

**UNNAMED TRIBUTARY TO SIXPENNY CREEK
BERKS COUNTY**

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

**Segment: Basin
Stream Code: 64027
Drainage List F**

**WATER QUALITY MONITORING SECTION (MAB)
WATER QUALITY DIVISION
BUREAU OF CLEAN WATER
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

2019

INTRODUCTION

Unnamed tributary (UNT) 64027 to Sixpenny Creek basin is currently designated High Quality - Coldwater Fishes, Migratory Fishes (HQ-CWF, MF) and was evaluated for redesignation to Exceptional Value (EV) in response to a request from The Nature Conservancy and based on the results of routine Department of Environmental Protection (DEP) aquatic life use surveys.

The stream redesignation process begins with an evaluation of the “existing uses” and the “designated uses” of a stream. “Existing uses” are water uses actually attained in the waterbody. Existing uses are protected through permit or approval actions taken by the DEP. “Designated uses” are water uses identified in regulations that protect a waterbody. Candidates for stream redesignation may be identified by the DEP based on routine waterbody investigations or based on requests initiated by other agencies or from the general public through a rulemaking petition to the EQB.

GENERAL WATERSHED DESCRIPTION

UNT to Sixpenny Creek is a small, shallow and cold first-order tributary to Sixpenny Creek located in Union Township, Berks County. UNT to Sixpenny Creek drains 1.03 square miles with a total of 6.91 stream miles (Table 1, Figure 1). The stream originates within and approximately 80% of it lies within French Creek State Park. UNT to Sixpenny Creek is located on the Elverson 7.5-minute series USGS quadrangle map. Land use is 100% forested. There are no NPDES permits within the watershed.

Table 1. UNT Sixpenny Creek basin – station locations

STATION	DESCRIPTION
UNTSC	UNT to Sixpenny Creek, 500 meters upstream of the confluence with Sixpenny Creek Union Township, Berks County Lat: 40.239866 Long: -75.777984
PC (REF)	Pine Creek, 250 downstream of Long Lane Pike Township, Berks County Lat: 40.4232399 Long: -75.704330

