A Sample Tub of Fish From Goose Lake, September 2019

Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2019

Survey Dates: September 23-25, 2019
MnDNR Permit Number: 29292

Prepared for:
VLAWMO and MnDNR

Prepared by:
Steve McComas
Blue Water Science

February 7, 2020

Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2019

Summary

The first recorded Goose Lake fish survey occurred in 1986 and was conducted by the MnDNR. The 1986 results indicated a sparse fishery with moderate numbers of black bullheads and only two other species in low numbers (brown bullheads and white suckers)(Table 1). It is likely that winterkill was a frequent occurrence and selects for low-oxygen tolerant fish such as bullheads. In 2012, fish were more abundant, especially in the East Goose basin (Table 1). Black bullheads had a high density and may have been adversely impacting water quality. The VLAWMO sponsored bullhead removal by commercial fishermen and bullhead numbers were reduced based on the 2017 survey results. Black bullheads were not likely to be impacting water quality at this time. Also in 2017, black crappies had a very high density whereas bluegill sunfish, yellow perch, and largemouth bass decreased compared to the 2012 survey. In 2019, black bullheads were the dominant fish and crappies declined compared to 2017 fish survey results. A partial winterkill may have occurred after the 2017 survey. In 2019, bullheads are abundant and predator fish are rare.

Table 1. Three fish surveys have been conducted on Goose Lake since 1986. The first survey was conducted on June 30, 1986 by the Minnesota Department of Natural Resources (MnDNR). The second fish survey was conducted on July 17-18, 2012 Blue Water Science (BWS). The third survey was conducted on September 7-8, 2017 by BWS. The fourth survey was conducted on September 24-25, 2019 by BWS.

	1986 Goose Fish/Net MnDNR	2012 West Goose Fish/Net (n=3) BWS	2012 East Goose Fish/Net (n=8) BWS	2012 Goose Fish/Net (n=11) BWS	2017 West Goose Fish/Net (n=4) BWS	2017 East Goose Fish/Net (n=8) BWS	2017 Goose Fish/Net (n=12) BWS	2019 West Goose Fish/Net (n=4) BWS	2019 East Goose Fish/Net (n=8) BWS	2019 Goose Fish/Net (n=12) BWS	Typical Range (MnDNR)
Black bullhead	48	14	105	80	17	24	22	194	474	446	11.5 - 132.6
Black crappies		3.0	44	33	12	219	150	1.1	0.8	1.3	2.4 - 15.1
Bluegills		68	154	131	44	21	28	16	64	53	1.9 - 29.5
Brown bullhead	0.4										0.4 - 4.5
Fathead minnows								1.9		1.3	NA
Golden shiner		1.3		0.4	6.8	0.5	2.6	11	1.5	8.6	0.2 - 1.1
Green sunfish		0.3	1.3	0.7	0.5		0.2	3.1	6.3	6.3	0.2 - 1.9
Hybrid sunfish		1.0	0.9	0.9	1.8	0.6	1.0	1.0	1.4	1.6	NA
Largemouth bass		1.7	21	16		1.0	0.7				0.3 - 1.2
Pumpkinseed		2.3	12	10	2.5	1.0	1.5	22	7.1	20	0.8 - 8.4
White sucker	0.4		0.1	0.1							0.3 - 2.6
Yellow bullhead					0.3		0.1				NA
Yellow perch		0.3	55	40	1.0	0.1	0.4	8.5	0.8	6.2	0.3 - 3.8
Number of fish species	3		10			10			9		
TOTAL FISH	49	92	393	312	85	267	206	259	555	544	--

[left] Map of trapnet sets in 2019, same location as previous surveys. [right] Fish from a single trapnet in 2019.

Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2019

Introduction

Goose Lake (ID: 62-0034) is a 145-acre shallow lake, located in Ramsey County, Minnesota. In September 2019, VLAWMO contracted for a fish survey with Blue Water Science with a permit number 29292 granted from the MnDNR. Previous fish surveys were conducted in 2017 and 2012 by Blue Water Science and in 1986 by the MnDNR. The primary objective of this survey was to characterize the fish community in Goose Lake.

