Croton Dam Pond

Newaygo County
Muskegon River Watershed, surveyed in 2022

Mark A. Tonello, Fisheries Management Biologist

Environment

Croton Dam Pond is an impoundment on the Muskegon River in the western lower peninsula, located in eastern Newaygo County. Croton Dam Pond was created in 1907 when Croton Dam was constructed by Consumers Power Company (now Consumers Energy). At full pool, Croton Dam Pond has a surface area of 1,209 acres (Lawler, Matusky, and Skeller (LMS), 1991), although other sources list the acreage as 1,380 acres (O'Neal and Claramunt 2014) or 1,320 acres (Trimberger 1984). Croton Dam maintains a normal head of 45.5 feet and inundates a 7.5-mile reach of the Muskegon River with moderate to high gradient (O'Neal 1997). Croton Dam is a hydroelectric dam, and it is operated by Consumers Energy and regulated by the Federal Energy Regulatory Commission (FERC). Croton Dam is rated as a High Hazard dam by FERC, meaning that failure or mis-operation will probably result in loss of human life. The current operating license was issued in 1994 and will expire in 2034. For this report, the entire reach from Hardy Dam to Croton Dam (including the eastern or Little Muskegon River arm) will be referred to as Croton Dam Pond (CDP).

Most of the land surrounding CDP is privately owned, although there are several large parcels with shoreline frontage owned by Consumers Energy. There is one access site with a fishing pier and public boat launch (administered by Consumers Energy) on CDP, located just north (upstream) of Croton Dam on the western shore of CDP. There is also a large public campground on the eastern shore of CDP that is administered by Croton Township. Foot access is also available on both sides of the impoundment directly downstream from Hardy Dam, on land owned by Consumers Energy. The eastern arm of CDP is separated from the main body by a causeway, upon which lies Croton-Hardy Drive. The eastern arm empties into the main body of CDP through a bridge crossing. On the eastern arm, there is no public frontage, other than the road frontage created by the causeway.

The terrain surrounding CDP is characterized as hilly with a mix of hardwoods and conifers. The surface elevation of CDP is approximately 722 feet, while some of the hills flanking both sides of CDP reach elevations of over 900 feet. Substrates in the impoundment consist mainly of sand, organic muck (particularly in the coves), and some gravel. Further upstream, closer to Hardy Dam, the substrates turn mostly to gravel. Croton Pond has variable depths, as most of the impoundment is defined by steep drop-offs to the river channel. The basin nearest to the dam is the deepest, at approximately 40 feet. The eastern arm of CDP has depths that reach approximately 30 feet. Stumps and woody debris that once defined the floodplain now offer fish cover. Those stumps also can present navigational hazards.

Only two tributary streams flow into CDP. One is unnamed, relatively small and short in length, and flows into CDP from the east. The only other tributary to CDP is the Little Muskegon River, which flows into the eastern arm. The Little Muskegon River is one of the larger tributaries to the Muskegon River, and is a trout stream with fisheries for Brown, Brook, and Rainbow Trout. It is possible that the Little Muskegon River provides spawning habitat for species like Walleye, Smallmouth Bass, Redhorse, and White Suckers, but this has never been documented.

History

It is highly likely that fish were stocked into CDP after it was created in 1907, but records between then and the early 1930s are unavailable. The first documented fish stocking of CDP took place in 1934, when adult Walleye were stocked into CDP (Table 1). These fish were from the so-called "Newaygo Transfer". Starting in 1923 (Eschmeyer 1947 and 1949b), fisheries personnel from the Michigan Department of Conservation (MDOC; the precursor to the MDNR of today) captured Walleye and other fish species with dipnets at Newaygo Dam and transferred them to upstream impoundments (including CDP) and other lakes in the watershed. The Newaygo Transfer continued until 1966. Other species transplanted into CDP during the Newaygo Transfer included Northern Pike, Rainbow Trout, Brown Trout, Brook Trout, and even Sauger. Smallmouth Bass were also stocked into CDP by MDOC between 1934 and 1945, and in 1979. Spring fingerling Walleye were stocked into CDP on a fairly regular basis between 1983 and 1995. Brown Trout were stocked for three consecutive years between 1985 and 1987, and there were two transfers of Bluegill into CDP, in 1984 and 1986. No fish have been stocked into CDP since 1995 (Table 1).

