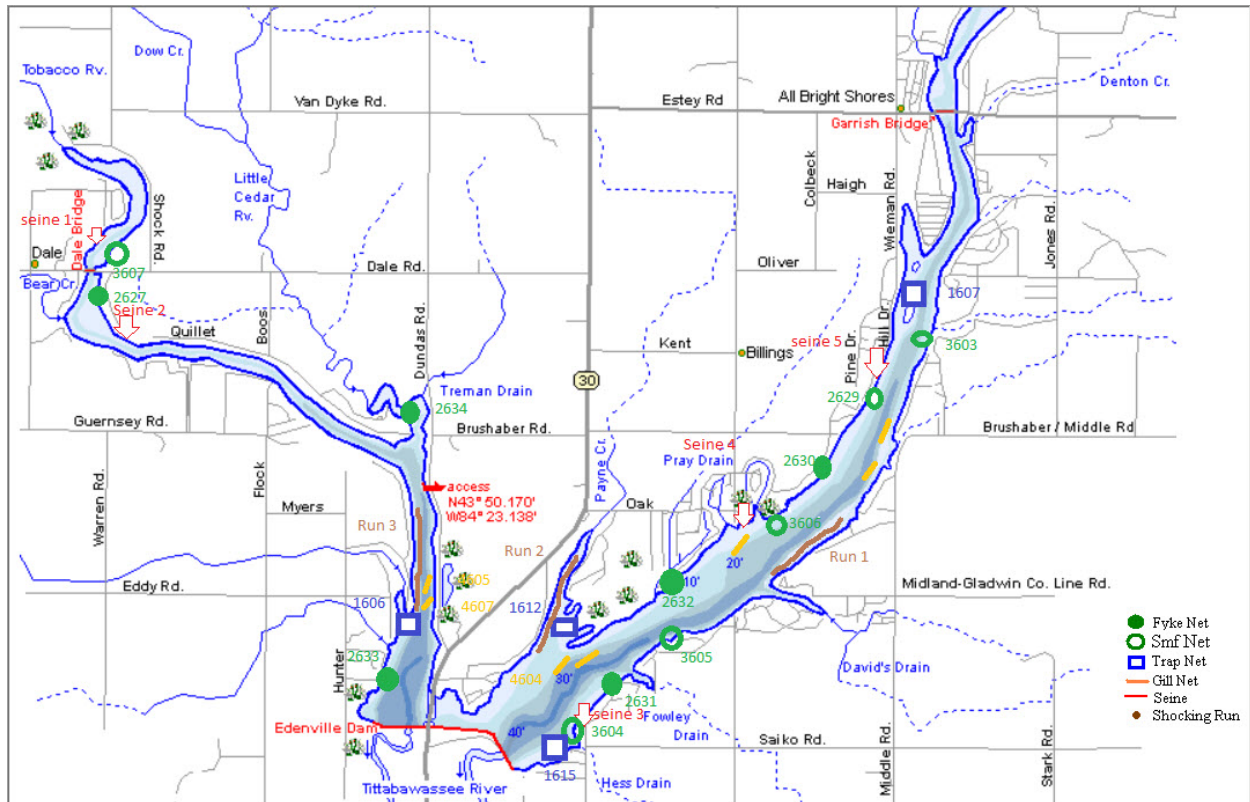




Wixom Lake, Gladwin County

Wixom Lake, T16N, R1E, Sec 4. Status and Trends Survey, 2014



Introduction

Wixom Lake is a 1980 acre impoundment of the Tittabawassee and Tobacco Rivers. The impoundment is located in extreme south central Gladwin County in the town of Edenville, or 11 miles north of the Village of Sanford. There is a DNR public access site on the west arm (Tobacco arm) of the Impoundment which is accessed off Dundas Rd. from M30. The access site has two concrete ramps, courtesy piers, two outhouses, and a parking lot to accommodate a large number of vehicles and trailers. There are also several private marinas located on both arms of the impoundment. The lake is heavily used for boating, fishing, swimming and duck hunting.

