



Sample of a Trapnet Catch in Rice Lake, July, 2014

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2014

Survey Dates: July 16 - 18, 2014

MnDNR Permit Number: 19901

Submitted to:
Rice Lake Area
Association and the
City of Maple Grove



Prepared by:
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December 1, 2014

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2014

Summary

Rice Lake is an 314 acre lake located in Hennepin County, Minnesota.

On July 16, 17, and 18, 2014, a fish survey using standard trapnets was conducted for Rice Lake. The objective of the fish survey was to characterize existing fish conditions and to determine if fish densities were high enough to be contributing to the observed poor water quality in Rice Lake.

Results of the 2014 fish survey are shown in Table S1. The effects of a 2013-2014 winterkill were noticed. The fish catch was dominated by young of the year black bullheads and carp. Adult bluegill sunfish and golden shiners were present indicating there was significant immigration from other sources, probably Elm Creek. A total of twelve fish species were observed.

Table S1. Rice Lake trapnet results for fish surveys conducted in 2014 and 2008 by Blue Water Science and in 1979, 1985, 1994 by the MnDNR. Fish data are shown as fish/trapnet. YOY = young of the year.

	1979 July 12 (5 nets) (MnDNR)	1985 July 9 (8 nets) (MnDNR)	1994 July 11 (9 nets) (MnDNR)	2008 Aug 19-21 (12 nets) (BWS)	2014 July 17-18 (12 nets) (BWS)	DNR Range
Bullhead - Black	99	116	1.7	177	7.6	0.7 - 26
Bullhead - Brown			0.1			1.4 - 6.6
Bullhead - Yellow	0.4	2.8	0.4	0.9	1.0	0.8 - 6.2
Carp		2.1	0.3	3.8	0.3	1.0 - 3.6
Crappie - Black	1.4	17	35	46	2.8	1.8 - 21
Crappie - White			0.4			2.5 - 11.6
Dogfish (Bowfin)		0.3	1.1	0.2		0.5 - 1.7
Golden Shiner				1.8	16	NA
Largemouth Bass		0.1	0.4	1.8	0.5	0.3 - 1.2
Northern Pike	0.4	3.1	0.3	0.1	1.3	NA
Sunfish - Bluegill	2.6	42	40	37	62	7.5 - 63
Sunfish - Green		0.4	0.6		0.1	0.2 - 2.0
Sunfish - Hybrid		9.3	1.9			NA
Sunfish - Orangespot			0.1			NA
Sunfish - Pumpkinseed		2.1	10	1.0	0.1	0.8 - 8.4
Tadpole madtom (small bullhead)	0.2					NA
White Sucker		2	0.2	6.5	0.1	0.3 - 2.2
Yellow Perch	3.6	21	8.9	4.2	0.7	0.5 - 3.4
Bullhead - Black YOY				16	654	NA
Carp YOY					405	NA
Crappie - Black YOY					1.3	NA
Sunfish - Bluegill YOY					2.7	NA

Conclusions and Recommendations

Objectives of this fish survey were to evaluate the effects of the 2013-2014 winterkill and to determine if fish were having an impact on water quality of Rice Lake. Listed below are observations and recommendations:

- Lake phosphorus modeling indicates that Elm Creek is a major phosphorus source to Rice Lake as well as phosphorus coming from the lake sediments. However, this shallow lake is well-mixed throughout the summer so phosphorus release from anoxic conditions is unlikely. Also the algae blooms start early and extend well into fall, times when the lake should be well-oxygenated and phosphorus release would be low and not influencing algae blooms.
- Evidence supports the influence of fish as a phosphorus source and impacting algae blooms in Rice Lake. The 2008 fish survey found elevated numbers of adult bullheads and carp and poor water quality (Table S1 and Figure S1). Few adult predator fish such as bass, northern pike, or walleyes were found in 2008.
- In the 2014 fish survey, adult bullheads and carp catch rates were lower compared to the 2008 fish survey (Table S1). Water quality was better in 2014 compared to 2008. The winterkill over the 2013-2014 winter likely reduced the adult population of bullheads and carp.
- However, young of the year carp and bullheads were abundant in 2014 and have the potential to produce poor water quality in the future.
- A lake drawdown with no aeration should reset conditions in Rice Lake, but immigration of fish from Elm Creek is likely. Therefore, a restocking program that emphasizes a predator control component should be considered. Stocking 1-year old bass in the spring of 2015 and then crappies in the fall would help. Walleyes could be considered, but they have not been a factor in the past.
- Because of the possible overwhelming recruitment of bullheads and carp from Elm Creek, the chances of a long-term “balanced” fish community remains a challenge. The best long term strategy is to lower phosphorus concentrations in Elm Creek which would reduce phosphorus loading to Rice Lake and improve water quality. After water quality is improved, then fish restructuring would be more effective and possibly sustaining.