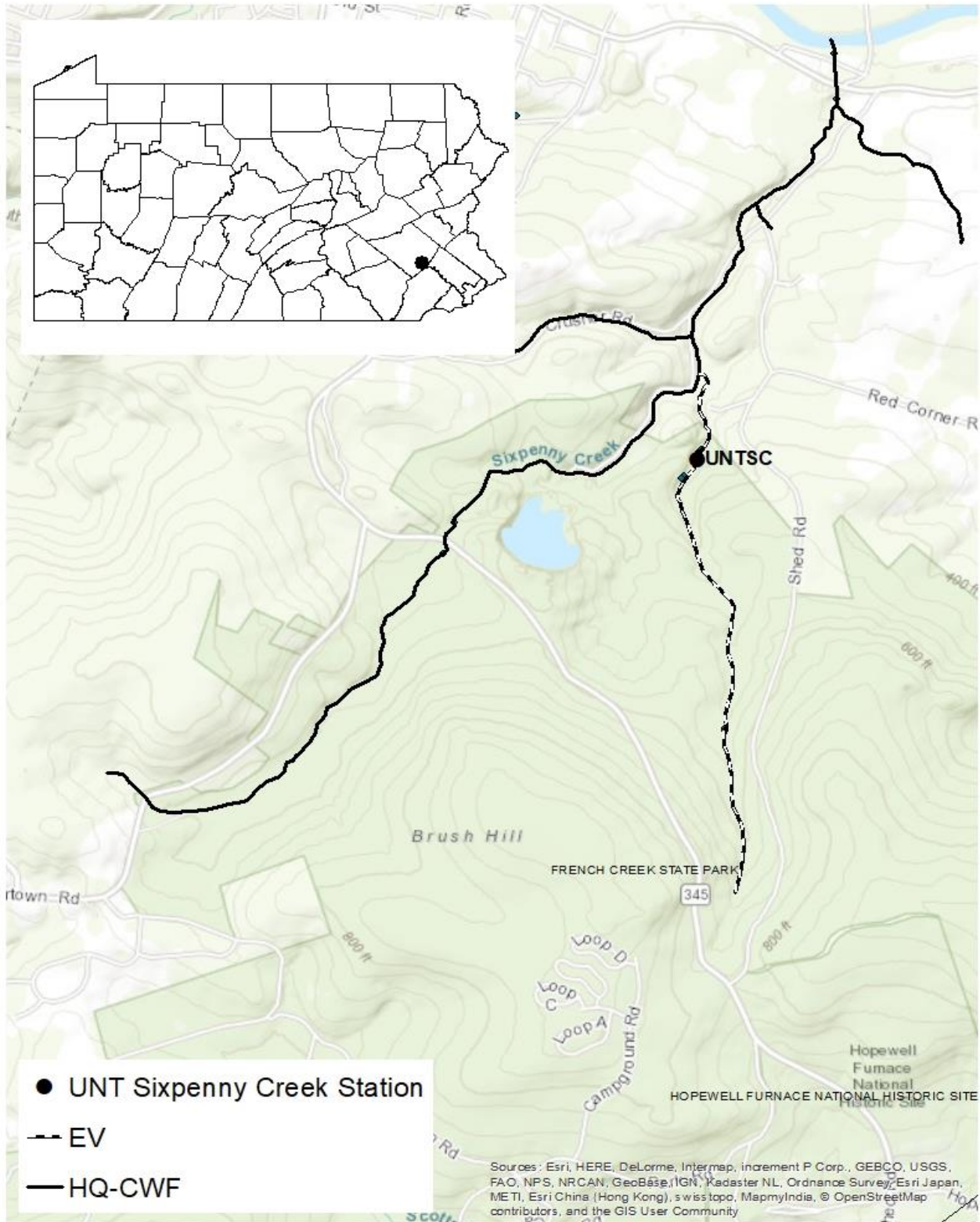


Figure 1. UNT Sixpenny Creek basin – station locations

WATER QUALITY AND USES

Water Chemistry

No long-term water quality data is available from the UNT to Sixpenny Creek basin that would allow a direct comparison to water quality criteria. Water chemistry grab samples and field meter data were collected on December 7, 2017. Water chemistry results indicate comparable concentrations of all metals and nutrients for the UNT to Sixpenny Creek station and the Pine Creek reference station (Tables 2 & 3).

Table 2. UNT to Sixpenny Creek December 2017 – discrete field measurements

PARAMETER	UNITS	STATIONS	
		UNTSC	PC (REF)
DISSOLVED OXYGEN	mg/L	12.22	12.74
pH	SU	7.3	7.49
SPECIFIC CONDUCTANCE	µS/cm ^c	91.3	147.1
TEMPERATURE	°C	5.7	5.0

Aquatic Biota

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of water quality. DEP staff collected habitat and benthic macroinvertebrate data at one station on UNT to Sixpenny Creek and at one EV reference station on Pine Creek in Berks County on May 10, 2006 (Table 1, Figure 1).

Habitat. Instream habitat was assessed at the UNT to Sixpenny Creek station and Pine Creek EV reference station. The total habitat score for the UNT to Sixpenny Creek basin station was 202, reflecting optimal habitat conditions (Table 4).

Benthos. Benthic macroinvertebrate samples were collected on May 10, 2006 using the DEP's Rapid Bioassessment Protocol (RBP) benthic sampling methodology, which is a modification of the United States Environmental Protection Agency's (EPA) RBPs (Plafkin, et al. 1989, Barbour et al. 1999) (Table 5). The dominant taxon for both samples was the pollution sensitive mayfly *Ephemerella*. Overall taxa richness was high with 30 and 29 taxa for UNT to Sixpenny and Pine Creek respectively. Both samples were dominated by pollution sensitive Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) taxa.

