

Woodard Lake
Ionia County
Grand River Watershed, last surveyed 2010

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Environment

Woodard Lake is a 73 acre lake located in Ronald Township in northern Ionia County, approximately 9 miles east of the city of Belding, Michigan. Woodard Lake lies in the Grand River watershed. While there are no inlets, Woodard Creek flows out of the southwestern corner of Woodard Lake. After exiting Woodard Lake, Woodard Creek flows northwest for approximately 8 miles before joining Dickerson Creek. Dickerson Creek eventually flows into the Flat River, which then joins the Grand River.

The southern third of Woodard Lake is developed with approximately 25 homes, docks, armored shorelines, and other associated infrastructure. The eastern shore of the northern two thirds of the lake is sparsely developed with only a couple of homes, while the western and northern shores are undeveloped. The western shore consists of a large tamarack bog. The surrounding landscape is rural and relatively flat with agriculture being the predominant land use. The occasional swamp or woodlot is also present.

A public boat launch located on the southeastern shore provides access to Woodard Lake. The site is operated by the Michigan Department of Natural Resources (MDNR) and has a paved boat launch, pit toilet, and parking available for 10 vehicles. The maximum depth of Woodard Lake is 22 feet. The lake is characterized by lengthy shoals and gradual drop-offs. The predominant substrate is organic muck, although some sandy areas are also present.

History

Woodard Lake has a long history of management by the Michigan Department of Conservation (MDOC; the precursor to today's MDNR) and MDNR. Management efforts began in the late 1800s, but fish stocking records before 1933 are incomplete. Existing stocking records indicate that Bluegill were stocked prior to 1937 and Largemouth Bass were stocked from 1939-1942 and from 1944-45 (Table 1). Correspondence from 1949 recommends that Largemouth Bass stocking should be halted because they were "already stunted".

Much of the discussion in the Woodard Lake file throughout the 20th century is focused on stunted Bluegill populations. The first mention of Bluegill stunting is found in a report by Brown (1938), though the lake is erroneously referred to as "Woodward" Lake in that report. Correspondence from 1942 mentions the Bluegill stunting issue, and good fishing for Largemouth Bass. That report also indicates that Muskellunge and Cisco were present in Woodard Lake. Despite this report, no Muskellunge or Cisco have ever been recovered in fisheries surveys of Woodard Lake.

The first fisheries survey of Woodard Lake was conducted in 1942 when MDOC researchers surveyed the lake with gill nets. They caught Bluegill, Pumpkinseed Sunfish, Largemouth Bass, White Sucker, Brown Bullhead, Yellow Bullhead, Warmouth Bass, and Golden Shiner (Table 2). The first fisheries survey to use a variety of gear types to assess Woodard Lake was conducted in 1947. MDOC researchers utilized seines, fyke nets, experimental gill nets, and hook and line. Species encountered in the survey included Yellow Perch, Bluegill, Pumpkinseed Sunfish, Hybrid Sunfish, Largemouth Bass, Black Crappie, Warmouth Bass, Lake Chubsucker, Brown Bullhead, Yellow Bullhead, Bowfin, Grass Pickerel, Blackchin Shiner, Golden Shiner, and Iowa Darter.

Correspondence from 1950 indicated that the Largemouth Bass stocking from 1939-1945 resulted in improvements of the size structure of the Bluegill population. Bluegills of 8 and 9 inches were regularly caught by anglers. Even though the bluegill populations were improving, the note also mentioned that Largemouth Bass populations had become stunted.

In the fall of 1963, MDOC Fisheries managers used toxaphene (a fish toxicant) to thin out the fish population and induce better growth and size structure. A follow-up seine survey in the spring of 1964 indicated that the kill was effective in removing a good portion of the fish in the lake. Gill net surveys conducted in 1966, 1969, and 1971 were small-scale and provided limited information on the status of the fish community. Walleye were stocked in 1964 (Table 1), but none were captured in any of the following fisheries surveys. Rainbow Trout were stocked in 1970 and 1971, but none were ever caught in fisheries surveys, nor were any reported by anglers. Comments from the 1971 creel survey indicate that anglers were catching nice Bluegill up to 10 inches, in addition to Northern Pike, Largemouth Bass, and Walleye.

