Fish Creek
Montcalm County
Grand River Watershed; Last Surveyed in 2023

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Environment

Fish Creek originates in a cedar swamp southeast of the village of Edmore in northeastern Montcalm County (Figure 1). Fish Creek has numerous small branches near the headwaters and generally flows south until just west of Crystal Lake, near the town of Crystal. Near this junction, West Branch Fish Creek joins the mainstem of Fish Creek, and the river makes a hard turn and begins to flow east before switching to a southeastern direction flowing towards the city of Carson City. From Carson City, Fish Creek flows south towards the village of Hubbardston, and eventually to the Maple River. There is a hydroelectric dam on Fish Creek in the village of Hubbardston in Ionia County. The dam is a complete fish passage barrier and does not allow any migratory Salmonids or other fish species to move upstream.

Fish Creek from the headwaters to the confluence with the Maple River is over 40 miles in length. The Fish Creek watershed encompasses approximately 175 square miles (Lincoln 1972). Much of the watershed is comprised of farmlands with sandy loam and loamy sand soil types (Lincoln 1972). Upstream reaches have a stream width around 8 feet and downstream reaches have a stream width greater than 30 feet. Fish Creek is a designated county drain from the furthest north crossing of Pine Grove Road downstream to the Vickeryville Road crossing.

Fish Creek is a designated trout stream throughout the entire length and is managed with two different fishing regulations. From Sidney Road downstream to the confluence with the Maple River, Fish Creek is managed by Type-4 regulations which allow anglers to fish year-round. The possession season is year-round for Rainbow Trout (Steelhead) and salmon. For Brown Trout and Brook Trout, the possession season is the last Saturday in April through September 30. The minimum size limit is 7 inches for Brook Trout and 10 inches for all other trout and salmon species. The daily possession limit is five fish but no more three fish can be trout 15 inches or larger. From the headwaters downstream to Sidney Road, Fish Creek is managed with Type-1 regulations and is only open to fishing from the last Saturday in April through September 30. The daily possession limit is the same as for the Type 4 waters. Minimum size limits are 7 inches for Brook Trout, 8 inches for Brown Trout, and 10 inches for all other trout and salmon species.

Much of the Fish Creek watershed is dominated by row crop farming specifically for potatoes (Smith 1973). The soils are nutrient rich and there are intensive water withdrawals from Fish Creek and tributaries to support the potato crops (Smith 1973). There is relatively low urban development within the Fish Creek watershed, but due to the proximity of the stream to Grand Rapids, Lansing, and Mount Pleasant it attracts anglers from multiple areas of the state.

The upper reaches of Fish Creek flow through the Vestaburg and Stanton State Game Areas. The game areas provide excellent riparian cover for trout species, access for anglers, and areas without water withdrawals. Historically, Brook Trout populations were widespread on both game areas (Smith 1973).

This report will only focus on the upper portions of Fish Creek from the headwaters downstream to Condensery Road (Montcalm County). The middle and lower reaches of Fish Creek have not been surveyed recently; thus, there is no updated information to provide to readers.

History

Fish Creek has been actively managed as a trout stream since Brook Trout were first stocked in 1889, Rainbow Trout in 1905, and Brown Trout in 1933. Fisheries survey efforts began in the early 1960s. Electrofishing surveys from the 1960s and 1970s indicate that Fish Creek upstream of Colby Road had a fishable population of both Brook Trout and Brown Trout. Brook Trout were most abundant in the upper reaches, whereas Brown Trout became more common as the stream proceeded closer to the Colby Road crossing. From Colby Road downstream to around Holland Lake Road, the fishery was primarily Brown Trout with a few Brook Trout captured across time. From Holland Road downstream to Condensery Road, Fish Creek appeared to have a transitional fish community with a few Brown Trout and an increasing abundance of warmwater game fish species including Bluegill, Green Sunfish, and Largemouth Bass.

In the early 1970s, Michigan Department of Natural Resources (DNR) staff observed that Fish Creek was not supporting a significant trout population downstream of Colby Road. In an effort to remove competing fish species, Fish Creek was treated with antimycin from Colby Road downstream to Blackmer Road in June 1972. The majority of Brown Trout collected post-treatment "were large, showing that little recruitment of young fish was taking place and that only the large older fish that are not readily available to the average trout fisherman's creel were remaining" (Smith 1972). The treatment was considered a success and 26,000 Brown Trout fingerlings and 7,200 Brook Trout fingerlings were stocked back into this section of Fish Creek later in 1972.

