

**CRANE LAKE**

**Noble County**

**Fish Management Report 2008**

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**2008**

## EXECUTIVE SUMMARY

- Crane Lake is a 28-acre, undeveloped natural lake located in southwestern Noble County. Public access is available at a state-owned site along the CR 500 S. Fish surveys to assess fish populations on Crane Lake were initiated in 1979. In 1981, the lake experienced a major fish kill following a heavy rain. It was treated with rotenone in September 1981 and restocked with largemouth bass, bluegills, and channel catfish.
- To obtain current information on the fish population at Crane Lake, a general fish survey was conducted June 9-11, 2008. Effort consisted of ½ hour of electrofishing, two gill net lifts and two trap net lifts. A Tier II submerged vegetation survey was conducted on July 27, 2008.
- Maximum depth of the Lake is 35 feet, and average depth is 13 feet. During summer dissolved oxygen levels are usually inadequate for fish below 10 feet. The lake is often turbid and water quality has averaged 2 ½ feet from 1979 to 1998, however, increased to eight feet in 2008.
- A total of 191 fish weighing 95 pounds was collected. Eleven species were noted. Redear sunfish were first by number (36%) and weight (28%). Largemouth bass were second by number (23%) and weight (28%). Bluegill ranked third by number (12%) and carp ranked third by weight (%). Growth for bass and bluegill were average when compared to local natural lakes.
- Submersed vegetation was found to a maximum depth of 13.5 ft in May and 12 ft in July. Curlyleaf pondweed and Coontail were the dominant species, occurring at 77% and 67%. Other plants observed during the two samples were elodea, leafy pondweed, and filamentous algae.
- Although stock size bass were collected at the lowest rates since 1981, catch rates in 2008 were still average when compared to nearby natural lakes and indicate that the population is satisfactory for anglers. Similarly, bluegill catch rates were the lowest ever recorded on Crane Lake, yet average lengths of bluegills have steadily increased since the first post-rotenone survey was conducted in 1981.
- The abundance of redear over 9 inches indicates that, with respect to the declining bluegill abundance, redear present an equal or better fishing opportunity for anglers.
- To more accurately assess the current fish population, the DFW should conduct fish population surveys at Crane Lake during earlier months when vegetation is less dense and bluegill and other panfish are more susceptible to the sampling gear.

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## INTRODUCTION

Crane Lake is a 28-acre, undeveloped natural lake located in southwestern Noble County. Public access is available at a state-owned site along the CR 500 S. It lies within the Tippecanoe River watershed and adjacent land use includes cropland and small woodlots. Inlets are located on the east and northeast ends of the lake and are sourced by runoff. The outlet is located on the southwest end of the lake and drains into Big Lake.

Maximum depth of the Lake is 35 feet, and average depth is 13 feet. During summer dissolved oxygen levels are usually inadequate for fish below 10 feet. The lake is often turbid and water quality has averaged 2 ½ feet from 1979 to 1998, however, increased to eight feet in 2008 (Table 1). Cattails, waterwillow, and spatterdock are the most common emergent plants. Coontail is the most abundant submerged plant, however two invasive species, Eurasian watermilfoil and Curlyleaf pondweed may also be abundant during the summer months. Duckweed and water meal are typically present on the water's surface. The bottom of the lake is mostly muck.

Fish surveys to assess fish populations on Crane Lake were initiated in 1979. In 1981, the lake experienced a major fish kill following a heavy rain. It was treated with rotenone in September 1981 and restocked with largemouth bass, bluegills, and channel catfish. A 14-inch size limit was imposed on bass in 1982 and channel catfish were stocked regularly through 1995.

