

Unnamed Tributary to Whetstone Run

Delaware County

WATER QUALITY STANDARDS REVIEW STREAM EVALUATION REPORT

**Segment: Basin
Stream Code: 00770
Drainage List: G**

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

2018

INTRODUCTION

The Department of Environmental Protection (Department) conducted an evaluation of the unnamed tributary (UNT) to Whetstone Run in response to a petition submitted to the Environmental Quality Board (EQB) by the Darby Creek Valley Association. On October 18, 2016, the EQB accepted the petition for further evaluation. The entire Whetstone Run basin is currently designated Warm Water Fishes, Migratory Fishes (WWF, MF). The petition requests the UNT to Whetstone Run be redesignated to High Quality – Warm Water Fishes, Migratory Fishes (HQ-WWF, MF).

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 Department. “Designated uses” are water uses identified in regulations that protect a waterbody. Candidates for stream redesignation may be identified by the Department 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

Whetstone Run is a tributary to Darby Creek within the lower Delaware River basin and is located within Marple Township, Delaware County. UNT to Whetstone Run has a drainage area of approximately 0.28 square miles and consists of 0.59 stream miles. The current land use within the basin consists of forested (48%), urban/developed (50%), and other (2%). There are no NPDES permits within the basin.

WATER QUALITY AND USES

Water Chemistry

The Department collected in-situ field meter data from candidate and reference stations in 2015 and 2017, as well as comprehensive water chemistry samples in 2015 from UNT Whetstone Run and in 2017 from both candidate and reference stations (Figure 1, Table 1).

Water chemistry sample results from UNT Whetstone Run characterize higher concentrations of nearly all metals, ions and nutrients analyzed when compared to reference station results (Table 2). Chloride results from UNT Whetstone Run in 2015 (110.9 ug/L) and 2017 (158.0 ug/L) were approximately ten times higher than reference stations UNT Sixpenny Creek (11.0 ug/L) and Pine Creek (16.6 ug/L) in 2017. Barium results from UNT Whetstone Run in 2017 (200 ug/L) were elevated compared to UNT Sixpenny (26 ug/L) and Pine Creek (21 ug/L). Specific conductance is a commonly used measure of anthropogenic stress to instream water quality. Specific conductance measured in 2015 from UNT Whetstone Run was 456 us/cm², in 2017 it was 622 us/cm². Specific conductance measured from UNT Sixpenny Creek was 65.7 us/cm² and 91.3 us/cm² in 2015 and 2017. At Pine Creek is was measured at 147.1 us/cm² in 2017.

