Big Fish Lake
Lapeer County, T06N/R09E/34
Flint River Watershed, Last surveyed 2017

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Environment

Big Fish Lake is located in the Ortonville Recreation Area in southern Lapeer County approximately 5 miles south of Hadley (Figure 1). Although there are no discernible inlets or outlets, Big Fish Lake lies within the Kearsley Creek sub-watershed of the Flint River which drains to the Saginaw River and eventually to Saginaw Bay of Lake Huron.

Big Fish Lake lies within the Washtenaw district of the Southern Lower Michigan Regional Landscape Ecosystem and is described by features identified in the Jackson Interlobate sub-district (Albert 1995). The Jackson Interlobate sub-district description includes coarse-textured end moraines with kettle lakes and wetlands dispersed among pitted outwash deposits. Topography is described as gently sloped and undulating hills. Soil textures range from sand to clay with a common occurrence of sandy loam on the elevated moraines, sand on the outwash, and organic peat in the depressions. Soils are of McBride-Marlette association and described as being well drained sand and sandy loam.

Land features of the Big Fish Lake catchment area indicate 55% forest cover, 22% wetland, 15% urban, 7% agriculture, and 1% water. Approximately 50% of the Big Fish Lake shoreline is owned by the State of Michigan and is part of the Ortonville Recreational Area. The other 50% of the shoreline is under private ownership with multiple dwellings.

Big Fish Lake is 105 acres and reaches a maximum depth of 70 feet (Figure 2). Sixty percent of the lake is estimated to be littoral (<10 ft.). Contour changes are fairly gradual. In general, Big Fish Lake is classified as a warmwater, small size, and deep lake. Chemical parameters measured in 2003 and 2017 are typical of the region. Alkalinity ranges between 100-130 parts per million (ppm) and pH ranges from 7.5 at mid-depth to 8.4 on the surface. Lake productivity, as measured by the Trophic State Index (Carlson 1977), indicates Big Fish Lake is of mesotrophic classification (Table 1). Mesotrophic lakes generally have intermediate nutrient levels, moderate water clarity, relatively abundant aquatic vegetation, and support diverse biological communities.

Thermal characteristics measured in 2017 are consistent with warmwater lake classification. An August 2017 temperature profile revealed stratification occurs with a thermocline between 15 and 26 feet (Table 2). Oxygen concentrations are typically fish limiting (<3 ppm) at depths below 25 feet. Warmwater habitat (>70F) during stratification is prevalent in the upper 10 ft. of water. Coolwater habitat with sufficient oxygen is limited to the 15-25 ft. depths.

Shoreline development is an indicator of potential impacts affecting habitat for fish and other aquatic animals. Although the effects of individual property can vary, an increased number of dwellings, docks, and shoreline armoring are generally associated with decreased wood structure and vegetation which can affect fish productivity. Seawalls create a barrier between shoreline vegetation and the water's edge which can negatively impact frogs, turtles, and fish. Decreased wood structure and

vegetation often results with fish aggregating around dock structures. Swimming beaches typically lack wood structure and vegetation. Big Fish Lake has an estimated shoreline of 2.7 miles. In summer of 2017, a total of 77 dwellings were counted yielding a dwelling density of 29/mile which would be considered high compared to statewide averages for waters with public access but typical of medium size lakes in the region. Sixty-one docks were counted and an estimated 15% of the shoreline was armored with seawall. Overall, shoreline development of Big Fish Lake is considered moderate. Private housing on the east shore is tightly packed with limited room for expansion. The west shore primarily encompasses state park land which is lightly developed for swimming and picnicking. A public boat launch is available on the west shore and accommodates approximately 20 trailers. High speed boating is allowed between the hours of 11:00am to 7:30pm.

Aquatic vegetation is the dominant fish cover and Big Fish Lake supports a diverse plant community with common occurrence of chara (Chara spp.), curlyleaf pondweed (Potamogeton crispus), bladderwort (Utricularia spp.), water shield (Brasenia spp.), water lily (Nymphaea spp.), Eurasian milfoil (Myriophyllum spicatum), common milfoil (Myriophyllum spp.), coontail (Ceratophyllum demersum), pickerel weed (Pontederia cordata), and cattail (Typha spp.). Aquatic vegetation treatments to alleviate nuisance weed growth occur semi-regularly. Wood structure is relatively sparse.

