



Carp Sampled in Rice Lake, August, 2008

Fish Survey of Rice Lake (ID #27-0116), Hennepin County, Minnesota in 2008

Survey Dates: August 19 - 21, 2008

MnDNR Permit Number: 15390

Submitted to:

Rice Lake Area Association and
City of Maple Grove

Prepared by:

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Summary

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

On August 19, 20, and 21, 2008, a fish survey using standard trapnets and mini-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 2008 fish survey are shown in Table 1. The fish catch was dominated by black bullheads and crappies with a substantial carp population present as well. A total of twelve species were observed.

Table 1. Rice Lake trapnet results for the fish survey conducted from August 19, 20, and 21, 2008 by Blue Water Science and three previous fish surveys conducted by MnDNR. Fish data are shown as fish/trapnet.

	2008 Aug 19-21 (12 nets)	1994 July 11 (9 nets)	1985 July 9 (8 nets)	1979 July 12 (5 nets)	DNR Range	2008 Mini Fyke-net
Bullhead - Black	177	1.7	116	99	0.7 - 26	5.6
Bullhead - Black YOY	16				NA	16
Bullhead - Brown		0.1			1.4 - 6.6	
Bullhead - Yellow	0.9	0.4	2.8	0.4	0.8 - 6.2	0.3
Carp	3.8	0.3	2.1		1.0 - 3.6	0.9
Crappie - Black	46	35	17	1.4	1.8 - 21	12
Crappie - White		0.4			2.5 - 11.6	
Dogfish (Bowfin)	0.2	1.1	0.3		0.5 - 1.7	
Golden Shiner	1.8				NA	1.1
Largemouth Bass	1.8	0.4	0.1		0.3 - 1.2	1.3
Northern Pike	0.1	0.3	3.1	0.4	NA	
Sunfish - Bluegill	37	40	42	2.6	7.5 - 63	7.8
Sunfish - Bluegill YOY					NA	439
Sunfish - Green		0.6	0.4		0.2 - 2.0	
Sunfish - Hybrid		1.9	9.3		NA	
Sunfish - Orangespot		0.1			NA	
Sunfish - Pumpkinseed	1.0	10	2.1		0.8 - 8.4	0.1
Tadpole madtom (small bullhead)				0.2	NA	
White Sucker	6.5	0.2	2		0.3 - 2.2	0.2
Yellow Perch	4.2	8.9	21	3.6	0.5 - 3.4	3.1

Conclusions and Recommendations

One of the objectives of this fish survey was to determine if fish were having an impact on water quality of Rice. The answer is “yes”. Here are some factors that support an impact of fish on water quality:

1. Lake phosphorus modeling indicates that Elm Creek is a major phosphorus source to Rice Lake, but the modeling also indicates a large amount of phosphorus must be coming from the lake sediments. Sediment resuspension and nutrient loading from motor boats are probably not a factor. There is poor water quality prior to boating activities in the spring and well into fall, after boating activity has subsided.
2. Phosphorus release from the sediments is a possibility but unlikely a major phosphorus source. This shallow lake is well-mixed throughout the summer. 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.
3. Another clue that fish are at a high density is that there are very few submerged plants found in Rice. Even though clarity is poor, if fish were not a factor, there should be more submerged plant growth in the shallow water.
4. Evidence supports the influence of fish impacting algae blooms in Rice Lake. The 2008 fish survey found elevated numbers of bullheads and carp. Few predator fish such as bass, northern pike, or walleyes were found. The existing fish community is out of balance. It appears the fish community in Rice contributes to algae blooms and poor water clarity in the lake.

To improve water quality in Rice, it is recommended that the fish community should be restructured. Two options to consider are a lake drawdown with no aeration or an ongoing large-scale commercial fish removal effort. Either option would reduce the existing high population of bullheads and carp. This would be followed with a restocking program that emphasized a predator control component.

However, because of the ongoing recruitment of bullheads and carp from Elm Creek, the chances of a long-term “balanced” fish community are only 50/50 at best and probably less than that at this time. 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.

Before major fish work occurs, the nutrient loading from Elm Creek should be assessed. Maybe Elm Creek is in good shape and fish activities could start. If the Elm Creek average phosphorus concentration is between 150 - 200 ppb, that is about as good as could be expected.

Introduction

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

In August of 2008, 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

Four standard trapnets and three mini trapnets were used for three 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 mini trapnets were 2 x 3 feet square frame with one funnel mouth opening with a 25-foot lead. The mesh size was 1/8 inch. The trapnets were set on Monday morning August 18, 2008. The nets were fished for the following 3 days (August 19, 20, 21). Trapnet locations are shown in Figure 1 and pictures of a typical trapnet are shown in Figure 2.

Shoreline seining was conducted using a bag seine. The bag seine was 50 feet long with a mesh size of 1/4 inch. The seine was anchored on shore and then walked out and brought around to shore. The fish were collected in the “bag” of the seine.

