Pipestone Creek 2013 Survey Report

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Introduction

Pipestone Creek begins as two separate branches. One branch flows out of Rowe Lake and the other branch flows out of Pipestone Lake (Figure 1). The two branches converge near M-140, and the stream flows to the west for 17 miles to its confluence with the St. Joseph River approximately 4 miles southeast of the city of Benton Harbor. The Pipestone Creek watershed encompasses 44 miles^2 in Berrien and Cass counties. Agriculture (64%) is the predominant land use in the watershed, followed by forests (14%) and wetlands (11%; land use estimates from Michigan Department of Natural Resource's Aquatic Habitat Viewer). Dams in the headwaters control water levels in Pipestone and Rowe lakes. Andres Dam historically blocked fish movements on one of the tributaries to Pipestone Creek. The stream has cut around this dam and it no longer serves as a barrier to fish migration (Potawatomi Resource Conservation and Development Council 2011). Pipestone Creek and its tributaries are classified as Type 1 trout streams.

The terrain is relatively flat in the headwaters and hilly throughout most of the main stem. Stream gradient averages 4.6 ft/mile from the convergence of the two headwater streams to the Dohm Road crossing and 12.2 ft/mile from this crossing to the confluence with the St. Joseph River. The upper half of Pipestone Creek flows through fine-textured till. Darcy groundwater maps indicate low potential for groundwater inputs along this portion of the stream. About 1 mile upstream of Dohm Road, the surficial geology transitions to end moraines of coarse-textured glacial till. Relative to the upstream region, the surficial materials in the lower portion of the watershed have greater permeability and groundwater inputs to the creek are stronger.

The portion of Pipestone Creek from the headwaters to a point approximately 0.5 miles upstream of Park Road is a designated county drain. Many of the tributaries also are designated drains, and large sections of the river system have been affected by dredging and channelization. In addition, wetlands within the watershed have been tiled and drained to facilitate agricultural operations. These human activities have altered stream morphology, groundwater delivery and flow patterns, and the abundance of large woody cover within the creek.

The Michigan Department of Conservation (predecessor of the Michigan Department of Natural Resources [MDNR]) stocked brown trout and rainbow trout in Pipestone Creek from 1933 until 1954 (Table 1). At that time annual stocking was discontinued because riparian landowners were restricting public access to the stream. No stocking occurred during 1955-1976 with the exception of the release of surplus rainbow trout in the creek in 1966.

Late-summer electrofishing surveys were conducted on Pipestone Creek and tributary streams in 1968, 1975, and 1976. Twenty-six fish species were collected during these sampling efforts. One young-of-year rainbow trout was captured on the main stem near Dohm Road. Ten brown trout (total length = 4-16 inches) and four rainbow trout (total length = 6-10 inches) were captured in two of the tributaries. Other game fish species were rare and most of the fish were too small to be of interest to anglers.

Pipestone Creek is accessible to fish from Lake Michigan and the species composition of the fish community changes seasonally. An electrofishing survey completed in October 1977 revealed the

presence of adult brown trout, steelhead (i.e., rainbow trout that spend part of their life in Lake Michigan), and coho salmon in Pipestone Creek. Several yearling steelhead also were collected, indicating that some natural recruitment was occurring in this system.

Annual brown trout stocking resumed in 1977 (Table 1). Electrofishing was conducted at six stations on Pipestone Creek in early September 1982 to assess survival and growth of stocked trout. Eighteen brown trout were captured in 2,300 ft of sampling effort. The Hillandale Road station had the highest brown trout catch per effort (CPE; 3.0 fish/100 ft). The total length range for brown trout was 6-22 inches. No young-of-year (YOY) brown trout or rainbow trout were collected. One adult Chinook salmon and one YOY coho salmon were captured during the survey.

Electrofishing surveys were completed at five locations on Pipestone Creek in August 1990. Thirty brown trout were collected in 3,150 ft of sampling effort. Once again, the Hillandale Road station had the highest brown trout CPE (2.9 fish/100 ft). Overall, the survey results indicated that Pipestone Creek supported a low-density brown trout population with above average growth rates. No young-of-year brown trout were captured, so it appeared that natural recruitment was minimal. Many adult steelhead were observed from Dohm Road downstream to the confluence with the St. Joseph River. The presence of several juvenile fish in the catch at the Hillandale Road and Dohm Road stations corroborated earlier observations of natural recruitment of steelhead in the creek.

In July 1997, electrofishing was conducted at five stations from Park Road downstream to Hillandale Road. Sixty-four brown trout were captured in 3,850 ft of sampling effort. The Hillandale Road (4.2 fish/100 ft) and Dohm Road (2.8 fish/100 ft) stations had the highest CPEs. Additional sampling at Hillandale Road yielded a population estimate of 243 brown trout/mile. For all stations combined, young-of-year fish composed 81% of the total brown trout catch. Thus, at least 81% of the brown trout collected during the 1997 survey were wild fish. Natural recruitment of steelhead and coho salmon also was documented.

