Cedar Creek

Barry County
Thornapple River watershed, last surveyed 2021

Addie Dutton, Fisheries Management Biologist

Environment

Cedar Creek is a major tributary to the Thornapple River in Barry County, Michigan. Cedar Creek drains a watershed of 29,623 acres that originates at the outlet of Wall Lake. The watershed is dominated by agricultural lands which are predominantly row crops or hay fields (42.1%) and some range lands (9.9%; BCD 2016). Forested areas (30.8%), wetlands (10.0%), small areas of impervious surfaces (3.5%), urban areas (3.4%), and open water (3.8%) comprise the remainder of the watershed. There is little development or industrial use and the largest residential development is around the shoreline of Wall Lake. The riparian corridor of Cedar Creek is somewhat protected from development due to the high density of wetlands and lowland areas which are typically unsuitable for building (BCD 2016). Conservation easements exist for the Southwest Michigan Land Conservancy and on property owned by the Pierce Cedar Creek Institute for Environmental Studies.

The Cedar Creek watershed is of high quality and home to a number of state species of special concern, state threatened, and state endangered species. The Michigan Natural Features Inventory lists one amphibian species, three reptile species, two bird species, one mammal species, five mussel species, and five plant species within the Cedar Creek watershed. With over 50% of the watershed dedicated to agricultural practices, impairments are typically associated with erosion, poor road-stream crossings, lack of buffers, spills, runoff, or E. coli concerns.

History

Cedar Creek has had a long history of trout management with the initial trout stocking occurring in 1894. Brook Trout were stocked in Cedar Creek from 1894-1910 (Table 1). Rainbow Trout were stocked for only a few years in 1909 and 1910. From 1911 through 1969 there were no trout stocked in Cedar Creek. Beginning in 1970 and continuing through 2021 (except for 1972), Brown Trout have been stocked annually at a minimum of three locations (Table 1).

Surveys have been used to assess stocking practices since the 1920s. The first survey of Cedar Creek was conducted on May 28, 1926, by the Michigan Department of Conservation, the precursor to the present-day Michigan Department of Natural Resources (DNR). The survey described a fish community which included observations of Central Mudminnow, Common Shiner, Blacknose Dace, Common Sucker (most likely White Sucker), River Chub, and Creek Chub-which were numerous. On June 29, 1933, survey results led managers to conclude that the stream was "not suitable for trout of any kind in our estimation". The next survey occurred on July 14, 1964, incorporating electrofishing efforts at six road stream crossings (McGlynn, Coburn, Mixer, M-37, Dowling, and one unknown). The entire survey effort yielded only one Brown Trout. The fish community composition was consistent across sites and typical of warmwater fish assemblages that included numerous species of minnows, Centrarchids (bass and panfish), and several sucker species (Table 2).

Despite previous survey observations, public interest in expanding trout fishing opportunities continued. In the fall of 1970, a chemical reclamation treatment using rotenone was conducted on Cedar Creek from the village of Cedar Creek (Cedar Creek Rd.) downstream to the confluence with the Thornapple River. The rotenone treatment was intended to kill all fish in nearly 12 miles of Cedar Creek and "reclaim" the water to encourage a trout fishery. The fish species observed during the treatment and immediately following the treatment included warm and cool water species like Largemouth Bass, Common Carp, White Sucker, Redhorse spp., Bluntnose Minnow, Common Shiner, Creek Chub, Bluegill, Warmouth, Pumpkinseed, Bullhead spp., Rock Bass, Pickerel, and Northern Pike.

Surveys conducted from 1971-1973, indicated that the stocked Brown Trout were surviving and reproducing in Cedar Creek. However, warmwater species such as Smallmouth Bass, White Sucker, Largemouth Bass, Green Sunfish, and Bullhead species continued to be collected (Table 2). The chemical reclamation project was described in 1973 as "not as encouraging as other similar projects". Anglers were told that the best area for trout fishing was between M-37 and Coburn Road and Tamarack Creek which joins Cedar Creek in this reach.

In the summer of 1986 fish surveys were again conducted in the mainstem. At two upstream locations (Dowling Road and Broadway Road) no trout were present and warmwater species continued to dominate the fish community (Table 2). At four locations in the lower reaches of Cedar Creek (Mixer Road, McGlynn Road, and McKeown Road) 11 Brown Trout were captured in total at three sites, two of which yielded only a single brown trout. Warmwater fish species again dominated survey findings.

