

DEER AND LITTLE FALLS CREEKS

YORK COUNTY

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

**Segment: Basin
Stream Code: 06761, 06859
Drainage List: O**

**WATER QUALITY MONITORING SECTION (GLW)
DIVISION OF WATER QUALITY STANDARDS
BUREAU OF WATER STANDARDS AND FACILITY REGULATION
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

MAY 2010

INTRODUCTION

The Department conducted evaluations on portions of Deer Creek and Little Falls Creek basins located in Pennsylvania in response to petitions submitted by the Shrewsbury Township Board of Supervisors (York County) and accepted by the Environmental Quality Board (EQB) on October 19, 2004. The petitioner requests these basins be redesignated to High Quality-Cold Water Fishes (HQ-CWF) in order to provide water quality protection comparable to the highest level of water quality protection (Maryland's "Use III Designation") afforded to those portions of these basins downstream in Maryland. The Deer Creek and Little Falls Creek basins are currently designated Cold Water Fishes, Migratory Fishes (CWF, MF) and Warm Water Fishes (WWF), MF, respectively. The evaluations in this report are based on a field survey conducted May 5 and 6 and August 17, 2005.

GENERAL WATERSHED DESCRIPTION

Deer Creek and Little Falls Creek are freestone streams that are tributaries to the Susquehanna River and the Gunpowder River in Maryland, respectively. The candidate basins are located in Shrewsbury, New Freedom, Stewartstown and Fawn Grove Boroughs and Shrewsbury, Hopewell, and Fawn Townships, York County (Figure 1). The Deer Creek basin, which includes Ebaughs Creek as a major subbasin, has a drainage area of 25.3 square miles and 42.3 total stream miles in Pennsylvania. The Little Falls Creek basin has a drainage area of 4.2 square miles and consists of 5.7 total stream miles in Pennsylvania. The majority of both basins are within the state of Maryland. The surrounding area is characterized by relatively flat topography with some gently rolling hills of low relief.

The current land use in these watersheds consists mostly of farms, single-family residential and open fields. Land use in the Deer Creek basin is a mixture of cropland (62%), pasture (18%), forest (15%), and residential (5%), whereas the Little Falls Creek basin is cropland (85%), residential (14%) and forest (1%). One major population center, Stewartstown Borough lies within the eastern edge of the Deer Creek basin.

WATER QUALITY AND USES

Surface Water

No Long-term water quality chemistry data were available to allow a direct comparison to water quality criteria. Instead, biological data was collected to evaluate water quality conditions in Deer Creek and Little Falls Creek, since the indigenous aquatic community is a better indicator of both long-term water quality and ecological significance. Field alkalinity measurements collected from the petitioned areas on May 5 and 6, 2005 ranged from 32 – 44 mg/L for Deer Creek and 32-76 mg/L for Little Falls Creek. These alkalinity values indicate that these basins have moderately well buffering capacity.

There are eight NPDES permits issued for treated wastewater (5 waste water treatment plants {one publicly owned, three privately owned}, and three pump stations) in the Deer Creek basin and one NPDES permit (a pump station) for the Little Falls Creek basin. One of the privately owned waste water treatment plants in the Deer Creek basin has been constructed but is not being operated as of this report date. Regarding Pennsylvania's portions of these two basins, there is one surface water withdrawal from the Deer Creek basin and none from the Little Falls Creek basin.

Aquatic Biota

Department staff collected habitat and benthic macroinvertebrate data at eight locations on Deer Creek and Little Falls Creek on May 5 and 6, 2005, and from one station on Rock Run (small EV reference stream) on May 11, 2005 (Figure 1, Table 1). In addition, fish data was collected from one station on Beetree Run and an unnamed tributary to Little Falls Creek on August 17, 2005.