History

Big Fish Lake has an extensive history of fisheries management with the first records dated 1949. From 1966 to 1992 the lake was managed as a two-story trout lake and received annual stockings of Rainbow Trout followed later by Brown Trout. Up until 1990, Big Fish Lake carried a good reputation for trout angling but survival rates and angler success waned by 1992. In 1993, trout stocking was discontinued and fisheries management focused upon warmwater fish species and Northern Pike. Throughout its history, Big Fish Lake was noted for good populations of Largemouth Bass, Bluegill, Black Crappie, Pumpkinseed, Brown Bullhead, Yellow Bullhead and Northern Pike. Fisheries surveys conducted in 1995 and 2002 depicted a good recreational fishery for these species. No fish stocking has occurred since 1992. Fisheries Division files list 29 different fish species in Big Fish Lake (Table 3). Two species (Brown Trout, Rainbow Trout) are extirpated. The status of Creek Chubs, Channel Catfish, and Rock Bass is unknown and based upon single historical observations.

Current Status

From May 30 to June 2, 2017, Fisheries Division conducted a fisheries survey of Big Fish Lake using trap nets, large and small mesh fyke nets, seine, experimental gill nets, and electrofishing gear. The use of multiple gear types helps to present a generalized picture of the fish community. Large mesh trap and fyke nets are used to capture larger (>3 inches) fish that inhabit the littoral zone or that move inshore at night. Small mesh fyke nets and seine capture representative samples of small-bodied nongame species and smaller sizes (<3 inches) of sport fishes that inhabit the littoral zone. Night time electrofishing samples all fish species and sizes and is particularly effective for Largemouth Bass. Additional habitat evaluations (temperature, nutrients, and shoreline) were conducted in August.

A total of 1,957 fish representing 16 species were collected in the 2017 fisheries survey (Table 4). Large mesh trap and fyke nets captured 70% of the total catch. Small mesh fyke nets and seining captured 13% of the total catch. Night electrofishing collected 13% of the total catch and experimental

gill nets captured 5% of the total catch. Bluegill was the most abundant species collected at 58% of the total catch followed by Pumpkinseed (18%), Yellow and Brown bullhead (15%), Largemouth Bass (4%), and Black Crappie (4%). Other species captured in low abundance included Blackchin Shiner, Bluntnose Minnow, Grass Pickerel, Green Sunfish, Lake Chubsucker, Northern Pike, Spotfin Shiner, Tadpole Madtom, Warmouth, and Yellow Perch. All species collected are considered common to this region of the State.

A total of 1,130 Bluegill averaging 5.4 inches were collected in the 2017 fisheries survey (Table 4). Sixty-six percent of the Bluegills captured were collected with large mesh trap and fyke nets compared to 16% with seine and small mesh fyke gear and 5% with electrofishing gear. Average size of Bluegill collected with large mesh trap and fyke nets was 6.0 inches compared to 3.1 inches with seine and small mesh fyke nets, and 4.8 inches with electrofishing gear. Forty-four percent of the large mesh trap and fyke net catch met or exceeded the acceptable harvest size of 6 inches. Bluegill size structure was dominated by fish in the 4-7 inch size range. Age and growth analysis indicated Bluegill were growing below state average having a mean growth index of -1.2 (Table 5). Weighted age frequency indicated the catch was dominated by 5 and 6 year old fish with 10 year classes represented (Table 5). Bluegill longevity appeared to peak at 9 years.

A total of 348 Pumpkinseed sunfish averaging 5.9 inches were collected in the 2017 fisheries survey (Table 4). Eighty-eight percent of the Pumpkinseeds captured were collected with large mesh trap and fyke nets compared to 8% with seine and small mesh fyke nets, and 4% electrofishing. Forty-four percent of the total Pumpkinseed catch met or exceeded the acceptable harvest size of 6 inches. Pumpkinseed size structure was dominated by fish in the 5-6 inch size range. Age and growth analysis indicated Pumpkinseeds were growing slightly below state average having a mean growth index of -0.6 (Table 5). Weighted age frequency indicated the catch was dominated by 4 and 5 year old fish with 7 year classes represented (Table 5). Pumpkinseed longevity appears to peak at 8 years.

