

LAKE JOHN HAY
Washington County
2006 Fish Management Report

Clinton R. Kowalik
Assistant Fisheries Biologist

Larry L. Lehman
Fisheries Biologist



Fisheries Section
Indiana Department of Natural Resources
Division of Fish and Wildlife
I.G.C.-South, Room W273
402 W. Washington Street
Indianapolis, IN 46204

EXECUTIVE SUMMARY

- Lake John Hay is a 210-acre impoundment located approximately 6 mi northwest of Salem in Washington County. The lake is the primary water supply for the City of Salem which owns and maintains the lake. The Division of Fish and Wildlife (DFW) manages the fish populations. Access includes one boat ramp and only electric motors are allowed. Boat permits (daily or annual), which are required before a boat can launch at John Hay, are sold at Salem's Clerk-Treasurer's office and the Salem Police Department, which also distribute copies of Salem's special rules and regulations for the lake. Topographical maps of the property are also available from the Clerk-Treasurer's office.
- A general lake survey was conducted on Lake John Hay on July 10 to 12, 2006. This was the first fisheries survey since the 12 to 15-in slot limit was replaced in 1998 by a 14.0-in minimum size limit on largemouth bass. Water chemistry and aquatic vegetation data were also collected.
- The Secchi disk reading was 14.0 ft. The lake was thermally stratified into warm and cold layers. Dissolved oxygen concentrations were not adequate for fish survival below 20.0 ft. Submersed vegetation was found to a maximum depth of 17.5 ft. Coontail dominated the plant community, but Eurasian watermilfoil (an undesirable exotic species) and brittle naiad were found frequently throughout the lake.
- A total of 1,341 fish, representing 9 species and hybrid sunfish, was collected during this survey. Bluegill ranked first by number, followed by redear sunfish, longear sunfish and largemouth bass. Largemouth bass ranked first by weight, followed by bluegill, channel catfish, and redear sunfish.
- The DFW should maintain a 14.0-in minimum size limit on largemouth bass and continue to stock 3,360 channel catfish every two years. Use of triploid grass carp to control submersed aquatic vegetation should be investigated.

INTRODUCTION

Lake John Hay is a 210-acre impoundment located approximately 6 mi northwest of Salem in Washington County. The lake is the primary water supply for the City of Salem which owns and maintains the lake. The lake also provides water to Pekin and to the East Washington Water Corporation. The Division of Fish and Wildlife (DFW) manages the fish populations.

Construction of the lake was completed in 1968. Access includes one boat ramp and only electric motors are allowed. Boat permits (daily or annual), which are required before a boat can launch at John Hay, are sold at Salem's Clerk-Treasurer's office and the Salem Police Department, which also distribute copies of Salem's special rules and regulations for the lake. Topographical maps of the property are also available from the Clerk-Treasurer's office.

Lake John Hay is currently stocked with 3,360 (16/acre) channel catfish every two years. Lake John Hay has a 14.0-in minimum size limit on largemouth bass. This 14.0-in size limit was reinstated the summer of 1998 to replace the 12 to 15-in slot limit that was in effect for six years. The 1996 survey showed that largemouth bass had decreased in relative abundance and growth had increased from the previous survey in 1991; however, the bluegill fishery had declined in quality (Lehman 1997). This survey was conducted to evaluate fish population changes (especially with the bass-bluegill fishery) since the last survey in 1996.

METHODS

This survey was conducted on July 10 to 12, 2006, as part of a DFW work plan that covers management of fish populations in impoundments. Some physical and chemical characteristics of the water were measured in the deepest area of the impoundment according to standard lake survey guidelines (Shipman 2001). Submersed aquatic vegetation was sampled on August 9, 2006, using guidelines written by Pearson (2004). A GARMIN GPSmap 76 was used to record the location of the limnological data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish were collected by pulsed DC electrofishing along the shoreline at night with two dippers; effort equaled 0.50 h for all species with an additional 0.25 h for largemouth bass. Two trap nets and four experimental-mesh gill nets were fished overnight for two nights. All fish collected were measured to the nearest 0.1 in TL. Average weights for fish by half-inch groups for Fish Management District 8 were used to estimate the weight of bluegill, largemouth bass,

redeer sunfish, black crappie, and hybrid sunfish within the sample. Other fishes were weighed in the field to the nearest 0.01 lb. Fish scale samples were taken from selected species for age and growth analysis.