In 1978, eight stations were electrofished for a "trout population survey" between Pakes Road and Colby Road. All stations were 1,000 feet in length and electrofishing was conducted on two different dates. On the initial date, all trout were netted, measured to the nearest tenth of an inch (0.1), and marked with a fin clip. On the second date, all trout were netted, observed for a fin clip, and those not clipped were measured to the nearest 0.1 inch. The total surface area electrofished was 4.0 acres of Fish Creek. Population estimates were calculated for Brook Trout and Brown Trout separately. In 1978, the Brown Trout population estimate was 1,250 fish at a rate of 312.5/acre and 50.9 pounds/acre. The Brook Trout population estimate was 404 fish at a rate of 101/acre and 5.0 pounds/acre. Similar numbers of 2.0-4.9-inch Brook Trout and Brown Trout were captured, but beyond those length bins, Brown Trout was the dominant fish species in Fish Creek (Biener 1979). This study was repeated in 1980 and 1981, but a report was never written on the results and the remaining data sheets provide insufficient information for calculating population estimates.

In 1983, electrofishing surveys were completed at the Crystal Road, Sidney Road, and Condensery Road crossings to evaluate the necessity of a chemical treatment. Brook Trout and Brown Trout were sampled at the Sidney Road site and the recommendation was to not treat this area of Fish Creek, but rather to conduct a manual removal of "rough fish" by electrofishing. At the other two locations, a chemical treatment was recommended due to capturing only one Brown Trout at Crystal Road and zero trout at the Condensery Road site. A rotenone treatment occurred on September 28, 1983, to reclaim a portion of Fish Creek. The rotenone treatment occurred in the stretch of Fish Creek from Colby Road

downstream to Condensery Road. Following the treatment, 19,000 Brown Trout fingerlings were stocked in the section of stream that was reclaimed.

The next fisheries surveys were completed in 1986 to assess the status of the fish community after the 1983 rotenone treatment and to evaluate fish populations in an area of the headwaters where agricultural dredging was proposed. The headwater areas, which were within the Vestaburg State Game Area, had both Brook Trout and Brown Trout present. The survey report stressed that dredging Fish Creek would be detrimental to the trout fishery and should be avoided. Acceptable numbers of Brown Trout were caught at all locations shocked within the 1983 treatment area. However, subsequent fisheries surveys in 1990 indicated that rough fish numbers were once again increasing in the area previously reclaimed in 1972 and 1983. Recommendations were to continue stocking Brown Trout and reevaluate the stream in 1993 for a potential chemical treatment in 1994.

A third chemical treatment never occurred, but Fish Creek was sampled again in 1994. Surveys were completed at the Colby, Crystal, Sloan, and Bollinger Road stream crossings. Trout were present in very low numbers at all four sites. However, angler reports were positive and recent heavy rains were blamed for low electrofishing catch rates. Fisheries management continued as status quo until the next survey in 1996. Electrofishing surveys were completed at the Sloan and Vickeryville Road crossings. Zero trout were captured at Vickeryville and only 11 Brown Trout were caught at the Sloan Road site in 1,000 feet shocked.

From 1997 to 2001, Fish Creek was one of seven trout streams statewide where a stocked Brown Trout strain evaluation occurred. Gilchrist Creek, Wild Rose, and Seeforellen strain Brown Trout were marked with different fin clips and stocked into Fish Creek. Gilchrist Creek strain were stocked from 1997-2000, Seeforellen strain were stocked from 1998-2000, and Wild Rose strain were only stocked in 1997. Electrofishing surveys were completed in 1999-2001 to evaluate survival and growth of stocked fish. In Fish Creek, stocked trout densities were the second highest of all seven streams and the population estimate of Brown Trout greater than 8 inches in length was also second highest in Fish Creek (Wills 2005). The estimate of total Brown Trout biomass was the second lowest in Fish Creek. The total biomass of stocked Brown Trout was 1.7 times that of unclipped (naturally reproduced) which was second only to the Coldwater River which had a total biomass of stocked Brown Trout 4.9 times higher than unclipped Brown Trout (Wills 2005). The overall result of the Brown Trout strain evaluation survey was that Gilchrist Creek strain Brown Trout survived to age 2 100 times better than Seeforellen strain Brown Trout, and six times better than the Wild Rose strain (Wills 2005). Field notes indicated that habitat improvements were greatly needed to improve the trout fishery.

In 2003, Brown Trout were collected from the Tow Road and Colby Road sites to test for whirling disease. A small section of Fish Creek was shocked to collect these fish, but no real assessment of the fish community was completed. Fish were negative for whirling disease and this was the last fisheries survey completed prior to 2023. Brown Trout stocking occurred annually at five sites from 2017 through 2023 (Table 1).