In the late 1980s, Woodard Lake was included in a research study evaluating stunted Bluegill populations (Schneider and Lockwood 1997). Walleye were stocked into Woodard Lake to see if they had any effect on the stunted Bluegill population. Fisheries surveys were conducted annually from 1987 to 1996 to monitor the fish populations of Woodard Lake and evaluate responses. While it took a few years, the Woodard Lake Bluegill population did eventually show improvements in growth rates and size structure. Stocked Walleye did not return substantially in the sport fishery in Woodard Lake, although a few were undoubtedly caught by anglers. A zero possession limit on Walleye was established in 1996 and was removed in 2012. No Walleye have been stocked into Woodard Lake since 2005.

Comprehensive fisheries surveys of Woodard Lake were again conducted in 1998 (Harrington 1998) and 2006 (Harrington 2006). In both of these surveys, the Bluegill populations were strong and well-structured, with fish up to 9 inches in 1998 and 11 inches in 2006. Growth rates of Bluegill remained "improved" and were near the State of Michigan average. However, the Largemouth Bass population showed signs of severe stunting. In 1998, 62 Largemouth Bass were caught, with the largest only reaching 12 inches. Growth rates were over 4 inches slower than the State of Michigan average. In 2006, 112 Largemouth Bass were caught, and only one exceeded 11 inches. As in 1998, growth rates for Largemouth Bass were very poor.

According to MDNR Master Angler records, only one Master Angler qualifying fish has been caught from Woodard Lake since the program began in 1994. The fish was an 11.5 inch Bluegill that was caught and released in 2002.

Current Status

The most recent comprehensive fish community survey of Woodard Lake was conducted by the MDNR in the spring and summer of 2010. The netting portion of the survey took place from June 14-17. Survey gear included trap nets (9 net-nights), and experimental graded-mesh inland gill nets (6 net-nights). The seining and electrofishing portion of the survey took place during the evening of June 22. In that effort, three seine hauls were conducted, and three ten-minute transects were sampled by electrofishing. The primary purpose of this survey was to assess the status of a broader range of fish species present in Woodard Lake.

During the 2010 survey of Woodard Lake, a total of 662 fish were caught, representing 16 different species (Table 3). Bluegills were most abundant, with a total of 260 caught and these ranged in size up to 8 inches. Other panfish species were captured, including Pumpkinseed Sunfish, Black Crappie, Hybrid Sunfish, Green Sunfish, Warmouth, and Yellow Perch. Gamefish species caught included Largemouth Bass (170 from 1-20 inches, averaging 8.1 inches) and Northern Pike (one at 32 inches). Growth rates for Bluegill were equal to the State of Michigan average (Table 4), while those for Pumpkinseed Sunfish and Yellow Perch exceeded State averages. Largemouth Bass growth rates were again far below the State average.

Fish species that were not caught in the 2010 survey of Woodard Lake but reported in previous surveys include Black Bullhead, Bluntnose Minnow, Brown Bullhead, Central Mudminnow, Grass Pickerel, Iowa Darter, Johnny Darter, Walleye, and White Sucker (Table 2). Two new species were captured in the 2010 survey: Channel Catfish and Common Carp. Both species were represented by one individual.

Information on habitat and shoreline structure was collected on August 17, 2010 (Table 5). Woodard Lake had 10.7 docks/km, 13.0 dwellings/km, 18.3% shoreline armoring, and 3.3 submerged trees/km. A limnological profile of Woodard Lake also was measured on August 17, 2010 (Table 6). Mild temperature stratification was documented, yet there was not a clear thermocline or hypolimnion layer. The water temperature decreased from 73.9°F on the surface to 57.7°F at the bottom in 19 feet of water. Dissolved oxygen levels were consistent in the 9ppm range from the surface down to 9 feet. Below 9 feet, they quickly declined and were nearly anoxic below 12 feet (1.0 ppm). Secchi depth was recorded as 7.0 feet.

Analysis and Discussion

The size structure of the Woodard Lake Bluegill population improved dramatically as a result of the Walleye stocking experiment that started in 1987 (Table 7). Although catch rates for Bluegill were lower in the 2010 survey, the Bluegill size structure has remained strong, and has not reverted back to its previous stunted condition. In the 2010 survey, the Bluegill caught in trap nets averaged 6.4 inches in length, with more than 80% of them exceeding 6 inches. While not as numerous as Bluegill, other panfish species, including Pumpkinseed Sunfish and Yellow Perch populations were also strongly represented in the 2010 survey. Most of the Pumpkinseed Sunfish and Yellow Perch caught in the 2010 survey exceeded the minimum acceptable size for angling (6 inches for Pumpkinseed Sunfish and

7 inches for Yellow Perch). Therefore, Woodard Lake should be recommended for those anglers seeking a good panfish fishery.

