LENAPE LAKE

Shakamak State Park

Greene County

2009 Fish Management Report

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EXECUTIVE SUMMARY

- Lenape Lake is a 58-acre impoundment located in Shakamak State Park near Jasonville, Indiana. It is one of three lakes in the park that offer fishing as a primary attraction. In 2009, a spring bass supplemental survey and a general fish community survey were conducted to evaluate the bass slot size limit and the fish community as a whole.

- Fish sampling efforts produced 736 fish weighing a total of 233.42 lbs representing 9 species. Bluegill dominated the sample by number (53.3%), followed by redear sunfish (25.8%), largemouth bass (15.5%), and warmouth (2.2%). Other species collected were yellow bullhead, black crappie, black bullhead, channel catfish, and bowfin.

- The primary game species, bluegill, redear, and largemouth bass, exhibited little change since the previous survey in 2002. Lenape Lake currently offers excellent bluegill and redear fishing opportunities. Modeling the bass population using F.A.S.T. software indicated that total annual mortality is low for bass at 26%. Relative weight indices ranged from 89 to 93.4, indicating that the bass population may be too abundant for the food source.

- Gizzard shad were collected for the first time at Kickapoo and Shakamak Lakes in 2009. No shad were collected during the 2009 survey at Lenape Lake. A supplemental fisheries survey will be conducted in June of 2010 to determine if gizzard shad were able to successfully spawn in 2009 and 2010 at Kickapoo and Shakamak Lakes.

- A decision to remove the protected slot-size limit will be made when there is evidence of successful gizzard shad spawns or the presence of multiple year classes of gizzard shad at any of the state park lakes.

INTRODUCTION

Lenape Lake is a 58-acre impoundment located in Shakamak State Park near Jasonville, Indiana. Lenape Lake is one of three lakes at the park where fishing is a primary attraction. Constructed in 1934, Lenape Lake has been open to public fishing since its impoundment.

Beginning in 1973, Indiana imposed a 14-in minimum size limit on largemouth bass at all lakes and impoundments on lands owned by the state. Under the 14-in size limit, largemouth bass began to stockpile and by 1986 all three lakes at the park were being managed with a 12 to 15-in protected slot size limit. Currently, the slot size limit is in place and 1,225 channel catfish are stocked on odd numbered years. The most recent survey in 2002 was an evaluation of the slot size limit (Schoenung 2003). The recommendation of that survey was to maintain the protected slot size limit.

The present survey is an evaluation of the bass size limit as well as the fish community as a whole.

METHODS

Targeted bass sampling was conducted April 7, 2009. The general survey was conducted May 20 to June 3, 2009 and the vegetation survey was conducted on July 22 to 23, 2009. The objective of the survey was to evaluate the overall status of the fishery as well as the largemouth bass population. Bass sampling effort consisted of 0.51 h of spring nighttime pulsed DC electrofishing. Otoliths were removed from a sub-sample of bass for age and growth analysis and were fitted to the non-aged fish using an age length key. Using Fisheries Analysis and System Tools (FAST) software, this data set was used to run a catch-curve analysis for total annual mortality (Slipke and Maceina 2000). Sampling effort for the general survey consisted of 0.75 h of electrofishing, four overnight gill net sets, and four overnight trap net sets. All species were counted and measured to the nearest 0.1 in. Fish were weighed to the nearest 0.01 lb. Scale samples were taken from game species for age and growth analysis. Proportional stock density (PSD) and relative stock density (RSD) indices were used to assess the population (Anderson and Neumann 1996). Relative weights (Wr) were calculated for indices of fish condition (Murphy and Willis 1996). This report presents the results of the survey along with recommendations for future work.

RESULTS AND DISCUSSION

Water quality was good at Lenape Lake in comparison to other impoundments in the area. Dissolved oxygen levels were at least five parts per million (ppm) down to 8 ft (Appendix). The Secchi disk reading was 7 ft. Alkalinity measured at the surface was 68.4. This level of alkalinity indicates a moderately productive system. Conductivity was 180ms and pH was 8.2.