Current Status

In August and September 2023, electrofishing surveys were conducted at six locations on Fish Creek (Figure 1). Three of the six locations were where Brown Trout stocking occurred at public road-stream crossings. At each location, a single tow-barge electrofishing unit with two probes or three probes was

used to sample the entire stream width (Table 2). All trout were netted, enumerated, and measured to inch bin (e.g., 7-inch bin = 7.0-7.9 inches). The station length and additional data collected differed between stations (Table 2). The six stations that were sampled included: Pine Grove Rd., Colby Rd., Sloan Rd., Tow Rd., Condensery Rd., and Crystal Rd. In addition, qualitative observations regarding fish cover and substrate were recorded at each sampling site. At the Pine Grove Road station, a full habitat assessment was performed according to the random Status and Trends Program sampling guidelines (Wills et al. 2005).

Brown Trout were captured at five of the six locations with the highest catch per unit effort (CPUE) at the Colby Road station followed by the Crystal Road and Sloan Road stations (Figure 2). Brown Trout in the 3-inch bin at the Colby Road station constituted the highest catch across all stations, indicating high levels of natural reproduction at that site. There were decent numbers of Brown Trout in the 6-inch and 7-inch bins at the Colby, Sloan, and Crystal stations (Figure 3).

Brown Trout age and growth was only assessed at the Pine Grove Road station. Sixteen Brown Trout were aged from this station. Brown Trout sampled included fish ages 1-3 (Table 3). Brown Trout at the Pine Grove Road station had mean lengths that were 2.3 inches and 2.8 inches above the statewide averages for fish ages 1 and 2, respectively. Age and growth samples were not taken from Brown Trout at other stations due to the prevalence of scale regeneration and associated challenges for aging stocked trout. Based on the length-frequency of Brown Trout captured at other stations, it can be assumed that there were multiple year-classes of Brown Trout present with fish length ranging from 2.0 to 24.9 inches.

Across all sites, five Brown Trout over 20 inches were captured, with the largest being in the 24-inch bin. Twenty-inch Brown Trout are often considered the "trophy" size by many trout anglers. At the Pine Grove Road and Colby Road stations, the minimum size limit for Brown Trout is 8 inches. At the remaining stations, the minimum size limit for Brown Trout is 10 inches. At most sites, there were more sub-legal Brown Trout than legal Brown Trout (Figure 2).

Hobo temperature loggers were placed at six sites. Four of these sites corresponded to stations that were also surveyed for fish (Pine Grove, Colby, Sloan, and Condensery; Figure 1). The other two sites were at the Miner Road and Vickeryville Road crossings. Temperatures were recorded hourly from late March to mid November 2023. Monthly mean temperatures varied between sites. Condensery Road was the warmest site with a July mean temperature of 69.7 F and Pine Grove Road was the coldest site with a July mean temperature of 61.0 F (Figure 4).

Intensive habitat sampling was completed at the Pine Grove Road site following the random Status and Trends protocols. The average stream width was 14.2 feet, and nearly all of the habitat was classified as run with no riffles and only one pool. The riparian vegetation was a mix of grassland forbs and deciduous trees. The stability of the banks was in overall poor condition with at least 50% of the streambank being bare soil throughout the reach. The reach was shallow with a mean depth of 0.67 feet and a bottom substrate of sand in most places with some small pockets of detritus and silt present. This section of Fish Creek lacked coarse woody debris with only two small log jams and one individual submerged log. There were a few brush deposits, but woody habitat density was low across the reach. This part of the creek is a designated county drain, and it is likely that woody habitat has been removed as part of drain maintenance activities.

At the other stations, qualitative habitat measurements were recorded. The Colby Road site was dominated by areas with small cobble and non-embedded gravel with riffle, run, and relatively shallow pool habitat. There was a water withdrawal pump at this station that was in use for an adjacent potato farm. This area appeared to have heavy angler traffic. The habitat at the Tow Road site was completely different with large, deep pools present and very little riffle habitat. The Sloan Road site was wider than the previous two stations and the substrate was sand and gravel with some larger cobble in the mix. Native unionid mussel abundance was noted as high at this location. The Crystal Road site had much more sand present and had long areas of run habitat with some pockets of woody debris. The furthest downstream site, Condensery Road, appeared to be very flashy with bank erosion present. The substrate at this site was hard, predominantly clean gravel and cobble.

The non-trout species assemblage consisted of additional species and more transitional or warmwater fish species present from upstream to downstream (Tables 4 and 5). The number of species present increased from nine at Pine Grove Road to 20 at Condensery Road. This shift in fish community composition corresponded with the water temperatures of Fish Creek and also the change in aquatic habitat from upstream to downstream.

Analysis and Discussion

Thermal habitat conditions were ideal for Brown Trout throughout most of the stretches of Fish Creek sampled during 2023. The trout stream designation and Type-1 regulations for the headwaters to Sidney Road are appropriate given the high level of natural reproduction documented at the Colby Road site. The trout stream designation and Type-4 regulations are appropriate for the reach from Sidney Road downstream to Crystal Road. The reach between Crystal Road and Condensery Road was too challenging to sample; thus, the Type-4 regulations in this section should remain due to incomplete data. The fish community and water temperature at the Condensery Road station indicate that this site is most likely not supporting trout year-round but could support trout at certain times of the year. The lower reaches of Fish Creek were not sampled during the 2023 field season, so no conclusions regarding the trout stream designation in the lower portion of Fish Creek can be drawn.

