



A Sample Tub of Fish From Goose Lake, October 6, 2021

Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2021

Survey Dates: October 5-6, 2021
MnDNR Permit Number: 32508

Prepared for:
VLAWMO and MnDNR



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Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2021

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). It is likely that winterkill was a frequent occurrence and selects for low-oxygen tolerant fish such as bullheads.

The most recent fish survey was conducted in early October of 2021. Black bullheads were abundant and gamefish predators such as largemouth bass were not observed. In West Goose, sunfish numbers were high especially green and pumpkinseed sunfish (Table 1). Crappies of good size, up to 12 inches were found in East Goose.

Table 1. Goose Lake fish survey trapnet summary results from October 5-6, 2021.

	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	212	186	195	11.5 - 132.6
Black crappies	13	2	5.6	2.4 - 15.1
Bluegills	69	10	30	1.9 - 29.5
Fathead minnows	0.3		0.1	NA
Golden shiner	41		14	0.2 - 1.1
Green sunfish	62	2	22	0.2 - 1.9
Hybrid sunfish	13	1.3	5.0	NA
Pumpkinseed	102	3	36	0.8 - 8.4
Yellow perch	12	3.9	6.5	0.3 - 3.8
TOTAL FISH/NET	524	209	314	--



Figure 1. [left] Crappies from one sample net in Goose Lake. [right] Bullheads were most common in 2021.

Fish Survey of Goose Lake (ID #62-0034), Ramsey County, Minnesota in 2021

Introduction

Goose Lake (ID: 62-0034) is a 145-acre shallow lake, located in Ramsey County, Minnesota. In October 2021, VLAWMO contracted for a fish survey with Blue Water Science with a permit number 32508 granted from the MnDNR. Previous fish surveys were conducted in 1986 by the MnDNR and in 2019, 2017 and 2012 by Blue Water Science. 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-foot lead. Net mesh size was 3/8 inch. Six standard trap nets were set on Monday morning October 4, 2021. Six nets were fished for the following 2 days (October 5 and 6). Trapnet locations are shown in Figure 2 and pictures of a typical trapnet operation are shown in Figure 3.



Figure 2. Map of trapnet sets in 2021.



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 3. 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 October 5-6, 2021. More fish per net were trapped in West Goose compared to East Goose (Tables 2 and 3). Black bullheads were the most abundant species followed by pumpkinseed and bluegill sunfish. Nets 1, 5, and 6 were the most productive for bullheads (Table 2).

The average number of black bullheads caught per net was high with the average haul of 195 fish per net (Tables 2 and 3). West Goose had more bullheads than East Goose. Predator fish were either absent (largemouth bass) or in low numbers (crappies found at 5.6 crappie per net). Sunfish, yellow perch, and golden shiners were greater than the typical MnDNR range for lakes like Goose Lake (Table 3).

Table 2. Goose Lake fish survey results from October 5-6, 2021 using 6 nets monitored for 2 days for a total of 12 lifts are shown below.

Fish Species	West Goose				East Goose								Total Catch	Fish per Net (n=12)
	Net 5		Net 6		Net 1		Net 2		Net 3		Net 4			
	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	75	203	268	300	491	857	20	1	90	2	25	4	2336	195
Black crappies		1	31	19		2	9	4	1				67	5.6
Bluegills	76	58	99	44	20	18	6	1	1	9	25	3	360	30
Fathead minnow				1									1	0.1
Golden shiner	157	5		1									163	14
Green sunfish	109	70	40	29		2			11		1	2	264	22
Hybrid sunfish	6	5	24	15	1	4		1	1	1	1	1	60	5.0
Pumpkinseed	267	45	62	34	8	2			4	1	8	1	432	36
Yellow perch	14	5	15	13	10	2	8	1	2	1	4	3	78	6.5
TOTAL FISH	704	392	539	456	530	887	43	8	110	14	64	14	3761	314

Table 3. Goose Lake fish survey trapnet summary results from October 5-6, 2021.

	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	212	186	195	11.5 - 132.6
Black crappies	13	2	5.6	2.4 - 15.1
Bluegills	69	10	30	1.9 - 29.5
Fathead minnows	0.3		0.1	NA
Golden shiner	41		14	0.2 - 1.1
Green sunfish	62	2	22	0.2 - 1.9
Hybrid sunfish	13	1.3	5.0	NA
Pumpkinseed	102	3	36	0.8 - 8.4
Yellow perch	12	3.9	6.5	0.3 - 3.8
TOTAL FISH/NET	524	209	314	--

Fish Length: Fish lengths are shown in Table 4. Black bullhead lengths ranged from less than 3 inches to 10.5 inches representing several year classes (Table 4). Sunfish species, black crappies, 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. Green sunfish and pumpkinseed sunfish were abundant but small-sized in West Goose.

