

PICKERING CREEK

CHESTER COUNTY

**WATER QUALITY STANDARDS REVIEW
STREAM REDESIGNATION EVALUATION REPORT**

**Segment: Basin
Stream Code: 01508
Drainage List: F**

**WATER QUALITY MONITORING SECTION (MJL)
DIVISION OF WATER QUALITY STANDARDS
BUREAU OF POINT & NON-POINT SOURCE MANAGEMENT
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

February 2016

INTRODUCTION

The Department conducted an evaluation of the Pickering Creek basin (from its source to the Philadelphia Suburban Water Company Dam) in response to a petition from the Green Valleys Association that requests this basin be redesignated to Exceptional Value waters (EV). The Pickering Creek basin above the Philadelphia Suburban WCD is currently designated High Quality – Trout Stocking, Migratory Fishes (HQ-TSF, MF). One component of this evaluation is based on field surveys conducted November 10-17, 2008.

GENERAL WATERSHED DESCRIPTION

Pickering Creek is a freestone tributary to the Schuylkill River in the Delaware River watershed. The candidate basin is located in East Pikeland, West Vincent, Schuylkill, Upper Uwchlan, Uwchlan, Charlestown, and West Pikeland Townships, Chester County (Figure 1). The Pickering Creek basin has a drainage area of 38.8 square miles and the mainstem consists of 17.7 stream miles. The surrounding area is characterized by relatively flat topography with some gently rolling hills of low relief.

The current land use in the watershed consists mostly of agriculture and wooded land. Land use is a mixture of agriculture (46.8%), forest (41.9%), and urban/developed (8.8%). High density urban areas include an oil tank farm to the west and warehouse infrastructure to the west and southwest. Low density urban areas include sprawl associated with Phoenixville to the north and various cul-de-sac developments to the southwest.

WATER QUALITY AND USES

Surface Water

Biological data was collected to evaluate water quality conditions in Pickering Creek and the Pickering Creek basin, since the indigenous aquatic community is a better indicator of long-term water quality conditions. There are a total of six NPDES permits issued within the watershed. There is one surface water withdrawal owned and operated by AQUA PA Inc.

Aquatic Biota

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of both water quality and ecological significance. Department staff collected habitat and benthic macroinvertebrate data at seven locations on Pickering Creek, Pine Creek, and Pigeon Run on November 10 and 12, 2008 and from one station each on Sliders Branch (small tributary EV reference; Potter County) and Kettle Creek (mainstem EV reference; Potter County) November 17, 2008 (Figure 1, Table 1).

Habitat. Instream habitat was assessed at each station on Pickering Creek, Sliders Branch and Kettle Creek. Total habitat scores (Table 2) ranged from the suboptimal of 175 (1PC) to the optimal of 209 (1PN) compared to optimal scores found at reference stations 1SB (228) and 1KC (224). Low scoring parameters of all stations indicated moderate vegetative disruptive pressure, moderately eroded banks, and a lack of adequate riparian buffering at most stations.

Benthos. Benthic macroinvertebrate samples were collected at all nine stations (Table 3) using the Department's PA-DEP RBP benthic sampling methodology which is a modification of EPA's Rapid Bioassessment Protocols (RPBs; Plafkin, et al 1989; Barbour, et al 1999). Taxonomic diversity was fair overall, and ranged from a low of 20 at 2UNT and 1PN to a high of 26 at 1PR and 1PC. Taxa sensitive to water quality degradation were present, but scarce. This reduction in sensitive taxa compared to the reference stations reflects the cumulative impacts of human activity to these streams.

BIOLOGICAL USE QUALIFICATIONS

The biological use qualifying criterion applied to the petitioned basins was the DEP integrated benthic macroinvertebrate scoring test described at § 93.4b(b)(1)(v). Selected benthic macroinvertebrate community metrics from Pickering Creek (Table 4) were compared to those from reference streams with a comparable drainage area. Stations 1PC, 2PC and 3PC were compared to a reference station on Kettle Creek (1KC) in Potter County, which is currently designated Exceptional Value (EV). Stations 1PR, 1UNT, 1PN, AND 2UNT were compared to a station on Sliders Branch (1SB), a tributary to Kettle Creek. Sliders Branch and Kettle Creek were used as references because both are freestone streams, have similar drainage areas to the candidate basins (Sliders Branch = 5.5 and Kettle Creek = 20.2 square miles). In addition, Kettle Creek has served as an EV reference stream in several other Departmental surveys. Sampling of all stations was conducted within a week's time to minimize seasonal variation. The comparisons were done using the following metrics that were selected as being indicative of community health: taxa richness; modified EPT index; modified Hilsenhoff Biotic Index; percent dominant taxon; and percent modified mayflies.

