

**BRUSHY MEADOW CREEK
NORTHAMPTON COUNTY**

**WATER QUALITY STANDARDS REVIEW
STREAM REDESIGNATION EVALUATION**

**Segment: Basin;
East Bangor Dam to mouth
Stream Code: 64106
Drainage List C**

**WATER QUALITY MONITORING AND ASSESSMENT SECTION (TES)
DIVISION OF WATER QUALITY ASSESSMENT AND STANDARDS
BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

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INTRODUCTION

The designated uses listed for Brushy Meadow Creek in Chapter 93 are Trout Stocking, Migratory Fishes (TSF, MF). In December 1998, the Department's Northeast Regional Office (NERO) staff conducted a stream survey of Brushy Meadow in order to determine if the stream's TSF classification should be upgraded to Cold Water Fishes (CWF).

Based on their findings, the NERO requested that the TSF, MF use for Brushy Meadow Creek basin be changed to Cold Water Fishes, MF (CWF, MF) because of the presence of well-established cold water fauna (brown trout) and American eel. The Department's Central Office staff concurred with NERO's findings, but since no information related to temperature-critical summer months was included, concerns were raised that trout observed in December may be transients. Therefore, it was recommended that additional fish data be collected during the summer to make sure Brushy Meadow's fishery was not just a reflection of seasonal and local migratory responses from colder areas of Martins Creek (Brushy Meadow's receiving stream). In response, NERO requested Pennsylvania Fish & Boat Commission (PFBC) assistance in collecting detailed summer fish data from Brushy Meadow Creek.

Brushy Meadow Creek is officially listed as an unnamed tributary to Martins Creek and is locally known as Brushy Meadow Run. The USGS 7.5' Bangor topographic quadrangle map does not indicate a stream channel at Brushy Meadow's location, but there are upstream segments with no attributed name. The Department's last published Pennsylvania Gazetteer of Streams does not include a Brushy Meadow Creek or Run. The Department's hierarchical stream listing (which includes unnamed tributaries) does not list any Brushy Meadow Creek or Run but refers to it as "unnamed thru quarry" (Martins Creek river mile = 7.2) and assigns it a stream code (64106).

The purpose of this report is to review the information and data gathered during these investigations and determine the proper Ch. 93 designated use for Brushy Meadow Creek.

GENERAL WATERSHED DESCRIPTION

Brushy Meadow Creek is a tributary to Martins Creek in the Delaware River drainage. The basin is predominantly located south of Stroudsburg in Washington and Upper Mount Bethel Townships and the Borough of Bangor in Northampton County (Figure 1).

Brushy Meadow Creek is a small drainage system (about 4 mi²) with the upper section draining headwater wetlands and a lower section that flows through a quarry complex. The stream's midsection (upstream of Broad Street) is impounded, and known as "East Bangor Dam". This impoundment is considered a "*highly eutrophic warm water fishery with a history of temperature/dissolved oxygen related fishkills*" (DEP 1999). In addition to this impounded area, relatively flat rural lands with some gently rolling hills of low relief, quarries, and urbanized areas of Bangor characterize the surrounding area.

WATER QUALITY AND USES

Surface Water

No long-term water quality data were available to allow a direct comparison to water quality criteria. However, chemical "grab" samples and biological data were collected from two Brushy Meadow Creek stations in December 1998 by NERO staff. PFBC, with NERO assistance, collected fish data from one station in August 1999. Figure 1 shows sampling station locations.

Laboratory analysis results (DEP 1999) of Brushy Meadow Creek surface waters are presented in Table 1. Despite the limitations of grab samples, observations can be made that provide a generalized overview of Brushy Meadow's water quality. The grab sample results were generally better than criteria and, from DEP 1999, "within the ranges optimal for aquatic life". Based on conductance, hardness, alkalinity, calcium, and magnesium concentrations, grab sample analysis results suggest that Brushy Meadow Creek is a moderately hard system with good buffering capacity.

There is one active NPDES permitted point source discharge in the study area - a municipal sewage treatment plant discharge located in Washington Township and permitted to East Bangor Municipal Authority.

Aquatic Biota

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of both water quality and ecological significance. NERO collected habitat, benthic macroinvertebrate, and fish data in 1998. In order to consider warm weather influences on Brushy Meadow's fishery, PFBC and Department staff collected detailed, quantitative fish data in August 1999.

Habitat data is reported in Table 2. The overall habitat scores for the two Brushy Meadow Creek stations were 134 and 127 – in the low sub-optimal range. Individual habitat criterion scores indicate poor "embeddedness" conditions and riparian zone impacts. Many other habitat parameters also scored marginally poor. These stations reflect the quarry land-uses in the immediate area.