Table 4. Length frequency of fish species (as total length) for the West and East Goose Lake fish survey for October 2021.

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	13				89		1				42		1		182			
3					3						4	2			3			
3.5										7	7	4			18	2		
4					22	7				17	38	3	2		32	7	4	
4.5					22	3				2	20		3		15	1	5	1
5	3	8	1		8	1					17	2	9		12	7	8	5
5.5	28	66	4		2	9					8	1	6	1	20	7	1	8
6	29	47	7		5	34					14	3	1	1	12		6	2
6.5	14	9	2		17	28					16	1	11	5	7		4	1
7	14	11			16	1					7		9	1	3		1	3
7.5	8	8	2		4						3		2		2			
8	6	2	12											2	1		5	3
8.5	4	1	13														6	2
9	7	2	8														3	3
9.5	3												1				2	1
10	1																1	1
10.5	1																1	1
11				1														
11.5			1	2														
12			1	9														
12.5				4														
13																		
13.5																		
14																		
14.5																		
15																		
15.5																		
16																		
Total (measured)	131	154	51	16	188	83	1	0	26	0	176	16	45	10	307	24	47	31
Total (Counted)	715	1336			89				137		72		5		101			
Total Fish	846	1490	51	16	277	83	1	0	163	0	248	16	50	10	408	24	47	31
% of the Total Catch Measured	18%	11.5%	100%	100%	68%	100%	100%	100%	16%	100%	71%	100%	90%	100%	75%	100%	100%	100%

Representative Fish Species of Goose Lake



Hybrid sunfish



Bluegill sunfish



Black crappie



Pumpkinseed sunfish



Golden shiner



Yellow perch

Figure 4. Representative fish species found in Goose Lake in 2012, 2017, 2019, and 2021.

Goose Lake Fish Survey Highlights for 2021



Figure 5. Representative fish from West and East Goose Lake.

Comparison of 1986, 2012, 2017, 2019, and 2021 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 5). 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 5). Black bullheads had a higher density compared to 1986 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 impacting water quality in 2017. 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 levels. A partial winterkill may have occurred after the 2017 survey.

In 2021, bullhead numbers were lower compared to 2019 but the catch per net was still high. The size and year classes of yellow perch and crappies indicate they could be putting slight feeding pressure on young of the year bullheads.

Table 5. 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	2021 West Goose Fish/Net (n=4)	2021 East Goose Fish/Net (n=8)	2021 Goose Fish/Net (n=12) BWS	Typical Range (MnDNR)
Black bullhead	48	14	105	80	17	24	22	194	474	446	212	186	195	11.5 - 132.6
Black crappies		3.0	44	33	12	219	150	1.1	0.8	1.3	13.0	2.0	5.6	2.4 - 15.1
Bluegills		68	154	131	44	21	28	16	64	53	69	10	30	1.9 - 29.5
Brown bullhead	0.4													0.4 - 4.5
Fathead minnows								1.9		1.3	0.3		0.1	NA
Golden shiner		1.3		0.4	6.8	0.5	2.6	11	1.5	8.6	41		14	0.2 - 1.1
Green sunfish		0.3	1.3	0.7	0.5		0.2	3.1	6.3	6.3	62	2.0	22	0.2 - 1.9
Hybrid sunfish		1.0	0.9	0.9	1.8	0.6	1.0	1.0	1.4	1.6	13	1.3	5.0	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	102	3.0	36	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	12	3.9	6.5	0.3 - 3.8
Number of fish species	3	10			10			9			9			
TOTAL FISH/NET	49	92	393	312	85	267	206	259	555	544	524	209	314	--

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.

Because there was a significant decrease in bullheads from 2019 to 2021, there may be enough predation by sunfish and crappies on bullhead eggs and fry to start decreasing their abundance. It may be advisable to see if bullheads continue to decline due to natural fish predation pressure. If bullheads don't decrease, it is recommended that commercial bullhead removal be considered in 2022. 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 6. 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: Friday, October 01, 2021 8:17 AM
To: DeBates, TJ (DNR); Capt. Jason Peterson
Cc: Brian Corcoran
Subject: Fish survey for Goose Lake, Ramsey Co

Hello all,

Blue Water Science will be conducting a fish survey in Goose Lake (MN ID 62-003400), Ramsey County, starting on Monday, October 4, 2021. We will set 6 trap nets. The nets will be monitored daily and removed on Wednesday (October 6, 2021) and all fish will be weighed, measured, and returned to the lake. The nets will be removed from the lake on Wednesday, October 6, 2021. The fish survey is sponsored by the Vadnais Lake Area Management 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: 32508.

Thank you,

Steve McComas

BLUE WATER SCIENCE

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Appendix B

2019 Data

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

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	--

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		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	--

