

## **Distribution**

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**PA FISH AND BOAT COMMISSION  
COMMENTS AND RECOMMENDATIONS**

February 22, 2018

**WATER:** Mosquito Creek (310A) Lycoming County

**EXAMINED:** 7/30, 8/11, and 8/22/14

**BY:** D. Kristine, D. Nihart, B. Dooley, C. Lauer, and N. Walters

Bureau Director Action: \_\_\_\_\_ Date: \_\_\_\_\_

Division Chief Action: \_\_\_\_\_ Date: \_\_\_\_\_

CW Unit Leader Action: \_\_\_\_\_ Date: \_\_\_\_\_

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**AREA COMMENTS:** Mosquito Creek is a coldwater stream which flows into the West Branch Susquehanna River near South Williamsport in Lycoming County. The stream was found to support strong wild Brook Trout and Brown Trout populations throughout its length including legal-size fish. The mean biomass for wild Brook Trout and Brown Trout in Section 01 was estimated at 45.49 and 31.61 kg/ha, respectively and met the minimum biomass criteria for listing as a Class A mixed wild Brook and Brown Trout stream. Twelve percent of the Section 01 length was sampled. The biomass of wild Brown Trout in Section 02 was estimated at 57.37 kg/ha and met the minimum biomass criteria for listing as a Class A wild Brown Trout stream. Ten percent of the Section 02 length was sampled.

**AREA RECOMMENDATIONS:**

1. Add Mosquito Creek (10A), Section 01 (from the outflow of the Mosquito Valley Reservoir downstream to the Williamsport Water Authority Intake) and Section 02 (from the Williamsport Water Authority Intake downstream to the mouth) to the Commission's Class A Wild Trout Streams list.
2. Manage Mosquito Creek (10A), Section 01, as a Class A Mixed wild Brook and Brown Trout stream with no stocking of hatchery fish. Angling is currently prohibited in this section by the water authority. Manage Section 02 as a Class A wild Brown Trout stream under Commonwealth Inland Waters regulations with no stocking.
3. Continue to include Mosquito Creek from the headwaters downstream to the mouth on the PFBC's list of stream sections that support natural reproduction of trout.
4. Request the Department of Environmental Protection designate Mosquito Creek as High Quality-Cold Water Fishes and Migratory Fishes (HQ-CWF, MF) under 25 PA Code Chapter 93 based on the Class A qualifier found in 93.4b(2)(ii).

**This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.**

**PENNSYLVANIA FISH & BOAT COMMISSION  
BUREAU OF FISHERIES  
FISHERIES MANAGEMENT DIVISION**

Mosquito Creek (10A)  
Fisheries Management Report

Prepared by  
David Paul Kristine and Jason Detar

Fisheries Management Database Name: Mosquito Creek  
Lat/Lon: 41°13'30"/77°02'29"

Date Sampled: 7/30, 8/11, and 8/22/14 Date Prepared: March 27, 2015

### **Introduction**

Mosquito Creek is a coldwater stream which originates along the slopes of the North White Deer Ridge and flows north to its confluence with the West Branch Susquehanna River near South Williamsport at River Mile (RM) 41.77 in Lycoming County. The stream has a total length of 11.8 km (7.3 mi) as depicted on the Williamsport, PA United States Geological Survey 7.5 minute quadrangle. Mosquito Creek drains a watershed area of 42 km<sup>2</sup> (16 mi<sup>2</sup>; Figure 1). The current 25 PA Code Chapter 93 Water Quality Standards designation is Cold Water Fishes and Migratory Fishes (CWF, MF) for the entire stream. Mosquito Creek has been divided into two sections for management purposes:

Section 01: From the outflow of the Mosquito Valley Reservoir downstream to the Williamsport Water Authority Intake (7.1 km, 4.4 mi)

Section 02: From the Williamsport Water Authority Intake downstream to the Mouth (4.7 km, 2.9 mi)

The entire watershed of Mosquito Creek, Section 01 is owned by the Williamsport Municipal Water Authority and treated surface waters from this and the nearby Hagermans Run watersheds are the primary source of water to the greater Williamsport Area, serving over 51,000 customers. The authority manages these watersheds as a Nature Preserve and allows limited foot access but prohibits hunting, fishing, camping, motorized vehicles, and horseback riding. This watershed consists of mature forested mountainous areas and valleys with little human disturbance. The riparian lands along Section 02 are privately owned and consist of a mix of rural

and suburban activities. A review of Pennsylvania Fish and Boat Commission (PFBC) files for Mosquito Creek found only a historical PFBC stream survey conducted by Snyder (1932) and records of fingerling Brook, Brown, and Rainbow Trout stocking between 1934 and 1963. More recently, the stream was examined as part of the Unassessed Waters Program survey which indicated potential for Class A management.

