



Black Bullhead Caught in Alimagnet Lake in October 2020

Summary of Fish Surveys in Alimagnet Lake (ID #19-0021-00), Burnsville and Apple Valley, Minnesota for 2005 - 2020

Fish Survey: October 13-15, 2020
MnDNR Permit Number: 29777

Submitted to:
Cities of Apple Valley and
Burnsville and MnDNR



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Summary of Fish Surveys in Alimagnet Lake (ID #19-0021-00), Burnsville and Apple Valley, Minnesota, 2005 - 2020

Summary

Review of Fish Trapnet Surveys from 2000 Through 2020: The fish community of Alimagnet Lake has been manipulated and monitored over the years with a fish removal program in place from 2005-2012 plus 9,000 channel catfish were stocked in 2007, then 1,000 largemouth bass were stocked in 2008, and 2,000 largemouth bass fingerlings were stocked in 2016. Results of fish surveys conducted since 2000 are shown in Table S1.

Bullheads were removed from Alimagnet from 2005 through 2009, black crappies from 2008 through 2012, and bluegills from 2006 through 2012. The average bullhead catch per trapnet was less in 2020 compared to 2005 which was a lake management objective. Bluegill numbers peaked in 2015 and have declined since then. Yellow perch increased in 2011 and 2012 compared to previous years but then were lower in 2013-2020. For gamefish, northern pike numbers have gone down since 2005 whereas largemouth bass numbers have stayed about the same over the duration of the program. Channel catfish were not sampled in 2017, 2018, and 2020 and they may be scarce in Alimagnet Lake.



Sunfish sampled from one net in Alimagnet Lake in 2020.

Fish Trapnet Survey Results for 2000-2020

Table S1. Trapnet data represents fish caught per net. Data are for standard trapnet sizes. Black bullheads have been removed from 2005-2009 and bluegills from 2006-2012. Years of fish removal are highlighted with yellow shading.

	2000 (fish/lift) (MnDNR)	2005 (fish/lift) (BWS) (n=24)	2006 (fish/lift) (BWS) (n=80)	2007 (fish/lift) (BWS) (n=112)	2008 (fish/lift) (BWS) (n=80)	2009 (fish/lift) (BWS) (n=80)	2010 (fish/lift) (BWS) (n=18)	2011 (fish/lift) (BWS) (n=12)	2012 (fish/lift) (BWS) (n=12)
Bluegill sunfish	4	193	96	132	103	108	54	128	59
Black bullhead	84	50	35	14	19	4.5	4.0	1.1	0.3
Black crappie	5	16	13	24	52	33	16	15	7.3
Channel catfish	0	0	0	0	0.5	0.3	0	0.1	0.1
Golden shiner	0	0	0	0	0	0	0	0	0.1
Green sunfish	0	0	0	0	0	0	0	0	0.1
Hybrid sunfish	0	0	0	0	0	0	0	0	0
Largemouth bass	0.5	0.5	0.6	0.4	0.3	0.1	0.2	0.7	0
Madtom	0	0	0	0	0	0	0	0	0
Northern pike	3.9	0.7	0.5	0.3	0.3	0.2	0.3	0.1	0
Pumpkinseed	0	0	0	0	0	0	2.7	16	7.3
Walleye	0.3	0.04	0	0	0	0	0	0	0
White sucker	0	0.4	0.1	0.1	0.01	0.1	0	0.3	0
Yellow bullhead	0	0	0	0	0	0	0	0	0
Yellow perch	0	0.5	1.1	1	0.4	1.1	0.3	13	7.9
Number of Fish Species	6	8	7	7	8	8	7	9	8

	2013 (fish/lift) (BWS) (n=12)	2014 (fish/lift) (BWS) (n=12)	2015 (fish/lift) (BWS) (n=12)	2016 (fish/left) (BWS) (n=12)	2017 (fish/lift) (BWS) (n=12)	2018 (fish/lift) (BWS) (n=12)	2020 (fish/lift) (BWS) (n=12)
Bluegill sunfish	202	202	306	139	88	106	171
Black bullhead	0.7	0.3	1.1	0.7	0.3	0.2	0.2
Black crappie	49	60	37	45	56	7.8	27
Channel catfish	0.1	0.4	0.2	0.1	0	0	0
Golden shiner	0	0	0.2	0.1	0.1	0	0
Green sunfish	0.1	0.1	0	0	0	0.8	0
Hybrid sunfish	0.8	0.6	0	0	0	0.8	1.0
Largemouth bass	0.3	0.2	0.5	0.3	0	0.4	0.4
Madtom	0	0	0	0	0	0.1	0
Northern pike	0.4	0.2	0.4	0	0.3	0	0.1
Pumpkinseed	15	11	3.1	2.6	4.7	4.8	12
Walleye	0	0	0	0	0	0	0
White sucker	0.1	0	0.2	0	0.1	0	0
Yellow bullhead	0	0.1	0	0	0	0	0
Yellow perch	0.7	0.3	0.2	0.1	0.1	0.1	0.3
Number of Fish Species	11	11	10	8	8	9	8

Fish Removal Summary: In efforts to improve water quality in Alimagnet Lake, the Cities of Apple Valley and Burnsville sponsored bullhead and sunfish removal projects from 2005 through 2012. Approximately 179 pounds of fish per lake acre were removed over the 8-year period from 2005 through 2012, for a total of 17,866 pounds of fish (Table S2). Nearly ten times as many bluegills were removed compared to bullheads, but the bluegill biomass is only about four times that of the bullhead biomass (Table S2). In addition, over two thousand pounds of crappies were removed from 2008 - 2012 and restocked into area lakes and ponds. No fish were removed in 2013 through 2020.

Table S2. Summary of fish removed from Alimagnet Lake from 2005-2012.