Young of the year carp in 2014.



Young of the year black bullheads in 2014.

Rice Lake Water Quality

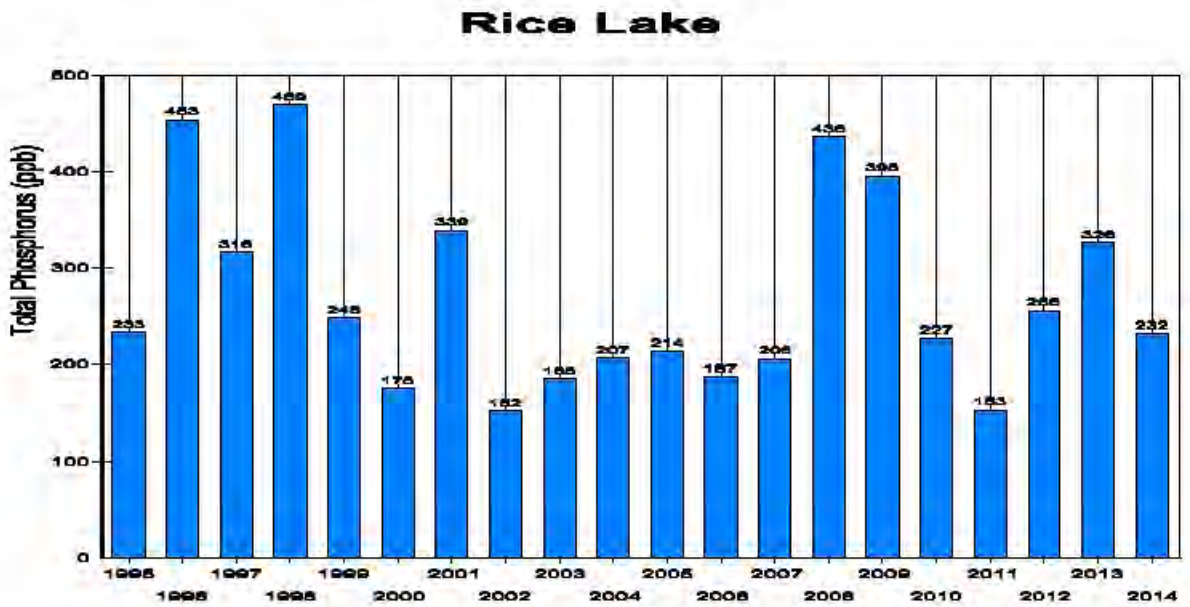
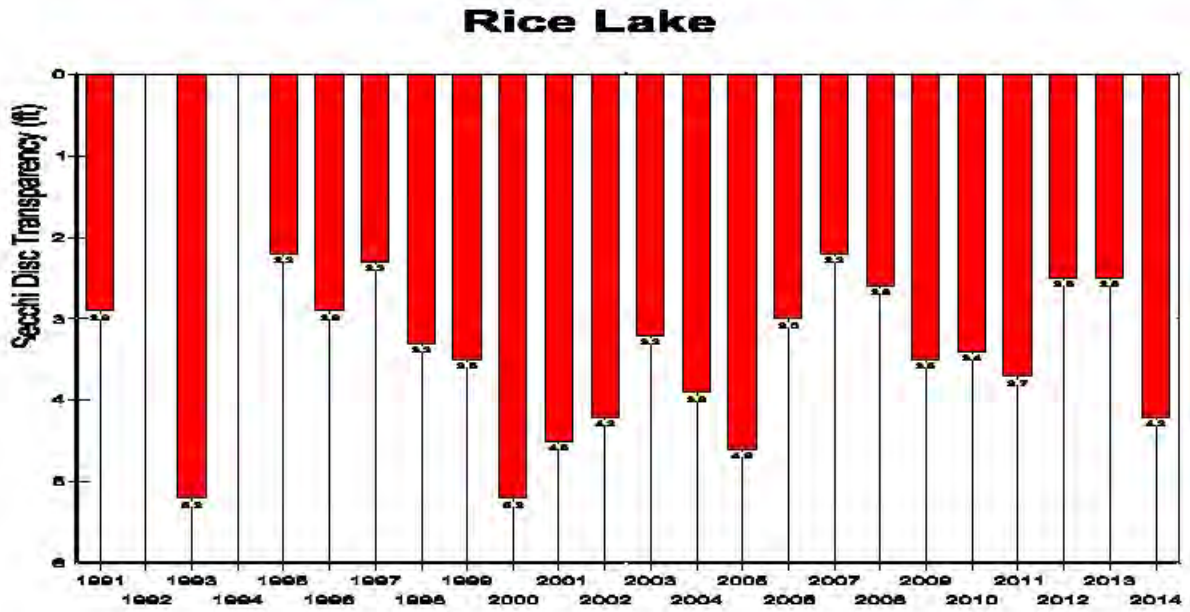


