

**PA FISH AND BOAT COMMISSION  
COMMENTS AND RECOMMENDATIONS  
September 3, 2013**

**WATER:** Brace Brook (405A) Wayne and Susquehanna Counties  
**EXAMINED:** July and August, 2013  
**BY:** Robert Wnuk, Aaron Frey, and Brian Shurmanek

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

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

WW Unit Leader Action: \_\_\_\_\_ Date: \_\_\_\_\_

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

**AREA COMMENTS:**

Brace Brook was dry at all access points during the initial Pennsylvania Fish and Boat Commission inventory in 1997. In 2012, however, Keystone College found wild Brook Trout upstream from Brace Brook Reservoir as part of the statewide Unassessed Waters project. The number of fish present suggested that Brace Brook might support a Class A wild Brook Trout population.

Population estimates were conducted at two sites on Brace Brook during the summer of 2013. One site was located upstream from the reservoir and the other site was located downstream from it. Both sites supported wild Brook Trout populations that qualified for Class A status.

**AREA RECOMMENDATIONS:**

1. Add Sections 01 and 02 of Brace Brook (05A), to the Class A Wild Trout Waters list.
2. Extend the wild trout listing limits for Brace Brook downstream to the mouth.
3. Request the Pennsylvania Department of Environmental Protection to upgrade Brace Brook to High Quality - Cold Water Fishes, Migratory Fishes in the Chapter 93 Water Quality Standards.

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  
Division of Fisheries Management**

Brace Brook (405A)  
Fisheries Management Report

Prepared by:  
Robert T. Wnuk and Aaron P. Frey

Date Sampled: July/August 2013      Date Prepared: September 2013

### **Introduction**

Brace Brook is a 4.67 km long stream located in Wayne and Susquehanna Counties. It originates at 622 m elevation in the Moosic Mountains and flows generally south through a forested drainage to its confluence with the Lackawanna River in Forest City. The Pennsylvania Fish and Boat Commission (PFBC) manages Brace Brook as two separate sections. Section 01 extends 2.37 km from the headwaters downstream to the backwaters of Brace Brook Reservoir, a small (0.73 ha) water supply impoundment. Section 02 extends 2.3 km from the outlet of Brace Brook Reservoir downstream to the mouth (Figure 1). The Pennsylvania Department of Environmental Protection classifies Brace Brook for Cold Water Fishes and Migratory Fishes (CWF, MF) in its Chapter 93 Water Quality Standards. Brace Brook can be found on the Forest City, PA United States Geological Survey 7.5 minute quadrangle.

Wnuk et al. (1998) attempted to survey Brace Brook but found that it was dry. As part of the statewide Unassessed Waters Program, however, Keystone College found wild Brook Trout *Salvelinus fontinalis* upstream from Brace Brook Reservoir during the summer of 2012 (Greiner 2012). The PFBC subsequently added Section 01 to the wild trout list. In addition, Greiner (2012) calculated that Section 01 potentially supported Class A biomass and recommended that the PFBC re-survey the stream.

### **Methods**

Brace Brook was examined in July and August of 2013. All procedures followed those outlined by Detar et al. (2011).

Physical habitat, chemical parameters, and fish communities were assessed at two sampling stations. Station 0101 was located at the backwaters of Brace Brook Reservoir and was 300 m long.

Station 0201 was located at the upstream end of the first braided channel and was 308 m long. Physical habitat evaluations followed the United States Environmental Protection Agency's Rapid Bioassessment Protocols for high gradient streams (Barbour et al. 1999). All chemical parameters were measured in the field using a colorimetric method for pH, a mixed indicator for total alkalinity, and EDTA titration for total hardness.

Fish sampling employed a Smith-Root backpack electrofishing unit (Model 12-A POW, 200 - 400 Volts pulsed direct current) with a single anode and a rat-tail cathode. All fish were identified to species according to the Integrated Taxonomic Information System (<http://www.itis.gov>). All trout captured were determined to be of wild or hatchery origin based on species, coloration, size, and fin wear. Wild trout captured were measured to 25 mm length groups and given an upper caudal fin clip during the first electrofishing pass. When at least 30 wild trout were captured at an individual site, a second electrofishing pass was made to obtain a Chapman modified Petersen population estimate (Ricker 1975). Wild trout biomass estimates were determined using state average weights calculated on August 14, 2013.

## Results and Discussion

### Section 01

Section 01 flowed through private woodlands and had a rural human population density of 14 persons/km<sup>2</sup> (Table 1). The single station in Section 01 encompassed 12.7% of the section length. Physical habitat was sub-optimal with a total score of 144 (Table 2). Flooding created the main physical habitat problems. Gravel bars deposited by floods split the stream into multiple braided channels. Water quality data indicated a moderately buffered system. Total alkalinity was 23 mg/l and pH was 6.7 (Table 3). Blacknose Dace *Rhinichthys atratulus* and wild Brook Trout were the only two fish species present. Blacknose Dace were abundant.