A total of 76 Largemouth Bass averaging 12.1 inches were collected in the 2017 fisheries survey (Table 4.) Forty-nine percent of the Largemouth Bass captured were collected with electrofishing gear and 42% were collected with large mesh trap and fyke nets. Average size of the electrofishing catch was 13.1 inches compared to 12.5 inches with net gear. Forty-one percent of the total Largemouth Bass catch met or exceeded the minimum harvest size of 14 inches. Largemouth Bass size structure was fairly evenly distributed between 6-18 inches with a significant prevalence of larger (> 14 inches) fish. Age and growth analysis indicated Largemouth Bass were growing below state average having a mean growth index of -1.0 (Table 5). Age frequency indicated the catch was dominated by 2-7 year old fish with 10 year classes represented (Table 5). Largemouth Bass longevity peaked at 10 years.

A total of 69 Black Crappie averaging 7.5 inches were collected in the 2017 fisheries survey (Table 4). Fifty-five percent of the Black Crappie were captured with large mesh trap and fyke nets compared to 30% with gill net and 14% with small mesh fyke and seine gear. Eighty percent of the Black Crappie collected met or exceeded the acceptable harvest size of 7 inches. Black Crappie size structure was dominated by fish in 6-7 inch size range. Age and growth analysis indicated Black Crappie were growing below state average having a mean growth index of -3.1(Table 5). Age frequency indicated the catch was dominated by 5-7 year old fish with 7 year classes being represented (Table 5). Black Crappie longevity appeared to peak at 7 years.

Sportfish collected in low abundance in 2017 included 9 Yellow Perch averaging 7.2 inches and 6 Northern Pike averaging 28.5 inches. Non-sportfish collected in abundance included 153 Yellow Bullheads averaging 9.2 inches, 88 Brown Bullheads averaging 9.7 inches, and 40 Warmouth averaging 5.1 inches.

Analysis and Discussion

The Big Fish Lake fish community remains similar in species composition and relative abundance to past surveys. Bluegill is the most abundant species. Brown and Yellow bullheads are common. Pumpkinseed sunfish, Black Crappie, Largemouth Bass, and Northern Pike are also common and represent the most sought after sportfish.

In southern Michigan warmwater lakes, Bluegill are typically the most abundant fish species present and play a key role in community structure and overall sport fishing quality (Schneider 1981). Schneider (1990) suggests indices of Bluegill characteristics which can be used to classify the status of populations. The "Schneider Index" uses size scores of length frequency data and relates them to a subjective ranking system ranging from "very poor" to "superior." Using the Schneider Index for classifying Bluegill populations, Big Fish Lake scored 4.3 for a satisfactory ranking (Table 6). This rank is a marked improvement from the 2002 survey but still below ranking from 1989 and 1995 surveys (Table 6). It is not uncommon to see varying shifts of size structure with Bluegill. For unknown reasons, the 2002 survey indicated a size structure dominated by smaller fish. However, the improved size structure depicted in 2017 is an indication of a good recreational fishery. Bluegill longevity is fairly good at 9 years and allows fish to achieve greater length.

Although Pumpkinseed sunfish appear in lesser abundance in Big Fish Lake, they are an important component of the recreational fishery. The Pumpkinseed sunfish fishery appears to be acceptable with opportunity to harvest fish in the 6-7 inch size range.

Largemouth Bass is one of the most highly sought after sportfish in Michigan and night electrofishing is particularly effective at capturing them as they move into the littoral zone for feeding. Fisheries Division's Status and Trends Program (Wehrly et. al. 2015) incorporates standardized night electrofishing procedures for bass and allows for statewide and regional comparisons. Using catch per effort (CPE) data, the status of the 2017 Big Fish Lake Largemouth Bass fishery can be compared to other similar water bodies (Figure 3). In terms of relative abundance, CPE (74 fish/hour) was below the mean value (91 fish/hour) for comparable lakes. In terms of biomass, CPE (56 lbs./hour) was slightly below the mean value (60 lbs./hour) for comparable lakes. In terms of percent legal sized fish captured, 51% of the fish captured (n=37) were legal sized compared to the mean value of 18%. These CPE comparisons indicate Big Fish Lake offers a good Largemouth Bass fishery with an excellent opportunity to catch legal sized fish.

