

Muncie Lake
Noble County
Fish Management Report

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EXECUTIVE SUMMARY

Muncie Lake is a 47-acre natural lake located in south-central Noble County near Wolf Lake, Indiana. A public boat ramp is now available on nearby Williams Lake located off County Road 250W and enables angler access to Muncie Lake. To provide current information on the status of the fishery to anglers who may now be interested in fishing the lake, a fish population survey was conducted in July 2010. Fish sampling was conducted on July 6-7, 2010. Submersed aquatic plants were sampled on August 5.

During the survey, 463 fish weighing 334 pounds and representing 18 species were collected. Altogether, sport fish accounted for 82% of the total number and 57% of the total weight. Bluegills ranged in length from 2.1 to 9.1 inches. Those that were 7-inch or larger accounted for 24% of those that were 3-inch and larger. The catch rate of bluegills captured during electrofishing was typical for lakes in the area. Their growth rate was also typical. Largemouth bass up to 20.1 inches were caught. Twelve were legal size (≥ 14 in). The electrofishing catch rate and growth rate of bass were also average.

Water clarity was the same in July and August (2.5 ft). Adequate amounts of oxygen for fish (>3 ppm) were present only in the top 4 feet of water. Coontail and Eurasian water milfoil were the only two species of submersed aquatic plants. Overall, submersed plants covered 43% of the littoral area.

Results of the 2010 fish survey were generally similar to results of the 1977 survey. The number of bluegills captured in 2010, however, was up 42% and their mean weight doubled from 0.08 pounds per fish to 0.15 pounds. Bass numbers increased in 2010. Bluegill and bass size structure may have also increased over the years.

In general, adequate numbers and size of bluegills and largemouth bass are present. Crappies, although fewer in number, along with channel catfish, northern pike, and several miscellaneous species offer some diversity of fishing opportunities at the lake. The most troubling aspect of the survey is the relatively high number and weight of non-sport fish. Bowfin, carp and spotted suckers made up half of the total weight.

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INTRODUCTION

Muncie Lake is a 47-acre natural lake located in south-central Noble County near Wolf Lake, Indiana. It is one of several small lakes located in the upper reaches of the Elkhart River South Branch (Lake Michigan watershed). Maximum depth is 26 feet and average depth is 12 feet. Because of its large watershed size (19,169 acres), its hydraulic retention time is estimated to be only 11 days. Water level can vary several feet depending on runoff. Portions of the north and south shorelines are residentially-developed. Palustrine wetlands are located along the west and east ends of the lake adjacent to inlets and the outlet. Public access is now available at a public boat ramp constructed in 2010 on nearby Williams Lake off County Road 250W.

Muncie Lake has little fish management history because of prior limited access. The only previous fish survey was conducted in August 1977. Gill-netting was also conducted in August 1981 to determine whether northern pike stocked upstream at Bear and Miller lakes had moved down into Muncie Lake (Pearson 1982). Like other lakes in the area, a 12-inch minimum size limit was imposed on largemouth bass in 1990 and increased to 14 inches in 1998. To provide current information on the status of the fishery to anglers who may now be interested in fishing the lake, another fish population survey was conducted in July 2010. The results of the survey are presented in this report.

METHODS

Fish sampling was conducted on July 6-7, 2010 according to survey guidelines and included 0.5 hour of pulsed DC electrofishing (504V) with two dip-netters, two gill net lifts, and two trap net lifts. This amount of effort now also corresponds to the standard effort being used to detect status and trends in fish communities (Workplan F10D642). All captured fish were measured to the nearest tenth-inch (total length, TL) and released when possible. Weights were estimated from standard length-weight formulas generated from data on file from Indiana natural lakes fish population surveys. Fish scales were taken from largemouth bass and bluegills for age and growth analyses using standard body-length: scale-length relationships. Temperature and oxygen profiles were measured on July 6. Water clarity was also measured on July 6 and again on August 5 when submersed aquatic plants were sampled according to standard procedures.

RESULTS

During the survey, 463 fish weighing 334 pounds and representing 18 species were collected (see appendices). Altogether, sport fish accounted for 82% of the total number and 57% of the total weight. Bluegills ranked first numerically (56%) but fourth in weight (12%) behind carp (24%), spotted suckers (16%), and largemouth bass (14%). Largemouth bass comprised 13% of the number.