The Largemouth Bass population in Woodard Lake continues to show signs of severe stunting, with some of the worst growth rates ever observed in southern Michigan inland lakes. This condition has been documented in multiple fisheries surveys occurring over the last few decades. Woodard Lake presently is a poor choice for angling Largemouth Bass, with very few fish attaining the minimum legal size of 14 inches.

Woodard Lake is moderately developed with cottages and residences along approximately half of its shoreline. Compared to other small, deep lakes in Michigan and in the Southern Lake Michigan Management Unit (SLMMU) in particular, Woodard Lake has an above-average number of docks, dwellings, and shoreline armoring (Wehrly et al. 2015; Table 5). Woodard Lake had lower amounts of available habitat and cover for fish species as represented by substantially fewer submerged trees/km than other small, deep lakes both in the SLMMU and statewide (Wehrly et al. 2015).

Management Direction

The 2015 survey showed that Woodard Lake has relatively healthy panfish populations, most likely due to the Walleye stocking program that ran from 1987 to 2005. Woodard Lake will never become a major Walleye fishery due to its shallow nature and small size. Even a relatively small number of adult Walleye can help to keep panfish populations in balance (Schneider and Lockwood 1997). Therefore, Walleye stocking should be resumed in Woodard Lake to continue to maintain this balance. The practice may even help to reduce numbers of small Largemouth Bass. According to Dexter and O'Neal (2004), the recommended stocking rates for fall fingerling Walleye are 10-40 per acre. Since the primary goal of this stocking program is Bluegill control, and the system is not sufficient to support larger populations, a lower target of 4 per acre should be utilized. Stocking up to 300 fall fingerling Walleye every third year should be sufficient to establish a Walleye population to control Bluegill and perhaps Largemouth Bass recruitment.

While the primary goal of stocking Walleye should be to control the Bluegill population, it is likely that anglers will occasionally catch adult Walleye. However, Walleye are often not easy to catch, and it is unlikely that anglers will catch them all. For these reasons, the re-establishment of the no-kill Walleye regulation is not recommended. While Woodard Lake will never be a major Walleye fishery, the prospect of occasionally catching a Walleye should add variety to the catch for anglers and make Woodard Lake a more inviting lake to fish.

The size structure and growth rates of the Largemouth Bass population in Woodard Lake remain among the worst in Michigan. For this reason, a 10 inch minimum size limit on Largemouth Bass should be instituted. The lower size limit would allow anglers the opportunity to harvest smaller Largemouth Bass. To improve growth rates and the size structure of Bass in Woodard Lake it will be necessary to reduce numbers of abundant smaller fish. If enough anglers did so, it might produce favorable outcomes for the Bass population. Similar regulations have been placed on other lakes in Michigan, including Corey Lake in St. Joseph County, Stone Lake in Cass County, Big Bass Lake in Lake County, and Spider and Arbutus Lakes in Grand Traverse County. According to Hettinger (2016a and 2016b), the 10 inch minimum size limit has positively affected the Largemouth Bass population

structure on Spider and Arbutus Lakes. In 2008, percentages of legal (over 14 inches) in fisheries surveys of Arbutus and Spider Lakes were 15% and 4% respectively. After 5 years of the 10 inch minimum size limit, those percentages had increased to 47% and 23% respectively (Hettinger 2016a and 2016b). Also, Brian Gunderman (MDNR, personal communication), found the average lengths-at-age of young largemouth bass (age 1-5) in Corey Lake improved by 0.5 inches from 1996 (14" MSL) to 2008 after a 10" MSL was adopted in 1998.

The lack of woody debris in the form of submerged trees possibly contributes to the poor Largemouth Bass population structure in Woodard Lake. Woody debris provides numerous ecological benefits for many species. Aquatic insects utilize woody debris for food and shelter, many fish species use submerged wood for cover, and Largemouth Bass spawn in nests protected by woody debris. Mammals, birds, reptiles, and amphibians also use woody debris for basking, perching, hunting, etc. Therefore, all efforts should be made to protect the sparse woody cover that currently exists in Woodard Lake. Adding more woody structure to the shoreline areas of Woodard Lake might help to improve the habitat available for Largemouth Bass and their prey.