Based on these five metrics, the seven stations in the candidate basin had Biological Condition Scores that ranged from 30% to 73% of the reference station (Table 5). These candidate/reference comparisons for the basin and mainstem stations, did not meet the 92% comparison standard required to qualify as Exceptional Value Waters (§ 93.4(b)(1)(v)).

ADDITIONAL EXCEPTIONAL VALUE WATERS QUALIFYING CRITERIA

Based on petitioner information suggesting that certain EV regulatory criteria may apply, the Department evaluated additional antidegradation criteria listed in § 93.4b(b). These additional criteria include:

- A. The water is an outstanding National, State, regional or local resource water [§ 93.4b(b)(1)(iii) – see Appendix A¹];
- B. The water is a surface water of exceptional recreational significance [§ 93.4b(b)(1)(iv) – see Appendix A²].
- C. The water is a surface water of exceptional ecological significance [§ 93.4b(b)(2) – see Appendix A³].

A. Waters qualifying as EV as outstanding National, State, regional or local resource waters under § 93.4b(b)(1)(iii):

This “outstanding resource waters” EV qualifier may be considered for the Pickering Creek basin from its source to the Philadelphia Suburban Water Company Dam since this portion of the petitioned basin already has the prerequisite HQ designation. This qualifier establishes requirements for national, state, regional and local resource waters.

Outstanding National or State Resource Waters

To qualify for outstanding National or State resource waters, a government agency must adopt water quality protection measures for such waters.

No waters that meet this criterion have been identified in the petition. In addition, no public lands encompass Pickering Creek basin from its source to the Philadelphia Suburban Water Company Dam.

Outstanding Regional or Local Resource Waters

To qualify for outstanding regional and local resource waters, a regional or local government must adopt “coordinated water quality protection measures,” as that phrase is defined in 25 Pa. Code Section 93.1, along a watershed corridor. (See Appendix A for definitions.) The Department evaluated whether any municipally-owned lands or other municipal real estate interests in land, such as conservation easements, are located along a watershed corridor and whether any such lands are “coupled with” sound land use water quality protective measures. In addition, the Department evaluated local ordinances described below, as “coordinated water quality protective measures” adopted by local governments within the Pickering Creek basin.

1. Charlestown Township has adopted protective measures through a wetland and riparian forest buffers ordinance that prohibits building within fifty feet of any wetland, and requires the Board of Supervisor's Landscape Plan approval for proposed plantings along watercourses.
2. East Pikeland Township has adopted protective measures through a riparian buffer conservation areas ordinance that limits building of structures or land disturbance within any riparian buffer area with noted exceptions.
3. Schuylkill Township has adopted protective ordinances that require all natural streams, channels, swales, or drainage systems be maintained in existing condition, and limits development within fifty feet of any wetlands.
4. Upper Uwchlan Township has adopted protective measures through a riparian buffer areas ordinance that limits building of structures or land disturbance within any riparian buffer area with noted exceptions.
5. Uwchlan Township has adopted protective measures that limit development within a fifty foot riparian buffer.
6. West Pikeland Township has adopted protective measures that limit development within an unspecified riparian buffer.
7. West Vincent Township has adopted protective measures that limit development within a fifty foot riparian buffer on level terrain, and an additional four feet for every one percent increase in slope.

Although the protective measures provided by these townships will enhance water quality protection, the regulations require that such measures be "coupled with" an interest in real estate, as described at § 93.1. Definitions - "Coordinated water quality protective measures". Such requisite real estate interests have not been identified along Pickering Creek basin from its source to the Philadelphia Suburban Water Company Dam.

Real Estate Interests

Real estate interests identified by the Natural Lands Trust and the French and Pickering Creek Conservation Trust include conservation easements of varying property specific measures to maintain existing water quality of Pickering Creek and tributaries.

