

CRANBERRY CREEK

MONROE COUNTY

WATER QUALITY STANDARDS REVIEW STREAM REDESIGNATION EVALUATION REPORT

**Segment: Basin
Stream Code: 04940
Drainage List C**

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

2018

INTRODUCTION

The Cranberry Creek basin is currently designated High Quality - Cold Water Fishes, Migratory Fishes (HQ-CWF, MF) and was evaluated for a redesignation to Exceptional Value (EV) in response to a petition to the Environmental Quality Board (EQB) from the Brodhead Creek Watershed Association dated January 7, 2013. The petitioner requested redesignation of the Cranberry Creek basin, from its source to mouth, asserting that the existing aquatic life use of the basin is of higher quality than is represented by the current HQ-CWF, MF designation. The Department conducted aquatic life use and stream survey work in the Cranberry Creek basin March 5, 2013. The EQB accepted the petition for further study on April 16, 2014.

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 water body. 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

Cranberry Creek is a relatively small, cold and shallow third-order tributary to Paradise Creek at River Mile Index (RMI) 3.16 located in Barrett and Paradise Townships, Monroe County and drains 6.85 square miles with a total of 13.32 stream miles (Figure 1). Cranberry Creek is located on the Buck Hill Falls, Mount Pocono and East Stroudsburg 7.5-minute series USGS quadrangle maps. Land use consists of approximately 90% forested land, 8.8% developed land, 0.2% wetlands. There are three permitted storm-water discharges and one permitted pesticides treatment area in the headwaters.

WATER QUALITY AND USES

Surface Water

No long-term water quality data were available from the Cranberry Creek basin that would allow a direct comparison to water quality criteria. The Department collected biological data at four stations within the Cranberry Creek study area on March 5, 2013. The Department also collected field meter data at three of the four stations. There was no field meter data collected at station 1CC (Figure 1, Table 1). Despite the limitations of instantaneous field meter data, these observations can provide an overview of Cranberry Creek’s water quality (Table 2).

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 four Cranberry Creek basin locations and at one EV reference station, Dimmick Meadow Brook, on March 5, 2013 (Table 1, Figure 1).

Habitat. Instream habitat was assessed at each station within the petitioned basin. Instream habitat was also assessed at the Dimmick Meadow Brook EV reference station. The habitat scores for the four Cranberry Creek basin stations ranged from 199 - 209, reflecting optimal habitat conditions (Table 3).

Benthos. Benthic macroinvertebrate samples were collected on March 5, 2013 for this redesignation evaluation using the Department's Rapid Bioassessment Protocol (RBP) benthic sampling methodology, which is a modification of the US Environmental Protection Agency's (EPA) RBPs (Plafkin, et al. 1989; Barbour et al. 1999). Benthic samples were collected from four stations in the Cranberry Creek basin and one on Dimmick Meadow Brook (Table 4). Taxa richness, modified Ephemeroptera Plecoptera Trichoptera (EPT) index, Hilsenhoff Biotic Index (HBI), and % dominant taxa metrics for stations 2UNTCC, 3CC, and 4CC were very similar to those of the reference station 1DMB. Candidate station 1CC had lower taxa richness and higher modified HBI than the other sample stations in the basin (Table 5). The dominant taxon at 1CC was Chironomidae, a pollution tolerant invertebrate directly responsible for elevated HBI values.

BIOLOGICAL USE QUALIFICATIONS

The Department applied its integrated benthic macroinvertebrate scoring test described at 25 Pa. Code §93.4b(b)(1)(v) to the petitioned Cranberry Creek basin. Selected benthic macroinvertebrate community metrics from the petitioned basin stations were compared to those from the reference stream station. The reference station on Dimmick Meadow Brook was used as a reference because it is within the same Atlantic Highland ecoregion and is of comparable drainage area to the candidate stations. In addition, Dimmick Meadow Brook has served as an EV reference stream in other Departmental 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, three stations - 2UNTCC, 3CC and 4CC had Biological Condition Scores (BCS) that were above the 92% EV qualifying criterion required to qualify as Exceptional Value Waters (§ 93.4b(b)(1)(v)) (Table 5). No other Antidegradation qualifying requirements listed in § 93.4b(b) apply to the Cranberry Creek petition area.