The first MDOC fisheries survey on CDP was conducted in 1947 (Eschmeyer 1947). The survey was part of a comprehensive fisheries study of all the Muskegon River impoundments. The survey was conducted for two purposes- first to conduct a general fisheries inventory of CDP, and second to investigate the Walleye population (referred to as "yellow pikeperch" at that time), particularly regarding the effects of the transfer of adult Walleye upstream and into CDP. Gear used included numerous gill net sets and multiple seine hauls. On CDP, multiple efforts were conducted in late July and early August. A total of 21 species were recorded in the 1947 survey (Table 2). Many of the Walleye transferred in 1947 had been tagged. With the combined results of the 1947 fisheries surveys of the Muskegon River impoundments and tag returns from anglers, the investigators found that while approximately 60% of the Walleye transferred upstream stayed in the body of water they were stocked into, the remainder successfully migrated downstream through the dams (sometimes through multiple dams). The 1947 Eschmeyer report also documented some mortality of fish that had attempted to move downstream through the turbines but had not survived (also known as "entrainment"). Over the years, other tagging studies also confirmed that downstream movement of Walleye through the dams was occurring (Crowe 1957, Hubbs 1933, Eschmeyer 1949a and 1949b).

The first electrofishing survey of CDP was conducted by MDOC in 1967. Few details are available, and no report was ever produced. Fish recorded during the survey included Northern Pike, Walleye, Smallmouth Bass, Largemouth Bass, Rock Bass, and Yellow Perch. The only written comments from the survey read as follows: "A good population of Smallmouth Bass with quite a few Walleyes showing up" (MDNR files, Cadillac). Another survey of CDP was conducted in 1970, this one utilizing gill nets and electrofishing. As with the 1967 survey, no report was produced. A total of 15 different species were caught in the 1970 survey (Table 2).

A file entry (MDNR files, Cadillac) documents a 28 lb 3 oz, 48-inch Tiger Muskellunge as having been caught from CDP in 1973 by an angler. This is the only report of a Tiger Muskellunge ever being caught from CDP by anglers, and none were ever caught in fisheries surveys. This was a curious catch since no Tiger Muskellunge were ever stocked into Croton Pond (although they had been stocked further upstream in the Muskegon River watershed).

The next MDNR fisheries survey of CDP was conducted in 1983. This survey was more comprehensive than the previous surveys and included inland gill nets, trap nets, and electrofishing. A total of 18 fish species were caught in the survey (Table 2). The survey results showed low panfish populations and a heavy presence of non-game species, including Redhorse, White Suckers, and Common Carp. In the CDP Management Plan produced after the survey (Trimberger 1984), several fisheries management actions were recommended, including stocking spring fingerling Walleye, stocking surplus Bluegill removed from overpopulated lakes, and stocking yearling Brown Trout.

Bluegill transfers in 1984 and 1986 were made to bolster the low Bluegill numbers found in the 1983 Croton Pond survey (Table 1). The Bluegills had been removed from area lakes that had overabundant, stunted Bluegill populations. Also, Brown Trout were stocked in 1985, 1986, and 1987 (Table 1). The Brown Trout stockings were discontinued after 1987 because very few were ever caught by anglers, likely due to predation on the stocked Brown Trout from the robust populations of Northern Pike and Walleye in CDP. Walleye spring fingerlings were also stocked into CDP in most years between 1983-1995, as recommended by Trimberger (1984; Table 1). Eventually it became apparent that natural reproduction was sufficient to support the fishery, and Walleye stocking into CDP was halted.

In April 1985, trap nets were utilized in a "rough fish" removal effort done in cooperation with the Newaygo County Sportsman's Club. This was a direct result of the 1983 MDNR Fisheries survey, which had showed that over 65% of the fish biomass of CDP consisted of non-game species including Redhorse, White Sucker, and Carp (Trimberger 1984). The effort was not overly successful, with less than 6,000 lbs. of undesirable fish removed. Correspondence from MDNR Fisheries Biologist John Trimberger described the effort as having "negligible" impact. The lack of shoal areas suitable for trap netting was mentioned as the reason that more fish weren't caught. No further fish removal efforts were ever conducted on CDP.

