Fox Island Pond (Bowman Lake)
Allen County

Fish Management Report 2008

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2008

EXECUTIVE SUMMARY

- Bowman Lake is a 6.75 acre borrow pit located at Fox Island County Park southwest of Fort Wayne. It is owned by the Allen County Parks Department. Maximum depth is 18 feet. The pit is moderately clear and secchi disc readings have ranged from 5.5 to 10.0 feet.

- To determine the current status of the fish community, a survey was conducted on June 30-July 1, 2008. Submersed aquatic vegetation was sampled at 20 random littoral sites using a doublehead rake according current guidelines.

- Fish sampling effort included one lap (0.32 h) of pulsed DC electrofishing (504V) with two dip-netters, one gill net lift, and one trap net lift. All captured fish were measured to the nearest tenth-inch (total length, TL) and released when possible.

- During the survey, 93 fish weighing 49 pounds were collected. Only four species were noted. Largemouth bass were first by number (66%) and weight (90%). Bluegill were second by number (28%) and third by weight (4%). Black crappies were third by number (5%) and ranked second by weight (6%). Additionally, a redfin pickerel that measured 12.7 in was collected.

- Submersed vegetation was found at 85% of the littoral sites, and was present to 18 feet. The overall mean rake score was 3.25. Slender naiad was the dominant vegetation, with a site frequency of 80%, followed by Chara spp. at 15%.

- Growth of bass was average up to age-4. Average length at age-5 was below average. Due to limited sampling effort, insufficient numbers of bluegills and crappies were captured to obtain adequate growth and size structure data.

- To obtain adequate growth and length structure data in the future, Bowman Lake should be sampled with increased gill net and trap net effort. Additionally, staff at FICP should consider such strategies as supplemental fish stockings, educational seminars, youth fishing derbies, and constructing fish attractors to increase angler participation and satisfaction at Bowman Lake.

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INTRODUCTION

Bowman Lake is a 6.75 acre borrow pit located at Fox Island County Park (FICP) southwest of Fort Wayne. It is owned by the Allen County Parks Department (ACPD). Maximum depth is 18 feet. The pit is moderately clear and secchi disc readings during surveys have ranged from 5.5 to 10.0 feet. At times, water is clear enough to see the entire bottom. During summer, water typically stratifies below 10 feet and oxygen levels drop too low for fish survival. Aquatic plants are moderately dense throughout most of the lake, though slender naiad, chara, and American pondweed are common. Much of the shoreline is accessible for fishing, but small fees are required to enter the park and to fish at Bowman Lake.

Past fish surveys were conducted in 1981, 1987, and 1996. Each survey indicated that overall fish populations were satisfactory, however, bluegills were small and their growth remained slow. This is likely due to Bowman Lake's low fertility and is common among pits with small watersheds. Channel catfish have been periodically stocked, however poor growth and minimal angler interest caused FICP to cease the stockings.

To determine the current status of the fish community, a survey was conducted on June 30-July 1, 2008.

METHODS

Fish sampling effort included one lap (0.32 h) of pulsed DC electrofishing (504V) with two dip-netters, one gill net lift, and one trap net lift. 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.

Submersed aquatic plants were sampled at 20 random littoral sites (Figure 1) using a doublehead rake according to current guidelines. A GPS was used to locate and record sites. Plant abundance, including algae, was quantified at each site by stacking the plants evenly across one side of the rake tines. Scores (0, 1, 3, 5) were assigned to the amount of plants based on increments marked evenly on the tines. Species were then separated and scored individually at each site.

RESULTS

During the survey, 93 fish weighing 49 pounds were collected. Only four species were noted. Largemouth bass were first by number (66%) and weight (90%). Bluegill were second by number (28%) and third by weight (4%). Black crappies were third by number (5%) and ranked second by weight (6%). Additionally, a redfin pickerel that measured 12.7 inches was collected.

A total of 61 largemouth bass, 6.1 to 15.0 inches long, were collected, weighing 36.8 pounds. Twenty three were between 10.0 and 12.0 inches TL, 21 were less than 10.0 inches, and 17 were greater than 12.0 inches. Only one bass was greater than the 14-inch minimum size limit. The largest bass, measuring 15.0 inches, was captured in the trap net. Bass were up to 5 years old and growth was average up to age-4; however length at age-5 was below average.