A diverse community of aquatic plants was observed during the vegetation survey. A total of six submersed plants were collected or observed. There were seven species of emergent plants observed. By frequency of occurrence, coontail was most abundant followed by Eurasian watermilfoil, water stargrass, brittle naiad, leafy pondweed, and curlyleaf pondweed. Other plants collected or observed were, American pondweed, giant duckweed, white water lily, arrow arum, water willow. Pithophora algae was the only algae collected.

Fish sampling efforts produced 736 fish weighing a total of 233.42 lbs, representing 9 species. Bluegill dominated the sample by number (53.3%), followed by redear sunfish (25.8%), largemouth bass (15.5%), and warmouth (2.2%). Other species collected were yellow bullhead, black crappie, black bullhead, channel catfish, and bowfin. Combined, these species totaled 5.8% of the total catch. Largemouth bass were the most abundant by weight (33.4%), followed by redear sunfish (30.5%), and bluegill (28.3%). These primary game species made up over 90% of the catch by weight.

The bluegill sample consisted of 392 fish ranging in length from 1.2 to 9.3 in. The bluegill PSD was 47 and the RSD8 was 21, compared to the last survey in 2002 when the PSD was 44.1 and the RSD8 was 18.2. Bluegill growth for age 1 to 3 was similar to the previous survey in 2002. Growth for older fish was slower. Bluegill are reaching preferred size (6 in) by age 4, and reach quality size (8 in) as early as age 6. In 2002, bluegill were reaching 8 in by age 4.

Weights of bluegill were compared to standard weights to determine Relative Weight (Wr). Bluegill were separated by stock indices and Wr averaged to determine condition of bluegill by stock indices. The relative weights in 2009 were considered high for all indices with stock size (3 in) to quality (6 in) fish at 114.9 and quality to preferred (8 in) at 114.3. 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.

The redear sample consisted of 190 fish ranging in length from 1.9 to 10.1 in. The redear PSD was 72 and the RSD9 was 25. Growth for redear is very good with redear reaching preferred size (7 in) as early as age 3.

The relative weights in 2009 were considered high for two categories. Stock size (4 in) to quality (7 in) fish was 128.0 and quality to preferred (9 in) was 125.2.

Spring largemouth bass sampling occurred on April 7, 2009. A total of 77 bass was collected with a length range of 3.6 to 18.0 in. The bass data from the general survey was collected over a month later. A total of 114 bass was collected with a length range of 4.5 to 19.8 in. The total catch for the two surveys was 191 bass. The PSD for bass was 52 and the RSD15 was 7. PSD and RSD15, when compared to bluegill indices, were within the range of 40 to 70 which is considered a balanced bass/panfish population. Of the 191 bass collected, 27% were within the 12 to 15-in protected slot limit, which is almost identical to the previous survey at 28%. Bass greater than 15 in accounted for 5% of the population compared to 2002, when 8% of the bass collected were 15 in and greater. Growth for bass appears to be good up to age 4. As bass reach the protected slot limit, it appears that growth slows, taking a bass at least 6 years to reach 15 in. This growth pattern is similar to the previous survey.

Total annual mortality was low at an estimated 26%. The relative weights in 2009 were between “underweight” and “in balance for food supply” for all three categories with stock size to quality fish at 92, quality to preferred at 89, and preferred to memorable at 93.4.

Warmouth comprised 2.2% of the catch. There were 16 fish collected with a length range of 1.6 to 8.8 in. Fifty percent of the warmouth sample was 6 in and greater. Anglers rarely target warmouth but they will often show up in the harvest.

There were 15 yellow bullhead collected with a length range of 7.4 to 12.9 in.

There were six black crappie collected with a length range of 3.6 to 9.8 in. Black crappie collections from past surveys have consistently represented less than 5% of the catch.

A single 10.6 in black bullhead and one 18.6 in bowfin was collected.

One 17.6 in channel catfish was also collected. There were 1,225 channel catfish stocked in 2007. Based on the size of the collected fish, it is most likely from that stocking. Only one channel catfish was collected indicating anglers are utilizing the stocked fish. It is recommended that the Division of Fish and Wildlife continue stocking channel catfish at a rate 25/acre.

DISCUSSION

Lenape Lake provides tremendous panfish opportunities. The size structure of both bluegill and redear is very good when compared to the other lakes in the park. The size structure for bass and bluegill is within the range of a balanced predator/prey relationship and appears to be unchanged since the 2002 survey.