Although these preserved and eased properties represent legally binding sound land use water quality protective measures, no regional or local government has adopted these easements or

is a beneficiary of these easements. Therefore, the easements may not be taken into consideration under the regulations.

B. Waters Qualifying as EV as Surface Water of Exceptional Recreational Significance under § 93.4b(b)(1)(iv):

This “surface water of exceptional recreational significance” EV qualifier defined in § 93.1 is applicable to surface waters that provide a “water-based, water quality-dependent recreational opportunity because there are only a limited number of naturally occurring areas and waterbodies across the State where the activity is available or feasible.”

This exceptional recreational waters qualifier has been reviewed for Pickering Creek’s recreational attributes as described below:

1. There are several beagling and fox hunts in the Northern Chester County community. While it may be important to have a natural habitat that provide cover for game, this recreational opportunity does not provide a water-based, water quality-dependent recreational opportunity.
2. The Pennsylvania Fish and Boat Commission provide fingerlings to local cooperative nurseries and stocks adult fish in Pickering Creek providing excellent fishing opportunities. These opportunities exist throughout the state and can not be described as a limited opportunity activity.
3. Various parks, summer camps, preserves and nature centers provide opportunities for specialized outings, hikes and environmental education events. These opportunities exist throughout the state and can not be described as a limited opportunity activity.

C. Waters Qualifying as EV as Surface Waters of Exceptional Ecological Significance under § 93.4b (b)(2):

Information gathered for the Pennsylvania Natural Heritage Program and reported in County Natural Areas Inventories for Chester County did identify Pigeon Run Wetland as an area of local significance within the Pickering Creek basin, but no statewide or local ecological community types were identified that would satisfy the “exceptional ecological significance” requirement of this EV criterion.

Additional information was provided that identified the *Cambarus acuminatus* complex, a group of crayfish not previously known to exist north of the Patapsco drainage in Maryland. In recent years four reproducing populations have been identified in Pennsylvania, including one in the Pickering Creek basin. These populations have not yet been described, and there exists the

potential for listing as a state and/or federal endangered or threatened species. Until these populations are described in cannot be determined if they are indeed unique or if they have a limited geographic reach. Although threatened and endangered species status alone, is not an EV qualifier, such species are provided protection through the Department's permitting process (See implementation of antidegradation regulations at 25 Pa. Code Section 93.4c(a)(2).)

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Department provided public notice of this redesignation evaluation and requested technical data from the general public through publication in the Pennsylvania Bulletin on August 13, 2005 (35 Pa.B 4671). A similar notice was also published in The Mercury newspaper (Pottstown, PA) on August 19, 2005. In addition, Schuylkill, Upper Uwchlan, Uwchlan, West Pikeland, West Vincent, Charlestown, East Pikeland Townships, and the Chester County Planning Commission were notified of the redesignation evaluation in a letter dated July 13, 2005. As a result of this and other requests, the petitioner provided data from Stroud Water Research Center, information pertaining to the *Cambarus acuminatus* complex, local township ordinances, and information on eased properties. Data was also submitted by the Homebuilders Association of Chester and Delaware Counties. The data provided by the petitioner was used as documentation and support for acceptance of the Pickering Creek petition for redesignation.

Final Draft Notice, Comments and Response. Once the final draft report was completed, it was made available to the petitioner, all municipalities, County Planning Commissions, County Conservation Districts and other State Agencies on December 15, 2015 with an initial public comment period ending 30-days later. The Schuylkill Township Environmental Advisory Council requested an extension of the original 30-day public comment period. In response the Department provided an additional 30-day comment period extension. The Green Valleys Watershed Association provided additional materials and comments in opposition of the no change recommendation. Also, the West Vincent Township Board of Supervisors provided a letter in support of the petition.

RECOMMENDATION

Based on applicable regulatory definitions and requirements of § 93.4b, the Department recommends that the Pickering Creek basin (from its source to the Philadelphia Suburban Water Company Dam) maintain its current designated use (Figure 1). The Pickering Creek basin is currently designated High Quality – Trout Stocking, Migratory Fishes (HQ-TSF, MF). This recommendation does not reflect the special protection designations sought in the petition.