A total of 185 individual (M + C - R) wild Brook Trout ranging from 25 to 224 mm in total length were captured at Station 0101 (Figure 2). Total wild Brook Trout biomass was estimated at 48.20 kg/ha and the biomass of wild Brook Trout < 150 mm was 40.42 kg/ha (Table 4). This was sufficient to qualify Section 01 for Class A status. An estimated 38 legal size fish were present in the section.

### Section 02

Access to Section 02 was limited in comparison to Section 01, as less than 10 percent of the section length was within 500 meters of a road (Table 1). Forests dominated the watershed, human population density was rural (39 persons/km<sup>2</sup>), and gravel deposits from flooding created multiple braided channels.

Physical habitat was sub-optimal with a total score of 141 (Table 2). Water quality was more acidic than in Section 01. Total alkalinity at Station 0201 was 10 mg/l and pH was 6.6 (Table 3). Culm dumps from historic mining along the banks of Section 02 produced this acidity. As at Station 0101, the only fish species present at Station 0201 were Blacknose Dace and wild Brook Trout. Blacknose Dace were abundant.

The single station in Section 02 encompassed 13.4% of the section length. A total of 204 individual (M + C - R) wild Brook Trout ranging from 50 to 249 mm in total length were captured at Station 0201 (Figure 2). Total wild Brook Trout biomass was estimated at 53.20 kg/ha and the biomass of wild Brook Trout < 150 mm was 29.07 kg/ha (Table 5). This was sufficient to qualify Section 01 for Class A status. An estimated 133 legal size fish were present in the section.

### **Acknowledgements**

We thank the Rail-Trail Council of Northeast Pennsylvania for providing keys to access the lower end of Brace Brook as well as several other streams in the area.

### **MANAGEMENT RECOMMENDATIONS**

1. Add Sections 01 and 02 of Brace Brook (05A), to the Class A Wild Trout Waters list.
2. Extend the wild trout listing limits for Brace Brook downstream to the mouth.
3. Request the Pennsylvania Department of Environmental Protection to upgrade Brace Brook to High Quality - Cold Water Fishes, Migratory Fishes in the Chapter 93 Water Quality Standards.

## LITERATURE CITED

- Barbour, M., J. Gerritsen, B. Snyder, and J. Stribling. 1999. Rapid bioassessment protocols for use in wadeable streams and rivers: periphyton, benthic macroinvertebrates, and fish, second edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.
- 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.
- Greiner, R. 2012. Brace Brook (405A) Section 01. Fisheries management report unassessed water. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191.
- Wnuk, R, R. Moase, T. Copeland, and R. Mulberger. 1998. Lackawanna River Basin (405A) fisheries management report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

**Table 1.** Physical and social data for Sections 01 and 02 of Brace Brook (405A).

Parameter	Section 01	Section 02
County	Wayne (100%)	Wayne (99%) Susquehanna (1%)
Gradient (m/km)	33.3	35.9
Length (km)	2.37	2.30
Width (m)	2.20	3.10
Road Access (% Within:)		
100 m	74	0
300 m	100	2
500 m	100	9
Ownership	100% Private	100% Private
2010 Human Population		
Density (#/km <sup>2</sup> )	14 (Rural)	39 (Rural)

**Table 2.** Physical habitat data collected at Stations 0101 and 0201 of Brace Brook (405A) in 2013.

Parameter	Station 0101	Station 0201
Available Cover	15	13
Embeddedness	14	15
Velocity/Depth Regime	16	13
Sediment Deposition	7	9
Channel Flow Status	15	14
Channel Alteration	14	14
Frequency of Riffles	17	18
Bank Stability:		
Left Bank	7	8
Right Bank	7	5
Vegetative Protection:		
Left Bank	8	8
Right Bank	8	6
Vegetative Zone Width:		
Left Bank	7	9
Right Bank	9	9
<b>Total Score:</b>	<b>144</b>	<b>141</b>

**Table 3.** Physical-chemical parameters measured at Stations 0101 and 0201 of Brace Brook (405A) in 2013.

Parameter	Station 0101	Station 0201
Date	7/18/13	8/06/13
Time (24 hour)	1000	1025
Air Temperature (°C)	27.0	28.0
Water Temperature (°C)	17.1	13.7
pH (Standard Units)	6.7	6.6
Total Alkalinity (mg/l)	23	10
Total Hardness (mg/l)	27	15
Specific Conductance (µmhos)	77	57