Gizzard shad were collected for the first time at Shakamak and Kickapoo Lakes. A decision to remove the protected slot-size limit will be made when there is evidence of successful gizzard shad spawns or the presence of multiple year classes of gizzard shad at any of the state park lakes.

Removing the slot limit for Lenape Lake will provide continuity of regulations for the entire park for bass as well as maintain high predator numbers in the event that shad are or were introduced at Lenape Lake. No shad were collected during 2009 survey at Lenape Lake.

LITERATURE CITED

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Submitted By: David S. Kittaka, Fisheries Biologist
Date: February 18, 2010

Approved by: Brian M. Schoenung, Fisheries Supervisor

Date: April 20, 2010

APPENDIX

Lake sampling page
Sampling effort and water chemistry
Fish species and relative abundance
Individual fish length frequencies and weights
Growth summaries for game fish
Location of fish sampling by gear type
Summary of aquatic vegetation survey

LAKE SURVEY REPORT

Type of Survey
[ ] Initial Survey [X] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Lenape Lake	Greene	5/20/09, 6/9/09
Biologist's name		Date of approval (Month, day, year)
David Kittaka, Debbie King		4/20/2010

LOCATION

Quadrangle Name	Range	Section
Jasonville	7W	6
Township Name	Nearest Town	
8N	Jasonville	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
Boat ramp and fishing pier		

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
58*	29	10 feet	580	550 MSL	None

Location of benchmark
None

INLETS

Name	Location	Origin
Intermittent stream	East	Runoff

OUTLETS

Name	Location
Kickapoo Lake	West

Water level control
Earthen dam with concrete drop box and gate valve.

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
Mixed hardwoods, State Park

Development of shoreline
Boat ramp, picnic area, boat mooring docks, and fishing pier.

Previous surveys and investigations
Lake mapping (U.S.G.S.) 1948; renovation 1966 and restocking 1969; fisheries surveys 1963, 1972, 1976, 1977, 1979, 1981, 1985, 1989, and 1997. Bass and bluegill sampling 1987-1989. Creel surveys 1986-1988, and 1992. Bass sampling only 1991.

*Recalculated acreage using GIS

SAMPLING EFFORT LENAPE LAKE 2009					
ELECTROFISHING	Day hours 0		Night hours 0.75		Total hours 0.75
TRAP NETS	Number of traps 4		Number of Lifts 1		Total effort 4
GILL NETS	Number of nets 4		Number of Lifts 1		Total effort 4
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color Brown	Turbidity 7 Feet 0 Inches (SECCHI DISK)
Alkalinity (ppm)* Surface: 68.4 Bottom:	pH Surface: 8.2 Bottom:
Conductivity: 180 ms, .09 TDS micromhos	Air temperature: 77 °F
Water chemistry GPS coordinates: N 39.16823932 W -87.23830313	

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	75.9	11.10	36			72		
2	75.4	11.40	38			74		
4	74.1	11.30	40			76		
6	72.9	9.90	42			78		
8	69.3	8.20	44			80		
10	63.3	0.50	46			82		
12	58.1	0.20	48			84		
14	55.6	0.20	50			86		
16	53.4	0.10	52			88		
18	50.7	0.10	54			90		
20	48.9	0.10	56			92		
22	47.5	0.10	58			94		
24	46.2	0.10	60			96		
26	45.3	0.10	62			98		
28	44.8	0.10	64			100		
30			66					
32			68					
34			70					

COMMENTS

*ppm-parts per million

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT, LENAPE LAKE 2009					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	392	53.3	1.2 - 9.3	66.11	28.3
Redear sunfish	190	25.8	2.7 - 10.1	71.16	30.5
Largemouth bass	114	15.5	4.5 - 19.8	78.05	33.4
Warmouth	16	2.2	1.6 - 8.8	3.59	1.5
Yellow bullhead	15	2.0	7.4 - 12.9	8.68	3.7
Black crappie	6	0.8	3.6 - 9.8	0.84	0.4
Black bullhead	1	0.1	10.6	0.68	0.3
Channel catfish	1	0.1	17.6	1.84	0.8
Bowfin	1	0.1	18.6	2.47	1.1
	736	100.0		233.42	100.0

