

Blue Grass Pit  
Warrick County  
Supplemental Largemouth Bass Survey

Date of Survey: April 1 and 9, 2008

Biologist: Michelle L. Cain, Assistant Fisheries Biologist

Survey Objective: Monitor the largemouth bass population under the 18.0-in length limit and two bass bag limit.

Methods: Largemouth bass collection effort consisted of 1.77 h on April 1 and 1.5 h on April 9, for a total of 3.27 h of pulsed DC night electrofishing with two dippers. All bass were measured to the nearest 0.1 in TL and weighed to the nearest 0.01 lb. Scale and spine samples were taken from a subsample of bass for age analysis. However, only scale ages were used for data analysis due to the lack of age-1 and age-2 bass aged. Proportional (PSD) and relative stock density (RSD) indices were used to assess the population (Anderson and Neumann 1996). Relative weights were calculated for bass 8.0 in and larger for 2004 and 2008 data. A Kruskal-Wallis one-way nonparametric analysis of variance was used to compare catch per unit effort (CPUE) and stock index values among years. A two sample Kolmogorov-Smirnov test was used to detect statistical differences among length-frequency distributions from year to year. The 18.0 in minimum size limit and two bass bag limit was enacted in 2003. Therefore data from 2004 is used as an indicator of the bass population before the new regulations had a chance to make an impact.

Summary: A total of 292 largemouth bass was collected that ranged in length from 4.3 to 20.0 in. They weighed a total of 283 lbs. The relative weights were 87.5 for stock size bass, 96.7 for quality size bass, and 102.5 for preferred size bass. A stock size bass is defined as anything 8.0 in or greater, a quality size bass is 12.0 in or greater, and a preferred size bass is 15.0 in or greater (Anderson and Neumann 1996). The relative weights in 2004 were lower for all three categories with stock size fish at 86.4, quality at

87.8, and preferred at 88.3. Fish with a relative weight close to 100 are in balance with their food supply, whereas fish with values below 85 are underweight and may be too abundant for their food supply (Flickinger et al 1999). Fish with a relative weight above 105 are more plump than necessary, reflecting an overabundant food supply (Flickinger et al 1999).

Bass growth was average with an age-4 and age-5 bass averaging 12.7 and 14.4 in. In 2007, an age-4 and age-5 bass averaged 12.0 and 14.9 in. The length-frequency distributions were significantly different between 2004 and 2008 ( $P > 0.001$ ) indicating more large bass in the population in the most recent survey. In 2004, only seven bass 14.0 in or greater was collected versus 68 in 2008.

The electrofishing catch rate decreased from the 2007 value of 159.4/h to 89.3/h. The decreased catch rate is due to the number of fish 8.0 in or less collected. The catch rate for fish 8.0 in or less was 35.1/h in 2007 versus 7.3/h in 2008. However, the CPUE for fish 14.0 in or greater increased from 9.2/h to 20.5/h and the CPUE for 18.0 in or greater increased from 1.8/h to 7.0/h.

The PSD increased from the 2007 value of 21 to 39. The PSD values were significantly different in 2004 and 2005 versus 2006 through 2008 ( $F = 11.25$ ,  $df = 4$ ,  $P = 0.04$ ). The RSD-14 increased from 7 to 25. The RSD-15 and RSD-18 also increased from values of 5 and 1 to 17 and 6. The RSD-14, RSD-15, and RSD-18 all substantially increased since 2004. The RSD-18 was 1 in 2004 versus 7 in 2008.

Blue Grass Pit's largemouth bass population has improved since the implementation of the new largemouth bass regulations. More large fish are being collected. Length-frequency, PSD, RSDs, and relative weights have all improved since 2004 indicating more, bigger bass. It is recommended that supplemental bass surveys be conducted in 2009 through 2012 to further evaluate the affects of the 18.0 length limit and two bass bag limit. During the 2010 and 2011 supplementals, all bass and muskellunge collected will be Floy tagged to identify fish collected from year to year. A subsample of bass will have a fin clip to determine the proportion of tags lost in year one. The Jolly-Seber model will be followed with all fish tagged in year one, followed by a tagging in the second year of fish not previously marked, and year three with no tagging (Miranda and Bettoli 2007). Recaptures will be recorded in each year as well as any tag

loss. Signs will be posted at both boat ramps about the tagging study so that anglers can properly report tagged fish kept. All tags will have a unique number and contact information for District 7 Fish Management. The tagging will allow for mortality, survival, population size, and recruitment estimates. This project could take the place of angler creel surveys that target largemouth bass. However, creels may still be needed in the future to obtain information on the muskellunge fishery.