The Brown Trout population in the middle reaches of Fish Creek is robust compared to other trout streams within the Southern Lake Michigan Management Unit (SLMMU). Catch-per-unit-effort was calculated based on the mean number of Brown Trout captured per 1,000 feet of DNR electrofishing sampling both in SLMMU and across the state during 2011-2021 The mean Brown Trout CPUE for trout streams in SLMMU was 80.9 and was 77.5 for trout streams statewide, and the 75th percentiles were 86.4 for SLMMU and 100.2 statewide. The median Brown Trout CPUE was 36.9 for streams statewide and 46.0 for streams in SLMMU. During the 2023 survey on Fish Creek, the CPUE for the Colby Road site was the highest at 392.2 which was well above the 75th percentile for streams in SLMMU and statewide. The next highest CPUE was at the Sloan Road site at 68.0, followed by the Crystal Road site at 60.9. These two sites were below the mean, but above the median for streams in SLMMU and statewide. The lowest two sites for Brown Trout CPUE were Tow Road (8.8) and Pine Grove Road (26.7).

Brown Trout have been regularly stocked into Fish Creek since the early 1950s. The 2023 survey documented extensive natural reproduction at the Colby Road site with 208 young-of-year Brown Trout captured in 1,000 feet. This level of natural reproduction indicates that stocking is not necessary at this location and natural reproduction is sufficient to support the fishery. The Pine Grove Road site has never

been stocked, so the Brown Trout captured at that site were either products of natural reproduction or fish that had moved upstream from other stocked locations. The habitat at this site was poor, as this section of Fish Creek is within the county drain and was historically straightened and dredged to reduce flooding of agricultural fields.

Anglers continue to report good fishing at Fish Creek and public access is available. The electrofishing results indicate that past stocking has led to high to moderate densities of Brown Trout at most stocking locations. Fish Creek is an especially valuable resource as it is one of the few trout streams in this region of the state and any positive habitat improvements should be considered especially in the face of climate change which may threaten coldwater systems like Fish Creek in the future.

Management Direction

1. Discontinue Brown Trout stocking at the Colby, Vickeryville, Miner, and Condensery Road crossings.
2. Consolidate Brown Trout stocking at three sites with suitable habitat and limited natural recruitment. Annually stock yearling Sturgeon River strain Brown Trout at Tow Road (1,500 fish), Sloan Road (1,700 fish), and Crystal Road (1,300 fish).
3. Encourage riparian landowners throughout the watershed to implement best management practices related to wetland retention, riparian buffer strips, functional septic systems, and reducing runoff into Fish Creek.
4. Survey Fish Creek every 10-15 years to ensure Brown Trout stocking is meeting management goals.
5. Work with Trout Unlimited and other partners to increase in-stream habitat, especially focusing on large woody debris where feasible.

References

Biener, W. 1979. Population estimate of the Brook Trout and Brown Trout in a section of Fish Creek, Michigan, during July and August 1978. Michigan Department of Natural Resources.

Lincoln, R.S. 1972. Preliminary habitat improvement report for Fish Creek. Michigan Department of Natural Resources Fisheries Division.

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.

Schneider, J. C., P. W. Laarman, and H. Gowing. 2000. Age and growth methods and state averages. Chapter 9 in Schneider, J. C. (ed.). 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Smith, D. 1972. Chemical reclamation of Fish Creek, Montcalm County, using fintrol bars (antimycin). Michigan Department of Natural Resources.

Smith, D. 1973. The trout streams of Michigan. No. 13 Fish Creek. Michigan Department of Natural Resources, Fisheries Division Technical Report 73-26, Ann Arbor.

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

Wills, T.C. 2005. Field performance of one wild and two domestic Brown Trout strains in seven Michigan rivers. Michigan Department of Natural Resources, Fisheries Research Report 2080, Ann Arbor.

Table 1. Site location, date, number, and the average (Avg.) total length (TL, inches) of Brown Trout stocked in Fish Creek from the headwaters to Condensery Road from 2017 to 2023.

