



Sample of a Trapnet Catch in Rice Lake, September, 2022

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2022

Survey Dates: September 6-8, 2022

MnDNR Permit Number: 34759

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



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February 8, 2023

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2022

Summary

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

On September 7-8, 2022, 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 2022 fish survey are shown in Table 1. The effects of a 2021-2022 winterkill were noticed. The fish catch was dominated by young carp at extremely high catch rates. Young of the year black bullheads and black crappies were also high. A total of thirteen fish species were observed.

The abundance of young carp, likely 2-year old fish was a surprise. They probably migrated into Rice Lake in 2022 after the fish kill. Seasonal average lake total phosphorus concentrations in 2022 were elevated however water clarity was not much different compared to 2021 (Figure 1).

Table 1. Rice Lake trapnet results for fish surveys conducted in 2008, 2014, 2022 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)	2022 Sept 7-8 (12 nets) (BWS)	DNR Range
Bullhead - Black	99	116	1.7	177	7.6	49	0.7 - 26
Bullhead - Brown			0.1				1.4 - 6.6
Bullhead - Yellow	0.4	2.8	0.4	0.9	1.0	5.3	0.8 - 6.2
Carp		2.1	0.3	3.8	0.3	125	1.0 - 3.6
Crappie - Black	1.4	17	35	46	2.8	58	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	0.1	NA
Largemouth Bass		0.1	0.4	1.8	0.5	3.8	0.3 - 1.2
Northern Pike	0.4	3.1	0.3	0.1	1.3	0.5	NA
Sunfish - Bluegill	2.6	42	40	37	62	7.8	7.5 - 63
Sunfish - Green		0.4	0.6		0.1		0.2 - 2.0
Sunfish - Hybrid		9.3	1.9			0.5	NA
Sunfish - Orangespot			0.1				NA
Sunfish - Pumpkinseed		2.1	10	1.0	0.1	0.1	0.8 - 8.4
Tadpole madtom (small bullhead)	0.2						NA
Walleye						0.1	NA
White Sucker		2	0.2	6.5	0.1	0.2	0.3 - 2.2
Yellow Perch	3.6	21	8.9	4.2	0.7	8.1	0.5 - 3.4
Bullhead - Black YOY				16	654	94	NA
Carp YOY					405	4.2	NA
Crappie - Black YOY					1.3	174	NA
Largemouth bass YOY						0.6	NA
Sunfish - Bluegill YOY					2.7		NA
Yellow perch YOY						0.4	NA

Conclusions and Recommendations

Objectives of this fish survey were to evaluate the effects of previous winterkills 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 1 and Figure 1). 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 1). 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 may have been a factor in reducing water clarity for the next few years.
- The 2022 fish survey was conducted after a significant winter fishkill over the 2021-2022 winter. Small 6 to 8 inch carp were abundant but so were young-of-the-year black crappies. Also, there was an above average adult largemouth bass population. The 2021-2022 fishkill was likely a partial fishkill. Some fish survived and some fish migrated into Rice Lake during the summer.
- Because of the possible overwhelming recruitment of bullheads and carp from Elm Creek, the chances of a long-term “balanced” fish community remain 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.



Although the fishery was dominated by smaller fish some larger carp, largemouth bass, and northern pike were also sampled.