Age-length keys were used to determine population age structure and to calculate mean total length for fish based on their length at capture. Proportional stock density (PSD) and relative stock density (RSD) were calculated for bluegill and largemouth bass using electrofishing data (Anderson and Neumann 1996). The Bluegill Fishing Potential (BGFP) index was used to assess bluegill fishing quality (Ball and Tousignant 1996). The BGFP index uses mean back calculated lengths (instead of mean length at age—which was calculated for this survey) to determine the quality of growth; therefore, the total index score was estimated. This adaptation was approved by Bob Ball, one of the authors of the original index (personal communication).

RESULTS

Lake John Hay was at normal pool. The Secchi disk reading was 14.0 ft. The lake was thermally stratified into warm and cold layers. At the time of the survey, dissolved oxygen concentrations were not adequate for fish survival below 20.0 ft.

Submersed vegetation was found to a maximum depth of 17.5 ft. Coontail dominated the plant community, was collected at 94% of the littoral sites, and was dense where collected. Eurasian watermilfoil (an exotic plant species) and brittle naiad were also found frequently throughout the lake.

A total of 1,341 fish, representing 9 species and hybrid sunfish, was collected during this survey. Total weight of the fish sample was approximately 170 lbs. Western mosquitofish were observed for the first time. Bluegill ranked first by number, followed by redear sunfish, longear sunfish and largemouth bass. Largemouth bass ranked first by weight, followed by bluegill, channel catfish, and redear sunfish.

A total of 882 bluegill was sampled that weighed 51 lbs. They ranged in length from 1.8 to 9.8 in. Relative abundance was 66% by number and 30% by weight. The electrofishing catch rate was 474.0/h compared to 1,342.3/h in 1996 (Lehman 1997). Bluegill did represent a balanced population as the bluegill PSD was 40. The PSD in 1996 was 9. The bluegill RSD-8

was 9 in this survey. In this sample, 13% of bluegill were 6.0 in or longer (quality size) while only 3% of bluegill were quality size in 1996.

The mean TL for age-4 bluegill in July was 7.6 in, which means that bluegill reached quality size before their fifth summer. Age-5 and age-6 bluegill appear to be growing above average. Assuming *good* growth, the BGFP index was 26, which is in the excellent category. In 1996, the BGFP index was 19, which is in the good category. Anglers reported catching bluegill up to 10 in long.

A total of 179 redear sunfish was sampled that weighed 14 lbs. They ranged in length from 2.1 to 9.6 in. Relative abundance was 13% by number and 8% by weight. Redear were not collected by electrofishing; however, 171 were collected by trap nets (42.8/lift). In this sample, 7% of redear were 7.0 in or longer (quality size), which is similar to 1996 (Lehman 1997). The mean TL for age-5 redear in July was 7.0 in. This growth is below average for southeastern Indiana, yet anglers reported catching redear up to 12 in long.

A total of 65 largemouth bass was sampled that weighed 52 lbs. They ranged in length from 2.9 to 15.4 in. Relative abundance was 5% by number and 31% by weight. The electrofishing catch rate was 61.3/h compared to 162.8/h in 1996 (Lehman 1997). Largemouth did represent a balanced population as the bass PSD was 68. The PSD in 1996 was 51. The bass RSD-15 was 8 in this survey. In this sample, 18% of bass were 14.0 in or longer (current legal size), compared to 17% in 1996. The mean TL for age-5 bass in July was 14.0 in. John Hay bass growth is average.

