Lake Wawasee

Kosciusko County

Fish Management Report

2008

Jed Pearson, fisheries biologist
Nathan Thomas, assistant fisheries biologist

INDIANA DIVISION OF
FISH&WILDLIFE

Fisheries Section
Indiana Department of Natural Resources
Division of Fish and Wildlife
I.G.C.-South, Room W273
402 W. Washington Street
Indianapolis, IN 46204

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EXECUTIVE SUMMARY

Unauthorized stockings of fish in public lakes pose a threat to fish populations and fishing opportunities in Indiana. In 2003, white bass appeared in Lake Wawasee presumably from illegal stockings. To monitor the number and size of white bass now in Wawasee and assess the overall fish community, a survey was conducted in June and July 2008. Total sampling effort consisted of 5.5 hours of electrofishing, 15 gill net lifts, and 18 trap net lifts.

Eighteen white bass were caught, ranging in length from 12.9 to 15.5 inches. Thirteen were caught in gill nets at a rate of 0.87/lift. The catch rate was more than three times greater than the catch rate of white bass in 2004 (0.25/lift) and similar to white bass catch rates in other northern Indiana natural lakes.

Bluegills, largemouth bass, yellow perch, and northern pike were the primary sport fish. Bluegills up to 9.3 inches were collected, although the June electrofishing catch rate was below normal. Largemouth bass measured up to 19.7 inches long, but only 13% were legal-size (≥14 in). The June catch rate was about half the normal catch rate for northern Indiana lakes. Northern pike were up to 33.5 inches long. The June gill net catch rate was 9.6/lift, well above average for other lakes in the area.

The most notable change in the fish community since 2004 appears to be a decline in small forage fish. Whether the decreases reflect an increase in predation from white bass is not known. Other minor changes may have occurred, including a shift toward smaller bluegills and fewer perch.

Lake Wawasee continues to support a satisfactory and diverse sport fishery and no immediate actions are needed to improve fishing. However, anglers are encouraged to fish for and remove white bass. More effort is also needed to prevent unauthorized fish stockings. Whether numbers of white bass increase remains to be seen.

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INTRODUCTION

Unauthorized stockings of fish in public lakes pose a threat to fish populations and fishing opportunities in Indiana. They can upset predator-prey balances, reach nuisance levels, reduce survival of rare species, introduce diseases and parasites, and contaminate the genetic pool of native fish populations. As a result, Indiana law (IC 14-22-9-8) prohibits stocking fish in various public waters unless a permit is granted by the Division of Fish and Wildlife (DFW). When reviewing a permit request, biologists consider the potential adverse impacts of stocking in light of potential benefits.

In spite of the permit requirement, evidence suggests more and more fish are being illegally stocked by anglers. For example, at Lake Wawasee anglers reported catching white bass during winter 2003. Biologists believe they are not native to the lake or the Elkhart River watershed (Lake Michigan drainage). White bass, however, are native in nearby lakes within the Tippecanoe River watershed (Ohio River drainage). The linear distance between Wawasee and lakes that contain native populations of white bass is less than five miles, so catching white bass where they are present and transporting them to Wawasee would not be difficult. White bass have also discovered recently in Lake-of-the-Woods (Marshall County) and Big Lake (Noble County). The only record of a white bass in the Lake Michigan watershed involved the capture of one in James Lake (Steuben County) in 1989. Although white bass are considered a sport fish and are popular among anglers, they normally feed on gizzard shad and have little impact on other sport fish where shad are abundant. Shad, however, are not present in Wawasee, so white bass would likely seek other prey species in the lake and could potentially compete with other predator species, such as largemouth bass and northern pike.

To monitor the number and size of white bass in Wawasee and assess the overall fish community, two fish population surveys have been conducted since 2003. In July 2004, two white bass ranging in length from 13.2 to 13.5 inches were captured in gill nets (0.25/lift) and one 12.9-inch white bass was captured in two hours of electrofishing. None were taken in 12 overnight sets of trap nets. A follow-up survey involving more sampling effort was conducted in June and July 2008. Results of the 2008 sampling, along with comparisons to earlier surveys at Wawasee, are presented in this report.

LAKE WAWASEE

Lake Wawasee covers 3,410 surface acres. It is located along State Road 13 at the town of Syracuse. The shoreline is mostly residential, except Conklin Bay (west end) and Johnson Bay (northeast corner). Several marinas are present and a state-owned boat ramp is located at the southeast end at the Wawasee Fishing Area. Maximum depth is 77 feet and average depth is 22 feet. The lake drains 23,618 acres and land use is primarily agriculture. Numerous submersed islands, shallow bars, and sharp drop-offs are present. During summer, enough oxygen (≥5 ppm) is present to support fish down to 20 feet (Table 1). At 30 feet, oxygen levels range from 5 ppm to less than 1 ppm and decreased over the years. Water clarity also declined from 11 feet in 1985 to 6 feet in 2008.

White bass are not the only non-native species in Lake Wawasee. European carp were introduced in the state more than a century ago and are present in the lake. Walleyes were occasionally stocked but never established a reproducing population. Zebra mussels were discovered in Wawasee in 1991. Asiatic clams were introduced earlier. Eurasian water milfoil, an invasive aquatic weed, has long been present and is now treated annually in offshore areas. Curly-leaf pondweed and purple loosestrife are also present. More recently, starry stonewort has appeared in Johnson Bay.

Lake Wawasee has undergone a host of other changes over the years. Much of its watershed has been tiled and ditched for farming, its wetlands have been channelized and developed, and its water level has been stabilized. Nearshore habitat has been damaged by residential development, channel construction, installation of bulkhead seawalls, extensive dock facilities, and removal of emergent plant beds. Because much of the lakebed is shallow, bottom scouring by boat hulls and motors also occurs. Nutrient inputs from the watershed and in-lake nutrient cycling contribute to water quality concerns. Because of its large size, popularity among boaters, and reputation of providing good fishing, Wawasee experiences a high level of recreational use, including organized fishing tournaments and other group activities. How all of these factors individually and collectively affect the quality and quantity of fishing opportunities at the lake is not known. Consequently, trying to isolate how white bass may ultimately affect fishing will not likely be possible. Nonetheless, fish population surveys provide a yardstick by which changes may be documented and measured.

FISH SAMPLING METHODS

During the fish population survey in 2008, total sampling effort consisted of 5.5 hours of pulsed DC might-time electrofishing (504V) with two dip-netters, 15 gill net lifts, and 18 trap nets lifts. Effort was divided between June 2-6 when fish were assumed to be more vulnerable to sampling gear and July 14-18 when previous surveys at Wawasee had been conducted. Surface temperature was 66F in June and 75F in July. June sampling consisted of 3.5 hours of electrofishing, nine gill nets lifts, and 12 trap net lifts. July sampling consisted of 2.0 hours of electrofishing, six gill net lifts, and six trap net lifts.

Sampling and data analyses generally followed current DFW sampling guidelines. 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 for Indiana natural lakes fish populations. Fish scales were taken from abundant sport fish for age and growth analyses using standard body-length:scale-length relationships. Catches from the July sampling were compared to data on file to evaluate long-term changes in the fish community. For purposes of size comparisons, length distributions of fish collected prior to 2008 were based on historic half-inch size bins (0.8-x-0.2, 0.3-x.0.7 where x = inch integer), while length distributions in 2008 were based on current half-inch size bins (x.0-x.4, x.5-x.9). Because aquatic plants were sampled by a private firm contracted through the DFW Lake and River Enhancement Program, no plant sampling was done during the 2008 fish survey (LARE report 2009)

RESULTS

Eighteen white bass were caught during the survey, ranging in length from 12.9 to 15.5 inches. Their combined weight was 25 pounds. Twelve were caught in June, ranging in length from 12.9 to 15.5 inches (mean = 13.9 in), and six were caught in July that measured 14.4 to 15.2 inches (mean = 14.6 in). Altogether, 13 white bass were captured in gill nets (0.87/lift), four were caught during electrofishing (0.73/hr), and one was caught in a trap net. The overall gill net catch rate was more than three times greater than the 2004 catch rate. Eight white bass were caught in nine gill net lifts in June (0.89/lift) and six were caught in six gill net lifts in July (1.00/lift). The July catch rate was four times greater than the July 2004 catch rate (0.25/lift).

