



Introduction

Lake Fenton is located in southeast Genesee County near the town of Fenton and is contained within the Shiawassee River watershed. It is the largest inland lake in Genesee County estimated at 845 surface acres. It is a "marl type" lake that has an average depth of 24 ft. and reaches a maximum depth of 92 feet. Its basin is diverse with several deep-water areas separated by shallow shoals. The shoreline is irregular in shape with a number of coves. One island (Case Island) is located near the center of the lake. There are no major inlets but the lake has two small outlets that drain to the Shiawassee River. A DNR boat access site is located on the south shore off Grove Park Road.

The shoreline of Lake Fenton is extensively developed for housing. Habitat sampling in 2011 counted 615 dwellings and estimated the dwelling density at 41/mile of shoreline. Artificial armoring occurs on an estimated 86% of the shoreline. A total of 877 docks were counted. Given its large size, extensive development, and public accessibility, Lake Fenton is a popular water body for all types of recreational use.

In general, Lake Fenton is classified as a warmwater, medium size, and deep lake of mesotrophic limnological characteristics. Limnological parameters measured in August, 2011 included secchi disk (20 ft.), alkalinity (115 mg/l), pH (7.2-8.5), total phosphorus (0.025 mg/l), and total chlorophyll-*a* (0.001 mg/l). These chemical properties yield a trophic status index of 38 and are consistent with mesotrophic classification. A temperature and oxygen profile taken in August, 2011, indicates warmwater thermal characteristics in the epilimnion with thermocline development between the 21-36 ft. depths (Table 1). Mid-summer dissolved oxygen concentrations appear to be fish limiting (<3 mg/l) below the 36 ft. depth.

Submerged fish habitat is generally sparse in Lake Fenton. The lake bottom is generally barren, consisting of sand and marl substrate. Submerged aquatic vegetation occurs sporadically in the littoral zone. Chara, elodea, eel grass, large leaf pondweed and water lily are present. Emergent vegetation is sparse due to the extensive shoreline development. Submerged wood structure is sparse.

The fish community of Lake Fenton has been regularly monitored by DNR, Fisheries Division. Past surveys have found 32 species of fish (Table 2). All fish species are native with the exception of walleye and redear sunfish. In 1981, walleye were first stocked by DNR, Fisheries to create an additional sport fishery. Walleye have been stocked regularly since 1990 (Table 3). Redear sunfish are believed to have been inadvertently introduced in the early 1990's with the fall fingerling walleye plants. Over the years, Lake Fenton has maintained a reputable sport fishery for bluegill, rock bass, largemouth bass, and northern pike. Freshwater jellyfish and zebra mussels are present in Lake Fenton.

Methods and Materials

Lake Fenton was selected for sampling as part of Fisheries Division's Status and Trends Program. The Status and Trends Program seeks to sample randomly selected water bodies, using similar protocols, to document fish community and habitat conditions and trends on a regional and statewide basis. Fish sampling using seine, small and large mesh fyke nets, trap nets, gill nets, and night time electrofishing, occurred May 23 to June 2, 2011. All fish were identified, counted, and measured to the inch group. Scale or spine samples were extracted from select sportfish to obtain age and growth data. Habitat sampling occurred August 17, 2011.

Results

A total of 2,126 fish representing 27 species were collected in this survey. Small mesh fyke nets comprised 33% of the total with the remaining catch being divided between trap nets (27%), large mesh fyke nets (20%), electrofishing (17%), seine (2%), and gill net (2%).



Bluegill were the most abundant species collected. A total of 1,115 bluegill averaging 3.8 inches comprised 52% of the total catch. A total of 624 bluegill averaging 2.2 inches were collected with small mesh fyke nets. Two hundred fifty-three bluegill averaging 6.9 inches were collected with trap and large mesh fyke nets. Two hundred and one bluegill averaging 4.3 inches were collected electrofishing, 26 bluegill averaging 4.8 inches were caught seining, and 11 bluegill averaging 7.4 inches were collected with gill nets. Seventy-five percent of the bluegill captured with trap and large mesh fyke nets met or exceeded the acceptable harvest size of 6 inches. Growth analysis indicated bluegill were growing below state average having a mean growth index of -1.2. Age analysis indicates the presence of 10 year classes with 96% of the catch between the ages of 1 and 6 years. Bluegill longevity appears to peak at 6 years with a small percentage (4%) living beyond and up to 10 years of age.

