Tamarack Creek
Montcalm, Newaygo Counties
Muskegon River Watershed, last surveyed 2019

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Environment

Tamarack Creek is located in the west-central Lower Peninsula of Michigan, near the small towns of Lakeview and Howard City. It lies in the Muskegon River watershed, and it originates as a designated agricultural drain to the north of Lakeview, in southern Mecosta County. From there, it flows southwest into Montcalm County, passing just north of Lakeview. It then proceeds southwest for approximately 21 miles to Howard City. After flowing through Howard City, Tamarack Creek flows generally west for another 15 miles into Newaygo County before joining the Little Muskegon River. Over its 36-mile course, Tamarack Creek drops approximately 200 feet, for a gradient of 5.6 ft/mi.

The landscape in the upper Tamarack Creek watershed is primarily agricultural, with scattered woodlots comprised of mostly hardwoods. Between Lakeview and Howard City, the landscape remains agricultural, but Tamarack Creek flows through a predominantly wooded corridor consisting of hardwoods. Downstream of Howard City, the watershed becomes primarily forested with northern hardwoods and conifers. The vast majority of the land within the watershed is privately owned, except for two small parks in Howard City (Minnie Farmer and Artman Parks) and the lower half mile or so of Tamarack Creek, which flows through Manistee National Forest land that is administered by the U. S. Forest Service (USFS).

Tamarack Creek has numerous small tributaries that join along its course. Most are designated agricultural drains. Notable tributaries include Alley Creek, Rice Creek (Designated Trout Stream), the Weatherby Drain (also a Designated Trout Stream), Brandy Creek, and Indian Lake Creek, along with a number of other designated agricultural drains and unnamed tributaries (some of which are also Designated Trout Streams). Notable lakes in the watershed include Whitefish Lake, Little Whitefish Lake, Indian Lake, and Tamarack Lake. There are no known dams on the mainstem of Tamarack Creek below Lakeview, but there are numerous private ponds in the watershed that likely exist due to the damming of springs or small tributaries.

Tamarack Creek is a Designated Trout Stream and is regulated by Michigan Department of Natural Resources (MDNR) Fisheries Division as a Type 4 stream open to all types of tackle and open to fishing year-round. The possession season for Brown and Brook Trout is from the last Saturday in April through September 30, while Rainbow Trout can be kept year-round. During the possession season, minimum size limits are 7" for Brook Trout, 10" for Brown Trout, and 10" for Rainbow Trout. A total of five trout can be kept per day, with no more than three fish over 15 inches.

History

The State of Michigan has a long history of stocking Tamarack Creek (Table 1). Brook Trout were first stocked in 1886, and Rainbow Trout were first stocked in 1901. The first official record of Brown Trout being stocked was in 1935, but it is possible that they were stocked much earlier than that, since

other nearby streams were stocked with Brown Trout decades earlier. Early 20th century stocking records are somewhat limited, and some records were reported to have been lost in a fire in Lansing. Over the years various combinations of Brook Trout, Brown Trout, and Rainbow Trout have been stocked. Brook Trout were last stocked in 1961. Since 2016, the current MDNR stocking regime has been to stock 11,000 yearling Brown Trout at five different sites and 5,300 yearling Rainbow Trout at three different sites. Prior to 2016, the prescription was to stock 14,900 Brown Trout at 9 sites and 6,300 Rainbow Trout at four sites.

Although there are no records of the original fish community of the Tamarack Creek, based on stream characteristics, water temperature and gradient, it may have supported Arctic Grayling as its only native salmonid species. The Arctic Grayling was well documented in other parts of the Muskegon River watershed and whether it was native to Tamarack Creek or not, by 1900 or shortly thereafter, Arctic Grayling was extirpated from all streams in the lower peninsula of Michigan (Vincent 1962).

Historical Scientific Investigations and Fisheries Management

The first scientific investigation by Michigan Department of Conservation (MDOC, the precursor to the MDNR of today) fisheries personnel on Tamarack Creek took place in 1940 (Shetter 1940). No fisheries survey was conducted, but the researchers "cruised" and observed approximately 8 miles of the stream (4 miles upstream and downstream of Howard City). They also took temperature readings at numerous locations within that stream reach. They noted stream temperatures that were warmer than desirable for salmonids and questioned the capability of the stream to hold salmonids year-round.