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

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LENAPE LAKE Bluegill, 2009									
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	7	1.8	0.00	1	19.0				
1.5	27	6.9	0.01	1	19.5				
2.0	20	5.1	0.01	2	20.0				
2.5	19	4.8	0.02	2	20.5				
3.0	42	10.7	0.02	2	21.0				
3.5	42	10.7	0.03	2	21.5				
4.0	26	6.6	0.04	2	22.0				
4.5	20	5.1	0.07	2	22.5				
5.0	22	5.6	0.09	2,3	23.0				
5.5	20	5.1	0.16	3,4	23.5				
6.0	26	6.6	0.19	3,4	24.0				
6.5	16	4.1	0.24	3,4	24.5				
7.0	19	4.8	0.32	3,4,5	25.0				
7.5	22	5.6	0.40	5,6	25.5				
8.0	44	11.2	0.46	4,5,6	26.0				
8.5	18	4.6	0.56	6,7,8	TOTAL	392			
9.0	2	0.5	0.71	7,8					
9.5									
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	507 /hr	GILL NET CATCH	0 /lift	TRAP NET CATCH	3 /lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LENAPE LAKE Redear sunfish, 2009									
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	1	0.5	0.01	1	19.5				
2.0					20.0				
2.5	1	0.5	0.02	2	20.5				
3.0					21.0				
3.5	1	0.5	0.04	2	21.5				
4.0	3	1.6	0.05	2	22.0				
4.5	10	5.3	0.10	2	22.5				
5.0	13	6.8	0.09	2	23.0				
5.5	9	4.7	0.14	2,3	23.5				
6.0	8	4.2	0.17	3,4	24.0				
6.5	12	6.3	0.24	3,4	24.5				
7.0	25	13.2	0.30	3,4	25.0				
7.5	17	8.9	0.35	3,4	25.5				
8.0	33	17.4	0.46	4,5,6	26.0				
8.5	25	13.2	0.53	5,6,7	TOTAL	190			
9.0	19	10.0	0.62	6,7					
9.5	10	5.3	0.71	4,5,7					
10.0	3	1.6	0.78	7,8					
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	153 /hr	GILL NET CATCH	1 /lift	TRAP NET CATCH	18 /lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LENAPE LAKE Largemouth bass both samples, 2009									
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	1	0.5	4.05	8
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5	2	1.0	0.02	1	21.5				
4.0	5	2.6	0.03	1	22.0				
4.5	21	11.0	0.04	1	22.5				
5.0	21	11.0	0.06	1	23.0				
5.5	14	7.3	0.07	1	23.5				
6.0	10	5.2	0.10	1	24.0				
6.5	3	1.6	0.10	1	24.5				
7.0					25.0				
7.5					25.5				
8.0	1	0.5	0.24	2	26.0				
8.5	4	2.1	0.29	2	TOTAL	191			
9.0	5	2.6	0.28	2					
9.5	10	5.2	0.37	2,3					
10.0	8	4.2	0.47	2,3					
10.5	4	2.1	0.57	2,3					
11.0	14	7.3	0.66	3,4					
11.5	9	4.7	0.73	3,4					
12.0	6	3.1	0.79	3,4					
12.5	16	8.4	0.93	4,5					
13.0	9	4.7	1.06	4,5					
13.5	5	2.6	1.16	5,6					
14.0	8	4.2	1.31	5,6,7,9					
14.5	7	3.7	1.41	7,8					
15.0	2	1.0	1.69	8					
15.5	1	0.5	1.80	6					
16.0	2	1.0	2.05	6					
16.5									
17.0									
17.5	2	1.0	2.70	9,10					
18.0	1	0.5	3.39	8					
18.5									

ELECTROFISHING CATCH	149 /hr	GILL NET CATCH	1 /lift	TRAP NET CATCH	0 /lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LENAPE LAKE, Warmouth, 2009									
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	3	18.8	0.01		19.5				
2.0	1	6.3	0.01		20.0				
2.5					20.5				
3.0	3	18.8	0.02		21.0				
3.5					21.5				
4.0	1	6.3	0.05		22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5	1	6.3	0.25		24.5				
7.0	1	6.3	0.30		25.0				
7.5	2	12.5	0.38		25.5				
8.0	2	12.5	0.49		26.0				
8.5	2	12.5	0.58		TOTAL	16			
9.0									
9.5									
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	17 /hr	GILL NET CATCH	0 /lift	TRAP NET CATCH	1 /lift