Date	Site Name	Species	Number	Avg. Length (inches)
04/27/2017	Colby Rd.	Brown Trout	1,300	5.09
04/27/2017	Condensery Rd.	Brown Trout	1,300	5.09
04/27/2017	Miner Rd.	Brown Trout	1,899	5.09
04/27/2017	Sloan Rd.	Brown Trout	1,400	5.09
04/27/2017	Vickeryville Rd.	Brown Trout	1,400	5.09
04/13/2018	Colby Rd.	Brown Trout	1,370	5.88
04/13/2018	Condensery Rd.	Brown Trout	1,320	5.88
04/13/2018	Miner Rd.	Brown Trout	1,980	5.88
04/13/2018	Sloan Rd.	Brown Trout	1,485	5.88
04/13/2018	Vickeryville Rd.	Brown Trout	1,485	5.88
04/16/2019	Colby Rd.	Brown Trout	1,300	5.37
04/16/2019	Condensery Rd.	Brown Trout	1,200	5.37
04/16/2019	Miner Rd.	Brown Trout	1,800	5.37
04/16/2019	Sloan Rd.	Brown Trout	1,400	5.37
04/16/2019	Vickeryville Rd.	Brown Trout	1,400	5.37
04/09/2020	Colby Rd.	Brown Trout	1,200	4.57
04/09/2020	Condensery Rd.	Brown Trout	1,100	4.57
04/09/2020	Miner Rd.	Brown Trout	1,700	4.57
04/09/2020	Sloan Rd.	Brown Trout	1,300	4.57
04/09/2020	Vickeryville Rd.	Brown Trout	1,300	4.57
04/21/2021	Colby Rd.	Brown Trout	1,200	4.81
04/21/2021	Condensery Rd.	Brown Trout	1,200	4.81
04/21/2021	Miner Rd.	Brown Trout	1,800	4.81
04/21/2021	Sloan Rd.	Brown Trout	1,300	4.81
04/21/2021	Vickeryville Rd.	Brown Trout	1,300	4.81
04/19/2022	Colby Rd.	Brown Trout	1,250	6.96
04/19/2022	Condensery Rd.	Brown Trout	1,200	6.96
04/19/2022	Miner Rd.	Brown Trout	1,800	6.96
04/19/2022	Sloan Rd.	Brown Trout	1,350	6.96
04/19/2022	Vickeryville Rd.	Brown Trout	1,350	6.96
05/04/2023	Colby Rd.	Brown Trout	1,123	6.97
05/04/2023	Condensery Rd.	Brown Trout	1,079	6.97
05/04/2023	Miner Rd.	Brown Trout	1,614	6.97
05/04/2023	Sloan Rd.	Brown Trout	1,210	6.97
05/04/2023	Vickeryville Rd.	Brown Trout	1,205	6.97

Table 2. Fish data recorded at each of the six locations on Fish Creek sampled in 2023. Station length is length of stream shocked, gear is electrofishing gear used, and fish data is what specific data was collected at each station. P/A = presence or absence. BNT = Brown Trout, NOP = Northern Pike, and SMB = Smallmouth Bass.

Date	Site	Station Length	Gear	Fish Data
08/29/2023	Pine Grove Rd.	600 feet	Tow Barge: 2 probes	All species length, age and growth on BNT
08/29/2023	Colby Rd.	900 feet	Tow Barge: 2 probes	BNT length, P/A all other species
08/31/2023	Sloan Rd.	1,000 feet	Tow Barge: 3 probes	BNT length, P/A all other species
08/31/2023	Tow Rd.	800 feet	Tow Barge: 3 probes	BNT length, P/A all other species
09/07/2023	Condensery Rd.	1,000 feet	Tow Barge: 3 probes	SMB and NOP length, P/A all other species
09/20/2023	Crystal Rd.	1,100 feet	Tow Barge: 3 probes	BNT length, P/A all other species

Table 3. Age and growth statistics for Brown Trout captured in the August 2023 survey of Fish Creek at the Pine Grove Road station. State average lengths are from Schneider et al. (2000).

Age	Number Aged	Length Range (in.)	Weighted Mean Length (in.)	State Average Length (in.)
1	10	7.3-9.4	8.5	6.2
2	5	11.1-12.7	12	9.2
3	1	14.7	N/A	12.2

Table 4. Species, total number captured, percent contribution by number, and the range in total length (inches, in.) of fish captured in Fish Creek at the Pine Grove Road station (August 2023).

Species	Number	Percent by Number	Length Range (in.)
Blacknose Dace	33	18.1	1.0-3.9
Brook Stickleback	1	0.5	1.0-1.9
Brown Trout	16	8.8	7.0-14.9
Central Mudminnow	8	4.4	1.0-4.9
Creek Chub	26	14.3	1.0-6.9
Johnny Darter	5	2.7	<1.0
Mottled Sculpin	80	44	1.0-4.9
White Sucker	13	7.1	2.0-6.9

Table 5. Presence/absence of fish species captured during the 2023 electrofishing surveys at six stations on Fish Creek. Thermal classifications are from Lyons et. al (2009). From left to right, sites are listed from upstream to downstream.