Another investigation of a similar nature was conducted in 1944 (Washburn 1944). While the results were similar to those of 1940, this effort stretched a little further downstream, where the researchers found more springs and cooler water temperatures. This investigation led Washburn to recommend the continued stocking of Brook, Brown, and Rainbow Trout at various levels. He also recommended a stream improvement project, as he found the lower reaches of Tamarack Creek to be overly wide and shallow. There is also correspondence in which degradation of the stream from agricultural impacts is discussed (MDNR files, Cadillac, 1951).

The first electrofishing effort on Tamarack was conducted in September of 1953, in response to reports of several Lake Trout having supposedly been caught by anglers over the summer. Two stations were shocked, both downstream of Howard City. Several Brown Trout and Rainbow Trout were caught, along with 21 other fish species (Table 2). No Lake Trout were caught in the effort, and whether the reports were true or not was never determined.

Due to the marginal nature of Tamarack Creek as a trout stream, rotenone treatments were conducted in 1971, 1979, and 1992. Rotenone is a chemical that induces a fish-kill in the waters to which it is applied. The reasoning behind these treatments was to reduce competing or "rough fish species" like Creek Chubs, White Suckers, Blacknose Dace, etc. Unfortunately, the treatments kill trout as well, since rotenone is non-discriminant. Regular rotenone kills were routinely conducted on many "marginal" trout streams in Michigan throughout the latter half of the 1900s. Immediately after a rotenone treatment, trout would be stocked. Reports from Tamarack Creek anglers showed the perception that for several years after treatments, trout fishing would be good, but then the competing species would recolonize, and the trout fishing would decline. MDNR fisheries management strategies have evolved since then, as managers began to realize that marginal temperatures and poor habitat

were far more detrimental to trout than competing species. Also, rotenone fish kills were not popular with landowners and the public at large.

Also, in the 1970s, fisheries managers installed several weirs or dams in Tamarack Creek. The goal of these dams was to halt upstream migrations of "rough fish" into the upper reaches of Tamarack Creek, theoretically ensuring better fishing for the stocked Brown and Rainbow Trout. Other marginal trout streams in the western Lower Peninsula were also managed in a similar fashion. As with the rotenone treatments, these temporary dams were removed when managers began to realize that the competing fish species were not the ultimate problem, and that the dams were time and labor-intensive and expensive to maintain; not to mention that their effectiveness was questionable at best.

Since the first electrofishing survey conducted on Tamarack Creek in 1953, numerous other electrofishing surveys have been conducted on Tamarack Creek over the years by MDOC/MDNR fisheries personnel. Surveys were conducted in 1965, 1970-1973, 1977, 1982, 1987, 1989, and 1993. In those surveys (and the 1992 rotenone survey; the only one in which all species were recorded), forty-five different fish species have been documented in Tamarack Creek (Table 2). Brown Trout, Creek Chub, and White Sucker were present in nearly all of the surveys. Prior to 2019, the most recent MDNR electrofishing survey was conducted in 1993 (four sites in Montcalm County) and was designed to assess the rotenone treatment that had been conducted in 1992.

Tamarack Creek was also sampled by the Michigan Department of Environmental Quality (MDEQ) in 1996 (Walker 1998), and in 2006 (Wesener 2010). In the 1996 MDEQ survey, four different stations on Tamarack Creek were sampled for macroinvertebrate community, physical habitat, and fish community (electrofishing). The stations included (from downstream to upstream): County Line Road (the lowest road/stream crossing on Tamarack Creek), Amy School Road (Artman Park; just west of Howard City), Minnie Farmer Park in Howard City, and Almy Road (approximately 5 miles upstream of Howard City). The fish surveys showed that Brown Trout were present at all four stations, Rainbow Trout were present at the lower two stations, and Brook Trout were present at the lowest station. The macroinvertebrate community rated as "Excellent" at all four stations, while the habitat rated as "Good (Slightly Impaired)" at the County Line and Minnie Farmer Park stations, "Excellent (Non-Impaired)", at the Amy School Road station, and "Fair (Moderately Impaired)" at the Almy Road station.

