Fisher Creek 2013 Survey Report

Prepared by Brian Gunderman

Introduction

Fisher Creek begins near the southeast corner of Branch County and flows 10 miles northwesterly to its confluence with Marble Lake (Figure 1). The Fisher Creek watershed encompasses 15.6 miles^2 in Branch and Hillsdale counties. The topography within the watershed is flat to gently rolling and the average stream gradient is 8.8 ft/mile. The surficial geology within the basin is diverse. Medium-textured glacial till and end moraines of medium-textured till flank the headwaters of the creek. Soil types in this area consist of silty loams of the Blount-Glynwood-Morley series. Darcy groundwater maps indicate low potential for groundwater inputs to the headwaters. Downstream of Lester Road, the creek flows through deposits of glacial outwash sand and gravel covered by fine loams of the Barry-Locke-Hatmaker series. Relative to the headwaters, groundwater inputs appear to be slightly higher in this section of the stream.

The entire length of Fisher Creek is a designated drain (locally known as the Pridgeon & Warner Drain). Several miles of the creek and tributary streams have been affected by dredging and channelization. Agriculture is the predominant land use in the watershed, and many wetlands have been tiled and drained to facilitate agricultural production. These human activities have substantially altered stream morphology, sediment inputs, groundwater delivery and flow patterns, and the abundance of coarse woody habitat in the creek. At the request of riparian landowners on Fisher Creek and Marble Lake, the Branch County Drain Commission dug a sediment trap in the creek upstream of Ray Quincy Road in 1988. This trap has been emptied once and is scheduled to be dredged again in 2015.

The Surface Water Quality Division (SWQD) of Michigan Department of Natural Resources (MDNR) conducted the first biological survey on Fisher Creek in 1990 (Oemke 1991). Electrofishing was completed at Fisher Road and Wolf Road. Ten fish species were captured at Fisher Road, including one Northern Pike and one Yellow Perch. The most abundant species in the catch were Creek Chub, Johnny Darter, and Central Stoneroller. Only four fish species (Longnose Dace, White Sucker, Creek Chub, and Largemouth Bass) were collected at Wolf Road. Macroinvertebrate communities were rated as fair at both stations. Habitat was rated as marginal at Fisher Road and poor at Wolf Road. Thick deposits of silt were documented from Wolf Road downstream to the sediment trap. Gravel substrates were common at Fisher Road.

Sampling was completed immediately downstream of the sediment trap at Ray Quincy Road in 1994 and 2005. The 1994 survey was conducted by SWQD (Kosek 1994) and the 2005 survey was conducted by the Michigan Department of Environmental Quality (MDEQ; Walterhouse 2007). Twelve fish species were captured in 1994 and 11 species were collected in 2005. The only game fish captured during these surveys were small Green Sunfish, Largemouth Bass, and Yellow Perch. Blacknose Dace, Creek Chub, and White Sucker were the most abundant species in 1994, whereas Creek Chubs, Central Stonerollers, and Hornyhead Chubs made up 94% of the catch in 2005. The fish community rating declined from acceptable in 1994 to poor in 2005. The change in rating may have been due to random sampling variation, as the macroinvertebrate community (rating = acceptable) and habitat (rating = marginal) were similar in both years. Habitat was impaired due to channelization and lack of sufficient vegetated buffer strips along the stream. *Cladophora* (attached algae) was abundant in the sediment trap in 1994, which is indicative of high nutrient inputs.

In 2010, MDEQ evaluated the macroinvertebrate community and aquatic habitat near the Bennett Road crossing (Walterhouse 2011). The macroinverbrate community rating was excellent and the habitat rating was good. Compared to previous surveys at Ray Quincy Road, the Bennett Road station had higher scores for bank stability, riparian vegetation, substrate, and instream cover.