Species	Thermal Classification	Pine Grove	Colby	Tow	Sloan	Crystal	Condensery
American Brook Lamprey	Transitional	X	X		X	X	X
Blacknose Dace	Transitional	X	X		X		X
Blackside Darter	Warm				X	X	X
Bluegill	Warm			X	X	X	X
Bluntnose Minnow	Warm		X			X	X
Brook Stickleback	Transitional	X	X				
Brown Trout	Cold	X	X	X	X	X	
Central Mudminnow	Transitional	X	X	X	X	X	
Common Shiner	Warm		X	X	X	X	X
Creek Chub	Transitional	X	X	X	X	X	X
Golden Redhorse	Warm						X
Grass Pickerel	Warm			X			
Greater Redhorse	Warm						X
Green Sunfish	Warm				X	X	X
Hornyhead Chub	Warm				X	X	X
Hybrid Sunfish	Warm						
Johnny Darter	Transitional	X	X	X	X	X	X
Mottled Sculpin	Cold	X	X	X			
Northern Hog Sucker	Transitional		X		X	X	X
Northern Pike	Transitional						X
Rainbow Darter	Warm				X	X	X
River Chub	Transitional				X		X
Rock Bass	Warm			X		X	X

Rosyface Shiner	Warm					X	X
Smallmouth Bass	Warm						X
White Sucker	Transitional	X	X	X	X	X	X
Yellow Bullhead	Warm					X	

Figure 1. Map of Fish Creek in Montcalm and Ionia Counties. Red octagons indicate electrofishing and temperature logger locations, red triangles indicate temperature logger locations, and red crosses indicate electrofishing locations for the 2023 survey.