Figure S1. Seasonal averages (May - September) for Secchi disc transparency (top) and total phosphorus (bottom).

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2014

Introduction

Rice Lake is a 314-acre lake, located in Hennepin County, Minnesota.

In July of 2014, the Rice Lake Area Association contracted for a fish survey with Blue Water Science with a permit granted from the MnDNR. The objectives were to characterize the fish community and to determine if fish were contributing to the poor water quality or lack of submerged aquatic plants that have been observed in Rice Lake.

Methods

Six standard trapnets were used for two days to survey fish in Rice Lake. The standard trapnet was a MnDNR-style with a 4 x 6 feet square frame with two funnel mouth openings and 50-foot lead. Net mesh size was ½ inch (bar length). The trapnets were set on Wednesday morning July 16, 2014. The nets were fished for the following 2 days (July 17 and 18). Trapnet locations are shown in Figure 1 and pictures of a typical trapnet are shown in Figure 2.

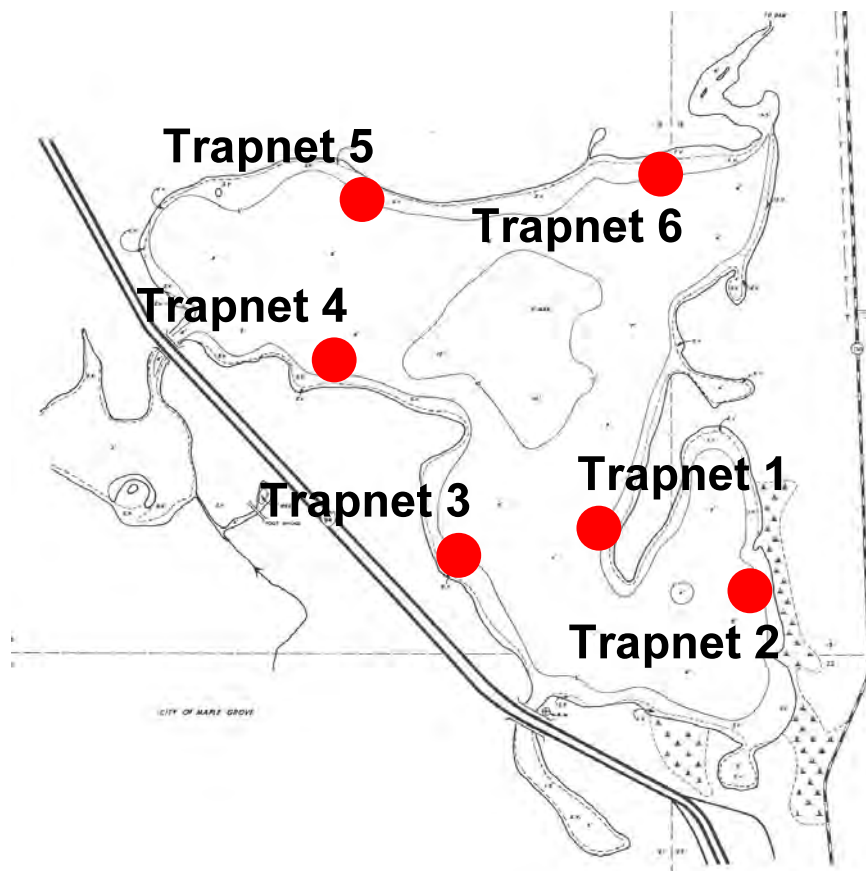


Figure 1. Map of standard trapnet sets (red) for 2014.

Trapnetting Method



Figure 2. [top] A trapnet is a live fish trap. Fish run into the 50-foot lead net and follow it back through a series of hoops with funnel mouths. Fish end up in the back hoop. [middle] A handheld net is used to remove the fish from the back of the trapnet. [bottom] Fish are transferred to tubs, then they are counted, measured, and released.

Results

Standard Trapnets: A total of 12 fish species were sampled in Rice Lake on July 16-18, 2014. The fish catch was dominated by black bullheads, bluegill sunfish, and golden shiners. The number of bluegill sunfish caught per net was high with the average haul of 62 per net (Table 1). This is above the normal range of 1.9-30 bluegill sunfish per lift for a lake like Rice Lake.