Seven fish community surveys were conducted at Crane Lake from 1979-1998. During this time, population estimates of 8-inch and larger largemouth bass were made on four occasions, ranging from 479 prior to the fish kill to 1,399 in 1990, and the number of 5-inch and larger bluegills was estimated to be 3,273 in 1986. Creel surveys indicate that fishing effort during the summer increased from 1,020 hours in 1984 to 4,604 hours in 1990. During another survey conducted in 1998, the number of 8-inch and larger largemouth bass fell to numbers similar before the fish kill ( $N = 325$ ), and the proportion of bluegill greater than 7 inches was at its highest level at 35% of the catch. Only minor changes were detected in other game and nongame species.

To obtain current information on the fish population at Crane Lake, another survey was conducted June 9-11, 2008.

## METHODS

Fish sampling effort was conducted according to current Division of Fish and Wildlife (DFW) guidelines and included 0.5 h of pulsed DC electrofishing (504V) with two dip-netters, two gill net lifts, and two trap net lifts. 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 30 random littoral sites on May 25 (Figure 1) and July 28 (Figure 2), 2008 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, 191 fish weighing 95 pounds was collected. Eleven species were noted. Redear sunfish were first by number (36%) and weight (28%). Largemouth bass were second by number (23%) and weight (28%). Bluegill ranked third by number (12%) and carp ranked third in weight (16%). Altogether, sportfish accounted for 91% of the number and 78% of the weight.

A total of 69 redear sunfish, 5.3 to 10.2 inches long, were collected, weighing 26.7 pounds. Fifty-eight were 7-inches or longer and 13 were 9 inches or larger. They were captured at a rate of 8/h of electrofishing and 33 per trap net lift. No redear were captured in gillnets.

Forty-four largemouth bass were collected, ranging from 5.2 to 16.5 in, weighing 26.5 lbs. Sixteen fish were 10.0 to 12.0 in long, and half were below 10.0 in. Only three bass were 14.0 in or longer. Largemouth bass PSD was 24, below the 40-70 range that characterizes a balanced predator population (Gablehouse, 1984). The electrofishing

catch rate (88/h) was average when compared to other natural lakes in the area. Growth rates for bass were also average.

Only 22 bluegills were collected, ranging in lengths from 3.7 to 8.9 in and weighing 3.7 lbs. Average length of bluegill was 5.9 in including seven fish over 7.0 in and three fish over 8.0 in. The electrofishing catch rate (28/h) and trap net catch rate (4/lift) were below average when compared to other nearby natural lakes. Growth up to age-4 was average and length at age-5 (8.2 in) was above average for bluegill in the area.

Other sportfish in the survey catch included 14 yellow bullheads, 11 black crappies up to 10.4 in, seven warmouth, and three yellow perch up to 11.5 in, and three brown bullheads. Nongame species included 15 golden shiners, two carp, and one spotted gar.

May plant sampling found submerged vegetation at 93% of the littoral sites to a maximum of 13.5 ft. Overall mean rake score was 2.17. Curlyleaf pondweed was the dominant plant with a site frequency of 77%, followed by coontail, which was found at 73% of littoral sites sampled. Eurasian watermilfoil, elodea, and filamentous algae were also collected. During the July sample, submersed vegetation was found at 77% of the littoral sites, to a maximum of 12 ft. The overall mean rake score was 1.47. Coontail was the dominant vegetation, with a site frequency of 67%, followed by Eurasian watermilfoil at 43%. Curlyleaf pondweed was only found at 23% of the sample sites. Leafy pondweed and filamentous algae were also observed.

## DISCUSSION

Based on the latest survey, Crane Lake continues to support a stable fish community. Before 2008, bass and bluegills dominated the survey catch since the rotenone application and restocking occurred in 1981 (Table 2). Although stock size bass collected in 2008 were at the lowest rates since 1981, they were still average when compared to nearby natural lakes and indicated that the population was satisfactory for anglers. Similarly, bluegill catch rates were the lowest ever recorded on Crane Lake, likely due to inadequate sampling conditions. The presence of dense stands of curlyleaf pondweed and mats of filamentous algae in shallow water, in combination with abundant spatterdock along the eastern shoreline likely hindered the success of both electrofishing

and trap netting during June sampling. To prevent this in the future, fish sampling should occur earlier in June before curlyleaf pondweed and other submerged and emergent vegetation becomes too dense and bluegill and other panfish are more susceptible to sampling techniques.