BLUEGILL AGE-LENGTH KEY 2009

Length group (in)	Total # number	Sub-sample	Age 1	2	3	4	5	6	7	8
1.0	7	5	7							
1.5	27	5	27							
2.0	20	5		20						
2.5	19	5		19						
3.0	42	5		42						
3.5	42	5		42						
4.0	26	5		26						
4.5	20	5		20						
5.0	22	5		13	9					
5.5	20	5			12	8				
6.0	26	5			21	5				
6.5	16	5			3	13				
7.0	19	5			4	11	4			
7.5	22	4					17	6		
8.0	44	5				9	18	18		
8.5	18	6						9	6	3
9.0	2	2							1	1
Total	392	82	34	182	49	46	38	32	7	4

REDEAR SUNFISH AGE-LENGTH KEY 2009

Length group (in)	Total # number	Sub-sample	Age 1	2	3	4	5	6	7	8
1.5	1	1	1							
2.0										
2.5	1	1		1						
3.0										
3.5	1	1		1						
4.0	3	3		3						
4.5	10	6		10						
5.0	13	5		13						
5.5	9	5		5	4					
6.0	8	5			6	2				
6.5	12	6			8	4				
7.0	25	5			15	10				
7.5	17	5			14	3				
8.0	33	5				7	20	7		
8.5	25	5					15	5	5	
9.0	19	5						8	11	
9.5	10	8				1	3		6	
10.0	3	2							2	2
Total	190	68	1	33	47	27	37	19	24	2

LARGEMOUTH BASS AGE-LENGTH KEY 2009

Length group (in)	Total # number	Sub-sample	Age 1	2	3	4	5	6	7	8	9	10
3.5	2	2	2									
4.0	5	5	5									
4.5	21	6	21									
5.0	21	6	21									
5.5	14	4	14									
6.0	10	5	10									
6.5	3	3	3									
7.0												
7.5												
8.0	1	1		1								
8.5	4	4		4								
9.0	5	5		5								
9.5	10	5		8	2							
10.0	8	8		6	2							
10.5	4	4		2	2							
11.0	14	5			6	8						
11.5	9	4			5	5						
12.0	6	5			1	5						
12.5	16	7				11	5					
13.0	9	5				7	2					
13.5	5	4					4	1				
14.0	8	8					1	2	3		2	
14.5	7	5							6	1		
15.0	2	2								2		
15.5	1	1						1				
16.0	2	2						2				
16.5												
17.0												
17.5	2	2									1	1
18.0	1	1							1			
18.5												
19.0												
19.5	1	1								1		
Total	191	110	76	26	17	36	11	6	10	4	3	1

Lake: Lenape
Date: 5/20/2009 to 6/9/2009
Species: Bluegill

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	27	1.8	0.00	0.00	1.8	1.8
2	182	3.7	0.71	0.06	3.5	3.8
3	49	6.1	0.31	0.08	5.9	6.2
4	46	6.9	0.67	0.12	6.7	7.2
5	38	7.9	0.11	0.05	7.8	8.0
6	32	8.3	0.11	0.06	8.2	8.4
7	7	8.8	0.04	0.07	8.7	9.0
8	4	8.9	0.06	0.13	8.6	9.1

Lake: Lenape Lake
Date: 4/7/2009 to 5/20/2009
Species: Largemouth bass

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	76	5.3	0.47	0.08	5.1	5.4
2	26	9.6	0.43	0.13	9.4	9.9
3	17	11.1	0.55	0.18	10.7	11.5
4	36	12.3	0.55	0.12	12.1	12.6
5	11	13.3	0.30	0.16	13.0	13.6
6	6	15.0	1.29	0.45	14.1	15.9
7	10	15.0	1.46	0.39	14.2	15.7
8	4	16.1	5.09	1.08	14.0	18.3
9	3	15.4	4.08	1.17	13.1	17.8
10	1	17.8				