Black Crappie appeared in similar abundance and size structure as found in past surveys but 2017 survey results indicate growth has been significantly slower in recent years. There are no readily available explanations for the slower growth rate but it does not appear to be caused by over-abundance. Still, a few Black Crappie were found in the 8-11 inch size range and offer a limited recreational fishery.

It is difficult to comment on the status of Northern Pike due to the low catch in 2017. Two local residents anecdotally indicated a decline in numbers but the 2017 catch was similar in abundance and size structure as found in the 1995 and 2002 surveys. All six of the Northern Pike collected in 2017 met or exceeded the legal harvest size of 24 inches.

Management Direction

Based upon the findings of the 2017 survey, the Big Fish Lake fish community is in good shape. The Bluegill and Pumpkinseed sunfish fisheries are better than average compared to other lakes in the region. The Largemouth Bass fishery is in excellent shape and offers anglers the opportunity to catch large fish. No fisheries management is recommended at this time but future surveys should take note of Black Crappie growth and a possible decline in abundance of Northern Pike.

References

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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, 2015, Ann Arbor.

Figure 1. Location of Big Fish Lake, Lapeer County.

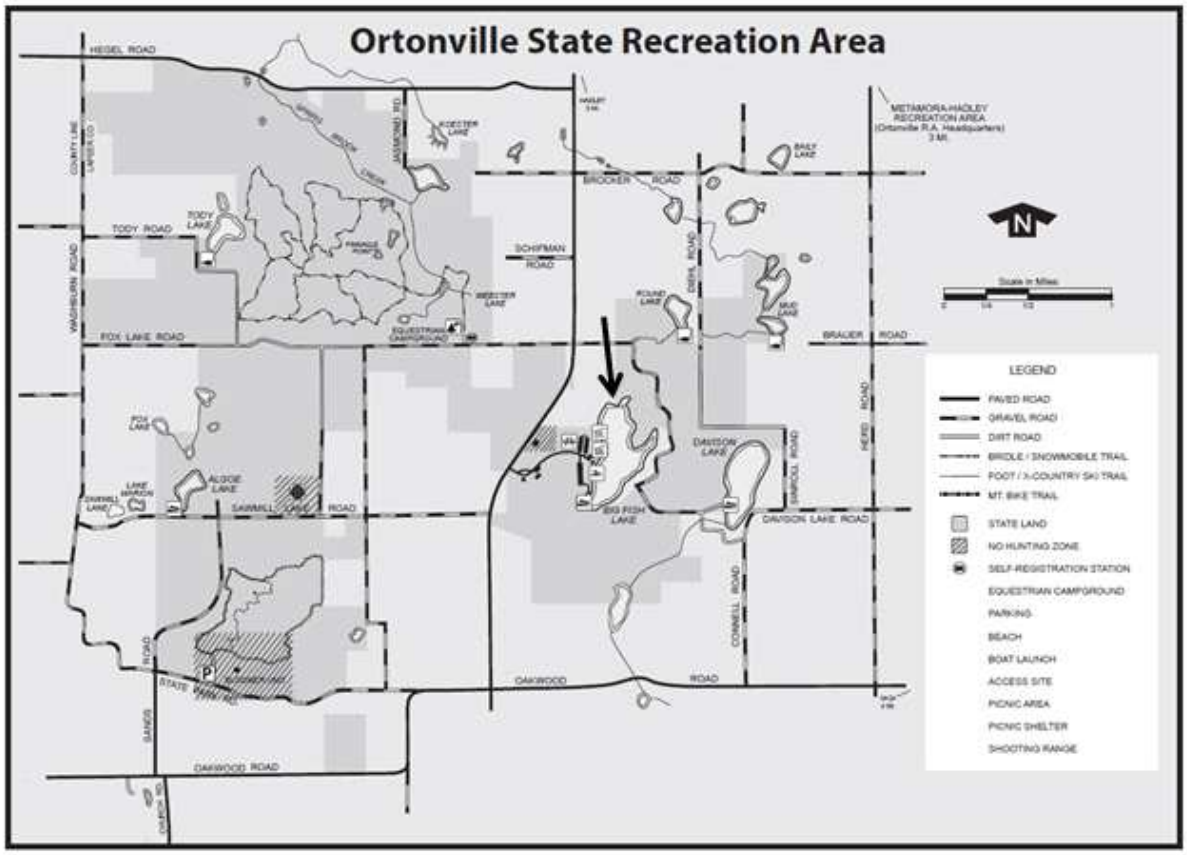


Figure 2. Bathymetric map of Big Fish Lake, Lapeer County.

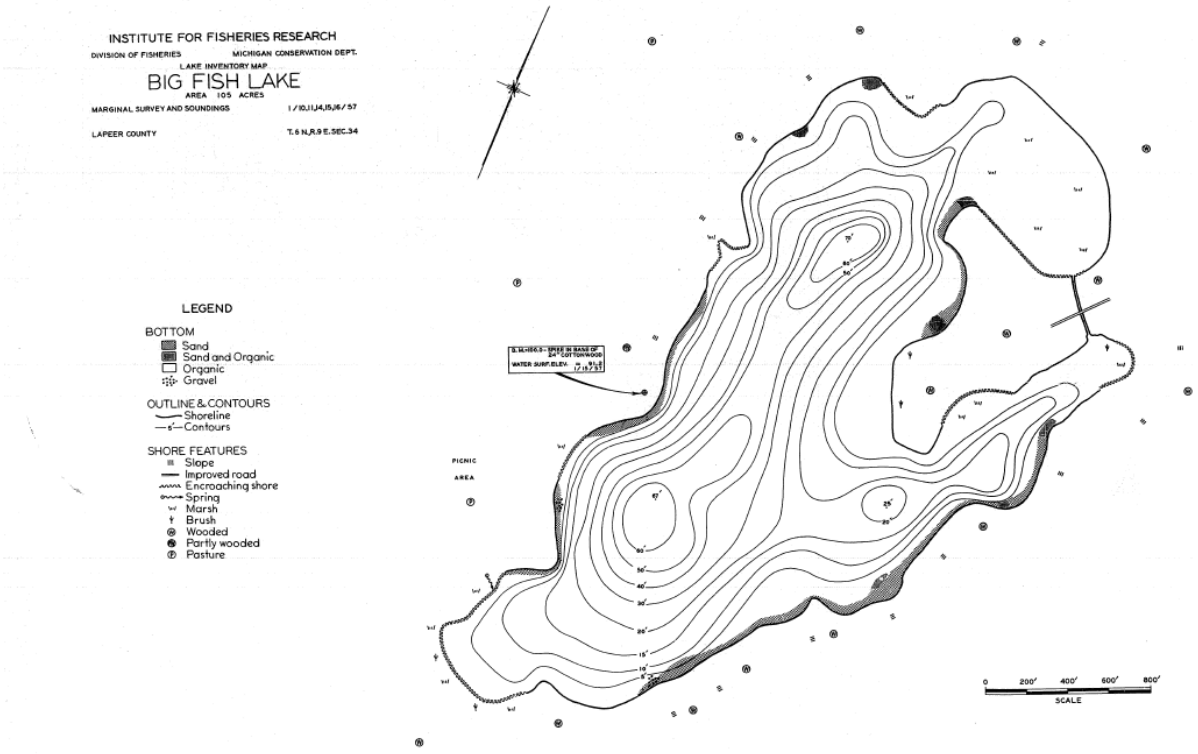
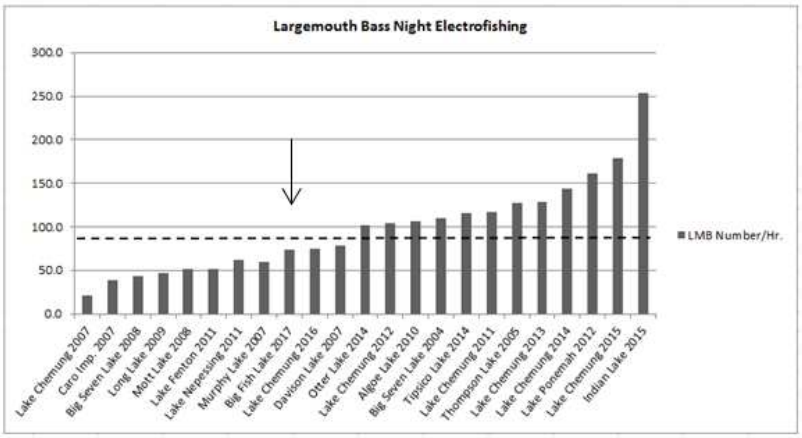
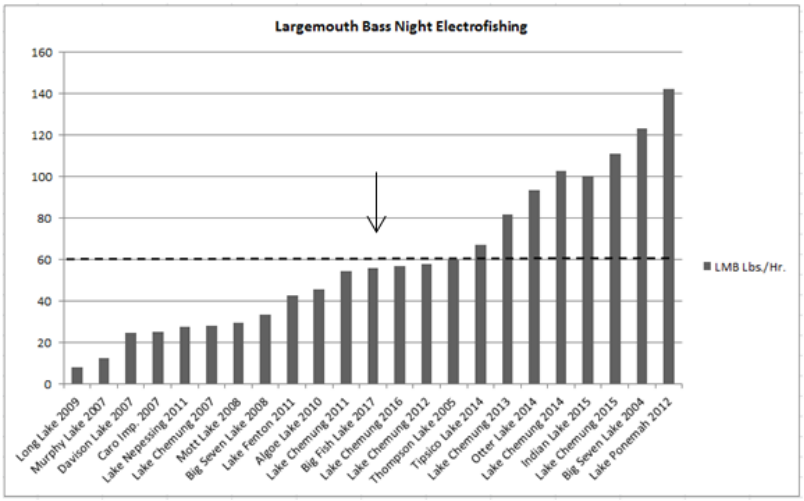