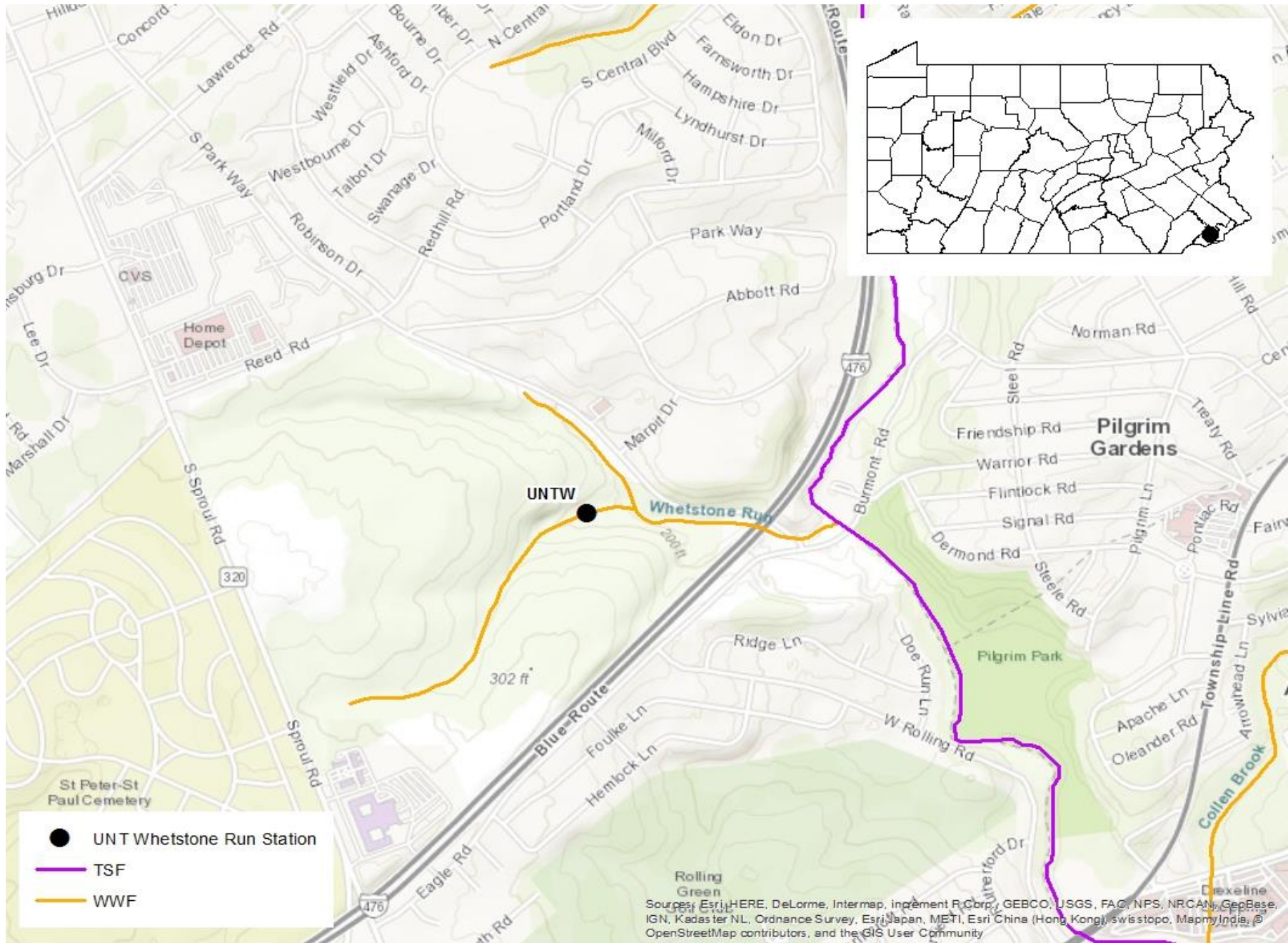


Figure 1. UNT Whetstone Run – station location

Table 1. UNT Whetstone Run and reference station locations

STATION	DESCRIPTION
UNTW	UNT 00770 to Whetstone Run, 200 meters upstream of the confluence with Whetstone Run Marple Township, Delaware County Lat: 39.95489 Long: -75.34233
UNTS (ref)	UNT 12345 to Sixpenny Creek, 550 meters upstream of the confluence with Sixpenny Creek Union Township, Berks County Lat: 40.24002 Long: -75.77779
PC (ref)	Pine Creek, 250 meters downstream of Long Lane Pike Township, Berks County Lat: 40.42735 Long: -75.69872

Table 2. Water chemistry results

	PARAMETER	STATIONS					
		UNITS	UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	PC (ref) ²
METALS AND IONS	ALUMINUM D	UG/L			<10	<10	<10
	ALUMINUM T	UG/L	<200		<10	22.2	14.9
	BARIUM T	UG/L			200	26	21
	BORON T	UG/L			<200	<200	<200
	BROMIDE	UG/L			107.3	<25	<25
	CADMIUM D	UG/L			<0.2	<0.2	<0.2
	CADMIUM T	UG/L	<0.2				
	CALCIUM T	MG/L	19.7		22.78	6.629	10.692
	CHLORIDE T	MG/L	110.9		158.0	11.0	16.6
	COPPER D	UG/L			<4	<4	<4
	COPPER T	UG/L	10		<4	<4	<4
	IRON D	UG/L			<20	<20	30
	IRON T	UG/L	184		<20	34	53
	LEAD D	UG/L			<1	<1	<1
	LEAD T	UG/L	<1		<1	<1	<1
	LITHIUM D	UG/L			<25	<25	<25
	LITHIUM T	UG/L			<25	<25	<25
	MAGNESIUM T	MG/L	13.000		17.328	2.925	4.686
	MANGANESE D	UG/L			<10	<10	<10
	MANGANESE T	UG/L	<10		<10	<10	<10
	NICKEL D	UG/L			<50	<50	<50
	NICKEL T	UG/L	<50		<50	<50	<50
	POTASSIUM T	MG/L			4.006	<1	1.142
	SELENIUM T	UG/L			<7	<7	<7
	SODIUM T	MG/L			58.398	5.892	8.855
	STRONTIUM T	UG/L			184	24	98
	SULFATE T	MG/L	18.56		15.77	7.16	10.6
	ZINC D	UG/L			<10	<10	<10
ZINC T	UG/L	<10		<10	<10	<10	