The combined catch of all fish in June and July totaled 2,276 and total weight was 1,237 pounds (Table 2). Twenty-five species and hybrid sunfish were found. Bluegills ranked first in number (47%) and third in weight behind northern pike (24%) and largemouth bass (14%). Largemouth bass also ranked second in number (12%), followed by yellow perch (8%) and yellow bullheads (5%). Northern pike accounted for only 5% of the catch by number. Altogether, sport fish made up 92% of the total number and 72% of the total weight of fish caught during the survey.

Overall, bluegills ranged in length from 1.6 to 9.3 inches. The largest group was 4 inches long (Table 3). Of all 3-inch and larger bluegills, 22% were 7-inch or larger and 6% were 8-inch and larger. The overall electrofishing catch rate (108/hr) was below the average range compared to other lakes in northern Indiana. The June catch rate (141/hr) was also below average. Bluegill growth, based on back-calculated lengths, was average, although mean length at age-4 was 5.8 inches, compared to 6.0 inches for area lakes.

Largemouth bass were 1.8 to 19.7 inches long, although only 34 (13%) were legal-size (≥14-in) and only three were 16-inch or larger (Table 4). The overall electrofishing catch rate (35/hr) was about one-third the typical catch rate for Indiana natural lakes. The catch rate in June (45/hr) was about half the typical bass catch rate. Bass grew at normal rates and reached 11.5 inches by age-4, 13.4 inches by age-5, and 14.7 inches by age-6.

The overall survey catch included 186 yellow perch that measured up to 11.2 inches and 117 yellow bullheads up to 15.3 inches. Most of the perch (153) and yellow bullheads (98) were caught in June. The dominant size group of perch was 5.0 to 7.5 inches and mostly included age-3 fish. Their growth rate was below average, especially among age-2 to age-4 fish.

The combined catch of northern pike included 108 fish measuring up to 33.5 inches long. Eighty-six were caught in June, all of which were taken in gill nets at a rate of 9.6/lift. The July catch included 22 pike, 20 of which were taken in gill nets (3.3/lift). Catch rates of pike in other area lakes are typically 1-2/lift. Catch rates exceeding 4/lift are considered high. Six pike taken in June were larger than 30 inches. None captured in July were that large. No standard to compare pike growth to other lakes is available, but they reached legal-size (20 in) during age-2 and averaged 22.4 inches at age-3 and 26.0 inches at age-5.

Other sport fish in the survey catch included 73 warmouth up to 9.9 inches long, 64 black crappies measuring 3.2 to 12.0 inches, 61 rock bass, 52 redear sunfish, and 33 brown bullheads up to 15.5 inches. Eighteen smallmouth bass up to18.1 inches long were captured. Spotted gar (50) and longnose gar (33) were the dominant non-sport fish. Although they only accounted for less than 4% of the number of fish in the survey, they totaled 12% of the weight. Other non-sport fish included 28 lake chubsuckers, 20 bowfin, and 17 carp up to 36 inches long. Carp made up 8% of the total weight. No other species accounted for 1% of the catch or more by number or by weight.

Since 1985, when surveys first incorporated use of DC electrofishing gear and trap nets, species composition during July surveys at Wawasee has not changed dramatically (Table 5). Bluegills have consistently ranked first by number, although fewer were caught in 2008 than previously. Largemouth bass also ranked second each year except 1997 when more perch were caught. Perch, meanwhile, have typically ranked third. Northern pike numbers have been relatively stable, varying between 22 and 38 per survey.

A more notable change in July 2008 compared to previous July surveys appears to be a decline in the number of species, especially small forage fish. The number of species in 2008 (not counting white bass) was 21, five fewer than were noted in 2004 and three fewer than 1985 and 1997. Species not found in 2008 but present in 2004 included bluntnose minnow, central mudminnow, logperch, longear, and mimic shiner, in spite of the same amount of electrofishing effort each year. In addition, fewer brook silversides, golden shiners, and miscellaneous sunfish (pumpkinseed, redear, rock bass, warmouth) were caught.

Although bluegill, largemouth bass, yellow perch, and northern pike populations remain the dominant sport species, there have been some minor shifts in numbers and sizes of these fish captured in July surveys (Table 6). For example, numbers of 8-inch and larger bluegills appear to have declined. Only five were captured in 2008. Catches of largemouth bass have generally been low over the years, but were lower in 1997 and 2008 compared to 1985 and 2004. The yellow perch catch in 2008 was the lowest to date. The size distribution of pike has probably remained the most stable, although no particular size group was as prevalent in 2008 compared to earlier years.

More fish were captured in the June survey than the July survey, due in part to differences in sampling effort (see Appendices). Species diversity was also greater in June (0.77) compared to July (0.70). There was no significant difference, however, in relative species composition (T-test, df = 24, p = 0.99) between the two periods (Table 7). The electrofishing catch rate of bluegills was higher in June (141/hr) than July (52/hr) but the trap net catch rate was lower in June (15/lift) than July (28/lift). The electrofishing catch rate of largemouth bass was also higher in June (45/hr) than July (17/hr). The electrofishing catch rare of perch was nearly five times greater in June (19/hr) compared to July (4/hr) and the gill net catch rate in June (8/lift) was four times greater than July (2/lift). As mentioned earlier, the gill net catch rate of pike was also three times greater in June (9.6/lift) than July (3.3/lift). Mean length of bluegills captured by electrofishing in both months was 4.6 inches, although no 8-inch and larger bluegills were caught in July while 12 were caught in June. Although fewer largemouth bass were captured at a lower electrofishing rate in July, bass length ranged from 1.5 to 19.5 inches and average length was 10.5 inches. Largemouth bass captured by electrofishing in June ranged from 4.0 to 15.0 inches and averaged 9.0 inches.

DISCUSSION

Based on the 2008 survey results, Lake Wawasee continues to support a satisfactory and diverse sport fishery. Bluegill, largemouth bass, yellow perch, and northern pike continue to be the most abundant sport fish and provide the most fishing opportunities at the lake. In addition to the four major species, Wawasee anglers have adequate opportunities to fish for crappies, smallmouth bass, rock bass, bullheads, and other sunfish, as well as white bass. Although fewer large bluegills may be present now than previously and large bass are relatively scarce, ample numbers of perch are available and northern pike are very abundant. Therefore, no immediate actions are needed to improve fishing. However, in addition to supporting on-going efforts to restore fish habitat that could improve fishing for bluegills and largemouth bass, as well as maintain fishing for perch and pike, Wawasee, like other natural lakes in northern Indiana, might benefit from a catch limit placed on bluegills and some innovative approaches to bass size regulations.

Years ago Indiana imposed a 25-fish daily creel limit on bluegills. The limit was lifted when studies indicated fishing mortality was low and many bluegills simply died from natural causes. As fishing pressure increased, and fishing gear has become more sophisticated, concerns have resurfaced that anglers may at times over-exploit bluegill populations. Based on a creel survey conducted from April through October 1997, anglers harvested 42,000 bluegills at Wawasee and Syracuse lakes, including nearly 11,000 that were 8-inch or larger. The percentage of the bluegill population that these figures represent was not determined, nor was the catch during winter ice-fishing estimated. Although the angler catch rate of bluegills at Wawasee was not high (0.34/hr), a daily limit of bluegills at all northern Indiana natural lakes might discourage anglers from capitalizing on vulnerable populations at specific times and inform anglers that fish resources are finite.

The relative scarcity of legal-size largemouth bass noted in Wawasee has been observed at other northern Indiana lakes as well. Although estimates of angler exploitation of bass in the region have declined over the past several decades due to imposition of minimum size limits and angler support of catch-and-release fishing, data suggests that exploitation at large lakes may still approach or exceed a 40% threshold considered to be "over-harvest". In 1997, anglers removed an estimated 39% of Wawasee's 14- to 17.5-inch largemouth bass and 22% of its 18-inch and larger bass.