The high relative abundance of wild fish in the 1997 brown trout catch prompted changes to the stocking program in Pipestone Creek. In 1998, the stocking density was reduced from 162 fish/acre to 116 fish/acre. All brown trout stocking in this system was discontinued in 2010.

Temperature loggers were deployed at two locations in Pipestone Creek during the summer of 1998. Mean July water temperatures were 68.7 ^{o}F at Old Pipestone Road and 67.6 ^{o}F at Dohm Road. Maximum recorded water temperatures were 77.3 ^{o}F at Old Pipestone Road and 75.5 ^{o}F at Dohm Road.

Materials and Methods

Electrofishing (250 V DC stream shocker with 2 probes, 3-5 A) was conducted at two stations on August 7, 2013 to assess natural recruitment, age distribution, and growth of brown trout in Pipestone Creek. The first station began 100 ft downstream of the Dohm Road crossing and extended 1,000 ft upstream (Figure 1). The second station began 250 ft downstream of the Hillandale Road crossing and extended 600 ft upstream. At each site, a single electrofishing run was completed while moving in an upstream direction. Total length was recorded for each fish captured. Weights for all fish species were calculated using the length-weight regression coefficients compiled by Schneider et al. (2000b). Scale samples for age determination were collected from all brown trout 4 inches or larger. Length-at-age data from both sampling locations were combined to generate mean lengths at age for Pipestone Creek brown trout.

Quantitative habitat evaluations were not completed at these stations. Habitat evaluations were limited to qualitative observations by the survey crew.

Results

Seventeen brown trout (CPE = 1.7 fish/100 ft) were captured at the Dohm Road sampling station. The total length range for these fish was 2.8-14.1 inches (Figure 2). Two age-2 fish were collected at this site. The remainder of the brown trout catch consisted of YOY and yearling fish (Figure 3).

Forty-five steelhead and four YOY coho salmon (total length = 3.1-3.4 inches) also were collected at the Dohm Road sampling station. The steelhead catch consisted of 25 YOY fish, 1 yearling, and 19 adults (total length = 24-29 inches). Coldwater and transitional fish species composed 79% of the catch by number and 99% of the total fish biomass at this site (Table 2).

Twenty-four brown trout (CPE = 4.0 fish/100 ft) were captured at the Hillandale Road sampling station. The total length range for these fish was 2.8-13.5 inches. Fish from three different year classes were collected, and young-of-year fish made up 17% of the catch. Ten steelhead also were captured at this station. The steelhead catch consisted of 2 YOY fish, 2 yearlings, and 6 adults (26-31 inches). Coldwater and transitional fish species composed 71% of the catch by number and 94% of the total fish biomass at the Hillandale Road station (Table 3).

The mean length at age for YOY brown trout in Pipestone Creek was similar to the statewide average (Figure 4). Growth was rapid for older fish. The mean length for age-2 brown trout in Pipestone Creek was 2.6 inches above the state average.

Abundance of large woody cover and deep pools was rated as “moderate” at both sites. Undercut banks, overhanging vegetation, and boulders were sparse. Sand and gravel were the predominant substrate types. Upstream of Dohm Road, someone had dropped multiple truckloads of countertop scraps into the stream. This violation was reported to Law Enforcement Division for investigation.

Analysis and Discussion

The brown trout population in Pipestone Creek has persisted in the absence of stocking. The brown trout CPE at Hillandale Road was similar in 2013 and 1997. At Dohm Road, the brown trout CPE in 2013 was lower than in 1997 but higher than in 1990. At both sites, the YOY catch was lower in 2013 than in 1997, whereas the CPE for age 1 and older fish at both sites was greater in 2013 than in 1997. The poor natural recruitment in 2013 may have been caused by high flows during the fry emergence period (Nuhfer et al. 1994).

In 2013 and in previous years, the brown trout CPE in Pipestone Creek was low relative to most streams sampled as part of MDNR’s Status and Trends Program (T. Wills, MDNR – Fisheries Division, unpublished). High summer water temperatures are one factor that limits trout production in this system. As noted previously, the mean July water temperature at Dohm Road was 67.6 ^{o}F in 1998. Brown trout growth occurs when water temperatures are between 39 ^{o}F and 67 ^{o}F (Elliott 1993), and McMichael and Kaya (1991) observed that brown trout catch per angler hour decreased when water temperatures exceeded 66 ^{o}F. Thus, summer water temperatures in Pipestone Creek are marginal for brown trout.