¹ 2015 Samples

² 2017 Samples

Table 2 cont. Water chemistry results

	PARAMETER	STATIONS					
		UNITS	UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	PC (ref) ²
NUTRIENTS	AMMONIA D	MG/L			<0.02	<0.02	<0.02
	AMMONIA T	MG/L	<0.02		<0.02	<0.02	<0.02
	NITRATE & NITRITE D	MG/L			1.9	<0.05	0.87
	NITRATE & NITRITE T	MG/L	1.63		1.88	<0.05	0.92
	NITROGEN T	MG/L	1.7		2.09	<0.25	1.02
	ORTHO PHOSPHORUS D	MG/L			0.011	0.012	0.014
	ORTHO PHOSPHORUS T	MG/L			0.012	0.011	0.015
	PHOSPHORUS D	MG/L			<0.01	<0.01	<0.01
	PHOSPHORUS T	MG/L	0.009		0.01	0.011	0.01
PHYSICAL/OTHER	ALKALINITY	MG/L	25.2	16	21	17	31
	DISSOLVED OXYGEN	MG/L	12.4	10.34	11.9	12.22	12.74
	HARDNESS T	MG/L	103		128	29	46
	pH	pH units	7.46	7.14	6.6	7.3	7.49
	SPECIFIC COND	US/CM ²	456	65.7	622	91.3	147.1
	TDS	MG/L	282		338	76	104
	TSS	MG/L	16		6	<5	<5
	TEMPERATURE	°C	10.43	12.1	5.6	5.7	5
	TOC	MG/L			0.98	1.43	1.6

¹ 2015 Samples

² 2017 Samples

Aquatic Biota

The indigenous aquatic community of a surface water is an excellent indicator of long-term conditions and is used as a measure of water quality. Departmental staff collected habitat and benthic macroinvertebrate data at a single location on UNT Whetstone Run in April 2015 as well as a reference sample from UNT Sixpenny Creek, Berks County. Samples collected in 2015 were collected prior to the petition submission and acceptance. The Department also collected an additional sample from UNT Whetstone Run in November 2017 along with another Exceptional Value (EV) reference sample on UNT Sixpenny and an additional EV sample from Pine Creek, Berks County.

Habitat. Instream habitat was assessed at each station where benthic macroinvertebrates were sampled (Table 3). The habitat evaluation consists of rating twelve parameters to derive a station habitat score. The total habitat scores were suboptimal at UNT Whetstone Run in 2015 (156) as well as 2017 (167). Suboptimal scores were influenced by low scores for embeddedness, sediment deposition, channel flow status, and bank condition. The total habitat scores at all reference stations/samples were optimal.

Table 3. Habitat assessment Results

PARAMETER	STATIONS				
	UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	PC (ref) ²
1. instream cover	12	18	12	17	17
2. epifaunal substrate	18	18	15	18	18
3. embeddedness	8	18	11	12	14
4. velocity/depth	13	15	13	14	19
5. channel alterations	17	20	17	19	13
6. sediment deposition	6	17	12	12	12
7. riffle frequency	18	18	13	20	19
8. channel flow status	9	20	12	15	17
9. bank condition	3	19	9	17	18
10. bank vegetative protection	17	20	16	17	17
11. grazing/disruptive pressures	18	20	18	20	19
12. riparian zone width	17	20	19	20	16
Total Score	156	223	167	201	199
Rating ³	SUB	OPT	SUB	OPT	OPT

¹ 2015 Samples

² 2017 Samples

³ OPT=Optimal (≥192); SUB=Suboptimal (132-191)

Benthos. Benthic macroinvertebrate samples were collected using the Department's Rapid Bioassessment Protocols (RBP) benthic sampling methodology, which is a modification of EPA's RBP(Barbour et al. 1999, Plafkin et al. 1989) (Table 4). Macroinvertebrate samples collected from UNT Whetstone Run in 2015 and 2017 are represented by a limited number of sensitive taxa, particularly Ephemeroptera (mayfly) and Plecoptera (stonefly) taxa. Three mayfly taxa were found in each 2015 and 2017 UNT Whetstone Run subsamples, while five were found in the 2015 UNT Sixpenny Creek and eight were found in both the 2017 UNT Sixpenny Creek and Pine Creek subsamples. Three stonefly taxa were found in the 2015 UNT Whetstone Run subsample and only two were found in the 2017 sample. Seven stonefly taxa were found in the 2015 UNT Sixpenny Creek, six in the 2017, and five in the Pine Creek 2017 subsamples. The reduced number of mayfly and stonefly taxa account for a majority of the reduced diversity and taxa richness in the UNT Whetstone Run samples.

