Genus Ceratopsyche	14	5	FC
	Genus Antocha	5	3	CG		Genus Cheumatopsyche	9	6	FC
	Genus Atherix	1	2	SC		Genus Hydropsyche	1	5	FC
	Genus Simulium	1	6	FC		Genus Leucotrichia	10	6	SC
Ephemeroptera	Genus Acentrella	2	4	SC		Genus Lype	8	2	CG
	Genus Baetis	3	6	CG		Genus Micrasema	1	2	SH

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score Maximum = 1.000
Modified Beck's Index	Observed value / 39	6	0.154	0.154
EPT Taxa Richness	Observed value / 23	12	0.522	0.522
Total Taxa Richness	Observed value / 35	23	0.657	0.657
Shannon Diversity Index	Observed value / 2.90	2.44	0.841	0.841
Hilsenhoff Biotic Index	(10 - Observed value) / (10 - 1.78)	3.87	0.746	0.746
Percent Intolerant Individuals	Observed value / 92.5	69.57	0.752	0.752
Average of adjusted standardized core metric scores * 100 = IBI Score				61.2

Results and Discussion

The following pages depict completed site evaluations, which consist of the data collected from the 2009 field surveys. This information is utilized to describe and interpret data for the evaluation of the health of the streams according to statistically interpreted results. There are 4 types of parameters presented in the following pages which include the total macroinvertebrate biological scores, surface water parameters, habitat scores and pebble counts. The macroinvertebrates have been statistically analyzed and incorporated into the tables below to examine how these streams compare according to the state wide scoring schemes, and the total adjusted and standardized scoring table is presented. There are two methods for gathering and interpreting macroinvertebrate data, both the riffle-run or multihabitat assessments and the associated Aquatic Life Use (ALU) benchmarks, which generate a score for interpretation. Additional information pertaining to the macroinvertebrate data is located in Appendix A. The surface water parameters analyze chemical constituents identified in the surface water samples collected. Additional information pertaining to the surface water parameters is located in Appendix B. The habitat results below describe the instream characteristics as well as the riparian buffer to determine if the area is able to support healthy macroinvertebrate and fish communities. Additional information pertaining to the habitat scores is located in Appendix C. The pebble count represents a numerical description of the conditions identified on the stream floor. Somewhat of a cross-section, this representation aids in identifying which sites have optimal, marginal or poor habitat available for aquatic organisms to colonize. Additional information pertaining to the pebble counts is located in Appendix D. This data is presented alphabetically according to watersheds and then by the site identification numbering system.

Aquashicola Creek Watershed
Aquashicola Creek (HQ-CWF, MF)

Monroe County Water Quality Study Site Assessment:
AQUACR11 - Ross Township

09/10/2009 (Latitude: 40° 52' 27.95" Longitude: -75° 19' 55.27")

Method - Multihabitat Assessment 10-DFrame Composite.

Location - Immediately upstream of bridge on Mt. Eaton Road.

Habitat Summary	
Substrate for Macroinvertebrates	15
Pool Variability	15
Channel Alteration	13
Sediment Deposition	14
Channel Flow Status	18
Condition of Banks	17
Bank Vegetative Protection	19
Riparian Vegetative Zone Width	16
Pool Substrate Characterization	17
Total Habitat Score	144

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	6	35.29	35.29
Taxa Richness	$(\text{Observed value} / 31) \times 100$	19	61.29	61.29
Beck4	$\text{Observed value} / 22 \times 100$	3	13.64	13.64
Shannon Diversity	$\text{Observed value} / 2.43 \times 100$	1.94	0.8	79.84
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	2	18.18	18.18
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	3	50	50
Average of adjusted normalized core metric scores = Total Biological Score				43.04