	Black Bullheads		Bluegills		Crappies		Totals		Fish Removal per Lake Acre (100 ac lake)
	number	pounds	number	pounds	number	pounds	number	pounds	
2005	739	231	0	0	0	0	739	231	2
2006	2,777	868	7,711	918	0	0	10,488	1,786	18
2007	1,464	488	14,610	1,948	0	0	16,074	2,436	24
2008	2,972	1,010	14,303	1,607	1,694	242	18,969	2,859	29
2009	649	259	13,804	1,980	907	162	15,360	2,401	24
2010	--	--	16,083	2,681	3,894	719	19,977	3,400	34
2011	--	--	10,219	2,237	3,738	1,041	13,357	3,278	33
2012*	--	--	6,220	1,349	540	126	6,760	1,475	15
Totals	8,601	2,856	82,950	12,720	10,773	2,290	102,324	17,866	179

* Yellow perch removal: 185 fish at 34 pounds in 2012

Fish Community Responses to Fish Removal and Fish Stocking: Fish removal efforts from 2005 through 2012 appear to have temporarily reduced numbers of bluegill sunfish over that time period based on the number of fish caught per trapnet set. Crappies increased in 2007 and 2008, then leveled off for a few years, although there were less crappies in 2018 (Figure S1). Bluegill sunfish increased from 2013 through 2015 and dropped off in 2016 and again in 2017 but were slightly higher in 2018 and 2020. Black bullhead numbers have remained low from 2009 - 2020 (Figure S1).

Fish Abundance and Total Lengths

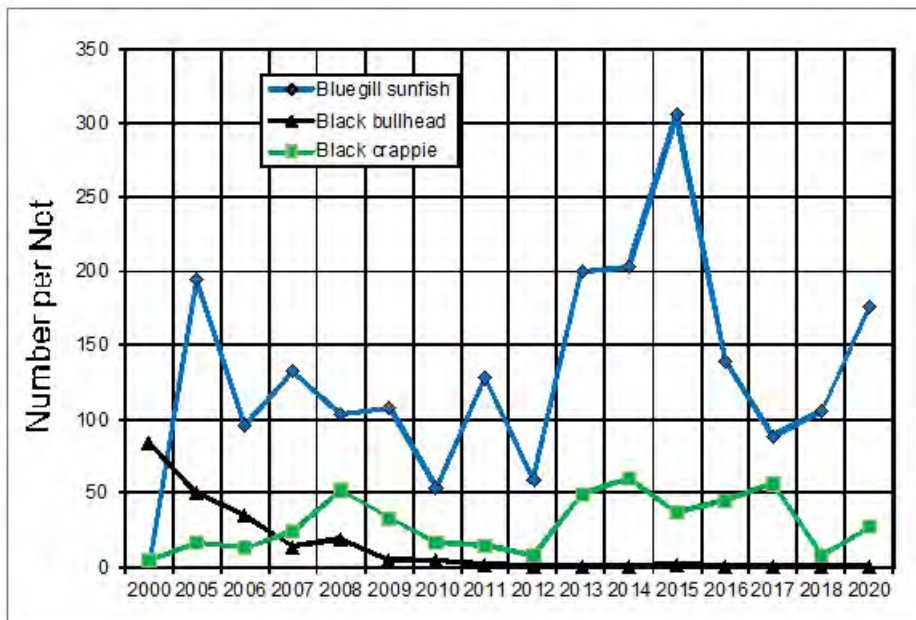


Figure S1. Fish abundance as measured with fish per trapnet from 2000 through 2018 and 2020.

Lake Water Quality: A winter aerator was installed in Alimagnet Lake over the winter of 1999-2000. Prior to the aerator installation, winter fish kills occasionally occurred resulting in temporary water quality improvements. With winter aeration, a winterkill has not been detected since 2000. Winter aeration initially sustained a fishery dominated by bullheads and sunfish. Since fish removal started in 2005 and catfish stocking in 2007 and water clarity peaked in 2011 and 2012 and declined for a few years with gradual increases in clarity since 2018 (Figure S2).