APPENDIX A

¹Definition at § 93.1: *Outstanding National, State, regional or local resource water*—A surface water for which a National or State government Agency has adopted water quality protective measures in a resource management plan, or regional or local governments have adopted coordinated water quality protective measures³ along a watershed corridor.

² Definition at § 93.1: *Surface water of exceptional recreational significance*—A surface water which provides a water-based, water quality-dependent recreational opportunity (such as fishing for a species with limited distribution) because there are only a limited number of naturally occurring areas and waterbodies across the State where the activity is available or feasible.

³ Definition at § 93.1: *Surface water of exceptional ecological significance*—A surface water which is important, unique or sensitive ecologically, but whose water quality as measured by traditional parameters (for example, chemical, physical or biological) may not be particularly high, or whose character cannot be adequately described by these parameters. These waters include:

- (i) Thermal springs.
- (ii) Wetlands which are exceptional value wetlands under § 105.17(1) (relating to wetlands).

⁴ Definition at § 93.1: *Coordinated water quality protective measures*—

(i) Legally binding sound land use water quality protective measures coupled with an interest in real estate which expressly provide long-term water quality protection of a watershed corridor.

(ii) Sound land use water quality protective measure include: surface or ground water protection zones, enhanced stormwater management measures, wetland protection zones or other measures which provide extraordinary water quality protection.

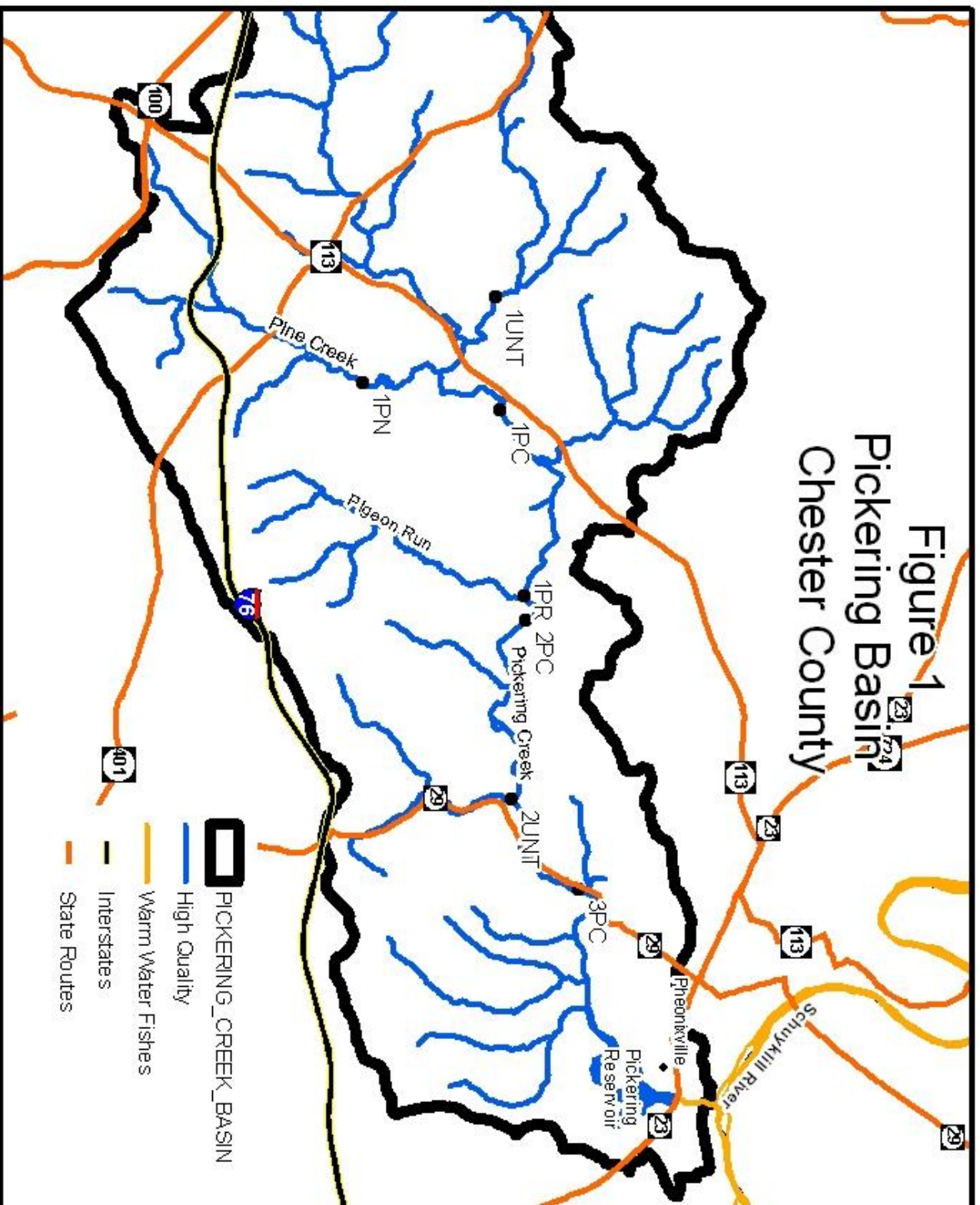
(iii) Real estate interests include:

- (A) Fee interests.
- (B) Conservation easements.
- (C) Government owned riparian parks or natural areas
- (D) Other interests in land which enhance water quality in a watershed corridor area.

REFERENCES

- Plafkin, JL, MT Barbour, KD Porter, SK Gross, & RM Hughes. 1989. Rapid Bioassessment Protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish. United States Environmental Protection Agency. EPA/444/4-89-001.
- Barbour, Michael T., Jeroen Gerritsen, Blaine D. Snyder, James B Stribling. 1999. Rapid Bioassessment Protocols For Us in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. United States Environment Protection Agency. EPA 841-B-99-002
- The Nature Conservancy (Pennsylvania Science Office). 1994. A Natural Areas Inventory of Chester County, Pennsylvania. The Berks County Planning Commission.

Figure 1
 Pickering Basin
 Chester County



**TABLE 1
STATION LOCATIONS
PICKERING CREEK
CHESTER COUNTY
November 10-17, 2008**

STATION	LOCATION
1UNT	Unnamed Tributary to Pickering Creek (01535) just downstream of Art School Road. West Pikeland Township, Chester County Lat: 40° 06' 00.39" Long: 75° 37' 35.49" RMI: 0.60
1PN	Pine Creek (01570) approximately 360 meters downstream of Horseshoe Trail. West Pikeland Township, Chester County Lat: 40° 04' 58.38" Long: 75° 36' 46.52" RMI: 0.80
1PC	Pickering Creek (01508) approximately 350 meters downstream of Pikeland Road. West Pikeland Township, Chester County Lat: 40° 06' 01.23" Long: 75° 36' 27.46" RMI: 8.70
1PR	Pigeon Run (01521) just upstream of Pickering Road. East Pikeland Township, Chester County Lat: 40° 06' 09.52" Long: 75° 34' 36.84" RMI: 0.01
2PC	Pickering Creek (01508) approximately 500 meters downstream of Pigeon Run and 200 meters upstream of Pickering Road. East Pikeland Township, Chester County Lat: 40° 06' 10.07" Long: 75° 34' 22.04" RMI: 6.50
2UNT	Unnamed Tributary to Pickering Creek (01518) just downstream of Pickering Dam Road. Charlestown Township, Chester County Lat: 40° 06' 01.08" Long: 75° 32' 36.02" RMI: 0.01
3PC	Pickering Creek (01508) approximately 10 meters upstream of Creek Road. Schuylkill Township, Chester County Lat: 40° 06' 30.86" Long: 75° 31' 40.85" RMI: 3.22
1SB	Sliders Branch (23953) approximately 80 meters upstream of confluence with Kettle Creek. Abbott Township, Potter County Lat: 41° 36' 56.50" Long: 77° 36' 12.68" RMI: 0.04
1KC	Kettle Creek (23661) approximately 200 meters upstream of confluence with Germania Branch. Abbott Township, Potter County Lat: 41° 35' 39.20" Long: 77° 37' 30.24" RMI: 40.79