Benthos. NERO staff collected benthic macroinvertebrate samples using the Department's PA-DEP RBPIII benthic sampling methodology. These data are presented in Table 3. The PA-DEP RBPIII method is a modification of EPA's Rapid Bioassessment Protocols (RBPs; Plafkin, et al 1989).

Considering the fact that both Brushy Meadow stations are downstream of the East Bangor Dam, there are minimal impacts to the biota. This stream section supports good populations of pollution sensitive biota as indicated by benthic macroinvertebrate sampling results and benthic metric indices (Table 3). There was reasonably good representation of sensitive mayflies, stoneflies, and caddisflies in both kick-screen and D-frame samples from each station (mEPT score range of 7-10).

Fish. NERO staff sampled Brushy Meadow fish populations in 1998 and in August 1999 with the assistance of PFBC. The presence of cold-water fishes, particularly brown trout, was the main basis for their 1999 CWF recommendation.

Seven species of fish were captured in Brushy Meadow Creek during the Department's December 1998 survey (Table 4). The PFBC quantitative IBI survey found only three species in August 1999 – including various year classes of brown trout (63 individuals with a size range of 50-231mm). These data demonstrate that well-established populations of brown trout are present year-round. Fish scale and size-class data from December 1998 indicates that four age classes were present (including "young-of-year" fingerlings). These results, including PFBC summer collections of trout in the lower size range, are evidence of trout natural reproduction.

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 April 22, 2000 (30 Pa.B 2071). A similar notice was also published in The Express Times newspaper (Easton, PA) on April 21, 2000. In addition, Washington Township, Bangor Borough, and the Lehigh Valley Planning Commission were notified of the evaluation in a letter dated April 19, 2000. No data on water chemistry, in-stream habitat, or the aquatic community were received in response to these notices.

A draft of this report was submitted to the above stakeholders, along with a request for comments, on September 20, 2002. No comments were received in response to this request.

RECOMMENDATIONS

The biological data indicate that Brushy Meadow Creek supports Cold Water Fishes (CWF) and Migratory Fishes (MF) uses downstream of the East Bangor Dam. Brown trout species and migratory American eel were collected from Brushy Meadow Creek during both cold and warm months.

Based on applicable regulatory criteria, the Department recommends that the Brushy Meadow Creek mainstem from the East Bangor Dam (at Broad Street) to the mouth be designated Cold Water Fishes (CWF), Migratory Fishes (MF). This will provide a level of Chapter 93 protection consistent with Brushy Meadow Creek's aquatic biota.

Due to the presence of impounded conditions (East Bangor Dam), the remaining portions of Brushy Meadow Creek (upstream of Broad Street) should remain unchanged (TSF, MF).

The recommended CWF change affects approximately 1.5 stream miles of Brushy Meadow Creek.