Figure 3. Comparison of night electrofishing catch data for Largemouth Bass in selected waterbodies in southeast Michigan. Dashed line indicated mean value.





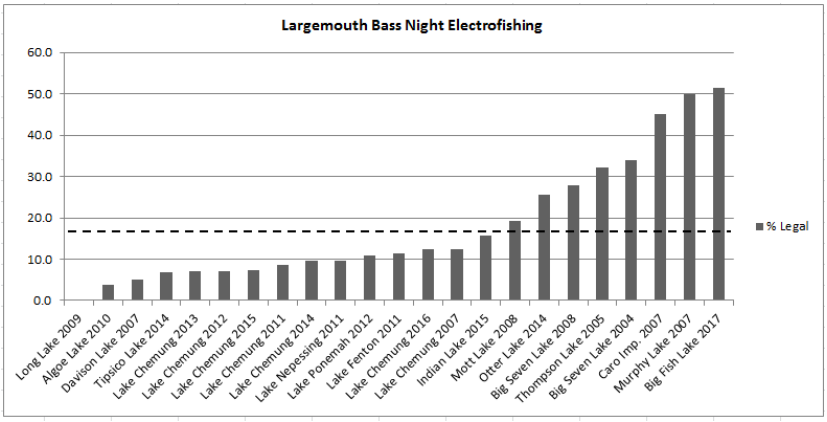


Table 1. Trophic State Index (TSI) for Big Fish Lake, Lapeer County (sampled at the 3 ft. depth).

	2002	**TSI**	**2017**	**TSI**
Secchi depth (ft.)	9.0	45.6	11.3	42.1
Total phosphorus (ug/l)	19.0	46.5	19.9	47.3
Chorophyl-*a* (ug/l)	6.0	48.2	3.4	42.6
Averaged TSI		46.8		44.0

*Oligotrophic (<38), Mesotrophic (38-48), Eutrophic (49-61), Hypereutrophic (>61)

Table 2. Temperature profile of Big Fish Lake, Lapeer County. Shaded area indicates thermocline. Data collected August 2017.