During the April 1985 fish removal effort, other game species were captured in the nets, including Walleye. Before being released back into CDP, a total of 260 Walleye were tagged. By late 1986, a total of 49 (18.9%) of the tags had been recovered from Walleye caught by anglers. In a December 1986 file note (MDNR files, Cadillac office), John Trimberger also noted that all of the returned tags had come from Croton Pond itself, and none had come from below Croton Dam, as might have been expected based on the findings of Walleye movement in the watershed impoundments by Eschmeyer (1947; 1949b).

Two fisheries surveys of CDP were conducted in 1990. One was conducted by MDNR, utilizing trap nets, inland gill nets, and electrofishing. In a short writeup, MDNR Fisheries Biologist Rich O'Neal remarked that the 1990 survey results were not all that different from the 1983 survey results. The other 1990 fisheries survey of CDP was part of the relicensing effort for Croton Dam and was conducted by a consultant retained by Consumers Energy (LMS 1991). The only method used was seining. A total of 2,075 fish representing 8 species were captured in 6 seine hauls (Table 2 shows fish species from both 1990 surveys).

During the open water season of 2007, MDNR conducted a creel census survey on CDP (O'Neal and Claramunt 2014). The survey ran from April 1 through October 31. A total of 11 fish species were recorded as caught by anglers during the survey, with harvest reported for 10 of those species. The most

popular harvested species were Bluegill (20,544) and Yellow Perch (7,234). The Walleye catch was modest, with 525 harvested and another 733 released. The Smallmouth Bass catch and release fishery was heavily utilized, as nearly 8,000 were caught and released. Over the survey period, a total of 50,494 angler hours were generated, leading to an estimated fishery value of nearly $500,000 at that time.

Since 1994, a total of 42 exceptional fish caught from CDP have been entered in the MDNR Fisheries Division Master Angler program and included 13 different species (Table 3). Northern Pike was the most numerous species entered, with 10 entries, followed by Common Carp with 6 entries, and Bluegill with 5 entries.

Current Status

The most recent comprehensive fisheries survey of CDP was conducted in the spring and summer of 2022. The purpose of the 2022 fisheries survey was to assess the overall fish community in CDP. MDNR Status and Trends netting protocols (Wehrly et al. 2009) were used for most portions of the survey. The netting portion of the survey took place from May 16 through May 20, 2022. Gear used included large-mesh fyke nets (15 net-nights), trap nets (11 net-nights), and experimental graded-mesh inland gill nets (9 net-nights). Seining and electrofishing were conducted on June 27. A total of six seine hauls were completed, along with three nighttime ten-minute electrofishing transects. A total of 1,579 fish were caught, representing 27 different species (Tables 4 and 5). Age and growth analysis was conducted by counting growth rings present in cross sections of spines taken from each fish (Table 6).

Previously recorded fish species that were not present in the 2022 survey of CDP included Black Redhorse, Blackside Darter, Central Stoneroller, Common Shiner, Golden Shiner, Hornyhead Chub, Longnose Gar, Mimic Shiner, Rainbow Trout, and Spottail Shiner (Table 2). Species caught in the 2022 survey that were not present in previous surveys of CDP included Emerald Shiner, Green Sunfish, Northern Hog Sucker, and Sand Shiner.

Shoreline data were collected on CDP by MDNR Fisheries personnel during August 2022 according to protocols outlined in Wehrly et al. (2009). Data collected included the number of docks, submerged trees, and houses observed per kilometer of shoreline, as well as how much of the shoreline is armored or hardened with seawalls or riprap to prevent erosion. While the fisheries survey covered the entire reach of CDP from Croton Dam to Hardy Dam, the shoreline survey only extended approximately 2/3 of the way upstream to Hardy Dam. Portions of the eastern or Little Muskegon arm that were navigationally difficult due to stumps were also excluded. The surveyed portions of CDP averaged 25.2 docks, 30.7 submerged trees and 21 houses per kilometer of shoreline. Armoring structures and materials were present along 52% of the lake shoreline (Table 7). A temperature/dissolved oxygen profile was collected on August 12th, 2022. The profile was taken in 36 feet of water, close to the dam in what is essentially the deepest part of the impoundment. Oxygen levels suitable for fish were found to a depth of 12 feet (Table 8). Secchi depth was measured at 6.5 feet on August 12th, 2022, indicating moderate clarity for an impoundment.