Other factors may also account for the relative scarcity of legal-size largemouth bass. Due to extensive nearshore development, habitat complexity and cover have been reduced. These changes may be impacting bass reproduction, growth, and survival and increase their vulnerability to anglers. In addition, Wawasee receives intense largemouth bass fishing pressure from individual anglers as well as tournament anglers. Even though most bass anglers release what they catch, many released bass may succumb to delayed mortality due to excessive and repetitive handling. Their survival may also be compromised by spawning stress, warm water temperatures, poor health, and displacement. Tournament anglers, especially, are likely to hold bass for longer periods, add additional stress to bass during weigh-ins, and displace bass greater distances from here they were caught. As a result, further restrictions on tournament fishing and harvest of legal-size bass may be needed.

Although only 18 white bass were captured during the 2008 survey, the four-fold increase in the July gill net catch rate in 2008 compared to 2004 indicates the population is expanding. Their abundance has now reached a level similar to other Indiana natural lakes (Table 8). Since 1979, white bass have been found in 25 other natural lakes. Except for the fish caught in Snow Lake, presumably from another unauthorized stocking, all were found in the Tippecanoe of Kankakee watersheds. Where present, the average number of white bass collected in surveys was 13. They comprised an average of only 1.6% percent of the numerical catch and 2.2% of the catch by weight. Average length ranged from a minimum of 11.6 inches to a maximum of 15.8 inches. Mean weight has been 0.8 pounds. Based on the June results, Wawasee now ranks 17th among 46 samples where white bass have been found. The overall gill net catch rate of white bass in Wawasee (0.87/lift) was greater than gill net catch rates obtained on occasion at Tippecanoe, James, and Ridinger lakes but less than gill net catch rates on other occasions at Barbee, Silver, Tippecanoe, Pike, Winona, and Ridinger lakes (Table 9). Unlike Wawasee, none of these other lakes have dense populations of northern pike, although muskies are stocked in Barbee and Tippecanoe. Whether the native population of predator fish, primarily largemouth bass and northern pike, can keep numbers of white bass in check in Wawasee or whether white bass will continue to increase, put additional predation on prey species, and compete with other sport fish remains to be seen.

RECOMMENDATIONS

- Encourage anglers to fish for and remove white bass.
- Inform anglers of problems associated with unauthorized fish stockings.
- Conduct future surveys at Wawasee in June and July for long-term comparisons.
- Continue on-going efforts to protect and enhance fish habitat.
- Consider a regulation to prohibit transport of live fish to and from lakes.
- Consider imposing a daily creel limit on bluegills and more restrictive regulations on largemouth bass fishing throughout northern Indiana natural lakes.

Submitted by: Jed Pearson, fisheries biologist
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Approved by: Stuart Shipman, regional fisheries supervisor
March 18, 2010

Table 1. Oxygen concentrations (ppm) and water clarity (secchi depth) at five-foot intervals during July surveys at Lake Wawasee, 1975 through 2008.

Depth (ft)	7/7/1975	7/14/1985	7/21/1997	7/12/2004	7/14/2008
0	9.8	8.0	9.0	7.6	8.6
5	10.4	8.0	9.0	7.6	7.8
10	7.8	8.0	9.0	7.6	7.5
15	9.2	8.0	7.0	6.6	7.8
20	9.2	7.0	6.0	5.6	5.7
25	8.6	7.0	3.0	2.9	2.2
30	4.4	5.0	2.0	0.2	0.4
35	1.2	3.0	1.5	0.1	0.1
40	0.4	2.0	1.0	0.1	0.0
45	0.4	0.5	0.8	0.1	0.0
50	0.4	0.0	0.6	0.1	0.0
55	0.2	0.0	0.6	0.1	0.0
60	0.0	0.0	0.6	0.1	0.0
65	0.0	0.0	--	0.1	0.0
70	0.0	0.0	--	0.1	0.0
Secchi (ft)	9.5	11	5.5	6.5	5.5

Table 2. Number, percent, size range, and estimated weight of fish collected during sampling in June and July 2008 at Lake Wawasee.

Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Bluegill	1067	46.8	1.6	9.3	133.1	10.8
Largemouth bass	269	11.8	1.8	19.7	167.2	13.5
Yellow perch	186	8.2	3.3	11.2	30.7	2.5
Yellow bullhead	117	5.1	3.4	15.3	102.9	8.3
Northern pike	108	4.7	14.7	33.5	294.9	23.8
Warmouth	73	3.2	3.2	9.9	20.2	1.6
Black crappie	64	2.9	3.2	12.0	21.8	1.8
Rock bass	61	2.7	2.4	12.0	29.1	2.4
Redear	52	2.3	2.7	11.3	20.4	1.6
Spotted gar	50	2.2	12.7	29.7	87.1	7.0
Longnose gar	33	1.4	20.0	38.0	65.8	5.3
Brown bullhead	33	1.4	7.8	15.5	35.3	2.9
Lake chubsucker	28	1.2	3.9	12.4	6.2	0.5
Bowfin	20	0.9	16.3	28.0	81.8	6.6
White bass	18	0.8	12.9	15.5	25.0	2.0
Smallmouth bass	18	0.8	4.2	18.1	12.4	1.0
Carp	17	0.7	16.0	36.0	97.9	7.9
Brook silverside	12	0.5	3.2	3.7	0.1	< 0.1
Golden shiner	10	0.4	4.0	7.6	1.1	< 0.1
Longear	9	0.4	3.8	5.1	0.56	< 0.1
Topminnow	8	0.4	2.0	3.3	0.1	< 0.1
Pumpkinseed	7	0.3	5.5	8.1	1.5	< 0.1
Logperch	6	0.3	3.1	4.4	0.16	< 0.1
Redfin pickerel	4	0.2	8.3	11.9	0.9	< 0.1
Hybrid sunfish	3	0.1	6.0	6.7	0.60	< 0.1
White crappie	3	0.1	6.5	7.5	0.56	< 0.1
TOTAL (26 species)	2276				1237.2	

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

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

Table 3. Overall catch of bluegills at Lake Wawasee in 2008.

Total number, catch by gear, percentage, estimated weight and age of bluegills																		
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+
1.5			2	2	0.2	0.01												
2.0	5		20	25	2.3	0.01	1						25					
2.5	37		35	72	6.7	0.01	5	4					40	32				
3.0	39		29	68	6.4	0.02	1	1					34	34				
3.5	35	2	27	64	6.0	0.03		2						64				
4.0	110	4	19	133	12.5	0.05		6						133				
4.5	138	5	18	161	15.1	0.07			1						161			
5.0	83	16	16	115	10.8	0.09			5						115			
5.5	45	17	19	81	7.6	0.12			3	2					49	32		
6.0	35	16	16	67	6.3	0.16				5						67		
6.5	18	29	23	70	6.6	0.20				3	2					42	28	
7.0	20	29	32	81	7.6	0.26					5						81	
7.5	19	30	24	73	6.8	0.32						5						73
8.0	10	17	12	39	3.7	0.39						5						39
8.5	2	7	4	13	1.2	0.47						5						13
9.0		2	1	3	0.3	0.55						2						3
Totals:	596	174	297	1067		133.06	7	13	9	10	7	17	99	263	325	141	109	128
										Mean length (in):			2.5	3.6	4.8	6.0	6.9	7.8
											Variance:		0.15	0.28	0.13	0.13	0.05	0.15

Table 4. Overall catch of largemouth bass at Lake Wawasee in 2008.