**Table 4.** Wild Brook Trout abundance and biomass estimates for Station 0101 of Brace Brook (405A) determined in 2013.

Length Group (mm)	Population Estimate	Number per Hectare	Kilograms per Hectare	Number per Kilometer
25 - 49	2	23	0.02	7
50 - 74	209	2,402	5.91	697
75 - 99	18	207	1.23	60
100 - 124	147	1,690	23.15	490
125 - 149	36	414	10.11	120
150 - 174	8	92	3.78	27
175 - 199	4	46	2.94	13
200 - 224	1	11	1.06	3
Totals	425	4,885	48.20	1,417
< 150 mm	412	4,736	40.42	1,374
> 175 mm	5	57	4.00	16

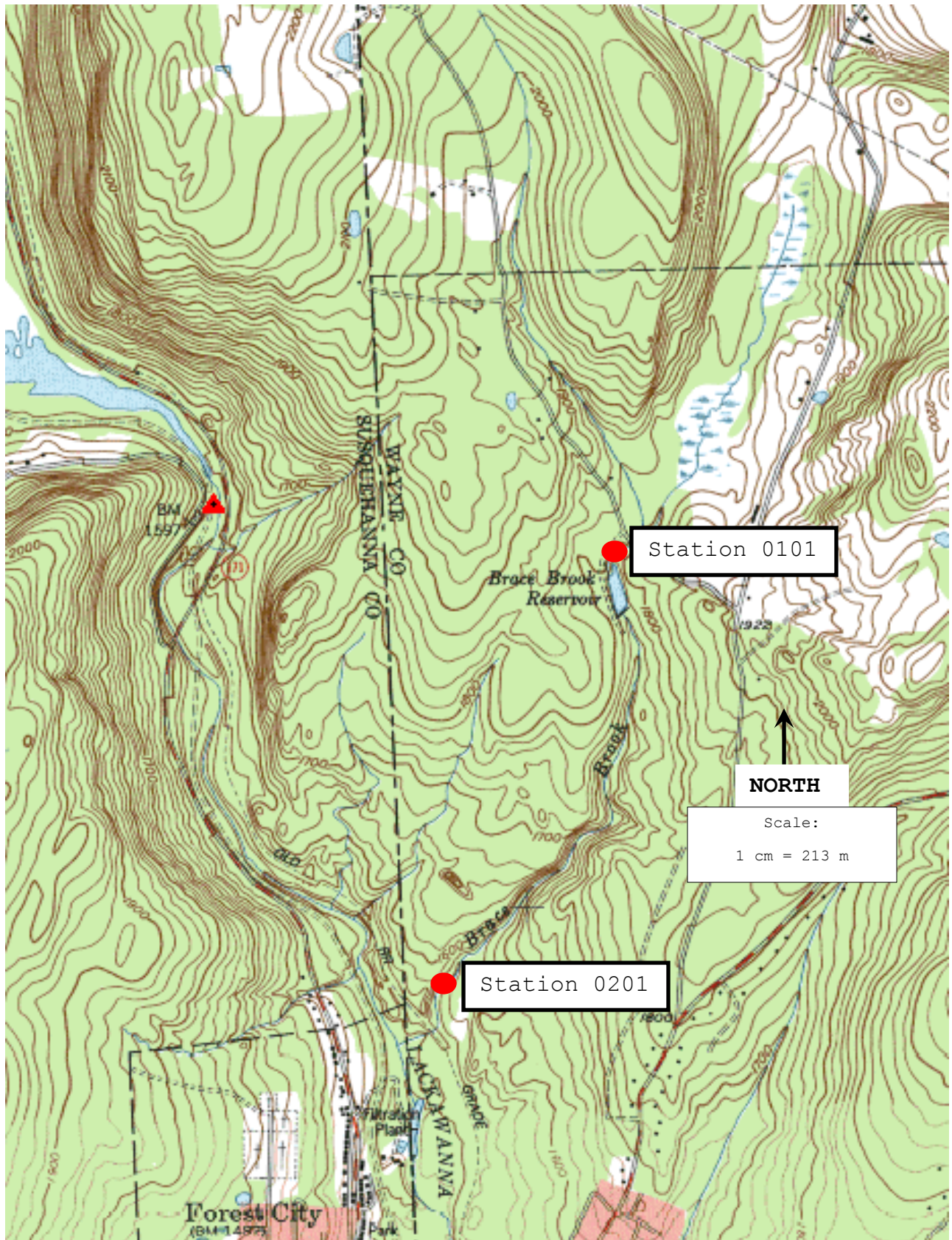
**Estimated Number of Legal Fish in Section 01: 38**