A total of 266 redear sunfish averaging 7.7 inches comprised 13% of the total catch. A total of 229 redear sunfish averaging 7.9 inches were collected with trap and large mesh fyke nets. Ninety-one percent of these redear sunfish met or exceeded the acceptable harvest size of 6 inches. Twenty-eight redear sunfish averaging 7.0 inches were collected electrofishing and 8 redear sunfish averaging 3.0 inches were collected with small mesh fyke nets. Growth analysis indicates redear were growing below state average having a mean growth index of -1.1. Age analysis indicates the presence of 6 year classes with 96% of the catch between of 1 and 6 years. Redear longevity appears to peak at 6 years.

A total of 78 largemouth bass averaging 11.4 inches comprised 4% of the total catch. Twenty-four percent of the largemouth bass collected met or exceeded the minimum harvest size of 14 inches. Forty-three largemouth bass averaging 12.7 inches were collected with trap and large mesh fyke nets. Twenty-six largemouth bass averaging 10.6 inches were collected electrofishing. Growth analysis indicates largemouth bass are growing below state average having a mean growth index -1.5. Age analysis indicates the presence of 9 year classes with 90% of the catch between the ages of 1 and 7 years. Largemouth bass longevity appears to peak at 9 years.

A total of 74 pumpkinseeds averaging 5.9 inches comprised 3 % of the total catch. A total of 32 pumpkinseeds averaging 6.8 inches were collected with trap and large mesh fyke nets and 38 pumpkinseeds averaging 5.5 inches were collected electrofishing. Eighty-one percent of the pumpkinseeds collected with trap and large mesh fyke nets met or exceeded the acceptable harvest size of 6 inches. Growth analysis indicates pumpkinseeds are growing near state average having a mean growth index of -0.2. Age analysis indicates the presence of 7 year classes with 99% of the catch between the ages of 2 and 7 years. Pumpkinseed longevity appears to peak at 7 years.

A total of 52 rock bass averaging 7.3 inches comprised 3% of the total catch. Thirty-seven rock bass averaging 8.3 inches were collected with trap and large mesh fyke nets and 10 rock bass averaging 4.1 inches were collected with small mesh fyke nets. Ninety-five percent of the rock bass collected with trap and large mesh fyke nets met or exceeded the acceptable harvest size of 6 inches. Growth analysis indicates rock bass are growing near state average having a mean growth index of -0.2. Age analysis indicates the presence of 10 year classes. Rock bass longevity appears to peak at 9 years.

A total of 32 yellow perch averaging 4.9 inches comprised 2% of the total catch. Electrofishing accounted for 88% of the catch. Eight percent of the yellow perch catch met or exceeded the acceptable harvest size of 7 inches. Growth analysis indicates yellow perch are growing below state average having a mean growth index of -0.7. Age analysis indicates the presence of 5 year classes with 97% of the catch between the ages of 1 and 4 years. Yellow perch longevity appears to peak at 4 years.



A total of 27 northern pike averaging 19.3 inches comprised 1% of the total catch. Four percent of the northern pike collected met or exceeded the minimum harvest size of 24 inches. Twenty northern pike averaging 19.6 inches were collected with gill nets and 5 northern pike averaging 21.1 inches were collected with trap and large mesh fyke net gear. Growth analysis indicated northern pike were growing below state average having a mean growth index of -4.0. Age analysis indicates the presence of 8 year classes with 82% of the catch between the ages of 1 and 5 years. Northern pike longevity appears to peak at 8 years.