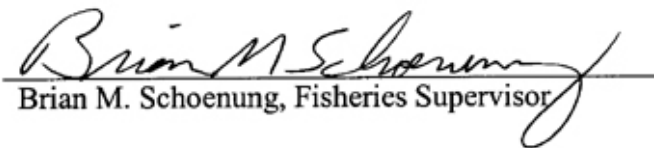
The estimated cost of the tagging study will be \$726 in equipment, \$600 for 1,000 tags and \$126 for two tagging guns and two extra needles. The total estimated cost for a creel clerk for one year at Bluegrass is \$12,456.

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, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.
- Flickinger, S. A., F. J. Bulow, and D. W. Willis. 1999. Small impoundments. Pages 561-588. *in* C. C. Kohler and W. A. Hubert editors. Inland fisheries management 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.
- Miranda, L. E. and P. W. Bettoli. 2007. Mortality. Pages 229-278, *in* C. S. Guy and M. L. Brown editors. Analysis and interpretation of freshwater fisheries data. American Fisheries Society, Bethesda, Maryland.

Submitted by: Michelle L. Cain, Assistant Fisheries Biologist  
Date: February 3, 2009

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Approved by:   
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Date: March 13, 2009

# Appendix

Blue Grass Pit largemouth bass data.

# LAKE SURVEY REPORT

Type of Survey	<input type="checkbox"/> Initial Survey	<input checked="" type="checkbox"/> Re-Survey
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Lake Name Blue Grass Pit	County Warrick	Date of survey (Month, day, year) April 1 & 9, 2008
Biologist's name Michelle L. Cain		Date of approval (Month, day, year) March 13, 2009

LOCATION		
Quadrangle Name Elberfeld	Range 9W	Section 31
Township Name 4S	Nearest Town Elberfeld	

ACCESSIBILITY					
State owned public access site One concrete and one gravel boat ramp		Privately owned public access site		Other access site	
Surface acres 199	Maximum depth 57	Average depth 25	Acre feet 4,975	Water level unknown	Extreme fluctuations 8 ft
Location of benchmark					

INLETS		
Name Blue Grass Creek	Location Northwest side of Blue Grass Pit	Origin

OUTLETS	
Name Culvert pipe to Loon Pit	Location South end of Bluegrass Pit
Water level control	

POOL	ELEVATION (Feet MSL)	ACRES	<b>Bottom type</b> <input type="checkbox"/> Boulder <input type="checkbox"/> Gravel <input type="checkbox"/> Sand <input checked="" type="checkbox"/> Muck <input type="checkbox"/> Clay <input type="checkbox"/> Marl
TOP OF DAM			
TOP OF FLOOD CONTROL POOL			
TOP OF CONSERVATION POOL		199	
TOP OF MINIMUM POOL			
STREAMBED			

Watershed use Reclaimed coal strip mine ground
Development of shoreline None

Previous surveys and investigations Supplemental survey: 2000, 2004, 2005, 2006, and 2007.
Standard fisheries survey: 2001.
Crappie survey: 2005 and 2008.
Angler creel survey: 2003 and 2006.