Habitat. Instream habitat was assessed at each station on Deer Creek and Little Falls Creek, and Rock Run. Overall, habitat scores (Table 2) were better in the Deer Creek basin where they indicated high suboptimal to optimal conditions, ranging from 182 to 202 (out of a possible maximum of 240). In contrast, Little Falls Creek habitat scores were fair reflecting lower suboptimal conditions with scores of 151 and 155. Lower scoring parameters usually indicate moderate to severe vegetative disruptive pressure, moderately eroded banks, and a lack of adequate riparian buffering at some stations (Table 2).

Benthos. Benthic macroinvertebrate samples were collected at all eight stations (Table 3) using the PA-DEP RBP benthic sampling techniques. Taxonomic diversity in the Deer Creek basin was fair to very good overall and ranged from a low of 12 at 5EC to a high of 27 at 3DC. Taxonomic diversity in the Little Falls Creek basin was generally good with 17 taxa at 1LFC and 16 taxa at 2BR. Taxa sensitive to water quality degradation were present at all stations in both basins, except at 1LFC and 5EC where they were nearly absent. The relatively high abundances of tolerant taxa at these two stations reflect the cumulative impacts of human activity to these streams. In addition, the conditions at 5EC were reflective of operational problems at the Stewartstown Borough Authority sewage treatment plant. The Stewartstown Borough Authority was in the process of upgrading the treatment facility at the time of the survey and has since completed construction. Four stations in the Deer Creek basin (1DC, 2UNT, 3DC and 4EC) had very good to excellent taxa richness and were dominated by taxa sensitive to pollution, indicating minimal impacts from human activity.

Fish. Fish data were collected from two stations in the Little Falls Creek basin, one on an unnamed tributary and the other on Beetree Run on August 17, 2005 (Table 4). At each station, approximately 50 meters of stream were electrofished to determine what taxa were present. An inquiry with the Pennsylvania Fish and Boat Commission (PFBC) indicated that fisheries data were available for Beetree Run and Deer Creek (included in Table 4). Fish collected from the unnamed tributary to Little Falls Creek (1LFC) included a mix of species indicative of cold water conditions and included one wild adult brown trout. Beetree Run collections included both adult and juvenile brown trout as well as a mix of species commonly

found in cold water habitat. Juvenile brown trout were relatively numerous (15 individuals) indicating wild reproduction. The PFBC survey at this same Beetree Run station in 1999 produced only 2 species of fish, blacknose dace and creek chub. This low number of taxa and the lack of brown trout may have been in response to severe drought conditions. In Maryland, Beetree Run supports the state's best wild brown trout fishery and is protected by their highest water quality designation, Use Designation III. PFBC fishery data from 4 Deer Creek stations in 1996 included brown trout (both of wild and hatchery origin) at all stations sampled, which indicated a stable, reproducing wild trout fishery.

BIOLOGICAL USE QUALIFICATIONS

The biological use qualifying criteria applied to Deer Creek and Little Falls Creek was the DEP integrated benthic macroinvertebrate test described at § 93.4b(a)(2)(i)(A) and § 93.4b(b)(1)(v). Selected benthic macroinvertebrate community metrics from Deer Creek and Little Falls Creek (Table 5) were compared to those from a reference stream with a comparable drainage area. All stations in both basins were compared to an EV reference station on Rock Run (1RR), a freestone tributary to French Creek. Rock Run was used as a reference because of similar drainage area to the candidate basins and geologic setting as the candidate basins. In addition, Rock Run has served as an EV reference stream in several other Departmental surveys. Sampling of all stations within the candidate basins occurred on back-to-back days, and collection of the reference station data was conducted within one week of the candidate stations 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, none of the stations in either of the candidate basin had Biological Condition Scores (BCS) that were greater than 80% of the reference station (Table 5). As a result, none of the candidate stations meet the 83% comparison standard required to qualify as High Quality Waters (§ 93.4b(a)(2)(i)(A)). None of the other antidegradation requirements listed in § 93.4b, pertaining to High Quality or Exceptional Value waters, apply to these stations.