Only 26 bluegills were collected, ranging in length from 2.1 to 8.0 inches and weighing 1.5 pounds. Nineteen were less than 3.0 inches. Four bluegills were over 7.0 in. Only four bluegills were captured during electrofishing and the trap net catch rate 24 per lift. Not enough individuals were captured for adequate age and growth analyses.

Five black crappies, ranging from 8.8 to 10.5 inches long, were captured during the survey. Total weight was 2.34 pounds. All crappies were captured in the gill net.

Submersed vegetation was found at 85% of the littoral sites, and was present to the bottom. The overall mean rake score was 3.25. Slender naiad was the dominant plant, with a site frequency of 80%, followed by Chara spp. at 15%. American pondweed, floating-leaf pondweed, and filamentous algae were also observed.

DISCUSSION

Few bluegills, especially larger individuals, were captured in 2008. This is not surprising, however, as Bowman Lake has not produced larger bluegills in past surveys (Table 1). In 1981, only two bluegill over 7.0 in were captured. In 1987, the largest bluegill captured was 4.5 in, and in 1996, only one bluegill was greater than 6.0 in. The 8.0 in bluegill captured in 2008 was the largest recorded by the DFW at Bowman Lake.

Though the size structure of bluegill has remained unchanged since past surveys, too few bluegills were captured to obtain accurate length structure data or growth

analysis. During the present survey, only one gill net and one trap net were set. To obtain more robust data on the fish population, it is recommended that Bowman Lake be sampled with increased sampling effort in the future. By increasing the number of nets, thereby increasing the number of sites at which nets are set, gear may be placed closer to fish.

Though fewer fish were captured in 2008 than any previous survey, Bowman Lake's fish species composition is of desirable sportfish (Table 2). Bluegill and largemouth bass are normally well-adapted for ponds and pits. Crappies, though a popular sportfish, are typically a less desirable species in small ponds. However, they have yet to pose a problem to other gamefish at Bowman Lake. Because the species composition at Bowman Lake has been stable over the past 20 years, fish management efforts should be directed towards increasing angler interest in Bowman Lake.

Because angler participation and license sales have steadily declined statewide over the past 18 years (Table 3), an initiative to conduct fish surveys and determine angler use at many ponds and river access sites owned and maintained by the Fort Wayne Parks and Recreation Department was undertaken. Termed "Fishin' in the Fort," the first phase of this program aims to inventory city fishing sites, describe the status of their current fish populations, and determine angler use of the city's diverse fisheries. By doing so, biologists hope to increase angler participation in Fort Wayne and initiate similar projects in various cities around the state to increase participation and interest in the outdoors. Though not near the city's center, Bowman Lake is only a few miles from significant residential development and often draws anglers who live close by. Therefore, similar strategies should be undertaken at Bowman Lake that will be conducted at Fort Wayne Park and Recreation Department ponds.

One of these options was initiated in June of 2008 when members of the GoFishIN program (an educational program designed to provide fishing information to local educators and anglers) gave an instructional seminar of how to instruct children to fish and to encourage youth participation in fishing. The goal of this seminar was to train individuals, including FICP staff, to be able to hold their own youth participation activities such as fishing derbies or educational seminars about fishing. The Division of

Fish and Wildlife (DFW) recommends that park staff utilize this training opportunity to increase youth (and adult) fishing at Bowman Lake.

In addition to encouraging more participation in fishing, other opportunities exist to improve fishing in Bowman Lake. For example, as part of Utah's Community Fishing Program, harvestable-size rainbow trout are stocked into city ponds monthly or biweekly if pressure is high (Penne and Cushing, 2008). Similar urban fisheries stockings currently take place in many states such as in Missouri (Meneau, 2008) and Idaho (Hebdon et al., 2008) to name a few. Comparable efforts have been taking place in Fort Wayne since 1986, as rainbow trout stockings in Spy Run. Similar to Spy Run, Bowman Lake does not contain adequate water quality to sustain trout throughout the year and, if stocked, should be advertised at an immediate put and take fishery. Never the less, this would provide more diversity to anglers living near Fort Wayne.