**TABLE 2
HABITAT ASSESSMENT RESULTS
PICKERING CREEK
CHESTER COUNTY
November 10-17, 2008**

PARAMETER	STATION ¹								
	1UNT	1PN	1PC	1PR	2PC	2UNT	3PC	1SB ³	1KC ⁴
1. instream cover	17	18	16	16	19	16	17	19	19
2. epifaunal substrate	18	19	11	15	17	18	18	19	19
3. embeddedness	15	17	13	15	15	15	15	19	16
4. velocity/depth regimes	15	17	17	17	19	15	18	19	19
5. channel alteration	15	18	18	15	17	14	17	20	20
6. sediment deposition	15	17	13	13	15	15	15	17	17
7. frequency of riffles	19	20	9	15	17	19	17	19	19
8. channel flow status	16	15	13	13	16	17	16	17	16
9. condition of banks	17	14	10	15	15	17	17	19	19
10. bank vegetative protection	19	18	18	18	16	19	17	20	20
11. disruptive pressure	17	19	18	16	15	15	15	20	20
12. riparian zone width	16	17	19	15	11	15	13	20	20
Total Score	199	209	175	183	192	195	195	228	224
Rating ²	OPT	OPT	SUB	SUB	OPT	OPT	OPT	OPT	OPT

¹ Refer to Figure 1 and Table 1 for station locations

² OPT=Optimal; SUB=Suboptimal

³ Sliders Branch, Potter County, November 17, 2008

⁴ Kettle Creek, Potter County, November 17, 2008

TABLE 3
SEMI-QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA
PICKERING CREEK, CHESTER COUNTY
NOVEMBER 10-17, 2008

STATION ¹		1UNT	1PN	1PC	1PR	2PC	2UNT	3PC	1SB ²	1KC ³
<u>MAYFLIES</u>										
Baetidae	<i>Acentrella</i>	1	1	2	2	2		1		
	<i>Baetis</i>									1
	<i>Dipheter</i>								9	1
Isonychidae	<i>Isonychia</i>	2	17	12	9	16	9	14		3
Heptageniidae	<i>Epeorus</i>								30	32
	<i>Leucrocuta</i>								1	3
	<i>Rhithrogena</i>								4	6
	<i>Maccaffertium</i>	7	5	10	3	7	3	15		
Ephemerellidae	<i>Ephemerella</i>	7			4	3	7	14	12	4
	<i>Eurylophella</i>	1			1	1				1
	<i>Serratella</i>			6	1	12	1	27	4	15
Caenidae	<i>Caenis</i>							1		
Leptophlebiidae	<i>Paraleptophlebia</i>								14	25
<u>STONEFLIES</u>										
Pteronarcyidae	<i>Pteronarcys</i>									1
Peltoperlidae	<i>Tallaperla</i>								1	
Taeniopterygidae	<i>Taeniopteryx</i>	1	8	3	11	11	3	4		
	<i>Taenionema</i>	2	1	2	3	1				8
Nemouridae	<i>Prostoia</i>			1	1					
Leuctridae	<i>Leuctra</i>								5	2
Capniidae	<i>Allocapnia</i>	17	5		17	4	18	1		1
	<i>Paracapnia</i>								23	
Perlidae	<i>Agnatina</i>									2
	<i>Paragnetina</i>							1		2
	<i>Acroneuria</i>	1		1	1	2	4	1		1
Perlodidae	<i>Cultus</i>								1	2
	<i>Isogenoides</i>								1	1
	<i>Isoperla</i>							1	28	14
	<i>Sweltsa</i>								6	2

TABLE 3 (continued)
SEMI-QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA
PICKERING CREEK, CHESTER COUNTY
NOVEMBER 10-17, 2008