Methods

Six standard trapnets were sampled for 2 days for a total of 12 lifts to survey fish in Goose Lake. The trapnet was a MnDNR-style with a 4 x 6 feet square frame with two funnel mouth openings and 50-feet lead. Net mesh size was 3/8 inch. Six standard trap nets were set on Monday morning September 23, 2019. Six nets were fished for the following 2 days (September 24 and 25). Trapnet locations are shown in Figure 1 and pictures of a typical trapnet operation are shown in Figure 2.

Figure 1. Map of trapnet sets in 2019.

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.

The back hoop of the trapnet is propped up on the bow (front end) of the survey boat. A dip net is used to remove the fish from the back of the trapnet.

Fish are transferred to tubs, then they are counted and measured and released.

Figure 2. Trapnet set and fish sampling in the Goose Lake fish survey.

Results

Fish Per Net: A total of 9 fish species were sampled in Goose Lake on September 24-25, 2019. Black bullheads were the most abundant species followed by bluegill sunfish. Nets 1, 3, and 6 were the most productive for bullheads (Table 1).

The average number of black bullheads caught per net was high with the average haul of 446 fish per net (Tables 1 and 2). East Goose had more bullheads than West Goose. Predator fish such as largemouth bass were either absent (bass) or in low numbers (crappies found at 1 crappie per net). Sunfish, perch, and golden shiners were greater than the typical range for lakes like Goose Lake (Table 2).

Table 1. Goose Lake fish survey results from September 24-25, 2019 using 6 nets monitored for 2 days for a total of 12 lifts are shown below.

Fish Species	East Goose								West Goose				Total Catch	Fish per Net (n=12)
	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 bullheads	510	784	126	135	860	1181	28	171	75	89	452	938	5349	446
Black crappies	2	2			1	1			1		6	2	15	1
Bluegills	42	48	38	27	77	62	147	67	32	36	46	13	635	53
Fathead minnow										10	2	3	15	1.3
Golden shiner	1		9		1		1		43	38	10		103	8.6
Green sunfish	1	5	5	1	5	5	15	13	5	5	9	6	75	6.3
Hybrid sunfish			2	1	3	4	1		1	3	2	2	19	1.6
Pumpkinseed		1	3	2	5	15	18	13	63	57	38	20	235	20
Yellow perch		1	1		1	1	2		20	5	17	26	74	6.2
TOTAL FISH	556	841	184	166	953	1269	212	264	240	243	582	1010	6520	543

Table 2. Goose Lake fish survey trapnet results from September 24-25, 2019.

	West Goose Fish per Net (n=4)	East Goose Fish per Net (n=8)	Goose Fish per Net (n=12)	Typical Range (MnDNR)
Black bullhead	194	474	446	11.5 - 132.6
Black crappies	1.1	0.8	1	2.4 - 15.1
Bluegills	16	64	53	1.9 - 29.5
Fathead minnows	1.9		1.3	NA
Golden shiner	11	1.5	8.6	0.2 - 1.1
Green sunfish	3.1	6.3	6.3	0.2 - 1.9
Hybrid sunfish	1.0	1.4	1.6	NA
Pumpkinseed	22	7.1	20	0.8 - 8.4
Yellow perch	8.5	0.8	6.2	0.3 - 3.8
Painted turtle	0.8	0.3	0.4	--
TOTAL FISH	259	556	544	--

Fish Length: Fish lengths are shown in Table 3. Black bullhead lengths ranged from less than 3 inches to 10.5 inches representing several year classes (Table 3). Sunfish species and yellow perch lengths also indicated several year classes were present but at lower densities than bullheads. Because panfish densities are lower and bullhead densities are higher compared to 2017 fish survey results, there may have been a partial winterkill sometime after the 2017 survey.

Table 3. Length frequency of fish species (as total length) for the West and East Goose Lake fish survey for September 2019.

