

FLINT LAKE  
Porter County  
2011 Status and Trends Summary

Date of Survey: June 6 to 8 and August 3, 2011

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Survey Objectives: Conduct a fishery evaluation under status and trends lake sampling protocol under work plan 300FW1F10D41642.

Introduction: Flint Lake is an 89-acre natural lake with a maximum depth of 70 ft located north of Valparaiso, Indiana. Flint Lake is one in a series of seven lakes. Access to Flint Lake is from a county road on the south shore. Fish management surveys occurred in 1976 and 1986 by the Division of Fish and Wildlife (DFW). The fish community has primarily been composed of bluegill, largemouth bass, black crappie, and brown bullhead. Spot check surveys for privately stocked walleyes have occurred in 1982 and 2005, but no walleyes were collected. Flint Lake is a fixed site and is surveyed annually under the status and trends work plan (Bacula and Price 2010). This is the second year of the status and trends evaluation at Flint Lake.

Methods: Status and trends lake sampling was conducted on June 6 to 8 and August 3, 2011. Physical and chemical characteristics were collected in the deepest part of the lake according to DFW sampling guidelines (Shipman et al. 2001). Plankton was sampled using four vertical tows in the deepest part of the lake. Aquatic vegetation was sampled on August 3, 2011 using the DFW Tier II Aquatic Vegetation Survey Protocol (IDNR 2007).

Fish were collected using three sampling gears at standard locations: pulsed DC, shoreline night electrofishing for 30 min at two 15 min transects, two standard gill nets, and two trap nets fished overnight. All fish collected were measured to the nearest 0.1 in total length (TL), and a length-weight regression was used to estimate the weight to the nearest 0.1 lb. Five scale samples were taken per half-inch group (X.0-X.4 for inch group and X.5-X.9 for half-inch

group) from bluegills and largemouth bass for age and growth analysis. Catch per unit effort (CPUE) was calculated as catch divided by effort for each sampling gear.

Summary: A total of 10 species of submersed aquatic vegetation were collected. The most common species were coontail, northern watermilfoil, eelgrass, and Eurasian watermilfoil. Aquatic vegetation was collected down to 18.5 ft. The mean rake score for all sampling locations was 3.08, and the maximum species per site was six. Additionally, emergent vegetation identified during the survey was arrowhead, cattail, spatterdock, and white water lily. Coontail, Eurasian watermilfoil, and eelgrass were also heavily abundant in 2010. In 2010 vegetation was collected down to 19.5 feet and mean rake score from all sites was a comparable 2.88 (Bacula and Price 2010).

Zooplankton analysis from the June collection in 2010 and 2011 was 2.1 and 3.9 ounces of zooplankton per acre-foot (oz/AC-F), respectively. The average across northern Indiana status and trends lakes (S&T lakes) was 2.8 oz/AC-F. June zooplankton diversity was 0.7 in 2010 and 1.0 in 2011; the mean of S&T lakes was 1.0. In June 2010 and 2011 the percent of the sample being *Daphnia* was 76.8 and 57.6, respectively; higher than S&T lakes average of 31.8. Analysis from the August zooplankton collection in 2010 and 2011 was 0.2 and 1.0 oz/ AC-F, respectively. S&T lakes August average was 1.2 oz/AC-F. August zooplankton diversity was 0.8 in 2010 and 1.1 in 2011 with S&T lakes averaging 1.2. In both August 2010 and 2011 no *Daphnia* was present; S&T lakes averaged 6.4%.

A total of 220 fish was collected representing 12 species and one hybrid for a total weight of 103.7 lbs. The most abundant species by number were bluegill (56%), largemouth bass (27%), gizzard shad and golden shiner (4%). The most abundant by weight were largemouth bass (51%), bluegill (23%), gizzard shad (11%), and brown bullhead (8%).

Bluegill was the most abundant species collected by number (123 fish) and second by weight (23.4 lbs). Bluegill CPUE from electrofishing was 206.0/h, 8.0/lift in trap nets and 2.0/lift for gill nets. Total length of bluegills ranged from 2.2 to 9.6 in, and 47% were considered harvestable (TL  $\geq$  6.0 in). Bluegill proportional stock density (PSD; number of fish  $\geq$  6.0 in TL / number of fish  $\geq$  3.0 in TL times 100) for fish collected with electrofishing was 46 (Anderson and Neumann 1996). Bluegill ages ranged from 1 to 7, 10 and 11.

There were 59 largemouth bass collected that weighed 52.4 lbs. The majority of bass were collected with electrofishing (CPUE = 116.0/h), while gill net CPUE was 0.5/lift and trap nets caught none. Total length of captured largemouth bass ranged from 5.0 to 18.7 in. Six largemouth bass were of legal length (TL  $\geq$  14 in.) Largemouth bass PSD (number of fish  $\geq$  12.0 in TL/ number of fish  $\geq$  8.0 in TL times 100) was 65. Largemouth bass ages ranged from 1 to 8 and one age-10 fish was collected. Bass reached legal length around age 7. Thirty-one of the 59 bass collected (53%) were between 10.0 and 12.9 in TL and were ages 4 to 6.

The remaining species collected during the survey represented less than 5% each of the total catch. Gizzard shad and golden shiners followed bluegill and largemouth bass as the next most abundant species collected, each with nine fish. Shad ranged in TL from 15.2 to 16.7 in. Other sportfish collected included three hybrid sunfish, three redear sunfish up to 8.7 in, and one yellow perch.

Overall, the 2011 survey caught far fewer fish (220) than the 2010 survey (460; Table 1). The 2011 survey collected 12 species and one hybrid, which is down 5 species from the 2010 survey when 17 were represented. Species present in the 2010 survey that were absent in the 2011 survey include black crappie, banded killifish, bowfin, northern pike, pumpkinseed sunfish, and common carp. These species were represented only in minute numbers in 2010 with only black crappie being represented by more than one individual. Redear sunfish and yellow perch declined from the third and fourth most abundant species comprising 5.2% and 3.3% of the catch in 2010, respectively. In 2011, redear and perch were the 6<sup>th</sup> and 8<sup>th</sup> most abundant species, representing 1% and less than 1% of total catch, respectively. The redear sunfish catch might reflect seasonal variability, and perhaps yellow perch variable recruitment between the years resulting in the differences in catch rates. Results in the following year's surveys will help draw more precise conclusions as to the species' fluctuation.

Bluegill and largemouth catches were down from 2010 numbers. The 2010 survey produced 288 bluegill and 85 largemouth bass compared to 123 bluegill and 59 largemouth collected in 2011. Bluegill CPUE's dropped from 2010 to 2011; electrofishing CPUE declined from 246.0/h to 206.0/h, and trap net CPUE dropped from 78.5/lift to 8.0/lift, respectively. Largemouth bass electrofishing CPUE dropped from 160/h in 2010 to 116/h in 2011. Bluegill and largemouth bass PSD was significantly higher in 2011 than 2010. Bluegill PSD rose from 14 in 2010 to 46 in 2011. Largemouth bass PSD also rose between 2010 and 2011 from 17 to 65,

respectively. Both bluegill and largemouth bass PSD's are within the objective range for a balanced population of 20-60 for bluegills and 40-70 for largemouth bass (Anderson and Neumann 1996).

The 2010 survey was conducted towards the end of June when the majority of the bluegill spawning activity is over, whereas the 2011 survey was conducted in early June when the larger bluegill were spawning. Differences in the timing of the reproduction period would have significant effects on the gears effectiveness in targeting fish; primarily electrofishing and trap netting. During spawn larger bluegill would be targeted in the shallows (increasing PSD), whereas after the spawn, more, smaller bluegill will enter the shallows and generally increase the catch rate. The number of bluegill and associated size structure between the two survey years reflects the selectivity of gears during and after spawning season. In 2010, 90% of the 288 bluegill were under harvestable length (TL < 6.0 in), while in 2011 47% of the 123 bluegill collected were harvestable length or larger.

There are rather substantial variations in game fish species (overall number of species, number of each species, and size structure of the species) between 2010 and 2011 that might be attributed to spawning season. However, this along with the overall number of species present will be something to monitor as the status and trends surveys of Flint Lake continue. Additional survey years will determine if management actions will be necessary or if the differences are a direct result of seasonal change in the aquatic community. Currently, the Flint Lake fishery offers good fishing to anglers with large number of harvestable bluegill and a generous portion of the largemouth bass population nearing legal length.

#### References:

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. pages 447-481 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.
- Bacula, T., and Price, J. 2011. 2010 Flint Lake: Status and Trends Report. Indiana Department of Natural Resources. Division of Fish and Wildlife. Indianapolis, Indiana.
- Shipman, S. T., E. Braun, D. Carnahan, L. Koza, B. Schoenung, D. Keller, D. Kittaka, and T. Stefanavage. 2001. Manual of fisheries survey methods. Indiana Department of Natural Resources. Division of Fish and Wildlife. Indianapolis, Indiana.

IDNR. 2007. Tier II aquatic vegetation survey protocol. Indiana Department of natural Resources. Division of Fish and Wildlife. Indianapolis, Indiana.

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Date: June 5, 2012

Table 1. Species relative abundance by number and percent number (Num. %) and weight and percent weight (Wt. %) from status and trends sampling in 2011 and 2010 at Flint Lake, Porter County, IN. Effort includes 30 minutes DC nighttime electrofishing, two gill nets and two trap nets fished overnight at standard locations.

Species	2011				2010			
	Num.	Num. (%)	Wt.	Wt. (%)	Num.	Num. (%)	Wt.	Wt. (%)
Bluegill	123	55.9	23.4	22.6	288	62.6	24.9	18.1
Largemouth bass	59	26.8	52.4	50.5	83	18.0	58.3	42.4
Gizzard shad	9	4.1	11.5	11.1	10	2.2	13.7	10.0
Golden shiner	9	4.1	0.9	0.9	1	0.2	0	*
Brown bullhead	6	2.7	8.7	8.3	9	2.0	10.2	7.4
Hybrid sunfish	3	1.4	1.4	1.4	-	-	-	-
Redear sunfish	3	1.4	1.5	1.5	24	5.2	6.1	4.5
Yellow bullhead	2	0.9	1.5	1.5	4	0.9	2.4	1.7
Lake chubsucker	2	0.9	0.5	0.5	8	1.7	2.5	1.8
Warmouth	1	0.5	0.2	0.2	8	1.7	1.3	0.9
Redfin pickerel	1	0.5	0.7	0.7	-	-	-	-
Black bullhead	1	0.5	1.0	1.0	2	0.4	0.7	0.5
Yellow perch	1	0.5	*	*	15	3.3	1.3	0.9
Black crappie	-	-	-	-	3	0.7	0.6	0.5
Banded killifish	-	-	-	-	1	0.2	0	*
Bowfin	-	-	-	-	1	0.2	4.4	3.2
Northern pike	-	-	-	-	1	0.2	2.1	1.6
Pumkinseed sunfish	-	-	-	-	1	0.2	0.1	0.1
Common carp	-	-	-	-	1	0.2	8.8	6.4
<b>TOTALS</b>	<b>220</b>		<b>103.7 lbs</b>		<b>460</b>		<b>128.5 lbs</b>	

\* Represents less than .1% of total

Common names of fish recognized by the American Fisheries Society

## APPENDIX





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

Lake: Flint	Secchi (ft): 5.5	Mean species/site: 2.20
County: Porter	Sites with plants: 35	SE Mean species/site: 0.24
Date: 8/3/2011	Sites with native plants: 35	Mean native species/site: 1.95
Littoral Depth (ft): 18.5	Number of species: 10	SE Mean natives/site: 0.21
Littoral Sites: 38	Number of native species: 9	Species diversity: 0.77
Total Sites: 40	Maximum species/site: 6	Native species diversity: 0.72

All Depths	Frequency of Occurrence	Rake score frequency per species				Plant Dominance
Species		0	1	3	5	
Coontail	87.50	12.50	30.00	27.50	30.00	52.50
Northern Watermilfoil	40.00	60.00	20.00	17.50	2.50	17.00
Eelgrass	35.00	65.00	25.00	10.00	0	11.00
Eurasian Watermilfoil	25.00	75.00	12.50	10.00	2.50	11.00
Variable Pondweed	10.00	90.00	2.50	5.00	2.50	6.00
Small Pondweed	7.50	92.50	7.50	0	0	1.50
Elodea	5.00	95.00	5.00	0	0	1.00
Richardson's Pondweed	5.00	95.00	5.00	0	0	1.00
Chara	2.50	97.50	0	2.50	0	1.50
Southern Naiad	2.50	97.50	2.50	0	0	0.50

Filamentous Algae 5.00

Other species observed: arrowhead, cattail, star duckweed, spatterdock, watermeal, white water lily



**NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL**

TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0	2	1.6	0.01	1	20.0				
2.5	7	5.7	0.02	1	20.5				
3.0	3	2.4	0.03	1	21.0				
3.5	5	4.1	0.05	1, 2	21.5				
4.0	8	6.5	0.07	2	22.0				
4.5	16	13.0	0.09	2, 3	22.5				
5.0	10	8.1	0.12	3, 4	23.0				
5.5	14	11.4	0.15	4, 5	23.5				
6.0	7	5.7	0.19	4, 5	24.0				
6.5	7	5.7	0.23	4, 5	24.5				
7.0	13	10.6	0.28	5, 6	25.0				
7.5	24	19.5	0.34	5, 7	25.5				
8.0	5	4.1	0.40	6, 7	26.0				
8.5	1	0.8	0.47	10	TOTAL	123			
9.0									
9.5	1	0.8	0.62	11					
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	206.0 /h	GILL NET CATCH	2.0/lift	TRAP NET CATCH	8.0/lift
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**NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS**

TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0	2	3.4	0.08	1	23.0				
5.5	2	3.4	0.10	1, 2	23.5				
6.0					24.0				
6.5	1	1.7	0.17	2	24.5				
7.0					25.0				
7.5	3	5.1	0.25	2, 3	25.5				
8.0	3	5.1	0.30	3	26.0				
8.5	3	5.1	0.36	3	TOTAL	59			
9.0									
9.5	1	1.7	0.49	4					
10.0									
10.5	4	6.8	0.65	4, 5					
11.0	3	5.1	0.74	4					
11.5	4	6.8	0.84	5, 6					
12.0	11	18.6	0.95	5, 6					
12.5	9	15.3	1.07	5, 6					
13.0	5	8.5	1.20	6					
13.5	2	3.4	1.34	6					
14.0	2	3.4	1.49	7					
14.5	2	3.4	1.65	6					
15.0									
15.5	1	1.7	1.99	8					
16.0									
16.5									
17.0									
17.5									
18.0									
18.5	1	1.7	3.32	10					

ELECTROFISHING CATCH	116.0/h	GILL NET CATCH	0.5/lift	TRAP NET CATCH	0/lift
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**AGE-LENGTH KEY FOR BLUEGILL**

LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0	2	2	2											
2.5	7	5	7											
3.0	3	3	3											
3.5	5	5	3	2										
4.0	8	5		8										
4.5	16	5		3	13									
5.0	10	5			8	2								
5.5	14	5				11	3							
6.0	7	5				6	1							
6.5	7	5				1	6							
7.0	13	5					8	5						
7.5	24	4					12		12					
8.0	5	5						2	3					
8.5	1	1										1		
9.0														
9.5	1	1											1	
10.0														
10.5														
Total	123	61	15	13	21	20	30	7	15	0	0	1	1	0
Mean TL			3.0	4.3	4.9	5.9	7.2	7.5	7.9			8.8	9.8	
SE			0.13	0.09	0.05	0.08	0.12	0.18	0.05					

**AGE-LENGTH KEY FOR LARGEMOUTH BASS**

LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0														
3.5														
4.0														
4.5														
5.0	2	2	2											
5.5	2	2	1	1										
6.0														
6.5	1	1		1										
7.0														
7.5	3	3		2	1									
8.0	3	2			3									
8.5	3	3			3									
9.0														
9.5	1	1				1								
10.0														
10.5	4	4				3	1							
11.0	3	3				3								
11.5	4	4					2	2						
12.0	11	5					4	7						
12.5	9	4					4	5						
13.0	5	3						5						
13.5	2	2						2						
14.0	2	1							2					
14.5	2	2						2						
15.0														
15.5	1	1								1				
16.0														
16.5														
17.0														
17.5														
18.0														
18.5	1	1										1		
19.0														
19.5														
Total	59	44	3	4	7	7	11	22	2	1	0	1	0	0
Mean TL			5.4	7.0	8.4	10.8	12.2	12.9	14.3	15.8		18.8		
SE			0.17	0.48	0.14	0.20	0.17	0.18	0.00					