The topography surrounding Wixom Lake is characterized by relatively low relief. The area consists of flat swampy lacustrine plains broken by gently rolling higher ground with occasional ridges composed of glacial outwash material. Land uses in the area are residential, forest, and agriculture. Most of the soils are sandy loams, and clay. The immediate shoreline soils are sandy clay, and birch-poplar-maple are the dominant tree species. About 70% of Wixom Lake is shoal with depths less than 15 feet. The bottom in the shallows is sand and pulpy peat. The lake has a maximum depth of roughly 40 feet. The bottom in the deeper areas is pulpy peat and clay. Wixom Lake has several inlets including the Tobacco River, the Tittabawassee River, Townline Creek, Gurnsey Creek, and others. The impoundment's outlet is through Edenville Dam. The hydroelectric facility (power house) is located on the Tittabawassee arm and an auxiliary spillway is located on the Tobacco Arm. Wixom Lake encompasses a drainage area above the dam of approximately 985 square miles. The two impoundment arms are connected by a channel, flowing under M30, and together form what is called Wixom Lake. Edenville Dam is the third in a series of 4 hydropower dams and impoundments on the Tittabawassee River. The maximum height of the gates when closed is



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28 feet, and the dam is at 33 feet. The project was constructed from 1923-1925. Production of electricity began in 1925 and continues to the present. The lake is maintained at normal levels at all times except spring drawdown, floods, dam repairs, drawdowns for ecological reasons, or releases for downstream riparians. The normal lake level was set at 670 feet. The dam allows for a limited amount of fish passage downstream, but no fish passage upstream.

Shoreline features

Wixom Lake is two distinct impoundments connected by a channel. There is fish migration between the two arms. Both arms are very long and the upper stretches become more riverine. The Tobacco arm has roughly 6 miles of impounded water, and the Tittabawassee arm has 9 miles. The maximum depth of each arm can be found just in front of the dams. The maximum depth is 40 feet in the Tittabawassee arm and 38 feet in the Tobacco arm. These are long narrow water bodies frequented by cuts and small drainages. There are numerous small boat docks and a few larger docks located in front of the many residences. The shoreline in the residentially developed areas is mostly hard armored, especially in the lower impoundment. Submerged trees were only found where the shoreline was natural. There are few areas with natural shoreline left in comparison to the developed residential areas. A few reaches exist in the north or upper end, in areas which had emergent wetlands, and a large area is undeveloped along the immediate west shore of the Tittabawassee arm. Wixom Lake generally drops off quickly to the river channel and to the deeper waters in the lower end. The upper reaches of both arms become shallower and have many stumps. Weed growth is common in the shallower waters of the impoundment. Weed treatments have been documented for years. Light penetration and turbidity may limit weed production.

Limnological Parameters

The hydrographic map of Wixom Impoundment shows it to be two separate impoundments or arms connected by a channel. As such, the water chemistry can be different. Measurements of parameters should ideally be done separately for the different arms of the impoundment, but this wasn't the case in 2014.

The sampling was conducted only in the Tittabawassee arm. The temperatures on August 19, 2014 were uniform from top to bottom ranging from 73.7 °F to 70.72 °F. The dissolved oxygen concentration was acceptable to support fish, (greater than 4 ppm) at all depths and ranged from 10.17 at the surface to 7.73 ppm at the bottom. The pH was also normal for the area, ranging from 7.73 to 8.01. Specific conductivity ranged from 397 to 4430 micro mhos. The chlorophyll a reading was 1.29 micrograms/liter. The water was quite clear with a secchi disk reading of 9.4 feet. The Wixom Lake had a total alkalinity of 170 mg/l, and a total phosphorus reading of 0.0331 mg/l. The total nitrogen measurement was .724 mg/l, and both ammonia nitrogen and nitrate-nitrite nitrogen were measured as less than 0.03 mg/l.