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Department provided notice of this redesignation evaluation and requested any technical data from the general public through publication in the Pennsylvania Bulletin on September 27, 2014 (44 Pa.B. 6149). The Monroe County Planning Commission, Barrett and Paradise Townships were notified of the designation evaluation in a letter dated September 15, 2017. In addition, a notification was posted on the Department's website.

RECOMMENDATION

Based on applicable regulatory definitions and requirements of § 93.4b(b)(1)(v) (the Department's integrated benthic macroinvertebrate scoring test), the Department recommends that the Cranberry Creek basin, from and including UNT 04948 to its mouth, be designated in Chapter 93 as Exceptional Value, Migratory Fishes (EV, MF). The Department recommends that the Cranberry Creek basin from the source to UNT 04948 maintain the current High Quality – Cold Water Fishes, Migratory Fishes designated use. This recommendation adds approximately 10.25 miles of EV streams to Chapter 93 and partially reflects the EV designation sought in the petition.

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.

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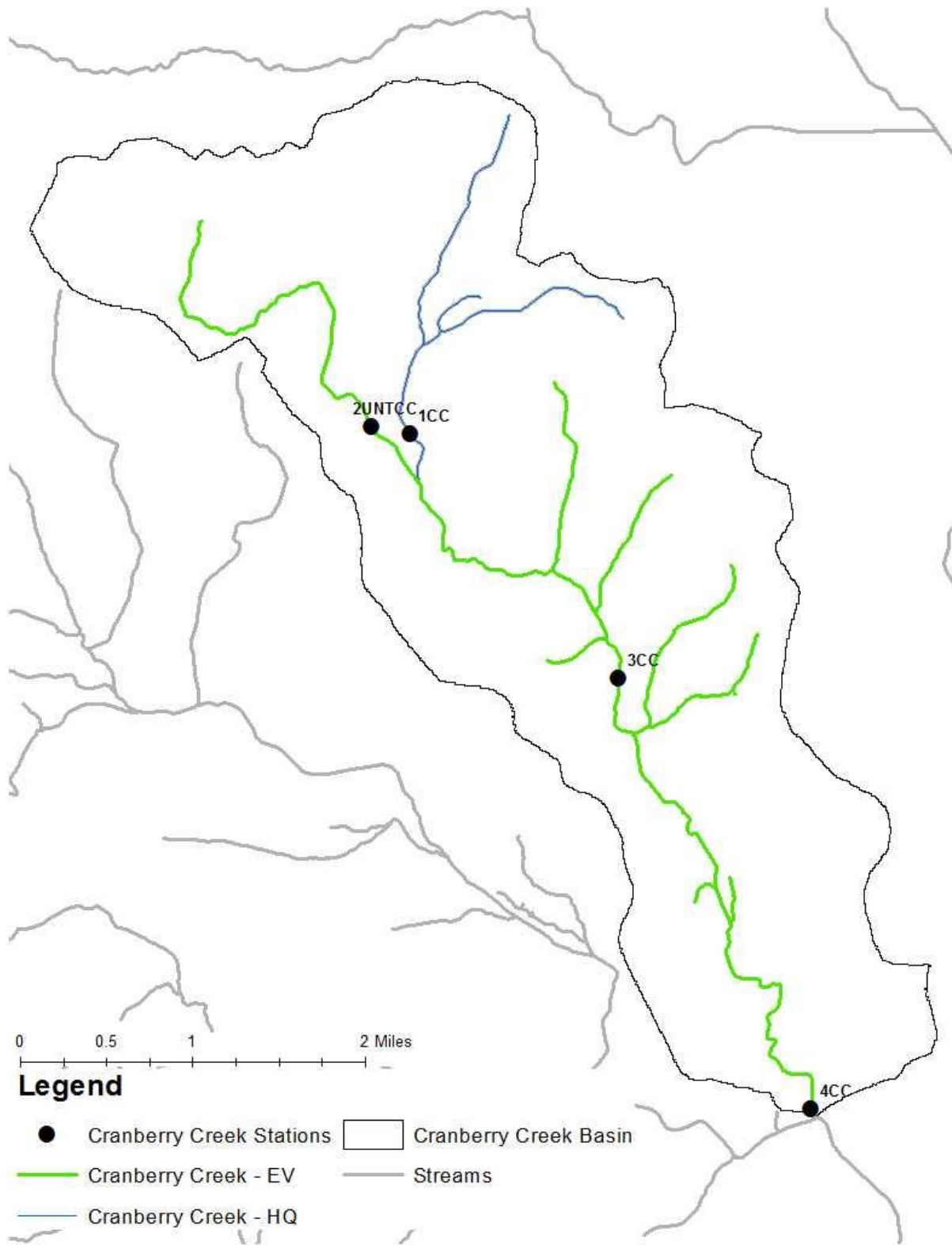