The remaining undeveloped shoreline of Woodard Lake should be protected and considered critical to the continued health of the lake's aquatic community. Future unwise riparian development and wetland loss may result in deterioration of the water quality and aquatic habitat. Healthy biological communities in inland lakes require suitable natural habitat. Human development within the lake watershed, along the shoreline, and in the lake basin has a tendency to change and diminish natural habitat. Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Generally for inland lakes this includes maintenance of good water quality, especially for nutrients; preservation of natural shorelines, especially shore contours and vegetation; and preservation of bottom contours, vegetation, and wood debris within a lake. Guidelines for protecting fisheries habitat in inland lakes can be found in O'Neal and Soulliere (2006).

Since the most recent fisheries survey of Woodard Lake was conducted in 2010, another fisheries survey should be conducted as soon as possible. In particular better estimation of parameters associated with Bluegill and Largemouth Bass populations should be targeted. Trap nets are the best gear for assessing both species and should be a strong component of the survey gear. A Schneider Index (Schneider 1990) should be estimated for the Bluegill population in Woodard Lake. In the case of both species, sample sizes should be large enough to establish growth rates for multiple year classes.

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Table 1. Fish stocked in Woodard Lake, Ionia County, 1874-2016.

Year	Species	Number	Size	Strain
1874	Lake Whitefish	5,000	fry	Detroit River
1877	American Eel	5,000	spring fingerlings	Hudson River
1905	Lake Trout	6,000	fry	
	Largemouth Bass	1,000	fingerlings	
1908	Warmouth	900	yearlings	
1909	Lake Trout	7,500	fry	
1910	Largemouth Bass	2,000	fingerlings	
	Walleye	75,000	fry	
	Yellow Perch	600	fingerlings	
1933	Bluegill	3,000	yearlings	
	Largemouth Bass	6,600	1 mo.	
	Yellow Perch	4,840	7 mo.	
1934	Bluegill	5,465	4 mo., yearlings	
	Largemouth Bass	975	4 mo.	
	Yellow Perch	2,250	8 mo.	
1935	Bluegill	2,000	4 mo.	
	Largemouth Bass	1,160	3 mo,	
1936	Bluegill	2,375	5 mo.	
1937	Bluegill	4,200	4 mo.	
	Largemouth Bass	1,215	3 mo,	
1938	Largemouth Bass	160	yearlings	
1939	Largemouth Bass	300	yearlings	
	Yellow Perch	3,000	7 mo.	
1940	Largemouth Bass	550	yearlings	
1941	Largemouth Bass	100	yearlings	
1942	Largemouth Bass	248	5 mo.	
1944	Largemouth Bass	216	4 mo.	
1945	Largemouth Bass	100	yearlings	
1964	Walleye	16,000	fingerlings	
1970	Rainbow Trout	2,000	spring fingerlings	
1971	Rainbow Trout	2,000	spring fingerlings	
1987	Walleye	1,500	spring fingerlings	Muskegon
1990	Walleye	1,134	fall fingerlings	Muskegon
1994	Walleye	8,368	spring fingerlings	Muskegon
1995	Walleye	8,952	spring fingerlings	Muskegon
1996	Walleye	9,326	spring fingerlings	Muskegon
1998	Walleye	7,019	spring fingerlings	Muskegon
2000	Walleye	7,070	spring fingerlings	Muskegon
2003	Walleye	7,246	spring fingerlings	Muskegon
2005	Walleye	7,837	spring fingerlings	Muskegon

Table 3. Number, weight, and length of fish collected from Woodard Lake with trap nets, inland gillnets, electrofishing, and seining June 14-22, 2010.

Species	Number	Percent by number	Weight (pounds)	Percent by weight	Length range (inches) ¹	Average length	Percent legal size ²
Black Crappie	1	0.2	0.7	0.3	10-10	10.4	100 (7")
Blackchin Shiner	14	2.1	0.0	0.0	1-1	1.5	
Bluegill	260	39.3	47.1	22.4	1-8	6.3	50 (6")
Bowfin	8	1.2	21.4	10.2	13-27	18.8	
Common Carp	1	0.2	8.5	4.0	26-26	26.5	
Channel Catfish	1	0.2	1.3	0.6	16-16	16.5	100 (12")
Golden Shiner	2	0.3	0.5	0.2	8-9	9.0	
Green Sunfish	1	0.2	0.1	0.0	4-4	4.5	
Hybrid Sunfish	5	0.8	2.4	1.1	8-8	8.5	
Lake Chubsucker	12	1.8	1.4	0.7	4-6	5.7	
Largemouth Bass	170	25.7	45.1	21.5	1-20	8.1	1 (14")
Northern Pike	1	0.2	7.9	3.8	32-32	32.5	100 (14")
Pumpkinseed Sunfish	34	5.1	9.4	4.5	2-8	6.7	85 (6")
Warmouth	24	3.6	5.7	2.7	5-8	6.7	79 (6")
Yellow Bullhead	39	5.9	23.1	11.0	8-13	10.6	98 (7")
Yellow Perch	89	13.4	35.6	16.9	4-11	9.7	38 (24")
Total	662	100	210.2	100			

¹Note 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.