Habitat

Submerged large woody structure is nearly absent around most of the developed shoreline. The few natural shorelines do provide cover for fish, but they are becoming increasingly rare around the lake. Docks provide some cover along the developed shoreline, as do the steeper drop offs. At the time of the netting survey, aquatic vegetation was established. Wild Celery, milfoil, various pondweeds, lily pads in the slower areas, and some algae were common. Aquatic vegetation also provides fish habitat for feeding, nursery, and spawning. Stumps are common in the upper reaches of both arms. These were left from the trees after the area was dammed and flooded.

Past Fisheries Management

The impoundment was created in 1925. Fish were stocked from 1937 to 1944. Species stocked included bluegills, walleye fry, perch, smallmouth bass and largemouth bass. No active management was performed from 1944 to 1951.



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In 1951, a biological inventory was made. Species collected included black crappie, yellow perch, bluegill, pumpkinseeds, largemouth bass, smallmouth bass, bluntnose minnows, fathead minnows, golden shiners, common shiners, mimic shiners, sand shiners, spotfin shiners, brassy minnows, hornyhead chubs, stonerollers, logperch, Johnny darter, Iowa darter, blackside darter, white suckers, black bullheads, brown bullheads, and yellow bullheads. Rock bass and walleyes were reported as rare. An aquatic plant survey was also conducted. Common plant species include *Anacharis*, *Ceratophyllum*, *Juncus*, *Lemna minor*, *Myriophyllum*, several *Potamogeton* species, *Scirpus*, *Sparangium*, and *Typha*.

The DNR public access site was acquired and constructed in 1961. Fingerling (1- inch) channel catfish were stocked from 1963-1966. Records also indicate that a pike marsh was operated cooperatively with a local sportsman's club, but production records are scant.

Wixom Impoundment was again surveyed using gill nets in 1967. The survey caught most of the fish listed above for the 1951 survey, with the addition of channel catfish and northern pike. No walleye were caught. Bluegill and northern pike were growing above state average, while perch, smallmouth bass, and black crappie were growing somewhat below state average.

Files also indicate that Wixom Impoundment has also had some experiences with winter kills, although most of them were documented as light. There have been several documented occurrences over the years. Most of these occurrences were in back channels and isolated areas.

The first survey that deployed trap nets, fyke nets and gill nets was conducted in 1985. Similar species were captured. A number of walleyes were captured in the survey. Channel catfish were also shown to be well established. Growth data was kept separate for the two arms of Wixom Lake. Bluegills, black crappie, and perch were growing above average in both arms. The Tittabawassee arm had slightly better growth. Northern pike were growing slowly in the Tobacco arm, and this didn't appear to be the case for the Tittabawassee arm although too few fish were aged to calculate a growth index.

Before the last status and trends survey in 2002, there was the 1994 survey. The purpose was for a general survey and to evaluate the stocked walleye and muskellunge. The 1994 survey collected good numbers of walleye, northern pike, smallmouth bass, largemouth bass, and channel catfish but no muskellunge. Bluegill and crappie growth was above state average. Pike and walleye growth was near to slightly above state average. An fall electrofishing index was also conducted in 1994 in the Tobacco arm. Fifty-one young of the year walleye were captured. An additional 27 more were observed. This equated to 23.6 fingerlings per mile. The 1994 survey also documented a rich environment for turtles. Painted, snappers, and a high number of map turtles were observed or netted during the survey. A mudpuppy was also captured.

The first status and trends survey was conducted in 2002. Similar species were recorded and four muskellunge were captured. Anglers report catching both muskellunge and walleye.

Management for northern muskellunge began with the first stocking in 1986. Muskellunge production and frequency of stocking has limited the ability to get the muskies established. However, muskellunge are also stocked in the impoundments above Wixom and tend to have the ability to move down the system.



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Table 1. More recent stocking in Wixom Lake, 1979 – present.