In the 2006 MDEQ survey, one site on the Weatherby Drain and three sites on Tamarack Creek were sampled for macroinvertebrate community and physical habitat. The Tamarack Creek stations included (from upstream to downstream): Masters Road, Tamarack Road, and Nimberger Road. At the Weatherby drain site, the macroinvertebrate community rated as "Poor", while the habitat rated as "Marginal (Moderately Impaired). The macroinvertebrate community rated as "Acceptable" at all three Tamarack Creek sites. The habitat rated as "Good (Slightly Impaired)" at the Masters Road and Tamarack Road stations, and "Marginal (Moderately Impaired)" at the Nimberger Road site.

One issue that has been discussed several times over the years involves stocking areas that lack public access (or areas where landowners are posting their land and not allowing anglers to fish). This issue is documented in 1956, 1963, and again in 2016 (MDNR files, Cadillac) when MDNR Fisheries Biologist Rich O'Neal cut several stocking sites due to landowners denying angler access to the stream on their property. The need for additional public access on Tamarack Creek is well-documented in the

file, as are recommendations that the State should consider purchasing land along the stream for public access.

In 2015, the Muskegon River Watershed Assembly (MRWA) was awarded a large grant from the Environmental Protection Agency through the Great Lakes Restoration Initiative (GLRI) program. The grant was dedicated to the Tamarack Creek watershed, with the goal of reducing non-point source pollution through a variety of methods. The project was completed over a two-year period, from 2015 through 2017. Tactics utilized included the stabilization and restoration of nearly 500 feet of eroding streambanks at Artman and Minnie Farmer Parks, adding cover crops to 2,700 acres of fallow farmland, adding 9 acres of buffer and filter strips along tributary streams in the watershed, and replacing 5 different road/stream crossings that were negatively impacting the watershed. The cover crops, buffer/filter strips, and the road/stream crossing improvements were all completed in the Weatherby Drain subwatershed of Tamarack Creek. Many partners contributed to the effort, and over $211,000 was spent in the effort (MRWA 2018).

Current Status

The most recent MDNR Fisheries Division survey of Tamarack Creek was conducted on July 30, 2019. The station began at the M-82 crossing and ran upstream for 1,700 feet. Sampling was conducted using a tow barge electrofishing unit with 3 probes and followed the MDNR Status & Trends protocol described by Wills et al. (2011) for both fisheries and habitat assessments. Sampling consisted of one electrofishing pass. Temperature data were also collected for the summer of 2019 using a continuous recording thermometer that took hourly readings.

Seven-hundred sixty-two fish representing 24 different species were caught in the 2019 survey (Table 3). Bluegill, Brown Trout, and Green Sunfish were the most numerous species captured. Within the 2019 survey reach, Tamarack Creek averaged 40.2 feet wide and 2.1 feet deep (Table 4). The maximum depth was 4.1 feet and the discharge was estimated at 61.8 CFS. The primary substrate within the survey reach was sand (41.5%; Table 4). Rocky substrates like gravel and cobble comprised about 40% of the total. The July average temperature within the reach was 67.7° F, while the maximum temperature for the summer of 2019 was 73.0° F (Table 5). The survey reach flows through a forested area with a mix of hardwood and white pine trees as the primary landcover. Vegetative cover in the riparian zone consisted of various overhanging grass and shrub species.

The Brown, Brook, and Rainbow Trout captured in the 2019 Tamarack Creek survey were aged by examining growth rings on the scales. Only one age class was represented for Brook Trout, while five different age classes of Brown Trout and two age classes of Rainbow Trout were present (Table 6). With all year classes combined, Brown Trout aged 0-3 were growing 0.3 inches faster than the State of Michigan average. Age -1 Rainbow Trout were growing 2.4 inches faster than the State of Michigan average, although these were likely fish that had been stocked just a few months prior to the survey (the same applies for the age-1 Brown Trout). Not enough Brook Trout were caught to make statistical inferences regarding age and growth.

