

**AQUASHICOLA CREEK  
MONROE AND CARBON COUNTIES**

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

**Segment: Basin, Source to Buckwha Creek  
Stream Code: 03776  
Drainage List: D**

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

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**TABLE OF CONTENTS**

TABLE OF CONTENTS ..... 3

INTRODUCTION ..... 4

GENERAL WATERSHED DESCRIPTION..... 4

WATER QUALITY ..... 5

    Discrete Physicochemical..... 5

    Biological ..... 8

    Physical..... 11

INTEGRATED BENTHIC MACROINVERTBRATE SCORING TEST ..... 12

OUTSTANDING STATE RESOURCE WATERS ..... 13

NATIONAL WILDLIFE REFUGE WATERS ..... 13

PUBLIC RESPONSE AND REQUEST FOR TECHNICAL DATA ..... 14

    Evaluation Notice ..... 14

RECOMMENDATION ..... 15

LITERATURE CITED ..... 16

APPENDIX A – DEFINITIONS..... 17

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## **INTRODUCTION**

The Department of Environmental Protection (DEP) conducted an evaluation of the Aquashicola Creek basin from the source to Buckwha Creek (Figure 1) in response to a rulemaking petition submitted by the Aquashicola/Pohopoco Watershed Conservancy and accepted by the Environmental Quality Board (EQB) on December 21, 2010. This portion of the Aquashicola Creek basin is currently designated High Quality – Cold Water Fishes, Migratory Fishes (HQ-CWF, MF). The petition requests the Aquashicola Creek basin from the source to Buckwha Creek be redesignated to Exceptional Value (EV). Components of this evaluation include physicochemical, biological and physical data collection and evaluations of EV qualifying criteria.

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**

Aquashicola Creek is a tributary to the Lehigh River that originates in Ross and Hamilton townships, Monroe County. Aquashicola Creek flows west-southwest through Eldred Township, Monroe County and then Lower Towamensing Township, Carbon County to the confluence of Buchwha Creek. This portion of the Aquashicola Creek basin includes 24.7 stream miles and drains approximately 22 square miles of the Glaciated Pocono Plateau. The majority of the basin includes low-gradient stream reaches defined as having pool/glide channel morphology and naturally lacking riffles. Unnamed Tributary (UNT) 03853, as described by the National Hydrography Dataset, or Ross Common Creek, as described by the *Pennsylvania Gazetteer of Streams* (DEP 2003a), is the exception and is high gradient with cobble substrate and predominant riffle/run habitat. According to the National Land Cover Database (NLCD) 2016, the vast majority of land cover is forested, scrub or grassland (68%), 19% developed, 10% agricultural and 3% barren lands, open water or wetlands (Dewitz 2019). State Game Lands (SGL) 168 comprises about 4.7 square miles or 21% of the basin. There are currently three National Pollutant Discharge Elimination System (NPDES) permits, including one sewage facility and two pesticide treatment areas within the basin.

## WATER QUALITY

### Discrete Physicochemical

Field meter data (temperature, specific conductance, pH, dissolved oxygen) were collected at each of the four Aquashicola Creek basin stations and from the Wild Creek and Little Bush Kill reference stations as part of the 2010 data collection effort (Figure 1, Tables 1-3). In addition, four DEP water chemistry samples were available that were collected from 2008 through 2016, two each from stations 3AC and 4AC (Table 3).

**Table 1.** Station Locations – Aquashicola Creek Basin.

STATION	DESCRIPTION
1RCC	Ross Common Creek 20 meters upstream of Hemlock Lane Ross Township, Monroe County Lat: 40.8673 Long: -75.3193
2AC	Aquashicola Creek 100 meters upstream of Mount Eaton Road Ross Township, Monroe County Lat: 40.8743 Long: -75.3319
3AC	Aquashicola Creek 100 meters upstream of Chestnut Ridge Road Eldred Township, Monroe County Lat: 40.8356 Long: -75.4330
4AC	Aquashicola Creek 50 meters upstream of Blue Mountain Drive Lower Towamensing Township, Monroe County Lat: 40.8241 Long: -75.5167
WC	Wild Creek 50 meters upstream of Reservoir Road Penn Forest Township, Carbon County Lat: 40.9401 Long: -77.8404
LBK	Little Bush Kill downstream of Silver Lake Road Porter Township, Pike County Lat: 41.2593 Long: -74.9947

**Table 2.** DEP Discrete Physicochemical Data – Wild Creek (WC) and Little Bush Kill (LBK) Reference (REF).

PHYSICAL/ OTHER	PAREMETER	UNITS	REF	
			WC	LBK
			11/16/10	11/16/10
	DISSOLVED OXYGEN	mg/L	11.6	10.8
	pH	pH units	7.92	5.05
	SPECIFIC COND	µS/cm <sup>c</sup>	76.7	48.0
	TEMPERATURE	°C	8.2	5.8

The Monroe County Planning Commission has conducted the Monroe County Water Quality Study since 1985 that includes the collection of water quality data, including discrete physicochemical data. Discrete physicochemical data were available from a single location on Aquashicola Creek located just over one mile downstream of station 3AC from 2015 through 2020 (Monroe County Planning Commission 2015, 2016, 2017, 2018, 2019, 2020; Table 4).