The wild trout population of Mosquito Creek was examined during 2014 to determine possible Class A status and to gather contemporary information for management and protection purposes.

### **Methods**

The habitat, water chemistry, and wild trout abundance of Mosquito Creek Section 01 was examined on July 30 and August 11, 2014 at two sampling stations totaling twelve percent of the section length. One representative sampling station was examined on August 22, 2014 in Section 02 totaling ten percent of the section length. Procedures were carried out according to those outlined by Detar et al. (2011). Rapid bioassessment protocols (RBP) were used to assess the habitat in this stream (Barbour et al. 1999). Trout population abundance and relative fish species occurrence was determined using a pulsed DC battery backpack electrofisher. The total lengths (TL) of all wild trout captured were measured and recorded in 25-mm (1.0 inch) length groups. Wild trout were given an identifying caudal fin clip during the initial electrofishing pass to facilitate a mark-recapture population estimate and trout densities were determined using the Chapman modification of the Petersen estimator or M+C-R when R was less than three. Statewide average weights calculated for each length group were used to generate the biomass estimate. Scientific and common fish names reference the Integrated Taxonomic Information System (<http://www.itis.gov>).

### **Results**

#### ***Site River Mile: 0.19***

Sample site RM 0.19 was located 85 m downstream of the SR 0654 Bridge. The 465-m long station averaged 4.1 m in width (Table 1). The site was heavily impacted by human activities with little bank vegetative protection and evidence of substantial bedload movement. Aquatic habitat was given a suboptimal rating with a final overall RBP habitat score of 135/200 (Table 2).

Water chemistry parameters and their associated values measured under normal flow conditions were as follows: water temperature 18.3°C, specific conductance 161 umhos, pH 7.8 standard units, and total alkalinity 75 mg/l (Table 3).

Sixteen fish species were captured in Mosquito Creek at this site, including Blacknose Dace *Rhinichthys atratulus*, Brook Trout *Salvelinus fontinalis*, hatchery Brook Trout, Brown Bullhead *Ameiurus nebulosus*, Brown Trout *Salmo trutta*, Central Stoneroller *Campostoma anomalum*, Chain Pickerel *Esox niger*, Common Shiner *Luxilus cornutus*, Greenside Darter *Etheostoma blennioides*, Longnose Dace *Rhinichthys cataractae*, Northern Hog Sucker *Hypentelium nigricans*, Redbreast Sunfish *Lepomis auritus*, Rock Bass *Ambloplites rupestris*, Slimy Sculpin *Cottus cognatus*, Smallmouth Bass *Micropterus dolomieu*, Tessellated Darter *Etheostoma olmstedii*, and White Sucker *Catostomus commersonii* (Table 4).

A total of 103 wild Brown Trout ranging from 50-mm to 449-mm in total length (TL) were captured at this site with 48 (47 percent) being greater than or equal to the legal harvestable length (175 mm: 7 in) (Table 5). Total Brown Trout biomass was estimated to be 57.37 kg/ha. Brown Trout abundance was estimated at 261 trout/km (420 trout/mi) with 117 trout/km (188 trout/mi) being of legal length or longer. In addition, one wild Brook Trout was captured at this site.

#### **Site River Mile: 4.08**

Sample site RM 4.08 was located at the Stone Arch Bridge. The 430-m long station averaged 3.1 m in width (Table 1). Bank erosion was light and excellent cover for trout was provided by boulder, pools, and large woody debris. The RBP habitat analysis yielded a final score of 174/200 (Table 2).

Water chemistry parameters and their associated values measured under normal flow conditions were as follows: water temperature 13.0°C, specific conductance 40 umhos, pH 6.4 standard units, and total alkalinity 11 mg/l (Table 3). Wild Brook and Brown Trout, Slimy Sculpin, and Blacknose Dace were found at this site (Table 4).

A total of 149 wild Brook Trout ranging from 50-mm to 249-mm in total (TL) were captured at this site with 14 (nine percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total Brook Trout biomass was estimated to be 30.21 kg/ha. Brook Trout abundance was estimated at 628 trout/km (1,010 trout/mi) with 33 trout/km (53 trout/mi) being of legal length or longer (Table 6).