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+
1.5	1			1	0.4	0.01												
2.0																		
2.5																		
3.0																		
3.5																		
4.0	1			1	0.4	0.03												
4.5	3			3	1.1	0.04	3						3					
5.0	4			4	1.5	0.06	1						4					
5.5	7			7	2.6	0.08		4						7				
6.0	15			15	5.6	0.10		3	1					11	4			
6.5	21			21	7.8	0.13		4	1					17	4			
7.0	13	1		14	5.2	0.16		4	1					11	3			
7.5	9	3		12	4.5	0.20		2	1					8	4			
8.0	4	3		7	2.6	0.25		1	3					2	5			
8.5	6	1		7	2.6	0.30		1	2					2	5			
9.0	18	3		21	7.8	0.35			4						21			
9.5	14	5		19	7.1	0.42			5	1					16	3		
10.0	9	7		16	5.9	0.49			2	4					5	11		
10.5	8	4		12	4.5	0.57			2	2					6	6		
11.0	6	9		15	5.6	0.65			1	3					4	11		
11.5	11	5		16	5.9	0.75				5						16		
12.0	7	6		13	4.8	0.85				1	3					3	10	
12.5	9	3		12	4.5	0.97				3	1					9	3	
13.0	6			6	2.2	1.09				2	2					3	3	
13.5	6	6		12	4.5	1.23				1	3	1				2	7	2
14.0	4	6	1	11	4.1	1.37					2						11	
14.5	3	5	1	9	3.3	1.53					1	2					3	6
15.0	6	3	1	10	3.7	1.70						4						10
15.5		2		2	0.7	1.88												
16.0		1		1	0.4	2.07												
16.5																		
17.0		1		1	0.4	2.49												
17.5																		
18.0																		
18.5																		
19.0																		
19.5	1			1	0.4	3.80												
Totals:	192	74	3	269		167.23	4	19	23	22	12	7	7	58	77	65	37	18
												Mean length (in):	4.8	6.6	8.9	11.3	13.2	14.6
												Variance:	0.07	0.57	1.62	1.08	0.79	0.26

Table 5. Number of fish collected during standard fish population surveys conducted in July at Lake Wawasee from 1975 through 2008.

Species	1975	1985	1997	2004	2008
Banded killifish	4	1			
Black crappie	127	21	12	65	25
Bluegill	452	333	488	1919	294
Bluntnose minnow	5	2	2	36	
Bowfin	26	6	5	8	6
Brook silverside	44		4	47	3
Brown bullhead	43	25	9	13	6
Carp	2	4		7	6
Central mudminnow				1	
Golden shiner	15	14	9	13	4
Green sunfish	6		1		
Hybrid sunfish			3	5	
Lake chubsucker	70	11	2	5	1
Largemouth bass	129	126	44	142	66
Logperch		4	4	37	
Longear	64	18	41	59	
Longnose gar	74	43	14	1	15
Mimic shiner				2	
Northern pike	31	34	28	38	22
Pumpkinseed	105	9	14	21	3
Redear	95	45	13	94	8
Redfin pickerel	11	4	21	3	2
Rock bass	36	3	15	40	13
Smallmouth bass	13	19	5	6	6
Spotted gar	38	7	8	15	9
Walleye		9			
Warmouth	39	17	22	32	10
White bass				3	6
White crappie					3
Yellow bullhead	41	25	38	115	19
Yellow perch	287	99	61	95	33
TOTAL	1757	879	863	2822	560
EFFORT					
Electrofishing hours	5 (AC)	2.5 (AC/DC)	1 (DC)	2 (DC)	2.0 (DC)
Gill net lifts	40	11	6	8	6
Trap net lifts	0	10	5	12	6

Table 6. Number and size of bluegills, largemouth bass, yellow perch, and northern pike collected during July surveys at Lake Wawasee from 1975 through 2008. Size distributions prior to 2008 were based on historic half-inch bin lengths (see Methods).

Bluegill			**YEAR**		
Size (inch)	**1975**	**1985**	**1997**	**2004**	**2008***
1-2	3	0	1	0	2
2-3	26	11	160	154	39
3-4	66	62	72	900	64
4-5	87	123	133	514	48
5-6	59	44	79	245	76
6-7	94	46	27	74	30
7-8	82	37	11	23	30
8-9	24	2	0	5	5
9-10	9	6	2	4	0
≥10	2	2	3	0	0
Total	452	333	488	1919	294
Largemouth bass			**YEAR**		
Size (inch)	**1975**	**1985**	**1997**	**2004**	**2008***
<8	57	13	11	39	14
8-12	63	88	22	61	33
12-14	4	14	9	26	9
14-18	2	11	2	13	9
≥18	3	0	0	3	1
Total	129	126	44	142	66
Yellow perch			**YEAR**		
Size (inch)	**1975**	**1985**	**1997**	**2004**	**2008***
<2	0	5	0	0	0
2-4	17	8	0	5	1
4-6	48	24	17	42	9
6-8	111	40	37	28	13
8-10	71	10	4	11	8
10-12	35	12	1	4	2
12-14	5	0	2	5	0
Total	287	99	61	95	33
Northern pike			**YEAR**		
Size (inch)	**1975**	**1985**	**1997**	**2004**	**2008***
<17	3	0	0	0	0
17-19	4	0	1	1	4
19-21	2	0	4	4	3
21-23	2	4	6	17	5
23-25	7	10	10	6	5
25-27	2	12	1	2	3
27-29	7	4	4	3	1
29-31	3	0	1	1	0
≥31	1	4	1	3	1
Total	31	34	28	37	22
EFFORT					
Electro-hours	5.0 (AC)	.5 (AC/DC)	1.0 (DC)	2.0 (DC)	2.0(DC)
Gill net lifts	40	11	6	8	6
Trap net lifts	0	10	5	12	6

*Length increments based on current size bins

Table 7. Relative species composition (percentages) of fish captured during fish population surveys at Lake Wawasee in June and July 2008.

Species	June	July
Black crappie	2.39	4.46
Bluegill	44.99	52.50
Bowfin	0.81	1.07
Brook silverside	0.52	0.54
Brown bullhead	1.57	1.07
Carp	0.64	1.07
Golden shiner	0.35	0.71
Lake chubsucker	1.57	0.18
Largemouth bass	11.82	11.79
Logperch	0.35	0.00
Longear	0.52	0.00
Longnose gar	1.05	2.68
Northern pike	5.01	3.93
Pumpkinseed	0.23	0.54
Redear	2.56	1.43
Redfin pickerel	0.12	0.36
Rock bass	2.79	2.32
Smallmouth bass	0.70	1.07
Spotted gar	2.39	1.61
Topminnow	0.47	0.00
Warmouth	3.67	1.79
White bass	0.70	1.07
White crappie	0.00	0.54
Yellow bullhead	5.70	3.39
Yellow perch	8.91	5.89

Table 8. Number, minimum and maximum size (inches), and weight (pounds) of white bass collected during fish population surveys at northern Indiana natural lakes since 1979.

