

Lake Tippecanoe
Kosciusko County
Fish Management Report– 2006

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EXECUTIVE SUMMARY

Lake Tippecanoe and the Oswego basin is an 851-acre natural lake located 2 miles west of North Webster. A state-owned boat ramp is available on Armstrong Road.

Lake Tippecanoe is moderately fertile, although the main basin is less fertile. During summer, enough oxygen for fish in the top 15-20 feet.

Eurasian water milfoil is the dominant aquatic plant and is treated with herbicides. Eel grass has become more common, while spatterdock and water lilies are scarce.

Recent fish management efforts have centered on muskie stockings and imposition of bass size limits.

To obtain information on the fish community, a survey was done on June 19-22, 2006. Effort included 75 minutes of electrofishing, nine gill net lifts, and nine trap net lifts.

During the survey, 988 fish were collected and total weight was 576 pounds. Bluegills dominated the catch by number (39%), followed by largemouth bass (13%), and gizzard shad (13%). Carp ranked first in weight (17%), followed by bass (13%) and shad (11%). Bluegills were 2.0-8.5 inches long, but the electrofishing catch rate was very low. Bass were 4.1-17.7 inches long but only six were legal-size. No muskies were captured.

Lake Tippecanoe has a diverse and relatively stable fish community. The survey results suggest the average size of bluegills may have increased over the past 10 years but the percentage of 14-inch and larger bass remains low despite imposition of size limits. Non-sport fish do not pose a threat to the fishery.

Overall fishing quality at Lake Tippecanoe is satisfactory. It is recommended that annual stockings on 1,133 muskie fingerlings continue, but more work is needed to understand factors that limit the number of legal-size bass. Other environmental suggestions are offered.

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INTRODUCTION

Lake Tippecanoe, including the Oswego Lake basin, is an 851-acre natural lake located 2 miles west of North Webster. It lies within the Tippecanoe River watershed and drains 72,320 acres. The water level is maintained by a dam built in 1936 at the west end of Oswego Lake. The main inlets enter from James Lake (Tippecanoe River) and the Barbee Lakes (Grassy Creek). With a maximum depth of 122 feet, it is the deepest lake in Indiana. The basin is steep-sided and has an average depth of 37 feet. Hydraulic retention time is 175 days.

Farming is the major land use in the watershed, but small towns, woodlots, wetlands, and lakes are present. Nearly all of the shoreline is residentially developed. Areas of natural shoreline and wetlands occur mainly between the Tippecanoe and James basins (Ball Wetland Area). A state-owned boat ramp is available on Armstrong Road about 1 mile upstream on Grassy Creek. Several commercial marinas are also present.

Lake Tippecanoe in general is moderately fertile (mesotrophic), although the main basin is less fertile. Ample amounts of oxygen are present down to 90 feet in early summer. By late summer, enough oxygen for fish (≥ 5 ppm) is present in the top 15-20 feet (Table 1), although 3-4 ppm have been recorded as deep as 70 feet. Records from 1909 through 1951 indicate oxygen levels were similar: < 1 ppm at 30 feet and 3-4 ppm to 90 feet (Frey 1955). Water clarity varied from 5-6.5 feet from the 1970s through the 1990s but has improved in recent years. The bottom is sand, marl and muck. In another early study (Wilson and Opdyke 1941), bottom sediments consisted of carbonates (73%), silica (19%) and organic matter (7%) and were derived mostly from in-lake sources.

Eurasian water milfoil has been the dominant submersed aquatic plant over the years and is treated annually with herbicides. Eel grass has become increasingly more common, although submersed plants are generally sparse due to the sharp contour and sandy bottom. Many areas are devoid of plants. Spatterdock and water lilies are very scarce, cover less than 5 surface acres, and are located mainly at the mouths of the two main inlets and in portions of the Oswego basin, based on sampling conducted by the Division of Fish and Wildlife (DFW) on August 8, 2006. An early account says that aquatic plants grew profusely in the Oswego basin (Miles 1915).

Some historical records of fish abundance and size at Lake Tippecanoe are available. The 1915 report stated smallmouth bass, bluegills and crappies were abundant. Walleyes, northern pike, and ciscoes were also present. However, largemouth bass were not considered plentiful except in marshy areas in spring. Bluegills, 8 inches long, were sampled in 1929 and were 5-6 years old (Ricker 1942). White bass, large channel catfish, and stocked rainbow trout have also been recorded (Doggett 1951). Although ciscoes were noted as early as 1875 (Jordan 1875), periodic die-offs occurred as water quality declined and eliminated them before 1970 (Gulish 1974). Since then, the DFW has conducted follow-up fish population surveys at Lake Tippecanoe on three occasions: July 1976, April 1982, and July 1995.

