

**BUCK HILL CREEK
MONROE COUNTY**

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

SEGMENT: BASIN

STREAM CODE: 05023

DRAINAGE LIST: C

**WATER QUALITY MONITORING SECTION (DSB)
DIVISION OF WATER QUALITY STANDARDS
BUREAU OF WATER STANDARDS AND FACILITY REGULATION
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

MAY 2010

INTRODUCTION

Buck Hill Creek basin from the source to Griscom Creek (05024), except for UNT 05028 and UNT 05027 and a 0.36-mile segment of the mainstem, has a designated use of Exceptional Value (EV) in Chapter 93 of the Pennsylvania Code. This also includes a Migratory Fishes (MF) designation for the basin below Buck Hill Falls. The basin of the 0.36-mile segment retained the High Quality-Cold Water Fishes (HQ-CWF) designation when the rest of the basin was upgraded to EV in June 2000. This designation was based on a November 1996 stream survey and subsequent 1997 Stream Redesignation Evaluation Report, as a result of a petition submitted to the Environmental Quality Board (EQB) by the Buck Hill Conservation Foundation in August 1995. The HQ-CWF segment was the result of the Biological Condition Score (BCS) at one station falling 5 percentage points below the 92% threshold for qualification for EV.

The Buck Hill Conservation Foundation submitted a second petition to the EQB requesting that the basin of the 0.36-mile HQ-CWF segment be evaluated for redesignation as EV. This petition was accepted for further study by the EQB on April 19, 2005. The petitioners explained that because the Buck Hill Creek basin upstream and downstream of this segment has an EV designation and there are no obvious sources of impairment that would account for a degradation in water quality they reasoned that the lower BCS was probably the result of natural variability of the macroinvertebrate community. This report is based on a field survey conducted by Aquatic Resource Consulting (ARC) in April 2004 and reviewed by the Department for accuracy and completeness. ARC's report was carefully studied to make sure that the methodology used for macroinvertebrate sample collection and processing conformed to the Department's Antidegradation Implementation Guidance.

GENERAL WATERSHED DESCRIPTION

Buck Hill Creek is a tributary to Brodhead Creek in the Delaware River basin. This basin covers an area of 8.8 square miles and contains 16.0 stream miles. It is located in Coolbaugh and Barrett Townships, Monroe County. The candidate basin is in Barrett Township. State Route 191 crosses this basin and the eastern edge contains a golf course, otherwise the land use is almost entirely mixed hardwood forest. This is a freestone stream with a moderate to high gradient throughout its length. Two stations were sampled as part of this survey (Figure 1 and Table 1).

WATER QUALITY AND USES

Surface Water:

No long-term water quality data were available to allow a direct comparison to water quality criteria. The 1996 DEP survey indicated that water quality was generally good at Station 1BHC (Table 2). Since the instantaneous nature of grab samples precludes comparison to applicable water quality criteria, the indigenous aquatic community is a better indicator of long-term conditions and is used as a measure of ecological significance.

There are no surface water withdrawals for public water supply or NPDES permitted discharges located in the candidate basin. The only potential source of nonpoint source discharge (NPS) is the crossing of SR 191 about ¾ miles upstream of the candidate segment.

Aquatic Biota:

Habitat assessments and biological samplings were conducted at 2 stations (1 candidate and 1 reference) during the ARC April 2004 survey. The physical habitat assessments revealed that conditions at Station 1BHC and Reference Station R1 scored in the Optimal range for benthic macroinvertebrates and fish (Table 3). Condition of Banks is the only habitat parameter at Station 1BHC that scored lower than the Optimal range. The overall habitat scores of 223 and 220 for candidate and reference stations respectively were very high and indicate excellent instream and riparian habitat.

Benthic macroinvertebrate samples were collected using the Department’s Antidegradation protocol (adapted from Plafkin’s 1989 and Barbour’s 1999 Rapid Bioassessment Protocols manuals). Taxonomic diversity was high at both stations with a predominance of individuals from taxa that are sensitive to water quality degradation (e.g. *Ephemerella*, *Epeorus*, *Cinygmula*, *Tallaperla*, and *Rhyacophila*).