Though only 22 bluegill were collected, average length was the highest since surveys began in 1979, and mean lengths at capture have steadily increased since the first post-renovation survey was conducted in 1981 (Table 3). Relative abundance of bluegill by 1-in size classes has remained similar since 1990 (Figure 3).

More redear were collected in 2008 than any previous survey. The abundance of these fish over 9 inches indicates that these fish now present an equal or better fishing opportunity for anglers when compared to larger bluegill (>7 in). Compared to bluegill, redear exhibit faster growth and are known for putting up an excellent fight for a panfish.

Other minor changes were detected in the fish population at Crane Lake. Channel catfish were absent from the catch, however, this was expected due to the ending of stockings in 1995 because of higher priority hatchery needs and a shift in management policy (Pearson, 1998). There were no detectable changes in nongame species, as abundance has remained low.

Crane Lake continues to be one of the few lakes in Indiana with undeveloped shorelines. Because of this, efforts should be made by the DNR to preserve the natural character of lake. If possible, the lake and surrounding shoreline should be purchased by the state to preserve its unique features.

## RECOMMENDATIONS

- To more accurately assess the current fish population, fish sampling should occur earlier in June before curlyleaf pondweed and other submerged and emergent vegetation becomes too dense and bluegill and other panfish are more susceptible to sampling techniques.
- Due to the relative natural state of Crane Lake, the DNR should attempt to preserve the natural character of its shoreline by purchasing Crane Lake and surrounding land.

## LITERATURE CITED

Gabelhouse, D. W. 1984. A length-categorization system to assess fish stocks. *North American Journal of Fisheries Management*. 4:273-285.

Pearson, J. 1998. Crane Lake Fish Management Report. Indiana Department of Natural Resources. Indianapolis, IN.

Submitted by: Nathan D. Thomas, Assistant Fisheries Biologist  
Date: January 7, 2010