Analysis and Discussion

The 2022 MDNR fisheries survey of CDP showed relatively healthy fish populations. Most popular fish species showed multiple year classes (an indication that natural reproduction is occurring regularly) and modest growth rates. The popular fish species for anglers on CDP include Bluegill, Black Crappie, Largemouth Bass, Northern Pike, Pumpkinseed, Smallmouth Bass, Walleye, and Yellow Perch.

Walleye were abundant in the 2022 survey of CDP (Tables 4 and 5). Consistent year classes were present, even though no Walleye have been stocked into CDP in many years. This is an indication that Walleye are naturally reproducing on an annual basis in CDP. Growth rates for Walleye were slightly faster than the state average, with Walleye typically reaching the legal size of 15 inches by age 4 or 5 (Table 6). These findings correspond with historical fisheries knowledge of CDP, which has shown excellent natural reproduction for Walleye since the impoundment was created. The Walleye of CDP are extremely popular with anglers, and CDP is known as one of the better lakes for Walleye fishing in the area.

The 2022 MDNR fisheries survey showed an abundant, healthy population of Smallmouth Bass, with lesser numbers of Largemouth Bass. CDP is a very popular for bass fishing, with multiple tournaments held each year (15 tournaments were held on CDP in 2022). In the 2007 creel survey, only 61 Largemouth Bass were harvested, and 986 were released. This was in contrast with Smallmouth Bass, of which 382 were harvested and 7,769 released (O'Neal and Claramunt 2014). Based on the recent survey, growth of both species of bass was average compared to the statewide average for each species, while both species of bass attain legal size (14 inches or larger) in CDP at approximately age 5.

The Yellow Perch fishery of CDP is well-known by anglers and is heavily utilized. The 2022 survey showed good numbers of "keeper" sized Yellow Perch between 7 and 12 inches. They were growing slightly better than the state average. While Bluegill, Black Crappie, Rock Bass, and Pumpkinseed were present in lesser numbers, those species still provide viable fisheries for those anglers willing to search for them. Large individuals of both species were present, with Bluegill up to 8 inches and Black Crappie up to 13 inches caught in the survey.

Compared to other lakes in Michigan, CDP is heavily populated with docks and dwellings (Table 7), although the survey did not cover the entire shoreline of CDP. The surveyed shoreline of CDP had 21.0 dwellings per kilometer while the average large deep lake in Michigan has 9.2 dwellings per kilometer (Wehrly et al. 2015). CDP also had 25.2 docks per kilometer of shoreline, while the average large deep lake in Michigan had 4.3 docks per kilometer (Wehrly et al. 2015). CDP did have much more submerged woody debris (30.7 trees/km) than other large lakes in Michigan (average = 8.4 trees/km; Wehrly et al. 2015). CDP also had very heavy shoreline armoring (52.0%). Other large, deep, inland lakes in Michigan average 24.2%. Despite this, CDP offers a scenic fishing experience, and it does have large reaches of natural shoreline, particularly where the lakefront property is owned by Consumers Energy.

CDP stratifies in the summer, with very low oxygen levels present below the thermocline. In August of 2022, low oxygen levels were found as shallow as 9 feet (Table 8). This renders much of the water column inhospitable for fish. This issue is not new for CDP, as it was mentioned by Eschmeyer over 75 years ago (1947). This is not uncommon for impoundments- similar results were recorded for a recent

limnological study of Hardy Dam Pond (Tonello 2022). However, no previous limnological studies of CDP have found oxygen levels that low, that shallow.

Management Direction

CDP continues to provide an excellent fishery for Walleye, as it has since it was created. It has excellent spawning habitat for Walleye, and the 2022 fisheries survey documented consistent naturally produced year classes. A total of 9 different year classes were present in the 2022 survey catch, none of which were stocked. Therefore, CDP should continue to be managed as a self-sustaining Walleye fishery. Walleye stocking is simply not necessary in CDP and would likely lead to slower Walleye growth rates. CDP also provides excellent fisheries for Northern Pike and Smallmouth Bass (as evidenced by numerous bass tournaments conducted on CDP). Fishing for panfish including Yellow Perch, Black Crappie, Bluegill, and Pumpkinseed is also popular and successful on CDP. Bow anglers also fish CDP frequently, targeting the abundant Common Carp, Redhorse, and White Suckers.