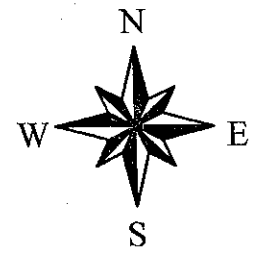
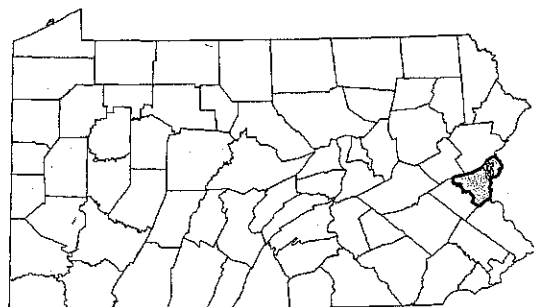
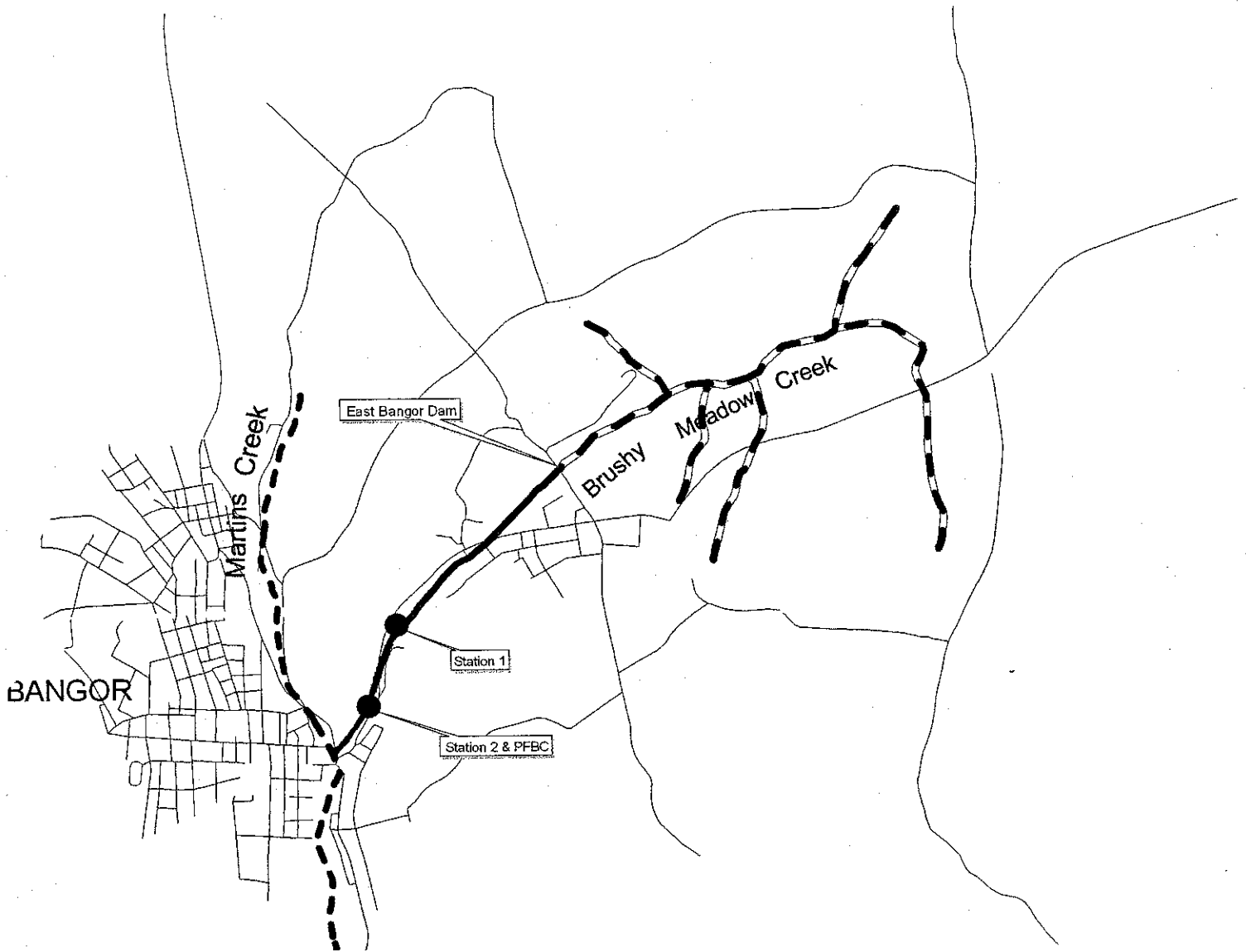
REFERENCES

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.

Department of Environmental Protection. 1999. *Recommendation for Stream Class Upgrade; Brushy Meadow Run, Northampton County*. Northeast Regional Office Memorandum; February 26, 1999.

Pennsylvania Fish & Boat Commission (1999). File information, 8/25/99 IBI Survey of Martins Creek basin.

FIGURE 1. BRUSHY MEADOW CREEK



- Roads
- Martins Creek (TSF-MF)
- Brushy Meadow Creek
- CWF-MF (recommended)
- TSF-MF

TABLE 1
WATER CHEMISTRY
BRUSHY MEADOW CREEK, NORTHAMPTON COUNTY
December 1999

STATIONS	1	2
DATES	12/22/99	12/22/99
field Temp	8.9	8.7
field DO	10.4	10.8
pH	6.9	7
ALK	82	86
COND	488	642
BOD	0.71	0.62
Susp Sol	26	28
NH ₃	<0.02	0.02
NO ₂	<0.01	<.01
NO ₃	0.58	0.54
HARD	220	297
CA	59	82
MG	18	22
CU*	<10	<10
PB*	<1	<1
NI*	<50	<50
ZN*	<10	<10
AL*	<200	<200
MN*	71	44
FE*	109	110
CD*	<10	<10