Approved by: Stu Shipman, Fisheries Supervisor

Date: January 11, 2010

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

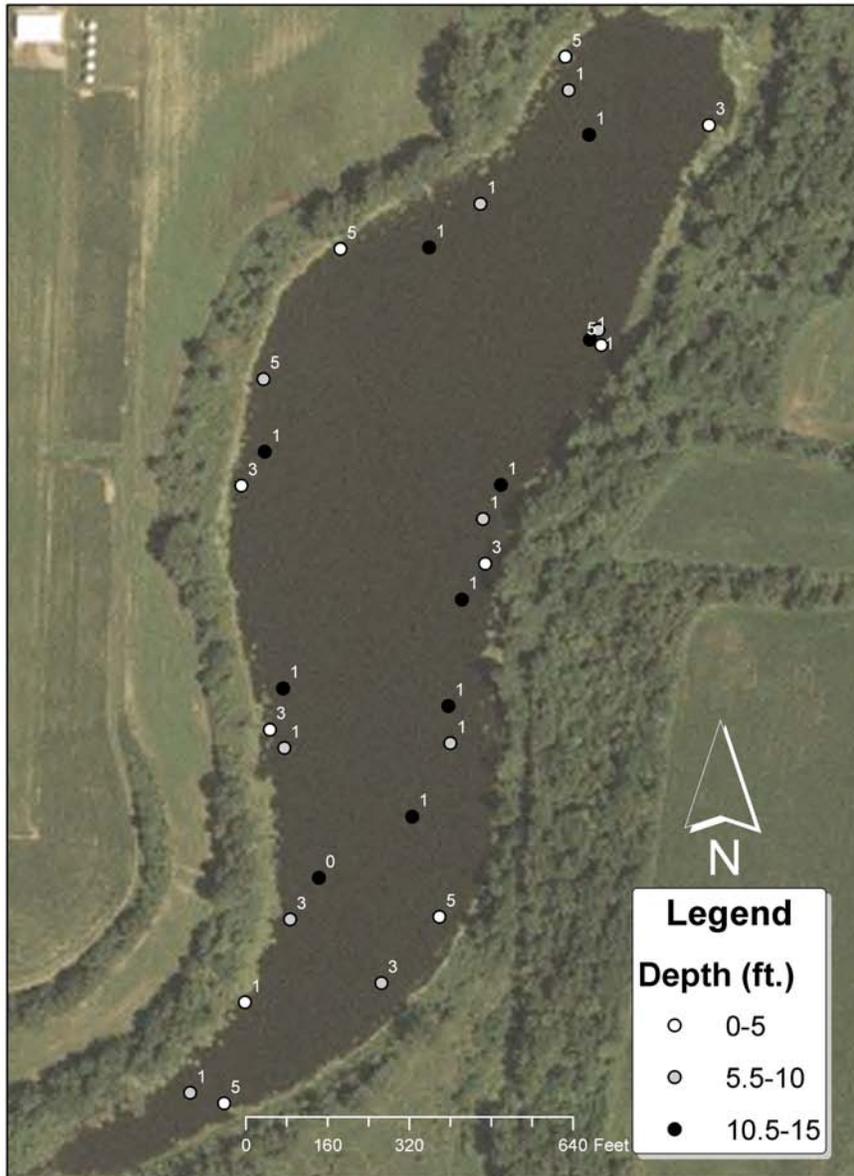


Figure 2. Satellite image of Crane Lake with submersed aquatic vegetation points and overall rake scores, July 2008.