Bluegills ranged in length from 2.1 to 9.1 inches. Those that were 7-inch or larger accounted for 24% of those that were 3-inch and larger. Five bluegills were 8-inch or larger. The catch rate of bluegills captured during electrofishing (89/15-min) was typical for lakes in the area (100/15-min). Their growth rate was also typical of area lakes with age-4 bluegills averaging 6.4 inches long. Age-4 bluegills in most area lakes average 6.1 inches.

Sixty largemouth bass were captured, ranging in length from 1.5 to 20.1 inches. Most bass were 7.5 to 11.0 inches. Twelve were legal size (≥ 14 in). The electrofishing catch rate of bass (29/15-min) was average compared to other lakes (30/15-min). Their growth rate was also average.

Few other sport fish were collected. Twenty redear sunfish up to 8.6 inches long were caught, in addition to 19 black crappies up to 9.8 inches, nine channel catfish from 13.3 to 25.0 inches, and two northern pike from 31.5 to 34.2 inches. Other sport fish included yellow bullheads, green sunfish, yellow perch, a brown bullhead and warmouth. Non-sport fish included 34 spotted suckers up to 18.2 inches long, 15 carp up to 24 inches, 13 bowfin, 12 spotted gar, six golden shiners, four white suckers, and a brook silverside.

Water clarity was the same in July and August (2.5 ft). Adequate amounts of oxygen for fish (>3 ppm) were present only in the top 4 feet of water and no oxygen was present in water 8 feet deep or deeper. Only two species of submersed aquatic plants were collected during the August sampling. None were detected in water deeper than 10.5 feet. Coontail was found at 11 of 30 sites (37%) and Eurasian water milfoil, a non-native species, was found at four sites (13%). Even where present, neither species was abundant. Dominance scores of both species, a measure that combines plant coverage with density, were low (<12). Overall, submersed plants covered 43% of the littoral area.

DISCUSSION

Results of the 2010 fish survey were generally similar to results of the 1997 survey (Table 1). Some differences, including fewer fish and fewer species, were likely due to variations in sampling date and changes in sampling gear and effort. Twenty-five species were found in 1977 compared to 18 species in 2010. Notably absent from the 2010 catch were pumpkinseeds. The number of bluegills captured in 2010, however, was up 42% compared to 1977 and their total weight was up 184%, doubling from a mean weight of 0.08 pounds per fish to 0.15 pounds. The number of largemouth bass captured in 2010 was also greater, as were numbers of bowfin and carp.

Bluegill structure may have increased over the years (Table 2). Only 8% of all 3-inch and larger bluegills captured in 1977 were 7-inch or large compared to 24% in 2010, although numbers of 8-inch and larger bluegills were similar. Likewise, similar numbers of 14-inch and larger bass were caught in 1977 and 2010 (Table 3). Of all 8-inch and larger bass, 16% were 14-inch and larger in 1977 and 20% were 14-inch and larger in 2010. Only nine were 12-inch and larger in 1977 compared to 20 in 2010. Increased size of bass may be the result of the 14-inch size limit. It is not known whether more large bass has indirectly contributed to the increase in bluegill size.

In general, adequate numbers and size of bluegills and largemouth bass are present. Crappies, although fewer in number, along with channel catfish, northern pike, and several other species offer some diversity of fishing opportunities at the lake. The most troubling aspect of the survey is the relatively high number and weight of non-sport fish. Three species - bowfin, carp and spotted suckers - made up half of the total weight of fish in the 2010 survey. White suckers, although perhaps less abundant now, also contribute to the biomass of non-sport fish. The abundance of carp and suckers may be adversely impacting the aquatic habitat (low clarity, little vegetation). Because of the lake's connection to the Elkhart River South Branch, there is little opportunity to reduce their abundance or block their movement into the lake. Although suckers can provide food for large predator fish, such as northern pike, the pike fingerlings stocked in upstream lakes years ago (Pearson 1982) apparently did not increase pike abundance in Muncie Lake. Two pike (25.5-44.5 in) were netted in 1977 (0.33/lift), two (20.5-29.5 in) were netted in 1981 (1.00/lift), and two (31.5-34.2 in) were netted in 2010 (1.00/lift).

RECOMMENDATIONS

Long-term fish management efforts at Muncie Lake should focus on protecting and enhancing the natural character of the lake, reducing nutrient inputs and habitat alterations, restoring native plant diversity and abundance, and using the abundant sucker population as forage for additional predator fish. In the short-term, information on the current status of the fish community should be provided to interested anglers.

REFERENCES

Pearson, J. 1977. Muncie Lake, Noble County, fish management report. Indiana Division of Fish and Wildlife.

Pearson, J. 1982. Northern pike stockings in the upper reaches of the Elkhart River, South Branch. Indiana Division of Fish and Wildlife.