Table 1. Rice Lake trapnet results for the fish survey conducted in July 2014.

	Fish Captured (July 17-18 2014)												Total Catch	2014 Fish per Net (n=12)	Normal Range (MnDNR)
	Net 1		Net 2		Net 3		Net 4		Net 5		Net 6				
	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2			
Black bullhead (<i>Ameiurus melas</i>)	15	13	8	9	5		5		11	8	8	9	91	7.6	2.2 - 60.5
Black crappies (<i>Pomoxis nigromaculatus</i>)	2	4	1	1	3	1	6		4	8	1	2	33	2.8	2.4 - 15.1
Bluegill sunfish (<i>Lepomis macrochirus</i>)	68	51	95	56	44	10	75	1	184	71	82	12	749	62	1.9 - 29.5
Carp (<i>Cyprinus carpio</i>)			1		1		1						3	0.3	1.0 - 3.6
Golden shiner (<i>Notemigonus crysoleucas</i>)	18	17	10	1	9	1	7	1	58	30	15	27	194	16	NA
Green Sunfish (<i>Lepomis cyanellus</i>)				1									1	0.1	0.2 - 2.0
Largemouth bass (<i>Micropterus salmoides</i>)					1		2			1	1	1	6	0.5	0.3 - 1.2
Northern Pike (<i>Esox lucius</i>)			3	5							4	4	16	1.3	NA
Pumpkinseed sunfish (<i>Lepomis gibbosus</i>)											1		1	0.1	0.8 - 8.4
White sucker (<i>Catostomus commersonii</i>)											1		1	0.1	0.3 - 2.2
Yellow bullheads (<i>Ameiurus natalis</i>)			5	5						1		1	12	1.0	0.8 - 6.2
Yellow perch (<i>Perca flavescens</i>)			2	2	1		1			1	1		8	0.7	0.5 - 3.4
TOTAL FISH	103	85	125	80	64	12	97	2	257	120	114	56	1,115	92.9	
Turtles - painted			2	1	13	1	5		1	1	11	1	36	1.5	
Turtles - snapping					2			1			2		5	0.9	
Black bullhead YOY (<i>Ameiurus melas</i>)			4,852	190	2,710	95							7,847	654	NA
Black crappies YOY (<i>Pomoxis nigromaculatus</i>)						5		10					15	1.3	NA
Bluegill sunfish YOY (<i>Lepomis macrochirus</i>)						10	16	6					32	2.7	NA
Carp YOY (<i>Cyprinus carpio</i>)	15	12	756	1,036	626	39	100	12	456	939	25	846	4,862	405	NA