In 1987 anglers reported fair fishing for Brown Trout in Cedar Creek, and the decision was made to chemically treat the entire length of Cedar Creek again to enhance trout survival and create fishing opportunities. The rotenone treatment occurred in October 1987 and covered an area from Broadway Road downstream to the confluence with the Thornapple River as well as the area in Tamarack Creek from Broadway Road to the confluence with Cedar Creek. Follow-up electrofishing surveys were conducted in September 1991 at four locations (Broadway Road, Mixer Road, McGlynn Road, and McKeown Road). Brown Trout were captured at all four locations, but not in the abundances expected following four years of stocking after clearing the system with chemical treatments. The rotenone treatment was considered to have had inconsistent success for Cedar Creek. The low abundance of Brown Trout and high abundance of other warmwater fish species, led to the discontinuation of Brown Trout stocking at the uppermost site (Broadway Rd.) in 1991.

In August of 1997 electrofishing surveys were conducted at three road stream crossings (Mixer, McGlynn, and McKeown). Brown Trout were captured at all three survey locations. Brown Trout captured at the McGlynn and McKeown sites were between 6-9 inches in length and at the Mixer site, two of the 11 Brown Trout captured were greater than 9 inches in length. In all, 83% of the Brown Trout were yearlings and only one fish was older than age 2.

During the 1997 survey, two Hobo water temperature loggers were deployed June 23rd at Dowling Road and at M-37. The loggers were programmed to record water temperature every two hours and were recovered on August 2, 1997. The average water temperature at the Dowling Road site was 66.9°F and the maximum water temperature was 74.8°F. Average water temperatures at the M-37 site were 68.9°F and the maximum water temperature was 75.6°F.

Current Status

During the late summer and early fall of 2021 Cedar Creek was sampled by electrofishing at four sites. Sampling sites included the three stocking locations (M-37, McGlynn Road, and Coburn Road), and one upstream location (Broadway Road; Figure 1). At all sites, a barge electrofishing unit with two probes was used to collect fish. All fish were netted, identified, and measured for total length at the M-37, McGlynn and Broadway Road locations. At the Coburn Road location, species were recorded for presence/absence, and lengths were recorded only for Smallmouth Bass. Age and growth structures were removed from all Smallmouth Bass captured.

In addition to fish sampling, habitat and limnological measures were taken at the McGlynn Road site. Limnological sampling was conducted along 12 cross-sectional transects within the stream reach (Figure 1). For each transect, the stream (wetted) width and habitat type (run, riffle, or pool) were recorded. Water depth, dominant substrate, and percent coverage of wood and rooted plants (within a 1 ft diameter circle) were recorded at five locations split evenly across each transect plus an additional measurement at the thalweg. On the left and right banks of the transect, riparian vegetation class and bank stability ratings (1 = < 25% bare soil; 2 = 25-50% bare soil; 3 = 51-75% bare soil, 4 = > 75% bare soil) were recorded. If a bank was undercut, the water depth and length (perpendicular to stream flow) was recorded. At a single transect, that was most representative of the survey reach, water depth and water velocity were taken at 1-foot intervals to estimate stream discharge. The amount of large woody debris and riprap were quantified across the entire reach for log jams, brush deposits, and single logs that were at least 6 inches in diameter and at least 6 feet long (Wills et al. 2000).

A total of 32 fish species were captured across the four locations sampled (Table 3). Twelve of the fish species were observed at all four locations. No trout were captured during the 2021 survey. Gamefish species collected included Bluegill, Green Sunfish, Pumpkinseed, Northern Pike, Rock Bass, Largemouth Bass, and Smallmouth Bass. Twenty-nine Smallmouth Bass were captured across the four locations, 4 from the Broadway site, 4 at the M-37 site, 11 at the McGlynn site, and 10 at the Coburn site and these represented multiple age classes indicating stable recruitment into the population (Table 4). When sites were pooled, enough age-4 and age-5 fish were captured to allow for comparison of average lengths of Smallmouth Bass in Cedar Creek to documented statewide averages. The average length of age-4 Smallmouth Bass from Cedar Creek was 13.2 inches, and the average of age-5 Smallmouth Bass was 14.3 inches which were on par with statewide averages of 13.0 inches and 14.7 inches, respectively for Smallmouth Bass captured during the month of July.