Submitted by: Jed Pearson, Fisheries Biologist

Approved by: Stu Shipman, Fisheries Supervisor
November 3, 2010

Table 1. *Number and weight of fish collected in surveys at Muncie Lake in 1977, 1981 and 2010.*

Species	Number			Pounds		
	1977	1981	2010	1977	1981	2010
Black crappie*	84	98	19	19.47	13.88	6.15
Bluegill*	183	5	260	14.10	0.76	40.01
Bowfin	10	3	13	26.05	10.02	34.96
Brook silverside	present		1	--		0.01
Brown bullhead*	4	1	1	3.48	0.70	0.65
Carp	6		15	33.16		78.72
Channel catfish*	4	1	9	9.78	0.17	24.28
Common shiner	1			0.05	9.11	
Golden shiner	88	59	6	16.84		1.10
Green sunfish*	3		2	0.26		0.39
Johnny darter	2			--		
Lake chubsucker	1	1		0.40	0.32	
Largemouth bass*	49	3	60	34.77	1.65	47.67
Logperch	1			--		
Pumpkinseed*	19			1.45		
Northern hogsucker	1			0.63		
Northern pike*	2	2	2	22.65	7.54	16.51
Redear sunfish*	46		20	5.74		5.75
Redfin pickerel	1			0.22		
Spotted gar	13		12	21.20		18.23
Spotted sucker	53	3	34	29.02	3.86	53.11
Warmouth*	17		1	2.73		.05
White crappie*		25			2.14	
White sucker	38	20	4	22.25	21.98	4.64
Yellow bullhead*	7	2	2	3.51	1.28	1.61
Yellow perch*	21	4	2	1.54	0.79	0.36
TOTAL	654	227	463	269.3	74.20	334.2

Sampling effort:

Electrofishing minutes	60 AC	0	30 DC
Gill net lifts	6	2	2
Trap net lifts	6	0	2

* considered to be sport fish

Table 2. *Bluegill size* at Muncie Lake in 1977 and 2010.*

Inches	1977	2010
1-1½	0	0
2-2½	4	5
3-3½	95	13
4-4½	16	59
5-5½	28	52
6-6½	26	69
7-7½	10	57
8-8½	4	4
9-9½	0	1
Total	183	260
RSD ≥7**	7.7	23.9

*Sizes represent historical length classes. For example: 6-6½ represents 5.8 to 6.7 inches.

** Relative Stock Density: percentage of 7-inch and larger bluegills of all 3-inch and larger bluegills.

Table 3. *Largemouth bass size at Muncie Lake in 1977 and 2010.*

Inches	1977	2010
< 4	6	3
4-7½	6	7
8-11½	28	30
12-13½	1	8
14-17½	5	9
≥ 18	3	3
Total	49	60
RSD ≥14**	16.3	20.0

*Sizes represent historical length classes. For example: 12-13½ represents 11.8 to 13.7 inches.

** Relative Stock Density: percentage of 14-inch and larger bass of all 8-inch and larger bass.

**APPENDIX
Lake Pages**

FISH SURVEY REPORT
Indiana Division of Fish and Wildlife

Type of survey
Initial: Re-survey: <input checked="" type="checkbox"/>

Lake name	County	Date of survey (Month, day, year)
Muncie Lake	Noble	7/6 - 7/7/10
Biologist's name	Date of approval (Month, day, year)	
Jed Pearson		

LOCATION		
Quadrangle name	Range	Section
Merriam	9E	11
Township	Nearest town	
33N	Wolf Lake	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site			
Constructed in 2010 on west side of lake					
Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
47	26	12	583	883.27	1-3 feet

INLETS		
Name	Location	Origin
Forker Creek	Northeast corner of lake	Chain o' Lakes State Park
Unnamed ditch	Southeast corner of lake	Runoff
Carroll Creek	Southwest corner of lake	Bear Lake

OUTLET

Name	Location
Thumma Ditch (Elkhart S Branch)	Northwest corner of lake, flows to Williams Lake

Water level control
None

POOL	ELEVATION (Feet MSL)	ACRES	Bottom type
TOP OF DAM			Boulder _____
TOP OF FLOOD CONTROL POOL			Gravel _____
TOP OF CONSERVATION POOL			Sand _____
TOP OF MINIMUM POOL			Muck <input checked="" type="checkbox"/>
			Clay <input checked="" type="checkbox"/>
			Marl <input checked="" type="checkbox"/>
STREAMBED			