It is highly unlikely that another fisheries survey will be conducted on CDP any time in the near future, so it will be critical for MDNR Fisheries personnel to continue communicating with CDP anglers. In particular, it will be important for MDNR to continue to monitor the results of fishing tournaments on CDP. Mandatory reporting for bass and Walleye tournaments should help with this endeavor.

Much of the shoreline of CDP is heavily developed with manicured lawns, seawalls, and rock riprap. This is not the best shoreline management strategy for CDP. Restoring the CDP shoreline to a more natural state would benefit CDP both in terms of habitat for fish, reptiles, amphibians, mammals, and birds, in addition to scenic value. Guidelines for protecting fisheries habitat in inland lakes can be found in Fisheries Division Special Report 38 (O'Neal and Soulliere 2006). Also, the Michigan Natural Shoreline Partnership, an organization dedicated to promoting natural shoreline landscaping to protect Michigan's inland lakes (https://www.shorelinepartnership.org/), can provide guidance and training on how best to manage the land/water interface for the benefit of CDP. Since most of the undeveloped shoreline on CDP is owned by Consumers Energy, we commend them for maintaining the shoreline of CDP in this fashion, and we recommend that they continue to do so.

Over the past year, Consumers Energy has held several community meetings regarding the future of Croton Dam and other large-hydropower dams around the state, including Rogers and Hardy Dams, which are also on the Muskegon River (https://www.consumersenergy.com/company/electric-generation/renewables/hydroelectric/hydro-future). While the dams are licensed to operate through 2034, Consumers Energy has discussed all options with the dams, including potential dam removal. If Croton Dam were removed, CDP would revert to again being the Muskegon River, and would resemble the high-gradient, cold-water habitat that is currently present below Croton Dam. Fish passage would be restored, making it possible for important migratory species like Walleye, Lake Sturgeon, Chinook Salmon, Steelhead, and numerous other native species to again access the area. Native riverine species like Smallmouth Bass and Brown Trout would also potentially thrive and create popular fisheries. Therefore, the MDNR Fisheries Division is closely monitoring the community discussions that are currently being fostered by Consumers Energy.

References

Crowe, W. R. 1957. Movement and harvest of native Walleyes from impoundments on the Muskegon River. Institute for Fisheries Research Report 1518. Michigan Department of Conservation, Ann Arbor.

Eschmeyer, P. H. 1947. Observations on certain waters of the Muskegon River drainage, with particular reference to the annual transfer of adult Yellow Pike-Perch to these waters from the river below Newaygo Dam. Institute for Fisheries Research Report 1142. Michigan Department of Conservation, Ann Arbor.

Eschmeyer, P. H. 1949a. Reproduction and migration of the Yellow Pike-Perch (Stizostedion vitreum vitreum), in Michigan. PHD Dissertation, University of Michigan, Ann Arbor.

Eschmeyer, P. H. 1949b. A review of Pike-Perch tagging experiments in Michigan, with particular reference to studies on the Muskegon River. Institute for Fisheries Research Report 1222. Michigan Department of Conservation, Ann Arbor.

Hubbs, C. L. 1933. Results of tagging experiments on the Muskegon River, 1932. Institute for Fisheries Research Report 195. Michigan Department of Conservation, Ann Arbor.

Lawler, Matusky and Skeller Engineers. 1991. Application for license for major project-existing dam, Muskegon River, Croton project, FERC project #2452. Prepared for Consumers Power Company, Jackson, Michigan.

O'Neal, R. P. 1997. Muskegon River Assessment. MI Department of Natural Resources, Fisheries Division, Special Report Number 19. Ann Arbor, MI.

O'Neal, R. P., and G. J. Soulliere. 2006. Conservation guidelines for Michigan lakes and associated natural resources. Michigan Department of Natural Resources, Fisheries Special Report 38, Ann Arbor.

O'Neal, R. P., and T. Claramunt. 2014. Croton Impoundment 2007 Angler Survey Report. Michigan Department of Natural Resources, Cadillac.

Tonello, M. A. 2022. Status of the Fishery Report 2022-327: Hardy Dam Pond, Newaygo and Mecosta Counties. Michigan Department of Natural Resources, Lansing.

Trimberger, E. J. 1984. A proposed management plan for Croton Pond. Michigan Department of Natural Resources, Cadillac.

Wehrly, K.E., G.S. Carter, and J.E. Breck. 2009 Draft. Standardized sampling methods for the inland lakes status and trends program. Chapter 27 in Manual of Fisheries Survey Methods. Michigan Department of Natural Resources, Fisheries Division internal document, Ann Arbor.