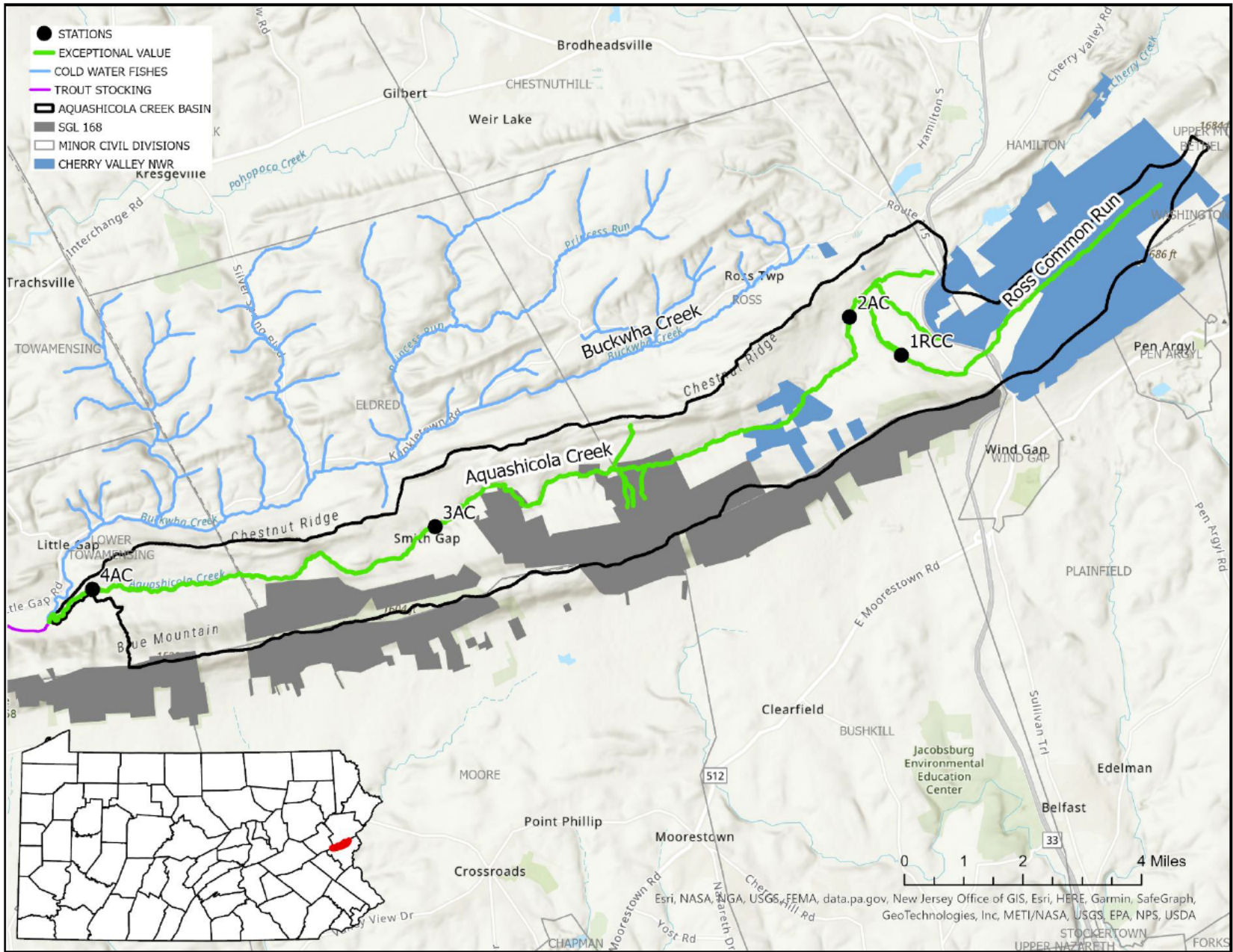


Figure 1. Aquashicola Creek Basin Station Locations and Redesignation Recommendation.