Channel catfish were originally stocked into Bowman Lake in 1982. A DFW fish survey conducted in 1987 determined that these fish were slow growing and contributing little to the fishery. Nevertheless, catfish were again stocked in 1989. By 1996, it was determined that the stockings had been unsuccessful and drew little interest from anglers. Nevertheless, fish stockings have been very successful around the state in the past. The stocked fish pond at the Indiana State Fair draws thousands of children and adults annually and provides a great tool for fisheries education. Coupled with educational programs and advertising (signs, newspaper articles, etc.) the continuation of channel catfish stockings, or initiation of rainbow trout stockings at Bowman Lake may not only increase fishing diversity, but increase youth and adult fishing at the lake. Therefore, it is recommended that FICP, in coordination with the Indiana Division of Fish and Wildlife, explore the financial costs and social benefits of supplemental fish stockings to help promote and diversify the fishery.

In the summer of 2008, management at FICP voiced concerns over the lack of access to suitable fish structure and habitat for fishermen. Though the lake is vegetated, no dense, continuous beds are available for small fish to seek protection from predators. Although a large tree was dropped by the FICP staff into the lake on the northwest end of the lake, little room is available near this tree to suit more than one or two anglers at a time. To increase available fish habitat and concentrate fish to improve angler success, it

is recommended that staff at FICP consider constructing brush piles to be placed within the four to six foot depth contour. The attractors should be constructed according to DFW recommendations (http://www.in.gov/dnr/fishwild/3729.htm), and should be placed in areas within casting distance from shore.

Educational training, youth fishing derbies, supplemental fish stockings, advertisement to the public, and the addition of fish attractors are some strategies that may not only increase the diversity of fishing at Bowman Lake, but also bring more anglers to the park and increase participation in outdoor activities around Fort Wayne.

SOURCES CITED

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RECOMMENDATIONS

- The DFW should sample Bowman Lake with increased gill net and trap net effort in the future to obtain more data on the fish population.

- Staff at FICP should consider such strategies as supplemental fish stockings, educational seminars, youth fishing derbies, and constructing fish attractors to increase angler participation at Bowman Lake.

Submitted by: Nathan D. Thomas, Assistant Fisheries Biologist
Date:

Approved by:

Approved by: _____
Stu Shipman, Fisheries Supervisor
Date:

Figure 1. Satellite image of Bowman Lake with submersed aquatic vegetation points and overall rake scores, July 2008.

Table 1. Number and size of bluegills captured during fish population surveys at Bowman Lake, 1981-2008

Length (in)	1981*	1987*	1996*	2008
0.0				
0.5	1			
1.0	7	1		
1.5	24	6		
2.0	47	13	10	12
2.5	39	11	68	7
3.0	25	11	62	1
3.5	12	4	21	1
4.0	8		12	
4.5	3	1	3	
5.0			5	
5.5			4	1
6.0			1	
6.5	1			
7.0				2
7.5	2			1
8.0				1
Total	169	47	186	26

*Denotes length bins of 0.8 to 0.2 and 0.3 to 0.7 for inch-groups

Table 2. Number of fish collected during fish population surveys at Bowman Lake, 1981-2008.

Species	1981	1987	1996	2008
Black crappie	2	2	5	5
Bluegill	169	47	186	26
Channel catfish	3	4	4	0
Largemouth bass	11	17	37	61
Redfin pickerel	4	16	0	1
Yellow bullhead	2	5	3	0
TOTAL	191	91	235	93
SAMPLING EFFORT				
Electrofishing (hr)	0.33*	0.49*	0.23	0.32
Gill net lifts	2	2	1	1
Trap net lifts	2	3	2	1

*Denotes AC Electrofishing

Table 3. Number of paid resident and non-resident fishing license holders in Indiana, 1990-2008.