Materials and Methods

A stream shocker (250 V DC, 6 A, two probes) was used to capture fish in Fisher Creek on August 1, 2013 as part of MDNR's Status and Trends Program. This program involves standardized sampling on randomly selected streams to provide information on spatial and temporal trends in Michigan fish communities. The sampling station began 150 ft downstream of the Central Road culvert and extended upstream for a distance of 1,300 ft (Figure 2). A single electrofishing run was completed while moving in an upstream direction. Total length was recorded for all fish captured. Weights for all fish species were calculated using the length-weight regression coefficients compiled by Schneider et al. (2000). Fish habitat and riparian bank conditions within the sampling station were assessed using the methods outlined by Wills et al. (2006). An Onset Hobo Temp Pro v2 temperature logger was deployed approximately 400 ft upstream of the Ray Quincy Road crossing on January 24, 2013. The logger was programmed to record water temperatures every hour and was retrieved on November 13, 2013.

Results

Nineteen fish species were collected in Fisher Creek during the 2013 survey (Table 1). Creek Chub (n = 1,036) and Central Stoneroller (n = 853) were the most abundant species in the catch. The sample included four panfish species: Bluegill (n = 46), Yellow Perch (n = 28), Green Sunfish (n = 2), and Pumpkinseed (n = 1). No panfish larger than 5 inches were captured. Largemouth Bass also were present. Young-of-year individuals made up 86% of the Largemouth Bass catch and the maximum observed length for bass was only 9 inches (Figure 3). No coldwater fish species were collected. Transitional and warmwater species made up 46% and 54% of the total fish biomass, respectively. None of the fish species captured during the survey currently are classified as endangered, threatened, or of special concern in Michigan.

At the time of sampling, the mean stream width was 14 ft, the mean depth was 0.7 ft, and the discharge was 3.1 cfs. The most common riparian vegetation type was small deciduous trees (46%), followed by pasture (19%), large deciduous trees (15%), and grassland (12%). Bank stability was rated as fair (25-50% bare soil) at 54% of the measurement locations and poor (50-75% bare soil) at the remaining locations. Gravel (37%) was the most abundant substrate type (Figure 4), but loose (i.e., not embedded) gravel only covered 8% of the survey area. Sand (8%) and silt (5%) deposits were limited. Coarse woody habitat was rare and consisted of five logs (total = 54 linear ft) and five brush deposits (total =162 ft^2). The mean July water temperature was 71.7 ^oF and the average weekly temperature range during July was 13.3 ^oF. The mean water temperature during the hottest week (July 15-21) was 78.4 ^oF.

Analysis and Discussion

The species composition of the catch was similar in 2005 and 2013. Creek Chubs, Central Stonerollers, and Hornyhead Chubs continue to be the dominant fish species in this portion of Fisher Creek. The length

of the electrofishing station was greater in 2013 than in 2005. Thus, more microhabitats were sampled and the total number of species represented in the catch was higher in 2013.

Irrigation often is used to enhance agricultural production in Branch County. 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 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. Fisher Creek is classified as a warm stream. Warm streams have mean July water temperatures greater than 69.8 ^{o}F and fish communities consisting of warmwater and transitional fish species. Coldwater species (e.g., trout and sculpins) are absent or rare in warm streams (Zorn et al. 2008). No coldwater fish species have been captured during electrofishing surveys on Fisher Creek and the mean July water temperature in 2013 was greater than 69.8 ^{o}F. It is highly unlikely that any coldwater fish species could survive in Fisher Creek. For example, the incipient lethal temperature for Brown Trout is 76.5 ^{o}F (Elliott 1981; Elliott 2000). This is the maximum temperature Brown Trout can tolerate for a 7 day period. During July 15-21, 2013, the mean water temperature in Fisher Creek exceeded this threshold by nearly 2 ^{o}F. Thus, it appears that the existing thermal classification for Fisher Creek is correct.

Fishing activity on this stream appears to be minimal due to the scarcity of game species and the lack of public land adjacent to the stream. Some Northern Pike and suckers from Marble Lake move into Fisher Creek to spawn in the spring. Adult Northern Pike presumably drop back into the lake before the legal possession season for this species begins, but the sucker run creates fishing, bowfishing, and spearing options for anglers who own land along the creek or are granted access by riparian landowners.