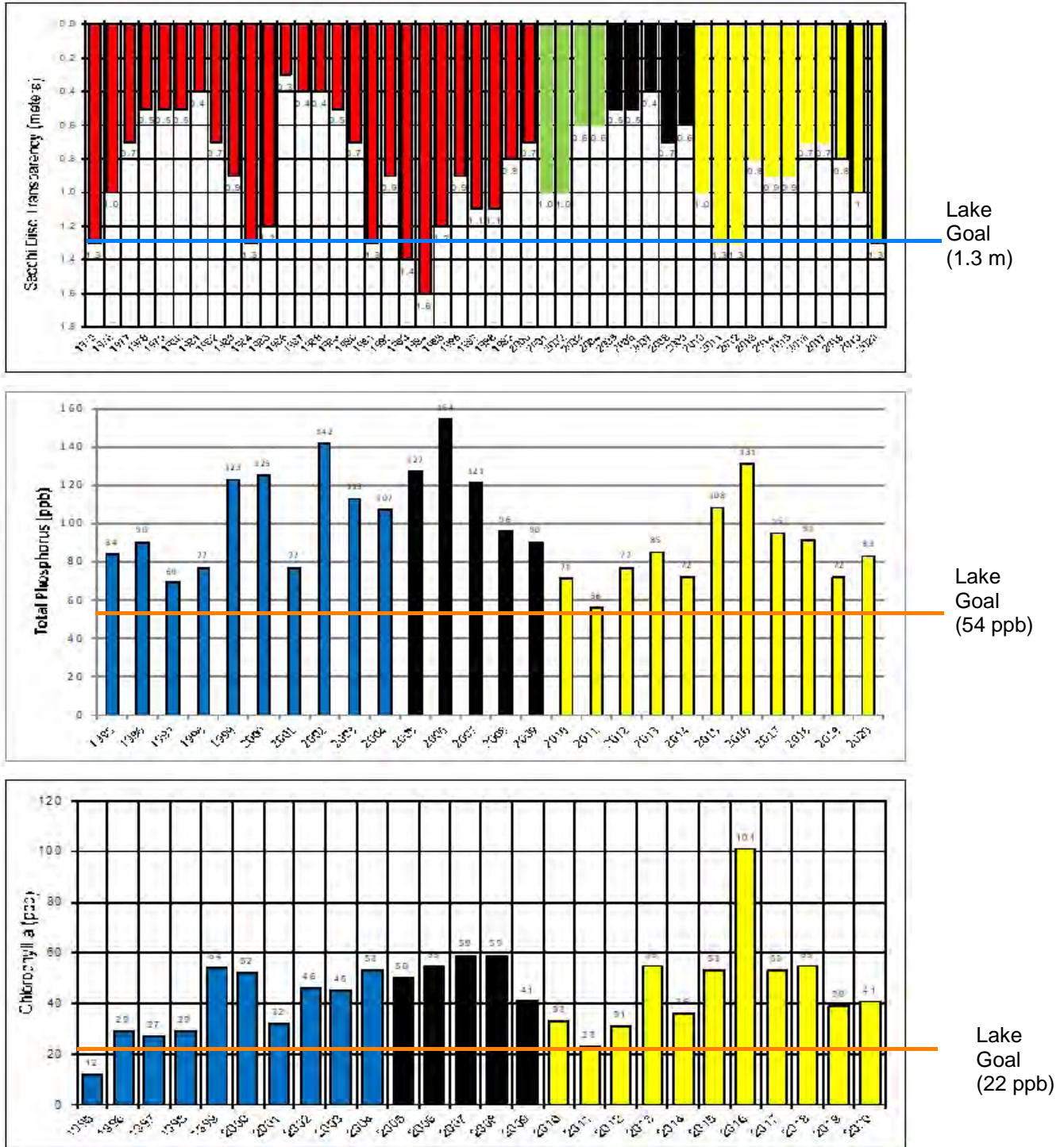


Figure S2. Seasonal water quality data for Alimagnet Lake. Seasonal average is from May - September. Data are from the Met Council CAMP program. Black bars indicate five years of improvement project implementation and the yellow bar represents maintenance projects occurring.

Observations and Conclusions

1. In 2007, 9,000 channel catfish were stocked. They gradually increased in size up to 2016. However, their abundance is relatively unknown at this time.
2. In 2008, 1,000 largemouth bass were stocked and in 2016, 2,000 largemouth bass were stocked. In 2020, another 1,000 largemouth bass were stocked. However, largemouth bass abundance has been sparse over the years with minor spawning evidence.
3. As of 2012, 179 pounds of fish/acre have been removed. This is over the removal goal of 100 pounds of fish per lake acre for a total of 10,000 pounds (based on a 100 acre lake). Water quality had fluctuated since 2011.
4. In 2012, bluegill sunfish and black crappie numbers were less than 2011 catch rates, but there was an increase in smaller lengths in 2012 compared to 2011. The increase in smaller lengths with higher numbers of fish continued in 2013, 2014, and 2015. It may be that the abundant vegetation was serving as a refuge for smaller fish.
5. The Alimagnet fish community, from a sport fishery perspective, is in good shape. Bluegill abundance is above average. If largemouth bass are to become established, stocking at 1 pound per acre (100 lbs) or 4,000 fish may be needed to establish a significant bass population.
6. From a water quality perspective, fish do not appear to be adversely impacting water quality. Other factors may be contributing to phosphorus loading including unmonitored runoff or phosphorus translocation by rising benthic algae off lake sediments.



Channel catfish caught in 2017. The catfish stocked in 2007 would now be about 11 years old in 2018. Channel catfish live for about 15 years.

Summary of Fish Surveys in Alimagnet Lake (ID #19-0021-00), Burnsville and Apple Valley, Minnesota for 2005 - 2020

Lake size: 89 ac (MnDNR)

Littoral area: 89 ac (MnDNR)

Maximum depth: 11.5 ft (MnDNR)

Introduction

Alimagnet Lake (ID # 19-0021) is an 89-acre lake located in Apple Valley and Burnsville, Minnesota. Alimagnet Lake has had fluctuating water quality conditions over the last 30 years. Alimagnet Lake has a moderately-sized watershed of 1,094 acres which is 11 times bigger than the lake surface area. Because of this relatively small watershed size there is the potential for good water quality. However, Alimagnet Lake has experienced poor water quality conditions over the years. An organic carbon amendment, using crushed corn, was applied over the summers of 2005 and 2006 with the objective to reduce lake phosphorus concentrations and improve water clarity. However, little water quality improvement was noted. It was speculated in 2005 that a previous winterkill in the 1990s, with a resulting rebound in an unbalanced fish community, could adversely be impacting lake water quality. A fish survey in 2005 documented high densities of bluegill sunfish and black bullheads.

From 2005 through 2012 there has been a fish removal program that included black bullheads, bluegill sunfish, and black crappies over various years. Channel catfish and largemouth bass have also been stocked. The objective was to use a fish removal program combined with stocking to help improve lake water quality. In 2020, a fish survey was conducted to evaluate the current fishery after 9 years of fish removal and after the stocking of largemouth bass and channel catfish.

Fish Survey Methods

In 2020, a fish survey used a total of 6 trapnets set for 2 nights from October 14-15, 2020. The standard-sized trapnet was a MnDNR-style with a 4 x 6 foot square frame with five hoops, two throats and a 50-foot lead. The net mesh size was ½ inch (bar length). Locations of the trapnets in Alimagnet Lake are shown in Figure 1. All fish that were captured were recorded and released back into Alimagnet Lake.

Trapnets have been used to remove fish in Alimagnet Lake from 2005-2012. Both the MnDNR (2006-2012) and Blue Water Science (2005-2009) have removed fish (Figure 2). No fish removal has been conducted from 2013 through 2020.