Irrigation is commonly used to enhance agricultural production in southwest Michigan. Since July 9, 2009, Part 327 of Public Act 451 requires all large-quantity withdrawals (defined as 70 gallons per minute [100,000 gallons per day] or greater) to be registered with the Michigan Department of Environmental Quality (MDEQ). A water withdrawal assessment tool was created to facilitate estimation of the ecological effects of proposed withdrawals (Hamilton and Seelbach 2011). If a proposed withdrawal is predicted to have adverse effects on the fish community, the applicant is directed to pursue alternative options (e.g., digging a deeper well, finding a different location for a well, or acquiring water from other farmers within the sub-watershed that are not using all of their permitted withdrawal capacity). One factor that influences withdrawal allotments is the thermal classification of the stream. Pipestone Creek is divided into two sections at a point approximately halfway between the Park Road and Dohm Road crossings (Figure 1). Upstream of this divide, the creek is classified as a warm stream. The lower section of the creek is classified as a cool stream. Cool streams have mean July water temperatures between 67.1 ^{o}F and 69.8 ^{o}F. The fish community in the lower section of Pipestone Creek consists of a mixture of coldwater, transitional, and warmwater species, which is typical of a cool stream (Lyons et al. 2009). The percentage of the total fish biomass composed of coldwater species was higher in Pipestone Creek than is expected of a cool stream. However, most of the biomass consisted of adult steelhead which only spend part of their life cycle in the creek. Based on the water temperature data from 1998 and the fish community data from 2013, it appears that the existing thermal classification for the lower half of Pipestone Creek is correct.

The 2013 length-at-age data indicate that brown trout in Pipestone Creek grow at an average rate during their first year of life and that growth accelerates beginning at age 1. The observed growth pattern likely is due to a dietary shift. Stauffer (1977) observed that small brown trout (mean total length = 4.56 inches) in the Au Sable River system primarily consumed small invertebrates such as mayflies and sow bugs, whereas larger brown trout (mean total length = 8.81 inches) consumed fish, crayfish, and dragonfly larvae. Macroinvertebrate surveys for quantitatively assessing prey availability were not conducted on Pipestone Creek. Qualitative observations suggested that crayfish abundance was high at Dohm Road and moderate at Hillandale Road.

Under the existing Type 1 trout stream regulations, no fishing is allowed on Pipestone Creek during October 1 through the Friday before the last Saturday in April. Reclassifying the creek as a Type 4 stream would eliminate the closed season and would allow anglers to target steelhead and salmon. This option was rejected for two reasons. (1) Due to the small size of Pipestone Creek, it would be difficult for anglers to successfully land any steelhead or salmon that they hooked. (2) This change would increase the minimum size limit for brown trout from 8 inches to 10 inches. Based on the 2013 length-frequency data, it appears that this change would result in a 42% reduction in the number of brown trout available for harvest (Figure 2).

Management Recommendations

Four fisheries management goals have been developed for Pipestone Creek. Goal 1: Protect existing fish habitat. Goal 2: Reduce human-induced fluctuations in stream discharge. Goal 3: Reduce erosion and sedimentation. Goal 4: Maintain or enhance the existing trout fishery in Pipestone Creek.

At least two different methods will be used to accomplish Goal 1. Fisheries Division personnel will continue to review MDEQ permit applications for potential effects on aquatic resources. If a proposed project is likely to degrade the aquatic habitat, Fisheries Division staff will object to the proposal and

suggest feasible alternatives. Fisheries Division also will report any observed water withdrawals to MDEQ to ensure that these withdrawals are registered as required under Part 327 of Public Act 451.

One approach for reducing fluctuations in stream discharge is to slow the movement of runoff into the river through restoration of wetlands. The Friends of the St. Joe River (Friends) received funding from the United States Environmental Protection Agency to conduct a functional assessment of all historic and existing wetlands within the St. Joseph River watershed, and the assessment is nearly completed. The Friends and partner organizations have used this tool to identify high quality wetlands for protection (e.g., conservation easements) and potential sites for wetland restoration. This information is being relayed to local units of government so that they can incorporate wetland conservation and restoration planning into their zoning and ordinances. The wetlands tool also has been used to identify and invite landowners to wetland protection and restoration workshops. Fisheries Division personnel have participated in the steering committee meetings and will continue to assist with this project as opportunities arise. Wetlands function as natural filters that trap sediment and nutrients from runoff, so restoration of wetlands also would facilitate progress toward accomplishing Goal 3.

Two other tactics would decrease erosion and sedimentation in Pipestone Creek, and both of these tactics require collaboration with outside partners. Traditionally, dredging of designated drains has created trapezoidal channels with steep side slopes and no floodplain. Converting existing trapezoidal channels into two-stage ditches with bankfull flats would reduce the potential for erosion by decreasing current velocities during high flows. The Berrien County Drain Commission has created two-stage ditches on portions of the Galien River system. Fisheries Division will work with the Drain Commissioner to identify similar opportunities in the Pipestone Creek watershed. Installation and maintenance of vegetated buffer strips along the main stem and tributary streams also would reduce sedimentation. As nearly all of the land within the watershed is privately owned, this option will require collaboration with riparian landowners. Fisheries Division will work with MDEQ, the Michigan Department of Agriculture and Rural Development, the Friends, and other organizations to inform riparian landowners of the ecological importance of vegetated buffer strips and economic incentives for installing buffer strips.