Wehrly, K. E., D. B. Hayes, and T. C. Wills. 2015. Status and trends of Michigan inland lake resources 2002-2007. Michigan Department of Natural Resources Fisheries Report 08. Institute for Fisheries Research, Ann Arbor.

Table 1. Fish stocked in Croton Dam Pond, Newaygo County, 1934-2022.

Year	Species	Number	Size
1934	Walleye	3,981	adults
	Smallmouth Bass	3,000	3 mo.
1935	Rainbow Trout	39	adults
	Smallmouth Bass	5,250	3 mo.
	Walleye	5,710	adults
1936	Smallmouth Bass	3,800	2 mo.
1937	Northern Pike	3	adults
	Rainbow Trout	7	adults
1938	Brown Trout	4	adults
	Rainbow Trout	31	adults
	Smallmouth Bass	1,160	4 mo.
	Walleye	1,202	adults
1939	Brown Trout	1	adults
	Northern Pike	9	adults
	Rainbow Trout	43	adults
	Smallmouth Bass	1,200	3 mo.
	Walleye	551	adults
1940	Brook Trout	6	adults
	Brown Trout	3	adults
	Northern Pike	25	adults
	Smallmouth Bass	8	adults
	Walleye	490	adults
	Yellow Perch	20	adults
1941	Bluegill	30,000	3 mo.
	Rainbow Trout	3,500	yearlings
	Smallmouth Bass	3,000	1 mo.
1942	Rainbow Trout	22	adults
	Smallmouth Bass	1,000	3 mo.
	Walleye	3,029	adults
1943	Rainbow Trout	7	adults
	Smallmouth Bass	5,600	3 mo.
	Walleye	2,034	adults
1944	Bluegill	5,000	4 mo.
	Largemouth Bass	5,000	4 mo.
	Northern Pike	1	adults
	Rainbow Trout	2	adults
	Walleye	698	adults
1945	Smallmouth Bass	2,000	4 mo.
1947	Rainbow Trout	4	adults
1948	Brown Trout	1	adults
	Rainbow Trout	1	adults
1949	Brown Trout	1	adults
	Rainbow Trout	2	adults
1950	Walleye	377	adults
1952	Walleye	1,891	adults

Table 1 continued

1954	Northern Pike	4	adults
	Rainbow Trout	5	adults
	Walleye	1,874	adults
1955	Northern Pike	4	adults
	Rainbow Trout	1	adults
	Walleye	1,977	adults
1956	Brown Trout	1	adults
	Northern Pike	1	adults
	Sauger	2	adults
	Walleye	1,764	adults
1957	Brook Trout	1	adults
	Walleye	851	adults
1958	Walleye	1,855	adults
1959	Walleye	991	adults
1960	Walleye	2,509	adults
1961	Walleye	463	adults
1962	Walleye	140	adults
1963	Walleye	849	adults
1964	Walleye	188	adults
1965	Walleye	412	adults
1966	Walleye	261	adults
1979	Smallmouth Bass	5,000	2.2 inch
1983	Walleye	2,800	spring fingerlings
1984	Bluegill	4,282	wild transplant
	Walleye	20,032	spring fingerlings
1985	Brown Trout	7,500	yearlings
	Walleye	50	fall fingerlings
1986	Bluegill	1,364	wild transplant
	Brown Trout	13,200	yearlings
	Brown Trout	299	wild transplant
1987	Brown Trout	8,450	yearlings
1989	Walleye	4,500	spring fingerlings
1990	Walleye	16,500	spring fingerlings
1991	Walleye	25,000	spring fingerlings
1993	Walleye	9,600	spring fingerlings
1994	Walleye	48,000	spring fingerlings
1995	Walleye	2,370	spring fingerlings

Table 2. Presence/absence of fish species in historical fisheries surveys of Croton Dam Pond, Newaygo County, Michigan.