Table 3. UNT to Sixpenny Creek, December 2017 – chemistry results

	PARAMETER	UNITS	STATIONS	
			UNTSC ¹	PC (REF) ²
<i>Metals and Ions</i>	ALUMINUM D	µg/L	<10	<10
	ALUMINUM T	µg/L	22.2	14.9
	BARIUM T	µg/L	26	21
	BORON T	µg/L	<200	<200
	BROMIDE	µg/L	<25.0	<25.0
	CADMIUM D	µg/L	<.20	<.20
	CALCIUM T	mg/L	6.629	10.692
	CHLORIDE	mg/L	11	16.6
	COPPER D	µg/L	<4	<4
	COPPER T	µg/L	<4	<4
	IRON D	µg/L	<20	30
	IRON T	µg/L	34	53
	LEAD D	µg/L	<1.0	<1.0
	LEAD T	µg/L	<1.0	<1.0
	LITHIUM D	µg/L	<25	<25
	LITHIUM T	µg/L	<25	<25
	MAGNESIUM T	mg/L	2.925	4.686
	MANGANESE D	µg/L	<10	<10
	MANGANESE T	µg/L	<10.00	<10.00
	NICKEL D	µg/L	<50	<50
	NICKEL T	µg/L	<50	<50
	POTASSIUM T	mg/L	<1.00	1.142
	SELENIUM T	µg/L	<7	<7
	SODIUM T	mg/L	5.892	8.855
	STRONTIUM T	µg/L	24	98
SULFATE	mg/L	7.16	10.6	
ZINC D	µg/L	<10.0	<10.0	
ZINC T	µg/L	<10.0	<10.0	
<i>Nutrients</i>	AMMONIA D	mg/L	<.02	<.02
	AMMONIA T	mg/L	<.02	<.02
	NITRATE & NITRITE D	mg/L	<0.05	0.87
	NITRATE & NITRITE T	mg/L	<0.05	0.92
	NITROGEN T	mg/L	<0.25	1.02
	ORTHO PHOSPHORUS D	mg/L	0.012	0.014
	ORTHO PHOSPHORUS T	mg/L	0.011	0.015
	PHOSPHORUS D	mg/L	<0.01	0.01
PHOSPHORUS T	mg/L	0.011	0.01	
<i>Other</i>	ALKALINITY	mg/L	17	31
	HARDNESS	mg/L	29	46
	PH	SU	7.3	7.6
	SPECIFIC CONDUCTANCE	µS/cm ^c	89.5	142.9
	TDS	mg/L	76	104
	TOTAL SUSPENDED SOLIDS	mg/L	<5	<5
TOTAL ORGANIC CARBON	mg/L	1.43	1.6	

"<" indicate concentrations below reporting limit

¹ Refer to Figure 1 and Table 1 for station locations

² Reference Station – Refer to Table 1 for location

Table 4. UNT to Sixpenny Creek, May 2006 – habitat assessment results, riffle/run prevalence

PARAMETER	SCORING RANGE	STATIONS	
		UNTSC ¹	PC (REF) ²
1. INSTREAM COVER	0-20	17	17
2. EPIFAUNAL SUBSTRATE	0-20	18	18
3. EMBEDDEDNESS	0-20	17	18
4. VELOCITY/DEPTH	0-20	15	17
5. CHANNEL ALTERATIONS	0-20	19	19
6. SEDIMENT DEPOSITION	0-20	16	18
7. RIFFLE FREQUENCY	0-20	16	18
8. CHANNEL FLOW STATUS	0-20	16	17
9. BANK CONDITION	0-20	16	17
10. BANK VEGETATIVE PROTECTION	0-20	15	18
11. GRAZING/DISRUPTIVE PRESSURES	0-20	18	19
12. RIPARIAN VEGETATION ZONE WIDTH	0-20	19	18
Total Score	0-240	202	214
Rating ³		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)

BIOLOGICAL USE QUALIFICATIONS

The DEP applied its integrated benthic macroinvertebrate scoring test described at 25 Pa. Code § 93.4b(b)(1)(v) to the UNT to Sixpenny Creek basin. Selected benthic macroinvertebrate community metrics from the evaluated basin were compared to those from the reference station. The reference station on Pine Creek was used as a reference because it is within the same Atlantic Highland ecoregion and is of comparable drainage area to the candidate station. In addition, Pine Creek has served as an EV reference stream in other DEP surveys. The comparisons were done using the following metrics that were selected as being indicative of community health: taxa richness, modified EPT index, modified HBI, percent dominant taxon, and percent modified mayflies.

Based on the benthic macroinvertebrate scoring test described above, the station on UNT to Sixpenny Creek has Biological Condition Scores (BCS) that are above the 92% EV qualifying criterion required to qualify as Exceptional Value Waters (§ 93.4b(b)(1)(v)) (Table 6).