A total of 128 wild Brown Trout ranging from 50-mm to 324-mm in total length (TL) were captured at this site with 41 (32 percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total Brown Trout biomass was estimated to be 60.27 kg/ha. Brown Trout abundance was estimated at 398 trout/km (640 trout/mi) with 123 trout/km (198 trout/mi) being of legal length or longer (Table 6).

The combined abundance and biomass for wild Brook and Brown Trout combined was estimated at 1,026 trout/km and 90.48 kg/ha, respectively (Table 6).

#### ***Site River Mile: 6.44***

Sample site RM 6.44 was located at the confluence with Shires Run. The 428-m long station averaged 3.3 m in width (Table 1). Banks were stable with no erosion and cover for trout was considered optimal consisting mainly of pools, large woody debris, and undercut banks. The RBP habitat analysis yielded a final score of 189/200 (Table 2).

Water chemistry parameters and their associated values measured under normal flow conditions were as follows: water temperature 11.5°C, specific conductance 34 umhos, pH 6.5 standard units, and total alkalinity 5 mg/l (Table 3). Wild Brook and Brown Trout, and Slimy Sculpin were found at this site (Table 4).

A total of 373 wild Brook Trout ranging from 25-mm to 224-mm in total length (TL) were captured at this site with 19 (five percent) being greater than or equal to the legal harvestable length (175 mm: 7 in). Total Brook Trout biomass was estimated to be 60.75 kg/ha. Brook Trout abundance was estimated at 1,833 trout/km (2,949 trout/mi) with 49 trout/km (79 trout/mi) being of legal length or longer (Table 7). In addition, three wild Brown Trout were also captured at this site with an estimated biomass of 2.95 kg/ha. The combined abundance and biomass for wild Brook and Brown Trout was estimated at 1,839 trout/km and 63.70 kg/ha, respectively (Table 7).

#### ***Section 01 Average:***

The mean abundance and biomass for wild Brook Trout at the two sample sites in Section 01 was estimated at 1,231 trout/km and 45.49 kg/ha, respectively (Table 8). The mean abundance and biomass for wild Brown Trout was estimated to be 203 trout/km and 31.61 kg/ha. The average abundance and biomass for wild Brook and Brown Trout combined was estimated at 1,434 trout/km and 77.10 kg/ha.

## Discussion

Mosquito Creek was found to be a remote, mostly undisturbed trout stream from its headwaters downstream to the Williamsport Municipal Water Authority Intake with increasing human activity and disturbance from this point to the mouth. The stream should continue to be listed on the PFBC's list of stream sections that support natural reproduction of trout based on the presence of both young-of-the-year and multiple year classes of trout, as outlined in 58 PA Code §57.11., Listing of Wild Trout Streams. In addition, the estimated combined biomass of wild Brook and Brown Trout of 77.10 kg/ha for Section 01 and 57.37 kg/ha for Brown Trout in Section 02 met the PFBC's minimum biomass criteria of 40 kg/ha for listing these sections of Mosquito Creek as Class A Wild Trout streams, as outlined in 58 PA Code §57.8a, Class A Wild Trout Streams. Thus, based on the wild trout biomass and sampling greater than 10 percent of perennial stream flow, Mosquito Creek should be managed as a Class A Wild Trout Stream from headwaters downstream to the mouth in two management Sections as outlined above. Currently no fishing is allowed in Section 01 but should angling be allowed in the future this stream could be managed under Commonwealth Inland Waters regulations with no stocking. Section 02 should continue to be managed under Commonwealth Inland Waters regulations with no stocking.

The current 25 PA Code Chapter 93 Water Quality Standards designation for the entire length of Mosquito Creek is Cold Water Fishes and Migratory Fishes (CWF, MF). This is an inadequate level of protection for this stream. Due to the significant wild trout resource which meets Class A criteria, Mosquito Creek should be upgraded to the High Quality-Cold Water Fishes and Migratory Fishes (HQ-CWF, MF) designation by the PA Department of Environmental Protection (DEP) upon listing by the Commission as a Class A wild trout stream.