In addition to applying the above antidegradation scoring test, the Department's benthic metric Index of Biotic Integrity (IBI) was also employed. The Department's IBI for benthic macroinvertebrates in wadeable freestone riffle-run streams (Chalfant, 2007; modified in 2008) is calculated as the arithmetic mean of six adjusted, standardized metric scores: Beck's index (a tolerance value-weighted richness metric based on the most sensitive taxa defined as having Hilsenhoff tolerance values of 2 or less); sensitive (having Hilsenhoff tolerance values of 4 or less) EPT taxa richness; total taxa richness; Shannon Diversity; Hilsenhoff Biotic Index; and percent individuals of sensitive (having Hilsenhoff tolerance values of 3 or less) taxa in a 200 (+/- 20%) count sub-sample. The six raw metric scores are standardized to reference values, which results in standardized metric scores adjusted to a scale of 0 to 100. These six adjusted standardized scores are averaged to calculate the total IBI score. IBI scores closer to 100 represent reference-quality conditions and scores closer to 0 represent more impacted

conditions. The low IBI score (26.9) at station 5EC was a result of discharge from the Stewartstown Borough Authority's wastewater treatment plant that was out of compliance. This discharge problem has since been corrected and is now in compliance with the facility's permit limits. As a result of the low IBI score (39.1) at station 1LFC, the affected portion of this Little Falls Creek tributary will be listed on Pennsylvania's 2010 303(d) list of impaired waters.

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 November 27, 2004 (34 Pa.B 6368). A similar notice was also published in The Daily Record newspaper (York, PA) on November 20, 2004. In addition, Shrewsbury, New Freedom, Stewartstown and Fawn Grove Boroughs and Shrewsbury, Hopewell, and Fawn Townships and the York County Planning Commission were notified of the redesignation evaluation in a letter dated November 19, 2004. Fisheries data for Little Falls Creek was received from Joe Berg in response to these requests. The Stewartstown Borough Authority sent a letter in opposition to the requested redesignation but without any supporting technical data. In addition, The Honorable Shari Wilson, Secretary of the Maryland Department of the Environment (MDE) and Matthew Rowe of MDE's Science Services Administration sent a letters expressing strong support for redesignation of the Pennsylvania portions of these two watersheds to EV to afford protection of Maryland's downstream designated use.

The petitioner and local municipality and planning commission representatives were notified by a postcard mailing that the report was available on the Department's web page for review with a 30-day comment period, which closed on April 16, 2010. In response, the Shrewsbury Township Board of Supervisors expressed concern that DEP did not recommend High Quality protection to both waters. The raised concerns addressed the number of field sample sites and their locations, tributaries that were not sampled, the choice of a "pristine" reference, and not supporting the higher downstream designations in Maryland. The Department's field surveys and resulting report have properly addressed these issues. The sample site coverage yielded representative data, which properly reflects the varied land-uses in the basin. Selection of an EV reference stream is a requisite of DEP's stream redesignation process. With regard to the protection of Maryland's downstream designated use, Pennsylvania is prohibited from issuing an NPDES permit when the imposition of conditions cannot ensure compliance with the water quality requirements of Maryland.