BIOLOGICAL USE QUALIFICATIONS

The qualifying criterion applied to UNT Whetstone Run was the Department's integrated benthic macroinvertebrate scoring test described at 25 Pa. Code § 93.4b(a)(2)(i)(A). Selected benthic macroinvertebrate community metrics from UNT Whetstone Run were compared to reference stations from UNT Sixpenny Creek and Pine Creek (Table 5). The EV reference stations on UNT Sixpenny Creek and Pine Creek were used as references because the sites and samples qualify as EV reference

Table 4. Semi-quantitative benthic macroinvertebrate data

TAXA		STATIONS				
		UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	PC (ref) ²
Ephemeroptera						
Baetidae	<i>Baetis</i>	26	1			25
Baetidae	<i>Plauditus</i>			9		
Ephemerellidae	<i>Ephemerella</i>	1	34		10	29
Ephemerellidae	<i>Teloganopsis</i>					7
Heptageniidae	<i>Cinygmula</i>		9		1	
Heptageniidae	<i>Epeorus</i>		12		7	17
Heptageniidae	<i>Leucrocuta</i>		2		1	
Heptageniidae	<i>Maccaffertium</i>	10		10	4	3
Heptageniidae	<i>Rhithrogena</i>					6
Isonychiidae	<i>Isonychia</i>				1	1
Leptohyphidae	<i>Tricorythodes</i>			1		
Leptophlebiidae	<i>Habrophlebiodes</i>				2	
Leptophlebiidae	<i>Paraleptophlebia</i>				17	6
Plecoptera						
Capniidae	<i>Allocapnia</i>			101	8	
Chloroperlidae	<i>Sweltsa</i>		1		6	1
Leuctridae	<i>Leuctra</i>	10	1		2	
Nemouridae	<i>Amphinemura</i>	19	1			
Perlidae	<i>Acroneuria</i>		8		10	
Perlodidae	<i>Isoperla</i>	1	8	4		6
Perlodidae	<i>Remenus</i>		1			
Pteronarcidae	<i>Pteronarcys</i>		4		1	3
Taeniopterygidae	<i>Strophopteryx</i>					2
Taeniopterygidae	<i>Taeniopteryx</i>				2	2
Trichoptera						
Apataniidae	<i>Apatania</i>					1
Glossosomatidae	<i>Glossosoma</i>	1			3	
Hydropsychidae	<i>Cheumatopsyche</i>	2		1		5
Hydropsychidae	<i>Diplectrona</i>	61	22	48	39	2
Hydropsychidae	<i>Hydropsyche</i>	7				7
Lepidostomatidae	<i>Lepidostoma</i>				2	
Limnephilidae	<i>Pycnopsyche</i>		1			1
Philopotamidae	<i>Dolophilodes</i>	1		2	2	11
Polycentropodidae	<i>Polycentropus</i>	3	1	6		1
Rhyacophilidae	<i>Rhyacophila</i>	1	8	2	3	10
Uenoidae	<i>Neophylax</i>		1		1	

¹ 2015 Samples

² 2017 Samples

Table 4 cont. Semi-quantitative benthic macroinvertebrate data

TAXA	STATIONS				
	UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	PC (ref) ²
Odonata					
Gomphidae		1			
Gomphidae				2	
Diptera					
Blephariceridae		1			
Ceratopogonidae		2		2	
Chironomidae	44	14	37	73	29
Empididae	1				
Empididae	5				
Simuliidae		13		1	12
Simuliidae	2			1	
Tipulidae	5		1		1
Tipulidae		2		1	2
Tipulidae				1	
Tipulidae	1	2	5	1	1
Coleoptera					
Elmidae	5	5	11	1	1
Elmidae		5		32	3
Elmidae		1			5
Psephenidae	4			2	
Psephenidae				1	1
Non-Insect Taxa					
Cambaridae			1		
Hirudinea		1			
Oligochaeta		1			1
Collembola			1		

¹ 2015 Samples

² 2017 Samples

samples (PADEP 2013), the sites represent similar drainage areas to the candidate station and are of similar stream type. Sampling of candidate and reference stations was conducted within a temporally narrow window to minimize seasonal variation. Comparisons with the following metrics were used as an indicator of community health: taxa richness, modified Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) index, modified Hilsenhoff Biotic Index (HBI), percent dominant taxon, and percent modified mayflies.