Figure 1. Cranberry Creek Basin - Station Locations

Table 1. Cranberry Creek Basin – Station Locations

STATION	LOCATION
1CC	Cranberry Creek approximately 500m upstream of unnamed tributary Paradise Township, Monroe County Lat: 41.144142 Long: -75.283420
2UNTCC	Unnamed Tributary to Cranberry Creek upstream of Snowbird Lane Paradise Township, Monroe County Lat: 41.144489 Long: -75.286695
3CC	Cranberry Creek upstream of Cranberry Creek Rd. Paradise Township, Monroe County Lat: 41.128577 Long: -75.265961
4CC	Cranberry Creek at mouth Paradise Township, Monroe County Lat: 41.101375 Long: -75.249727
1DMB (ref)	Dimmick Meadow Brook, 50m upstream of Schocopee Rd Milford Township, Pike County Lat: 41.349413 Long: -74.835960

Table 2. Cranberry Creek March 2013 – Discrete Field Measurements

PARAMETER	STATIONS ¹					REFERENCE ²
	UNITS	1CC	2UNTCC	3CC	4CC	1DMB
Dissolved Oxygen	mg/L	-	13.6	13.50	14.30	9.68
pH	pH units	-	7.33	8.00	8.50	6.78
Specific Conductance	µS/cm ²	-	53	86.9	97.0	27.9
Temperature	°C	-	3.5	3.8	2.6	11.1

Table 3. Cranberry Creek Basin – Habitat Assessment Results, Riffle/Run Prevalence

PARAMETER	SCORING RANGE	STATIONS ¹				REFERENCE ²
		1CC	2UNTCC	3CC	4CC	1DMB
1. instream cover	0-20	17	18	17	16	18
2. epifaunal substrate	0-20	18	17	17	18	19
3. embeddedness	0-20	18	17	15	16	17
4. velocity/depth	0-20	12	13	16	14	14
5. channel alterations	0-20	17	18	17	17	18
6. sediment deposition	0-20	18	18	18	18	18
7. riffle frequency	0-20	17	18	18	18	19
8. channel flow status	0-20	16	16	17	17	16
9. bank condition	0-20	15	17	18	17	18
10. bank vegetative protection	0-20	16	18	17	18	19
11. grazing/disruptive pressures	0-20	17	19	19	19	20
12. riparian vegetation zone width	0-20	18	20	19	18	20
Total Score	0-240	199	209	208	206	216
Rating ³		OPT	OPT	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)

Table 4. Cranberry Creek Basin - Semi-Quantitative Benthic Macroinvertebrate Data