**Table 3. DEP Discrete Physicochemical Data – Aquashicola Creek Basin**

PARAMETER	UNITS	STATIONS <sup>1</sup>								
		1RCC	2AC	3AC	3AC	3AC	4AC	4AC	4AC	
		11/15/10	11/15/10	4/17/08	11/15/10	10/15/14	11/15/10	7/14/16	11/17/16	
METALS AND IONS	ALUMINUM T	ug/L	-	-	-	-	-	-	86.0	37.0
	BARIUM T	ug/L	-	-	-	-	-	-	43.0	59.0
	BORON T	ug/L	-	-	-	-	-	-	<19.10	<19.10
	BROMIDE	ug/L	-	-	-	-	-	-	10.163	<3.036
	CALCIUM T	mg/L	-	-	-	-	25.0	-	20.0	29.5
	CHLORIDE T	mg/L	-	-	6.78	-	6.93	-	7.43	8.145
	COPPER T	ug/L	-	-	-	-	-	-	0.728	0.77
	IRON T	ug/L	-	-	128	-	-	-	233	184
	LEAD T	ug/L	-	-	-	-	-	-	0.218	0.27
	LITHIUM T	ug/L	-	-	-	-	-	-	<3.0	<3.0
	MAGNESIUM T	mg/L	-	-	-	-	5.955	-	5.134	6.838
	MANGANESE T	ug/L	-	-	-	-	-	-	20.0	128
	NICKEL T	ug/L	-	-	-	-	-	-	<12	<12
	POTASSIUM T	mg/L	-	-	-	-	<1.0	-	0.5	0.749
	SELENIUM T	ug/L	-	-	-	-	-	-	<0.763	<0.763
	SODIUM T	mg/L	-	-	-	-	3.139	-	3.402	4.751
	STRONTIUM T	ug/L	-	-	-	-	-	-	326	458
SULFATE T	mg/L	-	-	7.5	-	7.87	-	8.34	8.986	
ZINC T	ug/L	-	-	-	-	-	-	13.0	31.0	
NUTRIENTS	AMMONIA D	mg/L	-	-	-	-	-	-	0.019	<0.012
	AMMONIA T	mg/L	-	-	-	-	-	-	0.014	<0.012
	NITRATE & NITRATE D	mg/L	-	-	-	-	-	-	0.3	0.163
	NITRATE & NITRITE T	mg/L	-	-	0.34	-	-	-	0.29	0.167
	ORTHO PHOSPHORUS D	mg/L	-	-	-	-	-	-	0.016	0.008
	ORTHO PHOSPHORUS T	mg/L	-	-	-	-	-	-	0.015	0.01
	NITROGEN D	mg/L	-	-	-	-	-	-	0.39	0.404
	NITROGEN T	mg/L	-	-	-	-	-	-	0.298	0.442
	PHOSPHORUS D	mg/L	-	-	-	-	-	-	0.014	0.011
	PHOSPHORUS T	mg/L	-	-	<0.01	-	-	-	0.024	0.016
PHYSICAL/OTHER	ALKALINITY T	mg/L	-	-	51.0	-	76.8	-	-	92.8
	DIC	mg/L	-	-	-	-	-	-	16.08	23.5
	DOC	mg/L	-	-	-	-	-	-	1.5	2.22
	DISSOLVED OXYGEN	mg/L	10.56	11.08	11.26	11.57	8.46	11.23	7.43	8.68
	HARDNESS T	mg/L	-	-	-	-	87	-	71.0	102
	OSMOTIC PRESSURE	mosm/kg	-	-	-	-	-	-	<1.0	<1.0
	pH	pH units	7.87	7.67	7.92	7.0	7.46	8.03	8.12	7.19
	SPECIFIC COND	µS/cm <sup>c</sup>	65.7	231.2	143	168.8	191.4	157.3	170.9	209.8
	TEMPERATURE	°C	9.6	9.7	10.93	8.2	15.3	9.2	21.7	7.4
	TDS	mg/L	-	-	-	-	106	-	108	132
	TOC	mg/L	-	-	1.0	-	-	-	-	-
	TSS	mg/L	-	-	-	-	-	-	<5.0	<5.0

<sup>1</sup> Refer to Figure 1 and Table 1 for station locations  
 "<" indicate concentrations below the reporting limit.  
 "-" indicate parameter was not tested

Discrete physicochemical data collected throughout the Aquashicola Creek basin is indicative of excellent water quality conditions. Generally, metals concentrations are low, nutrient concentrations are low and are often below reporting limits. Ross Common Creek, the high-gradient tributary, has a much lower specific conductance when compared to Aquashicola Creek, which is comparable to that of Wild Creek and Little Bush Kill reference stations and indicative of the exceptionally pristine water quality of Ross Common Creek.