LAKE	CO	Month	Year	SPECIES	Number	%N	Min size	Max size	Pounds	%LB	Mean lbs
Pike	43	6	2000	White bass	129	13.2	5.6	15.2	46.35	6.6	0.36
Lake-Woods	50	7	2007	White bass	76	17.9	2.0	16.3	75.5	21.6	
Pike	43	6	2005	White bass	37	3.8	6.1	17.3	16.07	1.8	0.43
Winona	43	7	2007	White Bass	34	2.2	6.2	17.4	35.85	4.8	1.05
Caldwell	43	5	1979	White bass	33	2.2			3.29	1.2	0.10
Bass	75	6	1991	White bass	22	5.8			4.67	2.1	0.21
Ridinger	43	7	1995	White bass	22	2.8			29.21	6.1	1.33
Silver	43	7	1989	White bass	19	1.7			16.68	4.3	0.88
Maxinkuckee	50	8	1983	White bass	17	3.5			22.70	4.4	1.34
Winona	43	7	1994	White bass	17	1.3			12.27	3.4	0.72
Winona	43		2003	White bass	15	1.1	6.4	15.4	9.73	1.0	0.65
Barbee	43	6	1997	White bass	14	0.9	5.8	15.5	12.92	1.8	0.92
Barbee	43	6	1988	White bass	13	0.8			13.48	2.1	1.04
Koontz	75	5	2000	White bass	12	1.0	9.5	14.5	10.31	2.8	0.86
Lake-of-the-Woo	50	6	1996	White bass	12	2.4			5.70	1.4	0.48
Tippecanoe	43	7	1995	White bass	12	1.4			19.37	4.0	1.61
Wawasee	43	6	2008	White bass	12	0.7	12.9	15.5	16.10	1.8	1.34
Yellow Creek	43	7	1986	White bass	11	1.0			18.10	4.5	1.65
Winona	43		2005	White bass	10	1.2	13.6	15.1	13.07	3.1	1.31
Wolf	45	7	1987	White bass	10	0.5			10.98	1.6	1.10
Hoffman	43	6	1989	White bass	9	1.0			3.96	1.0	0.44
South Mud	25	7	1996	White bass	7	2.0			4.82	2.4	0.69
Wawasee	43	7	2008	White bass	6	1.1	14.4	15.2	8.88	2.7	1.48
Wolf	45	6	1999	White bass	6	0.6	7.0	19.1	5.68	1.9	0.95
Silver	43	6	2006	White bass	5	1.0	7.1	15.3	3.56	1.0	0.71
Bass	75	9	1996	White bass	4	0.6			1.40	0.4	0.35
Wawasee	43	7	2004	White bass	3	0.1	12.9	13.5	3.24	0.5	1.08
Big Chapman	43	6	1999	White bass	2	0.1	14.7	15.3	3.53	0.9	1.77
Center	43	6	1997	White bass	2	0.1	14.1	16.2	3.24	0.4	1.62
Little Chapman	43	6	1999	White bass	2	0.1	13.7	14.0	2.69	0.6	1.35
Little Chapman	43	7	2005	White bass	2	0.2	14.3	16.3	3.42	1.5	1.71
Ridinger	43	6	2003	White bass	2	0.1	8.8	15.5	1.93	0.4	0.97
Big	57	6	2009	White bass	1	0.1	14.0		1.30	0.3	1.30
Big Chapman	43	6	1991	White bass	1	0.1			0.17	0.1	0.17
Big Chapman	43	7	2005	White bass	1	0.1	15.4	15.4	1.72	0.6	1.72
Carr	43	7	1988	White bass	1	0.1			0.88	0.2	0.88
Diamond	43	7	1985	White bass	1	0.1			1.41	0.3	1.41
Diamond	43	6	2005	White bass	1	0.1	15.2	15.2			0.00
Flint	64	6	1986	White bass	1	0.4			2.48	2.1	2.48
James	43	6	2006	White bass	1	0.1	17.1	17.1	2.35	0.8	2.35
Little Chapman	43	7	2006	White bass	1	0.1	15.3	15.3	0.00	0.0	0.00
Maxinkuckee	50	6	2007	White bass	1	0.2	16.1	16.1	2.1	0.6	
Robinson	92	6	1999	White bass	1	0.1	15.8	15.8	1.76	0.4	1.76
Snow	76	5	1989	White bass	1	0.1			1.26	0.3	1.26
South Mud	25	6	1980	White bass	1	0.2			1.14	0.4	1.14
Tippecanoe	43	6	2006	White bass	1	0.1	18.4	18.4	2.93	0.5	2.93

Table 9. Year, number of gill net lifts, number of white bass, and catch per lift of white bass captured during fish population surveys at selected lakes near Lake Wawasee.

Lake	Year	Nets	Number	Catch/lift
Ridinger	1995	6	22	3.67
Winona	2007	7	19	2.71
Pike	2008	3	5	1.67
Tippecanoe	1995	8	11	1.38
Silver	2006	4	5	1.25
Barbee	1997	15	14	0.93
Wawasee	**2008**	**15**	**13**	**0.87**
Ridinger	2003	4	2	0.50
James	2006	6	1	0.17
Tippecanoe	2006	9	1	0.11
			Mean	1.33

APPENDIX
Lake Pages

FISH SURVEY REPORT

Indiana Division of Fish and Wildlife

Type of survey	
Initial:	Re-survey: X

Lake name	County	Date of survey (Month, day, year)
Lake Wawasee	Kosciusko	6/2-6/5/08
Biologist's name		Date of approval (Month, day, year)
Nate Thomas		

LOCATION

Quadrangle name	Range	Section
Lake Wawasee	7E	
Township	Nearest town	
34N	Syracuse, IN	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
SE corner off of E Hatchery Rd	Various marinas	

Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
3,410	77	22	67,337	858.89	None

INLETS

Name	Location	Origin
Turkey Creek	SE Corner	Indian Village Lake
Dillon Creek	NE Corner	Runoff
Unnamed	SW Corner	Runoff

OUTLET

Name	Location
Turkey Creek	Flows towards Syracuse Lake

Water level control

Dam below Syracuse Lake on Turkey Creek

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

Boulder	
Gravel	X
Sand	X
Muck	X
Clay	
Marl	

Watershed use

General Farming with wooded lots and residential areas

Development of shoreline

The shoreline is 90% developed with marsh areas in Johnson and Conklin bays undeveloped.

Previous surveys and investigations

Fish surveys, DNR, 1975, 1985, 1997; Largemouth bass movement study, DNR,1998; Rock seawall studies, DNR, 2002,2003;

SAMPLING EFFORT

ELECTROFISHING	Day hours	Night hours	Total hours
		3.5	3.5
TRAPS	Number of traps	Days	Total lifts
	4	3	12
GILL NETS	Number of nets	Days	Total lifts
	3	3	9

PHYSICAL AND CHEMICAL CHARACTERISTICS

Color	Turbidity
Blue-green	12 Feet 0 Inches (Secchi disk)

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

Depth (ft)	Degrees F	Oxygen*	
Surface	65.8	10.0	
2	65.8	10.0	
4	65.8	10.0	
5	65.7	10.0	
6	65.7	10.0	
8	65.7	10.0	
10	65.7	10.0	
12	65.7	10.0	
14	65.5	10.0	
15	65.5	10.0	
16	65.5	10.0	
18	64.8	9.2	
20	64.4	9.3	
22	64.0	9.2	
24	62.8	8.8	
25	62.6	8.7	
26	61.2	8.3	
28	60.4	8.0	
30	59.0	7.0	
32	58.1	6.4	
34	58.1	7.0	
35	57.2	6.4	
36	57.9	6.4	
38	57.6	6.2	
40	56.8	5.7	
42	56.7	5.6	
44	56.5	5.3	
45	56.5	5.3	
46	56.3	5.1	
48	55.6	4.5	

Depth (ft)	Degrees F	Oxygen*	
50	55.0	4.1	
52	53.9	2.4	
54			
55			
56			
58			
60			
62			
64			
65			
66			
68			
70			
72			
74			
75			
76			
78			
80			
82			
84			

Sampling date:

	Surface	Bottom
pH	9.0	8.0
Alkalinity*	119.7	136.8
Conductivity		
TDS		

*ppm = parts per million

Relative Abundance, Size and Estimated Weight of Fish Collected at Lake Wawasee, June 2008

Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Bluegill	773	45.0	1.7	9.3	104.10	11.4
Largemouth bass	203	11.8	4.2	16.1	121.82	13.3
Yellow perch	153	8.9	3.3	11.2	23.96	2.6
Yellow bullhead	98	5.7	6.6	15.3	87.84	9.6
Northern pike	86	5.0	14.7	33.5	232.17	25.4
Warmouth	63	3.7	3.2	8.3	15.61	1.7
Rock bass	48	2.8	2.8	12.0	20.84	2.3
Redear	44	2.6	2.7	11.3	18.52	2.0
Spotted gar	41	2.4	12.7	29.7	68.90	7.5
Black crappie	41	2.4	3.2	11.5	13.51	1.5
Brown bullhead	27	1.6	7.8	15.5	27.84	3.0
Lake chubsucker	27	1.6	3.9	12.4	5.71	0.6
Longnose gar	18	1.0	24.5	38.0	37.70	4.1
Bowfin	14	0.8	16.3	28.0	56.55	6.2
White bass	12	0.7	12.9	15.5	16.10	1.8
Smallmouth bass	12	0.7	4.2	14.9	5.65	0.6
Carp	11	0.6	16.0	36.0	52.71	5.8
Longear	9	0.5	3.8	5.1	0.56	0.1
Brook silverside	9	0.5	3.2	3.7	0.10	0.0
Topminnow	8	0.5	2.0	3.3	0.10	0.0
Golden shiner	6	0.3	4.0	7.6	0.49	0.1
Logperch	6	0.3	3.1	4.4	0.16	0.0
Pumpkinseed	4	0.2	5.5	8.1	0.88	0.1
Hybrid sunfish	3	0.2	6.0	6.7	0.60	0.1
Redfin pickerel	2	0.1	8.5	11.9	0.48	0.1
TOTAL (25 species)	1718				912.90	