Species	1947	1970	1983	1990	2022
Black Bullhead			x		x
Black Crappie	x	x	x	x	x
Black Redhorse				x	
Blackside Darter				x	
Bluegill			x	x	x
Bluntnose Minnow	x				x
Bowfin		x	x	x	x
Brown Bullhead	x	x	x	x	x
Central Stoneroller	x				
Channel Catfish			x	x	x
Common Carp	x	x	x	x	x
Common Shiner	x	x			
Creek Chub	x				x
Emerald Shiner					x
Golden Redhorse				x	x
Golden Shiner		x			
Green Sunfish					x
Hornyhead Chub	x				
Johnny Darter	x				x
Largemouth Bass	x	x	x		x
Logperch	x			x	x
Longnose Gar			x	x	
Mimic Shiner	x				
Northern Hog Sucker					x
Northern Pike	x	x	x	x	x
Pumpkinseed	x	x	x	x	x
Rainbow Trout	x				
Redhorse spp.	x	x	x		
Rock Bass	x	x	x		x
Sand Shiner					x
Shorthead Redhorse				x	x
Silver Redhorse				x	x
Smallmouth Bass	x	x	x	x	x
Spottail Shiner				x	
Walleye	x	x	x	x	x
White Sucker	x	x	x	x	x
Yellow Bullhead			x		x
Yellow Perch	x	x	x	x	x

Table 3. Michigan DNR Master Angler awards issued for fish caught from Croton Dam Pond, Newaygo and Mecosta Counties, Michigan, 1994-2022.

Species	Number of Master Angler awards issued
Northern Pike	10
Common Carp	6
Bluegill	5
Smallmouth Bass	3
Yellow Perch	3
Channel Catfish	3
Black Crappie	3
White Sucker	2
Redhorse	2
Northern Hog Sucker	2
Bullhead	1
Longnose Gar	1
Walleye	1
Total:	42

Table 4. Number, weight, and length of fish collected from Croton Dam Pond with small mesh fyke nets, large mesh fyke nets, trap nets, and experimental gill nets, May 16-20, 2022, and by electrofishing and seining, June 27, 2022.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches)[1]	Average length	Percent legal size[2]
Black Bullhead	77	4.9	16.7	1.5	1-14	10.7	23 (7")
Black Crappie	41	2.6	17.7	1.6	3-13	8.1	71 (7")
Bluegill	164	10.4	16.2	1.5	1-8	5.2	26 (6")
Bluntnose Minnow	64	4.1	0.2	0.0	1-3	1.9	
Bowfin	4	0.3	23.4	2.1	24-26	25.5	
Brown Bullhead	242	15.3	232.5	21.0	7-15	12.8	100 (7")
Common Carp	7	0.4	58.0	5.2	16-33	25.4	
Channel Catfish	2	0.1	21.1	1.9	26-34	30.5	100 (12")
Creek Chub	1	0.1	0.0	0.0	2-2	2.5	
Emerald Shiner	1	0.1	0.0	0.0	4-4	4.5	
Golden Redhorse	3	0.2	10.6	1.0	18-24	21.5	
Green Sunfish	1	0.1	0.0	0.0	2-2	2.5	
Johnny Darter	4	0.3	0.0	0.0	1-2	1.8	
Largemouth Bass	9	0.6	9.8	0.9	1-17	8.6	33 (14")
Logperch	24	1.5	0.3	0.0	2-4	3.6	
Northern Hog Sucker	2	0.1	0.3	0.0	6-8	7.5	
Northern Pike	62	3.9	164.2	14.8	12-36	21.1	35 (24")
Pumpkinseed	50	3.2	8.5	0.8	2-8	5.4	38 (6")
Rock Bass	92	5.8	18.2	1.6	2-11	6.6	43 (6")
Sand Shiner	13	0.8	0.0	0.0	1-2	1.6	
Shorthead Redhorse	4	0.3	11.4	1.0	15-21	19.0	
Silver Redhorse	43	2.7	148.6	13.4	15-28	22.2	
Smallmouth Bass	67	4.2	61.9	5.6	1-17	11.4	30 (14")
Walleye	40	2.5	94.7	8.5	10-27	18.1	75 (15")
White Sucker	56	3.5	120.6	10.9	4-21	16.3	
Yellow Bullhead	30	1.9	21.9	2.0	6-14	11.2	97 (7")
Yellow Perch	476	30.1	51.7	4.7	1-12	6.4	28 (7")
Total	1,579	100	1,108.5	100			

[1]Note some fish were measured to 0.1 inch, others to inch group: e.g., "5"=5.0 to 5.9 inch, "12"=12.0 to 12.9 inches; etc.

[2]Percent legal size or acceptable size for angling. Legal size or acceptable size for angling is given in parentheses.