**Table 4.** Monroe Co. Planning Commission Discrete Physicochemical Data – Aquashicola Creek

PARAMETER		UNITS	UPSTREAM OF LOWER SMITH GAP ROAD (40.8293, -75.44627)					
			5/4/2015	5/9/2016	4/27/2017	4/20/2018	4/16/2019	4/28/2020
METALS AND IONS	ALUMINUM T	mg/L	-	-	<0.10	<0.10	<0.20	<0.160
	CALCIUM T	mg/L	-	-	18.6	14.30	14.6	17.1
	CHLORIDE T	mg/L	-	-	9.65	10.80	10.10	9.33
	IRON T	ug/L	-	-	<0.05	0.09	0.232	0.127
	MAGNESIUM T	mg/L	-	-	4.41	3.71	3.48	4.01
NUTRIENTS	AMMONIA T	mg/L	-	-	<0.50	<0.50	<0.30	<0.30
	NITRATE T	mg/L	-	-	0.443	0.402	0.412	0.445
	NITROGEN T	mg/L	-	-	-	<1.0	-	-
	NITROGEN KJELDAHL T	mg/L	-	-	<1.0	<1.0	<1.25	<1.25
	PHOSPHORUS T	mg/L	-	-	<0.20	<0.05	<0.02	<0.02
PHYSICAL/OTHER	ALKALINITY T	mg/L	-	-	56.0	44.0	40.2	46.2
	BOD	mg/L	-	-	<3.0	<3.0	<3.0	<3.0
	DISSOLVED OXYGEN	mg/L	10.70	10.75	7.55	12.66	11.04	11.72
	HARDNESS T	mg/L	-	-	64.7	51.0	50.8	59.2
	pH	pH units	7.70	7.99	7.27	7.75	7.55	7.78
	SPECIFIC COND	µS/cm <sup>c</sup>	175.0	129.0	159.0	136.0	128.0	144.0
	TEMPERATURE	°C	13.56	12.83	12.49	7.0	8.5	9.2
	TDS	mg/L	-	-	49.0	94.0	66.0	143.0
	TOC	mg/L	-	-	1.51	1.43	2.32	1.58

"<" indicate concentrations below the reporting limit.

"-" indicate parameter was not tested

### Biological

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of water quality. DEP staff collected macroinvertebrate data from four stations throughout the Aquashicola Creek basin, and from two reference stations, one each from Wild Creek located in Carbon County and Little Bush Kill located in Pike County. Data was collected using DEP benthic macroinvertebrate data collection protocols, which is a modification of the US Environmental Protection Agency's (EPA) Rapid Bioassessment Protocols (Plafkin et al. 1989, Barbour et al. 1999). Data collected from three stations on the low-gradient reaches of Aquashicola Creek and the Little Bush Kill reference station were collected using DEP's *Wadeable Multihabitat Stream Macroinvertebrate Data Collection Protocol* (Pulket 2017). Data collected from the high-gradient tributary, Ross Common Creek, as well as the corresponding high-gradient reference, Wild Creek, were collected using DEP's *Wadeable Riffle-Run Stream Macroinvertebrate Data Collection Protocol* (Shull 2017).



Macroinvertebrate data from all candidate stations is consistent with excellent water quality conditions. The high-gradient, Ross Common Creek tributary sample had an Ephemeroptera Plecoptera Trichoptera (EPT) richness of 29 taxa with 12 Ephemeroptera (mayfly) taxa, 9 Plecoptera (stonefly) taxa and 8 Trichoptera (caddisfly) taxa with an overall sample Hilsenhoff Biotic Index (HBI) of 2.81. The three low-gradient, Aquashicola Creek samples had EPT richness values of 10 (2AC), 19 (3AC) and 24 (4AC) with less mayfly taxa (6 (2AC), 4 (3AC), 10 (4AC)), less stonefly taxa (2 (2AC), 4 (3AC), 4 (4AC)) and, with one exception, more caddisfly taxa (2 (2AC), 11 (3AC), 10 (4AC)) than the Ross Common Creek tributary. Aquashicola Creek samples had HBIs of 5.91 (2AC), 4.48 (3AC) and 4.66 (4AC). In addition, no Odonates (Dragon/Damselflies), Hemipterans (True Bugs) or Non-Insect taxa were identified in the Ross Common Creek sample, while a relatively diverse representation from each of these families/groups were found in Aquashicola Creek samples (Table 5). The differences in the macroinvertebrate community of Ross Common Creek and Aquashicola Creek are consistent with differences expected between high-gradient and low-gradient surface waters and support the application of specific data collection protocols and reference stations for each surface water classification.