BIOLOGICAL USE QUALIFICATIONS

The biological use qualifying criteria applied to Buck Hill Creek was the integrated benthic macroinvertebrate score test described at § 93.4b(a)(2)(i)(A) and § 93.4b(b)(1)(v). This score is calculated from the macroinvertebrate samples referenced above. Following the Department’s Antidegradation protocol, a 200 (+/- 20%) count subsample was randomly selected from the total sample and enumerated (Table 4). Selected benthic macroinvertebrate community metrics were generated from these subsamples (Table 5). Candidate station metrics were compared to a reference station on Buck Hill Creek downstream from the candidate basin. The designated use of Buck Hill Creek at the location of this reference station is EV and this station meets all of the other qualifications, outlined in the Department’s Antidegradation Implementation Guidance document, for acceptable reference stations. All sampling was conducted on the same day to minimize the effects of seasonal variation. This comparison was done using the following metrics which were selected as being indicative of community health: taxa richness; modified EPT index (total number of intolerant Ephemeroptera, Plecoptera, and Trichoptera taxa); modified Hilsenhoff Biotic Index; percent dominant taxon; and percent modified mayflies.

Based on these five metrics, Station 1BHC had a biological condition score of 100% of the reference station score. This score surpasses the threshold of 92% that would 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 August 13, 2005 (35 Pa.B. 4671) and a similar notice was also published in the Pocono Record on August 19, 2005. In addition, Barrett Township along with the Monroe County Planning Commission was all notified of the evaluation in a letter dated July 13, 2005. No data on water chemistry, instream habitat, or the aquatic community were received in response to these notifications.

The petitioner and local municipality and planning commission representatives were notified by a postcard mailing that the report was available on the Department's web page for review with a 30-day comment period, which closed on April 16, 2010. 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 protected use designation of Buck Hill Creek (05023) basin from and including UNT 05028 to UNT 05026 be changed from the current HQ-CWF to EV based on biological condition scores greater than 92% of the reference station score (§93.4b(b)(1)(v)). This recommendation affects a 0.36-mile segment of the main stem and 2.03 total stream miles.

REFERENCES

Muhkergee, JJ. 1997. Buck Hill Creek Special Protection Evaluation Report. DEP Internal Document

Buck Hill Conservation Foundation. 1995. Petition to Redesignate the Protected Water Use for Buck Hill Creek. Buck Hill Creek petition file.

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

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.