The habitat survey at the McGlynn site included measurements on the instream and riparian habitat. The average wetted width of Cedar Creek at this site was 25.3 feet and the average depth was 1.6 feet. Nearly all the transects sampled were run habitat, with one area of pool habitat. The bottom substrate was variable with 33% small cobble, 32% sand, 18% large cobble, and 13% gravel. In addition, there were small patches of detritus/silt and boulder habitat present. There was abundant instream woody habitat at the McGlynn site where 735 square feet of brush deposits and 420 square feet of natural log jams were present. The riparian habitat included 38% tag alders, 33% small deciduous trees, 25% grassland/forbs, and 4% large deciduous trees. The majority of the stream banks were considered fair for stability with 25-50% of the bank composed of bare soil. The estimated discharge for the McGlynn section of Cedar Creek was 31.35 cubic feet per second (cfs).

During the summer of 2021, hobo temperature loggers were placed at four stations (M-37, McGlynn Road, Coburn Road and Broadway Road). Temperatures were recorded hourly from late April to mid November 2021. Mean July water temperatures were consistently above 70°F (range 71.3°F - 72.7°F; Table 5) and maximum water temperatures in all reaches were >80°F. Upstream locations were the warmest, the Broadway site maximum water temperature was 85°F and the M-37 site maximum water temperature was 81.4°F.

Analysis and Discussion

No trout were captured at any of the stocking sites or the additional upstream location surveyed in 2021. Given the long history of trout management and trout stocking, the observation was discouraging. Fish species captured were indicative of a warm or transitional stream system. No coldwater fish species were captured and only seven of the 32 fish species captured were considered transitional species. By number, warmwater species made up 70-91% of the catch at each station enumerated.

In 1997, surveys at the McKeown Road, McGlynn Road, and Mixer Road crossings all captured Brown Trout. However, most of the trout captured had been stocked only four months earlier and only one fish had survived two years in the stream. The other fish species captured during the 1997 survey were indicative of a warmwater or transitional fish community.

For Brown Trout, preferred temperatures for growth are between 39°F and 67°F (Elliott 1993), and McMichael and Kaya (1991) observed that Brown Trout catch per angler hour decreased when water temperatures exceeded 66°F. Similarly, Brown Trout in Jocassee Reservoir, South Carolina, exhibited a preference for water 68°F or cooler (Barwick et al. 2004) and Zorn et al. (2009) found that Michigan streams with July mean temperatures > 68°F rarely supported sizeable Brown Trout populations. Based on these studies, the mean July water temperature for the Dowling Road site on Cedar Creek would have been considered marginal for trout in 1997 and mean July temperature at the M-37 crossing were above the 68°F threshold. All of the 2021 mean July temperatures in Cedar Creek were > 68°F.

The mean July water temperature at the M-37 crossing was higher in 2021 than in 1997. There were no obvious changes in watershed land use that could be responsible for this change. Grand Rapids climate data from the National Oceanic and Atmospheric Administration indicated that air temperatures were similar in 1997 and 2021, but July precipitation was 1.95 inches in 1997 and 4.44 inches in 2021. Thus, the ratio of surface runoff to groundwater inputs likely was higher in 2021 than in 1997.

Historically fisheries in Cedar Creek were intensively managed to create fishing opportunities for Brown Trout through stocking and the use of two chemical reclamation treatments. Electrofishing surveys and two years of temperature monitoring data reveal that Cedar Creek does not have suitable habitat for trout.

Management Direction

Rather than continue attempting to manage Cedar Creek as a coldwater stream, management should focus on the native warmwater fishes (such as Smallmouth Bass or sunfish). As such, management recommendations are to:

1. Cease stocking Brown Trout in Cedar Creek. Given the lack of trout captured and poor thermal habitat, there is little rationale to continue the practice.

2. Remove the trout stream designation and type 1 trout regulations from Cedar Creek. To eliminate confusion as to whether it is a trout stream.

3. Collaborate with stakeholders, including Pierce Cedar Creek Institute, to develop more appropriate fishery objectives and an updated watershed management plan for Cedar Creek.

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Table 1. Fish stocking in Cedar Creek from 1894 through 2021.