Depth	**Temperature (F)**
0	76
3	76
6	76
9	75
12	74
15	68
18	62
20	55
24	50
26	48
29	46
32	45
35	45
38	44
41	44
44	44
47	44
50	44
53	44
56	44
59	44
62	44
65	44
67	44
70	44

Table 3. List of fishes in Big Fish Lake, Lapeer County. Status: E= extirpated, P= recent observation, U=unknown.

Common name	Scientific name	Status
Carps and minnows		
Blacknose Shiner	*Notropis heterolepis*	P
Blackchin Shiner	*Notropis heterondon*	P
Bluntnose Minnow	*Pimephales notatus*	P
Creek Chub	*Semotilus atromaculatus*	U
Emerald Shiner	*Notropis atherinoides*	P
Golden Shiner	*Notemigonus crysoleucas*	P
Fathead Minnow	*Pimephales promelas*	P
Sand Shiner	*Notropis stramineus*	P
Spotfin Shiner	*Cyprinella spiloptera*	P
Mudminnows		
Central Mudminnow	*Umbra limi*	P
Suckers		
Lake Chubsucker	*Erimyzon sucetta*	P
White Sucker	*Catostomus commersoni*	P
Bullhead catfishes		
Brown Bullhead	*Ameiurus nebulosus*	P
Channel Catfish	*Ictalurus punctatus*	U
Tadpole Madtom	*Notorus gyrinus*	P
Yellow Bullhead	*Ameiurus natalis*	P
Trouts		
Brown Trout	*Salmo trutta*	E
Rainbow Trout	*Oncorhynchus mykiss*	E
Pikes		
Grass Pickerel	*Esox americanus*	P
Northern Pike	*Esox lucius*	P
Sunfishes		
Black Crappie	*Pomoxis nigromaculatus*	P
Bluegill	*Lepomis macrochirus*	P
Green Sunfish	*Lepomis cyanellus*	P
Largemouth Bass	*Micropterus salmoides*	P
Pumpkinseed	*Lepomis gibbosus*	P
Rock Bass	*Ambloplites rupestris*	U
Warmouth	*Lepomis gulosus*	P
Perches		
Yellow Perch	*Perca flavescens*	P
Least Darter	*Etheostoma microperca*	P

Table 4. Total catch (all gear) from Big Fish Lake, Lapeer County. Data collected May/June 2017.

Common name	Number	Percent by number	Weight (lb.)	Percent by weight	Length range (in.)*	Average length (in.)	Percent legal size**
Black Crappie	69	3.5	16.9	3.6	4-12	7.5	80
Blackchin Shiner	3	0.2	0.0	0.0	1-2	1.8	100
Bluegill	1130	57.7	155.7	32.8	1-8	5.4	33
Bluntnose Minnow	9	0.5	0.1	0.0	2-3	3.2	100
Brown Bullhead	88	4.5	40.8	8.6	6-12	9.7	94
Grass Pickerel	5	0.3	0.7	0.1	6-10	8.5	100
Green Sunfish	13	0.7	1.0	0.2	3-6	4.6	8
Hybrid Sunfish	1	0.1	0.1	0.0	5-5	5.5	0
Lake Chubsucker	3	0.2	1.1	0.2	7-9	8.5	100
Largemouth Bass	76	3.9	97.9	20.6	2-18	12.1	41
Northern Pike	6	0.3	31.4	6.6	27-29	28.5	100
Pumpkinseed	348	17.8	63.0	13.3	1-8	5.9	44
Spotfin Shiner	3	0.2	0.0	0.0	3-3	3.5	100
Tadpole Madtom	1	0.1	0.0	0.0	3-3	3.5	100
Warmouth	40	2.0	4.7	1.0	3-8	5.1	15
Yellow Perch	9	0.5	1.4	0.3	6-8	7.2	44
Yellow Bullhead	153	7.8	59.8	12.6	5-12	9.2	95
All species total	1957		474.6				

* Note some fish may be measured to 0.1 inch, others to inch group.