Fish Size Distribution: Length frequencies for Rice Lake fish species surveyed in 2014 are shown in Table 2. The size of the existing fish indicates they are several years old and that bullheads and sunfish are surviving the winter conditions. A few small largemouth bass indicate successful spawning is occurring in the system.

Table 2. Length frequency of fish species (as total length) for the Rice Lake fish survey from the standard trapnets for 2014 (young of the year bullhead lengths are not shown).

size (inches)	Black bullhead	Bluegills	Carp	Crappies	Golden shiner	Green sunfish	Large-mouth bass	Northern pike	Pumpkin-seeds	White suckers	Yellow bullhead	Yellow perch
<3		32		15								
3		6	4				1					1
3.5			6									
4		3	28		3		2					1
4.5		3	65	1	9	1			1			
5		2	61	1	10							
5.5		3	65	1	6							
6	4	25	13		53			1			2	1
6.5	1	154	2		38							
7	3	144		1	34			1			1	
7.5	1	43		6	1			4			1	2
8	2	1		8				2				3
8.5				12				2			2	
9	7			3				4			1	
9.5	12							1			3	
10	22							1			2	
10.5	26											
11	13											
11.5												
12												
12.5												
13												
13.5												
14												
14.5												
15							1			1		
15.5												
16												
16.5												
17							1					
18												
19							1					
20												
21												
22												
23												
24			1									
25			1									
26			1									

Examples of Rice Lake Fish Species



Black and yellow bullhead fry



Bluegill sunfish



Carp



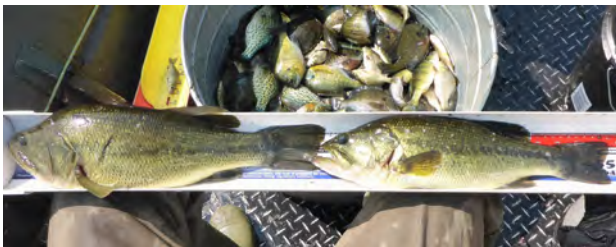
Mirror carp (put under the carp lengths)



Black crappies



Golden shiner



Largemouth bass



Northern pike



Yellow perch

Turtles: Both painted turtles and snapping turtles were common in Rice Lake.

Table 3. Rice Lake painted turtle and snapping turtle catch per net for the two netting days.

Trapnets

Net	Day 1		Day 2		TOTAL	
	Painted	Snapping	Painted	Snapping	Painted	Snapping
1					0	0
2	2		1		3	0
3	13	2	1		14	2
4	5			1	5	1
5	1		1		2	0
6	11	2	1		12	2
Total Turtles Caught	32	4	4	1	36	5
Average number/lift	5.3	0.7	0.7	0.2	3	0.4

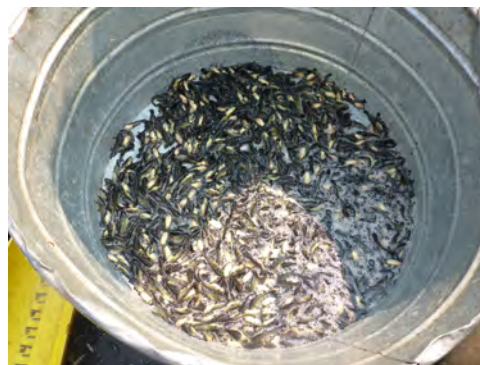
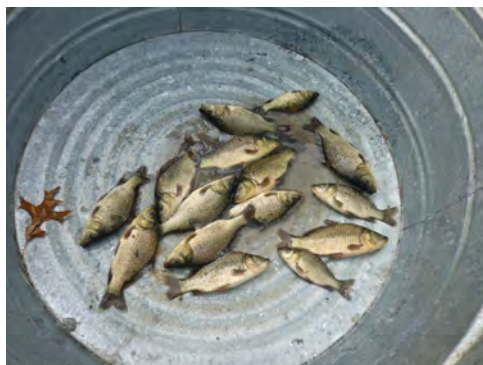


Rice Lake snapping turtle.