Length (inches)	Black Bullhead		Black Crappies		Bluegills		Fathead Minnow		Golden Shiner		Green Sunfish		Hybrid Sunfish		Pumpkin-seed		Yellow Perch	
	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East
<3	56					1	15											
3	4	2			1	9						3		1	1	5		
3.5	2	1			3	25						7			9	22		
4		2			10	130			13	1	6	13	1	1	55	20	11	
4.5		5			36	199			31	3	6	13		1	75	8	4	1
5	13	24			56	105			26	1	7	7		2	30	1	5	
5.5	58	158			9	26			11	3	3	4		2	3	1	5	
6	52	30				3			3	1	1	1	3		1		11	
6.5	20	9			3				4	1	2	2	1	2	3		15	
7	20	7			2	5			3	2			2		1		6	2
7.5	8				7	4								1			4	
8	9	5	2			1							1	1			5	1
8.5	3	1	4														1	1
9	3		2	2													1	1
9.5	1		1	1														
10	1	1		1														
10.5	1			2														
11																		
11.5																		
12																		
12.5																		
13																		
13.5																		
14																		
14.5																		
15																		
15.5																		
16																		
Total (measured)	251	245	9	6	127	508	15	0	91	12	25	50	8	11	178	57	68	6
Total (Counted)	1303	3550																
Total Fish	1554	3795	9	6	127	508	15	0	91	12	25	50	8	11	178	57	68	6
% of the Total Catch Measured	16%	6%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Representative Fish Species of Goose Lake

Hybrid sunfish

Bluegill sunfish

Black crappie

Pumpkinseed sunfish

Largemouth bass

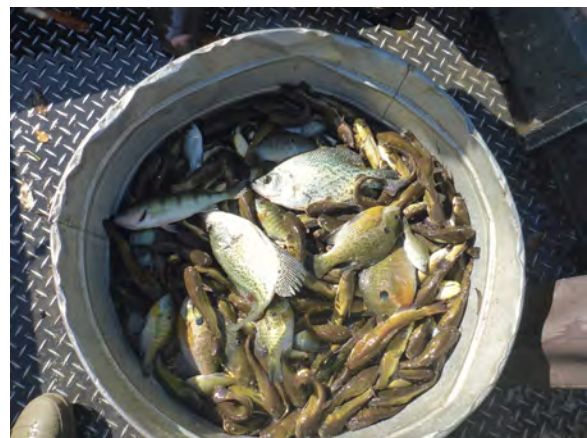

Yellow perch

Golden shiner

Figure 3. Representative fish species found in Goose Lake in 2012, 2017, and 2019.

Comparison of 1986, 2012, 2017, and 2019 Fish Surveys

The first recorded Goose Lake fish survey occurred in 1986 and was conducted by the MnDNR. The 1986 results indicated a sparse fishery with moderate numbers of black bullheads and only two other species in low numbers (brown bullheads and white suckers)(Table 4). It is likely that winterkill was a frequent occurrence and limited fish numbers and reduced fish species. In 2012, fish were more abundant, especially in the East Goose basin (Table 4). Black bullheads had a high density and may have been adversely impacting water quality. The VLAWMO sponsored bullhead removal by commercial fishermen and bullhead numbers were reduced based on the 2017 survey results. Black bullheads were not likely to be impacting water quality at this time. Also in 2017, black crappies had a very high density whereas bluegill sunfish, yellow perch, and largemouth bass decreased compared to the 2012 survey. In 2019, black bullheads were the dominant fish and crappies declined compared to 2017 results. A partial winterkill may have occurred after the 2017 survey. In 2019, bullheads are abundant and predator fish are rare.

Table 4. Three fish surveys have been conducted on Goose Lake since 1986. The first survey was conducted on June 30, 1986 by the Minnesota Department of Natural Resources (MnDNR). The second fish survey was conducted on July 17-18, 2012 Blue Water Science (BWS). The third survey was conducted on September 7-8, 2017 by BWS. The fourth survey was conducted on September 24-25, 2019 by BWS.