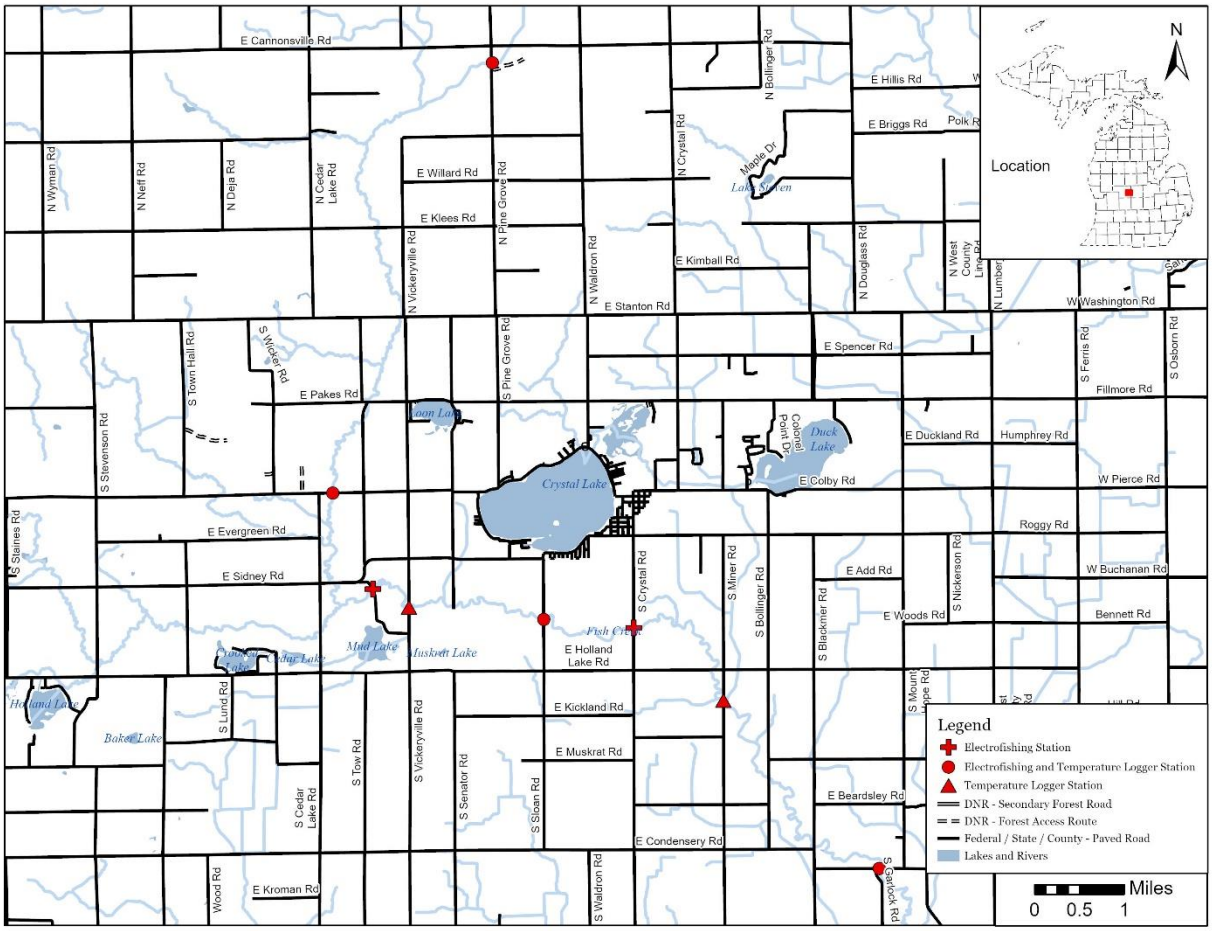


Figure 2. Brown Trout catch per unit effort with electrofishing gear at six sites on Fish Creek in summer 2023. Catch per unit effort is defined as the number of Brown Trout captured per 1,000 feet of creek shocked. From left to right, sites are listed from upstream to downstream.

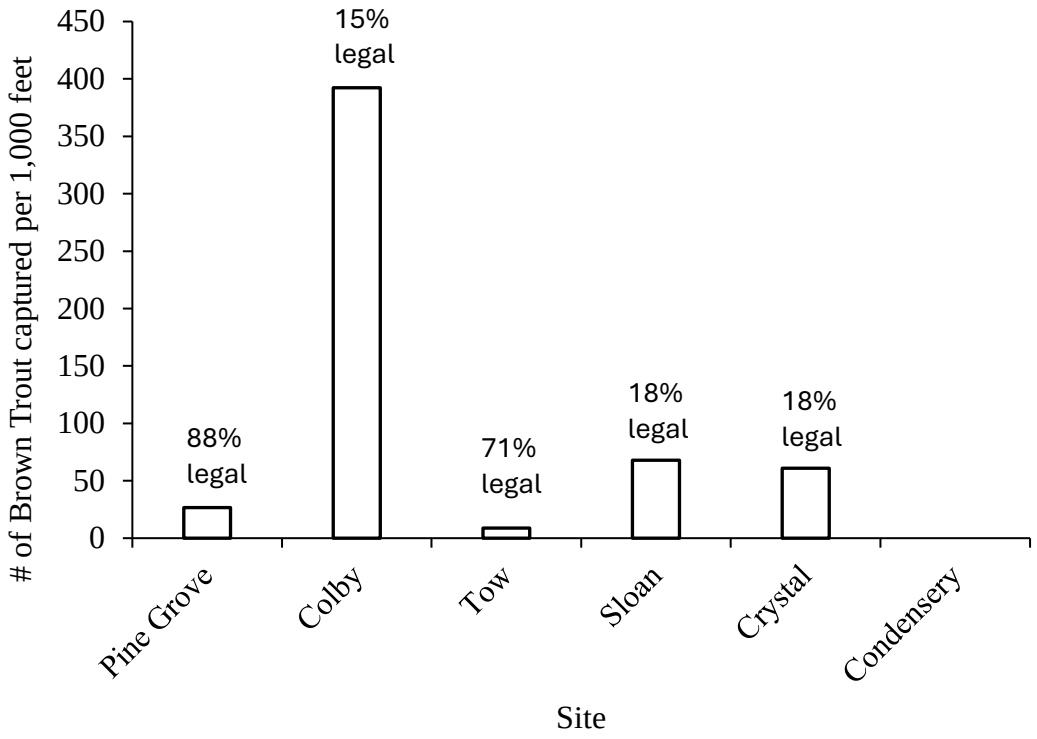


Figure 3. Length frequency histogram for Brown Trout captured in Fish Creek across six sites in summer 2023.