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

Table 4. Average total weighted length (inches) at age, and growth relative to the state average, for fish sampled from Woodward Lake with trap nets, inland gill nets, electrofishing, and seining from June 14-22, 2010. Number of fish aged is given in parenthesis.

Species	Age												Mean Growth Index
	0	I	II	III	IV	V	VI	VII	VIII	IX	X	XII	
Black Crappie						10.4 (1)							--
Bluegill		2.0 (12)	4.2 (12)	5.3 (17)	6.2 (11)	7.4 (7)	7.7 (5)	8.3 (5)	8.5 (1)		8.7 (1)		0.0
Largemouth Bass	1.4 (10)	(4.3) (2)	6.2 (12)	7.5 (6)	8.1 (10)	9.7 (10)	10.6 (12)	11.8 (5)	11.3 (2)			20.8 (1)	-3.8
Northern Pike						32.7 (1)							--
Pumpkinseed Sunfish			2.4 (1)	5.9 (10)	7.1 (10)	7.7 (5)	8.3 (2)						+1.1
Yellow Perch		4.5 (1)	5.6 (1)		9.1 (7)	9.3 (13)	10.3 (7)		11.2 (2)	10.6 (1)	10.4 (1)		+0.8

Table 5. Shoreline data for Woodard Lake, Ionia County, compared with that for other small, deep lakes in the Southern Lake Michigan Management Unit (SLMMU) and statewide (from Wehrly et al. 2015). Woodard Lake sampling was conducted by MDNR Fisheries personnel on August 17, 2010.

	Total docks per km	Dwellings per km	Percent shoreline armoring	Submerged trees per km
Woodard Lake	10.7	13.0	18.3	3.3
Average for small, deep lakes in the SLMMU	7.1	12.2	10.5	8.6
Michigan statewide average for small, deep inland lakes	5.3	9.5	7.2	74.5

Table 6. Water temperature, dissolved oxygen and pH profile for Woodard Lake, Ionia County, August 17, 2010.

Depth (ft)	Temperature (°F)	Dissolved oxygen (ppm)	pH
0	79.0	9.2	8.8
1	78.9	9.3	8.0
2	78.8	9.4	8.0
3	78.8	9.4	8.0
4	78.7	9.5	8.0
5	78.7	9.6	8.0
6	78.7	9.7	8.0
7	78.7	9.7	8.0
8	78.6	9.7	8.0
9	78.2	9.4	8.0
10	77.3	3.7	7.3
11	75.6	1.3	7.0
12	73.7	0.8	7.0
13	71.2	0.7	7.0
14	68.3	3.0	7.1
15	64.3	0.9	6.9
16	63.5	0.7	6.9
17	62.0	0.5	6.8
18	60.5	0.5	6.7
19	57.7	0.5	6.5

Table 7. Woodard Lake bluegill size structure rating using the Schneider Index (Schneider 1990). Growth Index was not used in this comparison since it was not available for all years. Schneider Index rankings are as follows: 1 = very poor, 2 = poor, 3 = acceptable, 4 = satisfactory, 5 = good, 6 = excellent, 7 = superior.

Year Surveyed	Trap net catch average length (in.)	%>6 in.	%>7 in.	%>8 in.	Schneider Index
1988	5.9	52.6	3.1	0	2.75
1989	5.5	54.2	2.5	0	2.75
1990	5.2	40.5	3.9	0	2.25
1991	6.0	86.0	13.4	0	4
1992	6.1	83.4	22.5	0.8	4.25
1993	5.7	61.9	20.6	0	3.25
1995	6.4	89.1	49.1	5.7	5
1996	6.5	79.4	61.7	16.4	5.5
1998	6.3	77.5	37.3	12.3	5
2006	6.8	94.4	66.4	21.1	6
2010	6.4	80.1	49.3	14.7	5