Lake: Lenape
Date: 5/20/2009 to 6/9/2009
Species: Redear

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	1	1.8				
2	33	5.0	0.39	0.11	4.8	5.2
3	47	7.1	0.40	0.09	6.9	7.2
4	27	7.5	0.60	0.15	7.2	7.8
5	37	8.6	0.16	0.07	8.4	8.7
6	19	8.8	0.19	0.10	8.6	9.0
7	24	9.3	0.18	0.09	9.2	9.5
8	2	10.3	0.00	0.00	10.3	10.3

GPS LOCATION OF SAMPLING EQUIPMENT LENAPE LAKE, 2009

GILL NETS				
1	N	39.1671251	W	-87.226574
	N	39.1671571	W	-87.22769
2	N	39.1701011	W	-87.231259
	N	39.1694528	W	-87.231226
3	N	39.1697824	W	-87.237102
	N	39.1690845	W	-87.237206
4	N	39.1656542	W	-87.236321
	N	39.1661501	W	-87.236909
5	N		W	
	N		W	
6	N		W	
	N		W	
7	N		W	
	N		W	
8	N		W	
	N		W	
9	N		W	
	N		W	
10	N		W	
	N		W	
11	N		W	
	N		W	
12	N		W	
	N		W	
13	N		W	
	N		W	
14	N		W	
	N		W	
15	N		W	
	N		W	
16	N		W	
	N		W	
17	N		W	
	N		W	
18	N		W	
	N		W	
19	N		W	
	N		W	
20	N		W	
	N		W	

TRAP NETS				
1	N	39.1667017	W	-87.227247
2	N	39.1686087	W	-87.229762
3	N	39.1695005	W	-87.23391
4	N	39.1706992	W	-87.231516
5	N		W	
6	N		W	
7	N		W	
8	N		W	
9	N		W	
10	N		W	
11	N		W	
12	N		W	
13	N		W	
14	N		W	
15	N		W	
16	N		W	
17	N		W	
18	N		W	
19	N		W	
20	N		W	