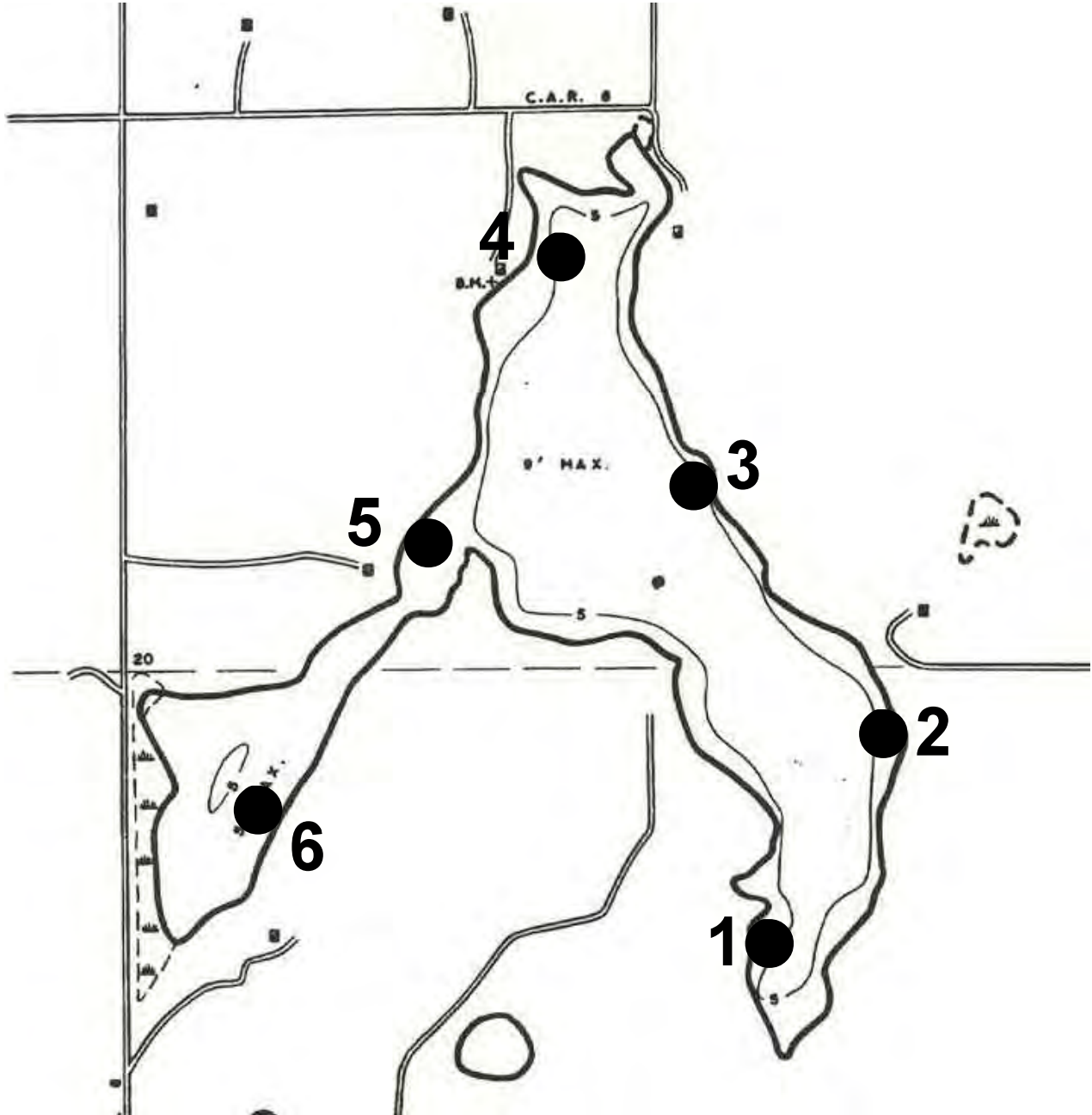


Figure 1. Trapnet locations for the fish survey in Alimagnet Lake in 2020. These are the same locations that have been used for the last few years.



Figure 2. [top] A trapnet is a live fish trap. Fish run into the 50-foot lead net and follow it to the back of the net through a series of hoops with funnel mouths. Fish end up in the back hoop. This net is on the shoreline. The back hoop is tied to a tree and the lead is being stretched out so the full net can be seen. [bottom] Fish are removed from the back hoop and transferred to tubs. Then the fish are counted and measured and returned to the lake.

Results

Fish Survey Catch Rates in 2020

In October, Blue Water Science conducted a fish survey using 6 trapnets set over 2 nights for a total of 12 sets. Results for each net on each day are shown in Table 1.

Table 1. Alimagnet Lake trapnet results for the fish survey conducted in October 14-15, 2020. All fish were included in these counts.

	Fish Captured (October 14-15, 2020)												Total Catch	2020 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>)		1							1				2	0.2	2.2 - 60.5
Black crappies (<i>Pomoxis nigromaculatus</i>)	10	8	41	219	4	12	3		18	9	3		327	27	2.4 - 15.1
Bluegill sunfish (<i>Lepomis macrochirus</i>)	305	56	141	145	50	79	129	49	755	332	58	13	2,112	176	1.9 - 29.5
Hybrid sunfish (<i>Lepomis sp</i>)		2	8	2								1	13	1.1	NA
Largemouth bass (<i>Micropterus salmoides</i>)			1	1					3				5	0.4	0.3 - 1.2
Northern pike (<i>Esox lucius</i>)					1								1	0.1	NA
Pumpkinseed sunfish (<i>Lepomis gibbosus</i>)	26	5	12	13	1	6	17	4	30	24	6		144	12	0.8 - 8.4
Yellow perch (<i>Perca flavescens</i>)				2					1				3	0.3	0.8 - 6.2
TOTAL FISH	341	72	203	382	56	97	149	53	808	365	67	14	2,607	217	

Length Frequencies in 2020

Fish lengths for all fish species are shown in Table 2. Black bullheads were scarce. Black crappies were common but relatively small with most fish less than 7.5 inches. Bluegills were abundant with a majority of fish were in the 6.5-7 inch category. Northern pike were the longest fish in Alimagnet.

Table 2. Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on October 14-15, 2020. Fish in the yellow shading were considered to be young of the year and were not included in the statistics.