Year	Resident License Holders	Non-Resident License Holders	Total
1990	614,447	105,327	719,774
1991	697,055	99,792	796,847
1992	613,261	102,421	715,682
1993	606,988	99,448	706,436
1994	598,283	98,447	696,730
1995	616,782	137,403	754,185
1996	614,595	133,656	748,251
1997	571,861	90,671	662,532
1998	607,191	93,827	701,018
1999	576,604	89,982	666,586
2000	588,014	91,154	679,168
2001	568,001	87,384	655,385
2002	575,366	121,612	696,978
2003	437,165	72,751	509,916
2004	575,366	121,612	696,978
2005	437,165	72,751	509,916
2006	471,891	99,743	571,634
2007	455,533	74,753	530,286
2008	433,231	65,098	498,329

APPENDIX
Lake Pages

FISH SURVEY REPORT

Indiana Division of Fish and Wildlife

Type of survey
Initial: Re-survey:

Lake name	County	Date of survey (Month, day, year)
Bowman Lake	Allen	6/30/08-7/1/08
Biologist's name		Date of approval (Month, day, year)
Thomas		

LOCATION		
Quadrangle name	Range	Section
Arcola/Ft. Wayne West	11E	26
Township	Nearest town	
Aboite	Fort Wayne	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
		Allen County Parks Dept.

Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
6.7	17	6	78		None

INLETS		
Name	Location	Origin
None		

OUTLET	
Name	Location
None	
Water level control	

POOL	ELEVATION (Feet MSL)	ACRES	Bottom type	
TOP OF DAM			Boulder	
TOP OF FLOOD CONTROL POOL			Gravel	X
			Sand	X
TOP OF CONSERVATION POOL			Muck	
			Clay	
TOP OF MINIMUM POOL			Marl	
STREAMBED				

Watershed use

Fox Island County Park and Nature Preserve

Development of shoreline

Beach located along southeast shoreline. The remainder is wooded and grassland.

Previous surveys and investigations

Fish survey, IDNR, 1981, 1987, 1996

SAMPLING EFFORT			
ELECTROFISHING	Day hours	Night hours	Total hours
		0.32	0.32
TRAPS	Number of traps	Days	Total lifts
	1	1	1
GILL NETS	Number of nets	Days	Total lifts
	1	1	1

PHYSICAL AND CHEMICAL CHARACTERISTICS				
Color	Turbidity			
Blue-green	6	Feet	0	Inches (Secchi disk)

TEMPERATURE, DISSOLVED OXYGEN (ppm), TOTAL ALKALINITY (ppm), pH

Depth (ft)	Degrees F	Oxygen*		Depth (ft)	Degrees F	Oxygen*	
Surface	76.1	10.3		50			
2	76.1	10.3		52			
4	76.1	10.2		54			
5	75.9	10.1		55			
6	75.9	10.0		56			
8	75.7	10.0		58			
10	75.7	10.0		60			
12	73.9	1.7		62			
14				64			
15				65			
16				66			
18				68			
20				70			
22				72			
24				74			
25				75			
26				76			
28				78			
30				80			
32				82			
34				84			
35				Sampling date:			
36					Surface	Bottom	
38				pH	7.8	7.5	
40				Alkalinity*	86	120	
42				Conductivity			
44				TDS			
45							
46							
48							

**ppm = parts per million*

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake:	Bowman Lake	Secchi(ft):	5.0	SE Mean species / site:	0.15
Date:	8/6/2008	Littoral sites with plants:	17	Mean natives / site:	1.15
Littoral Depth (ft):	15.0	Number of species:	4	SE Mean natives / site:	0.15
Littoral Sites:	20	Maximum species / site:	2	Species diversity:	0.48
Total Sites:	20	Mean species / site:	1.15	Native diversity:	0.48

	Frequency of	Score Frequency				
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Slender niad	80.0	20.0	15.0	15.0	50.0	62.0
Chara spp.	15.0	85.0	5.0	10.0	0.0	7.0
American pondweed	10.0	90.0	10.0	0.0	0.0	2.0
Floating-leaf pondweed	10.0	90.0	10.0	0.0	0.0	2.0
Filamentous Algae	15.0					

Other species noted:

Relative Abundance, Size and Estimated Weight of Fish Collected at Bowman Lake

Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Largemouth bass	61	65.6	6.1	15.0	36.80	89.6
Bluegill	26	28.0	2.1	8.0	1.53	3.7
Black crappie	5	5.4	8.8	10.5	2.34	5.7
Redfin pickerel	1	1.1	12.7	12.7	0.42	1.0
Total	93				41.09	

*Common names of fishes recognized by the American Fisheries Society.