**Table 5.** Benthic Macroinvertebrate Data – Aquashicola Creek Basin

TAXA		STATIONS <sup>1</sup>				REF <sup>1</sup>	
		1RCC	2AC	3AC	4AC	WC	LBK
Ephemeroptera (Mayflies)							
Ameletidae	<i>Ameletus</i>	1	1	-	-	-	-
Baetidae	<i>Acerpenna</i>	2	-	-	-	-	1
	<i>Baetis</i>	1	-	-	-	-	-
	<i>Callibaetis</i>	-	8	-	1	-	-
	<i>Centroptilum</i>	-	-	-	-	-	2
	<i>Dipheter</i>	4	-	-	-	-	-
	<i>Plauditus</i>	-	-	-	11	-	-
	<i>Labiobaetis</i>	-	1	-	2	-	-
	Caenidae	<i>Caenis</i>	-	-	-	1	-
Ephemerellidae	<i>Ephemerella</i>	5	-	13	2	2	-
	<i>Eurylophella</i>	2	1	2	1	-	13
	<i>Serratella</i>	-	-	2	2	-	-
Heptageniidae	<i>Epeorus</i>	15	-	-	-	4	-
	<i>Heptagenia</i>	-	-	-	1	-	-
	<i>Leucrocuta</i>	1	-	-	-	-	-
	<i>Maccaffertium</i>	2	1	5	7	-	1
Leptophlebiidae	<i>Habrophlebiodes</i>	1	-	-	-	1	-
	<i>Leptophlebia</i>	1	48	-	1	-	45
	<i>Paraleptophlebia</i>	5	-	-	-	9	-
Metretopodidae	<i>Siphloplecton</i>	-	-	-	-	-	1

<sup>1</sup> Refer to Figure 1 and/or Table 1 for station locations

"-" indicate taxa was not identified at a particular station

**Table 5 (cont.).** Benthic Macroinvertebrate Data – Aquashicola Creek Basin

TAXA		STATIONS <sup>1</sup>				REF <sup>1</sup>	
		1RCC	2AC	3AC	4AC	WC	LBK
Plecoptera (Stoneflies)							
Capnidae	<i>Allocapnia</i>	1	15	6	2	-	-
	<i>Paracapnia</i>	2	-	1	-	-	-
Leuctridae	<i>Leuctra</i>	-	-	-	-	1	-
Nemouridae	<i>Prostoia</i>	-	-	-	1	-	-
Peltoperlidae	<i>Tallaperla</i>	4	-	-	-	2	-
Perlidae	<i>Acroneuria</i>	-	-	-	-	5	-
	<i>Agnetina</i>	1	-	-	-	-	-
	<i>Isoperla</i>	10	-	1	-	1	-
	<i>Sweltsa</i>	9	-	-	-	-	-
Pteronarcyidae	<i>Pteronarcys</i>	1	-	-	-	-	-
Taeniopterygidae	<i>Strophopteryx</i>	-	-	-	3	-	-
	<i>Taeniopteryx</i>	2	2	12	11	9	-
	<i>Taenionema</i>	1	-	-	-	3	-
Trichoptera (Caddisflies)							
Apataniidae	<i>Apatania</i>	-	-	8	5	1	-
Brachycentridae	<i>Brachycentrus</i>	-	-	-	14	-	-
	<i>Micrasema</i>	1	-	-	1	1	2
Glossosomatidae	<i>Glossosoma</i>	-	-	-	-	1	-
Hydropsychidae	<i>Ceratopsyche</i>	2	-	40	10	5	-
	<i>Cheumatopsyche</i>	4	-	3	23	2	-
	<i>Diplectrona</i>	15	-	-	-	1	-
	<i>Hydropsyche</i>	-	-	-	7	-	-
Hydroptilidae	<i>Hydroptila</i>	-	-	2	-	-	-
	<i>Oxyethira</i>	-	-	-	-	-	3
Lepidostomatidae	<i>Lepidostoma</i>	1	-	-	-	2	-
Leptoceridae	<i>Triaenodes</i>	-	-	2	-	-	-
Limnephilidae	<i>Platycentropus</i>	-	-	-	-	-	19
	<i>Pycnopsyche</i>	-	11	2	1	-	8
Molannidae	<i>Molanna</i>	-	-	-	-	-	1
Philopotamidae	<i>Chimarra</i>	-	-	1	-	-	-
	<i>Dolophilodes</i>	13	-	-	-	25	-
Polycentropodidae	<i>Polycentropus</i>	2	7	8	3	-	-
Phryganeidae	<i>Ptilostomis</i>	-	-	1	-	-	2
Psychomyiidae	<i>Lype</i>	-	-	-	1	-	-
	<i>Psychomyia</i>	-	-	1	1	-	-
Rhyacophilidae	<i>Rhyacophila</i>	1	-	-	-	8	-
Thremmatidae	<i>Neophylax</i>	-	-	1	-	-	2
Odonata (Dragon/Damselflies)							
Calopterygidae	<i>Calopteryx</i>	-	-	1	1	-	-
Gomphidae	<i>Gomphus</i>	-	-	-	-	-	2
	<i>Ophiogomphus</i>	-	-	1	-	-	-
	<i>Stylogomphus</i>	-	-	-	-	-	2
Diptera (True Flies)							
Ceratopogonidae	<i>Probezzia</i>	-	-	1	-	1	-
Chironomidae		46	44	38	32	27	22
Simuliidae	<i>Prosimulium</i>	6	-	-	-	-	1
	<i>Simulium</i>	-	-	-	1	1	-
	<i>Stegopterna</i>	-	-	-	-	-	5
Tipulidae	<i>Antocha</i>	-	-	3	2	1	-
	<i>Dicranota</i>	-	-	-	-	2	-
	<i>Hexatoma</i>	-	-	-	-	1	-
	<i>Tipula</i>	-	2	-	-	-	-