**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	4	1.4	4.1	8, 9
1.5					19.5	3	1.0	4.6	8, 9
2.0					20.0	1	0.3	4.1	not aged
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0	1	0.3	0.03	1	22.0				
4.5	1	0.3	0.03	1	22.5				
5.0	7	2.4	0.05	1, 2	23.0				
5.5	2	0.7	0.07	1	23.5				
6.0	1	0.3	0.10	1	24.0				
6.5	2	0.7	0.14	2	24.5				
7.0	4	1.4	0.18	2, 3	25.0				
7.5	6	2.1	0.21	2	25.5				
8.0	11	3.8	0.24	2, 3	26.0				
8.5	26	8.9	0.27	2, 3	TOTAL	292			
9.0	33	11.3	0.34	2, 3					
9.5	34	11.6	0.39	3					
10.0	22	7.5	0.46	3					
10.5	15	5.1	0.56	3, 4					
11.0	16	5.5	0.54	3, 4					
11.5	7	2.4	0.68	3, 4					
12.0	13	4.5	0.77	3, 4					
12.5	7	2.4	0.97	4, 5					
13.0	14	4.8	1.15	4					
13.5	2	0.7	1.46	5					
14.0	10	3.4	1.55	4, 5					
14.5	12	4.1	1.72	4, 5					
15.0	5	1.7	2.10	5					
15.5	2	0.7	2.05	6					
16.0	7	2.4	2.46	6					
16.5	6	2.1	2.68	6					
17.0	3	1.0	2.66	7					
17.5	5	1.7	3.14	6, 7, 8					
18.0	5	1.7	3.54	7, 8					
18.5	5	1.7	3.75	8					

ELECTROFISHING CATCH	89.3/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	8	9	
4.0	1	1	1									
4.5	1	1	1									
5.0	7	6	5	2								
5.5	2	2	2									
6.0	1	1	1									
6.5	2	2	2									
7.0	4	4		3	1							
7.5	6	6		6								
8.0	11	6		7	4							
8.5	26	7		22	4							
9.0	33	7		5	28							
9.5	34	7			34							
10.0	22	7			22							
10.5	15	4			11	4						
11.0	16	6			13	3						
11.5	7	6			5	2						
12.0	13	7			6	7						
12.5	7	6				5	2					
13.0	14	7				14						
13.5	2	2					2					
14.0	10	5					2	8				
14.5	12	7					3	9				
15.0	5	5						5				
15.5	2	1							2			
16.0	7	5							7			
16.5	6	3							6			
17.0	3	2								3		
17.5	5	5							1	3	1	
18.0	5	5								2	3	
18.5	5	4									5	
19.0	4	4									3	1
19.5	3	3									2	1
20.0	1	0										
Totals	278	132	12	46	127	40	26	16	8	14	2	

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean			Lower 95%CI	Upper 95%CI
		TL	Var	SE		
1	12	5.6	0.58	0.22	5.1	6.0
2	46	8.3	0.80	0.13	8.0	8.6
3	127	10.1	0.89	0.08	9.9	10.2
4	40	12.7	1.19	0.17	12.4	13.1
5	26	14.4	0.48	0.14	14.2	14.7
6	16	16.5	0.23	0.12	16.2	16.7
7	8	17.7	0.17	0.15	17.4	18.0
8	14	18.8	0.34	0.16	18.5	19.1
9	2	19.5	0.13	0.25	19.0	20.0

**GPS LOCATION OF SAMPLING EQUIPMENT**

GILL NETS			TRAP NETS			ELECTROFISHING		
1	N	W	1	N	W	1	N 38.095660	W -87.460880
	N	W	2	N	W		N 38.095370	W -87.458052
2	N	W	3	N	W	2	N 38.095435	W -87.457877
	N	W	4	N	W		N 38.093124	W -87.456560
3	N	W	5	N	W	3	N 38.093049	W -87.456624
	N	W	6	N	W		N 38.093229	W -87.457997
4	N	W	7	N	W	4	N 38.093432	W -87.458112
	N	W	8	N	W		N 38.091545	W -87.460865
5	N	W	9	N	W	5	N 38.091415	W -87.461065
	N	W	10	N	W		N 38.093014	W -87.462650
6	N	W	11	N	W	6	N 38.092680	W -87.462773
	N	W	12	N	W		N 38.089661	W -87.464759
7	N	W	13	N	W	7	N 38.094870	W -87.458440
	N	W	14	N	W		N 38.095190	W -87.461200
8	N	W	15	N	W	8	N	W
	N	W	16	N	W		N	W
9	N	W	17	N	W	9	N	W
	N	W	18	N	W		N	W
10	N	W	19	N	W	10	N	W
	N	W	20	N	W		N	W
11	N	W				11	N	W
	N	W					N	W
12	N	W					N	W
	N	W					N	W
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