	Black bullhead	Black crappie	Bluegill	Hybrid sunfish	Largemouth Bass	Northern pike	Pumpkinseed	Yellow perch
<3			58	1			3	
3		1						
3.5		1	7				1	
4		2	24				2	
4.5			10				13	
5		2	32	1	1		6	
5.5		7	42	2	1		15	
6		7	70	1			34	
6.5		4	172	1			44	
7		33	128	4			25	
7.5		47	6	2	1		1	
8		24			1			1
8.5		1		1				2
9		2						
9.5								
10	2	1						
11								
12								
13								
14								
15								
16								
17								
18								
19					1			
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35						1		
Measured	2	132	491	12	5	1	141	3
Counted		195	1,563					
TOTAL	2	327	2,054	12	5	1	141	3
fish/ net (12 nets)	0.2	27	171	1.0	0.4	0.1	12	0.3

Fish Trap Data Summary for 2000-2020

Results of the trapnet data from 2000 to 2020 may reflect influences of fish removal, stocking and the aquatic plant status. After bluegill removal was concluded at the end of 2012, bluegill numbers have been increasing since 2013 but in 2016 and 2017 bluegill numbers decreased (Table 3). In 2020 bluegill numbers were higher than in 2016-2018 but not as high as 2015.

Gamefish abundance has been relatively low based on trapnet results. A northern pike was found in the 2020. Largemouth bass were sampled at 0.4 fish per net and has been relatively unchanged for a number of years. It may be that there are not enough predators to keep bluegill numbers in check.

Table 3. Trapnet data represents fish caught per net. Data are for standard trapnet sizes. Black bullheads have been removed from 2005-2009 and bluegills from 2006-2012. Years of fish removal are highlighted with yellow shading.

	2000 (fish/lift) (MnDNR)	2005 (fish/lift) (BWS) (n=24)	2006 (fish/lift) (BWS) (n=80)	2007 (fish/lift) (BWS) (n=112)	2008 (fish/lift) (BWS) (n=80)	2009 (fish/lift) (BWS) (n=80)	2010 (fish/lift) (BWS) (n=18)	2011 (fish/lift) (BWS) (n=12)	2012 (fish/lift) (BWS) (n=12)
Bluegill sunfish	4	193	96	132	103	108	54	128	59
Black bullhead	84	50	35	14	19	4.5	4.0	1.1	0.3
Black crappie	5	16	13	24	52	33	16	15	7.3
Channel catfish	0	0	0	0	0.5	0.3	0	0.1	0.1
Golden shiner	0	0	0	0	0	0	0	0	0.1
Green sunfish	0	0	0	0	0	0	0	0	0.1
Hybrid sunfish	0	0	0	0	0	0	0	0	0
Largemouth bass	0.5	0.5	0.6	0.4	0.3	0.1	0.2	0.7	0
Madtom	0	0	0	0	0	0	0	0	0
Northern pike	3.9	0.7	0.5	0.3	0.3	0.2	0.3	0.1	0
Pumpkinseed	0	0	0	0	0	0	2.7	16	7.3
Walleye	0.3	0.04	0	0	0	0	0	0	0
White sucker	0	0.4	0.1	0.1	0.01	0.1	0	0.3	0
Yellow bullhead	0	0	0	0	0	0	0	0	0
Yellow perch	0	0.5	1.1	1	0.4	1.1	0.3	13	7.9
Number of Fish Species	6	8	7	7	8	8	7	9	8

	2013 (fish/lift) (BWS) (n=12)	2014 (fish/lift) (BWS) (n=12)	2015 (fish/lift) (BWS) (n=12)	2016 (fish/lift) (BWS) (n=12)	2017 (fish/lift) (BWS) (n=12)	2018 (fish/lift) (BWS) (n=12)	2020 (fish/lift) (BWS) (n=12)
Bluegill sunfish	202	202	306	139	88	106	171
Black bullhead	0.7	0.3	1.1	0.7	0.3	0.2	0.2
Black crappie	49	60	37	45	56	7.8	27
Channel catfish	0.1	0.4	0.2	0.1	0	0	0
Golden shiner	0	0	0.2	0.1	0.1	0	0
Green sunfish	0.1	0.1	0	0	0	0.8	0
Hybrid sunfish	0.8	0.6	0	0	0	0.8	1.0
Largemouth bass	0.3	0.2	0.5	0.3	0	0.4	0.4
Madtom	0	0	0	0	0	0.1	0
Northern pike	0.4	0.2	0.4	0	0.3	0	0.1
Pumpkinseed	15	11	3.1	2.6	4.7	4.8	12
Walleye	0	0	0	0	0	0	0
White sucker	0.1	0	0.2	0	0.1	0	0
Yellow bullhead	0	0.1	0	0	0	0	0
Yellow perch	0.7	0.3	0.2	0.1	0.1	0.1	0.3
Number of Fish Species	11	11	10	8	8	9	8

Length Frequency Analysis from 2005 to 2018 and 2020

Overall, the bluegill population was small-sized in 2005 and only 6% of the bluegills were 6-inches or greater. In 2016, 51% were 6 inches or greater (Table 4). Bluegills may be slightly increasing in length in 2015 compared to 2014. Black crappies have increased in number since 2005 but their average length has decreased slightly.

Table 4. Length frequency of bluegill, black bullhead, and black crappies (total length). Blue shading represents dominant length.