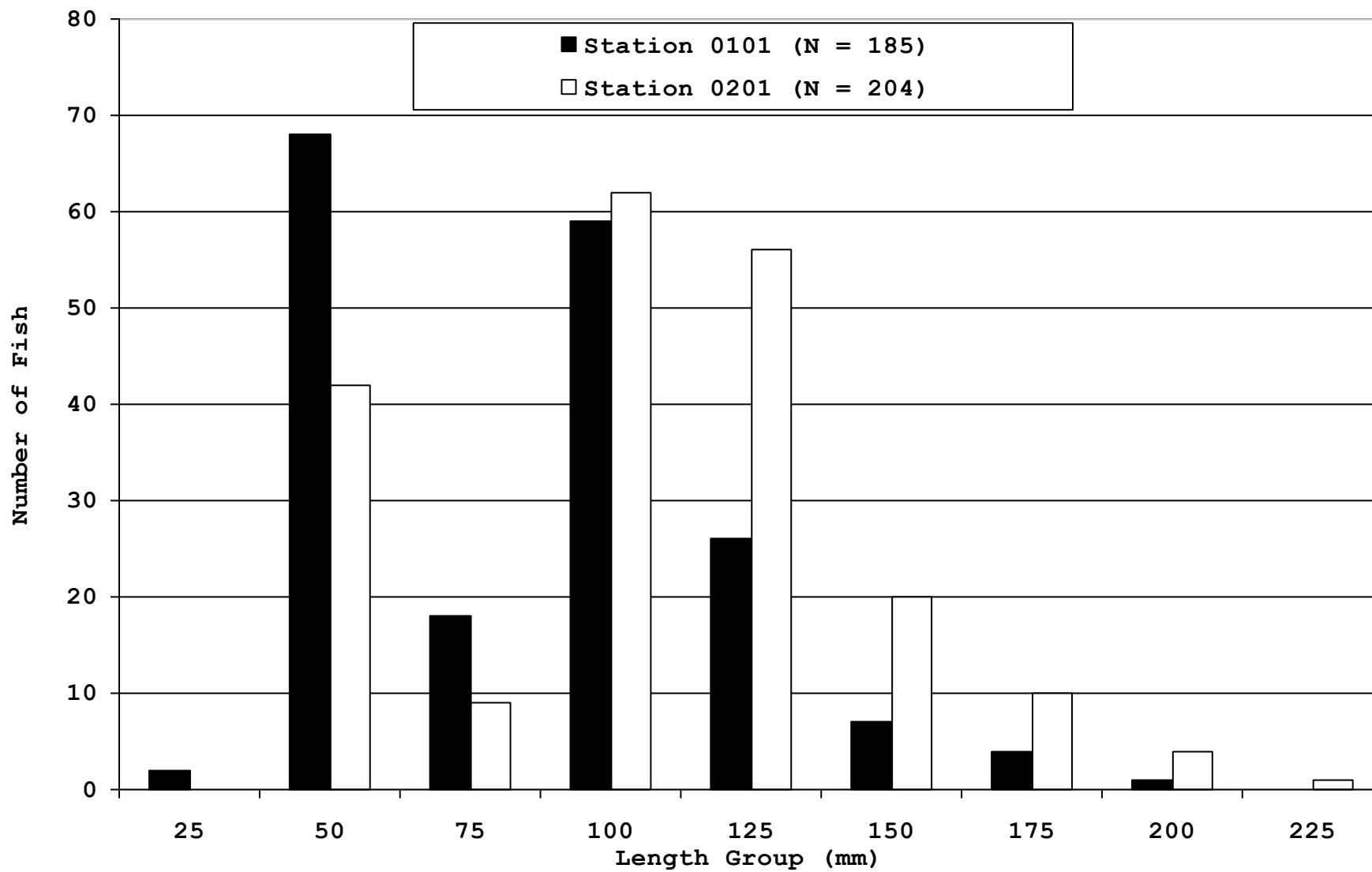
**Table 5.** Wild Brook Trout abundance and biomass estimates for Station 0201 of Brace Brook (405A) determined in 2013.

Length Group (mm)	Population Estimate	Number per Hectare	Kilograms per Hectare	Number per Kilometer
50 - 74	59	618	1.52	192
75 - 99	9	94	0.56	29
100 - 124	74	775	10.62	240
125 - 149	64	670	16.37	208
150 - 174	23	241	9.89	75
175 - 199	12	126	8.03	39
200 - 224	5	52	4.84	16
225 - 249	1	10	1.37	3
Totals	247	2,586	53.20	802
< 150 mm	206	2,157	29.07	669
> 175 mm	18	188	14.24	58

**Estimated Number of Legal Fish in Section 02: 133**



**Figure 1.** Location map for Brace Brook (405A), Wayne and Susquehanna Counties.



**Figure 2.** Length-frequency distributions (M + C - R) of wild brook trout captured in Brace Brook (405A), Wayne and Susquehanna Counties, during 2013.

DISTRIBUTION

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