SILVER CREEK
SUSQUEHANNA COUNTY

WATER QUALITY STANDARDS REVIEW
STREAM REDESIGNATION EVALUATION REPORT

SEGMENT: BASIN

STREAM CODE: 31879

DRAINAGE LIST: I

WATER QUALITY MONITORING SECTION (MJL, DSB)
DIVISION OF WATER QUALITY STANDARDS
BUREAU OF CLEAN WATER
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 2016

INTRODUCTION

The Department conducted an evaluation of the Silver Creek basin from its source to its confluence with Snake Creek, excluding the Laurel Lake Creek basin, in response to a petition from the Silver Lake Association that was accepted for study by the Environmental Quality Board (EQB) on May 19, 2010. The petition requests the Silver Creek basin, excluding the Laurel Lake Creek basin, be redesignated to Exceptional Value (EV). The Silver Creek basin is currently designated Cold Water Fishes, Migratory Fishes (CWF, MF). Components of this evaluation are based on a field survey conducted by the Department in May of 2010, as well as water quality data collected by researchers at Cornell University from Silver Creek Lake.

GENERAL WATERSHED DESCRIPTION

Silver Creek is a freestone tributary to Snake Creek in the Susquehanna River watershed (Figure 1). This basin covers an area of 21.6 square miles and contains 41.5 stream miles. It encompasses portions of Bridgewater, Franklin, Forest Lake, Liberty, and Silver Lake Townships in Susquehanna County. Land use in this basin is approximately 78% mixed hardwood forest. The remaining portion of the basin is a mixture of low-density residential and agriculture. In addition there are several paved and dirt roads traversing this basin. Salt Spring State Park and the Highpoint Preserve are also located in this watershed.

Silver Lake, a natural glacially formed lake, is the source of Silver Creek. Silver Lake, Cranberry Lake, and Salt Spring State Park are listed in the Natural Areas Inventory of Susquehanna County as locally significant sites (The Nature Conservancy, 2006). Silver Creek is a freestone stream with moderate gradient throughout its length.

WATER OUALITY AND USES

Surface Water

Biological data was collected to evaluate water quality conditions in the petitioned basin, since the indigenous aquatic community is a better indicator of long-term water quality conditions. There are a total of 4 NPDES permits issued and no surface water withdrawals within the petitioned basin.

Water Chemistry

No long-term water quality data were available to allow a direct comparison to water quality criteria. Silver Lake, the source of Silver Creek is a deep water (over 100 feet), natural lake with an area of approximately 90 acres and an estimated detention time of 609 days. The land use of the lake's shoreline is a mixture of approximately 66% permanent and seasonal residences and 33% mature forest. Silver Lake is primarily spring fed and stays cool enough during the summer months to support a population of stocked brown and rainbow trout. Data collected by researchers at Cornell University indicated a layer of water between 14 and 41 feet that had temperatures less than 72ºF and dissolved oxygen (DO) concentrations greater than 5 mg/L during August of 2008. At other times of the year this layer was expanded (Jirka, et al 2009).

Aquatic Biota

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of water quality. Department staff collected habitat and benthic macroinvertebrate data at seven locations within the petitioned basin and from one station on West Branch Fishing Creek (EV reference; Sullivan County) in May of 2010 (Figure 1, Table 1).

Habitat. Instream habitat was assessed at each station within the petitioned basin as well as the West Branch Fishing Creek reference station. The physical habitat assessments revealed that conditions at stations 1UNT, 3MC, 6FB, 7UNT, and reference station R1 scored in the optimal range. Optimal habitat scores for these stations ranged from 206 to 196. Stations 2SC, 4SC, and 5FB scored in the suboptimal range due mostly to poor riparian habitat and channel alterations (Table 2).

Benthos. Benthic macroinvertebrate samples were collected 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 high at all stations with individuals from taxa that are sensitive to water quality degradation (e.g. *Acentrella*, *Epeorus, Leuctra,* and *Dolophilodes*) outnumbering individuals from more tolerant taxa (Table 3).