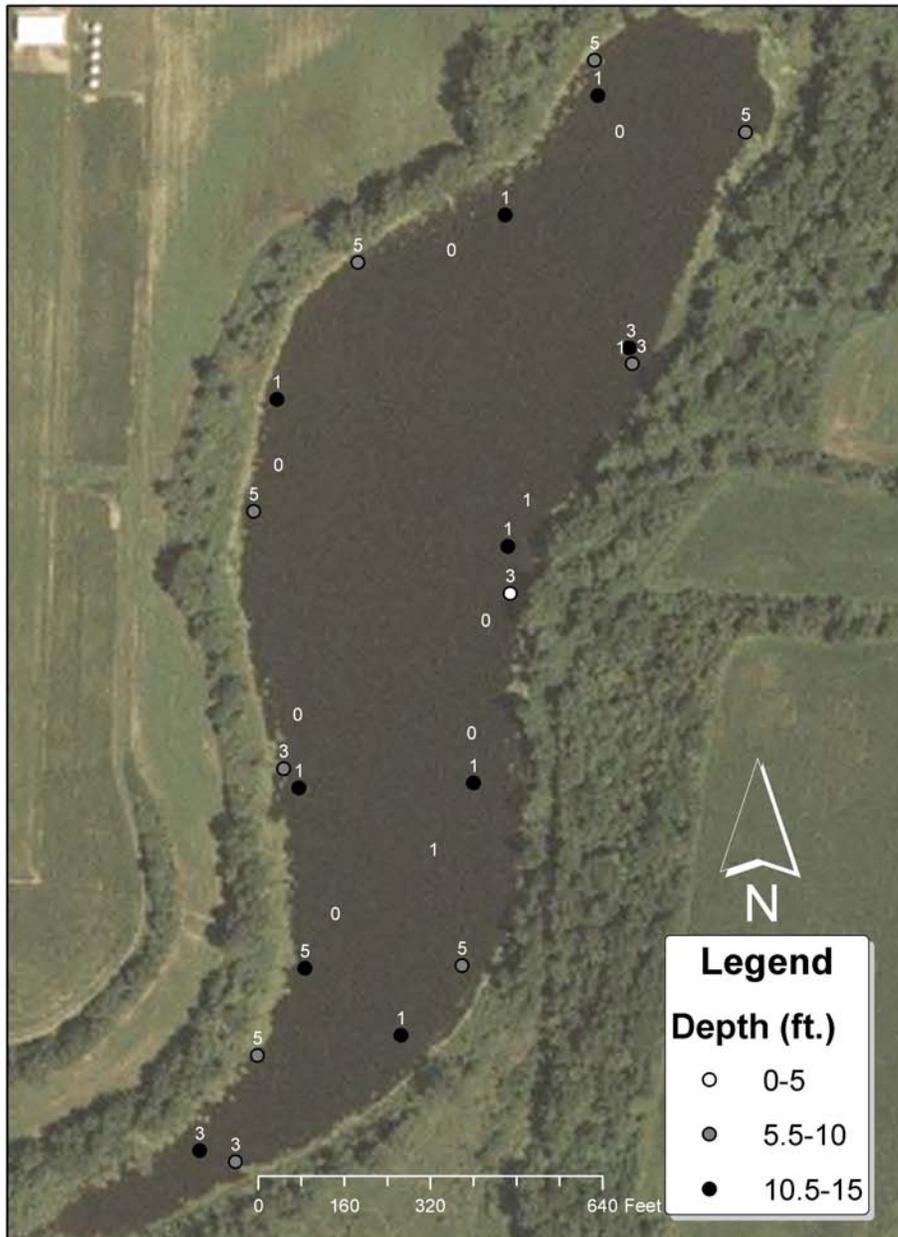


Figure 3. Size distribution of bluegill by 1-inch length increments, 1990-2008.

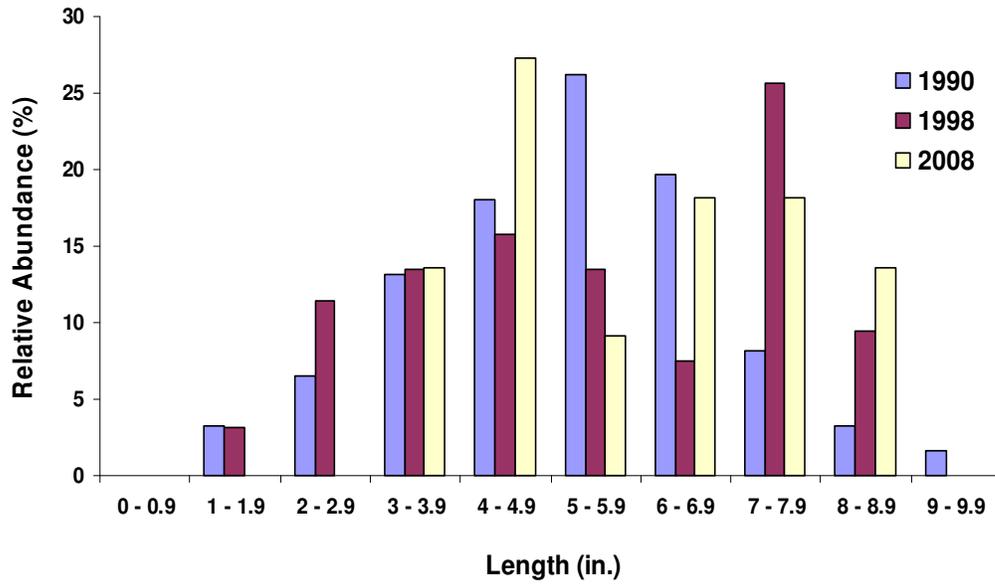


Table 1. Historic summer? oxygen levels (ppm) and water clarity (secchi depth) at Crane Lake, 1979-2008.

Feet	1979	1981	1982	1983	1985	1990	1998	2008
0	12	10.2	8	8	10	8	9	9.0
5	15	9.3	8	7	9	8	9	8.0
10	12	0.2	4.5	3	9	6	2	6.0
15	2	0.2	0	0	3	4	0.8	1.0
20	1	0.2	0	0	0	3	0.4	0.6
25	1	0.2	0	0	0	2	0.4	0.5
30	0	----	0	0	0	2	0.4	0.5
Secchi	6.5	3.5	8	4.5	2	2	2	8

Table 2. Number of fish collected in fish population surveys at Crane Lake, 1979-2008.