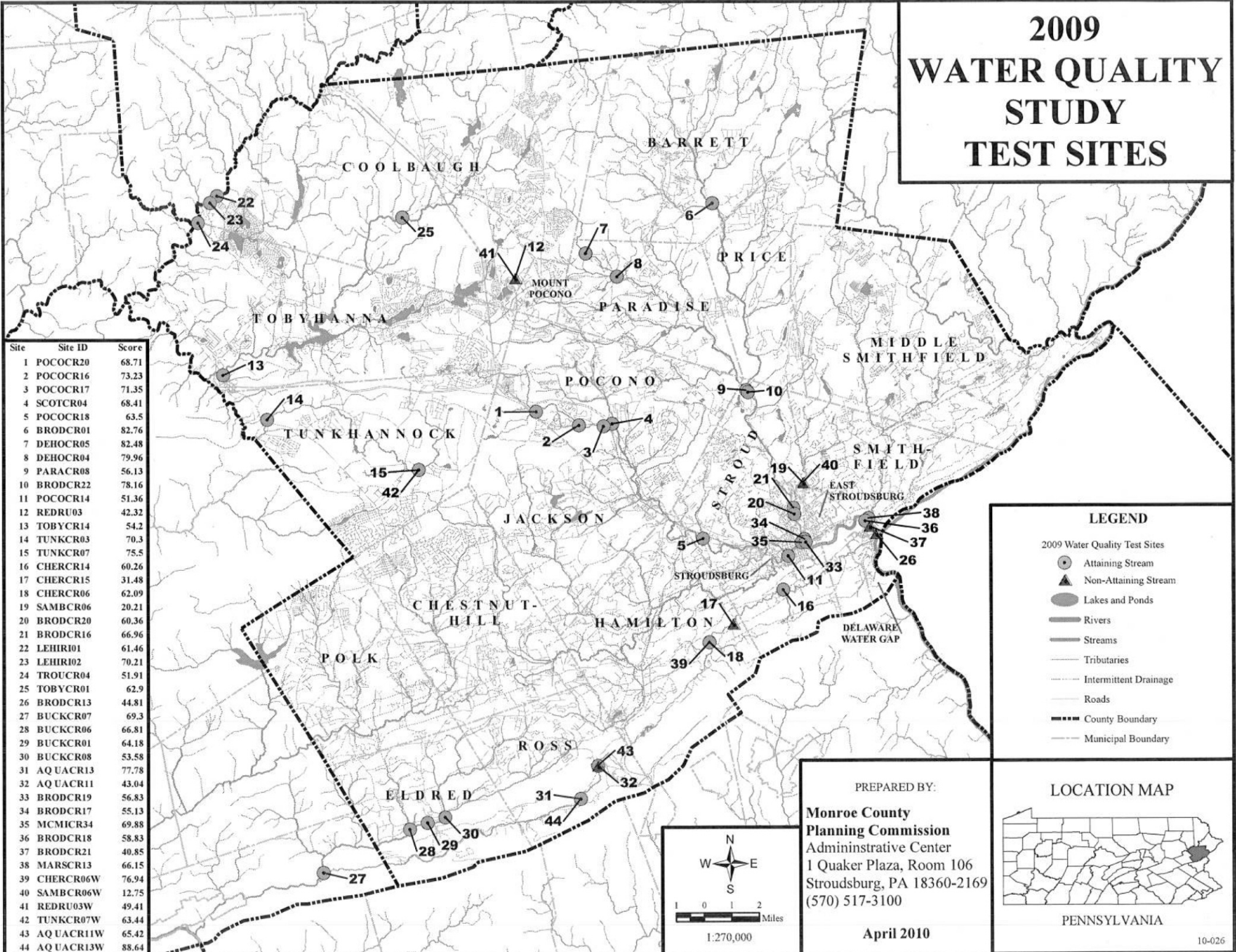
Surface Water Parameters	
Volume of Flow cfs	0.634
Water Temperature °C	14.04
Dissolved Oxygen mg/l	11.64
pH (Field)	8.38
Specific Conductance µS	254
Total Hardness mg/l	118
Total Alkalinity (CaCO3) mg/l	90
Nitrogen mg/l	1.12
Nitrate (NO3) mg/l	1.12
Chloride mg/l	16
TDS (Total Dissolved Solids) mg/l	152
Fecal Coliform mls	64
Calcium mg/l	33.5
Magnesium mg/l	6.83
Oxidation-Reduction Potential	100.5
Sulfate mg/l	11.4