Table 5. UNT to Sixpenny Creek, May 2006 – semi-quantitative benthic macroinvertebrate data

TAXA	STATIONS	
	UNTSC ¹	PC (REF) ²
Ephemeroptera		
Ameletidae	<i>Ameletus</i>	3
Baetidae	<i>Acentrella</i>	1
	<i>Baetis</i>	1
Ephemerellidae	<i>Drunella</i>	9
	<i>Ephemerella</i>	70
Heptageniidae	<i>Cinygmula</i>	14
	<i>Epeorus</i>	11
	<i>Leucrocuta</i>	1
	<i>Rhithrogena</i>	10
	<i>Stenacron</i>	1
Leptophlebiidae	<i>Stenonema</i>	3
	<i>Paraleptophlebia</i>	5
Plecoptera		
Chloroperlidae	<i>Alloperla</i>	2
	<i>Sweltsa</i>	4
Leuctridae	<i>Leuctra</i>	3
Nemouridae	<i>Amphinemura</i>	3
Perlidae	<i>Acroneuria</i>	3
	<i>Perlesta</i>	10
Perlodidae	<i>Malirekus</i>	1
	<i>Isoperla</i>	20
Peltoperlidae	<i>Peltoperla</i>	9
	<i>Tallaperla</i>	9
Pteronarcyidae	<i>Pteronarcys</i>	17
Tricoptera		
Glossosomatidae	<i>Agapetus</i>	10
Hydropsychidae	<i>Diplectrona</i>	13
Philopotamidae	<i>Dolophilodes</i>	11
Polycentropodidae	<i>Polycentropus</i>	1
Rhyacophilidae	<i>Rhyacophila</i>	5
Odonata		
Gomphidae	<i>Lanthus</i>	4
Megaloptera		
Corydalidae	<i>Nigronia</i>	1
Coleoptera		
Psephenidae	<i>Psephenus</i>	2
	<i>Ectopria</i>	1
Elmidae	<i>Oulimnius</i>	3
	<i>Promoresia</i>	5
Diptera		
Blepharicaridae	<i>Blepharicera</i>	1
Tipulidae	<i>Tipula</i>	2
	<i>Dicranota</i>	3
	<i>Hexatoma</i>	2
Chironomidae		10
Non-Insect Taxa		
Oligochaeta		1

¹ Refer to Figure 1 and Table 1 for station locations

² Reference Station – Refer to Table 1 for location

Table 6. UNT to Sixpenny Creek, May 2006 – RBP metrics comparison

METRIC	STATIONS	
	UNTSC ¹	PC (REF) ²
1 TAXA RICHNESS	30	29
Candidate/Reference (%)	114	
Biol. Cond. Score	8	8
2 MOD. EPT INDEX	20	19
Candidate/Reference (%)	111	
Biol. Cond. Score	8	8
3 MOD. HBI	1.43	1.36
Candidate-Reference	0.48	
Biol. Cond. Score	8	8
4 % DOMINANT TAXA	29.2	26.5
Candidate-Reference	2	
Biol. Cond. Score	8	8
5 % MOD. MAYFLIES	48.8	44.7
Reference-Candidate	-5	
Biol. Cond. Score	8	8
TOTAL BIOLOGICAL CONDITION SCORE	40	40
% COMPARABILITY TO REFERENCE	100	

¹ Refer to Figure 1 and Table 1 for station locations

² Reference Station – Refer to Table 1 for location

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The DEP provided notice of this redesignation evaluation and requested any technical data from the general public through publication in the Pennsylvania Bulletin on March 2, 2016 (46 Pa.B. 1287). The Berks County Planning Commission, Berks County Conservation District and Union Township were notified of the evaluation in a letter dated May 27, 2016. In addition, a notification was posted on the DEP's website on June 15, 2016.

RECOMMENDATION

Based on applicable regulatory definitions and requirements of 25 Pa. Code § 93.4b(b)(1)(v) (the DEP's integrated benthic macroinvertebrate scoring test), the DEP recommends that the UNT 64027 to Sixpenny Creek basin be designated in Chapter 93 as Exceptional Value, Migratory Fishes (EV, MF). This recommendation adds approximately 6.91 miles of EV streams to Chapter 93.

REFERENCES

Barbour, M.T., Gerritsen, J., Snyder, B.D., Stribling, J.B. 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.

Plafkin, J.L., Barbour, M.T., Porter, K.D, Gross, S.K., Hughes, R.M. 1989. Rapid Bioassessment Protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish. United States Environmental Protection Agency. EPA/444/4-89-001.

DRAFT