Analysis and Discussion

The 2019 MDNR fisheries survey confirmed that Tamarack Creek continues to function as a trout stream, and that the stocked Brown Trout are thriving and "holding over" for multiple years. The

presence of 25 Brown Trout smaller than 4 inches is also an indicator that natural reproduction is occurring, at least in some years. The Brook Trout caught in the 2019 survey are obviously naturally reproduced since none are stocked in the watershed. Rainbow Trout were much less abundant, with only 8 caught in the survey and no evidence of natural reproduction. Angler reports indicate that Brown Trout fishing continues to be good in Tamarack Creek, and that Brown Trout sometimes reach large sizes (over 20 inches).

There is a small, warmwater tributary that enters Tamarack Creek within the survey reach. While the temperature of the tributary was not measured, the tributary was noticeably warmer than that of Tamarack Creek. Scrutiny of satellite imagery indicates that the tributary emanates from a private pond (likely created by a dam). It is possible or even likely that the large numbers of small Bluegill and Green Sunfish caught in the 2019 survey migrated downstream from this impoundment.

The impacts of agricultural practices on Tamarack Creek cannot be understated. Tamarack Creek has been dramatically degraded by these practices. It is likely that the impacts were already being felt by the time the initial scientific investigations were conducted (Shetter 1940; Washburn 1944). If Tamarack Creek were not degraded due to agricultural practices, its ability to host coldwater species would likely be much greater than it is currently. Private dams/impoundments on springs and small tributaries also contribute to the degradation of the water quality of Tamarack Creek. However, even with the degradation due to agricultural ditching and dredging, Tamarack Creek still functions as a trout stream, and even supports some natural reproduction of Brook Trout and Brown Trout. While the fishing in Tamarack Creek does not match other, colder, less degraded trout streams like the Pine, Hersey, or Little Manistee Rivers, with stocking it still provides a viable trout fishery less than one hour's drive from the major urban centers of Muskegon and Grand Rapids.

Currently, migratory salmonids from Lake Michigan, including Chinook Salmon, Coho Salmon, and Steelhead, cannot access Tamarack Creek or its tributaries. This is due to a large hydroelectric dam (Croton Dam; owned by Consumers Energy) that blocks all upstream fish passage on the Muskegon River. However, if the dam were ever removed or fish passage was provided through other means, Tamarack Creek and its tributaries would provide spawning and rearing habitat for the three species of migratory salmonids mentioned.

Management Direction

The current stocking regime of 11,000 yearling Brown Trout (at five sites) and 5,300 yearling Rainbow Trout (at three sites) annually on Tamarack Creek should be continued. The 2019 survey documented survival and holdover of stocked Brown and Rainbow Trout. Continued stocking will allow Tamarack Creek to continue to provide angling opportunities for those species within one hour of the major population centers of Grand Rapids and Muskegon.

Other reaches of Tamarack Creek further upstream should be sampled by electrofishing as soon as possible since they have not been surveyed since 1993. In particular, the area just downstream of Lakeview, near Satterlee and Nimberger Roads, where Brown Trout continue to be stocked, should be surveyed. The tributaries in the Tamarack Creek sub-watershed have also not been surveyed in many years (most since the 1960s). Therefore, all tributaries should also be surveyed by backpack electrofishing as soon as possible to establish current baseline data on existing fish populations.

The potential for the state (or other conservation-minded organizations) to acquire land along Tamarack Creek should be explored. Public land along Tamarack Creek would serve two purposes. First, it would provide assured public access for anglers, paddlers, and others who would enjoy Tamarack Creek. Second, it would assure that the land would be maintained in a wild, undeveloped state, which would contribute to the long-term health of the stream. Currently, public access is only available at road/stream crossings, at Artman and Minnie Farmer Parks in Howard City, and on USFS land in the extreme lower portion of the watershed.