Pebble Count		
Pebble Type	Axis of Particle size (mm)	Count
Fine Sand	> 0.125 - 0.25	2
Very Coarse Sand	> 1 - 2	9
Very Fine Gravel	> 2 - 4	8
Fine Gravel	> 4 - 6	11
Fine Gravel	> 6 - 8	11
Medium Gravel	> 8 - 11	10
Medium Gravel	> 11 - 16	37
Coarse Gravel	> 16 - 23	10
Coarse Gravel	> 23 - 32	2
Total Count		100

The total macroinvertebrate biological score is 43.0 which did not attain the benchmark of 55 for non-impairment. The total macroinvertebrates collected at this site was 220. The surface water parameters were within required limits. The habitat scored in the optimal range with 144 out of 180. The average pebble count particle size for this site is 10.7.

2009 WATER QUALITY STUDY TEST SITES

Site	Site ID	Score
1	POCOCR20	68.71
2	POCOCR16	73.23
3	POCOCR17	71.35
4	SCOTCR04	68.41
5	POCOCR18	63.5
6	BRODCR01	82.76
7	DEHOCR05	82.48
8	DEHOCR04	79.96
9	PARACR08	56.13
10	BRODCR22	78.16
11	POCOCR14	51.36
12	REDRU03	42.32
13	TOBYCR14	54.2
14	TUNKCR03	70.3
15	TUNKCR07	75.5
16	CHERCRI4	60.26
17	CHERCRI5	31.48
18	CHERCRI06	62.09
19	SAMBCR06	20.21
20	BRODCR20	60.36
21	BRODCR16	66.96
22	LEHIRI01	61.46
23	LEHIRI02	70.21
24	TROUCR04	51.91
25	TOBYCR01	62.9
26	BRODCR13	44.81
27	BUCKCR07	69.3
28	BUCKCR06	66.81
29	BUCKCR01	64.18
30	BUCKCR08	53.58
31	AQUACR13	77.78
32	AQUACR11	43.04
33	BRODCR19	56.83
34	BRODCR17	55.13
35	MCMICR34	69.88
36	BRODCR18	58.83
37	BRODCR21	40.85
38	MARSCR13	66.15
39	CHERCRI06W	76.94
40	SAMBCR06W	12.75
41	REDRU03W	49.41
42	TUNKCR07W	63.44
43	AQUACR11W	65.42
44	AQUACR13W	88.64



Aquashicola Creek (HQ-CWF, ME)

Monroe County Water Quality Study Site Assessment:

AQUACR11W- Ross Township

Winter Sampling

11/12/2009 (Latitude: 40° 52' 27.95" Longitude: -75° 19' 55.27")

Method - Multihabitat Assessment 10-DFrame Composite.

Location - Immediately upstream of bridge on Mt. Eaton Road.

Surface Water Parameters	
Water Temperature °c	8.69
Dissolved Oxygen mg/l	12.41
pH (Field)	8.74
Specific Conductance µS	162
Total Hardness mg/l	61
Total Alkalinity (CaCO3) mg/l	42.5
Nitrogen mg/l	0.628
Nitrate (NO3) mg/l	0.628
Chloride mg/l	15.6
TDS (Total Dissolved Solids) mg/l	97
Fecal Coliform mls	18
Calcium mg/l	15.5
Magnesium mg/l	3.77
Oxidation-Reduction Potential	59.7
Total Organic Carbon mg/l	1
Sulfate mg/l	7.7

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	13	76.47	76.47
Taxa Richness	$(\text{Observed value} / 31) \times 100$	22	70.97	70.97
Beck4	$(\text{Observed value} / 22) \times 100$	10	45.45	45.45
Shannon Diversity	$(\text{Observed value} / 2.43) \times 100$	2.09	0.86	86.01
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	7	63.64	63.64
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	3	50	50
Average of adjusted normalized core metric scores = Total Biological Score				65.42

The total macroinvertebrate biological score during the winter assessment was 65.4 which did attain the benchmark of 55 for non-impairment. The surface water parameters for winter were within required criteria. The total macroinvertebrates collected at this site during winter was 178.