FIGURE 1.
STATION LOCATIONS
BUCK HILL CREEK

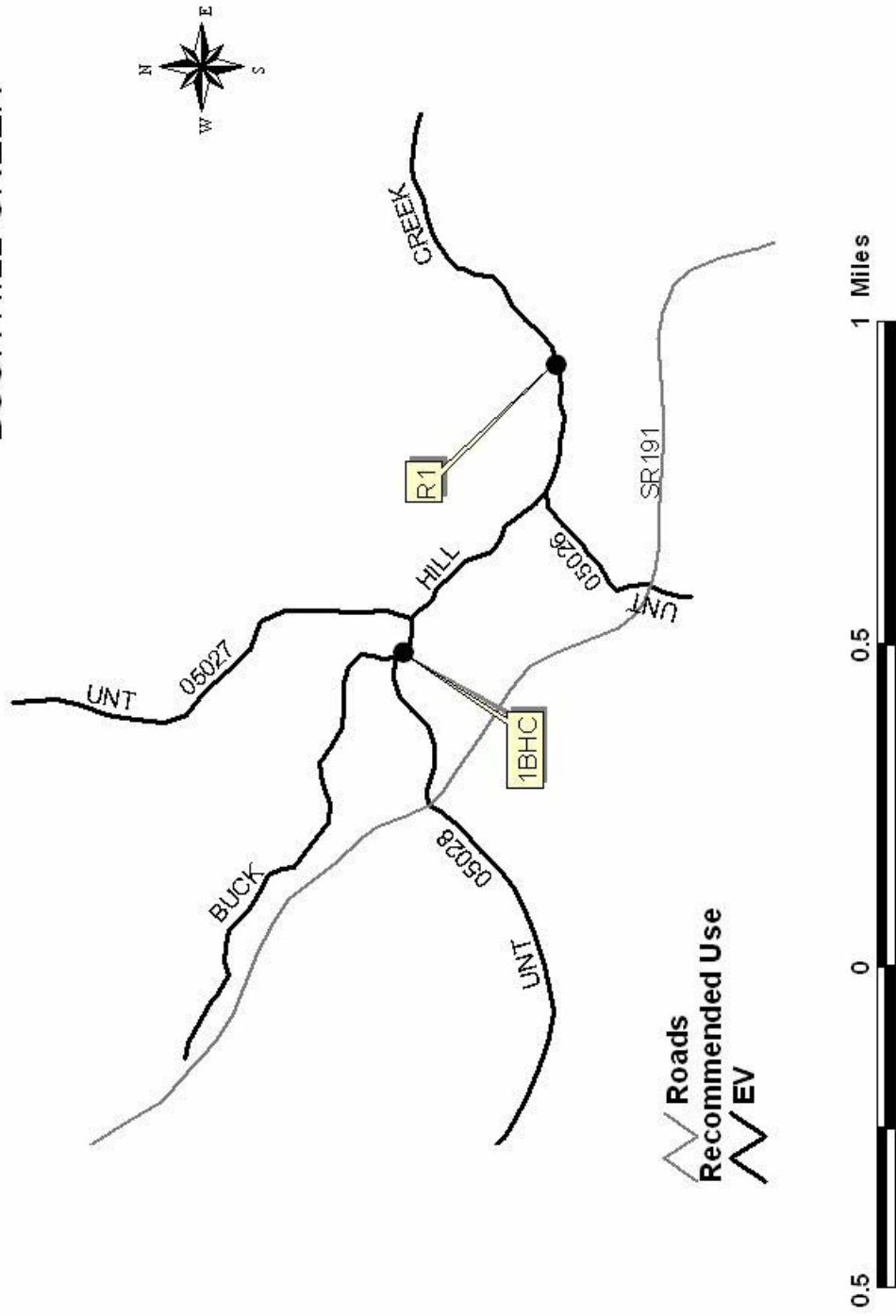


TABLE 1
STATION LOCATIONS
BUCK HILL CREEK
MONROE COUNTY

<u>STATION</u>	<u>LOCATION</u>
1BHC	Buck Hill Creek (05023); approximately 50 meters downstream of the mouth of UNT 05028. Barrett Township, Monroe County. Lat: 41 11 45 Long: 75 17 34 RM: 2.22
R1	Buck Hill Creek; approximately 50 meters downstream of the mouth of UNT 05026. Barrett Township, Monroe County. Lat: 41 11 31 Long: 75 17 08 RM: 1.68

TABLE 2

WATER CHEMISTRY¹
BUCK HILL CREEK
MONROE COUNTY
OCTOBER 29, 1996

STATION	1BHC
Field Parameters	
Temp (°C)	9.1
Cond (µmhos)	30.5
DO (mg/l)	8.9
Laboratory Parameters	
pH	6.3
Alkalinity	6.4
Acidity	0
Hardness	<10
T Diss. Sol.	16
Susp. Sol.	<2
NH ₃ -N	<0.02
NO ₂ -N	<0.01
NO ₃ -N	0.07
Total P	<0.02
Ca	2.32
Mg	0.61
Cl	2
SO ₄	<10
As*	< 4.0
As Diss	< 4.0
Cd*	< 0.2
Cd Diss	< 0.2
hex Cr*	<10
Cr*	<50
Cu*	< 10.0
Cu Diss	< 10.0
Fe*	22
Pb*	< 1.0
Pb Diss	< 1.0
Mn*	< 10.0
Ni*	< 25.0
Ni Diss	< 25.0
Zn*	< 10.0
Zn Diss	< 10.0
Al*	<135
fecal coliforms	<10