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- Because of the possible overwhelming recruitment of bullheads and carp from Elm Creek, the chances of a long-term “balanced” fish community remains a challenge. The best long term strategy is to lower phosphorus concentrations in Elm Creek which would reduce phosphorus loading to Rice Lake and improve water quality. After water quality is improved, then fish restructuring would be more effective and possibly sustaining.



[right] Young of the year carp in 2014.
[left] Young of the year black bullheads in 2014.

Appendix

Appendix: E-Mail Notification of Fish Survey to Be Conducted

From: Steve McComas [mailto:mccomas@pclink.com]

Sent: Monday, July 14, 2014 9:58 AM

To: Daryl Ellison ; Greg Salo

Cc: George Schneider; Rick Lestina (RLestina@maplegrovern.gov); Mark Lahtinen

Subject: Fish survey notification for Rice Lake, Hennepin County

Hello all,

Blue Water Science will be conducting a fish survey in Rice Lake (MN ID 27-116), Hennepin County, starting on Wednesday, July 16, 2014. We will set 6 fyke nets on Wednesday. The nets will be monitored daily on Thursday and Friday and all fish will be weighed and measured and returned to the lake. The nets will be removed from the lake on Friday, July 18. The fish survey is sponsored by the City of Maple Grove and the Rice Lake Association with the objectives of characterizing the existing fish community structure, assessing potential impacts of fish on water quality, and determining potential winterkill effects on the lake community.

This survey is being conducted under the permit number: 19901.

Thank you,

Steve McComas

BLUE WATER SCIENCE

550 South Snelling Avenue

St. Paul, MN 55116

651 690 9602

mccomas@pclink.com

Appendix: 2008 Rice Lake Trapnet Results

Rice Lake trapnet results for the fish survey conducted in August 2008.

Net	Bluegill	Bullhead Black	Bullhead Black YOY	Bullhead Yellow	Black Crappie	Carp	Dogfish	Golden Shiner	Large-mouth Bass	Northern Pike	Pumpkin-seed	Sucker	Yellow Perch
Tuesday (8/19/08)													
1	37	141		1	30	4			4			3	4
2	64	648	10	2	42	11	1		1	1	1	9	
3	77	112	90	1	65				2		7	21	3
4	2	2		1	7			13					1
subtotal	180	903	100	5	144	15	1	13	7	1	8	33	8
fish/ net	45	226	25	1.3	36	3.8	0.3	3.3	1.8	0.3	2.0	8.3	2.0
Wednesday (8/20/08)													
1	61	163		3	46	2			1		1	7	25
2	43	100	24		70	12			1		2	2	2
3	51	236	61		63	4			3		1		5
4	3	16			8	1		5					1
subtotal	158	515	65	3	187	19	0	5	5	0	4	9	33
fish/ net	40	129	16	0.8	47	4.8		1.3	1.3		1.0	2.3	8.3
Thursday (8/21/08)													
1	9	49		1	64	3		3	5			17	8
2	56	86		1	78	4	1		4			12	
3	42	555	26	1	70	3			1			7	
4	2	16			6	2		1					1
subtotal	109	706	26	3	218	12	1	4	10	0	0	36	9
fish/ net	27	177	6.5	0.8	55	3.0	0.3	1.0	2.5			9.0	2.3
Total Fish (12 nets)	447	2,124	191	11	549*	46	2	22	22	1	12	78	50
Fish/ Trapnet	37	177	16	0.9	46	3.8	0.2	1.8	1.8	0.1	1.0	6.5	4.2
MnDNR Normal Range*	7.5 - 63	0.7 - 26	NA	0.8 - 6.2	1.8 - 21	1.0 - 3.6	0.5 - 1.7	NA	0.3 - 1.2	NA	0.8 - 8.4	0.3 - 2.2	0.5 - 3.4

* 27 YOY black crappies were involved in total count

Rice Lake mini-trapnet results for the fish survey conducted in August 2008.