Further projects similar in nature to the recent GLRI project should be conducted within the watershed. In particular, measures that can mitigate the negative effects of agriculture on the watershed should be of high priority. Projects should include cover crops, buffer strips, streambank stabilization, and road/stream crossing improvement. This will require working directly with farmers and educating them about the effects of environmentally unsound agricultural practices on Tamarack Creek. Also, private dams/impoundments in the watershed should be investigated to see if the potential for removal exists. Habitat improvement projects should also be implemented to improve the populations of both stocked and naturally reproduced trout in Tamarack Creek. Habitat improvement projects should be designed to narrow and deepen the stream, provide habitat diversity within the stream channel, and provide overhead cover for trout.

References

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Table 1. Fish stocked into Tamarack Creek, Montcalm and Newaygo Counties.

Year	Species	Number	Life Stage	Strain
1886	Brook Trout	10,000	fry	
1888	Brook Trout	16,000		
1889	Brook Trout	10,000		
1890	Brook Trout	12,000		
1895	Brook Trout	25,000		
1896	Brook Trout	20,000		
1901	Brook Trout	32,000		
	Rainbow Trout	10,500		
1902	Brook Trout	39,000		
	Rainbow Trout	20,000		
1903	Brook Trout	16,000		
	Rainbow Trout	14,000		
1904	Brook Trout	8,000		
	Rainbow Trout	14,000		
1905	Brook Trout	9,000	fry	
	Rainbow Trout	8,000	fry	
1906	Brook Trout	2,000		
	Rainbow Trout	7,500		
1907	Brook Trout	21,000		
	Rainbow Trout	5,500	fry, fingerlings	
1909	Brook Trout	11,000	fry	
	Rainbow Trout	17,000	fry	
1911	Rainbow Trout	24,000	fry	
1912	Rainbow Trout	9,000	fry	
1913	Rainbow Trout	16,000	fry	
1934	Rainbow Trout	46,133	3 mo., yearlings	
1935	Brook Trout	8,100	4 mo., yearlings	
	Brown Trout	3,230	8 mo.	
	Rainbow Trout	2,000	7 mo.	
1936	Brook Trout	800	yearlings	
	Brown Trout	550	yearlings	
	Rainbow Trout	1,200	3 mo.	
1937	Brook Trout	2,000	6 mo.	
	Brown Trout	15,000	1 mo., yearlings	
	Rainbow Trout	27,175	2 mo., yearlings	
1938	Brook Trout	2,500	7 mo.	
	Brown Trout	10,400	3 mo., 7 mo.	
	Rainbow Trout	12,734	3 mo., 6 mo.	
1939	Brook Trout	5,500	7 mo.	
	Brown Trout	55,000	3 mo., 7 mo.	
	Rainbow Trout	6,950	5 mo., yearlings	

Table 1 continued.

1940	Brown Trout	46,000	2 mo., yearlings
	Rainbow Trout	9,800	6 mo., yearlings
1941	Brook Trout	100	yearlings
	Brown Trout	5,400	yearlings
	Rainbow Trout	4,300	8 mo., yearlings
1942	Brook Trout	1,000	yearlings
	Brown Trout	4,400	yearlings, adults
	Rainbow Trout	41,000	2 mo., yearlings
1943	Brown Trout	1,226	adults
	Rainbow Trout	1,400	yearlings
1944	Brown Trout	2,600	yearlings, adults
	Rainbow Trout	1,350	yearlings
1945	Brown Trout	3,027	yearlings, adults
	Rainbow Trout	2,300	yearlings, adults
1946	Brown Trout	2,600	yearlings, adults
	Rainbow Trout	1,050	yearlings
1947	Brown Trout	3,700	yearlings, adults
	Rainbow Trout	2,300	yearlings
1948	Brown Trout	2,800	yearlings, adults
	Rainbow Trout	3,150	yearlings
1949	Brown Trout	4,000	yearlings, adults
	Rainbow Trout	3,200	yearlings
1950	Brown Trout	4,275	yearlings
	Rainbow Trout	2,575	yearlings
1951	Brown Trout	5,056	yearlings
	Rainbow Trout	1,100	yearlings
1952	Brown Trout	2,764	yearlings
	Rainbow Trout	1,600	yearlings
1953	Brown Trout	1,975	yearlings
	Rainbow Trout	1,050	yearlings
1954	Brown Trout	1,400	yearlings
	Rainbow Trout	1,550	yearlings
1955	Brown Trout	550	legal
	Rainbow Trout	3,050	legal
1956	Brown Trout	1,300	legal
	Rainbow Trout	3,100	legal
1957	Brown Trout	300	legal
	Rainbow Trout	3,500	legal
1958	Brown Trout	1,200	legal
	Rainbow Trout	2,000	legal
1959	Brown Trout	200	legal
	Rainbow Trout	2,100	legal
1960	Brown Trout	1,200	legal, sublegal
	Rainbow Trout	1,400	legal

Table 1 continued.