STATION ¹		1UNT	1PN	1PC	1PR	2PC	2UNT	3PC	1SB ²	1KC ³
<u>CADDISFLIES</u>										
Philopotamidae	<i>Chimarra</i>	6	24	25	31	50	11	11		
	<i>Dolophilodes</i>	1			1				5	5
Polycentropodidae	<i>Polycentropus</i>									1
Hydropsychidae	<i>Diplectrona</i>								6	
	<i>Ceratopsyche</i>	50	64	35	17	55	68	23	1	11
	<i>Cheumatopsyche</i>	57	31	55	44	26	43	49	3	19
	<i>Hydropsyche</i>	1	4	12	2	4	1	1		
	<i>Macrostemum</i>			1						
Rhyacophilidae	<i>Rhyacophila</i>		3							3
Glossosomatidae	<i>Glossosoma</i>	2	1	4	5		1	2	1	
Hydroptilidae	<i>Leucotrichia</i>			1			1			
Brachycentridae	<i>Micrasema</i>			3				3		
Limnephilidae	<i>Apatania</i>								2	7
Uenoidae	<i>Neophylax</i>	3							3	
Leptoceridae	<i>Mystacides</i>				1					
<u>TRUE FLIES</u>										
Ceratopogonidae	<i>Bezzia</i>									3
Athericidae	<i>Atherix</i>		1						5	1
Empididae	<i>Chelifera</i>						1			
	<i>Hemerodromia</i>			1						
Tipulidae	<i>Antocha</i>	2	2	3	2	2	7	5	5	2
	<i>Dicranota</i>									3
	<i>Hexatoma</i>								1	
Simuliidae	<i>Simulium</i>	1				1				
Chironomidae		7	16	13	11	7	10	14	5	6

TABLE 3 (continued)
SEMI-QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA
PICKERING CREEK, CHESTER COUNTY
NOVEMBER 10-17, 2008

STATION ¹		1UNT	1PN	1PC	1PR	2PC	2UNT	3PC	1SB ²	1KC ³
<u>MISC. INSECT TAXA</u>										
Gomphidae	<i>Gomphus</i>								1	
	<i>Stylogomphus</i>				1					
Corydalidae	<i>Corydalus</i>							1		
	<i>Nigronia</i>				1					1
Psephenidae	<i>Psephenus</i>		3	1	2	1	1	1		
Elmidae	<i>Optioservus</i>	3	7	25	10	9	4	23	18	17
	<i>Oulimnius</i>	1	1	4	4	2	1	1	17	4
	<i>Promoresia</i>		1	1						
	<i>Stenelmis</i>	1		1	4			2		
<u>NON-INSECT TAXA</u>										
Turbellaria				1						
Oligochaeta			2	2						
Gammaridae	<i>Gammarus</i>						2			
Cambaridae	<i>Cambarus</i>	1								
Hydracarina						1			1	
Total Taxa		23	20	26	26	21	20	24	29	35
Total Individuals		175	197	225	189	217	196	216	213	210

¹ Refer to Figure 1 and Table 1 for station locations

² Sliders Branch, Potter County, November 17, 2008

³ Kettle Creek, Potter County, November 17, 2008

**TABLE 4
RBP METRIC COMPARISON
PICKERING CREEK
CHESTER COUNTY
NOVEMBER 10-17, 2008**

METRIC	CANDIDATE STATIONS				REF	CANDIDATE STATIONS			REF
	1PR	1UNT	1PN	2UNT	1SB	1PC	2PC	3PC	1KC
1. TAXA RICHNESS	26	23	20	20	29	26	21	24	35
Cand/Ref (%)	90	79	69	69	xxx	74	60	69	xxx
Biol. Cond. Score	8	7	5	5	8	5	1	3	8
2. MOD. EPT INDEX	15	13	9	9	18	12	11	13	22
Cand/Ref (%)	83	72	50	50	xxx	55	50	59	xxx
Biol. Cond. Score	8	6	1	1	8	2	1	3	8
3. MOD. HBI	4.19	4.65	4.57	4.48	2.04	4.59	4.18	3.97	2.44
Cand-Ref	2.15	2.61	2.53	2.44	xxx	2.15	1.74	1.53	xxx
Biol. Cond. Score	0	0	0	0	8	0	0	0	8
4. % DOMINANT TAXA	23	33	32	35	14	24	25	23	15
Cand-Ref	9	19	18	21	xxx	9	10	8	xxx
Biol. Cond. Score	8	2	3	1	8	8	8	8	8
5. % MOD. MAYFLIES	11	10	12	10	31	13	19	33	42
Ref-Cand	20	21	19	21	xxx	29	23	9	xxx
Biol. Cond. Score	5	5	6	5	8	3	5	8	8
TOTAL BIOLOGICAL CONDITION SCORE	29	20	15	12	40	18	15	22	40
% COMPARABILITY TO REFERENCE	73	50	38	30		45	38	55	