

BERMUDIAN CREEK

ADAMS COUNTY

WATER QUALITY STANDARDS REVIEW STREAM EVALUATION REPORT

**Segment: Basin
Stream Code: 08596
Drainage List: O**

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

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INTRODUCTION

The Department of Environmental Protection (DEP) conducted an evaluation of the Bermudian Creek basin in response to a request from the DEP's Southcentral Regional Office that identified a potential conflict between the Pennsylvania Fish and Boat Commission (PFBC) Wild Trout Waters classification and the Warm Water Fishes, Migratory Fishes (WWF, MF) designation for a portion of the basin. The Bermudian Creek basin from the source to Wiermans Mill Road is currently listed on the PFBC Wild Trout Waters list. The Bermudian Creek basin is currently designated WWF, MF with the exception of the Latimore Creek subbasin, which is currently designated Cold Water Fishes, Migratory Fishes (CWF, MF). The Wild Trout Waters classification suggests that the upper portion of the basin should be evaluated to determine the appropriate Aquatic Life Use.

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 Environmental Quality Board (EQB).

GENERAL WATERSHED DESCRIPTION

Bermudian Creek is a tributary to Conewago Creek, located in the lower Susquehanna River basin. The entire Bermudian Creek basin encompasses portions of Washington, Warrington, and Franklin townships, York County as well as portions of Latimore, Huntington, Tyrone, and Redding townships, Adams County. The basin has drainage area of approximately 110 square miles and consists of 220 stream miles. The headwaters of the basin drain the southern slope of South Mountain, which is the southern border of Pennsylvania's Ridge and Valley Physiographic Province. Most of the basin lies with the Piedmont Physiographic Province and consists of rolling and fertile agricultural lands, including a high concentration of orchards in the headwater reaches and mixed agricultural in the lower portion of the basin. The portion of the Bermudian Creek basin being evaluated, from the source to State Route (SR) 94, has a drainage area of 20.6 square miles and consists of 57.1 stream miles. The current land cover within this portion of the basin consists of forested (31%), agricultural (53%), water/wetlands (4%), and urban/developed areas (12%) (Dewitz 2019). There are three NPDES permits within the basin including two industrial waste discharges and one industrial stormwater permit. Both industrial waste discharges and the stormwater permit are associated with the Knouse Foods Cooperative Facility located in the headwaters of Bermudian Creek.

WATER QUALITY

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of water quality. DEP *Stream Surface Water Assessment Protocol* (SSWAP) macroinvertebrate surveys were completed at seven locations in 2004 and 2006. Bacteriological surveys were completed June 2014. PFBC staff collected fisheries data from one location (9BC) in 2006 and from a second location (10BC) in 2016 (Figure 1, Table 1).

Table 1. Station Locations – Upper Bermudian Creek Basin.

STATION	DESCRIPTION
1UNT	UNT 08741, 400 meters upstream of the confluence with Bermudian Creek Huntington Township, Adams County 2004 SSWAP Lat: 40.01940 Long: -77.22419
2BC	Bermudian Creek, 900 meters downstream of UNT 08741 Huntington Township, Adams County 2004 SSWAP Lat: 40.01547 Long: -77.21439
3BC	Bermudian Creek, upstream of Lobaugh Road Huntington Township, Adams County 2016 Bacteriological Monitoring Lat: 39.99218 Long: -77.18621
4BC	Bermudian Creek, upstream of Upper Bermudian Road Huntington Township, Adams County 2006 SSWAP Lat: 40.99026 Long: -77.180543
5UNT	UNT 08730, downstream of Idaville-York Springs Road and along Oxford Road Huntington Township, Adams County 2004 SSWAP Lat: 40.01347 Long: -77.17309
6UNT	UNT 08730, upstream of Blueberry Road Huntington Township, Adams County 2016 Bacteriological Monitoring 2006 SSWAP Lat: 40.00117 Long: -77.17089
7UNT	UNT 08728, upstream of Zeigler Mill Road Huntington Township, Adams County 2006 SSWAP Lat: 39.98379 Long: -77.16068
8BC	Bermudian Creek, 450 meters downstream of Oxford Road along Willow Lane Huntington Township, Adams County 2006 SSWAP Lat: 39.98002 Long: -77.15078
9BC	Bermudian Creek, 900 meters upstream of UNT 08727 Huntington Township, Adams County 2006 PFBC Survey Lat: 39.97743 Long: -77.14478
10BC	Bermudian Creek, 240 meters upstream of Wiermans Mill Road Huntington Township, Adams County 2016 PFBC Survey Lat: 39.97333 Long: -77.11942