RECOMMENDATION

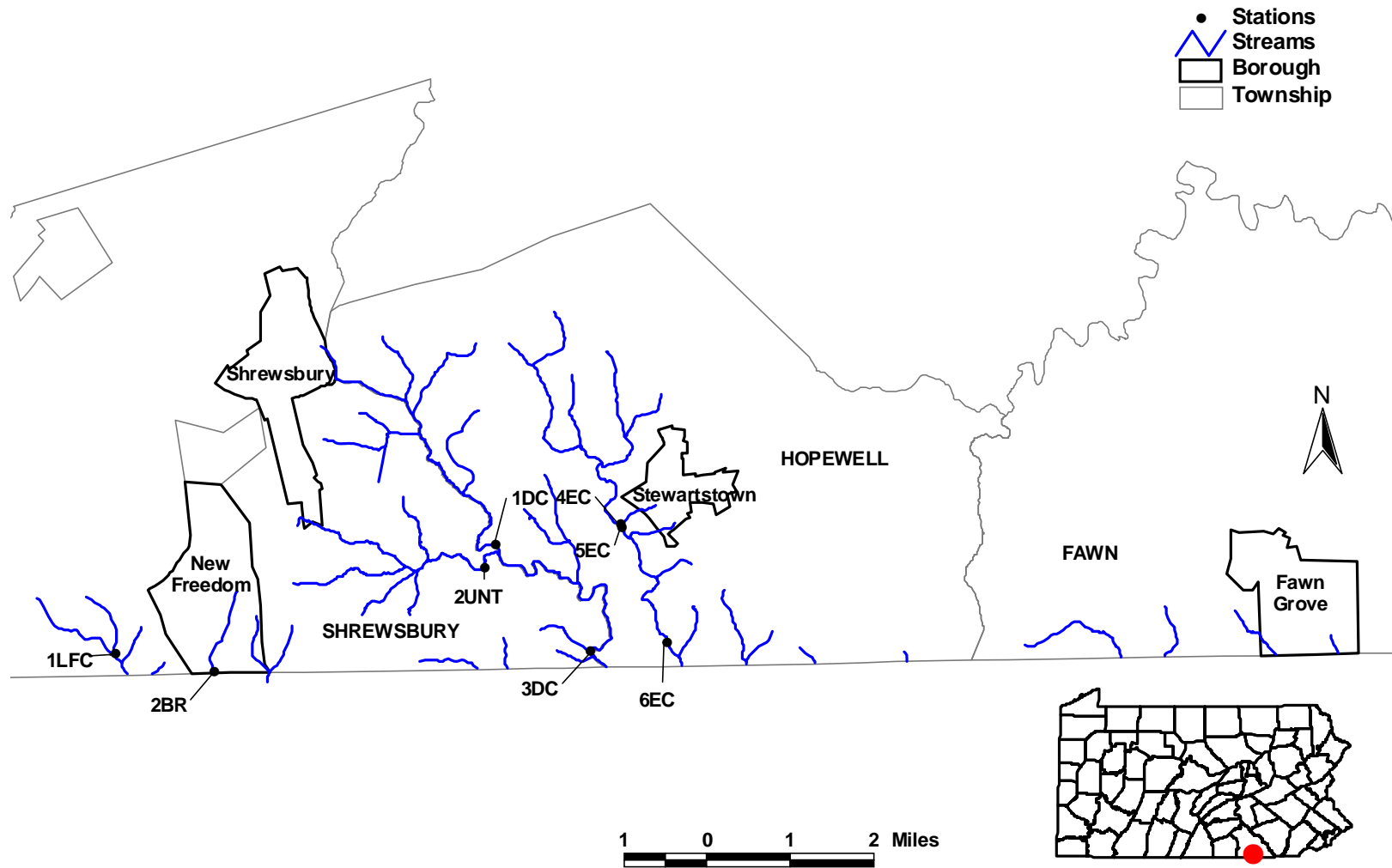
Based on applicable regulatory definitions and requirements of § 93.4b, the Department recommends that the Deer Creek basin retain its current Cold Water Fishes, Migratory Fishes (CWF, MF) designation. As indicated by the available physical, benthic macroinvertebrate and fish data, the aquatic habitat found in the Little Falls Creek basin supports a cold water fishery. Little Falls Creek basin should be redesignated Cold Water Fishes (CWF), MF to reflect the current aquatic life use. This recommendation adds approximately 5.7 stream miles of CWF

waters to Chapter 93. A total of 42.3 stream miles will retain their current designation. This recommendation does not reflect the HQ-CWF designation sought in the petition.

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 Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish. Second Edition. United States Environment Protection Agency. EPA 841-B-99-002
- Pennsylvania Fish & Boat Commission. 1996. Deer Creek (607I) Fisheries Management Report. File Information.
- _____. 1999. Beetree Run (607I) Fisheries Management Report. File Information.