Recent fish management efforts have centered on mainly walleye and muskie stockings, as well as imposition of bass size limits. From 1982-86, the DFW stocked about 430,000 walleye fingerlings (2 in) in the lake but the stockings failed to establish an adequate density ($\geq 7/\text{hr}$ electrofishing). Muskies, released upstream into Lake Webster since 1981, began showing up in catches at Lake Tippecanoe in 1985. Since 1997, approximately 9,600 muskie fingerlings (10 in) have been stocked directly into the lake up to an annual rate of 1/acre. A 12-inch minimum largemouth bass size limit went into effect in 1990 and was increased to 14 inches in 1998. Annual estimates of adult bass abundance in the 1980s varied from 5,559-7,281 and averaged only 7/acre. The average electrofishing catch rate (73/hr) was below normal (100-125/hr). No recent estimates of bass numbers have been made. However, to obtain current information on the status of the fish community at Lake Tippecanoe, another survey was done on June 19-22, 2006.

METHODS

Sampling effort during the latest fish population survey included 75 minutes of pulsed DC electrofishing (504V) with two dip-netters, nine gill net lifts, and nine trap net lifts. Surface water temperature was 76°. 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 natural lakes fish population surveys in the area. Fish scales were taken from dominant sport fish for age and growth analyses using standard body-length:scale-length relationships.

RESULTS

During the 2006 survey, 988 fish were collected (see appendices). Total weight was 576 pounds. Twenty-four species were present. Bluegills dominated the catch by number (39%), followed by largemouth bass (13%), and gizzard shad (13%). Bluegills, however, comprised only 9% of the weight. Instead, carp ranked first in weight (17%), followed by bass (13%) and shad (11%). No walleyes or muskies were caught. Altogether, sport fish accounted for 79% of the catch by number and 51% by weight.

Bluegills were 2-8.5 inches long. Of those 3-inch and larger, 34% were 7-inch and larger. The electrofishing catch rate of bluegills (16/15-min) was very low compared to other lakes in the area. Bluegills up to age-7 were found, although the dominant group was age-2 (30%). Age-4 and older bluegills accounted for 39% of the catch, but age-6 and older bluegills made up only 5%. Bluegill growth was typical with age-4 fish averaging 6.2 inches and age-6 bluegills averaging 7.5 inches.

Largemouth bass ranged from 4.1-17.7 inches long but only six bass (5%) were legal-size (14-in or larger). Of all 8-inch and larger bass, legal fish made up only 6% of the catch. Most bass were either age-3 (33%) or age-4 (33%) and were 8.5-12.5 inches. Age-6 and older bass represented less than 1% of the catch. The electrofishing catch rate of bass (26/15-min) was comparable to most natural lakes and bass growth was also average with fish reaching legal-size during age-5.

Other fish included 92 redear up to 11.2 inches long. They accounted for 9% by number and 7% by weight. Fifty-eight yellow perch, 5.5-10.4 inches long, were caught. They made up 6% of number and only 2% by weight. About half were 8-inch or larger, were age-4 or older, and grew at typical rates. Several sunfish were collected, including 35 warmouth, 12 rock bass, 11 pumpkinseeds, five longear, and four black crappies. Seven northern pike, ranging from 22.0-37.5 inches long, were caught in gill nets (0.8/lift) and comprised 10% of the survey weight. Twenty-six yellow bullheads, eight brown bullheads, six channel catfish, and an 18.4-inch white bass were also caught. The 127 gizzard shad ranged from 5.1-14.7 inches long. Only 10% were less than 8 inches. Most (82%) were 10-inch or larger. Other non-sport fish included 14 spotted suckers, 13 carp from 20.2-30.6 inches long, 11 brook silversides, 10 golden redhorse, 10 spotted gar, eight white suckers, seven carpsuckers, six lake chubsuckers, and four bowfin.

SUMMARY

Lake Tippecanoe has a diverse and relatively stable fish community (Table 2). No major changes have occurred in the relative abundance of various species in the lake over the past 30 years. Bluegills, although not particularly abundant, have typically dominated the lake by number. The most recent survey results, however, suggest the average size of bluegills may have increased over the past 10 years and the percentage of 7-inch bluegills is now larger than before (Table 3). The catch rate of largemouth bass in 2006 was also 37% greater than 1982 and 1995 (Table 4), although sample size was small and the percentage of 14-inch and larger bass remained low despite imposition of the 12-limit in the early 1990s and 14-inch limit in the late 1990s. The mean weight of bass captured in the 2006 survey (0.55 lbs) was similar to the mean weight in 1976 (0.51 lbs) and 1982 (0.56 lbs).

Sport fish other than bluegills and bass, while undergoing fluctuations in actual numbers from survey to survey, generally ranked the same. The most notable exceptions include a possible decline in yellow perch and crappies between the 1980s and 1990s and a buildup of channel catfish numbers in the 1990s. Numbers of northern pike and white bass have also varied, but the higher catches in 1982 probably reflected their greater vulnerability at the time of the survey (April) compared to summer months. Failure to capture any stocked muskies in the latest survey most likely also reflected their lack of vulnerability to the sampling gear. No muskies were caught during a summer survey in 2005 at Webster Lake either, despite the presence of a large muskie population in the lake. Additional spring-time trapping using large trap nets set near inlets might provide useful data on the status of the muskie population in Lake Tippecanoe.

Non-sport fish do not pose a threat to the fishery. Although several species are present that could compete with sport fish, such as gizzard shad, carp and suckers, their numbers are apparently held in check by habitat limitations, variable recruitment, and predation. For example, 30 years ago shad ranked second by number (19%) and first by weight (17%) in the survey catch. They made up 14% of the weight in 1995 and 11% in 2006. Likewise, gar were abundant and suckers ranked third by weight in 1976 but catches of these fish declined by 1995 and again in 2006. The low catch of shad and gar, along with the high catch of suckers, in 1982 was probably due to sampling in April.

RECOMMENDATIONS

Overall fishing quality at Lake Tippecanoe is satisfactory, perhaps more for the variety of fishing opportunities than the quality of fish size. Large bluegills, perch, and especially bass, are not abundant, but anglers have the option to fish for other species, including sunfish, catfish, pike, muskies and white bass. Apparently muskies have not adversely affected the native fish community. Therefore, it is recommended that annual stockings of 1,133 muskie fingerlings continue. Additional work, however, is needed to understand factors that limit the number of legal-size bass. Similar scarcities of large bass have been noted at other natural lakes where bass fishing, especially by tournament anglers, is more intense even though bass harvest is low. For example, only one bass larger than 14.5 inches was captured in an hour of electrofishing at nearby Dewart Lake in June 2006, yet growth of young bass in Dewart and Tippecanoe lakes is typical of most lakes. Sampling in June after adult bass have left their spawning areas may explain why few are captured in summer, but high mortality due to excessive catch-and-release fishing or other natural factors may also be reducing the number of large bass.

No other fish management recommendations are suggested at this time, but several lake management issues need attention. On-going efforts to reduce the input of nutrients and sediments into the lake should continue. If water quality improves further, some opportunity may exist to restore the native population of ciscoes. Local residents are also encouraged to continue efforts to protect and enhance the natural character of the lake. Lakefront property owners should minimize alterations to the shoreline and restore a more natural appearance by maintaining various plants along the edge and installing natural boulders in front of existing bulkhead seawalls to reduce wave energy. Efforts to control nuisance invasive plants species, such as Eurasian water milfoil and curly-leaf pondweed, should continue but beds of native species, including submersed and emergent plants, should be protected. The presence of several scattered patches of lilies at some locations indicates they may be remnants of once larger beds. Spatterdock and water lilies not only provide environmental and aesthetic benefits, they are important components of good fish habitat. A project is currently under development to expand the coverage of emergent plants at the east end of the lake within a proposed “ecozone” that could provide more diverse fish habitat and protect the adjacent wetland from erosion.

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January 12, 2007

Approved by: _____

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January 19, 2007

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Table 1. *Oxygen levels (ppm) and water clarity (secchi depth) at Lake Tippecanoe from 1972 through 2006.*

Depth (ft)	8/72	8/75	7/76	7/95	6/06
0	8.4	8.6	8.4	11.0	9.2
5	8.4	8.2	7.6	11.0	9.0
10	8.5	8.6	8.6	10.0	8.7
15	8.6	8.4	6.2	9.0	8.4
20	3.1	3.8	1.2	6.0	7.3
25	0.5	0.6	0.2	4.0	6.3
30	0.4	0.2	0.4	3.0	5.7
40	0.2	1.8	0.8	3.0	5.0
50	1.9	2.8	2.0	4.0	7.1
60	2.3	3.6	2.6	4.0	7.5
70	2.3	3.4	2.6	3.0	7.1
80	1.2	3.4	1.8	2.0	7.0
Secchi (ft)	5.5	6.5	5.0	5.0	11.0

Table 2. *Number and weight of fish collected during fish population surveys at Lake Tippecanoe from 1976 through 2006.*

Species	Number				Pounds			
	1976	1982	1995	2006	1976	1982	1995	2006
Black bullhead	na	1	0	0	na	0.3	0	0
Black crappie	70	69	9	4	16.3	32.0	2.0	1.8
Bluegill	655	166	295	383	52.1	21.0	32.3	52.4
Bluntnose minnow	na	11	1	0	na	<0.1	<0.1	0
Bowfin	na	4	1	4	na	11.1	3.0	20.3
Brook silverside	na	3	9	11	na	<0.1	<0.1	<0.1
Brown bullhead	na	19	1	8	na	10.9	0.9	8.8
Carp	9	3	2	13	38.8	22.2	21.5	99.5
Channel catfish	22	29	40	6	63.4	50.5	167.4	21.1
Gizzard shad	384	37	244	127	164.9	24.3	66.9	62.4
Golden redhorse	na	24	5	10	na	44.6	9.2	22.3
Golden shiner	na	14	3	0	na	1.9	0.2	0
Johnny darter	na	4	0	0	na	<0.1	0	0
Lake chubsucker	na	11	3	6	na	3.3	0.7	1.8
Largemouth bass	131	75	74	130	66.3	41.9	30.3	71.8
Log perch	na	6	1	0	na	<0.1	<0.1	0
Longear	na	3	2	5	na	0.3	0.2	0.3
Longnose gar	na	0	5	0	na	0	36.8	0
Northern hog sucker	na	2	0	0	na	1.2	0	0
Northern pike	9	34	1	7	48.2	145.1	5.0	56.0
Quillback carpsucker	na	5	5	7	na	23.7	21.0	22.6
Pumpkinseed	na	0	9	11	na	0	0.9	2.3
Redear	76	3	24	92	16.2	0.5	5.5	37.8
Redfin pickerel	na	0	2	0	na	0	<0.1	0
Rock bass	na	13	2	12	na	3.8	0.5	2.4
Smallmouth bass	1	15	3	0	1.5	6.2	3.5	0
Spotted gar	na	1	7	10	na	1.0	8.5	14.0
Spotted sucker	na	47	22	14	na	46.0	32.8	22.7
Warmouth	na	2	17	35	na	0.2	2.5	6.6
White bass	9	18	12	1	16.1	8.4	19.4	2.9
White sucker	na	34	1	8	na	62.7	2.0	16.3
Yellow bullhead	na	48	6	26	na	38.6	5.0	16.3
Yellow perch	145	186	31	58	10.0	17.8	4.6	13.3
<i>Bullheads</i>	32	--	--	--	21.9	---	--	--
<i>Other sunfish</i>	155	--	--	--	12.9	--	--	--
<i>Gar</i>	50	--	--	--	155.9	--	--	--
<i>Suckers</i>	76	--	--	--	120.5	--	--	--
<i>Others</i>	227	--	--	--	155.3	--	--	--
Total	2,051	887	837	988	960.3	619.3	482.6	575.7
Electrofishing minutes	na	60	45*	75				
Gill net lifts	na	12	8	9				
Trap net lifts	na	12	8	9				

*an additional 15 minutes of electrofishing was conducted for bass only in 1995.

Table 3. *Size of bluegills collected at Lake Tippecanoe from 1976 through 2006.*

Inches	1976	1982	1995	2006
1-1½	8	0	0	0
2-2½	16	0	58	55
3-3½	152	9	55	52
4-4½	174	21	43	73
5-5½	141	85	44	34
6-6½	90	22	49	56
7-7½	58	19	34	103
8-8½	15	7	10	10
9-9½	1	3	2	0
Total	655	166	295	383
RSD-7	11%	17%	19%	34%

Table 4. *Size of largemouth bass collected at Lake Tippecanoe from 1976 through 2006.*

Inches	1976	1982	1995	2006
< 4	na	0	1	0
4-7½	na	14	20	26
8-11½	na	40	40	82
12-13½	na	17	13	16
14-17½	na	4	0	6
≥ 18	na	0	0	0
Total	na	75	74	130
RSD-14	na	7%	0%	6%
Number/15-min	na	19	19	26

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)
Lake Tippecanoe	Kosciusko	6/19 - 6/22/06
Biologist's name		
Jed Pearson		

LOCATION		
Quadrangle name	Range	Section
Leesburg and North Webster	6E, 7E	1,12 & 6,7,8,17,18
Township	Nearest town	
N and 34N	Oswego	

ACCESSIBILITY

State owned public access site	Pprivately owned public access site	Other access site			
Upstream on Grassy Creek	On south shore at Tippy dance hall				
Surface acres	Maximum depth (ft)	Average depth (ft)	Acre feet	Water level (msl)	Extreme fluctuations (ft)
851 (2 basins)	122	37		836.4	1-3

INLETS		
Name	Location	Origin
Tippecanoe River	East end	from James (Little Tippy) Lake
Grassy Creek	Southeast corner	from the Barbee Lakes

OUTLET

Name	Location
Tippecanoe River	West end of Oswego Lake
Water level control	

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

Watershed use
 General farming, woodlots, wetlands, small towns and residential development.

Development of shoreline
 Nearly all of the shoreline is developed except a dedicated wetland at the east end of the lake.

Previous surveys and investigations
 Cisco study, IU 1955; Mapping, USGS 1966; Cisco check, DFW 1974; Fish surveys, DFW 1976,82,95;
 Water quality, EPA 1976; Walleye study, DFW 1978-79,82-88, Bass study, DFW 1983-88;
 Muskie study, DFW 1999,04,05; Feasibility study, LARE 1997, Aquatic plant plan, LARE, 2005,06

SAMPLING EFFORT			
ELECTROFISHING	Day hours	Night hours	Total hours
		1.25	1.25
TRAPS	Number of traps	Days	Total lifts
	3	3	9
GILL NETS	Number of nets	Days	Total lifts
	3	3	9

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color	Turbidity
Blue-green	11 Feet 0 Inches (Secchi disk)

TEMPERATURE, DISSOLVED OXYGEN (ppm), TOTAL ALKALINITY (ppm), pH								
Depth (ft)	Degrees F	Oxygen*		Depth (ft)	Degrees F	Oxygen*		
Surface	75.9	9.2		50	46.2	7.1		
2	76.1	9.1		52	45.9	7.3		
4	76.1	9.1		54	45.5	7.2		
5	76.1	9.0		55	45.5	7.2		
6	76.1	8.8		56	45.3	7.4		
8	76.1	8.8		58	45.1	7.4		
10	75.9	8.7		60	45.1	7.5		
12	74.3	9.1		62	45.0	7.3		
14	70.2	8.3		64	44.8	7.1		
15	70.3	8.4		65	44.8	7.2		
16	67.6	7.5		66	44.6	7.4		
18	64.9	7.2		68	44.6	7.1		
20	62.1	7.3		70	44.6	7.1		
22	61.0	6.9		72	44.4	7.3		
24	59.5	6.6		74	44.2	7.3		
25	58.8	6.3		75	44.2	7.2		
26	58.3	6.4		76	44.2	7.2		
28	57.4	5.7		78	44.1	7.2		
30	56.3	5.7		80	44.1	7.0		
32	55.4	5.3		90	43.7	6.2		
34	54.0	4.7		100	43.3	2.7		
35	53.6	4.3		Sampling date:				
36	53.2	4.3			Surface	Bottom		
38	51.8	4.6		pH	9.0	8.0		
40	50.5	5.0		Alkalinity*	137	171		
42	49.8	5.2		Conductivity				
44	48.9	5.3		TDS				
45	48.4	5.7						
46	47.8	6.2						
48	46.8	6.6						

*ppm = parts per million

Occurrence and abundance of submersed aquatic plants in Lake Tippecanoe*

County: Kosciusko	Sites with plants:	78	Mean species/site:	1.87
Date: 8/2/06	Sites with native plants:	76	Standard error (ms/s):	0.13
Secchi (ft): 7.0	Vegetated sites (%)	86.7	Mean native species/site:	1.72
Maximum plant depth (ft): 17	Number of species:	16	Standard error (mns/s):	0.13
Trophic status: Meso	Number of native species:	14	Species diversity:	0.84
Total sites: 90.0	Maximum species/site:	5	Native species diversity:	0.82

Depth (0 to 20 ft) Common Name	Occurrence Frequency (%)	Rake score observations (N,%) per species				Plant Dominance
		0 %	1 %	3 %	5 %	
Eel grass	55.6					32.9
Coontail	35.6					18.7
Chara	25.6					12.4
Spiny hornwort	6.7					4.4
Water stargrass	11.1					4.0
Richardson	10.0					3.3
Eurasian water milfoil	10.0					2.9
Naiad	4.4					1.8
Curly-leaf pondweed	4.4					1.8
Northern water milfoil	4.4					1.3
Sago pondweed	5.6					1.1
Flat-stemmed pondweed	5.6					1.1
Elodea	3.3					0.7
Variable pondweed	2.2					0.4
Various-leaved water milfoil	1.1					0.2
Whorled water milfoil	1.1					0.2

* Data reported by Aquatic Control, Incorporated

Lake Tippecanoe Emergent Plant Beds

Date: 8/8/06

Bed	Sites	Latitude	Longitude	Wid(ft)	SPA	WAL	ARA	SWL	CAT	PIK	PRL	BUL	LOT	N	N/site	Acres	Length
1	5	41.31821	-85.74580	59	60.0	100.0	20.0					40.0		4	2.20	0.30	207
2	6	41.31839	-85.74430	143	83.3	66.7			33.3					3	1.83	1.77	531
3	3	41.32252	-85.73905	25	100.0									1	1.00	0.03	44
4	3	41.32312	-85.73906	137	100.0	33.3		33.3	66.7					4	2.33	0.87	277
5	3	41.32433	-85.74599	42	100.0		33.3							2	1.33	0.14	149
6	3	41.32586	-85.78908	28	66.7									1	0.67	0.08	95
7	2	41.32445	-85.78910	72		100.0								1	1.00	0.05	29
8	7	41.32378	-85.78890	45									100.0	1	0.00	0.40	388
9	2	41.32383	-85.78771	41		100.0								1	1.00	0.03	36
10	2	41.32373	-85.78720	48		100.0								1	1.00	0.05	46
11	12	41.32811	-85.78282	56	75.0	83.3	25.0	41.7		8.3	8.3			6	2.42	0.81	1099
Sum	48		Mean	63	83.6	83.3	26.1	37.5	50.0	8.3	8.3	40.0	100.0	2.3	1.34		
			Count		7	7	3	2	2	1	1	1	1		Sum	4.54	2900
Isolated patches																	
	17				17.6	88.2								2	1.06		

Species present

- ARA *Arrow arum*
- BUL *Bulrush*
- CAT *Cattail*
- LOT *Sacred lotus*
- PIK *Pickerelweed*
- PRL *Purple loosestrife*
- SPA *Spatterdock*
- SWL *Swamp loosestrife*
- WAL *Water lily*

- Lake surface acreage: 851
- Percent surface coverage: 0.5
- Contour acreage within 10-ft depth:
- Percent 10-ft contour area coverage:
- Lake shoreline perimeter in miles: 8.0
- Estimated emergent bed miles: 0.6
- Bed edge:shoreline ratio (%): 6.9

The map at the right depicts the lakeward locations of 11 emergent plant beds (small black dots) and patches of emergent plants (stars) in Lake Tippecanoe and Oswego Lake.



Data summary prepared by Jed Pearson, 11/03/06
Indiana Division of Fish and Wildlife

Relative Abundance, Size and Estimated Weight of Fish Collected at Lake Tippecanoe						
Common Name*	Number	Percent	Minimum Length (in)	Maximum Length (in)	Weight (lb)**	Percent
Bluegill	383	38.8	2.0	8.5	52.44	9.1
Largemouth bass	130	13.2	4.1	17.7	71.77	12.5
Gizzard shad	127	12.9	5.1	14.7	62.36	10.8
Redear	92	9.3	2.4	11.2	37.75	6.6
Yellow perch	58	5.9	5.5	10.4	13.31	2.3
Warmouth	35	3.5	3.8	7.9	6.63	1.2
Yellow bullhead	26	2.6	8.7	12.6	16.29	2.8
Spotted sucker	14	1.4	9.5	18.4	22.69	3.9
Carp	13	1.3	20.2	30.6	99.46	17.3
Rock bass	12	1.2	2.8	8.2	2.41	0.4
Pumpkinseed	11	1.1	5.6	7.0	2.34	0.4
Brook silverside	11	1.1	3.5	3.8	0.03	0.0
Golden redhorse	10	1.0	11.7	20.0	22.28	3.9
Spotted gar	10	1.0	13.7	27.3	13.99	2.4
White sucker	8	0.8	11.9	20.2	16.30	2.8
Brown bullhead	8	0.8	10.9	14.5	8.79	1.5
Northern pike	7	0.7	22.0	37.5	56.03	9.7
Carp sucker	7	0.7	19.0	22.0	22.63	3.9
Channel catfish	6	0.6	14.9	25.0	21.05	3.7
Lake chubsucker	6	0.6	6.0	10.6	1.78	0.3
Longear	5	0.5	3.3	5.7	0.34	0.1
Bowfin	4	0.4	16.1	27.5	20.30	3.5
Black crappie	4	0.4	4.4	12.4	1.75	0.3
White bass	1	0.1	18.4		2.93	0.5
TOTAL	988				575.65	
*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 bluegills																			
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+	
2.0			12	12	3.1	0.01	2							12					
2.5			43	43	11.2	0.01	5							43					
3.0	1		10	11	2.9	0.02	1	2						4	7				
3.5	3		38	41	10.7	0.03	2	3						16	25				
4.0	7	1	40	48	12.5	0.05		6							48				
4.5	3		22	25	6.5	0.07		5							25				
5.0	4		10	14	3.7	0.09		3	2						8	6			
5.5	9		11	20	5.2	0.12			5							20			
6.0	6		11	17	4.4	0.16			4							17			
6.5	11	2	26	39	10.2	0.20				5							39		
7.0	22	5	46	73	19.1	0.26				2	3						29	44	
7.5	8	7	15	30	7.8	0.32				1	2	2					6	12	12
8.0	5		4	9	2.3	0.39					2	3						4	5
8.5		1		1	0.3	0.47						1							1
9.0																			
9.5																			
10.0																			
10.5																			
11.0																			
11.5																			
12.0																			
12.5																			
13.0																			
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17.0																			
17.5																			
18.0																			
18.5																			
19.0																			
19.5																			
20.0																			
Totals:	79	16	288	383		52.44	10	19	11	8	7	6	75	113	43	74	59	18	
													Mean length (in):	2.7	4.0	5.6	6.8	7.2	7.7
													Variance:	0.25	0.25	0.12	0.10	0.09	0.09

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+	
4.0	1			1	0.8	0.03	1							1					
4.5	2		2	4	3.1	0.04	2						4						
5.0	1			1	0.8	0.06	1						1						
5.5																			
6.0																			
6.5	1			1	0.8	0.13		1					1						
7.0	6			6	4.6	0.16		5					6						
7.5	13			13	10.0	0.20		5					13						
8.0	7			7	5.4	0.25		4					7						
8.5	7			7	5.4	0.30		1	4				1	6					
9.0	11			11	8.5	0.35			4					11					
9.5	13			13	10.0	0.42			4					13					
10.0	7			7	5.4	0.49			4	1				6	1				
10.5	14			14	10.8	0.57			1	5				2	12				
11.0	12	3		15	11.5	0.65			1	4				3	12				
11.5	8			8	6.2	0.75				4					8				
12.0	9	1		10	7.7	0.85			1	3				3	8				
12.5	4			4	3.1	0.97				2	1				3	1			
13.0																			
13.5	1	1		2	1.5	1.23					1					2			
14.0																			
14.5	1			1	0.8	1.53					1					1			
15.0																			
15.5		1		1	0.8	1.88					1					1			
16.0	1			1	0.8	2.07					1					1			
16.5	1	1		2	1.5	2.28					1					2			
17.0																			
17.5	1			1	0.8	2.73						1					1		
18.0																			
18.5																			
19.0																			
19.5																			
20.0																			
20.5																			
21.0																			
21.5																			
22.0																			
Totals:	121	7	2	130		71.77	4	16	19	19	6	1	6	28	43	43	8	1	
													Mean length (in):	4.5	7.5	9.6	11.2	14.7	17.5
													Variance:	0.10	0.21	0.81	0.43	2.48	

Number, catch by gear, percentage, estimated weight and age of yellow perch																		
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+
5.5	1	2		3	5.2	0.08		3							3			
6.0	1	3		4	6.9	0.10		3							4			
6.5	1	4	1	6	10.3	0.13		1	4					1	5			
7.0		5	1	6	10.3	0.17		2	1					4	2			
7.5	3	11	2	16	27.6	0.21		1	4					3	13			
8.0	1	7	2	10	17.2	0.25			1	2	2				2	4	4	
8.5	1	4	1	6	10.3	0.31				3	1	1				4	1	1
9.0		2		2	3.4	0.37					2						2	
9.5		1	2	3	5.2	0.44				1	2					1	2	
10.0			1	1	1.7	0.52					1						1	
10.5	1			1	1.7	0.61						1						1
11.0																		
11.5																		
12.0																		
12.5																		
13.0																		
13.5																		
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23.0																		
23.5																		
Totals:	9	39	10	58		13.31	0	10	10	6	8	2	0	15	22	9	10	2
										Mean length (in):				6.5	7.3	8.4	8.7	9.4
										Variance:				0.57	0.23	0.25	0.56	1.82

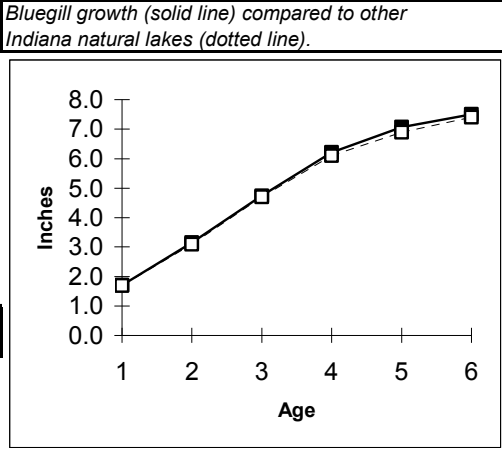
Number, catch by gear, percentage, estimated weight and age of gizzard shad																		
Length (in)	Catch by gear			Total Number	%	Estimated Weight (lb)	Age analysis (scales/half-inch)						Age Composition (number/age)					
	EF	GN	TN				1	2	3	4	5	6+	1	2	3	4	5	6+
5.0	1			1	0.8	0.05												
5.5	8			8	6.3	0.06												
6.0	4			4	3.1	0.08												
6.5																		
7.0																		
7.5	1			1	0.8	0.16												
8.0	3	1		4	3.1	0.19												
8.5	4	3		7	5.5	0.22												
9.0	1			1	0.8	0.26												
9.5	5	2		7	5.5	0.31												
10.0	5	1		6	4.7	0.36												
10.5	20	5		25	19.7	0.41												
11.0	11	2		13	10.2	0.47												
11.5	3			3	2.4	0.53												
12.0	8			8	6.3	0.60												
12.5	3		2	5	3.9	0.68												
13.0	12		3	15	11.8	0.76												
13.5	9	2	1	12	9.4	0.85												
14.0	6			6	4.7	0.94												
14.5	1			1	0.8	1.04												
15.0																		
15.5																		
16.0																		
16.5																		
17.0																		
17.5																		
18.0																		
18.5																		
19.0																		
19.5																		
20.0																		
20.5																		
21.0																		
21.5																		
22.0																		
22.5																		
23.0																		
Totals:	105	16	6	127		62.36												
												Mean length (in):						
												Variance:						

Bluegill
Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year	Class	Count	I	II	III	IV	V	VI
2005		10	2.0					
		stdev	0.60					
2004		19	1.8	3.3				
		stdev	0.39	0.59				
2003		11	1.4	3.0	4.7			
		stdev	0.34	0.46	0.68			
2002		8	1.7	3.1	4.7	6.3		
		stdev	0.29	0.58	0.71	0.43		
2001		7	1.8	3.3	4.7	6.4	7.1	
		stdev	0.29	0.54	0.79	0.82	0.56	
2000		5	1.6	3.0	4.8	5.9	7.0	7.5
		stdev	0.18	0.30	0.62	0.48	0.48	0.37
		Mean*	1.7	3.1	4.7	6.2	7.1	7.5
		St dev	0.19	0.17	0.02	0.25	0.04	
		Count	60	50	31	20	12	5

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

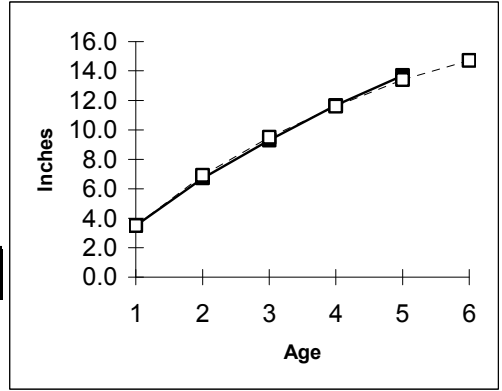


Largemouth bass
Intercept: 0.8 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year	Class	Count	I	II	III	IV	V	VI
2005		4	3.7					
		stdev	0.49					
2004		16	3.6	6.9				
		stdev	0.49	0.69				
2003		19	3.8	7.0	8.9			
		stdev	0.61	0.75	0.82			
2002		19	3.6	6.8	9.2	10.8		
		stdev	0.78	1.08	1.09	0.68		
2001		3	2.8	6.1	9.8	12.5	13.7	
		stdev	0.27	1.26	0.87	1.83	1.75	
2000								
		Mean*	3.5	6.7	9.3	11.7	13.7	
		St dev	0.41	0.39	0.43	1.24		
		Count	61	57	41	22	3	

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



Yellow perch
Intercept: 1.2 inch

BACK-CALCULATED LENGTHS (inches) AT EACH AGE

Year	Class	Count	I	II	III	IV	V	VI
2005		0						
2004		10	3.0	5.1				
		stdev	0.28	0.64				
2003		10	3.0	5.1	6.4			
		stdev	0.64	0.53	0.60			
2002		6	3.1	5.2	6.7	7.8		
		stdev	0.48	0.36	0.22	0.49		
2001		8	2.5	4.4	6.2	7.4	8.5	
		stdev	0.24	0.63	0.86	0.86	0.84	
2000		1	2.5	3.8	5.1	5.9	7.2	8.1
		Mean*	2.9	4.9	6.4	7.6	8.5	
		St dev	0.27	0.39	0.28	0.27		
		Count	34	34	24	14	8	

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