Species	Strain	Date	Number	Avg. Length (in.)
Muskellunge	Northern	9/13/1996	2,231	9.8
Muskellunge	Northern	10/6/1998	971	12.08
Muskellunge	Northern	11/2/2004	4,000	7.1
Muskellunge	Northern	11/2/2004	4,000	7.1
Muskellunge	Iowa	9/19/2006	3,455	10.84
Muskellunge	Northern	11/10/2010	4,000	9.64
Muskellunge	Great Lakes	11/14/2012	2,035	9.96
Muskellunge	Great Lakes	11/14/2013	3,081	8.48
Walleye	Muskegon	6/16/1985	58,906	2.28
Walleye	Bay De Noc	6/23/1992	59,927	2
Walleye	Bay De Noc	6/30/1994	58,200	1.8
Walleye	Muskegon	6/21/1989	10,672	1.84
Walleye	Muskegon	10/25/1989	27,741	4.16
Walleye	Muskegon	6/30/1989	2,820	1.92
Walleye	Muskegon	6/18/1991	46,001	2.28
Walleye	Muskegon	6/17/1995	112,768	1.84
Walleye	Muskegon	6/6/1998	106,425	1.44
Walleye	Tittabawassee	5/31/2000	120,615	1.28
Walleye	Tittabawassee	6/19/2002	75,038	1.36
Walleye	Tittabawassee	6/7/2006	14,525	1.62
Walleye	Tittabawassee	6/8/2006	68,500	1.828
Walleye	Tittabawassee	6/14/2006	27,284	1.88
Walleye	Muskegon	6/16/2011	78,906	1.828
Walleye	Muskegon	6/21/2011	43,747	2.04
Walleye	Muskegon	6/19/2012	98,769	2.18
Walleye	Muskegon	6/18/2014	151,984	1.84
Walleye	Muskegon	6/25/2014	76,032	2.328



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Methods

Wixom Lake was surveyed using a variety of gear types set forth in the Status and Trends protocol. Efforts included seining, boomshocking, trap netting, fyke netting, gill netting and limnology. The netting and boomshocking was conducted from 5/19-22/2014, and the limnology was conducted on August 19, 2014. Water temperatures during the netting averaged near 60°F. Each gear type is subject to certain biases and these must be considered when reviewing the survey catch. Trap and fyke nets were used to sample fish moving through the littoral zone. Experimental gill nets are designed to catch fish in the deeper areas. Seine hauls are designed to net fish in the shallows and nursery areas. These target young fish and some minnow species. Night electrofishing is designed to catch fish moving into the shallows at night, and typically samples both small and large fish. Collectively, the catch from all these gears allows for reasonable characterization of the fish community.

The objective of this survey was to update Fisheries Division files on the present status of the fish community and to compare to the survey of 2002. Wixom Lake was selected as an example of a large size, deep lake to test sampling procedures and fish dynamics for statewide comparisons as part of the Resource Inventory Program Status and Trends monitoring protocol.

Results

A total of 5,275 fish representing 27 species and one hybrid were collected in this assessment. This is up from total catch of 1378 fish and 24 species in 2002. The larger numbers are in a large part due to the increased capture of shiners and bluntnose minnows. The total weight captured is closer. Three additional species were captured. These included central mudminnow, madtom, green sunfish, and hybrid sunfish. The redhorse were keyed out as silver redhorse in 2014. Trap nets accounted for 26% of the total catch by number (35% by weight), large mesh fyke nets accounted for 26% (43% by weight), small mesh fyke nets accounted for 5.9% (2.1% by weight), electrofishing accounted for 6.9% (7.9% by weight), experimental gill nets accounted for 3.4% (10.7% by weight), and seining accounted for 41% (0.7% by weight).

Table 2. Fish captured in the 2014 Wixom Lake Survey, percent by number and weight, length range, and percent legal.