Species	1979	1982	1983	1985	1990	1998	2008
Black crappie	5	0	1	11	11	35	11
Bluegill	97	358	113	376	61	253	22
Bowfin	2	0	12	8	4	4	0
Bullhead	48	2	31	69	17	19	17
Carp	1	1	0	1	0	1	2
Catfish	0	24	26	33	27	10	0
Gar	6	0	0	0	0	5	1
Golden Shiner	53	35	79	130	35	22	15
Lake chubsucker	32	29	15	57	14	14	0
Largemouth bass	29	150	182	173	108	103	44
Others	2	1	0	1	0	1	0
Suckers	8	0	0	1	1	8	0
Sunfish	29	56	19	36	33	58	76
Yellow perch	42	24	211	91	48	7	3
TOTAL	354	680	689	987	359	540	191
SAMPLING EFFORT							
Electrofishing hours	1.0*	0.67*	1.0*	0.75*	0.67	0.5	0.5
Gill net lifts	4	3	6	4	6	4	2
Trap net lifts	6	4	6	8	4	4	2

† -Pre-rotenone treatment

\* - Conducted with AC electrofishing

Table 3. Size of bluegill collected during fish population surveys at Crane Lake, 1979-2008.

Inches	1979	1982	1983	1985	1990	1998	2008
1-1½	0	9	0	68	3	10	0
2-2½	18	5	2	16	4	32	0
3-3½	35	24	27	96	8	37	3
4-4½	14	41	31	114	13	44	6
5-5½	8	217	20	48	15	23	2
6-6½	1	47	14	13	12	28	4
7-7½	6	3	13	10	4	70	4
8-8½	14	2	6	11	2	9	3
9-9½	1	0	0	0	0	0	0
Mean	4.2	4.9	4.7	3.5	4.8	5	5.9
TOTAL	97	358	113	376	61	253	22

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)
Crane Lake	Noble	6/10-6/11/08
Biologist's name	Date of approval (Month, day, year)	
Nate Thomas		

LOCATION		
Quadrangle name	Range	Section
Merriam	9E	33,34
Township	Nearest town	
33N	Wolf Lake	

### ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site			
Located along CR 500N					
Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
28	35	12.9	362	899.24	2 feet

INLETS		
Name	Location	Origin
Unnamed	Northeast corner	Runoff
Unnamed	East Shore	Runoff

OUTLET			
Name	Location		
Unnamed	Southwest corner- flows to Big 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 _____
			Marl _____
STREAMBED			

Watershed use
General farming and woodlots

Development of shoreline
Undeveloped

Previous surveys and investigations
Bluegill Movement, Werner, 1966, 1967, and 1969; Fish Surveys, IDNR, 1979, 1981-1985, 1990, 1998; Bluegill population estimate, IDNR, 1986; Largemouth bass estimates, IDNR, 1981, 1984, 1990.

SAMPLING EFFORT			
ELECTROFISHING	Day hours	Night hours	Total hours
		0.5	0.5
TRAPS	Number of traps	Days	Total lifts
	2	1	2
GILL NETS	Number of nets	Days	Total lifts
	2	1	2

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color	Turbidity
Stained brown	8 Feet 0 Inches (Secchi disk)