BIOLOGICAL USE QUALIFICATIONS

The biological use qualifying criteria applied to the petitioned basin were the DEP integrated benthic macroinvertebrate scoring tests described at 25 Pa. Code § 93.4b(a)(2)(i)(A) and § 93.4b(b)(1)(v). Selected benthic macroinvertebrate community metrics from petitioned basin (Table 4) were compared to those from the reference stream, West Branch Fishing Creek. All sampling was conducted within a two day period to minimize the effects of seasonal variation. This comparison was 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, all stations had Biological Condition Scores (BCS) that ranged from 98-100% of the reference station score. As a result all stations exceed the threshold of 92% required to qualify for an EV designation under the Department's regulatory criterion (§93.4b(b)(1)(v)).

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Department provided public notice of this redesignation evaluation and requested any technical data from the general public through publication in the Pennsylvania Bulletin on October 23, 2010 (40 Pa.B 6338). A similar notice was also sent to Bridgewater, Franklin, Forest Lake, Liberty, and Silver Lake Townships along with the Susquehanna County Planning Commission on January 24, 2011 to notify them of this evaluation. One letter of support for the redesignation of Silver Creek was received by the Department.

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 September 4, 2015 with an initial public comment period ending 45-days later. No comments were received in response to this notice.

RECOMMENDATIONS

Based on applicable regulatory definitions and requirements of § 93.4b, the Department recommends that the designated use of Silver Creek basin from its source, excluding Laurel Lake Creek basin (31899), but also including McCormick Run basin (31903) be changed from the current CWF, MF designation to EV, MF based on § 93.4b(b)(1)(v). This designation affects 41.5 stream miles.

REFERENCES

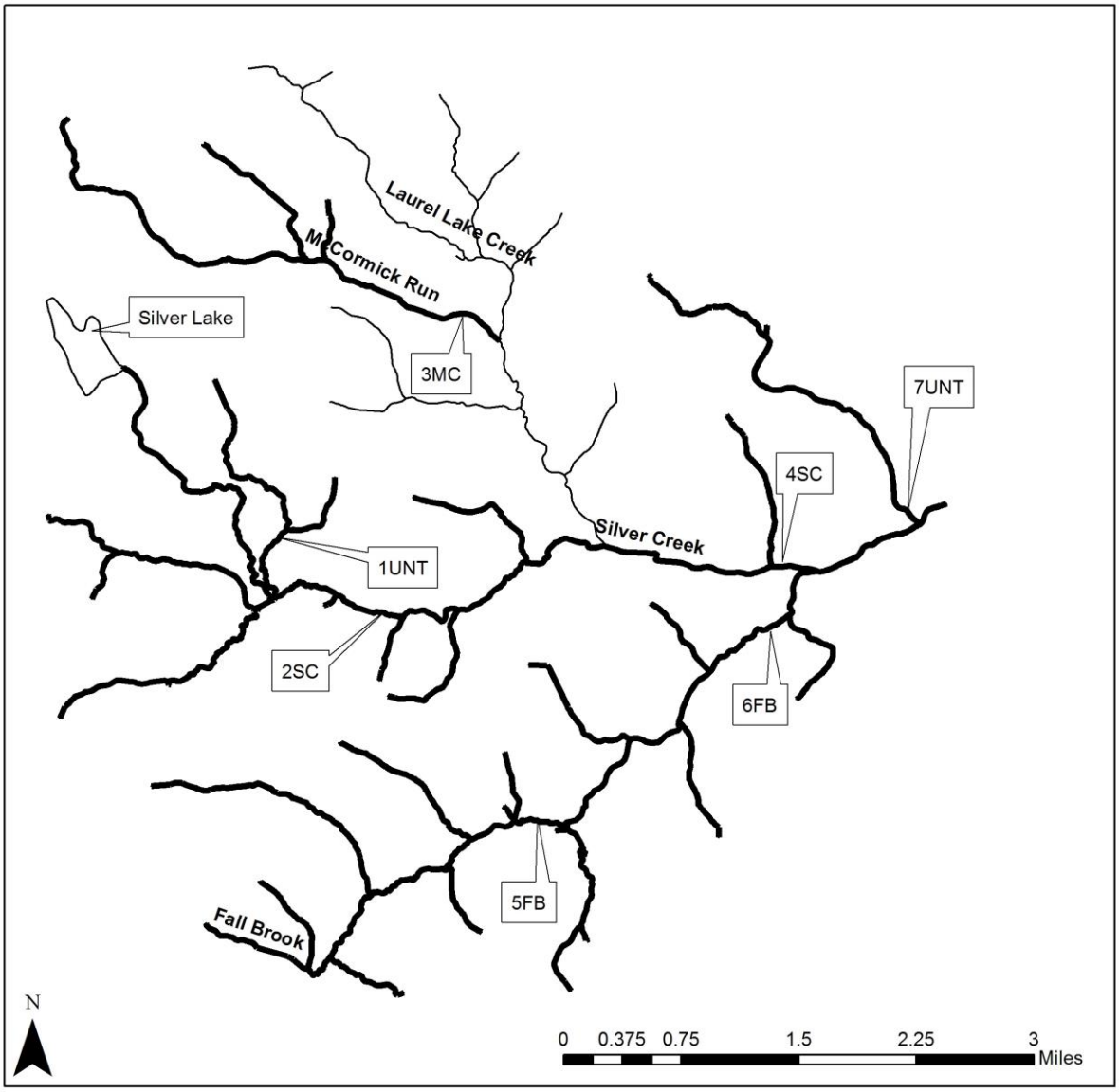
Barbour, MT, J. Gerritsen, BT Snyder, and JB Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition. United States Environmental Protection Agency. EPA/841/B-99-002.