¹ - Except for pH & conductance and indicated otherwise, all values are total concentrations in mg/l

* - Total concentrations in µg/l

**TABLE 3
HABITAT ASSESSMENT
SUMMARY
BUCK HILL CREEK
MONROE COUNTY
APRIL 25, 2004**

HABITAT PARAMETER	STATIONS¹	
	1BHC	R1
1. instream cover	19	20
2. epifaunal substrate	18	16
3. embeddedness	19	19
4. velocity/depth	17	19
5. channel alterations	20	20
6. sediment deposition	19	19
7. riffle frequency	20	20
8. channel flow status	18	16
9. bank condition	15	14
10. bank vegetation protection	18	17
11. grazing/disruptive pressures	20	20
12. riparian vegetation zone width	20	20
Total Score	223	220
Rating ²	OPT	OPT

¹ Refer to Figure 1 and Table 1 for station locations.

² OPT = Optimal

TABLE 4
SEMI QUANTITATIVE BENTHIC MACROINVERTEBRATE DATA
BUCK HILL CREEK
APRIL 25, 2004

TAXA	STATION	
	1BH C	R1
Ephemeroptera (mayflies)		
Baetidae; <i>Baetis</i>	30	35
Ephemerellidae; <i>Ephemerella</i>	29	31
<i>Drunella</i>	9	9
Heptageniidae; <i>Cinygmula</i>	26	26
<i>Epeorus</i>	64	56
<i>Stenonema</i>	1	
Leptophlebiidae; <i>Paraleptophlebia</i>	1	8
Plecoptera (stoneflies)		
Chloroperlidae sp.	12	5
Leuctridae; <i>Leuctra</i>	4	5
Nemouridae; <i>Amphinemura</i>		5
Peltoperlidae; <i>Tallaperla</i>	8	13
Perlidae; <i>Agneta</i>	1	
Perlodidae sp.		5
<i>Isoperla</i>	2	
<i>Yugus</i>	2	
Pteronarcyidae; <i>Pteronarcys</i>	1	3
Trichoptera (caddisflies)		
Hydropsychidae; <i>Diplectrona</i>	1	2
Rhyacophilidae; <i>Rhyacophila</i>	8	8
Diptera (true flies)		
Athericidae; <i>Atherix</i>		1
Simuliidae; <i>Prosimulium</i>		4
<i>Simulium</i>	3	1
Tipulidae; <i>Dicranota</i>	1	1
<i>Hexatoma</i>	1	5
Chironomidae	6	5
Odonata (dragon-, damselflies)		
Gomphidae; <i>Lanthus</i>		2
Coleoptera (aquatic beetles)		
Elmidae; <i>Stenelmis</i>		1
Total number in subsample	210	231

TABLE 5
RBP METRIC COMPARISON
BUCK HILL CREEK, MONROE COUNTY

METRIC	STATIONS	
	1BHC	R1
1. TAXA RICHNESS	20	22
Cand/Ref (%)	91	XXX
Biol. Cond. Score	8	8
2. MOD. EPT INDEX	15	13
Cand/Ref (%)	115	XXX
Biol. Cond. Score	8	8
3. MOD. HBI	1.55	1.69
Cand-Ref	-0.14	XXX
Biol. Cond. Score	8	8
4. % DOMINANT TAXA	30	24
Cand-Ref	6	XXX
Biol. Cond. Score	8	8
5. % MOD. MAYFLIES	62	56
Ref-Cand	-6	XXX
Biol. Cond. Score	8	8
TOTAL BIOLOGICAL CONDITION SCORE	40	40
% COMPARABILITY TO REFERENCE	100	