TEMPERATURE, DISSOLVED OXYGEN (ppm), TOTAL ALKALINITY (ppm), pH							
Depth (ft)	Degrees F	Oxygen*			Depth (ft)	Degrees F	Oxygen*
Surface	77.7	8.9			50		
2	77.7	8.9			52		
4	77.5	8.6			54		
5	76.6	7.6			55		
6	70.5	8.2			56		
8	62.8	7.7			58		
10	58.1	6.0			60		
12	54.7	3.5			62		
14	52.9	1.8			64		
15	50.4	1.1			65		
16	47.7	0.8			66		
18	45.7	0.7			68		
20	44.8	0.6			70		
22	44.2	0.6			72		
24	44.2	0.6			74		
25	44.2	0.5			75		
26	44.2	0.5			76		
28	44.2	0.5			78		
30	44.2	0.5			80		
32	44.2	0.5			82		
34	44.2	0.5			84		
35					Sampling date:		
36					Surface	Bottom	
38					pH	8.1	7.0
40					Alkalinity*		
42					Conductivity		
44					TDS	0.3	0.3
45							
46							
48							

\*ppm = parts per million

### Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Crane	Secchi(ft): 7.0	SE Mean species / site: 0.15
Date: 5/28/2008	Littoral sites with plants: 28	Mean natives / site: 0.77
Littoral Depth (ft): 13.5	Number of species: 4	SE Mean natives / site: 0.08
Littoral Sites: 30	Maximum species / site: 3	Species diversity: 0.66
Total Sites: 30	Mean species / site: 1.93	Native diversity: 0.08

Species	Frequency of	Score Frequency				Dominance
	Occurrence	0	1	3	5	
Curly-leaf pondweed	76.7	23.3	60.0	16.7	0.0	22.0
Coontail	73.3	26.7	46.7	13.3	13.3	30.7
Eurasian Watermilfoil	40.0	60.0	30.0	10.0	0.0	12.0
Elodea	3.3	96.7	3.3	0.0	0.0	0.7

Filamentous Algae 26.7

Other species noted:

### Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake: Crane	Secchi(ft): 4.0	SE Mean species / site: 0.19
Date: 7/28/2008	Littoral sites with plants: 23	Mean natives / site: 0.80
Littoral Depth (ft): 12.0	Number of species: 4	SE Mean natives / site: 0.12
Littoral Sites: 30	Maximum species / site: 4	Species diversity: 0.67
Total Sites: 30	Mean species / site: 1.47	Native diversity: 0.28

Species	Frequency of	Score Frequency				Dominance
	Occurrence	0	1	3	5	
Coontail	66.7	33.3	23.3	30.0	13.3	36.0
Eurasian watermilfoil	43.3	56.7	26.7	16.7	0.0	15.3
Curlyleaf pondweed	23.3	76.7	23.3	0.0	0.0	4.7
Leafy pondweed	13.3	86.7	10.0	3.3	0.0	4.0

Filamentous Algae 20.0

Other species noted:

<b>Relative Abundance, Size and Estimated Weight of Fish Collected at Crane Lake</b>						
Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Redear sunfish	69	36.1	5.3	10.2	26.72	28.1
Largemouth bass	44	23.0	5.2	16.5	26.55	28.0
Bluegill	22	11.5	3.7	8.9	3.72	3.9
Golden shiner	15	7.9	8.0	9.7	4.62	4.9
Yellow bullhead	14	7.3	7.0	11.5	7.39	7.8
Black crappie	11	5.8	5.0	10.4	3.49	3.7
Warmouth	7	3.7	4.3	8.8	1.90	2.0
Brown bullhead	3	1.6	11.0	14.2	3.37	3.5
Yellow perch	3	1.6	8.9	11.5	1.11	1.2
Carp	2	1.0	22.2	28.0	15.19	16.0
Spotted gar	1	0.5	19.4	19.4	0.91	1.0
TOTAL (11 species)	191				94.97	

\*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 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+		
3.5			3	3	13.6	0.04		3							3					
4.0	4			4	18.2	0.05		4							4					
4.5			2	2	9.1	0.07				2						2				
5.0	1			1	4.5	0.09				1						1				
5.5	1			1	4.5	0.12				1						1				
6.0	1		2	3	13.6	0.16				1	2					1	2			
6.5			1	1	4.5	0.20					1							1		
7.0	2			2	9.1	0.26					1								2	
7.5	2			2	9.1	0.32					1									2
8.0	2			2	9.1	0.39						2								2
8.5	1			1	4.5	0.47														1
Totals:	14	0	8	22		3.72		0	7	5	5	2	1		0	7	5	7	2	1