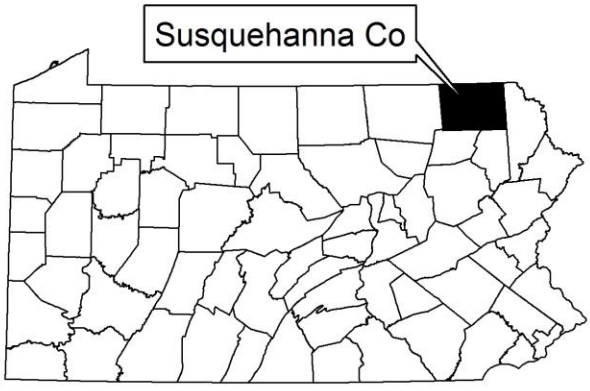
Jirka, KJ, LG Rudstam, and CE Kraft, 2009. Biological Assessment of Silver Lake: 2008. Dept of Natural Resources, Cornell University

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

The Nature Conservancy, 2006. A Natural Areas Inventory of Susquehanna County, PA. Pennsylvania Science Office.

Figure 1: Silver Creek, Susquehanna County





Streams

Cold Water Fishes

Exceptional Value

TABLE 1
STATION LOCATIONS
SILVER CREEK
SUSQUEHANNA COUNTY
MAY20-21, 2010

STATION	LOCATION
1UNT	Unnamed Tributary (UNT) to Silver Creek (31914) approximately 20 meters upstream from the SR0167 Bridge. Silver Lake Township, Susquehanna County. Lat: 41.9160 Long: -75.9270
2SC	Silver Creek approximately 100 meters upstream from the SR0167 Bridge. Silver Lake Township, Susquehanna County. Lat: 41.9094 Long: -75.9179
3MR	McCormick Run approximately 30 meters upstream from the mouth. Silver Lake Township, Susquehanna County. Lat: 41.9343 Long: -75.9012
4SC	Silver Creek approximately 30 meters upstream from the T601 Bridge. Franklin Township, Susquehanna County. Lat: 41.9127 Long: -75.8656
5FB	Fall Brook approximately 20 meters upstream from the T725 crossing. Bridgewater Township, Susquehanna County. Lat: 41.8899 Long: -75.8986
6FB	Fall Brook approximately 30 meters upstream from the T677 Bridge. Franklin Township, Susquehanna County. Lat: 41.9070 Long: - 75.8686
7UNT	UNT Silver Creek (31880) approximately 20 meters upstream from the SR4008 Bridge. Franklin Township, Susquehanna County. Lat: 41.9174 Long: -75.8510
R1	West Branch Fishing Creek (28020) approximately 80 meters upstream from the gate on Shingle Mill Road. Davidson Township, Sullivan County. Lat: 41.3041 Long: - 76.4415