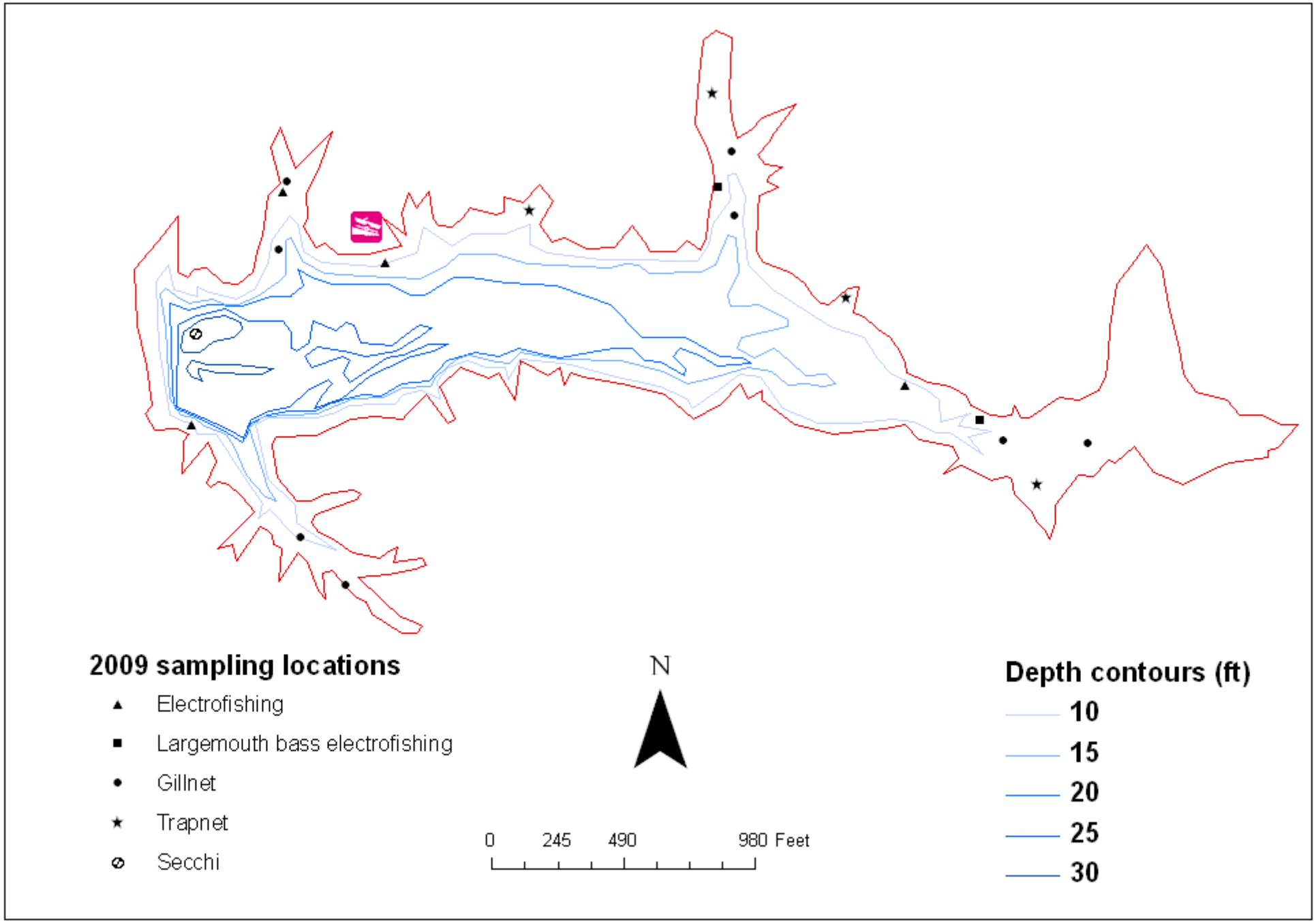
ELECTROFISHING				
1*	N	39.1673641	W	-87.228001
	N		W	
2*	N	39.1697438	W	-87.231436
	N		W	
3	N	39.167718	W	-87.228989
	N		W	
4	N	39.1689572	W	-87.235818
	N	39.1696808	W	-87.23716
5	N		W	
	N	39.1673004	W	-87.238354
6	N		W	
	N		W	
7	N		W	
	N		W	
8	N		W	
	N		W	
9	N		W	
	N		W	
10	N		W	
	N		W	
11	N		W	
	N		W	
12	N		W	
	N		W	
13	N		W	
	N		W	
14	N		W	
	N		W	
15	N		W	
	N		W	
16	N		W	
	N		W	
17	N		W	
	N		W	
18	N		W	
	N		W	
19	N		W	
	N		W	
20	N		W	
	N		W	

* spring bass sampling

Occurrence and Abundance of Submersed Aquatic Plants - Overall					
Lake:	**Lenape Lake**	**Secchi (ft):**	**4.5**	**SE Mean Species / Site:**	**0.17**
Date:	**7/22/2009**	**Littoral Sites w/Plants:**	**19**	**Mean Natives / Site:**	**0.80**
Littoral Depth (ft):	**12.5**	**Number of Species:**	**5**	**SE Mean Natives / Site:**	**0.14**
Littoral Sites:	**25**	**Max. Species / Site:**	**4**	**Species Diversity:**	**0.51**
Total Sites:	**30**	**Mean Species / Site:**	**0.93**	**Native Diversity:**	**0.35**

	Frequency of			**Score Frequency**		
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	63.3	36.7	13.3	13.3	36.7	47.3
Brittle naiad	3.3	96.7	3.3	0.0	0.0	0.7
Leafy pondweed	3.3	96.7	3.3	0.0	0.0	0.7
Water stargrass	10.0	90	10	0	0	2.0
Eurasian watermilfoil	13.3	86.7	13.3	0.0	0.0	2.7
Filamentous Algae	16.7					

Other species noted: Arrow arum, waterwillow, curlyleaf pondweed, American pondweed, white water lily cattail, giant duckweed, and an unidentified vining emergent on dam with large nodes at each leaf petiole (leaves 6" wide to 10"long).


2009 sampling locations
Electrofishing
Largemouth bass electrofishing
Gillnet
Trapnet
Secchi
N
0
245
490
980 Feet
Depth contours (ft)
10
15
20
25
30