Benthos

Benthic macroinvertebrate samples were collected using the DEP's SSWAP from UNT 08741 immediately downstream of the Knouse Foods facility (1UNT) and from Bermudian Creek downstream of UNT 08741 (2BC). Both samples indicate biological impairment resulting in the Bermudian Creek

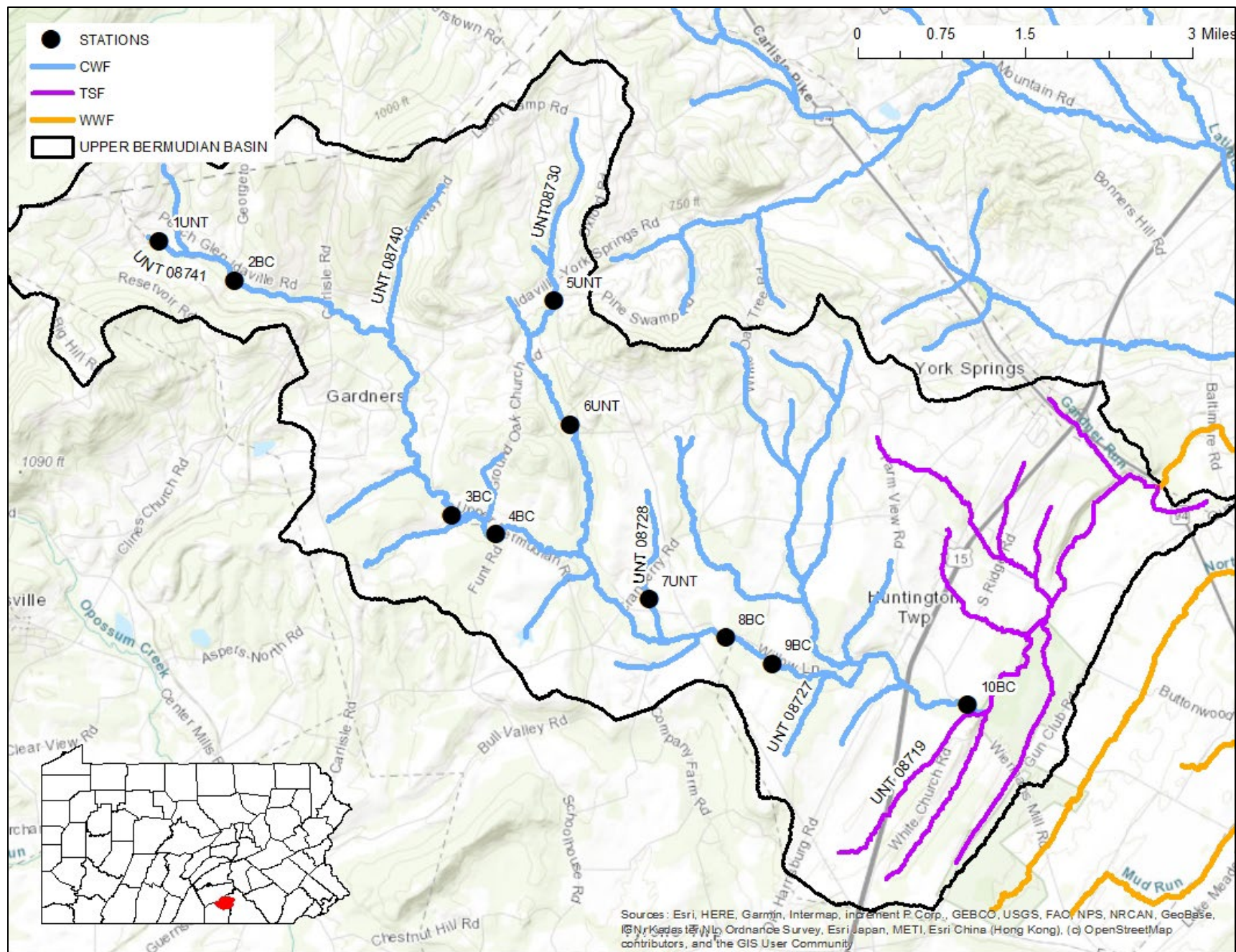


Figure 1. Upper Bermudian Creek Basin – Station Locations and Redesignation Recommendation.