The measures outlined for Goals 1-3 will assist with attainment of Goal 4 by improving habitat for brown trout. Stocking does not appear to be necessary to maintain this fishery. The existing Type 1 regulations will be retained as they protect brown trout during the spawning season while affording anglers a reasonable chance of catching a legal-sized fish during the possession season.

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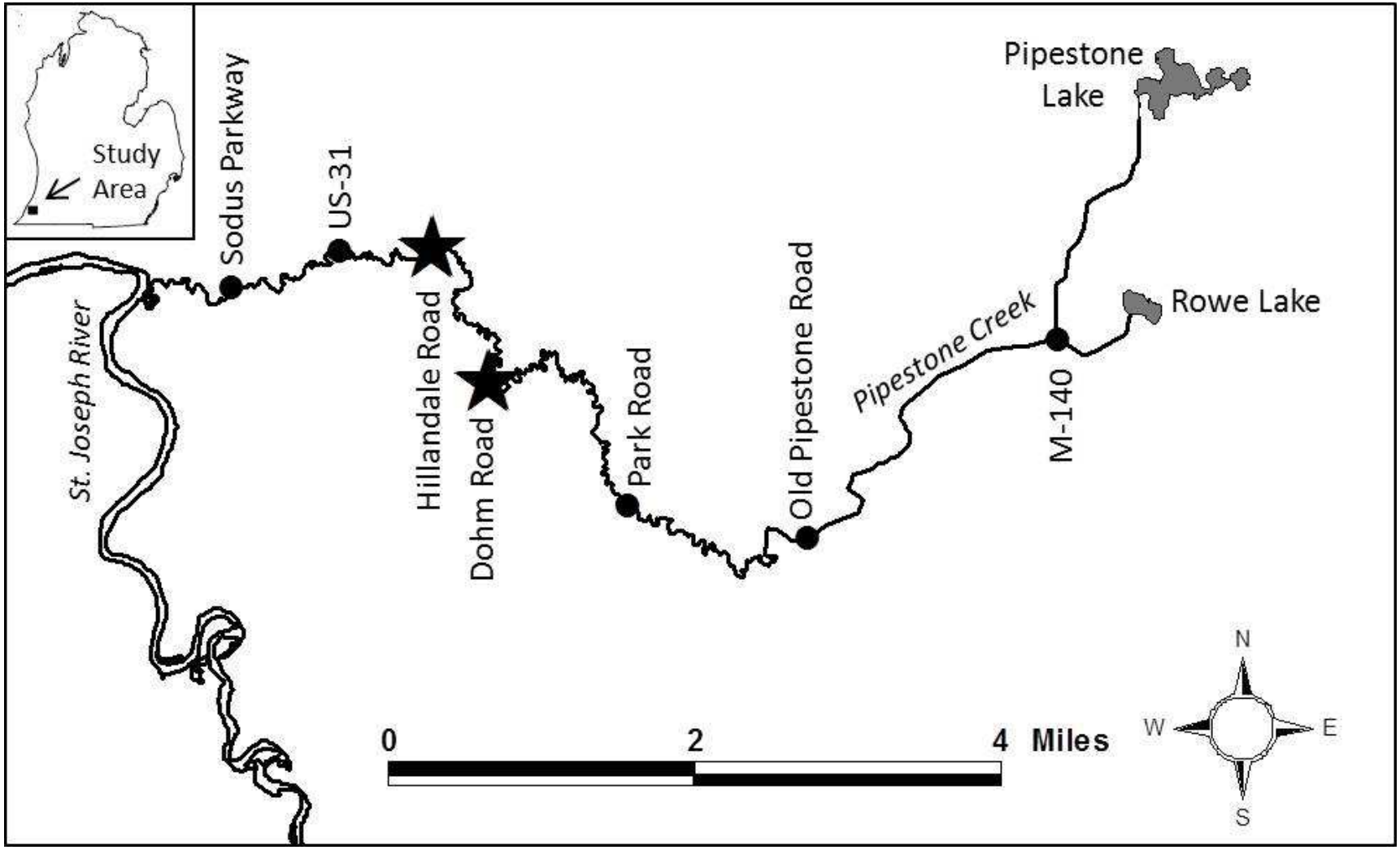

Figure 1.–Select road crossings (circles) and 2013 electrofishing stations (stars) on Pipestone Creek, Berrien County.