Net	Bluegill	Bluegill YOY	Bullhead Black	Bullhead Black YOY	Bullhead Yellow	Black Crappie	Black Crappie YOY	Carp	Golden Shiner	Large-mouth Bass	Pumpkin-seed	Sucker	Yellow Perch
Tuesday (8/19/08)													
1	18		17	42		31	1	2	6	2			9
2	6	1,620	1			2							1
3*	4	30	7		1	13	16	2		1	1		2
subtotal	28	1,650	25	42	1	46	17	4	6	3	1	0	12
fish/ net	9.3	550	8.3	14	0.3	15	5.7	1.3	2.0	1.0	0.3		4.0
Wednesday (8/20/08)													
1	15		1	26		13		3	2				2
2	8	1,500	2										
3	9		13	52		19				1			2
subtotal	32	1,500	16	78		32		3	2	1	0	0	4
fish/ net	11	500	5.3	26		11		1.0	0.7	0.3			1.3
Thursday (8/21/08)													
1	3			25		11			1				
2*	4	750				6		1	1	4			2
3	3	50	9	2	2	10	16			4		2	10
subtotal	10	800	8	27	2	27	16	1	2	8	0	2	12
fish/ net	3.3	267	3.0	9.0	0.7	9.0	5.3	0.3	0.7	2.7		0.7	4.0
Total Fish (9 nets)	70	3,950	50	147	3	105	33	8	10	12	1	2	28
Fish/ Mini Trapnet	7.8	439	5.6	16	0.3	12	3.7	0.9	1.1	1.3	0.1	0.2	3.1

*Day 1; net 3: crayfish = 1

Day 3; net 2: shiner minnows = 2

Length frequency of fish species (as total length) for the Rice Lake fish survey from the standard trapnets.

Size Range (in)	Bluegill	Black Bullhead	Black Crappie	Carp	Dogfish	Golden Shiner	Largemouth Bass	Northern Pike	Pumpkin-seed	Sucker	Yellow Perch
<3.0											
3.0							2				
3.5							2				
4.0	1						2				
4.5											
5.0	14					3	5		7		
5.5	21								1		
6.0	88	1	3			10					6
6.5	60	1				3					2
7.0	55	4	6			4	1				22
7.5	5	4	9								7
8.0	1	22	87			1					9
8.5		2	42								3
9.0			76								
9.5			4								
10.0		2	4								
10.5		1									
11.0											
11.5											
12							1				
13							1			1	
14							1				
15							1			1	
16							3			6	
17										24	
18							2			21	
19										22	
20										2	
21				8						1	
22				9	2						
23				7							
24				11							
25				3							
26				2							
27								1			
28											
29											
30				1				1			
31				1							

Rice Lake painted turtle and snapping turtle catch per net for the three netting days.

Trapnets

Net	Day 1		Day 2		Day 3			TOTAL		
	Painted	Snapping	Painted	Snapping	Painted	Snapping	Softshell	Painted	Snapping	Softshell
1	21	4	6	3	12			39	7	
2	7	4	6	2	2	1		15	7	
3	5	2	9		7			21	2	
4			1	2		2	1	1	4	1
Total Turtles Caught	33	10	22	7	21	3	1	76	20	1
Average number/lift (12 nets)	8.3	2.5	5.5	1.8	5.3	0.8	0.1			

Mini Trapnets

Net	Day 1		Day 2		Day 3		TOTAL	
	Painted	Snapping	Painted	Snapping	Painted	Snapping	Painted	Snapping
1	1			1	3	1	4	2
2	3		3				6	
3	1		1				2	
Total Turtles Caught	5	0	4	1	3	1	12	2
Average number/lift (12 nets)	1.7		1.3	0.3	1.0	0.3		