Figure 1
Deer and Little Falls Creeks
York County



**TABLE 1
STATION LOCATIONS
DEER CREEK AND LITTLE FALLS CREEK
YORK COUNTY**

STATION	LOCATION
1LFC	Unnamed tributary to Little Falls Creek (06882) approximately 70 meters downstream of Steltz Road (SR851). Shrewsbury Township, York County Lat: 39° 43' 28" Long: 76° 43' 11" RMI: 0.30
2BR	Beetree Run (06860) approximately 50 meters downstream of Orwig Road. New Freedom Borough, York County Lat: 39° 43' 16" Long: 76° 41' 52" RMI: 0.01
1DC	Deer Creek (06761) approximately 40 meters upstream of Gemmill Road (T429). Shrewsbury Township, York County Lat: 39° 44' 34" Long: 76° 38' 2" RMI: 3.31
2UNT	Unnamed Tributary to Deer Creek (06829) approximately 20 meters downstream of Gemmill Road (T542). Shrewsbury Township, York County Lat: 39° 44' 19" Long: 76° 38' 11" RMI: 0.33
3DC	Deer Creek (06761) approximately 40 meters downstream of unnamed tributary adjacent to Dutton Road (T542) near PA/MD state line. Shrewsbury Township, York County Lat: 39° 43' 25" Long: 76° 36' 46" RMI: 0.08
4EC	Ebaughs Creek (06810) approximately 25 meters upstream of Stewartstown Road (SR21030). Hopewell Township, York County Lat: 39° 44' 45" Long: 76° 36' 20" RMI: 2.25
5EC	Ebaughs Creek (06810) approximately 60 meters downstream of Stewartstown Road (SR21030) and discharge from Stewartstown Borough STP. Hopewell Township, York County Lat: 39° 44' 43" Long: 76° 36' 19" RMI: 2.21
6EC	Ebaughs Creek (06810) approximately 20 meters upstream of Blevins Road (T548) near PA/MD state line. Hopewell Townships, York County Lat: 39° 43' 30" Long: 76° 35' 44" RMI: 0.35

**TABLE 2
HABITAT ASSESSMENT RESULTS
DEER CREEK AND LITTLE FALLS CREEK
YORK COUNTY
MAY 5 AND 6, 2005**

PARAMETER	STATION ¹								
	1LFC	2BR	1DC	2UNT	3DC	4EC	5EC	6EC	1RR ³
1. instream cover	13	15	16	17	16	15	16	15	16
2. epifaunal substrate	15	16	17	18	17	18	18	16	16
3. embeddedness	15	14	15	16	16	14	14	11	15
4. velocity/depth regimes	12	10	16	18	17	15	15	19	15
5. channel alteration	15	16	17	18	18	18	18	18	18
6. sediment deposition	16	12	15	15	12	16	15	12	16
7. frequency of riffles	17	18	17	17	18	18	18	18	17
8. channel flow status	16	15	19	17	19	20	20	20	18
9. condition of banks	5	9	13	15	13	16	16	15	15
10. bank vegetative protection	5	10	13	16	13	17	16	16	18
11. disruptive pressure	13	11	16	17	15	15	15	16	17
12. riparian zone width	13	5	16	18	8	15	15	16	17
Total Score	155	151	190	202	182	197	196	192	198
Rating ²	SUB	SUB	SUB	OPT	SUB	OPT	OPT	OPT	OPT

¹ Refer to Figure 1 and Table 1 for station locations

² OPT=Optimal (≥ 192); SUB=Suboptimal (132-180)

³ Rock Run, Chester County, May 11, 2005

TABLE 3
SEMI-QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA
DEER CREEK AND LITTLE FALLS CREEK, YORK COUNTY
MAY 5 AND 6, 2005