The April 2015 UNT Whetstone Run sample compared to the reference sample on UNT Sixpenny Creek had a Biological Condition Score (BCS) of 48%. The November 2017 UNT Whetstone Run sample when compared to reference samples on UNT Sixpenny Creek and Pine Creek had BCSs of 60% and 50%, respectively. Based on these 2015 and 2017 comparisons, UNT Whetstone Run does not meet the 83% HQ qualifying criterion.

Table 5. RBP metric comparison

METRIC	STATIONS					
	UNTW ¹	UNTS (ref) ¹	UNTW ²	UNTS (ref) ²	UNTW ²	PC (ref) ²
1. TAXA RICHNESS	21	29	16	32	16	31
Cand/Ref (%)	72	xxx	50	xxx	52	xxx
Biol. Cond. Score	5	8	0	8	0	8
2. MOD. EPT INDEX	9	15	8	19	8	17
Cand/Ref (%)	60	xxx	42	xxx	47	xxx
Biol. Cond. Score	3	8	0	8	0	8
3. MOD. HBI	3.25	1.83	3.04	3.11	3.04	2.85
Cand-Ref	1.42	xxx	-0.07	xxx	0.19	xxx
Biol. Cond. Score	0	8	8	8	8	8
4. % DOMINANT TAXA	29	20.9	42.1	30.4	42.1	14.4
Cand-Ref	8.3	xxx	11.7	xxx	27.7	xxx
Biol. Cond. Score	8	8	8*	8	8*	8
5. % MOD. MAYFLIES	5.2	35.0	8.3	17.1	8.3	34.2
Ref-Cand	29.8	xxx	8.8	xxx	25.9	xxx
Biol. Cond. Score	3	8	8	8	4	8
TOTAL BIOLOGICAL CONDITION SCORE	19	40	24	40	20	40
% COMPARABILITY TO REFERENCE	48		60		50	

¹ 2015 Samples

² 2017 Samples

* Dominant Taxa with HBI of 3 or less

SURFACE WATER OF EXCEPTIONAL ECOLOGICAL SIGNIFICANCE

Based on petitioner information suggesting that UNT Whetstone Run may qualify as a surface water of exceptional ecological significance, the Department evaluated this qualification based on the criteria listed at 25 Pa. Code § 93.4b(b)(2) and the definition at § 93.1. A surface water of exceptional ecological significance is defined as 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 thermal springs or wetlands which are exceptional value wetlands under 25 Pa. Code § 105.17(1) (relating to wetlands). The Department reviewed information gathered for the Pennsylvania Natural Heritage Program and reported in *A Natural Heritage Inventory of Delaware County, Pennsylvania* (Western Pennsylvania Conservancy 2011). The information did not identify any surface waters with statewide or local ecological significance. No areas were identified that tie the petitioned surface water to rare or endemic ecological community types.

PUBLIC NOTICE AND REQUEST FOR TECHNICAL DATA

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 November 18, 2017 (47 Pa.B. 7126). Delaware County, Marple Township, the Pennsylvania Fish and Boat Commission, Delaware River Basin Commission, Delaware Riverkeeper Network, Trout Unlimited, Archdiocese of Philadelphia, the law firm of Cozen O'Connor who represent Sproul Road Developers, and the Darby Creek Valley Association were notified of the redesignation evaluation in a letter dated December 26, 2017. In addition, a notification was posted on the Department's website. Information was received from Cozen O'Connor representing Sproul Road Developers, Obermayer Rebmann Maxwell and Hippel representing the Archdiocese of Philadelphia, and the Delaware Riverkeeper Network.

The letter from Cozen O'Connor representing Sproul Road Developers included a report prepared by Kleinschmidt titled *Response in Support of Opposition to a Stream Redesignation Petition for the Unnamed Southern Tributary to Whetstone Run, Delaware County, Pennsylvania* hereafter identified as the Kleinschmidt Report. The Kleinschmidt Report characterizes the UNT Whetstone Run subbasin and the anthropogenic impacts that have negatively affected UNT Whetstone Run and generally the greater Darby Creek basin. The Kleinschmidt Report offers critical comments to points included in the rulemaking petition, but does not include additional water quality data.

RECOMMENDATION

Based on applicable regulatory definitions in 25 Pa. Code § 93.4b, the Department recommends that the UNT Whetstone Run maintain its current designated use in Chapter 93 as Warm Water Fishes, Migratory Fishes.

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.
- PADEP. 2013. Water Quality Antidegradation Implementation Guidance.
<http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=7842&DocName=WATER%20QUALITY%20ANTIDEGRADATION%20IMPLEMENTATION%20GUIDANCE.PDF%20>
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