A total of 47 naturally occurring hybrid sunfish was sampled that weighed 5 lbs. They ranged in length from 2.2 to 8.2 in. Relative abundance was 4% by number and 3% by weight. In this sample, 23% of hybrid sunfish were 6.0 in or longer.

A total of 22 black crappie was sampled that weighed 3 lbs. They ranged in length from 4.2 to 8.0 in. Relative abundance was 2% by number and 2% by weight. All of these fish were collected by gill nets. Three crappie were quality size (8.0 in or longer) and age 2. No age-3 crappie were collected. The mean TL for age-2 crappie in July was 7.5 in. Growth was average for southeastern Indiana.

A total of 16 channel catfish was sampled that weighed 35 lbs. They ranged in length from 11.2 to 28.0 in. All were caught in gill nets (catch rate = two catfish per lift). Relative

abundance was 1% by number and 20% by weight. In this sample, 50% of catfish were 16.0 in or longer (quality size).

DISCUSSION

This 2006 survey of Lake John Hay was the first fisheries survey since the 14.0-in minimum size limit on largemouth bass replaced the 12 to 15-in slot limit. Lake John Hay continues to provide fishing opportunities for a variety of sunfish, channel catfish, and a few bullheads. Anglers reported catching many quality size bluegill, redear sunfish, largemouth bass, and black crappie.

The goals of reinstating the 14.0-in largemouth bass size limit was a decrease in bluegill relative abundance, a decrease in the bluegill electrofishing catch rate, an increase in bluegill growth, a balanced bluegill population, and, therefore, an improved bluegill fishery. It is unknown how long it took for the bluegill fishery to improve, since the last survey was conducted 10 years ago, but this survey's results show that the aforementioned goals were accomplished.

With the 14.0-in size limit, it was thought that largemouth bass abundance and catch rates would increase. Electrofishing catch rates, however, have decreased and, even though more effort was directed at bass than all other species, relative abundance of bass also decreased. The bass PSD is near the upper limit of the range for a balanced population, and although fewer bass were collected in this survey than in 1996, a greater percentage of the bass were 14.0 in or longer (current legal size). John Hay bass growth is comparable to the district average.

Regular supplemental stockings of catfish fingerlings have been made into Lake John Hay since 1978 to maintain the channel catfish population, which was not expected to sustain itself through natural reproduction. Prior to this survey, approximately 27,000 catfish fingerlings had been stocked by the DFW. The low number of channel catfish collected in this survey would seem to indicate good harvest by anglers.

Submersed vegetation was found to a depth of 17.5 ft. It made electrofishing the shoreline and collecting a fish sample difficult. Excessive amounts can interfere with bass/bluegill management. Since Lake John Hay is a water supply reservoir, the use of herbicides is limited. However, using triploid grass carp to reduce submersed vegetation may be an option.

RECOMMENDATIONS

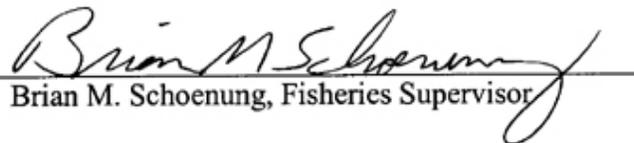
- The DFW should maintain the 14.0-in minimum size limit on largemouth bass at Lake John Hay.
- The DFW should continue to stock 3,360 (16/acre) channel catfish fingerlings every two years as long as it is felt channel catfish should be managed in this manner. Fingerlings should average at least 8 in long to reduce mortality from bass predation.
- Acres of submersed vegetation should be determined in 2008 and a triploid grass carp stocking recommendation made to the City of Salem. A stocking permit from the Division of Fish Wildlife is required before the fish can be stocked into Lake John Hay.