<sup>1</sup> Refer to Figure 1 and/or Table 1 for station locations  
 “-” indicate taxa was not identified at a particular station

**Table 5 (cont.).** Benthic Macroinvertebrate Data – Aquashicola Creek Basin

TAXA	STATIONS <sup>1</sup>				REF <sup>1</sup>	
	1RCC	2AC	3AC	4AC	WC	LBK
Megaloptera (Dobsonflies)						
Corydalidae <i>Nigronia</i>	-	-	-	-	4	-
Coleoptera (Aquatic Beetles)						
Dytiscidae <i>Agabus</i>	-	1	-	-	-	-
Elmidae <i>Dubiraphia</i>	-	3	11	6	-	1
<i>Macronychus</i>	-	-	1	1	-	-
<i>Microcylloepus</i>	-	-	-	-	1	-
<i>Optioservus</i>	-	-	7	9	-	-
<i>Oulimnius</i>	11	1	-	-	12	-
<i>Promoresia</i>	22	-	-	-	30	1
Haliplidae <i>Peltodytes</i>	-	1	-	-	-	-
<i>Halipus</i>	-	-	-	-	-	1
Ptilodactylidae <i>Anchytarsus</i>	-	-	-	-	5	-
Hemiptera (True Bugs)						
Corixidae <i>Hesperocorixa</i>	-	-	-	-	-	1
<i>Palmacorixa</i>	-	27	-	7	-	2
<i>Sigara</i>	-	3	-	-	-	-
Notonectidae <i>Notonecta</i>	-	-	-	-	-	2
Non-Insect Taxa						
Amphipoda <i>Hyaella</i>	-	39	3	3	-	73
Ancylidae <i>Ferrisia</i>	-	-	-	-	-	1
Asellidae <i>Caecidotea</i>	-	6	1	-	-	1
Oligochaeta	-	1	-	2	2	-
Physidae	-	2	-	1	-	-
Planorbidae	-	1	-	-	-	-
Sphaeriidae	-	-	-	2	-	4
Taxa Richness	33	23	29	36	31	28
Total Individuals	195	226	178	179	170	219

<sup>1</sup> Refer to Figure 1 and/or Table 1 for station locations

"-" indicate taxa was not identified at a particular station

## Physical

Instream habitat was evaluated at each station where benthic macroinvertebrates were collected using DEP's *Stream Habitat Data Collection Protocol* (Lookenbill 2017). The habitat evaluation consists of rating twelve parameters for high-gradient reaches and nine parameters for low-gradient streams to derive a total habitat score. Total habitat scores for all candidate and reference stations were all above optimal thresholds (Table 6).