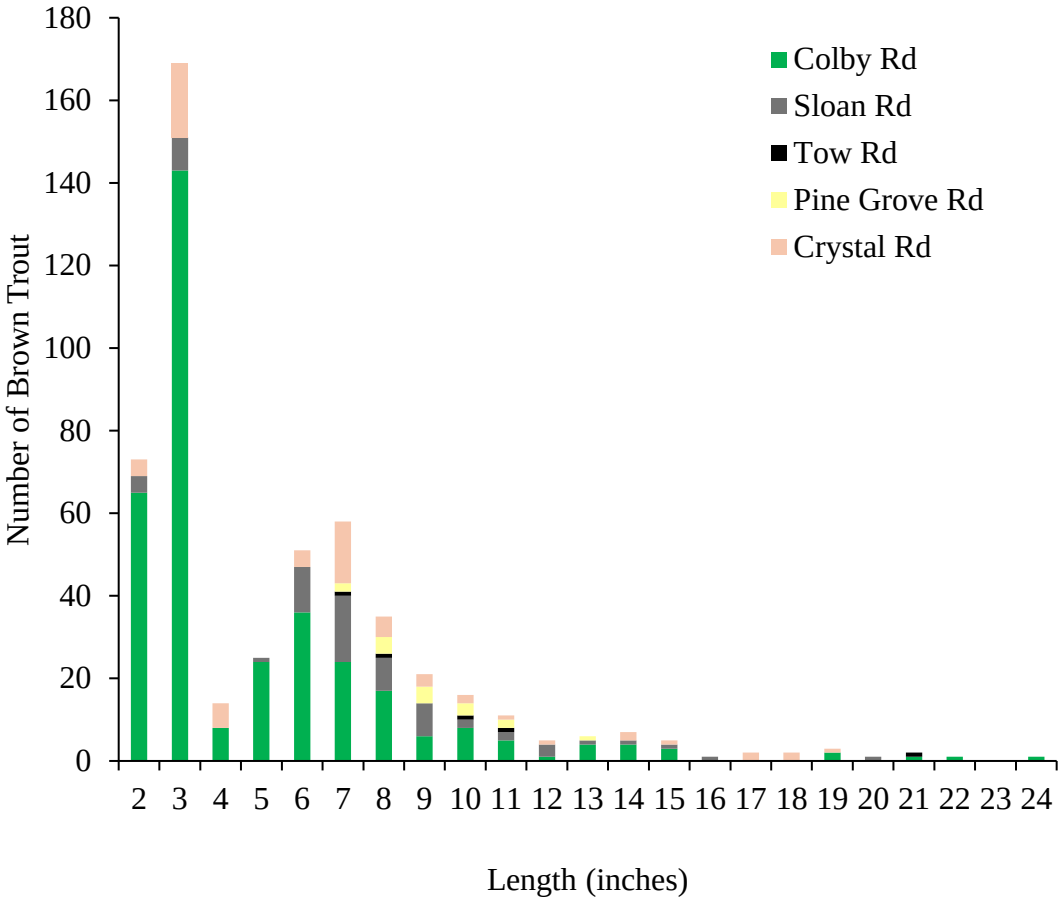
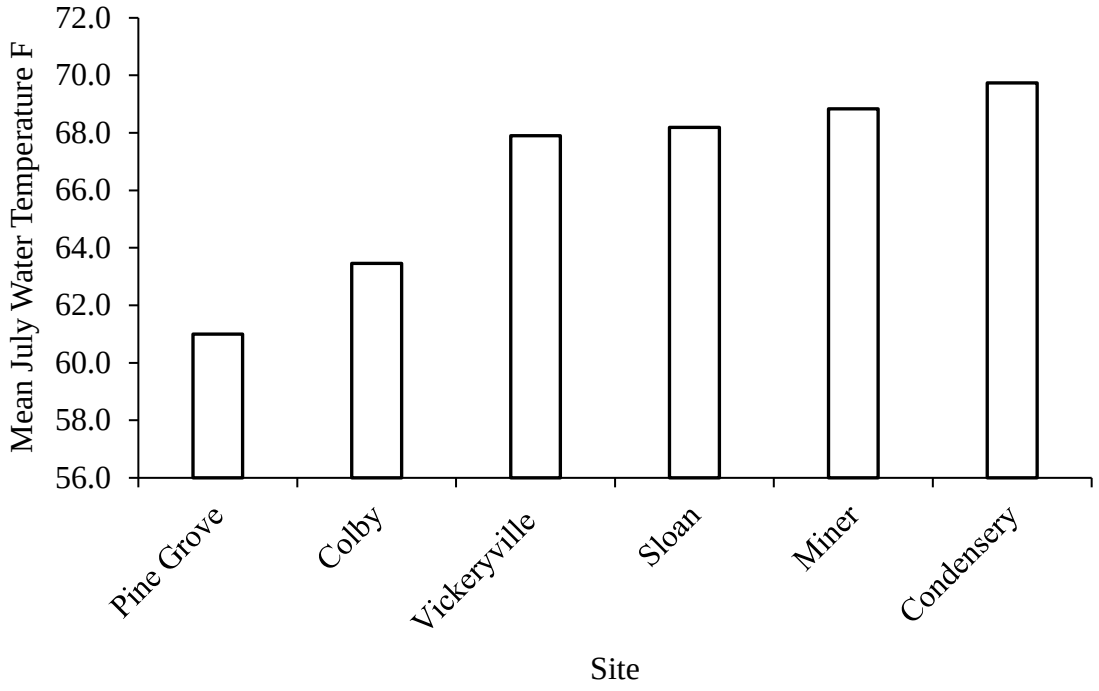


Figure 4. Mean July water temperatures (F) at six sampling locations on Fish Creek in 2023. From left to right, sites are listed from upstream to downstream.



Received April 2, 2025; Approved April 30, 2025
Brian Gunderman, Unit Review and Approval
Scott Heintzelman, External Reviewer
John Bauman, SFR Facilitator
John Bauman, Desktop Publisher and Approval