	1986 Goose Fish/Net MnDNR	2012 West Goose Fish/Net (n=3) BWS	2012 East Goose Fish/Net (n=8) BWS	2012 Goose Fish/Net (n=11) BWS	2017 West Goose Fish/Net (n=4) BWS	2017 East Goose Fish/Net (n=8) BWS	2017 Goose Fish/Net (n=12) BWS	2019 West Goose Fish/Net (n=4) BWS	2019 East Goose Fish/Net (n=8) BWS	2019 Goose Fish/Net (n=12) BWS	Typical Range (MnDNR)
Black bullhead	48	14	105	80	17	24	22	194	474	446	11.5 - 132.6
Black crappies		3.0	44	33	12	219	150	1.1	0.8	1.3	2.4 - 15.1
Bluegills		68	154	131	44	21	28	16	64	53	1.9 - 29.5
Brown bullhead	0.4										0.4 - 4.5
Fathead minnows								1.9		1.3	NA
Golden shiner		1.3		0.4	6.8	0.5	2.6	11	1.5	8.6	0.2 - 1.1
Green sunfish		0.3	1.3	0.7	0.5		0.2	3.1	6.3	6.3	0.2 - 1.9
Hybrid sunfish		1.0	0.9	0.9	1.8	0.6	1.0	1.0	1.4	1.6	NA
Largemouth bass		1.7	21	16		1.0	0.7				0.3 - 1.2
Pumpkinseed		2.3	12	10	2.5	1.0	1.5	22	7.1	20	0.8 - 8.4
White sucker	0.4		0.1	0.1							0.3 - 2.6
Yellow bullhead					0.3		0.1				NA
Yellow perch		0.3	55	40	1.0	0.1	0.4	8.5	0.8	6.2	0.3 - 3.8
Number of fish species	3		10			10			9		
TOTAL FISH	49	92	393	312	85	267	206	259	555	544	--

Figure 4. [left] Fish from one sample net in Goose Lake. Sunfish were common in 2019.
[right] Few black crappies were catch in 2019.

Conclusions and Recommendations

The trapnet survey in 2012 found the largemouth bass population had a high density and a size range from 6.5 to 16 inches indicating that several year classes of fish species were surviving over winter. Bluegills, yellow perch, and largemouth bass abundance (as fish/net) were above the typical MnDNR range for a lake like Goose. However bullheads were also abundant in 2012.

The fish community changed based on findings from the 2017 survey. It appears commercial fishing successfully reduced bullhead densities. In somewhat of a surprise, black crappie numbers increased dramatically while largemouth bass, bluegill, and yellow perch numbers decreased. Black crappies were the top predator in Goose Lake in 2017. Largemouth bass were present and within a range typical for these types of shallow lakes.

In the 2019 fish survey, largemouth bass were absent and crappie numbers declined sharply compared to 2017. Black bullhead abundance increased significantly. It appears a partial winterkill likely restructured the fish community by killing high oxygen-dependent species and favoring low oxygen tolerant species such as bullheads.

It is recommended that commercial bullhead removal be considered in 2020. The last time bullhead removal occurred, bullhead numbers declined and crappie numbers increased. Stocking bass may not be necessary since occasional winterkills seem to remove the bass and crappies may increase naturally without stocking and should exert predation on young bullheads.

Figure 5. Fish surveying crew for the Goose Lake 2019 survey. Sampling crew included Blue Water Science staff and VLAWMO staff.

Appendix A

Minnesota DNR Fish Survey Notification

From: Steve McComas [mailto:mccomas@pclink.com]
Sent: Thursday, September 19, 2019 3:45 PM
To: DeBates, TJ (DNR); Capt. Jason Peterson
Cc: Brian Corcoran
Subject: Fish survey on Goose Lake (62-003400), Ramsey County

Hello all,

Blue Water Science will be conducting a fish survey in Goose Lake (MN ID 62-003400), Ramsey County, starting on Monday, September 23, 2019. We will set 6 standard trap nets in the lake. The nets will be monitored daily on Tuesday and Wednesday and all fish will be weighed and measured and returned to the lake. The nets will be removed from the lake on Wednesday, September 25, 2019. The fish survey is sponsored by the Vadnais Lake Area Water Organization 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: 29292.