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

TABLE 2
HABITAT ASSESSMENT SUMMARY ¹
BRUSHY MEADOW CREEK, NORTHAMPTON COUNTY
December 1999

HABITAT PARAMETER	scoring range	STATIONS ¹	
		1	2
1 . instream cover	0 - 20	17	13
2 . epifaunal substrate	0 - 20	10	9
3 . embeddedness	0 - 20	5	5
4 . velocity/depth	0 - 20	14	11
5 . channel alterations	0 - 20	12	13
6 . sediment deposition	0 - 20	10	11
7 . riffle frequency	0 - 20	7	10
8 . channel flow status	0 - 20	17	16
9 . bank condition	0 - 20	11	16
10 . bank vegetation protection	0 - 20	11	9
11 . grazing/disruptive pressures	0 - 20	15	12
12 . riparian vegetation zone width	0 - 20	5	2
Total Score	0 - 240	134	127

1- from DEP 1999

TABLE 3
 BENTHIC MACROINVERTEBRATES
 Kick-Screen & D-frame Results ¹
 BRUSHY MEADOW CREEK
 December 1998

STATIONS	1		2	
	kick screen	D-frame	kick screen	D-frame
TAXA				
<u>Mayflies</u>				
Baetidae <i>Baetis</i>	X	1	X	1
Ephemerellidae <i>Ephemerella</i>	X	-	X	-
<i>Eurylophella</i>	-	-	-	1
<i>Serratella</i>	X	10	X	3
<u>Stoneflies</u>				
Perlidae <i>Acroneuria</i>	X	-	-	-
<i>Eccoptura*</i>	-	1	X	-
<i>Phasganophora**</i>	X	-	-	-
Capnidae <i>Paracapnia</i>	-	-	-	1
Nemouridae <i>Oemopteryx</i>	X	22	X	28
<i>Strophopteryx</i>	X	10	X	28
Taenioptergidae <i>Taeniopteryx</i>	X	15	X	5
<u>Caddisflies</u>				
Brachycentridae <i>Brachycentrus</i>	-	-	X	-
Hydropsychidae <i>Cheumatopsyche</i>	X	5	-	-
<i>Diplectrona</i>	X	3	-	-
<i>Hydropsyche</i>	-	5	X	2
Philopotamidae <i>Chimarra</i>	X	10	X	32
<i>Dolophilodes</i>	-	-	-	2
Rhyacophilidae <i>Rhyacophila</i>	X	-	X	1
<u>True Flies</u>				
Chironomidae	-	5	-	5
Simuliidae <i>Prosimulium</i>	-	1	-	-
<i>Simulium</i>	X	-	-	6
Tipulidae <i>Tipula</i>	X	-	X	-
<u>Misc. Insect Taxa</u>				
Elmidae <i>Optioservus</i>	X	3	-	-
Corydalidae <i>Nigronia</i>	X	1	X	-
Sialidae <i>Sialis</i>	-	-	-	1
Gomphidae <i>Arigomphus</i>	-	1	-	-
<u>Non-Insect Taxa</u>				
Amphipoda <i>Crangonyx</i>	X	18	X	15
Isopoda <i>Caecidotea</i>	X	-	-	-
Oligochaeta	X	10	X	1
total # individuals	-	121	-	132
taxa richness	19	17	15	16
mEPT***	10	7	9	9
Hilsenhoff	-	4.02	-	3.82
% Dom	-	18.18	-	24.24
total # mMayflies***	-	10	-	4
Shannon	-	3.81	-	2.99

1 - from DEP 1999; bold entries = taxa with Hils score <5

* initially reported as Classenia. Subsequent sampling of later instars revealed them as Eccoptura

** - = *Agneta*

*** - includes only taxa with Hils score <5

TABLE 4
FISHES ¹
BRUSHY MEADOW CREEK

TAXA	STATION		
	1	PFBC	2
<i>Salmo trutta</i> , brown trout	23 ²	63 (50-231 mm)	16 ²
<i>Oncorhynchus mykiss</i> , rainbow trout	-	-	-
<i>Rhinichthys atratulus</i> , blacknose dace	-	-	-
<i>Rhinichthys cataractae</i> , longnose dace	-	1	1
<i>Semotilus corporalis</i> , fallfish	-	-	-
<i>Catostomus commersoni</i> , white sucker	1	-	2
<i>Noturus insignis</i> , margined madtom	-	-	-
<i>Etheostoma olmstedii</i> , tessellated darter	-	-	-
<i>Percina peltata</i> , shield darter	-	-	-
<i>Lepomis macrochirus</i> , bluegill	1	-	-
<i>Micropterus salmoides</i> , largemouth bass	1	-	-
<i>Esox niger</i> , chain pickerel	1	-	-
<i>Anguilla rostrata</i> , American eel	3	13 (142-521mm)	5
TOTAL TAXA	6	3	4

1 - DEP: 12/22/98; PFBC: 8/25/99

2 - Young-of-year, juvenile, and adult stages represented