Rice Lake Water Quality

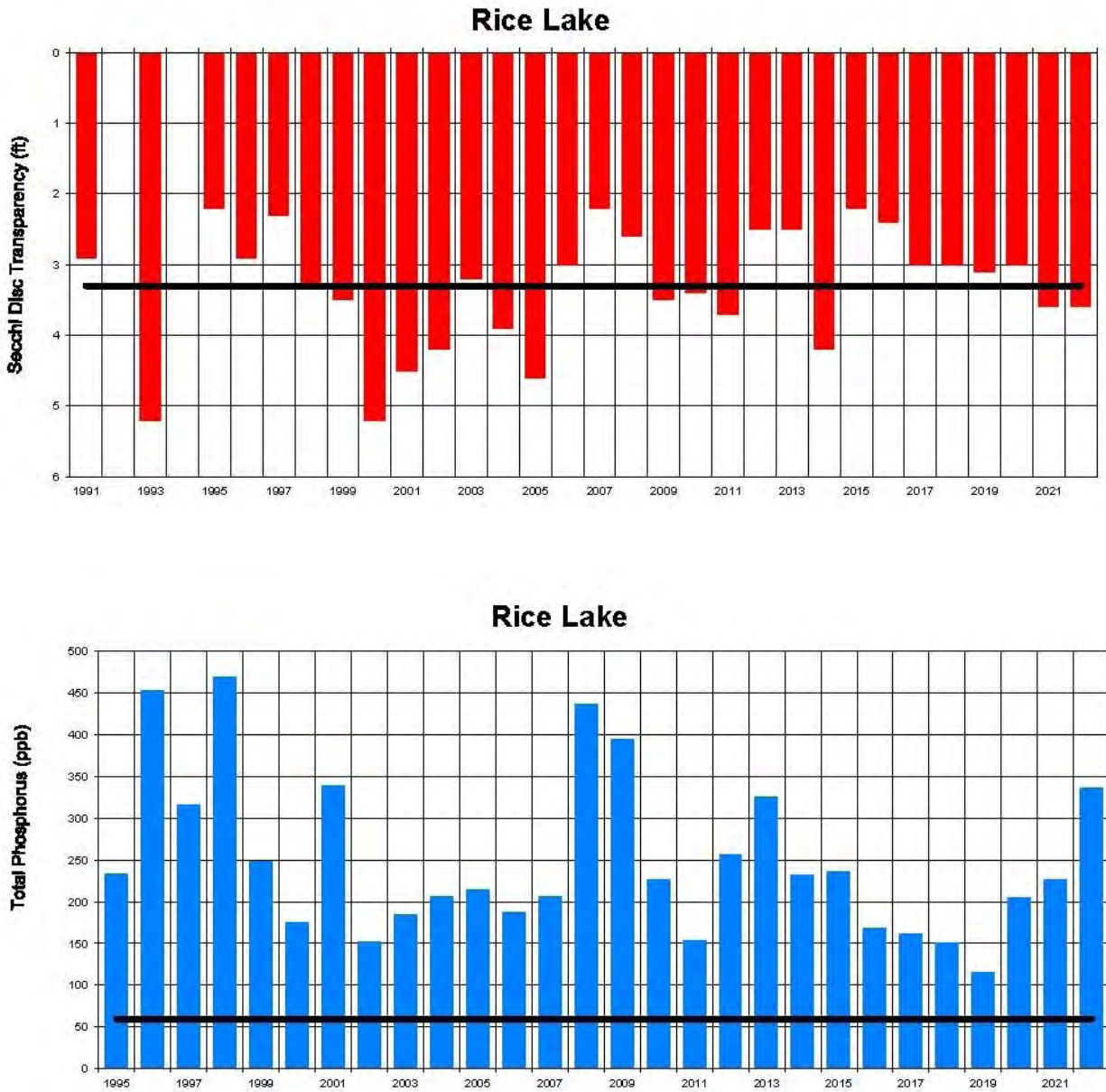


Figure 1. Seasonal averages (May - September) for Secchi disc transparency (top) and total phosphorus (bottom). Recent fish surveys have been conducted in 2008, 2014, and 2022. The black line indicates the threshold for impaired or unimpaired water quality. For Secchi disc transparency, values greater than 3.3 feet are unimpaired. For phosphorus, concentrations less than 60 ppb are unimpaired.

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2022

Introduction

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

In September of 2022, 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 trapnets were used for two days to survey fish in Rice Lake. Two MnDNR-style trapnets with a 3 x 5 feet square frame with five hoops, two funnel mouth openings and a 50-foot lead. Net mesh size was 3/8 inch (bar length). Also, four MnDNR-style trapnets with a 4 x 6 feet square frame with five hoops, two funnel mouth openings and a 50-foot lead. Net mesh size was 1/2 inch (bar length). The trapnets were set on Tuesday morning September 7, 2022. The nets were fished for the following 2 days (September 7 and 8). Trapnet locations are shown in Figure 2 and

pictures of a typical trapnet are shown in Figure 3.