*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, June 2008

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	4		2	6	0.8	0.01	1						6					
2.5	34		18	52	6.7	0.01	5	4					29	23				
3.0	30		8	38	4.9	0.02	1	1					19	19				
3.5	23	2	5	30	3.9	0.03		2						30				
4.0	102	3	14	119	15.4	0.05		6						119				
4.5	115	1	11	127	16.4	0.07			1						127			
5.0	63		9	72	9.3	0.09			5						72			
5.5	29	5	14	48	6.2	0.12			3	2					29	19		
6.0	31	9	15	55	7.1	0.16				5						55		
6.5	16	17	19	52	6.7	0.20				3	2					31	21	
7.0	16	18	30	64	8.3	0.26					5						64	
7.5	17	20	23	60	7.8	0.32						5						60
8.0	10	15	11	36	4.7	0.39						5						36
8.5	2	5	4	11	1.4	0.47						5						11
9.0		2	1	3	0.4	0.55						2						3
Totals:	492	97	184	773		104.1	7	13	9	10	7	17	54	191	228	105	85	110
												Mean length (in):	2.6	3.6	4.8	6.1	6.9	7.8
												Variance:	0.10	0.28	0.13	0.12	0.05	0.15

Number, catch by gear, percentage, estimated weight and age of largemouth bass, June 2008

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+
4.0	1			1	0.5	0.03												
4.5	3			3	1.5	0.04	3						3					
5.0	2			2	1.0	0.06	1						2					
5.5	7			7	3.4	0.08		4						7				
6.0	15			15	7.4	0.10		3	1					11	4			
6.5	21			21	10.3	0.13		4	1					17	4			
7.0	11			11	5.4	0.16		4	1					9	2			
7.5	4			4	2.0	0.20		2	1					3	1			
8.0	4			4	2.0	0.25		1	3					1	3			
8.5	5			5	2.5	0.30		1	2					2	3			
9.0	15	3		18	8.9	0.35			4						18			
9.5	11	4		15	7.4	0.42			5	1					13	3		
10.0	8	2		10	4.9	0.49			2	4					3	7		
10.5	6	1		7	3.4	0.57			2	2					4	4		
11.0	6	4		10	4.9	0.65			1	3					3	8		
11.5	9	2		11	5.4	0.75				5						11		
12.0	3	2		5	2.5	0.85				1	3					1	4	
12.5	8	3		11	5.4	0.97				3	1					8	3	
13.0	6			6	3.0	1.09				2	2					3	3	
13.5	6	6		12	5.9	1.23				1	3	1				2	7	2
14.0	1	5	1	7	3.4	1.37					2						7	
14.5	2	5	1	8	3.9	1.53					1	2					3	5
15.0	4	3	1	8	3.9	1.70						4						8
15.5		1		1	0.5	1.88												
16.0		1		1	0.5	2.07												
Totals:	158	42	3	203		121.82	4	19	23	22	12	7	5	49	58	46	26	16
												Mean length (in):	4.7	6.5	8.8	11.4	13.4	14.6
												Variance:	0.1	0.5	1.7	1.2	0.6	0.3

Number, catch by gear, percentage, estimated weight and age of yellow perch, June 2008

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+
3.0	3			3	2.0	0.01												
3.5	4			4	2.6	0.02		1						4				
4.0	3			3	2.0	0.03												
4.5	2		1	3	2.0	0.04												
5.0	22	1	1	24	15.7	0.06												
5.5	11	6		17	11.1	0.08			2						17			
6.0	5	16	2	23	15.0	0.10			4						23			
6.5	5	13	2	20	13.1	0.13			3	3					10	10		
7.0	3	8	1	12	7.8	0.17			2						12			
7.5	2	13	1	16	10.5	0.21			1	4	1				3	11	3	
8.0	1	7	1	9	5.9	0.25					2						9	
8.5	4	1	2	7	4.6	0.31					2						7	
9.0	1	1		2	1.3	0.37						1						2
9.5		2		2	1.3	0.44					1	1					1	1
10.0	1	3		4	2.6	0.52						1						4
10.5		2		2	1.3	0.61						2						2
11.0		2		2	1.3	0.71						1						2
Totals:	67	75	11	153		23.96	0	1	12	7	6	6	0	4	65	21	20	11
												Mean length (in):	---	3.5	6.2	7.0	8.2	10.0
												Variance:	---	0.00	0.35	0.26	0.21	0.47

Number, catch by gear, percentage, estimated weight and age of northern pike, June 2008

Length (in)	Catch by gear EF	GN	TN	Total Number	%	Estimated Weight (lb)	Age analysis (scales/half-inch) 1	2	3	4	5	6+	Age Composition (number/age) 1	2	3	4	5	6+
14.5		2		2	2.3	0.63	2						2					
15.0		1		1	1.2	0.70	1						1					
15.5		1		1	1.2	0.78	1						1					
16.0		1		1	1.2	0.86												
16.5		2		2	2.3	0.94	1						2					
17.0		2		2	2.3	1.04	1						2					
17.5		4		4	4.7	1.14		3						4				
18.0		2		2	2.3	1.24		1						2				
18.5		4		4	4.7	1.35		2	1					3	1			
19.0		2		2	2.3	1.47		2						2				
19.5		6		6	7.0	1.60		3	1					5	2			
20.0		5		5	5.8	1.73		2						5				
20.5		3		3	3.5	1.87		1						3				
21.0		7		7	8.1	2.01		2	2					4	4			
21.5		2		2	2.3	2.17			2						2			
22.0		5		5	5.8	2.33			4						5			
22.5		6		6	7.0	2.50		1	1	1				2	2	2		
23.0		5		5	5.8	2.68		1	2		1			1	3		1	
23.5		3		3	3.5	2.87				1	1					2	2	
24.0		3		3	3.5	3.06		1		2				1		2		
24.5		1		1	1.2	3.27					1						1	
25.0		1		1	1.2	3.48					1						1	
25.5		2		2	2.3	3.70				1						2		
26.0		1		1	1.2	3.94				1						1		
26.5		1		1	1.2	4.18			1		1				1		1	
27.0		3		3	3.5	4.43				1						3		
27.5		1		1	1.2	4.70					1						1	
28.0				0	0.0	4.97												
28.5		2		2	2.3	5.25				1						2		
29.0		1		1	1.2	5.55												
29.5		1		1	1.2	5.85					1						1	
30.0				0	0.0	6.17												
30.5				0	0.0	6.50												
31.0		2		2	2.3	6.84					1	1					1	1
31.5				0	0.0	7.19												
32.0				0	0.0	7.56												
32.5		1		1	1.2	7.94						1						1
33.0		2		2	2.3	8.33						2						2
33.5		1		1	1.2	8.73						1						1
Totals:	0	86	0	86		232.17	6	19	14	8	8	5	8	31	18	14	8	5
												Mean length (in):	15.8	19.9	21.6	25.4	26.0	32.6
												Variance:	1.14	2.86	2.31	4.27	8.76	0.93

Number, catch by gear, percentage, estimated weight and age of black crappie, June 2008

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+
3.0			1	1	2.4	0.01	1						1					
3.5					0.0	0.02												
4.0					0.0	0.03												
4.5					0.0	0.05												
5.0			2	2	4.9	0.07		1						2				
5.5		1	1	2	4.9	0.09		2						2				
6.0					0.0	0.11												
6.5					0.0	0.15		1										
7.0		1		1	2.4	0.18			1						1			
7.5	1	6	2	9	22.0	0.22			5						9			
8.0	1	5	5	11	26.8	0.27			6	2					8	3		
8.5		4	2	6	14.6	0.33			3	2					4	2		
9.0		2	2	4	9.8	0.39			1	2					1	3		
9.5					0.0	0.46												
10.0					0.0	0.53												
10.5			1	1	2.4	0.62					1						1	
11.0		2	1	3	7.3	0.71						3						3
11.5		1		1	2.4	0.81						1						1
Totals:	2	22	17	41		12.60	1	4	16	6	1	4	1	4	23	8	1	4
												Mean length (in):	3.0	5.3	7.9	8.5	10.5	11.1
												Variance:	—	0.08	0.24	0.20	—	0.06