Size Range (inches)	Bluegill							Black Bullhead								Black Crappie							
	2005 (10% measure) (n=486)	2012 (100% measure) (n=713)	2015 (4% measure) (n=147)	2016 (12% measure) (n=206)	2017 (50% measure) (n=523)	2018 (54% measure) (n=1267)	2020 (26% measure) (n=491)	2005 (14% measure) (n=171)	2012 (100% measure) (n=4)	2015 (100% measure) (n=13)	2016 (100% measure) (n=8)	2017 (100% measure) (n=4)	2017 (100% measure) (n=2)	2018 (100% measure) (n=2)	2020 (100% measure) (n=2)	2005 (64% measure) (n=248)	2012 (100% measure) (n=87)	2015 (58% measure) (n=257)	2016 (41% measure) (n=223)	2017 (93% measure) (n=623)	2017 (93% measure) (n=94)	2018 (100% measure) (n=94)	2020 (40% measure) (n=132)
<3.0	(8)					(31)	(58)													(2)			5
3.0	2% (11)	1% (5)		4% (9)		1% (1)													1% (1)				1% (1)
3.5	1% (1)	19% (139)	1% (1)	3% (7)	1% (1)	1% (2)	1% (7)									1% (1)	1% (2)	1% (3)	1% (2)				1% (1)
4.0	9% (43)	25% (181)		1% (3)	2% (9)	1% (6)	5% (24)									33% (29)		19% (42)					2% (2)
4.5	15% (73)	4% (32)	1% (1)	3% (6)	11% (57)	2% (15)	2% (10)									9% (8)							
5.0	41% (197)	6% (43)	12% (17)	4% (8)	15% (80)	13% (90)	7% (32)								2% (5)	1% (1)	1% (1)	2% (4)	6% (37)	1% (1)	1% (1)	1% (1)	2% (2)
5.5	26% (126)	7% (51)	39% (58)	33% (69)	22% (116)	21% (140)	9% (42)										1% (3)	12% (26)	18% (112)	2% (2)	2% (2)	2% (2)	5% (7)
6.0	4% (21)	5% (36)	40% (59)	36% (75)	33% (172)	34% (230)	14% (70)								2% (5)	11% (10)	12% (32)	7% (16)	11% (66)	29% (27)	29% (27)	29% (27)	5% (7)
6.5	1% (2)	5% (36)	7% (10)	14% (28)	16% (83)	21% (145)	35% (172)								4% (11)	7% (6)	43% (111)	20% (45)	29% (182)	41% (39)	41% (39)	41% (39)	3% (4)
7.0	1% (4)	12% (85)		1% (1)	1% (5)	3% (20)	26 (128)	1% (1)							21% (51)	1% (1)	37% (96)	29% (65)	29% (178)	24% (23)	24% (23)	24% (23)	25% (33)
7.5		13% (92)	1% (1)			1% (2)	1% (6)	3% (5)							18% (44)	1% (1)	3% (8)	6% (13)	5% (34)	2% (2)	2% (2)	2% (2)	36% (47)
8.0		2% (13)						88% (150)							38% (94)	6% (5)	1% (3)	2% (5)	1% (5)				18% (24)
8.5								7% (12)							10% (25)	15% (13)	1% (1)	1% (1)	1% (1)				1% (1)
9.0								2% (3)	25% (1)						4% (10)	6% (5)		1% (2)	1% (1)				2% (2)
9.5															1% (2)	7% (6)			1% (2)				
10.0									25% (1)			25% (1)			100% (2)	1% (1)							1% (1)
10.5										1% (8)													
11.0									25% (1)											1% (1)			
11.5									25% (1)	1% (8)	13% (1)		50% (1)	50% (1)		0.4% (1)							
12										38% (5)	38% (3)												
12.5										31% (4)	25% (2)												
13.0										15% (2)	13% (1)	50% (2)	50% (1)	50% (1)									
13.5											13% (1)												
14												25% (1)	25% (1)										

Channel Catfish Statistics - Alimagnet Lake

Total Length (inches)	2007 (stocking Nov 16)	2008	2009	2010 (MnDNR)	2011	2012	2013	2014	2015	2016	2017	2018	2020	
1														
2														
3														
4														
5														
6														
7	11% (2)													
8	39% (7)													
9	28% (5)													
10	17% (3)													
11	6% (1)	10% (4)												
12		5% (2)												
13		23% (9)	5% (1)											
14		26% (10)	14% (3)	4% (2)										
15		5% (2)	26% (6)	24% (13)										
16		3% (1)	33% (7)	26% (14)										
17			14% (3)	35% (19)	41 total fish 17-23 inches									
18			5% (1)	11% (6)										
19														
20														
21														
22							100% (1)							
23								40% (2)						
24							100% (1)			100% (1)				
25								50% (1)						
26								20% (1)						
27								20% (1)	50% (1)					
28														
29														
30								20% (1)						
Total Fish Measured	18 (subsample of the 9,000 catfish stocked)	39 (total catch from 80 trapnet lifts) (Oct 7-16) (0.5 fish/lift)	21 (total catch from 80 trapnet lifts) (July 14-23) (0.3 fish/lift)	54 (MnDNR trapnetting)	41 (MnDNR trapnetting)	1	1	5	2	1	0	0	0	
Age of Channel Catfish	2 years*	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	11 years	12 years	13 years	15 years	

*2 years (personal comm. Osage Fisheries, MO, supplier of the fish)

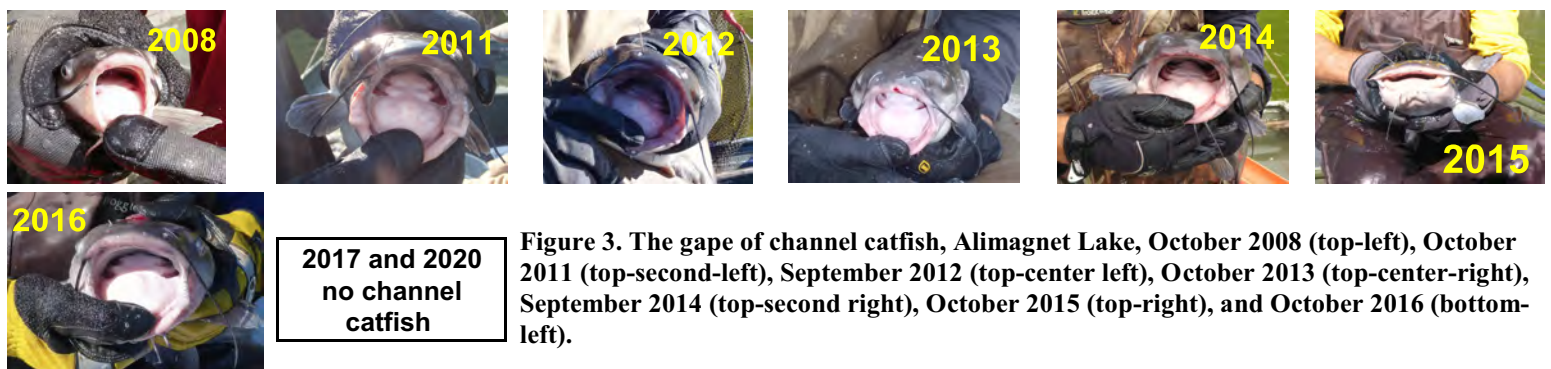


Figure 3. The gape of channel catfish, Alimagnet Lake, October 2008 (top-left), October 2011 (top-second-left), September 2012 (top-center left), October 2013 (top-center-right), September 2014 (top-second right), October 2015 (top-right), and October 2016 (bottom-left).