Mean length (in): -- 3.8 5.1 6.8 8.0 8.5  
 Variance: -- 0.07 0.43 0.40 0.00 ---

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

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+					
5.0	2			2	4.3	0.06	2										2						
5.5	3		1	4	8.5	0.08	4										4						
6.0																							
6.5																							
7.0																							
7.5	3			3	6.4	0.20		3									3						
8.0	5			5	10.6	0.25		3	1								4	1					
8.5	2			2	4.3	0.30		1	1								1	1					
9.0																							
9.5	6			6	12.8	0.42				6								6					
10.0	2			2	4.3	0.49				2								2					
10.5	5	1		6	12.8	0.57				6								6					
11.0	5			5	10.6	0.65				1	3							1	4				
11.5	2	1		3	6.4	0.75					3								3				
12.0	3			3	6.4	0.85					3								3				
12.5	1			1	2.1	0.97						1									1		
13.0																							
13.5	2			2	4.3	1.23						2									2		
14.0	1			1	2.1	1.37						1									1		
14.5																							
15.0	1			1	2.1	1.70										1							1
15.5																							
16.0																							
16.5	1			1	2.1	2.28										1							1
Totals:	44	2	1	47		26.55	6	7	17	9	4	2	7	8	18	10	4	2					

Mean length (in): 4.6 7.9 9.8 11.5 13.4 15.8  
 Variance: 4.12 0.13 0.67 0.19 0.40 1.13

Bluegill

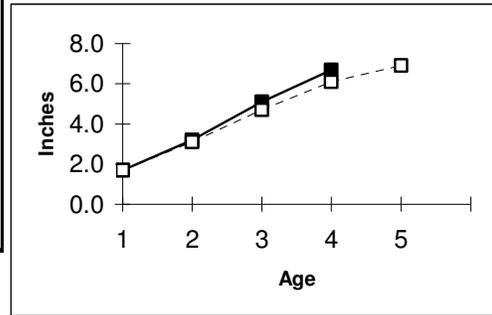
Intercept: 0.8 inch

**BACK-CALCULATED LENGTHS (inches) AT EACH AGE**

Year	Class	Count	I	II	III	IV	V	VI
2006		7	1.5	2.9				
	stdev		0.10	0.30				
2005		5	2.0	3.9	5.0			
	stdev		0.40	0.40	0.50			
2004		5	1.6	2.8	5.2	6.7		
	stdev		0.20	0.60	0.80	0.60		
2003		2	1.6	3.3	5.0	6.6	8.0	
	stdev		0.10	0.80	0.50	0.40	0.20	
2002		1	1.5	3.6	5.2	6.9	8.3	8.8
	stdev		-	-	-	-	-	-
Mean*			1.7	3.2	5.1	6.7		
SD			0.23	0.53	0.60	0.50		
Count			20	20	13	8		

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

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



Largemouth bass

Intercept: 0.8 inch

**BACK-CALCULATED LENGTHS (inches) AT EACH AGE**

Year	Class	Count	I	II	III	IV	V	VI
2007		6	5.2					
	stdev		0.50					
2006		8	4.0	7.3				
	stdev		0.30	0.58				
2005		17	4.2	7.8	9.9			
	stdev		0.42	0.84	0.73			
2004		9	3.6	7.0	9.8	11.4		
	stdev		0.50	0.70	0.76	0.48		
2003		4	3.5	7.4	10.0	12.0	13.5	
	stdev		0.34	0.80	0.77	1.05	0.67	
2002		1	3.3	7.5	9.1	12.6	14.4	14.9
	stdev							
Mean*			4.1	7.4	9.9	11.7	13.5	
SD			0.41	0.73	0.75	0.77	0.67	
Count			45	39	31	14	5	

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

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