TAXA	STATION ¹								
	1LFC	2BR	1DC	2UNT	3DC	4EC	5EC	6EC	1RR ²
Ephemeroptera (mayflies)									
Baetidae; <i>Acentrella</i>			32	8	12	22		10	
<i>Baetis</i>		2							4
<i>Plauditus</i>					4				1
Ephemerellidae; <i>Drunella</i>			7	1	2	4			1
<i>Ephemerella</i>	5	2	80	20	69	42	2	53	23
<i>Eurylophella</i>	1					1			
<i>Serratella</i>				2	4				
<i>Timpanoga</i>				3					
Heptageniidae; <i>Cinygmula</i>									2
<i>Epeorus</i>				1	1			1	19
<i>Leucrocuta</i>						1			
<i>Stenacron</i>					1	1			
<i>Stenonema</i>	1		4	13	5	3		4	
Isonychiidae; <i>Isonychia</i>			2	6	3			1	1
Leptophlebiidae;									5
<i>Paraleptophlebia</i>	1	5							
Plecoptera (stoneflies)									
Chloroperlidae; <i>Alloperla</i>					1	1			
<i>Haploperla</i>									10
Leuctridae; <i>Leuctra</i>	8	17	4	1	4	8			18
Nemouridae; <i>Amphinemura</i>		2	3	1		2			1
<i>Prostoia</i>						1			
Peltoperlidae; <i>Tallaperla</i>									1
Perlidae; <i>Acroneuria</i>			5	1	3	1	1	2	2
<i>Aagnetina</i>					1				
<i>Perlesta</i>			2	1		6			
Perlodidae; <i>Isoperla</i>									1

TAXA	STATION ¹								
	1LFC	2BR	1DC	2UNT	3DC	4EC	5EC	6EC	1RR ²
Trichoptera (caddisflies)									
Hydropsychidae; <i>Cheumatopsyche</i>	2		3	5	12	4	2	2	
<i>Diplectrona</i>		2	1		1				2
<i>Dolophilodes</i>	5	71	8	11	19	20		34	73
<i>Hydropsyche</i>	6	1	11	40	15	9	2	9	
Limnephilidae; <i>Pycnopsyche</i>									
Philopotamidae; <i>Chimarra</i>	3		1	5	1				
Polycentropidae; <i>Polycentropus</i>			1			1		1	
Psychomyiidae; <i>Psychomyia</i>						2			
Rhyacophilidae; <i>Rhyacophila</i>			2	2					2
Uenoidae; <i>Neophylax</i>									1
Other Insect Taxa									
DIPTERA (true flies)									
Chironomidae	173	78	144	77	17	42	74	80	16
Empididae; <i>Clinocera</i>							1		
<i>Hemerodromia</i>				6	2	4	1		
Simuliidae; <i>Prosimulium</i>	6								1
<i>Simulium</i>	6	2	1	2	7	6	74	3	6
Tipulidae; <i>Antocha</i>	2	3	2	4	2	4	6	1	1
<i>Hexatoma</i>									3
MEGALOPTERA (hellgrammites, dobson flies)									
Corydalidae; <i>Nigronia</i>			1	2					
ODONATA (dragon-, damselflies)									
Gomphidae;									1
COLEOPTERA (aquatic beetles)									
Elmidae; <i>Optioservus</i>	16	19	13	3	2	11	2	7	
<i>Oulimnius</i>			11	2	2	6			8
<i>Promoresia</i>									1
<i>Stenelmis</i>	3	4	6	21	16			1	1
Psephenidae; <i>Psephenus</i>	1	1	6	1	1				1
HEMIPTERA; Gerridae	1								
OLIGOCHETA									
AMPHIPODA		8	1	1		4	3		

TAXA	STATION ¹								
	1LFC	2BR	1DC	2UNT	3DC	4EC	5EC	6EC	1RR ²
Crangonyctidae; <i>Crangonyx</i>		4							
DECOPODA									
Cambaridae; <i>Orconectes</i>	1								
ISOPODA									
Asellidae; <i>Caecidotea</i>							1		
ARACHNIDA; Hydracarina						1			
Number of taxa in total sample	17	16	25	27	26	26	12	15	28