TABLE 2

HABITAT ASSESSMENT SUMMARY
SILVER CREEK
SUSQUEHANNA COUNTY
MAY 20-21, 2010

PARAMETER	STATION[1]							
	1UNT	2SC	3MR	4SC	5FB	6FB	7UNT	R1[2]
1. instream cover	17	17	18	15	17	16	16	17
2. epifaunal substrate	19	17	18	16	17	18	19	17
3. embeddedness	16	14	17	17	15	17	16	19
4. velocity / depth regime	16	15	16	19	17	17	17	17
5. channel alterations	15	14	19	10	15	16	14	20
6. sediment deposition	15	16	15	16	16	17	14	18
7. riffle frequency	19	19	19	16	16	16	19	18
8. channel flow status	16	16	15	16	16	16	16	15
9. bank condition	14	14	14	15	16	16	16	18
10. bank vegetative protection	15	15	15	12	15	16	14	17
11. grazing / disruptive pressure	19	16	20	15	16	19	20	20
12. riparian vegetative zone width	16	15	20	12	13	20	15	20
Total Condition Score	197	188	206	179	189	204	196	216
Rating[3]	OPT	SUB	OPT	SUB	SUB	OPT	OPT	OPT

[1] Refer to Figure 1 and Table 1 for station locations
[2] Reference Station – Refer to Table 1 for location
[3] OPT=Optimal (≥192); SUB=Suboptimal (132-191)

TABLE 3
SEMI-QUANTITATIVE MACROINVERTEBRATE DATA
SILVER CREEK
SUSQUEHANNA COUNTY
MAY 20-21, 2010

TAXA	STATIONS[1]							
	1UNT	2SC	3MR	4SC	5FB	6FB	7UNT	R1[2]
Ephemeroptera (Mayflies)								
Baetidae; *Acentrella*	29	31	41	25	3	33	3	
Baetis	14	20	1	3	6	12	4	16
Diphetor			1	1	2		5	
Ephemerellidae; *Dannella*				1				
Drunella	10	13	7	13	11	7	15	3
Ephemerella	1	6	14	22	9	16	16	20
Serratella				1	8	2	1	
Heptageniidae; *Cinygmula*	1	11	2				6	9
Epeorus	1	2	10	1	6	14	46	14
Heptagenia								1
Leucrocuta				3	1			
Maccaffertium						1		
Isonychiidae; *Isonychia*				1		3		
Leptophlebiidae; *Paraleptophlebia*		4	9	45	3	23	26	4
Habrophlebiodes		1		2	3		2	1
Plecoptera (Stoneflies)								
Chloroperlidae; *Haploperla*			3	2		5	5	1
Suwallia								11
Sweltsa								5
Leuctridae; *Leuctra*	19	55	36	14	68	13	24	4
Nemouridae; *Amphinemura*	74	10	10		4		15	11
Prostoia						1		
Peltoperlidae; *Tallaperla*	1						1	
Perlidae; *Acroneuria*	2	2	2	1	4	1	4	2
Perlodidae; *Isoperla*					1			4
Yugus								1
Pteronarcyidae; *Pteronarcys*			1					2
Taeniopterygidae; *Taeniopteryx*	2							
Tricoptera (Caddisflies)								
Glossosomatidae; *Agapetus*	1							
Hydropsychidae; *Ceratopsyche*	1	1	2	5	3	3		10
Cheumatopsyche		1		2	1	3	4	1
Diplectrona	1	1	1				9	
Hydropsyche		1						
Hydroptilidae; *Hydroptila*						1		
Lepidostomatidae; *Lepidostoma*	1		1					
Philopotamidae; *Dolophilodes*	22	9	3	12	10	13	1	
Polycentropodidae; *Polycentropus*				1	1			
Rhyacophilidae; *Rhyacophila*		3			2	1		8
Uenoidae; *Neophylax*			1					