Aquashicola Creek (HQ-CWF, MF)

**Monroe County Water Quality Study Site Assessment:
AQUACR13 - Ross Township**

09/10/2009

(Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")

Method - Multihabitat Assessment 10-DFrame Composite.

Location - Private Property off Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Habitat Summary	
Substrate for Macroinvertebrates	19
Pool Variability	18
Channel Alteration	15
Sediment Deposition	15
Channel Flow Status	19
Condition of Banks	20
Bank Vegetative Protection	20
Riparian Vegetative Zone Width	16
Pool Substrate Characterization	16
Total Habitat Score	158

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	15	88.24	88.24
Taxa Richness	$(\text{Observed value} / 31) \times 100$	27	87.1	87.1
Beck4	$\text{Observed value} / 22 \times 100$	8	36.36	36.36
Shannon Diversity	$\text{Observed value} / 2.43 \times 100$	2.22	0.91	91.36
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	7	63.64	63.64
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	7	116.67	100
Average of adjusted normalized core metric scores = Total Biological Score				77.78

Surface Water Parameters	
Volume of Flow cfs	3.66
Water Temperature °C	13.77
Dissolved Oxygen mg/l	10.39
pH (Field)	8.02
Specific Conductance µS	221
Total Alkalinity (CaCO3) mg/l	83
Nitrogen mg/l	0.823
Nitrate (NO3) mg/l	0.823
Chloride mg/l	12.1
TDS (Total Dissolved Solids) mg/l	133
Fecal Coliform mls	82
Calcium mg/l	28.6
Magnesium mg/l	6.25
Oxidation-Reduction Potential	137.9
Total Organic Carbon mg/l	1.1
Sulfate mg/l	8.8

Pebble Count		
Pebble Type	Axis of Particle size (mm)	Count
Very Fine Sand	0.062 - 0.125	11
Very Coarse Sand	> 1 - 2	3
Fine Gravel	> 4 - 6	2
Fine Gravel	> 6 - 8	1
Medium Gravel	> 8 - 11	4
Medium Gravel	> 11 - 16	10
Coarse Gravel	> 16 - 23	25
Coarse Gravel	> 23 - 32	13
Very Coarse Gravel	> 32 - 45	18
Very Coarse Gravel	> 45 - 64	6
Small Cobble	> 64 - 90	4
Medium Cobble	> 90 - 128	1
Large Cobble	> 128 - 180	1
Very Large Cobble	> 180 - 256	1
Total Count		100

The total macroinvertebrate biological score is 77.7 which did attain the benchmark of 55 for non-impairment. The total macroinvertebrates collected at this site was 212. The surface water parameters were within required limits. The habitat scored in the optimal range with 158 out of 180. The average pebble count particle size for this site is 20.4.

Aquashicola Creek (HQ-CWF, MF)

Monroe County Water Quality Study Site Assessment:

AQUACR13R - Ross Township

Macroinvertebrate Replicate

09/10/2009

(Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")

Method - Multihabitat Assessment 10-DFrame Composite.

Location - Private Property off Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	14	82.35	82.35
Taxa Richness	$(\text{Observed value} / 31) \times 100$	22	70.97	70.97
Beck4	$(\text{Observed value} / 22) \times 100$	7	31.82	31.82
Shannon Diversity	$(\text{Observed value} / 2.43) \times 100$	1.95	0.8	80.25
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	6	54.55	54.55
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	6	100	100
Average of adjusted normalized core metric scores = Total Biological Score				69.99

The total macroinvertebrate replicate score is 69.9 which attained the benchmark of 55 for non-impairment. The total macroinvertebrates collected at this site was 269. The replicate sample violated criteria for required sample size.