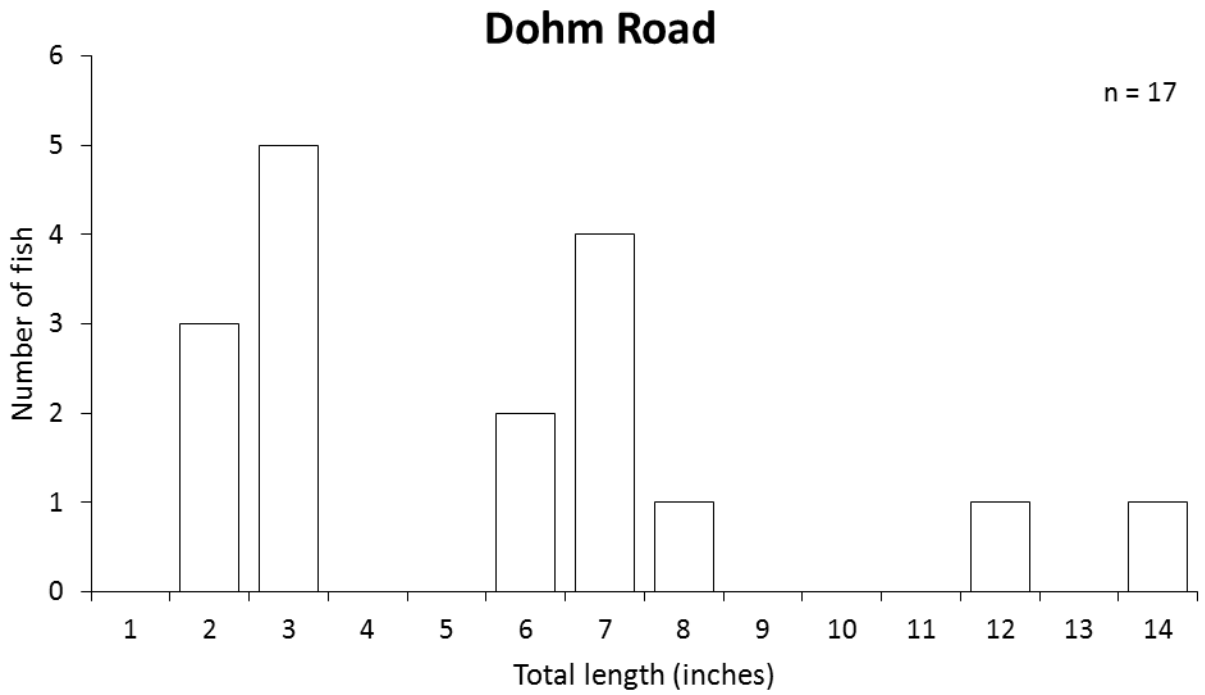

Figure 2.–Length frequency distributions for brown trout captured at the Dohm Road and Hillandale Road sampling stations on Pipestone Creek on August 7, 2013.