TAXA	STATIONS ¹				REFERENCE ²
	1CC	2UNTCC	3CC	4CC	1DMB
Ephemeroptera (mayflies)					
Baetidae; <i>Baetis</i>		2	4		6
<i>Diphetera</i>				1	
Ephemerellidae; <i>Drunella</i>		3	5	16	
<i>Ephemerella</i>	25	97	37	16	30
<i>Eurylophella</i>			2		
<i>Serratella</i>			10	26	
Ephemeridae; <i>Ephemera</i>			2		
Heptageniidae; <i>Cinygmula</i>		1	1		18
<i>Epeorus</i>	3	6	16	25	32
<i>Leucrocuta</i>					1
<i>Maccaffertium</i>	10		7	4	
Isonychiidae; <i>Isonychia</i>			2		
Leptophlebiidae; <i>Habrophlebiodes</i>		2			
<i>Paraleptophlebia</i>		3	3	11	5
Plecoptera (stoneflies)					
Capniidae; <i>Paracapnia</i>		1	1		6
Chloroperlidae; <i>Alloperla</i>				1	
<i>Haploperla</i>			1		
<i>Sweltsa</i>	1	1	3	5	2
Leuctridae; <i>Leuctra</i>	9	1	1	3	3
Nemouridae; <i>Amphinemura</i>	1	1			1
<i>Prostia</i>	13	3			
Peltoperlidae; <i>Tallaperla</i>	2				3
Perlidae; <i>Acroneuria</i>	2	4	3	3	6
Perlodidae; <i>Isoperla</i>	8	2	7	2	4
Pteronarcyidae; <i>Pteronarcys</i>	2		1		5
Taeniopterygidae; <i>Bolotoperla</i>				2	
<i>Oemopteryx</i>		2	3		
<i>Strophopteryx</i>	1				
<i>Taenionema</i>			9	14	
Tricoptera (caddisflies)					
Brachycentridae; <i>Brachycentrus</i>			2		
Goeridae; <i>Goera</i>				1	
Hydropsychidae; <i>Ceratopsyche</i>	4		5	9	5
<i>Cheumatopsyche</i>	4	3	3		
<i>Diplectrona</i>	27	17	9	6	7
<i>Hydropsyche</i>	8	1			
Lepidostomatidae; <i>Lepidostoma</i>	1				2
Odontoceridae; <i>Psilotreta</i>				1	
Philopotamidae; <i>Chimarra</i>				2	
<i>Dolophilodes</i>	4	1	1	2	1
Polycentropodidae; <i>Polycentropus</i>		1			
Rhyacophilidae; <i>Rhyacophila</i>	10	4	9	9	8
Uenoidae; <i>Neophylax</i>			1	1	1
Diptera (true flies)					
Ceratopogonidae; <i>Probezzia</i>		2			
Empididae; <i>Chelifera</i>				1	
Simuliidae; <i>Prosimulium</i>		10	3	13	34
<i>Stegopterna</i>	2				
Tipulidae; <i>Antocha</i>					1
<i>Dicranota</i>				1	
<i>Hexatoma</i>				1	2
<i>Tipula</i>				1	
Chironomidae	74	36	37	37	28

Table 4 (cont.). Cranberry Creek Basin - Semi-Quantitative Benthic Macroinvertebrate Data

TAXA	STATIONS ¹				REFERENCE ²
	1CC	2UNTCC	3CC	4CC	1DMB
Megaloptera (dobson, fishflies)					
Corydalidae; <i>Nigronia</i>	1	1		1	
Odonata (dragon, damselflies)					
Gomphidae; <i>Lanthus</i>	2		1		
Coleoptera (aquatic beetles)					
Elmidae; <i>Oulimnius</i>		1	15	4	1
<i>Promoresia</i>	1	2	6		7
<i>Stenelmis</i>		1			
Psephenidae; <i>Psephenus</i>				3	2
<i>Ectopria</i>	3		2		
Ptilodactylidae; <i>Anchytarsus</i>		1			
Non-Insect Taxa					
Turbellaria				1	
Oligochaeta	1	1			1
Ancylidae; <i>Ferrissia</i>			1		
Sphaeriidae	2	1	1		
Taxa Richness	27	31	35	32	28
Total number of individuals	221	212	214	223	222

¹ Refer to Figure 1 and Table 1 for station locations

² Reference Station – Refer to Table 1 for location

Table 5. Cranberry Creek Basin - RBP Metrics Comparison

METRIC	STATIONS ¹				REFERENCE ²
	1CC	2UNTCC	3CC	4CC	1DMB
1. TAXA RICHNESS	27	31	35	32	28
Candidate/Reference (%)	96	111	125	114	
Biol. Cond. Score	8	8	8	8	8
2. MOD. EPT INDEX	16	16	24	20	18
Candidate/Reference (%)	89	89	133	111	
Biol. Cond. Score	8	8	8	8	8
3. MOD. HBI	3.21	2.21	2.72	2.39	1.91
Candidate-Reference	1.30	0.30	0.81	0.48	
Biol. Cond. Score	1	8	6	8	8
4. % DOMINANT TAXA	34	46	17	17	15
Candidate-Reference	19	31	2	2	
Biol. Cond. Score	3	8 ³	8	8	8
5. % MOD. MAYFLIES	17	52	40	44	39
Reference-Candidate	22	-13	-1	-5	
Biol. Cond. Score	5	8	8	8	8
TOTAL BIOLOGICAL CONDITION SCORE	25	40	38	40	40
% COMPARABILITY TO REFERENCE	63	100	95	100	

¹ Refer to Figure 1 and Table 1 for station locations

² Reference Station – Refer to Table 1 for location

³ Dominant Taxa with HBI < 3