### **Management Recommendations**

1. Add Mosquito Creek (10A), Section 01 (from the outflow of the Mosquito Valley Reservoir downstream to the Williamsport Water Authority Intake) and Section 02 (from the Williamsport Water Authority Intake downstream to the mouth) to the Commission's Class A Wild Trout Streams list.
2. Manage Mosquito Creek (10A), Section 01, as a Class A Mixed wild Brook and Brown Trout stream with no stocking of hatchery fish. Angling is currently prohibited in this section. Manage Section 02 as a Class A wild Brown Trout stream under Commonwealth Inland Waters regulations with no stocking.
3. Continue to include Mosquito Creek from the headwaters downstream to the mouth on the PFBC's list of stream sections that support natural reproduction of trout.
4. Request the Department of Environmental Protection designate Mosquito Creek as High Quality-Cold Water Fishes and Migratory Fishes (HQ-CWF, MF) under 25 PA Code Chapter 93 based on the Class A qualifier found in 93.4b(2)(ii).



## Literature Cited

- Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in wadeable streams and Rivers. USEPA. Report 814-99-002 Washington, DC.
- Detar, J., R. Wnuk, R.T. Greene, and M. Kaufmann. 2011. Standard electrofishing protocols for sampling Pennsylvania wadeable streams. Pages 5-24 in D. Miko, editor. Sampling protocols for Pennsylvania's wadeable streams. Pennsylvania Fish and Boat Commission. Harrisburg, PA.
- Snyder, A. 1932. Mosquito Creek stream survey report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.

Table 1. Mosquito Creek (10A), Lycoming County. Site sampling locations, lengths surveyed, average site widths and site areas.

Site Date	Rivermile	Downstream limit description	Length (m)	Ave. Width (m)	Site Area (ha)
8/22/2014	0.19	85 m downstream SR 0654 Bridge	465	4.1	0.19
8/11/2014	4.08	Stone Arch Bridge	430	3.1	0.13
7/30/2014	6.44	Confluence with Shires Run	428	3.3	0.14

Table 2. High Gradient Rapid Bioassessment Protocol ratings for Mosquito Creek (10A), Lycoming County, conducted during 2014.

Habitat Parameter	RM 0.19	RM 4.08	RM 6.44	Habitat Parameter	RM 0.19	RM 4.08	RM 6.44
Epifaunal Substrate / Available Cover	15	18	19	Left Bank Stability	10	9	10
Embeddedness	13	17	19	Right Bank Stability	10	9	10
Velocity / Depth Regime	15	16	18	Left Bank Vegetative Protection	5	9	10
Sediment Deposition	14	15	16	Right Bank Vegetative Protection	5	9	10
Channel Flow Status	12	20	20	Left Bank Riparian Vegetative Width	4	7	10
Channel Alteration	11	17	17	Right Bank Riparian Vegetative Width	4	10	10
Frequency of Riffles or bends	17	18	20	<b>Total Score</b>	<b>135</b>	<b>174</b>	<b>189</b>

<u>Habitat Condition</u>	<u>Total Score</u>
Optimal	151-200
Suboptimal	101-150
Marginal	51-100
Poor	0-50

Table 3. Water chemistries collected in Mosquito Creek (10A), Lycoming County.

Parameter	Site 1	Site 2	Site 3
Site RM	0.19	4.08	6.44
Sample Date	8/22/14	8/11/2014	7/30/14
Time (24 hour)	1013	1150	1130
pH Field Colorimetric (SU)	7.8	6.4	6.5
Specific Conductance (UMHOS)	161	40	34
Total Alkalinity	Field	Mixed	
Indicator (MG/L)	75	11	5
Water Temperature (C)	18.3	13.0	11.5

Table 4. Fish species occurrence in Mosquito Creek (10A), Lycoming County during 2014.

Common Name	Scientific Name	RM 0.19	RM 4.08	RM 6.44
Blacknose Dace	<i>Rhinichthys atratulus</i>	X	X	
Brook Trout	<i>Salvelinus fontinalis</i>	X	X	X
Brook Trout - Hatchery	<i>Salvelinus fontinalis</i>	X		
Brown Bullhead	<i>Ameiurus nebulosus</i>	X		
Brown Trout	<i>Salmo trutta</i>	X	X	X
Central Stoneroller	<i>Campostoma anomalum</i>	X		
Chain Pickerel	<i>Esox niger</i>	X		
Common Shiner	<i>Luxilus cornutus</i>	X		
Greenside Darter	<i>Etheostoma blennioides</i>	X		
Longnose Dace	<i>Rhinichthys cataractae</i>	X		
Northern Hog Sucker	<i>Hypentelium nigricans</i>	X		
Redbreast Sunfish	<i>Lepomis auritus</i>	X		
Rock Bass	<i>Ambloplites rupestris</i>	X		
Slimy Sculpin	<i>Cottus cognatus</i>	X	X	X
Smallmouth Bass	<i>Micropterus dolomieu</i>	X		
Tessellated Darter	<i>Etheostoma olmstedi</i>	X		
White Sucker	<i>Catostomus commersonii</i>	X		
Total Species		16	4	3