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.
- Ball, R. L. and J. N. Tousignant. 1996. The development of an objective rating system to assess bluegill fishing in lakes and ponds. Research report. Indiana Department of Natural Resources. Indianapolis, Indiana. 18 pp.
- Lehman, L. L. 1997. Lake John Hay Fish Management Report, 1996. Fisheries Section. Indiana Department of Natural Resources. Indianapolis, Indiana. 12 pp.
- Pearson, J. 2004. A proposed sampling method to assess occurrence, abundance and distribution of submersed aquatic plants in Indiana lakes. Indiana Department of Natural Resources. Indianapolis, Indiana. 37 pp.
- Shipman, S. T. 2001. Manual of fisheries survey methods. Fisheries Section. Indiana Division of Fish and Wildlife. Indianapolis, Indiana. 58 pp.

Submitted by: Clinton R. Kowalik, Assistant Fisheries Biologist
Date: April 12, 2007

Approved by: Larry L. Lehman, Fisheries Biologist

Approved by: 
Brian M. Schoenung, Fisheries Supervisor

Date: March 28, 2008

LAKE SURVEY REPORT

Type of Survey	<input type="checkbox"/> Initial Survey	<input checked="" type="checkbox"/> Re-Survey
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Lake Name Lake John Hay	County Washington	Date of survey (Month, day, year) July 10-12, 2006
Biologist's name Larry L. Lehman		Date of Approval (Month, day, year) March 28, 2008

LOCATION		
Quadrangle Name Smedley, Indiana	Range 3 E	Sections 13, 14, 23, 24
Township 3 N	Nearest Town Rush Creek Valley	

ACCESSIBILITY					
State owned public access site		Privately owned public access site		Other access site Controlled by City of Salem	
Surface acres 210	Maximum depth 31 feet	Average depth 14.5 feet	Volume (Acre feet) 3,050	Water level (Feet MSL) 587	Extreme fluctuations 580 to 589 feet MSL
Location of benchmark Approximately 0.8 mile northwest of the dam at Rush Creek Valley					

INLETS		
Name Rinkers Creek	Location East end of the lake	Origin
Lick Creek	Southwest corner of the lake	
Four unnamed intermittent tributaries	North, east, and south sides of lake	

OUTLETS																
Name Rinkers Creek	Location At the dam below the principal spillway															
Water level control Principal spillway is a drop tower. A drawdown tube is present.																
POOL	ELEVATION (Feet MSL)	ACRES														
TOP OF DAM																
TOP OF FLOOD CONTROL POOL																
NORMAL POOL	587.0	210														
TOP OF MINIMUM POOL																
STREAMBED																
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Watershed use
The drainage area contains approximately 5,800 acres. It is covered with hardwood forests and farmland.

Development of shoreline
A parking lot with a boat ramp is located on the southern shoreline at the end of North Rinkers Creek Road.

A water pumping station is located on the southern shoreline at the end of West Bowers Road E.

Previous surveys and investigations
Fish populations study 1969; Fishery surveys 1970, 1974, 1979, 1991, and 1996.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours		Total hours
	0		0.50 to 0.75**		0.50 to 0.75**
TRAP NETS	Number of traps		Number of Lifts		Total effort
	2		2 lifts per net		4 Lifts
GILL NETS	Number of nets		Number of Lifts		Total effort
	4		2 lifts per net		8 Lifts
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls
	0				none

PHYSICAL AND CHEMICAL CHARACTERISTICS (7:00 pm)					
Color			Turbidity		
Green			14 feet		0 inches (SECCHI DISK)
Alkalinity (ppm)*			pH		
Surface: 137		Bottom: 222	Surface: 8.3		Bottom: 7.5
Conductivity:			Air temperature:		
240 micromhos/cm			85 °F		
Water chemistry GPS coordinates:					
N 38.68972334			W -86.15590925		