¹ Refer to Figure 1 for station location

² Rock Run, Chester County, May 11, 2005

**TABLE 4
FISHES
LITTLE FALLS CREEK
YORK COUNTY
DEP; AUGUST 17, 2005**

SPECIES NAME	STATION ^{1,2}						
	1LFC	2BR		Deer Creek (PFBC ³)			
	DEP 2005	PFBC 1999	DEP 2005	0101 1996	0201 1996	0202 1996	0301 1996
Brown Trout, <i>Salmo trutta</i> (adult)	1		1	P	P	R	R
Brown Trout, <i>S. trutta</i> (juvenile)			15				
White Sucker, <i>Catostomus commersoni</i>	X		X	P	C	A	C
Northern Hog Sucker, <i>Hypentelium nigricans</i>				C	C	P	P
Central Stoneroller, <i>Campostoma anomalum</i>						R	
Cutlips Minnow, <i>Exoglossum maxillingua</i>				C	P	P	C
Common Shiner, <i>Luxilus cornutus</i>				A		A	P
River Chub, <i>Nocomis micropogon</i>							R
Creek Chub, <i>Semotilus atromaculatus</i>	X	X	X	P	C	P	
Fall Fish, <i>S. corporalis</i>				C		C	C
Blacknose Dace, <i>Rhinichthys atratulus</i>	X	X	X	C	A	A	P
Longnose Dace, <i>R. cataractae</i>	X		X	P	P	P	R
Rosyside Dace, <i>Clinostomus funduloides</i>	X		X	A	A	C	A
Margined Madtom, <i>Noturus insignis</i>				P			P
American Eel, <i>Anguilla rostrata</i>				C	C	C	C
Redbreast Sunfish, <i>Lepomis auritus</i>							P
Pumpkinseed, <i>L. gibbosus</i>						P	P
Tessellated Darter, <i>Etheostoma olmstedii</i>			X	P	C	A	C
TOTAL TAXA	6	2	7	13	10	14	15

¹ Refer to Figure 1 and Table 1 for station locations

² X = Present but abundance not recorded

³PFBC 1996 Subjective Abundance Index (based on 300 m long station)

A = Abundant (>100); C = Common (26-100); P = Present (3-25); R = Rare (<3)

**TABLE 5
RBP METRIC COMPARISON
DEER CREEK AND LITTLE FALLS CREEK
YORK COUNTY
MAY 5 AND 6, 2005**

METRIC	STATION								
	1LFC	2BR	1DC	2UNT	3DC	4EC	5EC	6EC	1RR ¹
1. TAXA RICHNESS	17	16	25	27	27	26	12	15	28
Cand/Ref (%)	60.71	57.14	89.29	96.43	96.43	92.86	42.86	53.57	
Biol. Cond. Score	1	0	8	8	8	8	0	0	8
2. MOD. EPT INDEX	7	6	13	15	16	15	2	7	17
Cand/Ref (%)	41.18	35.29	76.47	88.24	94.12	88.24	11.76	41.18	
Biol. Cond. Score	0	0	7	8	8	8	0	0	8
3. MOD. HBI	5.22	3.24	2.73	4.36	2.84	3.42	5.83	3.39	1.38
Cand-Ref	3.84	1.85	1.35	2.98	1.46	2.04	4.45	2.01	
Biol. Cond. Score	0	0	0	0	0	0	0	0	8
4. % DOMINANT TAXA	72.08	35.29	36.20	32.08	33.33	20.3	43.79	38.46	35.4
Cand-Ref	36.64	-0.14	0.76	-3.35	-2.10	-14.15	8.35	3.02	
Biol. Cond. Score	0	8	8	8	8	8	8	8	8
5. % MOD. MAYFLIES	3.33	3.17	56.56	22.5	48.79	35.75	1.18	33.17	25.2
Cand-Ref	21.9	22.1	-31.31	2.74	-23.55	-10.51	24.06	-7.93	
Biol. Cond. Score	5	5	8	8	8	8	4	8	8
TOTAL BIOLOGICAL CONDITION SCORE	6	13	31	32	32	32	12	16	40
% COMPARABILITY TO REFERENCE	15.0	32.5	77.5	80.0	80.0	80.0	30.0	40.0	
DEP IBI Score	39.1	52.6	71.8	66.7	77.7	72.1	26.9	51.3	

¹ Rock Run, Chester County, May 11, 2005