Other fish species collected in appreciable numbers included 148 brown bullheads averaging 12.1 inches, 69 yellow bullheads averaging 10.3 inches, 55 longnose gar averaging 29.3 inches, and 30 carp averaging 27.5 inches. Other sportfish collected included 11 smallmouth bass averaging 12.8 inches, 9 black crappie averaging 7.8 inches, and 4 walleye averaging 23.5 inches. All other fish species were collected in relatively low numbers.

Discussion

In southern Michigan warmwater lakes, bluegill are one of the most abundant fish species present and play a key role in community structure and overall sportfishing quality (Schneider 1981). Schneider (1990) suggests indices of bluegill characteristics can be used to classify populations. The "Schneider Index" uses size scores of length frequency and relates them to an adjective ranking system ranging from "very poor" to "superior". Using the Schneider Index for classifying bluegill populations using trap or fyke net gear, Lake Fenton scored 5.25 for a "good" rank (Table 4). This good rank is an improvement compared to previous surveys (Table 4). It is difficult to ascertain an explanation for the improvement but it is not unusual to see size structure fluctuations over extended time periods.

A number of factors affect bluegill size structure including abundance, available food at all life stages, recruitment, mortality, habitat, and predator abundance. Bluegill stunting commonly occurs when there is an undesirable balance among rates of recruitment of young (too high), natural mortality of young (too low), and high fishing mortality of adults (Schneider and Lockwood 1997). For Lake Fenton, bluegill do not appear to be over abundant thus reducing competition for food. Recruitment and mortality rates appear to be in balance which is likely due to favorable habitat and predator abundance. In general, bluegill in Lake Fenton have maintained a stable balance providing for a very good recreational fishery.

Other panfish in Lake Fenton (redeer sunfish, rock bass, pumpkinseed) occur in less abundance but provide additional recreational opportunities. Redear sunfish appear to have established a self-sustaining population. Both redear and rock bass show greater propensity to achieve larger size compared to pumpkinseeds and bluegill.

The results of this survey confirm Lake Fenton's good reputation for largemouth bass. The size structure and catch rates for largemouth bass in 2011 were comparable to previous surveys indicating a self-sustaining population which supports a very good recreational fishery. Smallmouth bass occur in much less abundance but still offer some potential for anglers to catch sizable fish.

The 2011 catch rate of northern pike was good in terms of numbers but growth appeared suppressed and the size structure was dominated by fish in the 15-23 inch size range. Surveys in 1994 and 2000 showed a similar trend and suggests a high mortality of older and larger pike. It is unknown if this mortality is due to natural causes or from angler harvest. Recreational opportunities to catch northern pike in the 15-23 inch size range are good but it appears larger fish are less plentiful.



Walleye stocking in Lake Fenton has met with marginal success. There are anecdotal reports of anglers catching walleye, primarily during the ice fishery. Post stocking surveys have captured a few adult walleye but not enough to indicate a significant fishery has been created. Yet, the popularity of walleye with anglers and the opportunity to catch the occasional one seems to justify continued stocking. The purpose of the introduction was to diversify the fishery and provide another game fish for anglers to catch, and this objective is being met.

Too few yellow perch and black crappie were captured in this survey for detailed analysis. Low catches of both species were observed in 1994 and 2000 suggesting only small populations exist. Yellow perch appear to experience high mortality at an early age and small size suggesting the mortality is of natural causes versus angler harvest. There appears to be a few large black crappie available for anglers but not in high numbers. Brown and yellow bullheads, longnose gar, and bowfin are found in good numbers and provide additional angling opportunities.

Overall, the Lake Fenton fish community is very diverse and appears in satisfactory shape. The results of this 2011 survey are consistent with past surveys indicating a stable fish community. Predator and prey species appear in good balance. In terms of a recreational fishery, Lake Fenton continues to offer good opportunities for bluegill, rock bass, largemouth bass, and northern pike. Redear sunfish are developing as an additional sportfish species.

Recommendations

Management recommendations are to continue with walleye stocking at a rate of 50 spring fingerling per acre (42,250 sf) on an alternate year schedule (odd years).

References

Schneider, J.C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Division, Technical Report 90-10, Ann Arbor.