**Table 6.** Habitat Evaluation Data

PARAMETER	STATIONS <sup>1</sup>				REF <sup>1</sup>	
	1RCC	2AC	3AC	4AC	WC	LBK
1. INSTREAM COVER	19	15	19	20	20	20
2. EPIFAUNAL SUBSTRATE	20	-	-	-	20	-
3. POOL SUBSTRATE CHAR.	-	15	18	19	-	20
4. POOL VARIABILITY	-	18	18	18	-	20
5. EMBEDDEDNESS	20	-	-	-	18	-
6. VELOCITY/DEPTH	15	-	-	-	18	-
7. CHANNEL ALTERATIONS	14	20	20	20	20	20
8. SEDIMENT DEPOSITION	20	20	19	20	19	20
9. RIFFLE FREQUENCY	20	-	-	-	20	-
10. CHANNEL FLOW STATUS	20	20	20	20	20	20
11. BANK CONDITION	18	19	20	20	20	20
12. BANK VEG. PROTECTION	19	17	20	20	20	20
13. GRAZING/DISRUPT. PRES.	19	-	-	-	20	-
14. RIP. VEG. ZONE WIDTH	15	20	20	20	20	20
Total Score	219	164	174	177	235	180
Rating	OPT <sup>2</sup>	OPT <sup>3</sup>	OPT <sup>3</sup>	OPT <sup>3</sup>	OPT <sup>2</sup>	OPT <sup>3</sup>

<sup>1</sup> Refer to Figure 1 and/or Table 1 for station locations

<sup>2</sup> High Gradient: OPT = Optimal ( $\geq 192$ )

<sup>3</sup> Low Gradient: OPT = Optimal ( $\geq 144$ );

### **INTEGRATED BENTHIC MACROINVERTEBRATE SCORING TEST**

The qualifying criterion applied to the Aquashicola Creek basin was the DEP integrated benthic macroinvertebrate scoring test described at 25 Pa. Code § 93.4b(b)(1)(v). Selected benthic macroinvertebrate community metrics calculated for the three low-gradient, Aquashicola Creek stations were compared to the Little Bush Kill Creek station in Pike County, and those for the high-gradient, Ross Common Creek tributary station were compared to the Wild Creek station in Carbon County. Little Bush Kill and Wild Creek were chosen as EV references because they have comparable drainage areas, are found in similar geologic settings as the candidate stations, have demonstrated an existing use of EV based on biological measures, and the macroinvertebrate communities have demonstrated best attainable biological communities by scoring well above the top 25<sup>th</sup> percentile of Pennsylvania EV reference streams. In addition, both references have optimal habitat and similar gradient and drainage area to their respective candidate stream stations (DEP 2013b). 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 (HBI), percent dominant taxon, and percent modified mayflies. Based on these five metrics, the candidate stations on Aquashicola Creek and Ross Common Creek exceeded the EV qualifying criterion of 92% (§ 93.4b(b)(1)(v)) (Table 7).

A total of 24.7 stream miles qualify as EV Waters under this criterion.



**Table 7. Benthic Macroinvertebrate Metric Comparison**

METRIC	STATIONS <sup>1</sup>				REF <sup>1</sup>	
	1RCC	2AC	3AC	4AC	WC	LBK
TAXA RICHNESS	33	23	29	36	31	28
Cand/Ref (%)	106	82	104	129	-	-
Biol. Cond. Score	8	8	8	8	8	8
MOD. EPT INDEX	22	8	13	18	16	10
Cand/Ref (%)	138	80	130	180	-	-
Biol. Cond. Score	8	7	8	8	8	8
MOD. HBI	2.81	5.91	4.48	4.66	2.69	5.71
Cand-Ref	0.12	0.20	-1.23	-1.05	-	-
Biol. Cond. Score	8	8	8	8	8	8
% DOMINANT TAXA	23.6	21.2	22.5	17.9	17.6	33.3
Cand-Ref	6	-12.1	-10.8	-15.4	-	-
Biol. Cond. Score	8	8	8	8	8	8
% MOD. MAYFLIES	16.4	23.5	12.4	16.2	8.8	28.3
Ref-Cand	-7.6	4.8	15.9	12.1	-	-
Biol. Cond. Score	8	8	7	7	8	8
TOTAL BIOLOGICAL CONDITION SCORE	40	39	39	39	40	40
% COMPARABILITY TO REFERENCE	<b>100</b>	<b>98</b>	<b>98</b>	<b>98</b>		

<sup>1</sup> Refer to Figure 1 and/or Table 1 for station locations

### **OUTSTANDING STATE RESOURCE WATERS**

Due to SGL 168 encompassing approximately 21% of the Aquashicola Creek basin, the DEP evaluated additional special protection criteria listed in 25 Pa. Code § 93.4b(b)(1)(iii) – the water is an outstanding National, State, regional or local resource water [Appendix A]. The DEP evaluated water quality protective measures developed by the Pennsylvania Game Commission (PGC) to protect aquatic and adjacent riparian areas as important habitats on state game lands. The PGC has issued aquatic habitat buffer guidelines with inner buffer zones of 100 feet for EV and 50 feet for HQ streams and with outer buffer zones of 50 and 100 feet respectively, for a total of 150 feet of protection. The management plans allow limited activities within the buffered areas, recommend eliminating or minimizing existing roads or parking areas and encourage restoration of riparian areas.