Aquashicola Creek (HQ-CWF, MF)

**Monroe County Water Quality Study Site Assessment:
AQUACR13W - Ross Township
Winter Sampling**

11/12/2009 (Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")
Method - Multihabitat Assessment 10-DFrame Composite.
Location - Private Property off Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Surface Water Parameters	
Water Temperature °C	8.93
Dissolved Oxygen mg/l	12.78
pH (Field)	8.47
Specific Conductance µS	178
Total Hardness mg/l	72
Total Alkalinity (CaCO ₃) mg/l	55
Nitrogen mg/l	0.713
Nitrate (NO ₃) mg/l	0.713
Chloride mg/l	13.8
TDS (Total Dissolved Solids) mg/l	104
Magnesium mg/l	4.5
Oxidation-Reduction Potential	104
Total Kjeldahl Nitrogen mg/l	0.673
Sulfate mg/l	7.5

Metric Standardization Equations				
Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	17	100	100
Taxa Richness	$(\text{Observed value} / 31) \times 100$	31	100	100
Beck4	$(\text{Observed value} / 22) \times 100$	13	59.09	59.09
Shannon Diversity	$(\text{Observed value} / 2.43) \times 100$	2.77	1.14	100
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	8	72.73	72.73
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	8	133.33	100
Average of adjusted normalized core metric scores = Total Biological Score				88.64

The total macroinvertebrate biological score is 88.6 which attained the benchmark of 55 for non-impairment. The total macroinvertebrates collected at this site was 209. The surface water parameters were within required limits.

Monroe County Macroinvertebrate Replicate Taxa

Aquashicola Creek

Station ID: 09/10/2009-1130-AQUACR13-R (Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")

Method: 10-DFrame Composite, 200 subsample

Location: Private Property off of Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Shannon Diversity Index: 1.95

Taxa Richness: 22

EPT Taxa Richness: 14

Mayfly Taxa: 6

Caddisfly Taxa: 6

Beck4: 7

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
Amphipoda	Genus Hyalella	1	8	CG	Ephemeroptera	Genus Stenonema	5	3	SC
Coleoptera	Genus Optioservus	1	4	SC	Lumbricina	Order Lumbricina	3	8	CG
	Genus Psephenus	1	4	SC	Megaloptera	Genus Sialis	2	6	PR
	Genus Stenelmis	13	5	SC	Plecoptera	Genus Agnetina	2	2	PR
Diptera	Family Chironomidae	89	6	CG		Genus Suwallia	1	0	CG
	Genus Simulium	8	6	FC	Trichoptera	Genus Cheumatopsyche	75	6	FC
Ephemeroptera	Genus Acerpenna	5	6	CG		Genus Chimarra	29	4	FC
	Genus Baetis	26	6	CG		Genus Helicopsyche	1	3	SC
	Genus Hexagenia	1	2	PR		Genus Hydatophylax	1	2	SH
	Genus Paraleptophlebia	2	1	CG		Genus Molanna	1	6	SC
	Genus Serratella	1	2	CG		Genus Rhyacophila	1	1	PR

Metric Standardization Equations

Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	14	82.35	82.35
Taxa Richness	$(\text{Observed value} / 31) \times 100$	22	70.97	70.97
Beck4	$(\text{Observed value} / 22) \times 100$	7	31.82	31.82
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	1.95	80.25	80.25
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	6	54.55	54.55
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	6	100	100
Average of adjusted normalized core metric scores = Total Biological Score				69.99

Monroe County Macroinvertebrate Taxa Summary

Aquashicola Creek

Station ID: 09/10/2009-1130-AQUACR13 (Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")

Method: 10-DFrame Composite, 200 subsample

Location: Private property off Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Shannon Diversity Index: 2.22

Taxa Richness: 27

EPT Taxa Richness: 15

Mayfly Taxa: 7

Caddisfly Taxa: 7

Beck4: 8

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
Amphipoda	Class	5	10	CG	Ephemeroptera	Genus	9	3	SC
	Oligochaeta					Stenonema			
	Genus	5	4	CG		Genus	1	4	CG
Basommatophora	Gammarus				Hemiptera	Tricorythodes			
	Family	1	6	CG		Genus	1	8	PR
Coleoptera	Planorbidae					Odonata	Ramphocorixa		
	Genus	2	6	SC	Genus		1	6	PR
	Dubiraphia				Plecoptera		Argia		
Diptera	Genus	1	2	SC		Genus	1	0	SH
	Microcylloepus					Leuctra			
	Genus	19	4	SC	Trichoptera	Genus	1	5	FC
	Optioservus					Ceratopsyche			
	Family	87	6	CG		Genus	28	6	FC
Chironomidae				Cheumatopsyche					
Genus	10	6	FC	Genus		10	4	FC	
Ephemeroptera	Simulium				Veneroida	Chimarra			
	Genus	1	5	PR		Genus	9	5	FC
	Tabanus					Hydropsyche			
	Genus	9	4	SC		Genus	1	5	FC
	Acentrella					phylocentropus			
	Genus	1	6	CG		Genus	3	6	FC
	Acerpenna					Polycentropus			
	Genus	2	6	CG		Genus	1	6	SH
	Baetis					Trienodes			
	Genus	1	4	SC		Genus	1	8	FC
Ephemeroptera	Eurylophella								
	Genus	1	6	CG					
	Litobranchia								