The channel morphology within the 2013 sampling station was strongly influenced by past dredging and drain maintenance activities. The channel was incised and the banks were steep and eroding. Past removal of log jams and conversion of much of the surrounding land into agricultural fields has led to shortage of coarse woody habitat in the creek.

The paucity of sand and silt within the station suggests that the sediment trap has been efficient in removing these materials. However, the pre-treatment data necessary to facilitate a quantitative evaluation of the effects of the sediment trap are not available. The efficiency of a trap at removing sediment is determined by the length and depth of the trap, stream discharge, water temperature, and the size of the sediment particles (Hansen 1973). Zorn and Wills (2012) examined sediment traps on 65 stream reaches in Michigan and determined that most traps had no significant effects on substrate, thalweg depth, or bank stability in downstream reaches. They hypothesized that most traps were too short or were emptied too infrequently to efficiently capture sand or silt. The sediment trap in Fisher Creek was installed to treat a symptom (i.e., sedimentation of the lower reaches of Fisher Creek and Marble Lake) but does not address the underlying problem of bank erosion and sediment-laden runoff in upstream reaches. The best long-term solution for Fisher Creek and Marble Lake is to implement best management practices for reducing sediment inputs to the creek.

Management Recommendations

Habitat conditions within Fisher Creek are affecting the fish community in the stream and in Marble Lake. With this situation in mind, three fisheries management goals were developed for Fisher Creek. (1) Reduce erosion and sedimentation. (2) Reduce human-induced fluctuations in stream discharge. (3) Increase abundance of fish cover in the creek.

The Michigan Department of Agriculture and Rural Development (MDARD) recently received a federal grant to implement best management practices on agricultural lands in the St. Joseph River watershed. Fisheries Division will work with MDARD, other partner organizations, and riparian landowners to reduce erosion and sedimentation through the use of vegetated buffer strips, wetland restoration, livestock exclusion fencing, conservation tillage, and cover crops. As part of this project, MDARD and MDEQ also are hoping to reduce water withdrawals from streams and groundwater sources via installation of new technologies to optimize irrigation. Fisheries Division staff will assist with this effort by reporting any observed water withdrawals to ensure that these withdrawals are registered as required under Part 327 of Public Act 451.

The Branch County Drain Commissioner has expressed interest in reconnecting portions of Fisher Creek with its historic floodplain. Reconnecting the stream with its floodplain would result in increased flood storage capacity and decreased flow fluctuations in downstream reaches. As streams with more stable flow regimes tend to have greater bank stability, these efforts also would reduce erosion and sedimentation. Fisheries Division personnel will work with the Drain Commissioner, MDARD, MDEQ, and private landowners to identify suitable locations for reconnecting the creek with its floodplain.

Log jams historically were cleared from portions of Fisher Creek to facilitate rapid downstream movement of water. The removal of logs directly affects fish by reducing habitat complexity and abundance of holding cover and affects fish indirectly by reducing abundance of macroinvertebrates. Fisheries Division will work with the Branch County Drain Commissioner to develop options for retaining fish cover while meeting the needs of adjacent landowners.

References

Elliott, J. M. 1981. Some aspects of thermal stress on freshwater teleosts. Pages 209-245 *in* Pickering, A. D. (editor). 1981. Stress and fish. Academic Press, London, UK.

Elliott, J. M. 2000. Pools as refugia for brown trout during two summer droughts: trout responses to thermal and oxygen stress. Journal of Fish Biology 56:938-948.

Hamilton, D. A., and P. W. Seelbach. 2011. Michigan's water withdrawal assessment process and internet screening tool. Michigan Department of Natural Resources, Fisheries Special Report 55, Lansing.

Hansen, E. A. 1973. In-channel sedimentation basins – a possible tool for trout habitat management. Progressive Fish Culturist 35:138-142.

Kosek, S. 1994. A biological survey of Fisher and Tallahassee creeks, Branch County, August 3, 1994. Michigan Department of Natural Resources, Surface Water Quality Division Report 94/090, Lansing.