The water quality protective measures described in PGC resource management plans meet the “outstanding National, State, regional or local resource waters” definition. However, SGL 168 lands are not situated along watershed corridors in a manner that provides protection to substantial reaches of the corridor within the Aquashicola Creek basin (Figure 1).

### **NATIONAL WILDLIFE REFUGE WATERS**

Due to the presence of the Cherry Valley National Wildlife Refuge within the Aquashicola Creek basin, the DEP evaluated additional special protection criteria listed in 25 Pa. Code § 93.4b(b)(1)(i) – waters located in a National wildlife refuge or a State game propagation and protection area. Portions of the



Cherry Valley National Wildlife Refuge lie within the Aquashicola Creek basin, including the upper portions of the Ross Common Creek subbasin and additional, noncontiguous tracts located within the middle portions of the Aquashicola Creek basin. Approximately 2.8 miles of Ross Common Creek, including the very headwaters of Ross Common Creek, are contained entirely within the Cherry Valley National Wildlife Refuge and are otherwise situated along this portion of Ross Common Creek. The additional, noncontiguous tracts located within the middle portions of the Aquashicola Creek basin are not situated along watershed corridors in manner that borders substantial reaches. Those portions of Ross Common Creek that lie entirely within the Cherry Run National Wildlife Refuge meet the National wildlife refuge criteria.

A total of 2.8 stream miles qualify as EV waters under this criterion.

## **PUBLIC RESPONSE AND REQUEST FOR TECHNICAL DATA**

### **Evaluation Notice**

The DEP provided public notice of this redesignation evaluation and requested any technical data from the general public through publication in the *Pennsylvania Bulletin* on October 30, 2010 (49 Pa.B. 6338). A similar notice was published in the *Pocono Record* on February 2, 2011. In addition, Eldred, Hamilton, Ross, and Lower Towamensing townships, Monroe County Planning Commission, and Carbon County Planning Commission were notified of the redesignation evaluation in a letter dated February 1, 2011.

Letters supporting this proposed redesignation were received from Ross Township, Monroe County, Monroe County Conservation District, Monroe County Commissioner's Office, Friends of Cherry Valley, Wildlands Conservancy, Lehigh Gap Nature Center, Blue Mountain Preservation Association, Trout Unlimited (Broadhead Chapter), Bushkill Stream Conservancy, Sierra Club (Pennsylvania Chapter – Lehigh Valley Group), Representative Mike Carroll, Ilene Eckhart, Mr. and Mrs. Frank O'Donnell, Joanna Russell and Carolyn J. Lange.

A letter in opposition to this proposed redesignation was received from Eldred Township, Monroe County in 2011. However, a letter of support was subsequently received from Eldred Township in 2016. Also received in 2016, the Aquashicola/Pohopoco Watershed Conservancy provided additional information, including the addition of 1,000 acres to SGL 168 in Ross and Eldred townships and 90 acres to the Cherry Valley National Wildlife Refuge. In 2020, the Aquashicola/Pohopoco Watershed Conservancy compiled and forwarded an additional 20 letters of support from Monroe County Conservation District, Monroe County Commissioners, Representative Mike Carroll, Chestnut Hill Township, Eldred Township, Ross Township, Blue Mountain Preservation Association, Broadhead Chapter of Trout Unlimited, Broadhead Watershed Association, Bushkill Stream Conservancy, Clear Air Council, Friends of Cherry Valley, Friends of Frantz One Room Schoolhouse, Lehigh Gap Nature Center, North Pocono CARE, Pennsylvania Campaign for Clean Water, Ross Township Historical Society, Save Carbon County, Sierra Club and Watershed Coalition of the Lehigh Valley. In 2021, additional letters of support were received from Penn Future, Roy Christman, Clean Air Council,

Aquashicola/Pohopoco Watershed Conservancy, Delaware Riverkeeper Network and Monroe County Conservation District..

### **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 Aquashicola Creek basin from the source to Buckwha Creek be redesignated from HQ-CWF, MF to EV, MF.

This recommendation adds **24.7** stream miles of EV waters to Chapter 93.

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**APPENDIX A – DEFINITIONS**

<sup>1</sup>Definition at 25 Pa. Code § 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 measures<sup>2</sup> along a watershed corridor.

<sup>2</sup>Definition at 25 Pa. Code § 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 measures 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.