Metric Standardization Equations

Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	15	88.24	88.24
Taxa Richness	$(\text{Observed value} / 31) \times 100$	27	87.1	87.1
Beck4	$(\text{Observed value} / 22) \times 100$	8	36.36	36.36
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	2.22	91.36	91.36
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	7	63.64	63.64
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	7	116.67	100
Average of adjusted normalized core metric scores = Total Biological Score				77.78

Monroe County Macroinvertebrate Taxa Summary

Aquashicola Creek

Station ID: 09/10/2009-1200-AQUACR11 (Latitude: 40° 52' 27.95" Longitude: -75° 19' 55.27")

Method: 10-DFrame Composite, 200 subsample

Location: Immediately upstream of bridge on Mt. Eaton Road.

Shannon Diversity Index: 1.94

Taxa Richness: 19

EPT Taxa Richness: 6

Mayfly Taxa: 3

Caddisfly Taxa: 2

Beck4: 3

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
	Class Bithyniidae	3	7	SC	Ephemeroptera	Genus Baetis	2	6	CG
	Class Oligochaeta	8	10	CG		Genus Eurylophella	1	4	SC
Amphipoda	Genus Gammarus	77	4	CG		Genus Stenonema	2	3	SC
Coleoptera	Genus Dubiraphia	5	6	SC	Isopoda	Genus Caecidotea	33	6	CG
	Genus Lutrochus	1	6	UK	Odonata	Genus Cordulegaster	1	3	PR
	Genus Optioservus	10	4	SC	Plecoptera	Genus Isoperla	1	2	PR
Diptera	Family Chironomidae	57	6	CG	Trichoptera	Genus Cheumatopsyche	3	6	FC
	Genus Dicranota	1	3	PR		Genus Hydropsyche	3	5	FC
	Genus Simulium	7	6	FC	Veneroida	Genus Pisidium	4	8	FC
	Genus Tabanus	1	5	PR					

Metric Standardization Equations

Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	6	35.29	35.29
Taxa Richness	$(\text{Observed value} / 31) \times 100$	19	61.29	61.29
Beck4	$(\text{Observed value} / 22) \times 100$	3	13.64	13.64
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	1.94	79.84	79.84
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	2	18.18	18.18
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	3	50	50
Average of adjusted normalized core metric scores = Total Biological Score				43.04

Monroe County Winter Macroinvertebrate Taxa Summary

Aquashicola Creek

Station ID: 11/12/2009-1215-AQUACR11-W (Latitude: 40° 52' 27.95" Longitude: -75° 19' 55.27")

Method: 10-DFrame Composite, 200 subsample

Location: Immediately upstream of bridge on Mt. Eaton Road.

Shannon Diversity Index: 2.09

Taxa Richness: 22

EPT Taxa Richness: 13

Mayfly Taxa: 3

Caddisfly Taxa: 7

Beck4: 10

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
	Class	5	10	CG	Plecoptera	Genus Sweltsa	1	0	PR
Amphipoda	Oligochaeta					Genus	2	2	SH
	Genus	14	4	CG		Taeniopteryx			
Basommatophora	Gammarus				Rhynchobdellida	Genus	1	8	PR
	Family	1	6	CG		Myzobdella			
Coleoptera	Planorbidae				Trichoptera	Family	7	4	SH
	Genus	1	6	UK		Limnephilidae			
	Lutrochus					Genus	2	5	FC
	Genus	6	4	SC		Hydropsyche			
Diptera	Optioservus					Genus	1	6	SC
	Family	78	6	CG		Molanna			
Ephemeroptera	Chironomidae					Genus	1	5	FC
	Genus	17	4	CG		phylocentropus			
	Leptophlebia					Genus	1	4	SH
	Genus	1	6	CG		Platycentropus			
	Litobranchia					Genus	2	6	FC
	Genus	3	3	SC		Polycentropus			
Isopoda	Stenonema					Genus	3	4	SH
	Genus	22	6	CG	Veneroida	Pycnopsyche			
Plecoptera	Caecidotea					Genus	5	8	FC
	Genus	4	0	SH		Pisidium			
	Leuctra								