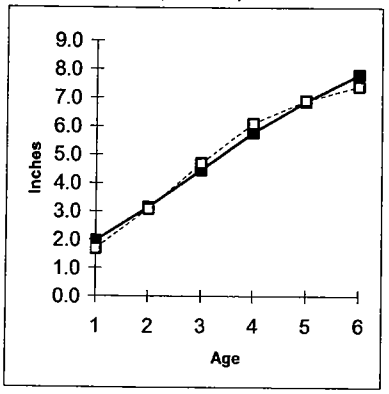
Bluegill
Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI	VII	VIII
2007	7	2.3							
	stdev	0.2							
2006	17	2.1	3.4						
	stdev	0.4	0.6						
2005	9	1.9	3.3	4.7					
	stdev	0.2	0.5	0.5					
2004	10	2.1	3.4	4.9	5.9				
	stdev	0.3	0.6	0.7	0.5				
2003	7	2.0	3.3	4.6	6.0	6.8			
	stdev	0.3	0.3	0.4	0.3	0.2			
2002	8	1.7	2.7	3.9	5.5	6.8	7.7		
	stdev	0.3	0.4	0.7	0.7	0.5	0.3		
2001	7	1.7	2.8	4.1	5.7	7.0	7.9	8.5	
	stdev	0.2	0.5	0.9	0.8	0.6	0.5	0.3	
2000	2	1.6	2.9	4.7	5.7	7.0	7.9	8.6	9.0
	stdev	0.3	0.3	0.4	0.2	0.0	0.3	0.2	0.1
Mean*		2.0	3.1	4.5	5.8	6.9	7.8	8.5	
SD		0.3	0.5	0.6	0.6	0.5	0.4	0.3	
Count		65	58	41	32	22	15	7	

Does not include age groups with less than three samples.

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



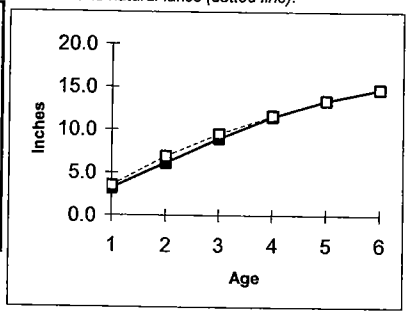
Largemouth bass
Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI
2007	4	3.8					
	stdev	0.2					
2006	19	2.9	6.1				
	stdev	0.4	0.7				
2005	23	2.9	6.0	8.5			
	stdev	0.5	1.1	1.2			
2004	22	3.1	6.1	9.0	11.1		
	stdev	0.5	1.0	1.0	1.0		
2003	12	2.9	5.9	8.9	11.4	13.0	
	stdev	0.6	1.3	1.1	1.0	0.9	
2002	7	3.5	6.4	9.4	11.9	13.7	14.7
	stdev	0.5	0.6	0.7	0.5	0.7	0.5
Mean*		3.2	6.1	8.9	11.5	13.4	14.7
SD		0.4	0.2	0.4	0.4	0.5	0.5
Count		87	83	64	41	19	7

Does not include age groups with less than three samples.

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



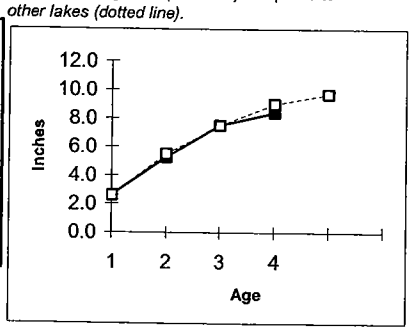
Black crappie
Intercept: 1.4 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI
2007							
	stdev						
2006	4	2.7	5.3				
	stdev	0.32	0.57				
2005	16	2.5	5.2	7.8			
	stdev	0.23	0.36	0.41			
2004	6	2.6	5.2	7.2	8.4		
	stdev	0.26	0.48	0.36	0.33		
2003	1	3.5	5.1	7.0	8.6	10.3	
	stdev	—	—	—	—	—	
2002	2	2.5	3.9	7.1	9.2	10.2	10.9
	stdev	0.18	0.32	1.25	1.84	0.91	0.51
Mean*		2.6	5.3	7.5	8.4	–	–
SD		0.3	0.5	0.4	0.3		
Count		29	29	25	9	3	2

Does not include age groups with less than three samples.

Black crappie growth (solid line) compared to other lakes (dotted line).



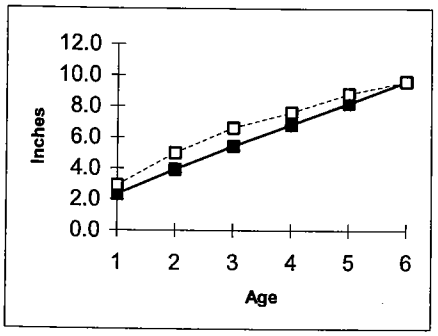
Yellow perch
Intercept: 1.2 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI
2007							
	stdev						
2006	1	2.0	3.0				
	stdev						
2005	12	2.3	3.8	5.9			
	stdev	0.3	0.6	0.5			
2004	6	2.5	4.0	5.1	6.7		
	stdev	0.2	0.3	0.5	0.5		
2003	6	2.4	4.1	5.3	6.8	8.0	
	stdev	0.2	0.5	0.7	0.7	0.6	
2002	4	2.1	3.8	5.4	6.9	8.4	9.6
	stdev	0.2	0.2	0.3	0.1	0.7	0.8
Mean*		2.3	3.9	5.4	6.8	8.2	9.6
SD		0.2	0.4	0.5	0.4	0.6	0.8
Count		28	28	28	16	10	4

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

Yellow perch growth (solid line) compared to other lakes (dotted line).



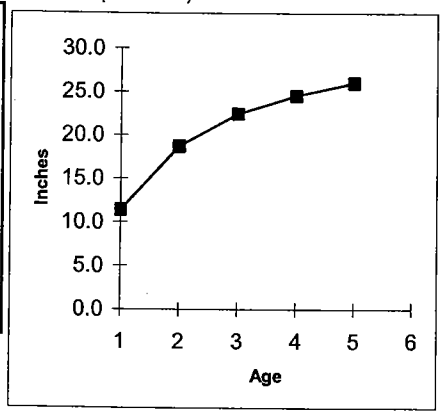
Northern pike
Intercept: 1.4 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year Class	Count	I	II	III	IV	V	VI
2007	6	14.0					
	stdev	1.20					
2006	19	10.2	18.8				
	stdev	0.80	1.72				
2005	14	10.4	17.5	21.2			
	stdev	1.25	1.90	1.98			
2004	8	11.5	19.9	23.1	24.5		
	stdev	1.37	1.34	1.60	1.69		
2003	8	11.1	18.6	22.9	24.6	26.0	
	stdev	0.95	2.34	2.05	2.50	2.71	
2002							
	stdev						
Mean*		11.4	18.7	22.4	24.5	26.0	
SD		1.11	1.83	1.87	2.09	2.71	
Count		55	49	30	16	8	

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

Northern pike growth (solid line) compared to other lakes (dotted line).



FISH SURVEY REPORT

Indiana Division of Fish and Wildlife

Type of survey	
Initial:	Re-survey: X

Lake name	County	Date of survey (Month, day, year)
Lake Wawasee	Kosciusko	7/14-16/2008
Biologist's name		Date of approval (Month, day, year)
Nate Thomas		

LOCATION

Quadrangle name	Range	Section
Lake Wawasee	7E	
Township	Nearest town	
34N	Syracuse, IN	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
SE corner off of E Hatchery Rd	Various marinas	

Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
3,410	77	22	67,337	858.89	None

INLETS

Name	Location	Origin
Turkey Creek	SE Corner	Indian Village Lake
Dillon Creek	NE Corner	Runoff
Unnamed	SW Corner	Runoff

OUTLET

Name	Location
Turkey Creek	Flows towards Syracuse Lake

Water level control

Dam below Syracuse Lake on Turkey Creek

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

Boulder	
Gravel	X
Sand	X
Muck	X
Clay	
Marl	

Watershed use

General Farming with wooded lots and residential areas

Development of shoreline

The shoreline is 90% developed with marsh areas in Johnson and Conklin bays undeveloped.