Lyons, J., T. Zorn, J. Stewart, P. Seelbach, K. Wehrly, and L. Wang. 2009. Defining and characterizing coolwater streams and their fish assemblages in Michigan and Wisconsin, USA. North American Journal of Fisheries Management 29:1130-1151.

Oemke, M. P. 1991. A biological survey of Fisher and Tallahassee creeks, Branch County, September 22, 1990. Michigan Department of Natural Resources, Surface Water Quality Division Report 91/093, Lansing.

Schneider, J. C., P. W. Laarman, and H. Gowing. 2000. Length-weight relationships. Chapter 17 *in* Schneider, J. C. (editor). 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Walterhouse, M. 2007. A biological survey of sites in the upper St. Joseph River watershed: Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph counties, Michigan, August and September 2005. Michigan Department of Environmental Quality, Water Bureau, Staff Report 07/048, Lansing.

Walterhouse, M. 2011. A biological survey of sites in the upper St. Joseph River watershed: Branch, Calhoun, Cass, Hillsdale, Kalamazoo, and St. Joseph counties, Michigan, August and September 2010. Michigan Department of Environmental Quality, Water Resources Division, Staff Report 11/033, Lansing.

Wills, T. C., T. G. Zorn, and A. J. Nuhfer. 2005. Stream Status and Trends Program sampling protocols. Chapter 26 *in* Schneider, J. C. (editor). 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Zorn, T. G., P. W. Seelbach, E. S. Rutherford, T. C. Wills, S.-T. Cheng, and M. J. Wiley. 2008. A regional-scale habitat suitability model to assess the effects of flow reduction on fish assemblages in Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report 2089, Ann Arbor.

Zorn, T. G., and T. C. Wills. 2012. A reconnaissance survey of the effects of sediment traps on Michigan streams. North American Journal of Fisheries Management 32:1005-1016.

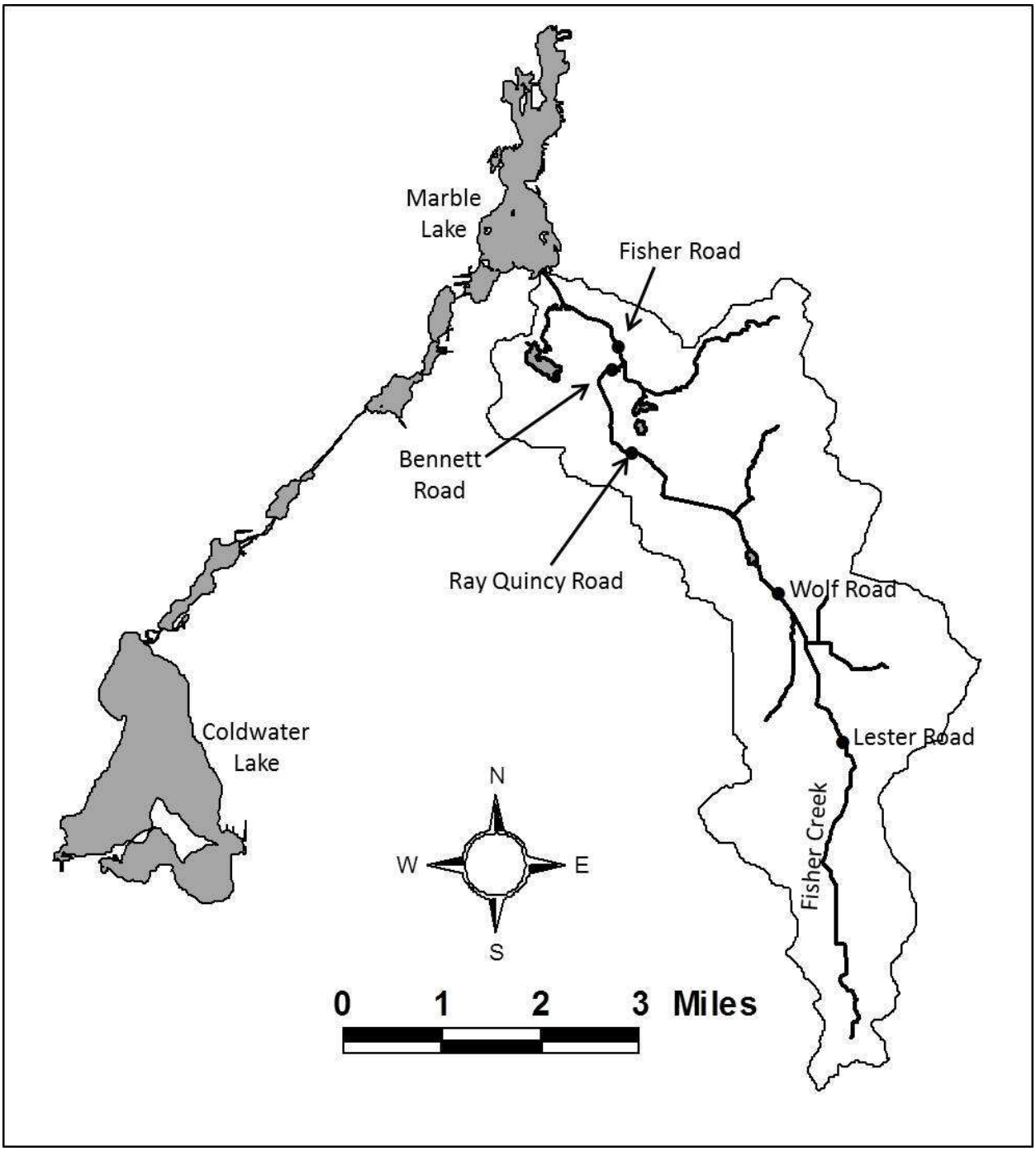

Figure 1.–Select road crossings (circles) in the Fisher Creek watershed, Branch County.

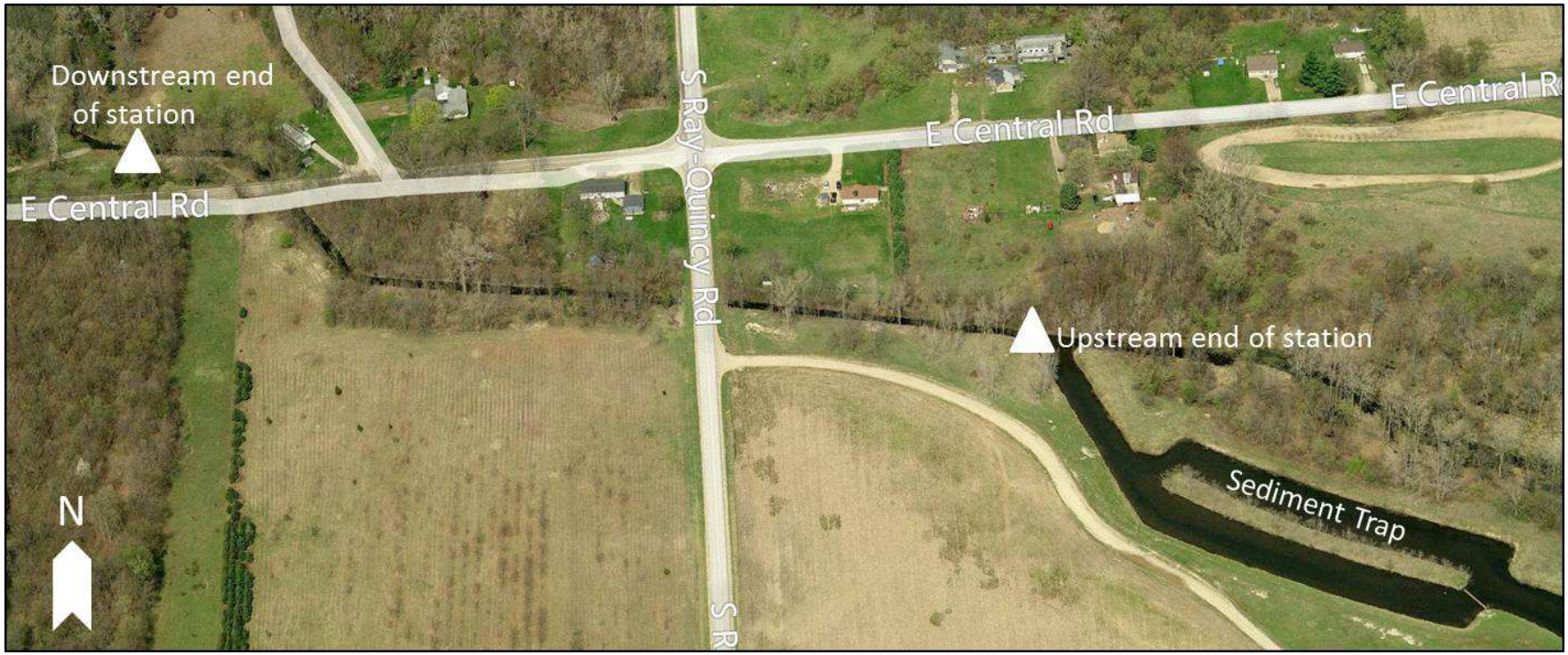

Figure 2.–Upstream and downstream limits of the electrofishing station on Fisher Creek, August 1, 2013. Image from www.bing.com/maps.

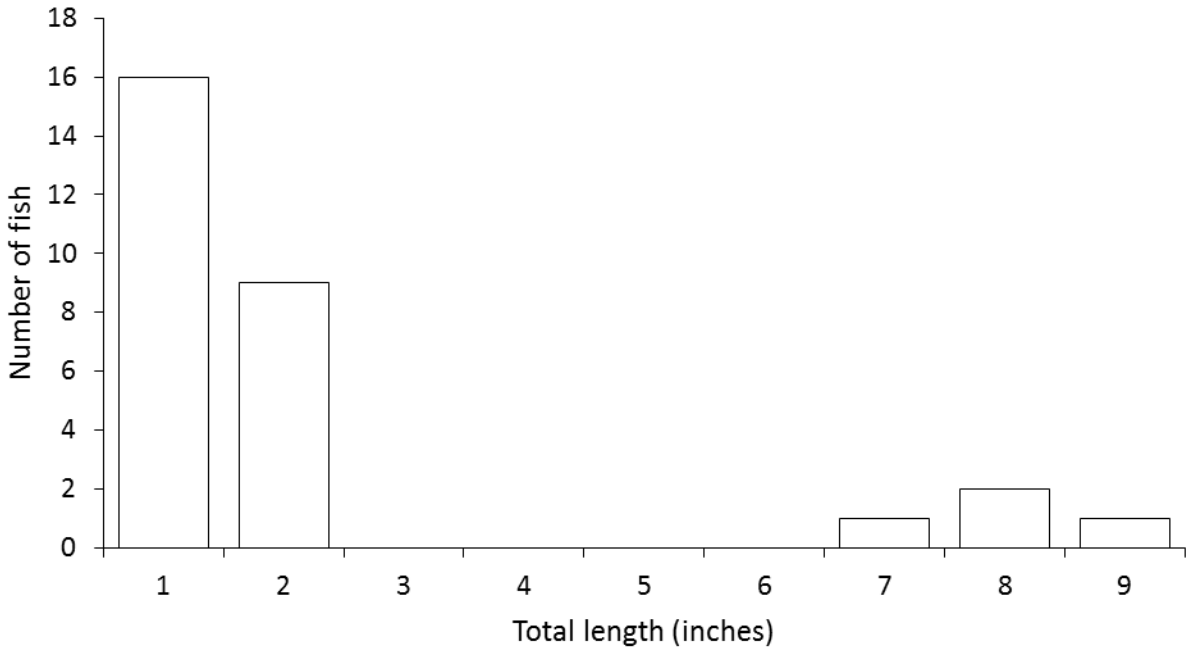

Figure 3.–Length frequency distribution for Largemouth Bass captured at the Ray Quincy Road electrofishing station on Fisher Creek on August 1, 2013.