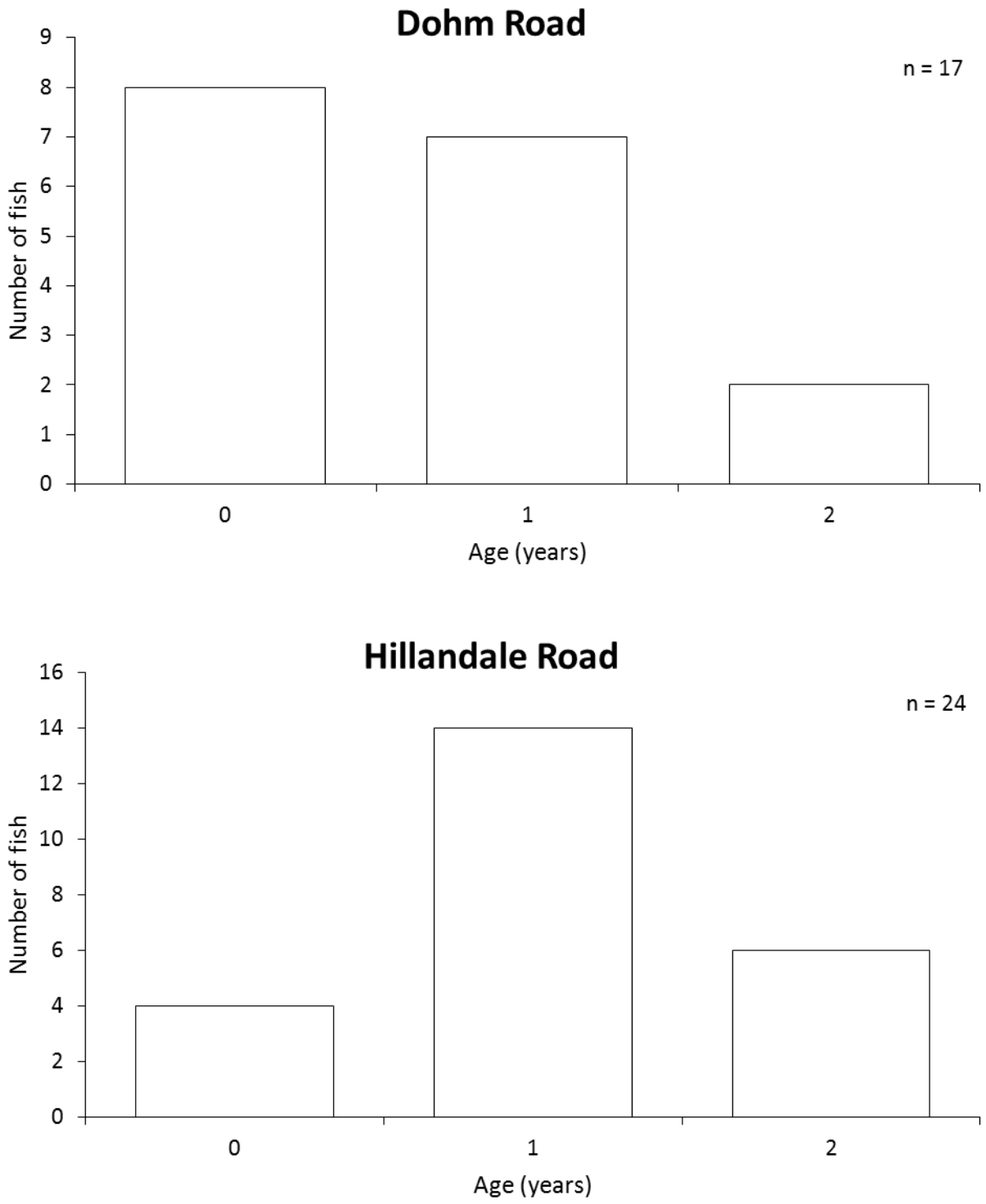

Figure 3.–Age frequency distributions for brown trout captured at the Dohm Road and Hillandale Road sampling stations on Pipestone Creek on August 7, 2013.