Schneider, J.C. 1991. Fish communities in warmwater lakes. Michigan Department of Natural Resources, Fisheries Division, Fisheries Technical Report 1890, Ann Arbor, Michigan.

Schneider, J.C. and R.N. Lockwood 1997. Experimental management of stunted bluegill lakes. Michigan Department of Natural Resources, Fisheries Division, Research Report 2040, Ann Arbor.



Table 1. Temperature and oxygen profile of Lake Fenton, August, 2011 (shaded area indicates thermocline).

Depth	Temperature (F)	Oxygen (mg/l)
0	76	10.0
3	76	10.0
6	76	10.0
9	76	10.0
12	76	9.9
15	76	9.9
18	75	9.5
21	74	8.7
24	69	8.8
27	63	6.9
30	58	4.8
33	56	4.1
36	54	3.4
39	53	2.7
42	53	2.5
45	52	2.2
48	52	2.0
51	50	1.5
54	50	1.1
57	48	0.8
60	48	0.7
63	48	0.6
66	47	0.4
69	47	0.4
72	47	0.4
75	47	0.3
78	47	0.4
81	47	0.3
84	47	0.3
87	47	0.3
90	47	0.3
93	46	0.4



Table 2. Fish species found in Lake Fenton (* indicates species captured in 2011).

Gars	Mudminnows
Longnose gar*	Central mudminnow*
Bowfins	Killifishes
Bowfin*	Banded killifish*
Carps & minnows	Silversides
Blacknose shiner*	Brook silverside*
Bluntnose minnow*	Sunfishes
Common carp*	Black crappie*
Golden shiner	Bluegill*
Spotfin shiner*	Green sunfish*
Spottail shiner*	Largemouth bass*
Suckers	Pumpkinseed*
Lake chubsucker	Rock bass*
Redhorse, (sp.)	Smallmouth bass*
White sucker	Warmouth*
Bullhead catfishes	Redear sunfish*
Bullhead, brown*	Perches
Bullhead, yellow*	Iowa darter
Bullhead, black	Yellow perch*
Tadpole madtom*	Walleye*
Pikes	
Grass pickerel*	
Northern pike*	

Table 3. Lake Fenton walleye stocking, 1990-2011. Data codes: sf-spring fingerling, ff-fall fingerling.

Year	Number	Size (inches)	Rate (#/acre)
1990	32,571 sf	2.1	39
1990	635 ff	8.5	1
1991	20,600 sf	2.1	23
1992	17,200 sf	2.0	20
1994	5,535 ff	3.0	7
1997	84,500 sf	1.3	100
1999	84,366 sf	2.2	100
2001	46,652 sf	2.3	55
2003	50,377 sf	1.5	60
2005	9,464 sf	2.2	11
2006	42,764 sf	1.6	51
2009	50,193 sf	1.6	59



2011 49,965 sf 1.9 59

Table 4. Schneider Index for classifying bluegill populations using trap or fyke net gear for Lake Fenton, Genesee County (index score in parenthesis).

Sample date	4/26/83	4/28/87	5/8/89	5/3/94	5/8/00	5/23/11
Sample size	938	66	122	135	175	253
Avg. length (in.)	5.9 (3)	5.8 (3)	6.0 (4)	6.6 (5)	5.8 (3)	6.9 (5)
% ≥ 6 inches	57 (4)	36 (3)	76 (5)	68 (4)	39 (3)	75 (5)
% ≥ 7 inches	25 (4)	5 (3)	11 (4)	42 (5)	17 (4)	47 (5)
% ≥ 8 inches	5 (5)	3 (5)	0 (2)	13 (6)	1 (5)	20 (6)
Growth index	+0.4	-0.6	-0.5	+0.9	-0.6	-1.2
Index score	4.00	3.50	3.75	5.00	3.75	5.25
Rank	Sat.	Accept.	Accept./Sat.	Good	Accept./Sat.	Good

Rank: 7=superior, 6=excellent, 5=good, 4=satisfactory, 3=acceptable, 2=poor, 1=very poor