Species	Number	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)*	Average length (in.)	Percent legal size**
Black crappie	1,005	19.1	305.1	17.8	4-17	8.0	79
Black bullhead	12	0.2	8.1	0.5	9-12	10.9	100
Bluegill	948	18.0	105.4	6.1	1-9	5.0	32
Bluntnose minnow	1,796	34.0	7.8	0.5	1-3	2.1	100
Bowfin	16	0.3	68.0	4.0	2-25	22.3	100
Brown bullhead	257	4.9	185.5	10.8	5-14	10.9	99
Common carp	12	0.2	118.0	6.9	19-35	27.0	100
Channel catfish	29	0.5	108.8	6.3	9-34	21.4	93
White sucker	26	0.5	48.8	2.8	1-20	16.2	100
Golden redhorse	34	0.6	116.1	6.8	2-27	20.0	100
Golden shiner	59	1.1	4.8	0.3	3-9	6.3	100



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Green sunfish	8	0.2	0.5	0.0	1-5	3.9	0
Hybrid Sunfish Hybrid	3	0.1	0.4	0.0	4-6	5.5	33
Johnny darter	1	0.0	0.0	0.0	1-1	1.5	100
Largemouth bass	70	1.3	92.5	5.4	2-19	11.4	41
Central mudminnow	2	0.0	0.0	0.0	2-2	2.5	100
Muskellunge Northern	2	0.0	43.2	2.5	41-42	42.0	50
Northern pike	67	1.3	234.2	13.6	6-32	23.4	52
Pumpkinseed	67	1.3	10.4	0.6	1-8	5.4	36
Rock bass	112	2.1	27.9	1.6	1-10	6.7	72
Spotfin shiner	438	8.3	4.1	0.2	1-3	2.6	100
Silver redhorse	36	0.7	39.0	2.3	7-17	14.5	100
Smallmouth bass	29	0.5	50.7	3.0	7-18	14.7	66
Tadpole madtom	4	0.1	0.0	0.0	1-3	2.3	100
Walleye	13	0.2	36.4	2.1	12-25	20.0	85
White bass	1	0.0	1.0	0.1	13-13	13.5	100
Yellow Perch	69	1.3	7.3	0.4	3-9	6.1	29
Yellow bullhead	159	3.0	92.1	5.4	2-13	9.6	97
All species totals:	5,275	100	1,716.1	100			

Bluegills were one of the most numerous gamefish species caught in the survey. The 948 caught represented 18% of the survey catch by number of any species including forage. Combining all gear types, bluegills ranged from 1 to 9 inches, and averaging 5.0 inches. Bluegill captured in the trap nets averaged 6.0 inches. Thirty-two percent of the bluegills surveyed in this assessment were of desirable angling size (≥ 6 inches). Bluegills are growing +0.4 above state average. Eight year classes were aged. Another way to look at bluegill size structure is to use the Schneider index (Schneider, 1990).

Table 2. Schneider Index for classifying bluegill lakes using trap net gear.

Sample date	5/14/2002	5/19/2014
Sample size	191	280
Water temp.	57F	
Ave. length (in.)	6.5 (5)	6.0 (4)
% ≥ 6 inches	75 (5)	47 (3)
% ≥ 7 inches	35 (5)	12 (4)
% ≥ 8 inches	6.8(5)	1.0 (1)
Index score	5	3
Rank	good	acceptable



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Wixom Lake has a Schneider index of 3 in 2014 on a scale from 1 to 7 which is down 2 rankings from 2002. To be consistent with 2002 only trap net bluegill were included. Growth still remains above state average and anglers have some larger fish to catch although the percentage of very large (larger than 8 inches) appears to be lower.

Pumpkinseed sunfish were not common, representing only 1.2% of the survey catch. They ranged from 1-8 inches and averaged 5.4 inches. Thirty-five percent of the pumpkinseeds caught were of desirable angling size (≥ 6 inches). Pumpkinseed size is lower than in 2002.