Previous surveys and investigations

Fish surveys, DNR, 1975, 1985, 1997; Largemouth bass movement study, DNR,1998; Rock seawall studies, DNR, 2002,2003;

SAMPLING EFFORT			
ELECTROFISHING	Day hours	Night hours	Total hours
		2	2
TRAPS	Number of traps	Days	Total lifts
	3	2	6
GILL NETS	Number of nets	Days	Total lifts
	3	2	6

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color	Turbidity
Blue-green	5 Feet 6 Inches (Secchi disk)

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

Depth (ft)	Degrees F	Oxygen*	
Surface	75.0	8.6	
2	75.0	8.0	
4	75.0	7.9	
5	75.0	7.8	
6	75.0	7.7	
8	75.0	7.6	
10	75.0	7.5	
12	75.0	7.7	
14	75.0	7.8	
15	75.0	7.8	
16	75.0	7.8	
18	75.0	7.7	
20	73.2	5.7	
22	71.2	4.5	
24	70.7	3.9	
25	68.2	2.2	
26	67.6	2.0	
28	66.7	1.2	
30	65.3	0.4	
32	61.7	0.2	
34	60.4	0.1	
35	59.2	0.1	
36	58.5	0.1	
38	58.1	0.1	
40	57.9	0.0	
42	57.7	0.0	
44	57.4	0.0	
45	57.2	0.0	
46	56.8	0.0	
48	56.5	0.0	

Depth (ft)	Degrees F	Oxygen*	
50	55.9	0.0	
52	55.8	0.0	
54	55.0	0.0	
55	54.5	0.0	
56	54.0	0.0	
58	53.1	0.0	
60	52.9	0.0	
62	52.7	0.0	
64	52.2	0.0	
65			
66			
68			
70			
72			
74			
75			
76			
78			
80			
82			
84			

Sampling date:

	Surface	Bottom
pH	9.0	8.0
Alkalinity*	119.7	153.9
Conductivity		
TDS		

*ppm = parts per million

Relative Abundance, Size and Estimated Weight of Fish Collected at Lake Wawasee, July 2008

Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Bluegill	294	52.5	1.6	8.9	28.96	8.9
Largemouth bass	66	11.8	1.8	19.7	45.40	14.0
Yellow perch	33	5.9	3.9	11.1	6.78	2.1
Black crappie	25	4.5	4.6	12.0	8.29	2.6
Northern pike	22	3.9	17.8	33.5	62.76	19.4
Yellow bullhead	19	3.4	8.4	14.5	15.02	4.6
Longnose gar	15	2.7	20.0	34.6	28.09	8.7
Rock bass	13	2.3	2.4	11.0	8.24	2.5
Warmouth	10	1.8	5.6	9.9	4.59	1.4
Spotted gar	9	1.6	18.5	29.3	18.17	5.6
Redear	8	1.4	6.0	8.0	1.84	0.6
Carp	6	1.1	17.8	34.0	45.22	13.9
Bowfin	6	1.1	20.7	25.0	25.25	7.8
White bass	6	1.1	14.4	15.2	8.88	2.7
Brown bullhead	6	1.1	12.0	15.4	7.43	2.3
Smallmouth bass	6	1.1	10.3	18.1	6.70	2.1
Golden shiner	4	0.7	4.9	7.6	0.62	0.2
Pumpkinseed	3	0.5	6.3	6.7	0.61	0.2
White crappie	3	0.5	6.5	7.5	0.56	0.2
Brook silverside	3	0.5	3.4	3.6	0.03	0.1
Redfin pickerel	2	0.4	8.3	9.0	0.40	0.1
Lake chubsucker	1	0.2	9.6	9.6	0.45	0.1
TOTAL (22 species)	560				324.29	

*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, July 2008

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+
1.5			2	2	0.7	0.00												
2.0	1		18	19	6.5	0.01												
2.5	3		17	20	6.8	0.01												
3.0	9		21	30	10.2	0.02												
3.5	12		22	34	11.6	0.03												
4.0	8	1	5	14	4.8	0.05												
4.5	23	4	7	34	11.6	0.07												
5.0	20	16	7	43	14.6	0.09												
5.5	16	12	5	33	11.2	0.12												
6.0	4	7	1	12	4.1	0.16												
6.5	2	12	4	18	6.1	0.20												
7.0	4	11	2	17	5.8	0.26												
7.5	2	10	1	13	4.4	0.32												
8.0		2	1	3	1.0	0.39												
8.5		2		2	0.7	0.47												
Totals:	104	77	113	294		28.96												

Mean length (in):

Variance:

Number, catch by gear, percentage, estimated weight and age of largemouth bass, July 2008

Length (in)	Catch by gear EF	GN	TN	Total Number	%	Estimated Weight (lb)	Age analysis (scales/half-inch) 1	2	3	4	5	6+	Age Composition (number/age) 1	2	3	4	5	6+
1.5	1			1	1.5	0.00												
2.0																		
2.5																		
3.0																		
3.5																		
4.0																		
4.5																		
5.0	2			2	3.0	0.06												
5.5																		
6.0																		
6.5																		
7.0	2	1		3	4.5	0.16												
7.5	5	3		8	12.1	0.20												
8.0		3		3	4.5	0.25												
8.5	1	1		2	3.0	0.30												
9.0	3			3	4.5	0.35												
9.5	3	1		4	6.1	0.42												
10.0	1	5		6	9.1	0.49												
10.5	2	3		5	7.6	0.57												
11.0		5		5	7.6	0.65												
11.5	2	3		5	7.6	0.75												
12.0	4	4		8	12.1	0.85												
12.5	1			1	1.5	0.97												
13.0																		
13.5																		
14.0	3	1		4	6.1	1.37												
14.5	1			1	1.5	1.53												
15.0	2			2	3.0	1.70												
15.5		1		1	1.5	1.88												
16.0																		
16.5																		
17.0		1		1	1.5	2.49												
17.5																		
18.0																		
18.5																		
19.0																		
19.5	1			1	1.5	3.80												
Totals:	34	32	0	66		45.40												

Mean length (in):

Variance:

Number, catch by gear, percentage, estimated weight and age of black crappie, July 2008

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+
5.5		1		1	4.3	0.09												
6.0																		
6.5																		
7.0		1		1	4.3	0.18												
7.5	1	6		7	30.4	0.22												
8.0		5		5	21.7	0.27												
8.5		4		4	17.4	0.33												
9.0		2		2	8.7	0.39												
9.5																		
10.0																		
10.5																		
11.0		2		2	8.7	0.71												
11.5		1		1	4.3	0.81												
Totals:	1	22	0	23		7.52												

Mean length (in):

Variance:

Number, catch by gear, percentage, estimated weight and age of northern pike, July 2008

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+
17.5		1		1	4.5	1.14												
18.0																		
18.5	1	2		3	13.6	1.35												
19.0		1		1	4.5	1.47												
19.5																		
20.0																		
20.5		2		2	9.1	1.87												
21.0		2		2	9.1	2.01												
21.5		1		1	4.5	2.17												
22.0						2.33												
22.5		2		2	9.1	2.50												
23.0		1		1	4.5	2.68												
23.5		2		2	9.1	2.87												
24.0	1	1		2	9.1	3.06												
24.5																		
25.0		1		1	4.5	3.48												
25.5																		
26.0		1		1	4.5	3.94												
26.5		1		1	4.5	4.18												
27.0																		
27.5																		
28.0		1		1	4.5	4.97												
28.5																		
29.0																		
29.5																		
30.0																		
30.5																		
31.0																		
31.5																		
32.0																		
32.5																		
33.0																		
33.5		1		1	4.5	8.73												
Totals:	2	20	0	22		61.42												

Mean length (in):

Variance: