

BUFFALO TRACE LAKE
Harrison County
2008 Largemouth Bass Population Estimate and Aquatic Vegetation Survey Report

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2009

EXECUTIVE SUMMARY

- The largemouth bass population estimate was conducted from April 23 through May 8, 2008. Effort consisted of 2.29 h of pulsed DC electrofishing over three nights using two dippers.
- Submersed aquatic vegetation was sampled on August 19.
- Submersed vegetation was found at all 30 sample sites. Southern naiad covered most of the lake.
- A total of 1,013 largemouth bass was sampled that ranged in length from 5.4 to 17.0 in. The overall electrofishing catch rate was 442.4/h. Bass grew slow, averaging 13.2 in at age 5 and 13.8 in at age 6.
- The population estimate for all bass was 3,145 which was slightly higher than the 2003 estimate of 2,558.
- The largemouth bass PSD was 17 which was substantially lower than the 2003 and 2004 PSD's of 33 and 56.
- The bass fishery has undergone some dramatic changes since the last surveys in 2003 and 2004. The population has shifted from one with good size distribution and descent growth to a population dominated by slow growing, small fish.
- Anglers need to harvest more bass to improve fishing.
- The aquatic vegetation abundance needs to be reduced and should be maintained at 10% to 20% of the lake bottom to make fishing better and improve angler access. It is recommended that the park use aquatic herbicides to treat the plants instead of stocking grass carp.
- A supplemental largemouth bass, bluegill, and aquatic vegetation survey should be done in 2011 to reevaluate the fishery.

INTRODUCTION

Buffalo Trace Lake is a 29-acre impoundment located within Buffalo Trace Park approximately ½ mi east of Palmyra on U.S. 150 in Harrison County. This lake was constructed in 1971 and is maintained and operated by the Harrison County Parks and Recreation Department. The park offers camping, swimming, picnic areas, shelter houses, sports facilities, a 1.3 mi-long fitness trail, boat rentals, and a concrete boat ramp. The daily entrance and boat launching fees are each \$3.00. Annual passes are available.

Past fish management activities have included biennial channel catfish stockings of 725, 8 in fish occurring in odd numbered years, a 12 to 15 in largemouth bass protective slot limit in 1996, a 1992 triploid grass carp stocking, supplemental bluegill and redear sunfish stocking in 2003, and numerous fish management surveys.

The previous survey was conducted in 2004 to evaluate the impacts of a 2004 fish kill. Survey findings were that the fish kill did not affect the bluegill and redear sunfish populations, and helped the bass population as that population was stunted and needed to be reduced. Aquatic vegetation was nearly absent as has been the case since 1995.

METHODS

The largemouth bass population estimate was conducted from April 23 though May 8, 2008. Effort consisted of 2.29 h of pulsed DC electrofishing over three nights using two dippers. Nightly effort ranged from 0.75 h to 0.79 h. Bass were measured to the nearest 0.1 in TL. Weights were estimated from the district averages. Scales were taken from a subsample of bass for age and growth analysis. Proportional stock density (PSD) and relative stock density (RSD) indices were calculated (Anderson and Neumann 1996). The population size was estimated using the Schnabel population estimate as described by Ricker (1975). Submersed aquatic vegetation was sampled on August 19 using guidelines written by the Department of Natural Resources (2006).

RESULTS

Submersed vegetation was found at all 30 sample sites. Southern naiad, small pondweed, and brittle naiad were the most dominant species. Emergent species observed were buttonbush, bulrush sp., and cattail sp. Southern naiad covered most of the lake.

A total of 1,013 largemouth bass was sampled over three nights. They ranged in length from 5.4 to 17.0 in and the estimated weight was 506 lbs. The overall electrofishing catch rate was 442.4/h which was comparable to the 404.0/h in 2004. Bass grew slow with age-5 and age-6 bass averaging 13.2 and 13.8 in compared to the district averages of 14.8 and 16.7 in. Bass grew faster in 2004 as age-5 bass averaged 14.2 in.

The population estimates were broken down by different size classes beginning with all bass, bass greater than 7.9 in, greater than 11.9 in, and greater than 14.9 in. The estimates, 95% CI, and percent SE are listed in Table 1. All of the 2003 and 2008 CI's for each size class did overlap indicating similar population numbers between years.

The estimate for all bass was 3,145 which was slightly higher than the 2003 estimate of 2,558. The estimate for bass greater than 7.9 in was 2,879 which was slightly higher than the 2,238 in 2003. The greater than 11.9 in size group population numbers were 248 in 2008 compared to 220 in 2004. The population estimate for bass greater than 14.9 in decreased from 17 to 4.

The largemouth bass PSD was 17 which was substantially lower than the 2003 and 2004 PSD's of 33 and 56. The suggested PSD range for a balanced bass fishery is 40 to 70 (Anderson and Neumann 1996). The RSD-14 and RSD-15 were 3 and 1 compared to 22 and 8 in 2003 and 26 and 18 in 2004.

DISCUSSION

Buffalo Trace Lake's bass fishery has undergone dramatic changes since the last surveys in 2003 and 2004. The population has shifted from one with good size distribution and decent growth to a population dominated by slow growing, small fish. This is supported by the high catch rates, high number of 8.0 to 12.0 in bass, low stock indices, and poor growth. Compounding the problem is the lake's dense aquatic vegetation which makes it harder for bass to prey on bluegill.

The 2003 survey findings indicated that the bass population was beginning to show signs of stockpiling and concluded that anglers were not harvesting enough bass under the slot limit. Those findings are further proven with this survey as bass numbers are even higher and growth poorer. The 12 to 15 in slot limit is the appropriate regulation to turn this fishery around.

Anglers just need to take advantage of being able to harvest small bass and improving the fishery at the same time.

The aquatic vegetation abundance needs to be reduced and should be maintained at 10% to 20% of the lake bottom to make fishing better and improve angler access. Triploid grass carp were stocked in 1992 and they pretty much eliminated all the plants by 1995. It is recommended that the park use aquatic herbicides to treat the plants instead of stocking grass carp. Herbicides are more effective for managing plants as they can be selective to specific areas and have nearly immediate results. Using grass carp as vegetation control is at best an inexact science as they do not show immediate impacts, don't necessarily eat the plants in areas needed, and have the possibility of eating too many plants (as demonstrated by the 1992 stocking) or not enough plants. The park can contact the district fisheries biologist for further herbicide treatment recommendations.

A supplemental largemouth bass, bluegill, and aquatic vegetation survey should be done in 2011 to reevaluate the fishery.

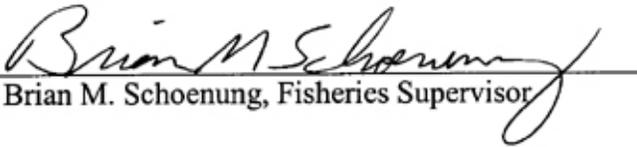
RECOMMENDATIONS

- Anglers need to harvest more largemouth bass.
- Aquatic vegetation abundance needs to be reduced and should be maintained at 10% to 20% of the lake bottom to make fishing better and improve angler access. Aquatic herbicides should be used in lieu of triploid grass carp.
- A supplemental largemouth bass, bluegill, and aquatic vegetation survey should be done in 2011 to re-evaluate the fishery.

LITERATURE CITED

- 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, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Indiana Department of Natural Resources. 2006. Tier II aquatic vegetation survey protocol. 9 pp.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin 191, Fisheries Research Board of Canada, Ottawa.

Submitted by: Daniel P. Carnahan, Fisheries Biologist
Date: September 17, 2009

Approved by: 
Brian M. Schoenung, Fisheries Supervisor

Date: December 9, 2009

Table 1. Schnabel population estimate for largemouth bass at Buffalo Trace Lake, 2004 and 2008.

<u>Year</u>	<u>Estimate</u>	<u>95% low CI</u>	<u>95% high CI</u>	<u>SE %</u>
<u>ALL LARGEMOUTH BASS</u>				
2004	2,558	2,175	3,054	8.6
2008	3,145	2,619	3,851	9.8
<u>LARGEMOUTH BASS ≥ 8 INCHES</u>				
2004	2,238	1,897	2,682	8.8
2008	2,879	2,387	3,544	10.1
<u>LARGEMOUTH BASS ≥ 12 INCHES</u>				
2004	220	145	350	21.8
2008	248	174	363	18.3
<u>LARGEMOUTH BASS ≥ 15 INCHES</u>				
2004	17	7	43	50.0
2008	4	2	11	50.0

Appendix

Fisheries Survey Data

LAKE SURVEY REPORT

Type of Survey	<input type="checkbox"/> Initial Survey	<input checked="" type="checkbox"/> Re-Survey
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Lake Name Buffalo Trace Lake	County Harrison	Date of survey (Month, day, year) April 23 - May 8, 2008
Biologist's name Larry L. Lehman, Clint Kowalik, Dan Carnahan		Date of Approval (Month, day, year) December 9, 2009

LOCATION		
Quadrangle Name Palmyra, IND. 1966. Photorevised 1988	Range 4E	Section 20
Township 1S	Nearest Town Palmyra	

ACCESSIBILITY					
State owned public access site Harrison County Park & Recreation Department controls access through gatehouse.					
Surface acres 29	Maximum depth 10 ft	Average depth 6 ft	Acre feet 174	Water level 776 ft MSL	Extreme fluctuations
Location of benchmark In Palmyra, approximately 1 mile west of Buffalo Trace Lake.					

INLETS		
Name Unnamed tributary	Location South side of lake	Origin Surface runoff

OUTLETS																
Name Unnamed	Location Begins at principal spillway															
Water level control Principal spillway is 3-foot corrugated steel drop tube with valve in bottom for drawdown. Grass emergency spillway.																
POOL	ELEVATION (Feet MSL)	ACRES														
TOP OF DAM																
TOP OF FLOOD CONTROL POOL	778.0															
NORMAL POOL	776.0	29.4														
TOP OF MINIMUM POOL																
STREAMBED																
<table border="0"> <tr> <td>Bottom type</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Boulder</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Gravel</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Sand</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Muck</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Clay</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Marl</td> <td></td> </tr> </table>			Bottom type		<input type="checkbox"/> Boulder		<input checked="" type="checkbox"/> Gravel		<input type="checkbox"/> Sand		<input type="checkbox"/> Muck		<input checked="" type="checkbox"/> Clay		<input type="checkbox"/> Marl	
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<input type="checkbox"/> Muck																
<input checked="" type="checkbox"/> Clay																
<input type="checkbox"/> Marl																

Watershed use Within park is primarily grassland with woods (used for recreation). Outside of park is primarily residential.
Development of shoreline Park facilities include a concrete boat ramp, boat dock, boat rentals, fishing piers, camping, swimming beach and bathhouse, camping, paved walking trail, picnic tables, grills, a ball diamond, and basketball, volleyball, and tennis courts.
Previous surveys and investigations Bluegill selective project in 1979. Fishery surveys in 1974, 1977, 1980, 1983, 1995, 1998, 2003, and 2004 Spot-check survey in 1997. Largemouth bass population estimate in 2003.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours		Total hours
	0		2.29		2.29
TRAP NETS	Number of traps		Number of Lifts		Total effort
GILL NETS	Number of nets		Number of Lifts		Total effort
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls
	0				none

COMMENTS					

Occurrence and Abundance of Submersed Aquatic Plants

Lake: Buffalo Trace Lake	Secchi (ft): 4.3	SE Mean Species / Site: 0.11
Date: 8/19/2008	Littoral Sites w/Plants: 30	Mean Natives / Site: 2.47
Littoral Depth (ft): 8.0	Number of Species: 4	SE Mean Natives / Site: 0.11
Littoral Sites: 30	Max. Species / Site: 3	Species Diversity: 0.69
Total Sites: 30	Mean Species / Site: 2.47	Native Diversity: 0.69

Species	Frequency of Occurrence	Score Frequency				Dominance
		0	1	3	5	
Southern naiad	100.0	0	6.7	66.7	26.7	68.0
Small pondweed	70.0	30.0	70.0	0	0	14.0
Brittle naiad	60.0	40.0	36.7	23.3	0	21.3
Chara	16.7	83.3	16.7	0	0	3.3
Filamentous algae	10.0					

Other species noted:

SUBMERSED: Curlyleaf pondweed, horned pondweed (collected on 5/8/08 during a fish survey)

EMERGENT: Bald cypress, cattail (*Typha* sp.), creeping water primrose, Spikerush (*Eleocharis* sp.), Willow (*Salix* sp.)

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS

TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	EST. AVE. WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	EST. AVE. 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	1	0.1	0.06	1	23.0				
5.5	5	0.5	0.08	1	23.5				
6.0	21	2.1	0.10	1	24.0				
6.5	35	3.5	0.13	1, 2	24.5				
7.0	20	2.0	0.16	1, 2	25.0				
7.5	4	0.4	0.20	2	25.5				
8.0	5	0.5	0.24	2	26.0				
8.5	27	2.7	0.28	2, 3	TOTAL	1,013			
9.0	171	16.9	0.33	2, 3					
9.5	240	23.7	0.39	2, 3					
10.0	171	16.9	0.46	2, 3					
10.5	92	9.1	0.53	2, 3, 4					
11.0	43	4.2	0.62	3, 4					
11.5	21	2.1	0.71	3, 4					
12.0	34	3.4	0.80	4, 5					
12.5	32	3.2	0.91	4, 5					
13.0	34	3.4	1.02	4, 5					
13.5	27	2.7	1.15	5, 6, 7					
14.0	17	1.7	1.31	Not aged					
14.5	5	0.5	1.47	Not aged					
15.0	3	0.3	1.68	7					
15.5	2	0.2	1.88	Not aged					
16.0	2	0.2	2.08	Not aged					
16.5									
17.0	1	0.1	2.56	Not aged					
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	442.4/h	GILL NET CATCH	N/A	TRAP NET CATCH	N/A
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LARGEMOUTH BASS AGE-LENGTH KEY										
Length group (in)	Total number	Sub-sample	AGE							
			1	2	3	4	5	6	7	
5.0	1	1	1							
5.5	5	4	5							
6.0	21	6	21							
6.5	35	6	29	6						
7.0	20	6	10	10						
7.5	4	2		4						
8.0	5	3		5						
8.5	27	6		14	14					
9.0	171	5		103	68					
9.5	240	5		192	48					
10.0	171	5		103	68					
10.5	92	5		18	55	18				
11.0	43	6			7	36				
11.5	21	5			4	17				
12.0	34	6				23	6			
12.5	32	6				21	11			
13.0	34	4				9	26			
13.5	27	4					14	7	14	
14.0	17									
14.5	5									
15.0	3	1								3
15.5	2									
16.0	2									
16.5										
17.0	1									
Totals	1,013	86	66	454	265	124	55	7		17

AGE-LENGTH KEY SUMMARY							
Age	Number	Mean			Lower 95%CI	Upper 95%CI	
		TL	Var	SE			
1	66	6.6	0.20	0.05	6.5	6.7	
2	454	9.6	0.48	0.03	9.6	9.7	
3	265	10.0	0.46	0.04	9.9	10.1	
4	124	11.8	0.59	0.07	11.7	12.0	
5	55	13.2	0.21	0.06	13.1	13.3	
6	7	13.8	0.00	0.00	13.8	13.8	
7	17	14.0	0.36	0.15	13.7	14.3	

GPS LOCATION OF SAMPLING EQUIPMENT

GILL NETS			TRAP NETS			ELECTROFISHING		
1	N	W	1	N	W			
	N	W	2	N	W		4/23/08	
2	N	W	3	N	W	1	N 38.40922	W -86.10153
	N	W	4	N	W		N 38.41056	W -86.10041
3	N	W	5	N	W	2	N 38.41060	W -86.10045
	N	W	6	N	W		N 38.41170	W -86.10470
4	N	W	7	N	W	3	N 38.41178	W -86.10468
	N	W	8	N	W		N 38.40924	W -86.10160
5	N	W	9	N	W			
	N	W	10	N	W		4/30/08	
6	N	W	11	N	W	1	N 38.40924	W -86.10156
	N	W	12	N	W		N 38.41066	W -86.10047
7	N	W	13	N	W	2	N 38.41061	W -86.10061
	N	W	14	N	W		N 38.41138	W -86.10469
8	N	W	15	N	W	3	N 38.41133	W -86.10470
	N	W	16	N	W		N 38.40927	W -86.10158
9	N	W	17	N	W			
	N	W	18	N	W		5/8/08	
10	N	W	19	N	W	1	N 38.40931	W -86.10159
	N	W	20	N	W		N 38.40928	W -86.10159
11	N	W				2	N 38.41057	W -86.10045
	N	W					N 38.41180	W -86.10468
12	N	W				3	N 38.41180	W -86.10467
	N	W					N 38.40905	W -86.10158
13	N	W					N	W
	N	W					N	W
14	N	W					N	W
	N	W					N	W
15	N	W					N	W
	N	W					N	W
16	N	W					N	W
	N	W					N	W
17	N	W					N	W
	N	W					N	W
18	N	W					N	W
	N	W					N	W
19	N	W					N	W
	N	W					N	W
20	N	W					N	W
	N	W					N	W