1961	Brook Trout	600	legal	
	Brown Trout	600	legal	
	Rainbow Trout	2,000	legal	
1962	Brown Trout	1,200	legal	
	Rainbow Trout	1,400	legal	
1963	Brown Trout	600	legal	
	Rainbow Trout	1,400	legal	
1964	Brown Trout	600	legal	
	Rainbow Trout	800	legal	
1965	Brown Trout	1,000	sublegal	
	Rainbow Trout	31,765	sublegal	
1966	Brown Trout	6,000	fall fingerlings	
1968	Brown Trout	1,000	yearlings	
1969	Rainbow Trout	3,000	yearlings	
1971	Brown Trout	33,712	fingerlings	
	Rainbow Trout	8,500	fingerlings	
1972	Brown Trout	37,702	yearlings	
1973	Brown Trout	23,400	yearlings	
	Rainbow Trout	15,300	yearlings	
1974	Brown Trout	8,700	yearlings	
	Rainbow Trout	4,400	yearlings	
1975	Brown Trout	18,800	yearlings	
1976	Brown Trout	17,400	yearlings	
	Rainbow Trout	6,000	yearlings	
1977	Brown Trout	9,200	yearlings	
	Rainbow Trout	6,000	yearlings	
1978	Brown Trout	6,000	yearlings	
1979	Brown Trout	19,000	yearlings	
1980	Brown Trout	14,963	yearlings	
1981	Brown Trout	13,100	yearlings	Harrietta
	Rainbow Trout	5,000	yearlings	Harrietta
1982	Brown Trout	11,850	yearlings	Harrietta
	Rainbow Trout	4,500	yearlings	Harrietta
1983	Brown Trout	15,780	yearlings	Harrietta
	Rainbow Trout	6,700	yearlings	Harrietta
1984	Brown Trout	17,500	yearlings	Harrietta
	Rainbow Trout	5,250	yearlings	Harrietta
1985	Brown Trout	12,740	yearlings	Harrietta
	Rainbow Trout	7,100	yearlings	Shasta
1986	Brown Trout	14,250	yearlings	Wild Rose, Soda Lake
	Rainbow Trout	7,100	yearlings	Shasta
1987	Brown Trout	14,950	yearlings	Soda Lake
	Rainbow Trout	4,800	yearlings	Shasta

Table 1 continued.

1988	Brown Trout	17,500	yearlings	Soda Lake
	Rainbow Trout	5,600	yearlings	Shasta
1989	Brown Trout	15,800	yearlings	Plymouth Rock
	Rainbow Trout	8,100	yearlings	Shasta
1992	Brown Trout	34,993	yearlings	Plymouth Rock
	Rainbow Trout	11,200	fall fingerlings	Shasta
1993	Brown Trout	14,910	fall fingerlings	Plymouth Rock
	Rainbow Trout	8,100	yearlings	Shasta
1994	Brown Trout	16,000	yearlings	Saint Croix
	Rainbow Trout	8,100	yearlings	Shasta
1995	Brown Trout	14,888	yearlings	Wild Rose
	Rainbow Trout	8,100	yearlings	Shasta, Arlee
1996	Brown Trout	13,940	yearlings	Wild Rose
	Rainbow Trout	5,583	yearlings	Shasta
1997	Brown Trout	12,325	yearlings	Seeforellen
	Rainbow Trout	3,800	yearlings	Eagle Lake
1998	Brown Trout	12,060	yearlings	Seeforellen
	Rainbow Trout	3,800	yearlings	Eagle Lake
1999	Brown Trout	14,900	yearlings	Seeforellen
	Rainbow Trout	6,140	yearlings	Eagle Lake
2000	Brown Trout	16,400	yearlings	Seeforellen
	Rainbow Trout	6,300	yearlings	Eagle Lake
2001	Brown Trout	14,900	yearlings	Wild Rose
	Rainbow Trout	6,300	yearlings	Eagle Lake
2002	Brown Trout	14,900	yearlings	Wild Rose
	Rainbow Trout	6,300	yearlings	Eagle Lake
2003	Brown Trout	14,900	yearlings	Wild Rose
	Rainbow Trout	6,300	yearlings	Eagle Lake
2004	Brown Trout	14,900	yearlings	Gilchrist Creek
	Rainbow Trout	6,300	yearlings	Eagle Lake
2005	Brown Trout	14,900	yearlings	Seeforellen
	Rainbow Trout	3,800	yearlings	Eagle Lake
2006	Brown Trout	14,900	yearlings	Wild Rose
	Rainbow Trout	9,700	yearlings	Eagle Lake
2007	Brown Trout	13,780	yearlings	Seeforellen
	Rainbow Trout	6,300	yearlings	Eagle Lake
2008	Brown Trout	14,900	yearlings	Seeforellen
	Rainbow Trout	6,300	yearlings	Eagle Lake
2009	Brown Trout	14,436	yearlings	Seeforellen
	Rainbow Trout	6,800	yearlings	Eagle Lake
2010	Brown Trout	15,600	yearlings	Wild Rose
	Rainbow Trout	6,500	yearlings	Eagle Lake

Table 1 continued.

2011	Brown Trout	14,900	yearlings	Gilchrist Creek
	Rainbow Trout	6,500	yearlings	Eagle Lake
2012	Brown Trout	17,373	yearlings	Wild Rose
	Rainbow Trout	6,300	yearlings	Eagle Lake
2013	Brown Trout	14,800	yearlings	Gilchrist Creek
	Rainbow Trout	6,300	yearlings	Eagle Lake
2014	Brown Trout	14,900	yearlings	Gilchrist Creek
	Rainbow Trout	6,400	yearlings	Eagle Lake
2015	Brown Trout	14,900	yearlings	Wild Rose
	Rainbow Trout	6,930	yearlings	Eagle Lake
2016	Brown Trout	11,000	yearlings	Gilchrist Creek
	Rainbow Trout	5,700	yearlings	Eagle Lake
2017	Brown Trout	11,495	yearlings	Sturgeon River
	Rainbow Trout	8,030	yearlings	Eagle Lake
2018	Brown Trout	12,100	yearlings	Sturgeon River
	Rainbow Trout	5,700	yearlings	Eagle Lake
2019	Brown Trout	11,000	yearlings	Gilchrist Creek
	Rainbow Trout	5,830	yearlings	Eagle Lake

Table 2. Presence/absence of fish species in historical fisheries surveys at various locations on Tamarack Creek and tributaries, Newaygo and Montcalm Counties, Michigan.

Species	1953	1965	1970	1971	1972	1973	1977	1979**	1980	1982	1987	1989	1992*	1993	1996**	2019
American Brook Lamprey	x	x														
Black Bullhead	x					x	x		x			x	x			
Black Crappie					x		x	x	x			x				
Blacknose Dace	x	x	x						x		x	x	x	x	x	x
Blacknose Shiner													x			
Blackside Darter	x	x	x			x			x		x	x			x	x
Bluegill												x	x			x
Bluntnose Minnow	x	x	x	x												
Brook Stickleback			x							x						
Brook Trout		x	x	x								x	x		x	x
Brown Trout	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Central Mudminnow			x	x	x	x	x		x	x		x	x		x	x
Central Stoneroller		x	x								x					
Chestnut Lamprey													x			
Common Carp								x								
Common Shiner	x	x	x	x	x	x	x		x			x				x
Creek Chub	x	x	x		x	x	x		x	x	x	x	x		x	x
Fathead Minnow										x						
Grass Pickerel												x				
Green Sunfish												x	x		x	x
Horneyhead Chub	x		x			x										x
Johnny Darter	x	x		x			x					x	x		x	x
Lamprey spp.			x	x											x	
Largemouth Bass	x					x					x	x	x	x	x	x
Logperch			x								x	x	x		x	x
Longnose Dace	x		x			x					x	x			x	x
Mottled Sculpin	x	x		x		x				x	x	x	x		x	x
Northern Brook Lamprey		x	x								x					
Northern Hog Sucker	x	x	x			x	x					x	x		x	x
Northern Pike		x	x	x		x	x	x				x				x
Northern Redbelly Dace	x	x	x							x			x			
Pearl Dace	x									x						
Pumpkinseed						x	x		x	x		x	x			x
Rainbow Darter													x			
Rainbow Trout	x				x	x	x				x	x		x	x	x
Rock Bass		x				x						x	x			x
Rosyface Shiner	x															x
Sand Shiner															x	
Shorthead Redhorse	x	x	x		x	x		x			x	x	x			x
Slimy Sculpin			x				x									
Smallmouth Bass	x															
Walleye			x													
White Crappie									x							
White Sucker	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Yellow Bullhead		x														
Yellow Perch	x			x	x	x			x	x	x	x				x