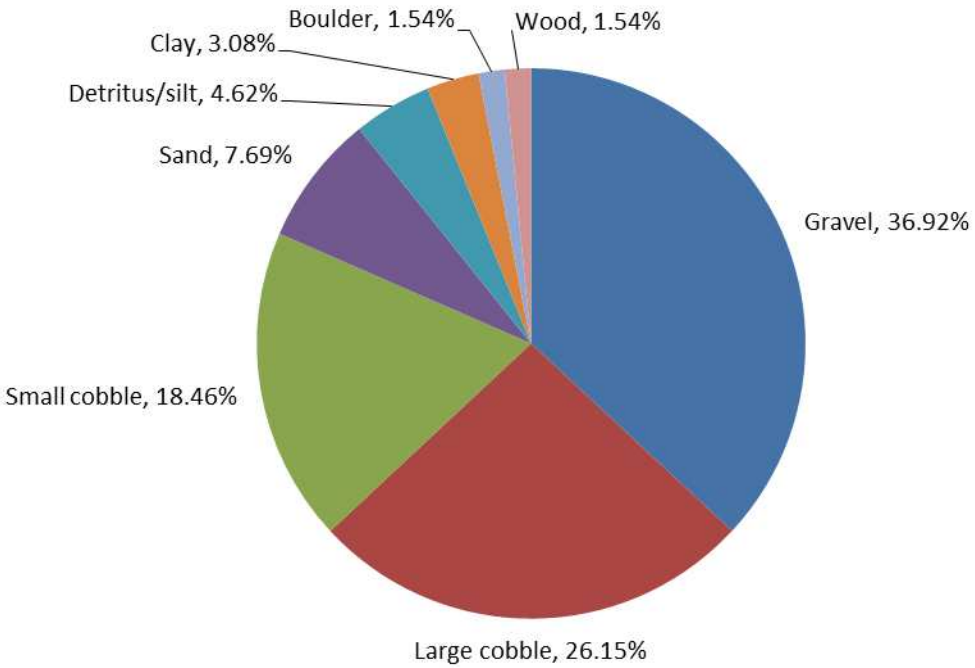

Figure 4.–Substrate types at the Ray Quincy Road sampling station on Fisher Creek, August 1, 2013.

Table 1.–Numbers, calculated weights, total lengths, and thermal classifications for fish species collected in Fisher Creek near Ray Quincy Road on August 1, 2013. Thermal classifications are from Lyons et al. (2009).

Species	Number	Percent by number	Weight (lb)	Percent by weight	Total length range (inches)	Thermal classification
Creek Chub	1,036	36.6	17.3	21.2	1-11	Transitional
Central Stoneroller	853	30.1	18.5	22.8	1-5	Warmwater
Hornyhead Chub	365	12.9	15.1	18.6	2-6	Warmwater
White Sucker	197	7.0	19.0	23.4	1-10	Transitional
Johnny Darter	101	3.6	0.2	0.2	1-2	Transitional
Logperch	83	2.9	1.9	2.3	3-4	Warmwater
Striped Shiner	48	1.7	2.5	3.1	2-8	Warmwater*
Bluegill	46	1.6	0.9	1.1	1-4	Warmwater
Largemouth Bass	29	1.0	1.3	1.6	1-9	Warmwater
Yellow Perch	28	1.0	0.7	0.8	2-5	Transitional
Yellow Bullhead	25	0.9	3.4	4.1	3-8	Warmwater
Grass Pickerel	7	0.2	0.1	0.1	3-4	Warmwater
Common Carp	5	0.2	0.4	0.5	4-5	Warmwater
Green Sunfish	2	0.1	0.1	0.1	3-4	Warmwater
Bluntnose Minnow	1	0.0	0.0	0.0	2	Warmwater
Blacknose Shiner	1	0.0	0.0	0.0	2	Transitional
Greenside Darter	1	0.0	0.0	0.0	2	Warmwater
Central Mudminnow	1	0.0	0.0	0.0	2	Transitional
Pumpkinseed	1	0.0	0.0	0.0	2	Warmwater
Total	2,830		81.3			

* Species not listed in Lyons et al. (2009). Temperature classification inferred from the geographic distribution of the species.