Year	Species	Number Stocked	Life Stage	Average Length (in)
1894	Brook Trout	5000	N/A	N/A
1896	Brook Trout	3000	N/A	N/A
1897	Brook Trout	3000	N/A	N/A
1909	Brook Trout	10000	Fry	N/A
1909	Brook Trout	5000	Fry	N/A
1909	Brook Trout	6000	Fry	N/A
1909	Rainbow Trout	15000	Fry	N/A
1910	Brook Trout	4000	Fry	N/A
1910	Brook Trout	7000	Fry	N/A
1910	Brook Trout	4000	Fry	N/A
1910	Rainbow Trout	12000	Fry	N/A
1970	Brown Trout	6000	Fall fingerling	N/A
1971	Brown Trout	14500	Fingerling	N/A
1971	Brown Trout	2400	Yearling	N/A
1973	Brown Trout	5600	Yearling	N/A
1974	Brown Trout	5600	Yearling	N/A
1975	Brown Trout	500	Yearling	N/A
1975	Brown Trout	3700	Yearling	N/A
1976	Brown Trout	3700	Yearling	N/A
1976	Brown Trout	500	Yearling	N/A
1977	Brown Trout	500	Yearling	N/A
1977	Brown Trout	3700	Yearling	N/A
1978	Brown Trout	2500	Yearling	N/A
1978	Brown Trout	500	Yearling	N/A
1979	Brown Trout	2,700	Yearling	6.2
1980	Brown Trout	3,000	Yearling	6.2
1981	Brown Trout	3,000	Yearling	4.3
1982	Brown Trout	3,850	Yearling	5.1
1983	Brown Trout	6,800	Yearling	6.3
1984	Brown Trout	6,800	Yearling	6.5
1985	Brown Trout	5,095	Yearling	6.9
1986	Brown Trout	5,710	Yearling	6.4
1987	Brown Trout	14,600	Fall fingerling	3.4
1988	Brown Trout	12,320	Yearling	5.4
1989	Brown Trout	7,240	Yearling	6.0
1990	Brown Trout	8,796	Yearling	5.0
1991	Brown Trout	7,240	Yearling	6.4
1992	Brown Trout	5,366	Yearling	6.0

Year	Species	Number Stocked	Life Stage	Average Length (in)
1993	Brown Trout	5,470	Yearling	6.1
1994	Brown Trout	5,609	Yearling	6.5
1995	Brown Trout	5,397	Yearling	6.5
1996	Brown Trout	5,498	Yearling	5.5
1997	Brown Trout	5,700	Yearling	5.6
1998	Brown Trout	5,310	Yearling	5.5
1999	Brown Trout	5,500	Yearling	6.0
2000	Brown Trout	5,860	Yearling	4.9
2001	Brown Trout	5,540	Yearling	5.2
2002	Brown Trout	5,540	Yearling	4.8
2003	Brown Trout	5,500	Yearling	5.2
2004	Brown Trout	5,900	Yearling	5.0
2005	Brown Trout	5,500	Yearling	5.7
2006	Brown Trout	5,600	Yearling	5.7
2007	Brown Trout	5,120	Yearling	5.4
2008	Brown Trout	5,500	Yearling	5.9
2009	Brown Trout	5,900	Yearling	5.6
2010	Brown Trout	5,800	Yearling	4.9
2011	Brown Trout	4,950	Yearling	4.6
2012	Brown Trout	6,413	Yearling	4.7
2013	Brown Trout	5,525	Yearling	5.4
2014	Brown Trout	2,700	Yearling	5.4
2015	Brown Trout	6,050	Yearling	5.3
2016	Brown Trout	5,500	Yearling	5.0
2017	Brown Trout	5,800	Yearling	4.9
2018	Brown Trout	6,050	Yearling	5.2
2019	Brown Trout	5,500	Yearling	5.0
2020	Brown Trout	5,200	Yearling	4.7
2021	Brown Trout	5,500	Yearling	5.1

Table 2. Presence/absence of fish species in electrofishing surveys at various locations on Cedar Creek between the headwaters and the confluence with the Thornapple River, Barry County. An “x” indicates the species was collected at that site in the given sampling year.