Table 5. Wild Brook and Brown Trout Petersen abundance and biomass estimates at sample site RM 0.19 on Mosquito Creek (10A), Lycoming County, on August 22, 2014.

Length Group (mm)	Population Estimate	Low 95% CI	High 95% CI	Estimated Number/Ha	Estimated Kg/Ha	Estimated Number/Km
Brook Trout						
75	1			5	0.03	2
Totals	1			5	0.03	2
Brown Trout						
50	3			16	0.04	6
75	24	12	53	127	0.81	52
100	1			5	0.08	2
125	24	13	49	127	3.34	52
150	15	8	32	79	3.48	32
175	8	4	20	42	2.85	17
200	16	7	40	85	8.23	34
225	13	7	26	69	9.29	28
250	11	6	22	58	10.62	24
275	1			5	1.25	2
325	3			16	6.07	6
375	1			5	3.06	2
400	1			5	3.68	2
425	1			5	4.57	2
Totals	122			644	57.37	261
Combined	123			649	57.40	263

Table 6. Wild Brook and Brown Trout Petersen abundance and biomass estimates at sample site RM 4.08 on Mosquito Creek (10A), Lycoming County, on August 11, 2014.

Length Group (mm)	Population Estimate	Low 95% CI	High 95% CI	Estimated Number/Ha	Estimated Kg/Ha	Estimated Number/Km
Brook Trout						
50	120	49	300	915	2.25	279
75	7			53	0.32	16
100	89	52	168	678	9.29	207
125	21	10	49	160	3.91	49
150	19	10	40	145	5.95	44
175	9			69	4.38	21
200	3			23	2.12	7
225	2			15	1.99	5
Totals	270			2,058	30.21	628
Brown Trout						
50	2			15	0.04	5
75	4			30	0.19	9
100	61	35	118	465	6.67	142
125	12	6	25	91	2.40	28
150	39	22	72	297	13.04	91
175	40	22	79	305	20.48	93
200	5	2	13	38	3.70	12
225	1			8	1.03	2
250	1			8	1.39	2
275	5			38	9.02	12
300	1			8	2.31	2
Totals	171			1,303	60.27	398
Combined	441			3,361	90.48	1,026

Table 7. Wild Brook and Brown Trout Petersen abundance and biomass estimates at sample site RM 6.44 on Mosquito Creek (10A), Lycoming County, on July 30, 2014.

Length Group (mm)	Population Estimate	Low 95% CI	High 95% CI	Estimated Number/Ha	Estimated Kg/Ha	Estimated Number/Km
Brook Trout						
25	10			71	0.07	23
50	452	250	905	3219	7.92	1056
75	47	24	98	335	1.99	110
100	146	103	215	1040	14.24	341
125	57	37	92	406	9.92	133
150	52	30	101	370	15.22	121
175	12	7	25	858	5.46	28
200	9	4	23	64	5.93	21
Totals	785			5,590	60.75	1,833
Brown Trout						
150	1			7	0.31	2
175	1			7	0.48	2
300	1			7	2.16	2
Totals	3			21	2.95	6
Combined	788			5,611	63.70	1,839

Table 8. Mean abundance and biomass for wild Brook and Brown Trout from Mosquito Creek (10A), Section 01. A total of two sites were examined at site RM 4.08 and 6.44 during 2014.