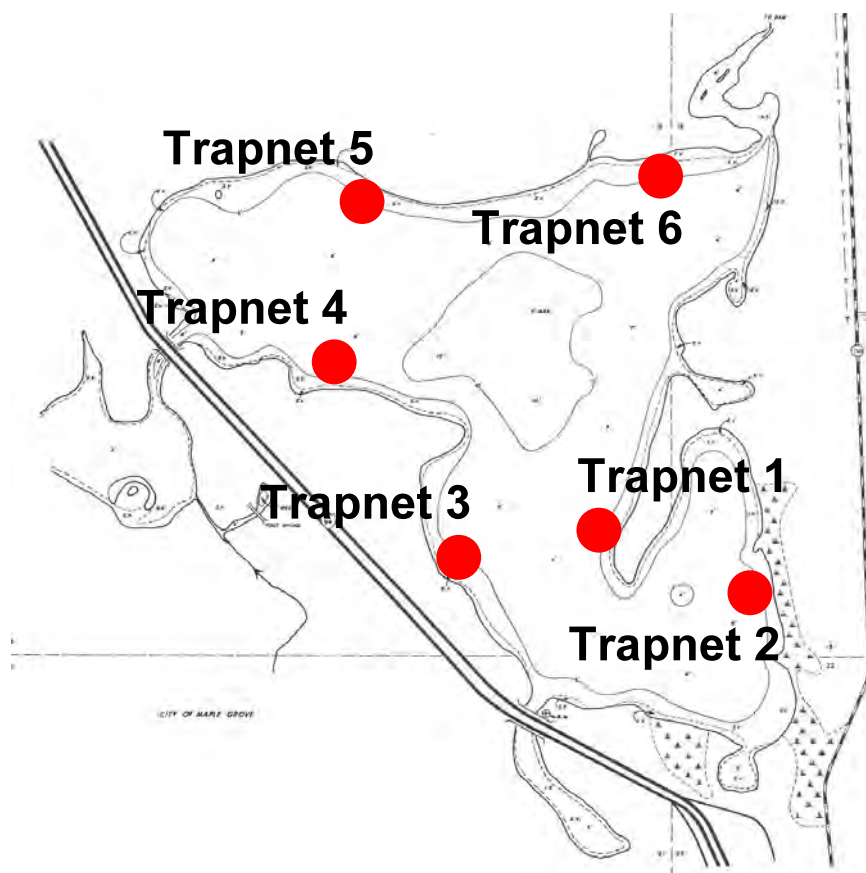


Figure 2. Map of standard trapnet sets (red) for 2022.

Trapnetting Method



Figure 3. [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 13 fish species were sampled in Rice Lake on September 7 and 8, 2022. The fish catch was dominated by black crappies, carp, and black bullheads (Table 2).

Although a fishkill was reported over the 2021-2022 winter, it was likely a partial winterkill. Adult fish for most of the fish species were observed (Tables 2 and 3). Also, successful spawning occurred in 2022 with abundant young-of-the-year black bullheads, crappies, and carp being present. Yellow perch and largemouth bass also showed signs of successful spawning in 2022. An interesting finding was abundance of carp that were 6 to 8 inches in length (Table 3). These are likely 2-year fish and had extremely high densities.

Table 2. Total fish sampled for the Rice Lake fish survey conducted on September 6-8, 2022.

September 2022														
	Net 1		Net 2		Net 3		Net 4		Net 5		Net 6		Total	Fish/net
	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														
YOY (4-6 inch)	500	280	35	38	67	16	33		19		63	80	1131	94
Adults	128	125	15	5	66	83	4	1	70	20	5	70	592	49
Bluegill sunfish														
YOY													0	0
Adults	20	32	3	10	2	8	5		8		4	1	93	7.8
Black crappie														
YOY (less than 3 in)	93	320	440	86	54	520	73		1	26	56	420	2,089	174
Adults	39	68	9	3	7	8	3		94	410	48	3	692	58
Carp														
YOY		50											50	4.2
2 year old fish	408	290	21	57	170	2	240	181	27	2	43	36	1477	123
Adults	1	1	2	1			1	1	3	5	1	4	20	1.7
Largemouth bass														
YOY (less than 5 in)			1		6								7	0.6
Adults	13	16	3		2			2	3	2	5		46	3.8
Northern pike														
Adults		1				3			1	1			6	0.5
Yellow perch														
YOY (less than 4 in)	1						4						5	0.4
Adults	9	20	1		1	6	12	29	5	7	1	6	97	8.1
Golden shiner														
Adults							1						1	0.1
Hybrid sunfish														
Adults	1	2	1		1		1						6	0.5
Pumpkinseed sunfish														
Adults	1												1	0.1
Walleye														
Adults			1										1	0.1
White sucker														
Adults		1							1				2	0.2
Yellow bullhead														
Adults	2	29	4		2		1	1	1	4		19	63	5.3
Total fish caught	1,216	1,235	536	200	376	648	378	215	233	477	226	639	6,379	532
Fish per net	203	206	89	33	63	108	63	36	39	80	38	107	1,065	89

Fish Size Distribution: Length frequencies for Rice Lake fish species surveyed in 2022 are shown in Table 3. The fish length distribution indicates for most fish species there are several year classes present. This indicates that bass, bullheads and crappies may be surviving the winter conditions or there is significant immigration from outside Rice Lake. Largemouth bass sizes indicate successful spawning is occurring in Rice Lake.