*Rotenone treatment

**Sampling conducted by MDEQ

Table 3. Number of fish caught per inch group in a July 30, 2019 electrofishing survey of Tamarack Creek, Newaygo County, MI. The station began at the M-82 crossing and ran upstream for 1,700 feet.

	Inch class																	
Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	Total:
Blacknose Dace		1																1
Blackside Darter		11	6															17
Bluegill		16	145	10														171
Brook Trout					2	2												4
Brown Trout		11	11	4	15	27	32	16	21	10	2	4	3	1				157
Central Mudminnow		1																1
Common Shiner		1	1	1	1													4
Creek Chub	5	9	21	4	4	2	1											46
Green Sunfish	6	53	12	5	2													78
Horneyhead Chub		7	7	19	9	7	6											55
Johnny Darter		12	3															15
Largemouth Bass	13	7																20
Logperch		1	24	1														26
Longnose Dace		6	21	6														33
Mottled Sculpin	2	31	20															53
Northern Hog Sucker								1	1	3	1		2					8
Northern Pike																	1	1
Pumpkinseed			1	1														2
Rainbow Trout					1		2	3	1		1							8
Rock Bass		1	1	1		1												4
Rosyface Shiner			1															1
Shorthead Redhorse										1	1	3	3	3	4	1		16
White Sucker				6	7	1	1	6	1	9	1	1		2	1			36
Yellow Perch			5															5
																		762

Table 4. Habitat evaluation from Tamarack Creek at the M-82 survey station, July 16, 2019. The discharge measurement was taken on July 30, 2019.

	2019
% Riffle	7.7
% Run	84.6
% Pool	7.7
Average width (ft)	40.2
Average depth (ft)	2.1
Max depth (ft)	4.10
Discharge (cfs)	61.8
Woody cover (sq ft)	420.0
Linear wood (ft)	282.0
Substrate	
clay	9.23%
detritus/silt	1.54%
sand	41.54%
gravel	18.46%
small cobble	16.92%
large cobble	4.62%
boulder	3.08%
wood	3.08%
island	1.54%

Table 5. Temperature data (degrees F) from Tamarack Creek at the M-82 survey station, 2019.

	2019
February Minimum	31.8
February Average	33.5
February Maximum	38.1
June Minimum	56.3
June Average	62.6
June Maximum	69.9
July Minimum	60.8
July Average	67.7
July Maximum	73.0
Aug Minimum	57.4
Aug Average	63.8
Aug Maximum	68.7

Table 6. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Tamarack Creek at the M-82 station by electrofishing. Number of fish aged is given in parenthesis. At least five individuals from any given age group must be caught to make statistical inferences regarding growth.

			Age					Mean Growth
Year	Month	Species	0	I	II	III	IV	Index
2019	July	Brook Trout		5.8 (4)				--
		Brown Trout	2.9 (20)	6.4 (32)	8.7 (36)	12.2 (9)	13.3 (2)	+0.3
		Rainbow Trout		7.6 (6)	10.1 (2)			+2.4