Fish Removal from 2005 - 2012

From 2005 through 2012, the Cities of Apple Valley and Burnsville oversaw a bullhead and sunfish removal project which also has served as fish surveys as well. The objectives of the fish removal program were to improve lake water quality and improve the fishery.

A summary of annual fish removal is shown in Table 5. Fish removal occurred over an eight year period from 2005 - 2012.

The removal goal has been a total of 100 pounds of fish per lake acre over a 5 to 6 year period. This amount of removal has resulted in water clarity improvements in Lee Lake, another lake in the metro area (McComas 2007, unpublished). At the end of 2012, an estimated 170 pounds of fish per acre have been removed with a total of 17,046 pounds removed (Table 5).

Table 5. Summary of fish removed from Alimagnet Lake from 2005-2012.

	Black Bullheads		Bluegills		Crappies		Totals		Fish Removal per Lake Acre (100 ac lake)
	number	pounds	number	pounds	number	pounds	number	pounds	
2005	739	231	0	0	0	0	739	231	2
2006	2,777	868	7,711	918	0	0	10,488	1,786	18
2007	1,464	488	14,610	1,948	0	0	16,074	2,436	24
2008	2,972	1,010	14,303	1,607	1,694	242	18,969	2,859	29
2009	649	259	13,804	1,980	907	162	15,360	2,401	24
2010	--	--	16,083	2,681	3,894	719	19,977	3,400	34
2011	--	--	10,219	2,237	3,738	1,041	13,357	3,278	33
2012*	--	--	6,220	1,349	540	126	6,760	1,455	15
Totals	8,601	2,856	82,950	12,720	10,773	2,290	102,324	17,866	179

* Yellow perch removal: 185 fish in 2012

Details of Alimagnet Fish Removal

Table 6. Summary of Alimagnet Lake fish removal efforts from 2005-2012. Alimagnet Lake is approximately 100 acres in size.

2005 (Sept 20-23)	Black Bullheads		Bluegills		Totals			
	number	pounds	numbers	pounds	numbers	pounds	numbers	pounds
4-day total (n=24)	739	231	0	0			739	231
Average per net	30	9.6	0	0			30	9.6
Fish removed per lake acre	7	2	0	0			7	2

2006 (Sept 11-21)	Black Bullheads		Bluegills		Totals			
	number	pounds	numbers	pounds	numbers	pounds	numbers	pounds
10-day total (n=80)	2,777	868	7,711	918			10,488	1,786
Average per net	35	10.8	96	11.5			131	22.3
Fish removed per lake acre	28	8.7	77	9.2			105	18

2007 (Aug 7 - 11 and Sept 11-19)	Black Bullheads		Bluegills		Totals			
	number	pounds	numbers	pounds	numbers	pounds	numbers	pounds
14-day total (n=112)	1,464	488	14,610	1,948			16,074	2,436
Average per net	14	4.4	132	17.4			146	21.8
Fish removed per lake acre	15	5	146	19			161	24

2008	Black Bullheads		Bluegills		Crappies		Totals	
	number	pounds	numbers	pounds	numbers	pounds	numbers	pounds
October 7-16, 2008								
10-day total (n=80)	1,496	576	8,232	968			9,728	1,544
Average per net	19	7.2	103	12.1			122	19.3
Fish removed per lake acre	15	6	82	10			97	16
June 24-27, 2008 (MnDNR)								
4-day total (n=76)	1,476	434	6,071	639	1,694	242	9,241	1,305
Average per net	19	5.7	80	8.3	22	3.2	121	17.2
Fish removed per lake acre	15	4	61	6	17	2	92	13

2009	Black Bullheads		Bluegills		Crappies		Totals	
	number	pounds	numbers	pounds	numbers	pounds	numbers	pounds
April 30 - May 4, 2009 (MnDNR)								
5-day total (n=54)	168	56	1,709	259	907	162	2,784	477
Average per net	3.1	1.0	32	4.8	17	3.0	52	8.8
Fish removed per lake acre	1.7	0.6	171	2.6	91	1.6	264	4.8
June 22-26, 2009 (MnDNR)								
5-day total (n=72)	120	40	3,452	523			3,572	563
Average per net	1.7	0.6	48	7.3			50	7.9
Fish removed per lake acre	1.2	0.4	35	5.2			36.2	5.6
July 14-23, 2009								
10-day total (n=80)	361	163	8,643	1,198			9,004	1,361
Average per net	4.5	2	108	15			113	17
Fish removed per lake acre	3.6	1.6	86	12			89.6	13.6

2010 (April 4-21, May 5, 10, 11, June 8) (MnDNR)	Black Bullheads		Bluegills		Crappies		Totals	
	number	pounds	numbers	pounds	number	pounds	numbers	pounds
14-day total	--	--	16,083	2,681	3,894	719	19,977	3,400
Fish removed per lake acre	--	--	161	26.8	39	7.2	200	34.0

2011* (April 18- June 3, June 16) (MnDNR)	Black Bullheads		Bluegills		Crappies		Totals	
	number	pounds	numbers	pounds	number	pounds	numbers	pounds
42-day total (28 nests/day)	--	--	10,219	2,237	3,738	1,041	13,957	3,278
Fish removed per lake acre	--	--	102	22	37	10	140	33

*81 yellow perch removed at 9 pounds

2012* (March 29 - May 17) (MnDNR)	Black Bullheads		Bluegills		Crappies		Totals	
	number	pounds	numbers	pounds	number	pounds	numbers	pounds
Fish removal total	--	--	6,220	1,349	540	126	6,760	1,475
Fish removed per lake acre	--	--	62	5.9	5.4	0.6	68	14.8

* 185 yellow perch removed at 34 pounds

Fish Stocking in 2007, 2008, 2016, and 2020

Fish stocking from 2007 through 2020 is summarized in Table 7.