Metric Standardization Equations

Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	13	76.47	76.47
Taxa Richness	$(\text{Observed value} / 31) \times 100$	22	70.97	70.97
Beck4	$(\text{Observed value} / 22) \times 100$	10	45.45	45.45
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	2.09	86.01	86.01
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	7	63.64	63.64
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	3	50	50
Average of adjusted normalized core metric scores = Total Biological Score				65.42

Monroe County Winter Macroinvertebrate Taxa Summary

Aquashicola Creek

Station ID: 11/12/2009-1230-AQUACR13-W (Latitude: 40° 51' 28.26" Longitude: -75° 20' 40.50")

Method: 10-DFrame Composite, 200 subsample

Location: Private property off Upper Smith Gap Road, approximately 0.5 miles downstream of Tittle Road.

Shannon Diversity Index: 2.77

Taxa Richness: 31

EPT Taxa Richness: 17

Mayfly Taxa: 8

Caddisfly Taxa: 8

Beck4: 13

Taxa		Number	Tolerance	Trophic Code			Number	Tolerance	Trophic Code
	Phylum	1	9	CG	Ephemeroptera	Genus	11	1	CG
	Nematomorpha					Paraleptophlebia			
	Class	8	10	CG		Genus	28	3	SC
	Oligochaeta					Stenonema			
	Class	2	9	PR	Isopoda	Genus	8	6	CG
Amphipoda	Turbellaria					Caecidotea			
	Genus	2	4	CG	Megaloptera	Genus	1	2	PR
Coleoptera	Gammarus					Nigronia			
	Dubiraphia	1	6	SC		Genus	1	6	PR
	Genus	1	6	UK	Odonata	Sialis			
	Lutrochus					Family	1	4	PR
	Genus	23	4	SC	Plecoptera	Gomphidae			
Diptera	Optioservus					Genus	1	2	PR
	Family	29	6	CG	Trichoptera	Agnetina			
	Chironomidae					Family	11	4	SH
	Genus	1	3	CG		Limnephilidae			
	Antocha					Genus	1	0	SC
	Genus	1	6	FC		Agapetus			
Ephemeroptera	Simulium					Genus	22	6	FC
	Genus	1	4	SC		Cheumatopsyche			
	Acentrella					Genus	13	4	FC
	Genus	3	6	CG		Chimarra			
	Acerpenna					Genus	17	5	FC
	Genus	2	6	CG		Hydropsyche			
	Baetis					Genus	2	6	SC
	Genus	2	1	SC		Molanna			
	Ephemerella					Genus	1	6	FC
	Genus	2	4	SC		Polycentropus			
	Eurylophella					Genus	1	4	SH
	Genus	11	4	CG		Pycnopsyche			
	Leptophlebia								

Metric Standardization Equations

Metric	Standardization Equation	Observed Metric Value	Normalized Metric Score	Adjusted Standardized Metric Score Maximum = 100
EPT	$(\text{Observed value} / 17) \times 100$	17	100	100
Taxa Richness	$(\text{Observed value} / 31) \times 100$	31	100	100
Beck4	$(\text{Observed value} / 22) \times 100$	13	59.09	59.09
Shannon Diversity Index	$(\text{Observed value} / 2.43) \times 100$	2.77	113.99	100
# Of Caddisfly Taxa	$(\text{Observed value} / 11) \times 100$	8	72.73	72.73
# Of Mayfly Taxa	$(\text{Observed value} / 6) \times 100$	8	133.33	100
Average of adjusted normalized core metric scores = Total Biological Score				88.64