basin from the source to UNT 08740 being listed on the Commonwealth's 303(d) list of impaired waters for Aquatic Life Use (Category 5 of the Integrated Report) for Source – Industrial Point Source, Cause – Organic Enrichment/Low Dissolved Oxygen.

Samples collected from UNT 08730 (5UNT) and UNT 08728 (7UNT) also indicate biological impairment and are listed as Aquatic Life Use impaired for Source – Agriculture, Cause – Siltation. Benthic macroinvertebrate samples were collected using the DEP's SSWAP from three additional locations (3BC, 4BC, 8BC) on Bermudian Creek, from the source to UNT 08727 that indicated support of the Aquatic Life Use (Figure 1, Table 1).

Bacteria

A total of 10 fecal coliform samples were collected from two locations throughout the targeted subbasin in accordance with the DEP's *Bacteriological Data Collection Protocol* (Bradburn and Miller 2015). Results ranged from 190 to 2000 colony forming units per 100 mL (CFUs/100mL). The geometric mean for each location was 263.9 CFUs/100mL (3BC) and 808.6 CFUs/100mL (6UNT) (Table 2). Results exceeded the criteria for fecal coliform bacteria at the time, which specified that during the swimming season (May 1 - September 30), the maximum fecal coliform level shall be a geometric mean of 200 CFUs/100 mL based on a minimum of 5 samples collected in a 30-day period. In addition, no more than 10% of samples collected in a 30-day period shall exceed 400 CFUs/100 mL. The entire Bermudian Creek basin from the source to UNT 08727 is listed on the Commonwealth's 303(d) list of impaired waters for Recreation Use (Category 5 of the Integrated Report) for Source – Unknown, Cause – Pathogens.

Table 2. Bacteriological Data – Bermudian Creek (3BC) and UNT 08730 (6UNT).

STATION ¹	UNITS	DATE					GEOMETRIC MEAN
		6/9/14	6/16/14	6/18/14	6/23/14	6/30/14	
3BC	CFUs/100 mL	320	260	270	190	300	263.9
6UNT	CFUs/100 mL	590	360	1100	2000	740	808.6

¹ Refer to Figure 1 and Table 1 for station locations

Fishes

Fish were collected using backpack electrofishing gear, targeting salmonids and characterizing total species composition using single-pass electrofishing methods from one location (9BC) on March 28, 2006 and from a second location (10BC) on May 26, 2016 (Table 3). The sample reaches were approximately 325 meters and 217 meters respectively. During the 2006 survey, a total of 13 species were collected including wild Brown Trout (*Salmo trutta*) ranging in length from 100 mm to 274 mm. During the 2016 survey, a total of 15 species were collected including wild brown trout (*Salmo trutta*) ranging from 50 to 199 mm. The 2006 and 2016 survey results demonstrate multiple year classes and natural reproduction of trout (Frederick and Kuhn 2015, Kuhn et al. 2016, Detar et al. 2011).

Table 3. PFBC Fisheries Data.