Species	1964	1971	1972	1973	1986	1991	1997	2021
Brown Trout	x	x	x	x	x	x	x	
Yellow Perch	x			x				
Smallmouth Bass	x	x	x	x	x	x	x	x
Bluegill	x	x		x	x		x	x
Pumpkinseed	x	x		x	x			x
White Sucker	x	x	x	x	x	x	x	x
Northern Hog Sucker	x		x	x	x	x	x	x
Redhorse spp.	x			x	x	x		
Lake Chubsucker	x				x			
Creek Chub	x	x	x	x	x	x	x	x
Common Shiner	x	x	x	x	x	x	x	x
Central Mudminnow	x	x		x	x	x	x	x
Hornyhead Chub	x			x	x	x		x
Johnny Darter	x	x			x	x	x	x
Rainbow Darter	x			x				x
Blackside Darter	x					x	x	x
River Chub	x	x						
Largemouth Bass	x	x		x	x	x		x
Green Sunfish	x	x		x	x	x	x	x
Grass Pickerel	x	x		x	x	x	x	x
Bullhead Spp.	x			x			x	
Common Carp	x							
Bluntnose Minnow		x			x	x		x
Warmouth		x			x			x
Central Stoneroller		x	x	x	x	x		x
Brown Bullhead		x						
Northern Pike			x	x				x

Species	1964	1971	1972	1973	1986	1991	1997	2021
Rock Bass			x	x	x	x	x	x
Yellow Bullhead			x					x
Logperch				x	x		x	x
Chestnut Lamprey				x				
Unknown Lamprey					x	x		
Longear Sunfish					x			
Madtom Spp.						x		x
Blacknose Dace						x	x	x
Rosyface Shiner						x		x
Golden Redhorse								x
Greater Redhorse								x
Mimic Shiner								x
Striped Shiner								x
Golden Shiner								x
Black Bullhead								x
American Brook Lamprey								x

Table 3. Species captured during electrofishing surveys in 2021. The numbers of fish observed are reported for the Broadway, M37, and McGlynn sites. At the Coburn site only presence (x) - absence data are available. The thermal classification of the fish species is derived from Lyons et al. (2009).

Species	Broadway	M37	McGlynn	Coburn	Thermal Classification
American Brook Lamprey		1			Transitional
Black Bullhead	2				Warm
Bluegill	9	12	3	X	Warm
Unknown Madtom	1				Unknown
Blacknose Dace	4	10			Transitional
Bluntnose Minnow	75		5	X	Warm
Blackside Darter	28	14	16	X	Warm
Creek Chub	120	25	14	X	Transitional
Common Shiner	61	20	48	X	Warm
Central Stoneroller	19	7	3		Warm
White Sucker	19	15	12	X	Transitional
Golden Redhorse	17		2	X	Warm
Golden Shiner	6	2	8		Warm
Grass Pickerel		3	4	X	Warm
Green Sunfish	12	3	15		Warm
Greater Redhorse		1			Warm
Hornyhead Chub	71	26	7		Warm
Johnny Darter	14	20	11	X	Transitional
Largemouth Bass	22	3	3	X	Warm
Logperch	1	1	6		Warm
Mimic Shiner			1		Warm
Central Mudminnow	1	3	9		Transitional
Northern Hog Sucker	19	7	6	X	Transitional
Northern Pike				X	Transitional
Pumpkinseed	1		3	X	Warm
Rainbow Darter	55	18	31	X	Warm
Rock Bass	24	7	21	X	Warm
Rosyface Shiner	14	6	4	X	Warm
Smallmouth Bass	4	4	11	10	Warm
Striped Shiner				X	Unknown
Warmouth	1				Warm
Yellow Bullhead	2		2		Warm

Table 4. Number of Smallmouth Bass per age group at the four sampling locations in Cedar Creek, Barry County, sampled by electrofishing in 2021.

Age	Broadway	M-37	McGlynn	Coburn
Age-0	0	0	0	0
Age-1	0	0	2	1
Age-2	0	0	1	0
Age-3	3	0	1	0
Age-4	1	1	0	3
Age-5	0	2	3	2
Age-6	0	0	0	0
Age-7	0	0	1	0
Age-8	0	1	2	1
Age-9	0	0	0	1

Table 5. Mean monthly water temperatures in degrees Fahrenheit recorded at four locations on Cedar Creek, Barry County, Michigan in 2021.