Watershed use
General farming, woodlots and wetlands

Development of shoreline
Sections of the south and north shores are residentially developed. Camp Lutherhaven is also located on the north shore

Previous surveys and investigations
Fish survey, DNR 1977

PHYSICAL AND CHEMICAL CHARACTERISTICS							
Color tea			Turbidity 2 Feet 6 Inches (Secchi disk)				
TEMPERATURE, DISSOLVED OXYGEN (ppm), TOTAL ALKALINITY (ppm), pH							
Depth (ft)	Degrees °F	Oxygen*		Depth (ft)	Degrees °F	Oxygen*	
Surface	80.2	13.3		55			
2	79.2	10.7		56			
4	73.1	6.9		58			
5	71.1	1.2		60			
6	69.5	0.3		62			
8	64.2	0.0		64			
10	59.5	0.0		65			
12				66			
14				68			
15	53.2	0.0		70			
16				72			
18				74			
20	50.9	0.0		75			
22				76			
24				78			
25				80			
26				82			
28				84			
30				85			
32				86			
34				88			
35				90			
36				92			
38				94			
40				95			
42				96			
44				98			
45				100			
46				Sampling date:			
48				Surface	Bottom		
50				pH	8.7	7.2	
52				Alkalinity*			
54				Conductivity	0.476	0.624	

*ppm = parts per million

Occurrence and abundance of submersed aquatic plants in Muncie Lake

County: Noble	Sites with plants:	13	Mean species/site:	0.50
Date: 8/6/10	Sites with native plants:	11	Standard error (ms/s):	0.12
Secchi (ft): 2.5	Vegetated sites (%)	43.3	Mean native species/site:	0.37
Maximum plant depth (ft): 10.5	Number of species:	2	Standard error (mns/s):	0.09
Trophic status: eutro	Number of native species:	1	Species diversity:	0.39
Total sites: 30	Maximum species/site:	2	Native species diversity:	0.00

Depth (0 to 15 ft) Common Name	Occurrence		Rake score observations (N,%) per species								Plant Dominance
	Frequency (%)		0 %	1 %	3 %	5 %					
Coontail	11	36.7	19	63.3	8	26.7	3	10.0	0	0.0	11.3
Eurasian water milfoil	4	13.3	26	86.7	3	10.0	1	3.3	0	0.0	4.0
Filamentous algae	5	16.7									

Relative Abundance, Size and Estimated Weight of Fish Collected at Muncie Lake						
			Minimum	Maximum		
Common Name*	Number	Percent	Length (in)	Length (in)	Weight (lb)**	Percent
Bluegill	260	56.2	2.1	9.1	40.01	12.0
Largemouth bass	60	13.0	1.5	20.1	47.67	14.3
Spotted sucker	34	7.3	8.4	18.2	53.11	15.9
Redear	20	4.3	6.2	8.6	5.75	1.7
Black crappie	19	4.1	5.9	9.8	6.15	1.8
Carp	15	3.2	20.2	24.4	78.72	23.6
Bowfin	13	2.8	13.7	22.6	34.96	10.5
Spotted gar	12	2.6	18.2	26.5	18.23	5.5
Channel catfish	9	1.9	13.3	25.0	24.28	7.3
Golden shiner	6	1.3	6.0	8.5	1.10	0.3
White sucker	4	0.9	12.3	17.1	4.64	1.4
Northern pike	2	0.4	31.5	34.2	16.51	4.9
Yellow bullhead	2	0.4	11.0	12.5	1.61	0.5
Green sunfish	2	0.4	5.8	6.5	0.39	0.1
Yellow perch	2	0.4	6.6	7.7	0.36	0.1
Brown bullhead	1	0.2	10.8		0.65	0.2
Warmouth	1	0.2	4.0		0.05	0.0
Brook silverside	1	0.2	1.6		0.01	0.0
TOTAL	463				334.2	