TEMPERATURE AND DISSOLVED OXYGEN (D.O.) (7:00 pm)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	82.9	9.53	36			72		
2	82.2	9.71	38			74		
4	81.7	9.88	40			76		
6	80.6	9.99	42			78		
8	80.2	10.03	44			80		
10	79.3	10.00	46			82		
12	77.0	10.33	48			84		
14	70.7	9.15	50			86		
16	63.0	9.20	52			88		
18	57.7	8.69	54			90		
20	54.3	11.75	56			92		
22	51.4	0.88	58			94		
24	50.0	0.69	60			96		
26	49.5	0.66	62			98		
28	48.9	0.66	64			100		
30	48.7	0.66	66					
32	48.6	0.66	68					
34			70					

COMMENTS
**Electrofishing effort for all species = 0.50 h plus extra 0.25 h for largemouth bass only = 0.75 h total for bass
**Electrofisher settings: 354 to 530 volts DC, pulse width = 4 ms (4.0 to 5.0 amps);
Limits of thermocline

*ppm-parts per million

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT

*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	882	65.8	1.8-9.8	51.39	30.3
Redear sunfish	179	13.3	2.1-9.6	13.53	8.0
Longear sunfish	95	7.1	2.0-6.0	3.38	2.0
Largemouth bass	65	4.8	2.9-15.4	51.81	30.5
Hybrid sunfish	47	3.5	2.2-8.2	4.88	2.9
Black crappie	22	1.6	4.2-8.0	3.47	2.0
Green sunfish	18	1.3	2.1-6.5	0.79	0.5
Channel catfish	16	1.2	11.2-28.0	34.64	20.4
Golden shiner	11	0.8	8.7-9.7	3.67	2.2
Yellow bullhead	6	0.4	6.0-10.2	2.04	1.2
Observed species					
Blackstriped topminnow					
Western mosquitofish					
Species collected in past surveys					
Black bullhead					
White catfish					
White sucker					
Totals (9 species & 1 hybrid)	1,341	100.0		169.60	100.0

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

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	20	2.3	<0.01	1	19.5				
2.0	183	20.7	<0.01	1,2	20.0				
2.5	242	27.4	0.01	1,2	20.5				
3.0	194	22.0	0.02	1,2	21.0				
3.5	64	7.3	0.03	2	21.5				
4.0	39	4.4	0.05	2,3	22.0				
4.5	12	1.4	0.06	2,3	22.5				
5.0	13	1.5	0.09	3	23.0				
5.5	4	0.5	0.12	3,4	23.5				
6.0	9	1.0	0.17	3,4	24.0				
6.5	17	1.9	0.22	3,4	24.5				
7.0	17	1.9	0.27	3,4	25.0				
7.5	33	3.7	0.34	4	25.5				
8.0	22	2.5	0.39	4,5	26.0				
8.5	9	1.0	0.50	4,5,6	TOTAL	882			
9.0	3	0.3	0.56	4,5,6					
9.5	1	0.1	0.75	4,5,6					
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	474.0/hr	GILL NET CATCH	7.6/lift	TRAP NET CATCH	146.0/lift
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AGE-LENGTH KEY FOR BLUEGILL

Length group (in)	Total number	Sub-sample	Age							
			1	2	3	4	5	6	7	
1.0										
1.5	20	2	20							
2.0	183	7	131	52						
2.5	242	5	97	145						
3.0	194	5	39	155						
3.5	64	5		64						
4.0	39	6		33	7					
4.5	12	4		3	9					
5.0	13	8			13					
5.5	4	4			3	1				
6.0	9	8			7	2				
6.5	17	6			6	11				
7.0	17	5			7	10				
7.5	33	6				33				
8.0	22	7				16	6			
8.5	9	6				2	6	2		
9.0	3	3				1	1	1		
9.5	1									
Total	882	87	286	452	51	76	13	3	0	

GROWTH SUMMARY FOR BLUEGILL AT DATE OF CAPTURE

Lake: Lake John Hay
 Date: 7/10/2006 to 7/12/2006
 Species: Bluegill

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	286	2.5	0.17	0.02	2.5	2.6
2	452	3.1	0.30	0.03	3.1	3.2
3	51	5.6	0.98	0.14	5.4	5.9
4	76	7.6	0.39	0.07	7.5	7.7
5	13	8.6	0.11	0.09	8.4	8.7
6	3	9.0	0.10	0.20	8.6	9.4