Table 3. Length frequency of fish species (as total length) for the Rice Lake fish survey from the standard trapnets for 2022.

Rice	Black bullhead	Black crappie	Bluegill	Carp	Golden shiner	Hybrid sunfish	LM Bass	Northern pike	Pumpkin-seed	Walleye	White sucker	Yellow bullhead	Yellow perch
<3	1131	2472		71									5
3	1												7
3.5		1			1								5
4	2						3						31
4.5				1			2						3
5				9			3						1
5.5				13			1						1
6			7	20			1						1
6.5		1	20	24		1							1
7	1		47	38		2			1				7
7.5		2	18	25									3
8	4	7	3	17		1						2	7
8.5	8	31	3	6		1							10
9	20	94	1	2		1							12
9.5	47	46		2									6
10	76	27					1					2	2
10.5	28	4					1					3	
11	10	1					3					4	
11.5	1						1				1	2	
12							11					2	
12.5	1						2						
13							3						
13.5							10						
14							5						
14.5							4						
15		1					1						
15.5													
16							1						
16.5													
17													
17.5													
18											1		
18.5													
19													
19.5										1			
20													
20.5													
21													
21.5								1					
22													
22.5								1					
23								1					
23.5													
24				1									
24.5													
25													
26				4									
27				2									
28				1									
29				2									
30				5									
31				1									
32				1									
33				2									
34													
35													
36				1									
Measured	1330	2687	99	248	1	6	53	6	1	1	2	15	102
Counted	393	94	0	1298	0	0	0	0	0	0	0	0	0
TOTAL	1723	2781	99	1546	1	6	53	6	1	1	2	15	102
fish/ net (12 nets)	144	232	8.3	129	0.1	0.5	4.4	0.5	0.1	0.1	0.2	1.3	8.5

Turtles: Both painted turtles and snapping turtles were common in Rice Lake. A softshell turtle was also observed.

Table 4. Rice Lake painted turtle and snapping turtle catch per net for the two netting days.

Trapnets

Net	Day 1			Day 2			TOTAL		
	Painted	Snapping	Softshell	Painted	Snapping	Softshell	Painted	Snapping	Softshell
1	1			3		1	4		1
2	4						4		
3	1	1		2			3	1	
4	1						1		
5									
6	2	1		4	1		6	2	
Total Turtles Caught	9	2		9	1	1	18	3	1
Average number/lift	1.5	0.3		1.5	0.2	0.2	1.5	0.3	0.1



Figure 4. Softshell turtle collected in September 2022.

Interesting Fish Related Observations in 2022



Crappies



Northern pike



Bluegills



Largemouth bass



Carp



Walleye

Fish Conditions from Surveys in 2008, 2014, and 2022



2008



2014



2022

Conclusions and Recommendations

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- The 2008 fish survey found elevated numbers of adult bullheads and carp and poor water quality (Table 1 and Figure 1). Few adult predator fish such as bass, northern pike, or walleyes were found in 2008.
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- The 2022 fish survey was conducted after a significant winter fishkill over the 2021-2022 winter. Small 8-10 inch carp were abundant but so were young-of-the-year black crappies. Also, there was an above average largemouth bass population. The 2021-2022 fishkill was likely a partial fishkill. Some fish survived and some fish probably migrated into Rice Lake during the summer.
- 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.

Appendix

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

From: Steve McComas [mailto:mccomas@pmlink.com]
Sent: Friday, September 02, 2022 9:20 AM
To: Daryl Ellison; Capt. Jason Peterson
Cc: George Schneider
Subject: Fish survey in Rice Lake (27-011600)

Hello all,

Blue Water Science will be conducting a fish survey in Rice Lake (MN ID 27-011600), Hennepin County, starting on Tuesday, September 6, 2022. We will set 6 trap nets. The nets will be monitored daily and removed on Thursday (September 8, 2022) and all fish will be weighed, measured, and returned to the lake. The nets will be removed from the lake on Thursday, September 8, 2022. The fish survey is sponsored by the Rice Lake Association with the objectives of characterizing the existing fish community structure and assessing potential impacts of fish on water quality.

This survey is being conducted under the permit number: 34759.

Thank you,

Steve McComas

BLUE WATER SCIENCE

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Appendix: 2014 Rice Lake Trapnet Results

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

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									

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	Largemouth 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	Largemouth 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				1			
27											
28											
29											
30				1				1			
31				1							