Month	Broadway	M-37	McGlynn	Coburn
May	61.1	60.8	60.2	60.4
June	70.6	70.2	69.2	69.4
July	72.7	72.2	71.3	71.6
August	73.5	72.9	71.9	72.2
September	65.3	64.8	64.0	64.2
October	57.7	57.5	57.1	57.2

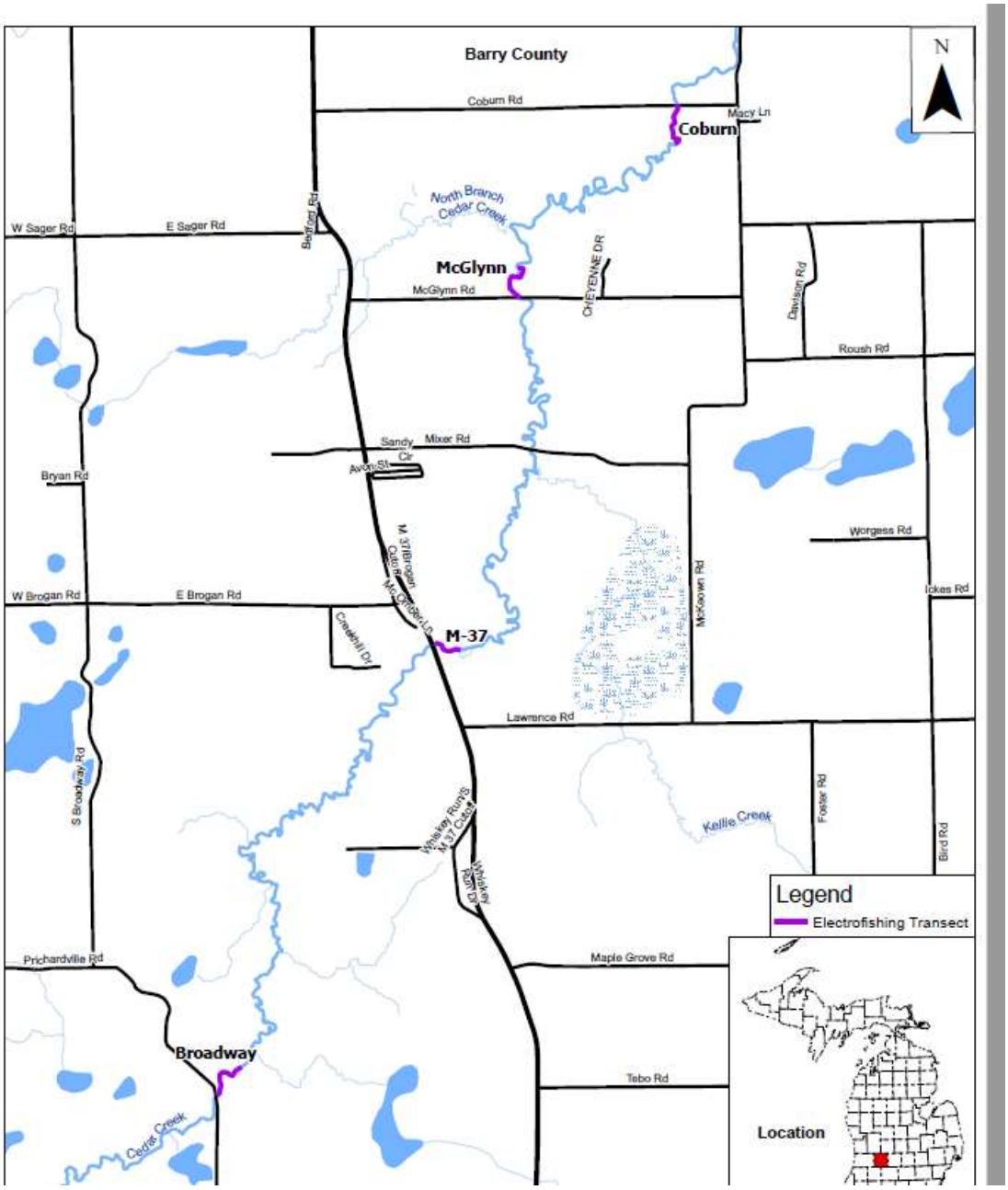

Figure 1. Map of the Cedar Creek watershed. The four electrofishing transects sampled in 2021 are indicated in purple.

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Brian Gunderman, Unit Review and Approval

Jory Jonas, External Reviewer

Tim Cwalinski, SFR Facilitator

Randall M. Claramunt, Desktop Publisher and Approval