THERMAL PREF. ²	TAXA		STATIONS ¹	
			9BC	10BC
			3/28/2006	5/26/2016
Cold	Rainbow Trout (hatchery)	<i>Oncorhynchus mykiss</i>	x	-
Cold-Cool	Brown Trout (hatchery)	<i>Salmo trutta</i>	x ³	-
Cold-Cool	Brown Trout (wild)	<i>Salmo trutta</i>	x ³	x
Cool	White Sucker	<i>Catostomus commersonii</i>	x	x
Cool	Fantail Darter	<i>Etheostoma flabellare</i>	x	x
Cool	Tesselated Darter	<i>Etheostoma olmstedii</i>	-	x
Cool	Cutlips Minnow	<i>Exoglossum maxillingua</i>	x	x
Cool	Eastern Blacknose Dace	<i>Rhinichthys atratulus</i>	x	x
Cool	Longnose Dace	<i>Rhinichthys cataractae</i>	x	x
Cool	Creek Chub	<i>Semotilus atromaculatus</i>	x	x
Cool-Warm	Rock Bass	<i>Ambloplites rupestris</i>	x	x
Cool-Warm	Central Stoneroller	<i>Campostoma anomalum</i>	x	x
Cool-Warm	Greenside Darter	<i>Etheostoma blennioides</i>	-	x
Cool-Warm	Common Shiner	<i>Luxilus cornutus</i>	x	x
Cool-Warm	Smallmouth Bass	<i>Micropterus dolomieu</i>	-	x
Cool-Warm	Margined Madtom	<i>Noturus insignis</i>	x	x
Cool-Warm	Bluntnose Minnow	<i>Pimephales notatus</i>	-	x
Warm	Green Sunfish	<i>Lepomis cyanellus</i>	x	-
Taxa Richness			13	15

¹ Refer to Figure 1 and Table 1 for station locations

² Thermal preference as described in *Technical Development of a Thermal Fish Index* (Wertz 2021)

³ Wild vs. hatchery counted as a single taxon

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

AQUATIC LIFE USE EVALUATION

The Aquatic Life Use of Bermudian Creek was evaluated according to definitions described at 25 Pa. Code § 93.3, Table 1 – *Protected Water Uses*. Table 1 defines the Cold Water Fishes (CWF) protected use as;

Maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat.

The PFBC surveys, conducted in 2006 and 2016 both document the maintenance and propagation of Salmonidae and other fish species indigenous to cold water habitat. The survey results demonstrate a CWF existing use for the Bermudian Creek basin from the source to UNT 08719.

Table 1 defines Trout Stocking (TSF) protected use as;

Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

Bermudian Creek from Cranberry Road (SR 1014) to Wiermans Mill Road and from Greenbriar Road (Township Route (TR) 619) to SR 94 are currently listed as Stocked Trout Waters by the PFBC. In addition, PFBC records indicate that trout stocking has occurred and is scheduled to occur in 2023 on both of these reaches. PFBC stocking records along with the presence of fish species preferring cool water habitats indicates that seasonal maintenance of stocked trout is appropriate for the Bermudian Creek basin as far downstream as SR 94 south of York Springs.

PUBLIC NOTICE 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 June 9, 2018 (48 Pa.B. 3491). Adams County Conservation District, Adams County Board of Commissioners, Huntington Township, Menallen Township, Tyrone Township, Cumberland County and Dickinson Township, Cumberland County were notified of the redesignation evaluation in a letter dated June 12, 2018. In addition, a notification was posted on the DEP's website. No data on water chemistry, instream habitat, or the aquatic community were received in response to these notices.

Final Draft Notice, Comments and Response

Once the final draft report was completed it was made available to affected municipalities, County Planning Commissions, County Conservation Districts, the Department of Conservation and Natural Resources and the PFBC in a letter dated November 16, 2019 with a public comment period ending 30-days later. In addition, the DEP provided public notice of the draft report comment period on the DEP's website and in the *Pennsylvania Bulletin* on November 16, 2019 (49 Pa.B. 6919). In response to the draft report notification, the PFBC provided additional fish survey data collected in May 2016.

RECOMMENDATION

Based on applicable regulatory definitions in 25 Pa. Code § 93.3, the DEP recommends that the Bermudian Creek basin from the source to UNT 08719 be redesignated from Warm Water Fishes, Migratory Fishes (WWF, MF) to Cold Water Fishes, Migratory Fishes (CWF, MF) based on documented maintenance and propagation of Salmonidae. In addition, the DEP recommends that the Bermudian Creek basin from and including UNT 08719 to SR 94 be redesignated from WWF, MF to Trout Stocking, Migratory Fishes (TSF, MF) based on PFBC Stocked Trout Waters listings and trout stocking records.

This recommendation adds approximately 39.8 total stream miles of CWF and 17.1 TSF waters to Chapter 93.

LITERATURE CITED

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