Length Group (mm)	Population Estimate	Estimated Num/ha	Estimated kg/Ha	Estimated Num/km
Brook Trout				
25	5	36	0.04	12
50	286	2067	5.08	668
75	27	194	1.16	63
100	118	859	11.76	274
125	39	283	6.92	91
150	36	258	10.59	83
175	11	77	4.92	24
200	6	43	4.02	14
225	1	8	1.00	2
Totals	529	3,825	45.49	1,231
Brown Trout				
50	1	8	0.02	2
75	2	15	0.10	5
100	31	232	3.33	71
125	6	46	1.20	14
150	20	152	6.68	47
175	21	156	10.48	48
200	3	19	1.85	6
225	1	4	0.51	1
250	1	4	0.69	1
275	3	19	4.51	6
300	1	7	2.24	2
Totals	90	662	31.61	203
Combined Totals:	619	4,487	77.10	1,434



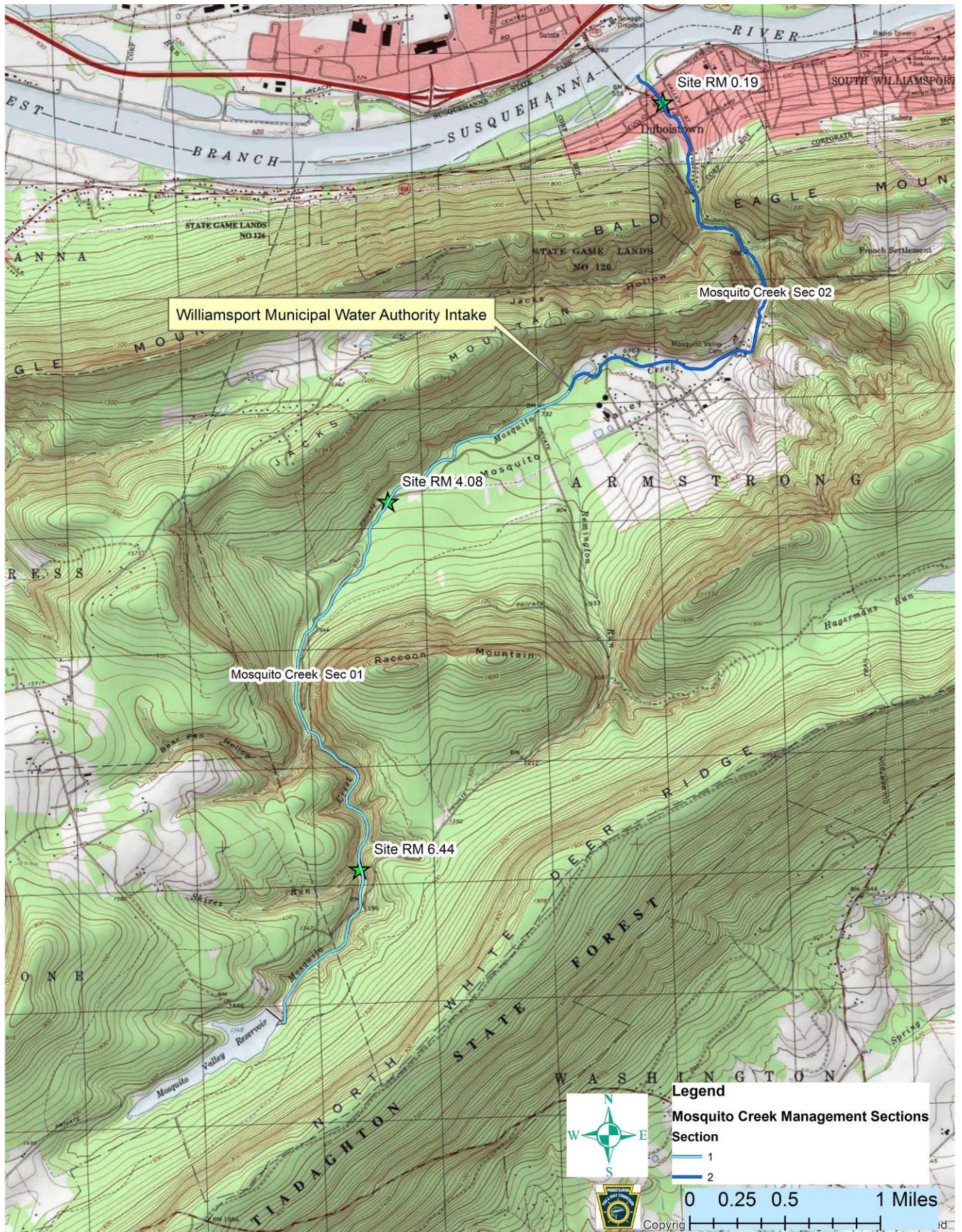


Figure 1. Location map for sample site river mile 0.19, 4.08, and 6.44 on Mosquito Creek (10A), Lycoming County.