**Weights estimated from standard length-weight regression models.

Number, catch by gear, percentage, estimated weight and age of largemouth bass

Length	Catch by gear			Total	%	Estimated	Age analysis (scales/half-inch)						Age Composition (number/age)					
(in)	EF	GN	TN	Number		Weight (lb)	1	2	3	4	5	6+	1	2	3	4	5	6+
6.0	3			3	4.9	0.10	2	1						1				
6.5																		
7.0	1			1	1.6	0.16		1						1				
7.5	4			4	6.6	0.20		4						4				
8.0	2			2	3.3	0.25		1	1					1	1			
8.5	5	2		7	11.5	0.30		2	4					2	5			
9.0	2			2	3.3	0.35		1						2				
9.5	1	1		2	3.3	0.42			2						2			
10.0	1	1		2	3.3	0.49			2						2			
10.5	3	3		6	9.8	0.57			3	2					4	2		
11.0	2	3		5	8.2	0.65				5						5		
11.5	8	2		10	16.4	0.75				5	1					8	2	
12.0	7	4		11	18.0	0.85					5						11	
12.5	2	1		3	4.9	0.97					3						3	
13.0	1			1	1.6	1.09					1						1	
13.5	1			1	1.6	1.23						1						1
14.0																		
14.5																		
15.0			1	1	1.6	1.70						1						1
Totals:	43	17	1	61		36.80	2	10	12	12	10	2	0	11	13	16	17	2
												Mean length (in):	---	7.8	9.4	11.2	12.1	14.3
												Variance:	---	0.80	0.88	0.14	0.13	---

Number, catch by gear, percentage, estimated weight and age of bluegill

Length	Catch by gear			Total	%	Estimated	Age analysis (scales/half-inch)						Age Composition (number/age)					
(in)	EF	GN	TN	Number		Weight (lb)	1	2	3	4	5	6+	1	2	3	4	5	6+
2.0			12	12	46.2	0.01												
2.5			7	7	26.9	0.01												
3.0			1	1	3.8	0.02												
3.5			1	1	3.8	0.03												
4.0																		
4.5																		
5.0																		
5.5			1	1	3.8	0.12												
6.0																		
6.5																		
7.0			2	2	7.7	0.26												
7.5	1			1	3.8	0.32												
8.0	1			1	3.8	0.39												
Totals:	2	0	24	26		1.53												

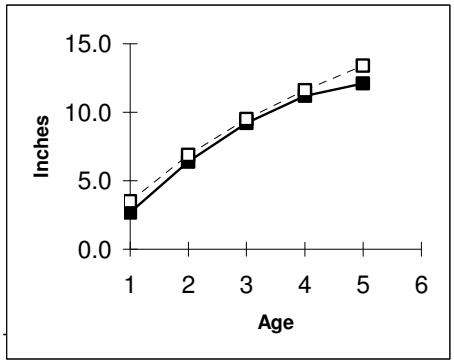
Mean length (in):

Variance:

Largemouth bass
Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI	VII
2007	2	4.8						
	stdev	0.32						
2006	10	3.1	7.0					
	stdev	0.47	0.90					
2005	14	2.6	6.3	9.1				
	stdev	0.40	0.72	0.89				
2004	12	2.7	6.5	9.4	11.2			
	stdev	0.40	1.23	0.90	0.43			
2003	10	2.2	6.0	9.3	11.2	12.1		
	stdev	0.40	0.97	0.97	0.54	0.36		
2002	1	2.6	5.1	8.9	10.7	12.6	13.6	
	stdev	--	--	--	--	--	--	
2001	1	2.6	7.2	10.4	12.4	13.1	13.9	14.5
	stdev	--	--	--	--	--	--	
Mean*		2.7	6.4	9.2	11.2	12.1		
SD		0.4	0.4	0.2	0.0			
Count		46	46	36	22	10		

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

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