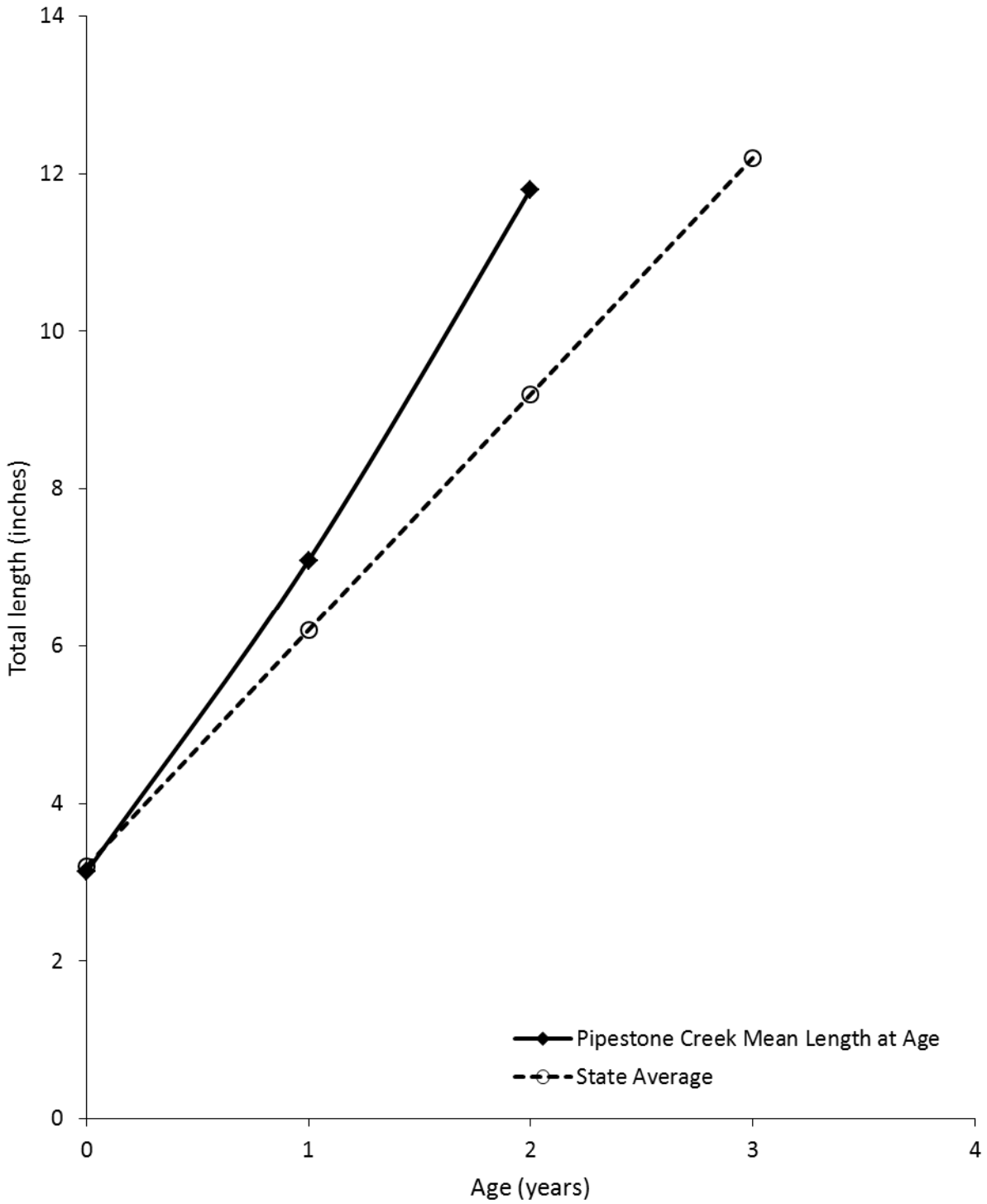

Figure 4.–Growth of brown trout in Pipestone Creek, as determined from scale samples collected at the Dohm Road and Hillandale Road sampling stations on August 7, 2013. State average lengths for August-September are from Schneider et al. (2000a).

Table 1.–Fish stocking in Pipestone Creek, 1933-2009.

Year	Species	Strain	Life stage	Number of fish	Average length (inches)
1933	Brown trout		Fall fingerling	1,750	---
	Rainbow trout		Fall fingerling	750	---
1934	Brown trout		Yearling	1,000	---
	Rainbow trout		Fall fingerling	1,000	---
1935	Brown trout		Fall fingerling	3,000	---
1936	Brown trout		Spring fingerling	25,000	---
			Fall fingerling	2,000	---
	Rainbow trout		Fall fingerling	1,500	---
1937	Brown trout		Fall fingerling	2,000	---
	Rainbow trout		Fall fingerling	500	---
1938	Brown trout		Fall fingerling	2,500	---
1939	Brown trout		Fall fingerling	1,000	---
			Yearling	200	---
	Rainbow trout		Fall fingerling	1,000	---
			Yearling	50	---
1941	Brook trout		Spring fingerling	2,000	---
	Brown trout		Spring fingerling	10,000	---
			Yearling	1,000	---
	Rainbow trout		Fall fingerling	3,000	---
			Yearling	3,000	---
1942	Rainbow trout		Adult	500	---
1943	Rainbow trout		Adult	275	---
1944	Brook trout		Fall fingerling	5,000	2.50
	Brown trout		Yearling	100	7.00
	Rainbow trout		Yearling	100	10.00
1945	Brook trout		Adult	50	13.00
			Spring fingerling*	3,000	1.00
	Brown trout		Yearling	100	8.00
			Yearling*	400	9.00
	Rainbow trout		Yearling	700	8.00
1946	Brown trout		Yearling	1,000	8.00
	Rainbow trout		Yearling	550	8.00
1947	Brown trout		Yearling	1,150	8.52
	Rainbow trout		Yearling	750	8.53
1948	Brown trout		Yearling	500	8.00
	Rainbow trout		Yearling	750	8.00
1949	Brown trout		Yearling	200	8.00
	Rainbow trout		Yearling	500	8.40

Table 1.–Continued.

Year	Species	Strain	Life stage	Number of fish	Average length (inches)
1950	Brown trout		Yearling	200	7.50
	Rainbow trout		Yearling	400	7.25
1951	Brown trout		Yearling	700	7.57
	Rainbow trout		Yearling	600	7.50
1952	Brown trout		Yearling	100	8.00
	Rainbow trout		Yearling	700	8.00
1953	Rainbow trout		Yearling	700	8.43
1954	Rainbow trout		Yearling	725	8.28
1966	Rainbow trout		Yearling	2,828	---
1977	Brown trout		Yearling	18,000	---
1978	Brown trout		Yearling	8,000	---
1979	Brown trout		Yearling	6,800	6.28
1980	Brown trout		Yearling	2,700	5.96
			Spring fingerling	6,000	2.96
1981	Brown trout	*Harrietta*	Yearling	4,400	4.40
1982	Brown trout	*Harrietta*	Yearling	8,500	5.16
1983	Brown trout	*Harrietta*	Yearling	8,800	6.27
	Rainbow trout	*Michigan*	Fall fingerling	30,000	2.80
1984	Brown trout	*Harrietta*	Yearling	9,000	6.78
1985	Brown trout	*Harrietta*	Yearling	6,280	5.96
		Plymouth Rock	Yearling	1,220	5.44
1986	Brown trout		Yearling	6,540	6.48
		Soda Lake	Yearling	1,200	5.60
1987	Brown trout		Yearling	8,040	5.72
1988	Brown trout	*Plymouth Rock*	Yearling	9,420	5.37
1989	Brown trout	*Soda Lake*	Yearling	9,000	5.87
1990	Brown trout	*Soda Lake*	Yearling	8,996	5.32
1991	Brown trout	*Plymouth Rock*	Yearling	9,717	6.05
1992	Brown trout	*Plymouth Rock*	Yearling	8,896	6.08
1993	Brown trout	*Plymouth Rock*	Yearling	8,960	6.16
1994	Brown trout	*Saint Croix*	Yearling	9,480	6.60
1995	Brown trout	*Wild Rose*	Yearling	8,520	6.16
1996	Brown trout	*Wild Rose*	Yearling	9,022	5.52
1997	Brown trout	*Wild Rose*	Yearling	9,956	5.84
1998	Brown trout	*Seeforellen*	Yearling	6,840	5.16
1999	Brown trout	*Seeforellen*	Yearling	7,000	5.92
2000	Brown trout	*Seeforellen*	Yearling	8,120	5.04
2001	Brown trout	*Seeforellen*	Yearling	7,160	5.28

Table 1.–Continued.