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF REDEAR SUNFISH

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	27	15.1	<0.01	1	20.0				
2.5	18	10.1	0.01	1,2	20.5				
3.0	33	18.4	0.02	2,3	21.0				
3.5	26	14.5	0.03	2,3	21.5				
4.0	16	8.9	0.05	2,3	22.0				
4.5	10	5.6	0.06	3,4	22.5				
5.0	11	6.1	0.10	3,4,5	23.0				
5.5	14	7.8	0.13	3,4	23.5				
6.0	7	3.9	0.16	4,5	24.0				
6.5	4	2.2	0.23	4	24.5				
7.0	3	1.7	0.26	4,5	25.0				
7.5					25.5				
8.0	6	3.4	0.41	4,5	26.0				
8.5	2	1.1	0.44	---	TOTAL	179			
9.0	1	0.6	0.57	---					
9.5	1	0.6	0.56	5					
10.0									
10.5									(% > 7.0" = 13/129(100) = 7.3)
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	0.0/hr	GILL NET CATCH	1.0/lift	TRAP NET CATCH	42.8/lift
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AGE-LENGTH KEY FOR REDEAR SUNFISH

Length group (in)	Total number	Sub-sample	Age						
			1	2	3	4	5	6	7
1.0									
1.5									
2.0	27	5	27						
2.5	18	7	8	10					
3.0	33	5		26	7				
3.5	26	5		10	16				
4.0	16	5		3	13				
4.5	10	5			6	4			
5.0	11	7			5	5	2		
5.5	14	6			5	9			
6.0	7	4				5	2		
6.5	4	4				4			
7.0	3	3				2	1		
7.5									
8.0	6	6				5	1		
8.5	2								
9.0	1								
9.5	1	1					1		
Total	179	63	35	50	50	34	6	0	0

GROWTH SUMMARY FOR REDEAR SUNFISH AT DATE OF CAPTURE

Lake: Lake John Hay
 Date: 7/10/2006 to 7/12/2006
 Species: Redear sunfish

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	35	2.4	0.04	0.04	2.3	2.4
2	50	3.3	0.17	0.06	3.2	3.4
3	50	4.3	0.55	0.10	4.0	4.5
4	34	6.2	1.17	0.18	5.8	6.6
5	6	7.0	2.81	0.67	5.7	8.4

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	1	1.5	0.01		20.5				
3.0					21.0				
3.5	1	1.5	0.03	1	21.5				
4.0	1	1.5	0.03	1	22.0				
4.5	3	4.6	0.04	1	22.5				
5.0					23.0				
5.5	3	4.6	0.09	1	23.5				
6.0	3	4.6	0.12	1	24.0				
6.5	1	1.5	0.16	1	24.5				
7.0	2	3.1	0.19	1,2	25.0				
7.5	1	1.5	0.19	1	25.5				
8.0	1	1.5	0.28	1	26.0				
8.5	2	3.1	0.28	2	TOTAL	65			
9.0	3	4.6	0.39	2					
9.5	3	4.6	0.43	2,3					
10.0	1	1.5	0.48	3			(PSD = 27/40(100) = 67.5)		
10.5	1	1.5	0.57	3			(% ≥ 14.0" = 12/65(100) = 18.4)		
11.0	3	4.6	0.67	3					
11.5	1	1.5	0.74	3					
12.0	6	9.2	0.84	3,4,5					
12.5	6	9.2	1.03	4,5					
13.0	5	7.7	1.15	4,5					
13.5	5	7.7	1.30	4,5					
14.0	2	3.1	1.39	4,5					
14.5	7	10.8	1.65	5,6					
15.0	3	4.6	1.79	5,6					
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	61.3/hr	GILL NET CATCH	1.6/lift	TRAP NET CATCH	1.5/lift
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AGE-LENGTH KEY FOR LARGEMOUTH BASS