Thank you,
Steve McComas
BLUE WATER SCIENCE
550 South Snelling Avenue
St. Paul, MN 55116
651 690 9602
mccomas@pclink.com

Appendix B

2012 Data

Goose Lake fish survey results from July 17-18, 2012 using six nets monitored for 2 days for a total of 11 lifts are shown below. One net in West Goose Lake was pulled to shore during the survey and was not counted for the survey. Nets 3 and 4 were the most productive.

Fish Species	East Goose								West Goose				Total Catch	Fish per Net (n=11)
	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 bullheads	99	150	7	53	68	290	101	71	5	7	--	31	882	80
Black crappies	39	20	22	1	79	17	99	73	5	1	--	3	359	33
Bluegills	197	142	25	25	197	233	188	224	62	79	--	64	1,436	131
Golden shiner	0	0	0	0	0	0	0	0	1	3	--	0	4	0.4
Green sunfish	0	1	0	0	7	1	0	1	0	1	--	0	8	0.7
Hybrid sunfish	0	7	0	0	0	0	0	0	0	3	--	0	10	0.9
Largemouth bass	16	9	1	0	25	19	54	41	2	0	--	3	170	15
Pumpkinseed	8	9	2	3	22	17	31	6	4	1	--	2	105	10
White sucker	0	0	0	0	0	0	1	0	0	0	--	0	1	0.1
Yellow perch	55	47	55	18	33	186	26	21	0	0	--	1	442	40
TOTAL FISH	414	385	112	100	431	763	500	437	79	95	--	104	3,420	311

Goose Lake fish survey trapnet results from July 17-18, 2012 using nets for 2 days for a total of 3 lifts are shown below. One net was pulled to shore during the survey and was not counted for the survey. Blue shading indicates where the number of fish caught, expressed as fish per net, were higher than the typical MnDNR range for a lake like Goose Lake.

	West Goose Fish per Net (n=3)	East Goose Fish per Net (n=8)	Goose Fish per Net (n=11)	Typical Range (MnDNR)
Black bullhead	14	105	80	11.5 - 132.6
Black crappies	3.0	44	33	2.4 - 15.1
Bluegills	68	154	131	1.9 - 29.5
Golden shiner	1.3	0	0.4	0.2 - 1.1
Green sunfish	0.3	1.3	0.7	0.2 - 1.9
Hybrid sunfish	1.0	0.9	0.9	NA
Largemouth bass	1.7	21	16	0.3 - 1.2
Pumpkinseed	2.3	12	10	0.8 - 8.4
White sucker	0	0.1	0.1	0.3 - 2.6
Yellow perch	0.3	55	40	0.3 - 3.8
Painted turtle	16	0.4	4.5	--
Snapping turtle	3.7	0	1.0	--
Softshell turtle	0	0.3	0.2	--
TOTAL FISH	92	393	312	--

Length frequency of fish species (as total length) for the West and East Goose Lake fish survey for July 2012.

Length (inches)	Black Bullhead		Black Crappies		Bluegills		Golden Shiner		Green Sunfish		Hybrid Sunfish		Largemouth Bass		Pumpkin-seed		White Sucker		Yellow Perch	
	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East
<3					1															
3					4															
3.5					5	2														
4					39	7									1	1				2
4.5					44	17										5				4
5					20	11				3	1				2	1				41
5.5				2	4	3	3			2		1				3				6
6		6	1	7	7	24			1	4		2				9			1	8
6.5		1		7	35	29				1	1	3		1	1	7				20
7		2	1	9	39	56	1				1	1		1	3	6				28
7.5	1		4	34	7	26								6		2				38
8	2	11	1	39		4								14		2				21
8.5	4	9	2	15										24						6
9	17	64		10										36						2
9.5	9	43		5										28						1
10	3	39		4									1	27						
10.5	6	2		2									2	5						
11		4		1										6						
11.5		1											1							
12														7						
12.5																				
13														3						
13.5														1						
14														2						
14.5																				
15														2						
15.5														1						
16														2						
16.5																				
17																				
17.5																				
18																1				
Total	42	182	9	135	205	179	4	0	1	10	3	7	5	165	7	36	0	1	1	177
% of the Total Catch Measured	100%	22%	100%	39%	100%	15%	100%	--	100%	100%	100%	100%	100%	100%	100%	38%	--	100%	100%	40%