Year	Species	Strain	Life stage	Number of fish	Average length (inches)
2002	Brown trout	*Gilchrist Creek*	Yearling	7,080	4.92
2003	Brown trout	*Gilchrist Creek*	Yearling	7,000	5.14
2004	Brown trout	*Gilchrist Creek*	Yearling	7,800	5.09
2005	Brown trout	*Seeforellen*	Yearling	7,000	5.85
2006	Brown trout	*Seeforellen*	Yearling	7,800	5.50
2007	Brown trout	*Seeforellen*	Yearling	6,400	5.50
2008	Brown trout	*Gilchrist Creek*	Yearling	7,000	4.16
2009	Brown trout	*Seeforellen*	Yearling	8,200	5.68

* Fish stocked in tributary to Pipestone Creek

Table 2.–Numbers, calculated weights, total lengths, and thermal classifications for fish species collected at the Dohm Road electrofishing station on Pipestone Creek on August 7, 2013. Thermal classifications from Lyons et al. (2009).

Species	Number	Percent by number	Weight (lb)	Percent by weight	Total length range (inches)	Thermal classification
Creek chub	161	34.6	2.4	1.5	1-8	Transitional
White sucker	63	13.5	10.5	6.6	1-15	Transitional
Johnny darter	54	11.6	0.2	0.1	1-2	Transitional
Rainbow trout	45	9.7	141.1	88.2	1-29	Coldwater
Spotfin shiner	28	6.0	0.2	0.1	2-3	Warmwater
Common shiner	26	5.6	0.5	0.3	2-5	Warmwater
Rainbow darter	20	4.3	0.1	0.1	1-2	Warmwater
Brown trout	17	3.7	2.9	1.8	2-14	Coldwater
Blacknose dace	17	3.7	0.2	0.1	1-3	Transitional
Hornyhead chub	13	2.8	0.3	0.2	1-5	Warmwater
Northern hog sucker	5	1.1	0.4	0.3	1-9	Transitional
Coho salmon	4	0.9	0.0	0.0	3-3	Coldwater
Golden redhorse	3	0.6	0.3	0.2	3-7	Warmwater
Largemouth bass	3	0.6	0.0	0.0	2-2	Warmwater
Stonecat	2	0.4	0.1	0.1	4-6	Warmwater
Green sunfish	2	0.4	0.1	0.0	2-4	Warmwater
Smallmouth bass	1	0.2	0.6	0.4	10	Warmwater
Blackside darter	1	0.2	0.0	0.0	3	Warmwater
Total	465		159.9			

Table 3.–Numbers, calculated weights, total lengths, and thermal classifications for fish species collected at the Hillandale Road electrofishing station on Pipestone Creek on August 7, 2013. Thermal classifications from Lyons et al. (2009).

Species	Number	Percent by number	Weight (lb)	Percent by weight	Total length range (inches)	Thermal classification
White sucker	51	21.2	10.6	14.6	1-15	Transitional
Creek chub	48	19.9	1.2	1.6	1-8	Transitional
Johnny darter	37	15.4	0.2	0.2	1-2	Transitional
Brown trout	24	10.0	5.1	7.1	2-13	Coldwater
Golden redhorse	17	7.1	2.8	3.9	3-14	Warmwater
Spotfin shiner	14	5.8	0.1	0.1	2-2	Warmwater
Rainbow darter	13	5.4	0.0	0.1	1-2	Warmwater
Rainbow trout	10	4.1	49.6	68.8	2-31	Coldwater
Round goby	7	2.9	0.0	0.0	1-3	Warmwater*
Bluntnose minnow	6	2.5	0.1	0.1	2-3	Warmwater
Smallmouth bass	4	1.7	0.9	1.2	4-10	Warmwater
Green sunfish	4	1.7	0.3	0.5	2-6	Warmwater
Largemouth bass	2	0.8	0.0	0.0	2-3	Warmwater
Northern hog sucker	1	0.4	1.3	1.8	14	Transitional
Stonecat	1	0.4	0.0	0.0	3	Warmwater
Warmouth	1	0.4	0.0	0.0	2	Warmwater
Central mudminnow	1	0.4	0.0	0.0	1	Transitional
Total	241		72.0			

* Species not listed in Lyons et al. (2009). Temperature classification based on data from Lee and Johnson (2005).