** Percent legal or acceptable size for angling.

Table 5. Mean growth for important sportfish from Big Fish Lake, May/June 2017.

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Species/Age	No. aged	Length range (in.)	State avg. length (in.)	Weighted mean length (in.)	Weighted age frequency (%)	Mean growth index*
Black Crappie						-3.1
Age III	1	5.5-5.5	7.9	5.5	1.5	
Age IV	2	6.4-6.4	8.9	6.4	3.4	
Age V	6	6.5-7.1	9.7	6.9	22.3	
Age VI	8	6.8-9.7	10.4	7.5	45.0	
Age VII	8	6.8-10.3	11.1	7.7	24.2	
Age VIII	2	10.1-11.1	11.6	10.8	2.17	
Age X	1	12.0-12.0		12.0	1.5	
Bluegill						-1.2
Age I	12	1.5-2.3	2.4	1.9	6.2	
Age II	6	2.6-3.3	4.2	3.0	2.7	
Age III	11	3.1-4.2	5.3	3.9	10.7	
Age IV	5	3.6-5.1	6.2	4.5	11.3	
Age V	14	4.3-8.1	6.9	5.1	5.1	
Age VI	16	5.3-8.1	7.4	6.8	22.7	
Age VII	3	5.9-8.4	8.0	6.9	4.2	
Age VIII	6	6.6-8.3	8.4	7.3	4.5	
Age IX	5	6.6-8.4	8.7	7.4	5.1	
Age X	1	8.4-8.4		8.4	0.5	
Largemouth Bass						-1.0
Age I	2	4.3-4.3	5.4	4.3	2.7	
Age II	14	5.2-7.1	8.7	6.3	16.9	
Age III	8	7.3-11.8	10.6	8.9	11.5	
Age IV	7	9.0-14.4	12.0	11.2	8.1	
Age V	17	9.2-17.2	13.7	13.3	23.5	
Age VI	10	11.0-18.2	15.0	14.9	14.1	
Age VII	8	13.9-17.5	16.7	16.24	11.7	
Age VIII	1	15.3-15.3	17.6	15.3	1.5	
Age IX	4	17.4-18.8	18.6	18.2	5.7	
Age X	3	17.8-18.8	19.3	18.3	4.2	
Northern Pike						na
Age V	1	28.2-28.2	26.1	28.2	16.7	
Age VI	3	27.0-29.3	27.8	27.8	50.0	
Age VII	1	29.4-29.4	30.0	29.4	16.7	
Age VIII	1	28.5-28.5		28.5	16.7	
Pumpkinseed						-0.6
Age III	7	3.8-4.6	5.2	4.2	9.3	
Age IV	7	4.6-7.0	5.8	5.8	21.3	
Age V	19	5.5-7.6	6.3	6.1	54.8	
Age VI	4	5.6-7.2	6.8	6.3	11.7	
Age VII	1	8.6-8.6	7.2	8.6	0.3	
Age VIII	2	7.5-7.9		7.7	2.3	
Age IX	1	8.8-8.8		8.8	0.3	

*Mean growth index is the average deviation from the state average length at age.

Table 6. Schneider Index for classifying bluegill lakes using trap net and large mesh fyke gear (index values in parenthesis) for Big Fish lake, Lapeer County.

Sample date	5/5/89	6/13/95	5/14/02	6/2/17
Sample size	539	542	466	745
Water temp.	56F	78F	60F	70F
Ave. length (in.)	7.0	6.7	5.3	6.0
	(6)	(5)	(2)	(4)
% $\geq$ 6 inches	77	82	23	44
	(5)	(5)	(2)	(3)
% $\geq$ 7 inches	52	37	2	30
	(6)	(5)	(2)	(5)
% $\geq$ 8 inches	22	3	0	7
	(6)	(5)	(2)	(5)
Index score	5.8	5.0	2.0	4.3
Rank	Good/Excel	Good	Poor	Satisfactory

Ranking: 7 = Superior, 6 = Excellent, 5 = Good, 4 = Satisfactory, 3 = Acceptable, 2 = Poor, 1 = V. Poor