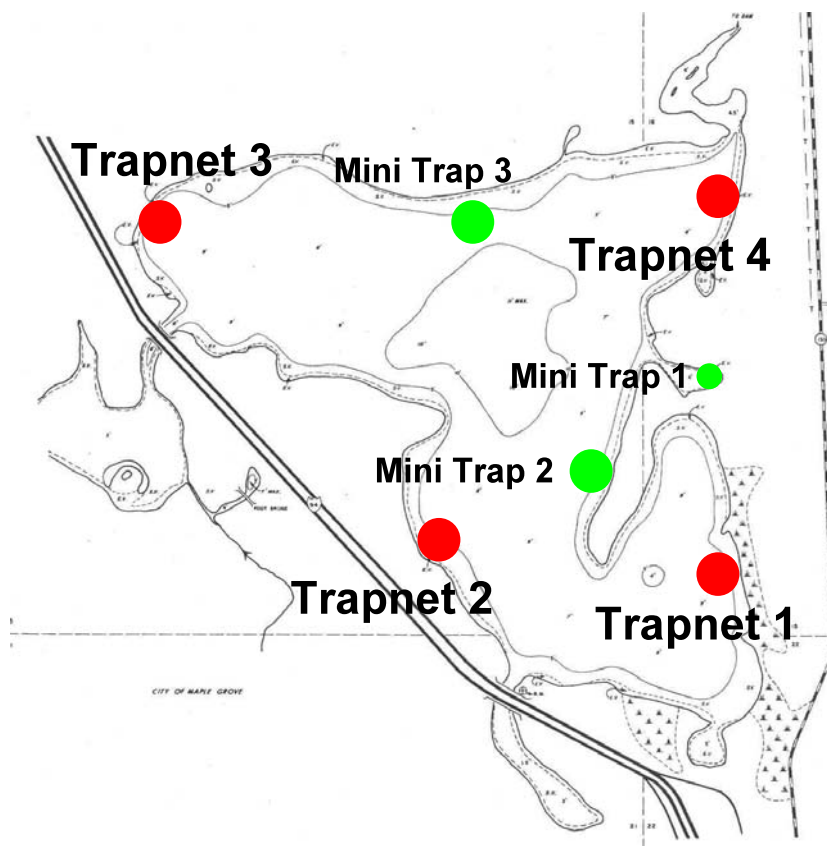


Figure 1. Map of standard trapnet sets (red) and mini-trapnets (green).

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 nine fish species were sampled in Rice Lake on August 19-21, 2008. The fish catch was dominated by black bullheads. The number of black bullheads caught per net was high with the average haul of 27 per net (Table 1). This is slightly above the normal range of 0.7-26 black bullheads per lift for a lake like Rice Lake.

Table 1. 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

Mini-Trapnets: A smaller mesh-size on the mini-trapnets captured minnows. The minnow population is moderate to high for a shallow lake setting (Table 2).

Table 2. 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

Fish Size Distribution: Length frequencies for Rice Lake fish species surveyed in 2008 are shown in Table 4. 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 4. 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	Large-mouth 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							

Examples of the Types of Rice Fish Captured in Trapnets



Figure 4. [top] Young-of-the-year and adult sunfish along with a crappie.
[middle] Sunfish, crappies, carp, and bullheads.
[bottom] Carp, sunfish, white sucker, and bullheads.

Examples of Rice Fish Species



**Figure 5. Top: Dogfish.
Middle: Northern pike and carp.
Bottom: Carp.**

Turtles: Both painted turtles and snapping turtles were common in Rice Lake. Turtles were captured in both the regular trapnets and the mini-trapnets. Also, one soft-shelled turtle was sampled as well.

Table 5. 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		



Soft-shelled turtle.

Conclusions and Recommendations

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2. Phosphorus release from the sediments is a possibility but unlikely a major phosphorus source. This shallow lake is well-mixed throughout the summer. 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.
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Appendix

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

From: "Steve McComas" <mccomas@pclink.com>
To: "Daryl Ellison" <Daryl.Ellison@dnr.state.mn.us>; <Steve.Jacobson@dnr.state.mn.us>
Subject: Rice Lake and Cedar Island Lake fish surveys
Date: Sunday, August 17, 2008 1:02 PM

Hello All,

Blue Water Science will be conducting fish surveys on Cedar Island Lake and Rice Lake (both in Hennepin County, and within the City of Maple Grove). The fish survey is sponsored by the City of Maple Grove and by the lake associations. We will set 6 fyke nets in each lake on Monday (August 18) and will sample the nets on Tue, Wed, and Thur. The nets will be removed on Thursday (Aug 21).

This survey is conducted under permit number 15390.

Fish will be weighed and measured and returned to the lakes.

Thank you,

Steve McComas
Blue Water Science
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St. Paul, MN 55116
651.690.9602