Table 5. Length frequency distribution for gamefish caught from Croton Dam Pond with small mesh fyke nets, large mesh fyke nets, trap nets, experimental gill nets, seining, and electrofishing, May and June 2022.

Inch Class	Black Crappie	Bluegill	Channel Catfish	Largemouth Bass	Northern Pike	Pumpkin seed	Rock Bass	Smallmouth Bass	Walleye	Yellow Perch
1		20		3				13		11
2		10				1	1			2
3	4	19		1		6	12	1		97
4		41				11	22	1		24
5	1	31				13	17			51
6	7	31				9	14	1		160
7	6	10				9	14	7		93
8	8	2				1	7	6		28
9	7			1			3	2		7
10							1	2	1	1
11	2						1	5	2	1
12	4				4			4	2	1
13	2			1	6			5	3	
14					5			6	2	
15					5			3	4	
16				1	2			8	4	
17				2	1			3		
18									2	
19					1				3	
20					4				3	
21					7				4	
22					2				3	
23					3				5	
24					4				1	
25					2					
26			1		7					
27					4				1	
28										
29					1					
30										
31										
32					1					
33					1					
34			1							
35					1					
36					1					
Total	41	164	2	9	62	50	92	67	40	476

Table 6. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Croton Dam Pond with small mesh fyke nets, large mesh fyke nets, trap nets, and experimental gill nets, May 16-20, 2022, and by seining and electrofishing on June 27, 2022. Number of fish aged is given in parenthesis. A minimum of five fish per age group is statistically necessary for calculating a Mean Growth Index, which is a comparison to the State of Michigan average.

	Age											Mean Growth
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	Index
Black Crappie		6.7	8.3	9.2		11.6	12.4		13.3	12.3		+0.7
		(12)	(9)	(8)		(2)	(4)		(1)	(1)		
Bluegill		4.8	6.1	6.9	8.0							+1.0
		(18)	(15)	(11)	(1)							
Largemouth Bass			9.0	13.7	14.7	16.2	17.7			17.9		+0.5
			(1)	(1)	(1)	(1)	(1)			(1)		
Northern Pike	14.0	15.7	20.1	24.2	27.5	34.7	35.1					+0.7
	(17)	(7)	(10)	(14)	(11)	(2)	(1)					
Pumpkinseed		4.5	6.0	6.9	7.6	7.2						+1.1
		(16)	(12)	(5)	(6)	(1)						
Smallmouth Bass	4.5	7.3	9.4	12.5	14.8	16.0	16.6	16.3	17.2			-0.1
	(1)	(9)	(10)	(11)	(9)	(5)	(4)	(2)	(1)			
Walleye		11.9	13.7	14.8	18.2	20.9		22.2	21.1	21.9	25.9	+0.7
		(5)	(2)	(7)	(7)	(9)		(6)	(1)	(2)	(2)	
Yellow Perch	4.2	6.0	6.6	7.2	8.7	9.8		12.2				+0.3
	(9)	(16)	(8)	(16)	(9)	(3)		(2)				

Table 7. Shoreline data for Croton Dam Pond, Newaygo County, compared with that for other large, deep depth lakes in Michigan (from Wehrly et al. 2015). Sampling was conducted by MDNR Fisheries personnel in August 2022.

	Total docks per km	Dwellings per km	Percent shoreline armoring	Submerged trees per km
Croton Dam Pond	25.2	21.0	52.0	30.7
Michigan statewide average for large, deep depth inland lakes	4.3	9.2	24.2	8.4

Table 8. Temperature and dissolved oxygen profile for Croton Dam Pond, Newaygo County, on 8/12/2022.

Depth (feet)	Temperature (F)	O2 (ppm)
0	74.9	9.84
3	73.7	10.15
6	73.6	9.97
9	72.5	4.04
12	70.5	3.13
15	69.7	2.69
18	69.2	2.12
21	68.7	1.74
24	66.5	0.00
27	63.0	0.00
30	59.9	0.00
33	58.0	0.00
36	56.5	0.00

Figure 1. Croton Dam Pond, Newaygo County, MI.

Received May 22, 2023; October 4, 2023
Scott Heintzelman, Unit Review and Approval
Tim Cwalinski, External Reviewer
John Bauman, SFR Facilitator
John Bauman, Desktop Publisher and Approval