Length group (in)	Total number	Sub-sample	Age						
			1	2	3	4	5	6	7
1.0									
1.5									
2.0									
2.5	1	1							
3.0									
3.5	1	1	1						
4.0	1	1	1						
4.5	3	3	3						
5.0									
5.5	3	3	3						
6.0	3	3	3						
6.5	1	1	1						
7.0	2	2	1	1					
7.5	1	1	1						
8.0	1	1	1						
8.5	2	2		2					
9.0	3	3		3					
9.5	3	3		2	1				
10.0	1	1			1				
10.5	1	1			1				
11.0	3	3			3				
11.5	1	1			1				
12.0	6	5			1	4	1		
12.5	6	6				5	1		
13.0	5	4				1	4		
13.5	5	5				2	3		
14.0	2	2				1	1		
14.5	7	7					5	2	
15.0	3	3					2	1	
Total	65	63	15	8	8	13	17	3	0

GROWTH SUMMARY FOR LARGEMOUTH BASS AT DATE OF CAPTURE

Lake: Lake John Hay
 Date: 7/10/2006 to 7/12/2006
 Species: Largemouth bass

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	15	5.9	1.66	0.33	5.2	6.5
2	8	9.0	0.64	0.28	8.4	9.6
3	8	11.1	0.66	0.28	10.5	11.7
4	13	12.9	0.43	0.18	12.6	13.3
5	17	14.0	0.85	0.22	13.5	14.4
6	3	14.9	0.08	0.17	14.6	15.3

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF HYBRID SUNFISH

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	5	10.6	0.01	Not aged	20.0				
2.5	4	8.5	0.02		20.5				
3.0	2	4.3	0.03		21.0				
3.5	8	17.0	0.03		21.5				
4.0	2	4.3	0.06		22.0				
4.5	5	10.6	0.07		22.5				
5.0	6	12.8	0.11		23.0				
5.5	4	8.5	0.13		23.5				
6.0	4	8.5	0.16		24.0				
6.5					24.5				
7.0	3	6.4	0.26		25.0				
7.5	3	6.4	0.34		25.5				
8.0	1	2.1	0.39		26.0				
8.5					TOTAL	47			
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									

(% ≥ 6.0" = 11/47(100) = 23.4)

ELECTROFISHING CATCH	4.0/hr	GILL NET CATCH	1.0/lift	TRAP NET CATCH	9.3/lift
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NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLACK CRAPPIE

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	1	4.5	0.03	1	22.0					
4.5	2	9.1	0.04	1	22.5					
5.0	2	9.1	0.07	1	23.0					
5.5	1	4.5	0.08	1	23.5					
6.0	1	4.5	0.10	2	24.0					
6.5	1	4.5	0.17	2	24.5					
7.0	7	31.8	0.18	2	25.0					
7.5	4	18.2	0.22	2	25.5					
8.0	3	13.6	0.24	2	26.0					
8.5					TOTAL	22				
9.0										
9.5										
10.0							(% ≥ 8.0" = 3/22(100) = 13.6)			
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	0.0/hr	GILL NET CATCH	2.8/lift	TRAP NET CATCH	0.0/lift
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AGE-LENGTH KEY FOR BLACK CRAPPIE

Length group (in)	Total number	Sub-sample	Age						
			1	2	3	4	5	6	7
1.0									
1.5									
2.0									
2.5									
3.0									
3.5									
4.0	1	1	1						
4.5	2	1	2						
5.0	2	2	2						
5.5	1	1	1						
6.0	1	1		1					
6.5	1	1		1					
7.0	7	6		7					
7.5	4	3		4					
8.0	3	2		3					
Total	22	18	6	16	0	0	0	0	0

GROWTH SUMMARY FOR BLACK CRAPPIE AT DATE OF CAPTURE

Lake: Lake John Hay
 Date: 7/10/2006 to 7/12/2006
 Species: Black crappie

Age	Number	Mean TL	Var	SE	Lo 95%CI	Up 95%CI
1	6	5.0	0.28	0.21	4.6	5.4
2	16	7.5	0.30	0.14	7.2	7.7