TABLE 3 (continued)
SEMI-QUANTITATIVE MACROINVERTEBRATE DATA
SILVER CREEK
SUSQUEHANNA COUNTY
MAY 20-21, 2010

TAXA	STATIONS[1]							
	1UNT	2SC	3MR	4SC	5FB	6FB	7UNT	R1[2]
Diptera (True flies)								
Ceratopogonidae; *Bezzia*		1						
Probezzia								1
Empididae; *Chelifera*			3					
Hemerodromia	1	2						
Neoplasta	2	2	1					
Simuliidae; *Prosimulium*	1							
Simulium	7	2	53	7	1	16		15
Tipulidae; *Antocha*				1	1			
Dicranota			3		1		1	2
Hexatoma		1		1				
Limnophila					1			
Pseudolimnophila	1							
Chironomidae	24	26	12	25	57	41	21	66
Megaloptera (Dobson/ Fish flies)								
Corydalidae; *Nigronia*								1
Odonata (Dragon/ Damselflies)								
Gomphidae; *Lanthus*					1			
Stylogomphus			1					
Coleoptera (Aquatic beetles)								
Elmidae; *Optioservus*	2	1	2	2	1	1	2	
Oulimnius	1		1		4	1	2	1
Stenelmis		1		8		1	1	
Psephenidae; *Psephenus*					1			
Non-Insect Taxa								
Nematoda (Roundworms)		1						
Oligochaeta					1			
Decapoda (Crayfish)								
Cambaridae; *Cambarus*		1			1			1
Richness	24	27	26	25	30	23	23	27
Total number of individuals	219	209	221	199	216	212	214	215

[1] Refer to Figure 1 and Table 1 for station locations
[2] Reference Station – Refer to Table 1 for location

TABLE 4
RBP METRIC COMPARISON
SILVER CREEK
SUSQUEHANNA COUNTY
MAY 20-21, 2010

METRIC	CANDIDATE STATIONS							REF
	1UNT	2SC	3MR	4SC	5FB	6FB	7UNT	R1
1. TAXA RICHNESS	24	27	26	25	30	23	23	27
Cand/Ref (%)	89	100	96	93	111	85	85	
Biol. Cond. Score	8	8	8	8	8	8	8	8
2. MOD. EPT INDEX	16	17	18	19	19	18	18	20
Cand/Ref (%)	80	85	90	95	95	90	90	
Biol. Cond. Score	7	8	8	8	8	8	8	8
3. MOD. HBI	3.04	2.67	3.13	2.59	2.63	3.13	1.70	3.53
Cand-Ref	-0.49	-0.86	-0.40	-0.94	-0.90	-0.40	-1.83	
Biol. Cond. Score	8	8	8	8	8	8	8	8
4. % DOMINANT TAXA	34	26	24	23	31	19	21	31
Cand-Ref	3	-5	-7	-8	0	-12	-10	
Biol. Cond. Score	8	8	8	8	8	8	8	8
5. % MOD. MAYFLIES	19	32	38	56	19	47	53	24
Ref-Cand	5	-8	-14	-32	5	-23	-29	
Biol. Cond. Score	8	8	8	8	8	8	8	8
TOTAL BIOLOGICAL CONDITION SCORE	39	40	40	40	40	40	40	40
% COMPARABILITY TO REFERENCE	98	100	100	100	100	100	100	