2017 Data

Goose Lake fish survey results from September 7-8, 2017 using 6 nets monitored for 2 days for a total of 12 lifts are shown below.

Fish Species	East Goose								West Goose				Total Catch	Fish per Net (n=12)
	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 bullheads	9	21	56	65	9	6	11	13	5	5	7	52	259	22
Black crappies	251	200	382	265	262	194	102	97		4	20	23	1800	150
Bluegills	8	10	31	16	10	6	55	30	20	19	73	62	340	28
Golden shiner	1	1			1	1					10	17	31	2.6
Green sunfish										2			2	0.2
Hybrid sunfish		1	3					1	2	2	3		12	1.0
Largemouth bass	1	1	2	2	1	1							8	0.7
Pumpkinseed		1	1	1		1	2	2		2	3	5	18	1.5
Yellow bullhead											1		1	0.1
Yellow perch	1								2	1		1	5	0.4
TOTAL FISH	271	235	475	349	283	209	170	143	29	35	117	160	2476	206

Goose Lake fish survey trapnet results from September 7-8, 2017.

	West Goose Fish per Net (n=4)	East Goose Fish per Net (n=8)	Goose Fish per Net (n=12)	Typical Range (MnDNR)
Black bullhead	17	24	22	11.5 - 132.6
Black crappies	12	219	150	2.4 - 15.1
Bluegills	44	21	28	1.9 - 29.5
Golden shiner	6.8	0.5	2.6	0.2 - 1.1
Green sunfish	0.5		0.2	0.2 - 1.9
Hybrid sunfish	1.8	0.6	1.0	NA
Largemouth bass		1.0	0.7	0.3 - 1.2
Pumpkinseed	2.5	1.0	1.5	0.8 - 8.4
Yellow bullhead	0.3		0.1	NA
Yellow perch	1.0	0.1	0.4	0.3 - 3.8
Painted turtle	1.5	0.4	0.9	--
Snapping turtle	0.8	0.1	0.3	--
TOTAL FISH		267	206	--

Length frequency of fish species (as total length) for the West and East Goose Lake fish survey for September 2017.

Length (inches)	Black Bullhead		Black Crappies		Bluegills		Golden Shiner		Green Sunfish		Hybrid Sunfish		Largemouth Bass		Pumpkin-seed		Yellow Bullhead		Yellow Perch	
	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East
<3						1														
3			2			2			1										1	1
3.5						7														0
4						8														3
4.5	1	6			7	3			1		1									
5	13	64	1		29	2	1					1			3					1
5.5	28	56	11		64	10	1								3	2				
6	5	34	27	19	55	41	10	2							2	1			2	
6.5	4	14	4	204	11	60	12				1				1				2	
7		12	1	31	4	24	3	2			2	3				1				
7.5	7	2	1		3	7					3						1			
8	6				1	1						1								
8.5	3	1																		
9	1																			
9.5		1																		
10																				
10.5																				
11																				
11.5																				
12	1																			
12.5																				
13																				
13.5																				
14														1						
14.5														1						
15														5						
15.5																				
16														1						
Total (measured)	69	190	47	254	174	166	27	4	2	0	7	5		8	10	8	1		4	1
Total (Counted)				1499																
Total Fish				1753																
% of the Total Catch Measured	100%	100%	100%	14%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%