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF CHANNEL CATFISH

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	2	19.0	2.16	
1.5					19.5				
2.0					20.0	1	9.5	2.69	
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0	1	9.5	4.62	
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0	1	9.5	7.75	
8.5					26.5				
9.0					27.0				
9.5					27.5				
10.0					28.0	1	9.5	7.81	
10.5					TOTAL	16			
11.0	2	12.5	0.41	Not aged					
11.5	3	18.8	0.47						
12.0	1	6.3	0.53						(% ≥ 16.0" = 8/16(100) = 50.0)
12.5									
13.0									
13.5	2	12.5	0.74						
14.0									
14.5									
15.0									
15.5									
16.0									
16.5	1	6.3	1.34						
17.0	1	6.3	1.88						
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	0.0/hr	GILL NET CATCH	2.0/lift	TRAP NET CATCH	0.0/lift
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Occurrence and Abundance of Submersed Aquatic Plants in Lake John Hay

Date:	8/9/06	Littoral sites with plants:	50	Species diversity:	0.62
Littoral depth (ft):	17.5	Number of species:	6	Native diversity:	0.47
Littoral sites:	53	Maximum species/site:	4	Rake diversity:	0.53
Total sites:	60	Mean number species/site:	1.70	Native rake diversity:	0.39
Secchi (ft):	13.3	Mean native species/site:	1.36	*Mean rake score:	4.34

Common Name	Site frequency	Relative density	Mean density	Dominance
Coontail	94.3	4.00	4.24	80.0
Eurasian watermilfoil**	34.0	0.91	2.67	18.1
Brittle naiad	28.3	1.00	3.53	20.0
Filamentous algae	22.6			
American pondweed	5.7	0.13	2.33	2.6
Southern naiad	5.7	0.09	1.67	1.9
Small pondweed	1.9	0.06	3.00	1.1

**Exotic plant

GPS LOCATION OF SAMPLING EQUIPMENT

GILL NETS			TRAP NETS			ELECTROFISHING		
1	N 38.68874	W -86.14275	1	N 38.69112	W -86.14526	1	N 38.69261	W -86.15451
	N 38.68875	W -86.14365	2	N 38.69083	W -86.14670		N 38.68908	W -86.15611
2	N 38.69045	W -86.14442	3	N 38.69196	W -86.15188	2	N 38.68729	W -86.14508
	N 38.68988	W -86.14399	4	N 38.68589	W -86.15651		N 38.68728	W -86.14502
3	N 38.69004	W -86.14688	5	N	W	3	N 38.68756	W -86.14799
	N 38.69008	W -86.14781	6	N	W		N 38.68577	W -86.14431
4	N 38.68724	W -86.15049	7	N	W	4	N	W
	N 38.68794	W -86.15053	8	N	W		N	W
5	N 38.69129	W -86.15553	9	N	W	5	N	W
	N 38.69191	W -86.15513	10	N	W		N	W
6	N 38.68145	W -86.15659	11	N	W	6	N	W
	N 38.68209	W -86.15677	12	N	W		N	W
7	N 38.68613	W -86.15409	13	N	W	7	N	W
	N 38.68555	W -86.15430	14	N	W		N	W
8	N 38.69099	W -86.14965	15	N	W	8	N	W
	N 38.69121	W -86.15052	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				12	N	W
	N	W					N	W
13	N	W				13	N	W
	N	W					N	W
14	N	W				14	N	W
	N	W					N	W
15	N	W				15	N	W
	N	W					N	W
16	N	W				16	N	W
	N	W					N	W
17	N	W				17	N	W
	N	W					N	W
18	N	W				18	N	W
	N	W					N	W
19	N	W				19	N	W
	N	W					N	W
20	N	W				20	N	W
	N	W					N	W