Number, catch by gear, percentage, estimated weight and age of bluegill																			
Length (in)	Catch by gear			Total Number	%	Estimated Weight (lb)	Age analysis (scales/half-inch)						Age Composition (number/age)						
	EF	GN	TN				1	2	3	4	5	6+	1	2	3	4	5	6+	
0.5																			
1.0																			
1.5																			
2.0			1	1	0.4	0.01	1						1	0	0	0	0		
2.5	2		2	4	1.5	0.01	4						4	0	0	0	0		
3.0	1			1	0.4	0.02	1						1	0	0	0	0		
3.5	10		2	12	4.6	0.03		6					0	12	0	0	0		
4.0	25		3	28	10.8	0.05		5					0	28	0	0	0		
4.5	29		2	31	11.9	0.07		5					0	31	0	0	0		
5.0	16		4	20	7.7	0.09		3	2				0	12	8	0	0		
5.5	25		7	32	12.3	0.12			5				0	0	32	0	0		
6.0	20	1	18	39	15.0	0.16			4	1			0	0	31	8	0		
6.5	23	2	5	30	11.5	0.20			3	2			0	0	18	12	0		
7.0	18	4	13	35	13.5	0.26			2	2	1		0	0	14	14	7		
7.5	8	5	9	22	8.5	0.32				4	1		0	0	0	18	4		
8.0			3	3	1.2	0.39					1	1	0	0	0	0	2		
8.5			1	1	0.4	0.47													
9.0			1	1	0.4	0.55													
9.5																			
10.0																			
10.5																			
11.0																			
11.5																			
12.0																			
12.5																			
13.0																			
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15.5																			
16.0																			
16.5																			
17.0																			
17.5																			
18.0																			
Totals:	177	12	71	260		40.01	6	19	16	9	3	1	6	83	103	51	13	2	
													Mean length (in):	2.5	4.3	6.0	6.9	7.3	8.0
													Variance:	0.10	0.21	0.34	0.29	0.13	0.00

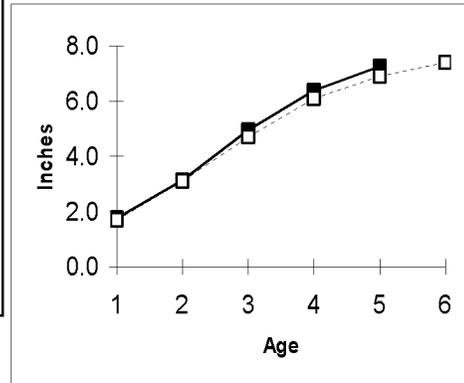
Bluegill

Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year	Class	Count	Mean L	I	II	III	IV	V	VI
2009		6	2.5	1.6					
	stdev		0.27	0.21					
2008		19	4.1	1.6	2.8				
	stdev		0.56	0.37	0.49				
2007		16	5.9	1.9	3.0	4.7			
	stdev		0.63	0.38	0.57	0.80			
2006		9	7.0	1.7	3.2	4.7	6.3		
	stdev		0.47	0.18	0.23	0.59	0.58		
2005		3	7.5	1.9	3.4	5.4	6.5	7.3	
	stdev		0.47	0.23	0.50	0.94	0.92	0.54	
2004		1	8.0	2.1	3.6	5.7	6.4	7.2	7.7
	stdev								
Mean*				1.8	3.1	5.0	6.4	7.3	
SD				0.14	0.26	0.41	0.12		
Count				53	47	28	12	3	

Bluegill growth (solid line) compared to other Indiana natural lakes (dotted line).



*Does not include age groups with less than three samples.

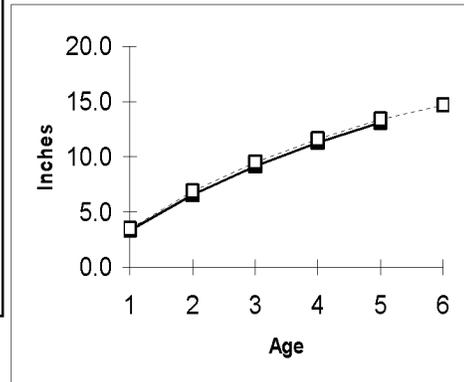
Largemouth bass

Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year	Class	Count	Mean L	I	II	III	IV	V	VI
2009		5	5.1	2.9					
	stdev		0.37	0.42					
2008		7	8.1	3.5	6.4				
	stdev		0.52	0.62	0.85				
2007		14	9.8	3.4	6.3	8.5			
	stdev		0.56	0.43	0.84	0.77			
2006		12	11.6	3.3	6.5	9.3	10.8		
	stdev		1.36	0.53	1.21	1.55	1.30		
2005		9	13.9	3.7	7.2	9.7	11.8	13.1	
	stdev		0.52	0.48	0.92	0.72	0.26	0.44	
2004		2	15.9	3.8	7.4	10.0	12.3	14.0	15.2
	stdev		0.42	0.94	2.13	1.28	0.58	0.41	0.79
Mean*				3.3	6.6	9.2	11.3	13.1	
SD				0.28	0.39	0.63	0.69		
Count				47	42	35	21	9	

Largemouth bass growth (solid line) compared to other Indiana natural lakes (dotted line).



*Does not include age groups with less than three samples.