Black crappie were the most common gamefish species in the survey catch. The 1000 captured represented 19% of the survey catch. Black crappie ranged from 4 to 17 inches, and averaged 8.2 inches. Seventy-nine percent of the crappie collected were of desirable angling size (≥ 7 inches). Eight year classes of black crappie were aged, and they were growing slightly above state average at +0.2 inches. Timing of this survey and temperatures may have caused this spike in the catch.

Sixty-seven yellow perch were collected in the survey ranging from 3-9 inches. This was up from 16 in 2002. Perch averaged 6.2 inches and are growing near state average.

One hundred and six rock bass were also surveyed. They ranged from 1 to 10 inches and averaged 6.7 inches. Seventy-four percent of the rock bass caught were of desirable angling size (≥ 7 inches).

Wixom Lake has a modest number of largemouth bass and smallmouth bass. The 68 largemouth bass and 29 smallmouth bass represented 1.3% and 0.6% of the survey catch by number respectively. Bass normally do not net well, so the numbers caught may not be indicative of the true relative abundance of bass in the lake. Largemouth bass ranged from 2 to 19 inches, and averaged 12.6 inches. Forty-four of the largemouth surveyed were of legal size (≥ 14 inches). Largemouth bass were represented by 9 year classes, and are growing +1.3 inches above state average. Smallmouth bass ranged from 7 to 18 inches, and averaged 14.5 inches. Sixty-six percent of the smallmouth surveyed were legal size (≥ 14 inches). Smallmouth were only represented by 5 year classes. Smallmouth bass are growing above state average (+1.7).

Sixty-seven northern pike were also taken in the survey. They ranged from 2-32 inches, and averaged 23.5 inches. Fifty-one percent of the northern pike handled during the survey were legal sized (≥ 24 inches). Seven year classes of northern pike were present in the survey catch. They are growing +0.2 above state average.

Two northern muskellunge were netted during this survey. They ranged from 41 to 42 inches and were captured in the same net. Both were aged as 7. These should have been age 0 in 2007 or stocked in 2007. No stocking matches up from Wixom Lake, or any above impoundment. These fish must be of natural origin.

Thirteen walleyes were captured during this survey. This is comparable to the 19 captured in 2002. They ranged from 12 to 25 inches, and averaged 20.0 inches. Eighty-five percent were legal size (≥ 15 inches). They were represented by nine year classes. The year classes present do not match up with all the stocked years. There may be some natural reproduction occurring, or there are fish moving down from the impoundments above.

Twenty-nine channel catfish were captured during this survey. They ranged from 9 to 34 inches and averaged 27 inches. These provide excellent fishing opportunities for anglers.

Rough fish, such as the three bullhead species, carp, bowfin, silver redhorse and white suckers represented 9.8% of the total survey catch. They are growing to large sizes and are not a problem at the present time.



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Seining and small mesh fyke nets were used to assess the minnow populations and young of the year fish. Many young bluegill, black crappie, sunfish, rock bass, killifish, spotfin shiners, daters, and bluntnose minnows were collected.

Discussion

Wixom Lake appears to have a well-balanced fish population. Most species are doing well. The predator population appears diverse. Muskellunge are present in low numbers and not well established. Walleye numbers appear somewhat low, but timing of the survey may be to blame. Panfish, pike, and bass are doing quite well. Rough fish only represent less than 10 % of the survey catch which does not appear to be excessive.

Management

Wixom Impoundment should continue to be managed for the species complex present. Efforts need to continue to build the muskellunge population and walleye populations as they were under represented in the survey catch. These are very popular locally for anglers. The management unit plans to continue to stock spring fingerling walleye biennially, and increase the rate if possible to 75/acre or a target of 148,500 fish. Muskellunge are listed with all the statewide needs and priorities and numbers are allocated annually. The hatcheries are now rearing Great Lakes muskellunge which are supposedly a better fit for Michigan waters. Iowa muskellunge may be available on occasion as well.

References

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Technical Report No. 90-10. Ann Arbor.