Table 7. Cities of Burnsville and Apple Valley sponsored stocking from 2007 through 2020.

Date	Species	Number Stocked	Size (inches)	Source
2007 (November 16)	Channel catfish	9,000	8-10	Osage Catfisheries Osage Beach, Missouri
2008 (November 5)	Largemouth bass	1,000	4-6	Rademacher Ponds Waconia, MN
2016 (October 12)	Largemouth bass	2,000 (90 fish/lb) (22 lbs)	3-5	Rademacher Ponds Waconia, MN
2020 (Autumn)	Largemouth bass	1,000	4-6	Rademacher Ponds Waconia, MN



2007 - Catfish - 9,000



2008 - Largemouth bass - 1,000



2016 - Largemouth bass - 2,000



2020 - Largemouth bass - 1,000

Water Quality in Alimagnet Lake

Water clarity in Alimagnet Lake from 1995 through 2010 and 2013 through 2019 was not meeting water quality goals. However, in 2011, 2012, and 2020 water clarity reached the lake goal (Figure 4). Prior to installation of winter aeration in 2000, years of good clarity were loosely correlated with previous winterkill episodes (winterkill was based primarily on lake resident observations). A winter aeration system was first operated over the winter of 1999-2000, and since that time, there have been no winterkill conditions (based on dissolved oxygen measurements taken by the City of Apple Valley). The fish community has continued to thrive without the setback of a winterkill. The disadvantage of this condition was that bluegills and maybe bullhead populations increased. The objectives of the fish removal project and predator fish stocking have been to “re-balance” the fish community has been reduced also. In addition watershed nutrient loading was decreased through watershed projects. It is anticipated that the cumulative effect of these projects should improve and sustain good water quality in Alimagnet Lake.

Secchi disc transparency, as characterized by summer averages, has fluctuated over the years of record, from 1975-2020 (Figure 4). The fluctuating seasonal averages going back to 1975 could represent the effect of occasional winterkills on water quality.

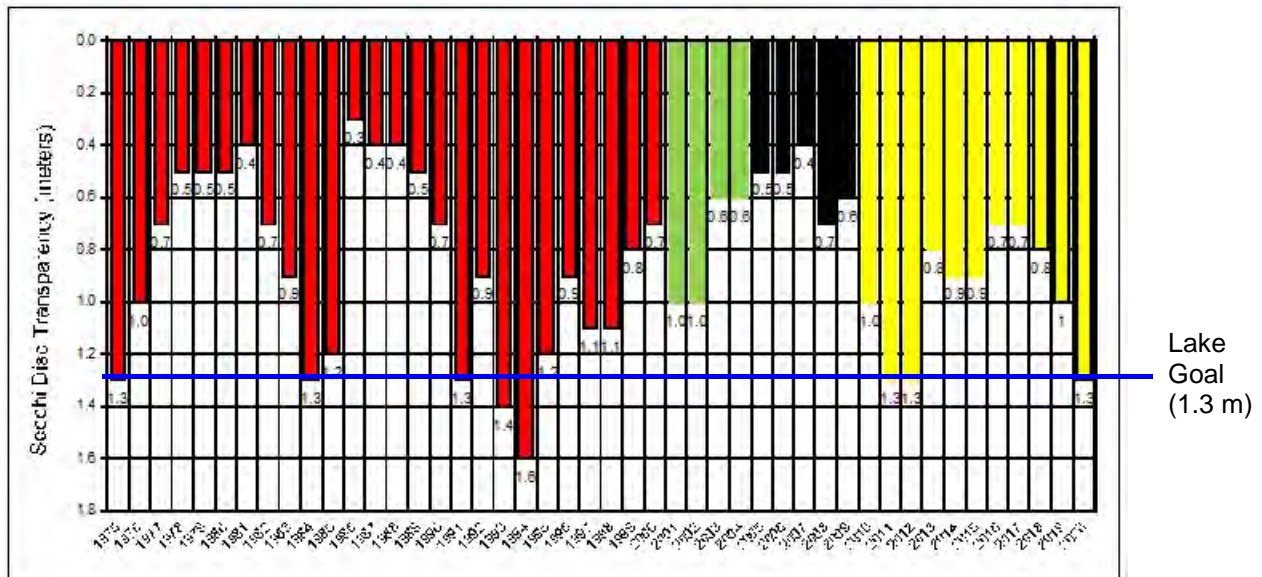


Figure 4. Summer average (May-September) for Secchi disc readings from 1975-2020. Data from 1975 - 1994 are from the MPCA. Data from 1995 - 2020 are from the Met Council CAMP program. Green bars indicate 4 years of winter aeration with no projects. Winter aeration has continued through 2015. Black bars indicate five years of improvement project implementation. Yellow bars represent maintenance projects but no fish removal.

Observations and Conclusions

1. In 2007, 9,000 channel catfish were stocked. They gradually increased in size up to 2016. However, their abundance is relatively unknown at this time.
2. In 2008, 1,000 largemouth bass were stocked and in 2016, 2,000 largemouth bass were stocked. Largemouth bass abundance has been sparse over the years with minor spawning evidence.
3. As of 2012, 179 pounds of fish/acre have been removed. This is over the removal goal of 100 pounds of fish per lake acre for a total of 10,000 pounds (based on a 100 acre lake). Water quality had fluctuated since 2011.
4. In 2012, bluegill sunfish and black crappie numbers were less than 2011 catch rates, but there was an increase in smaller lengths in 2012 compared to 2011. The increase in smaller lengths with higher numbers of fish continued in 2013, 2014, and 2015. It may be that the abundant vegetation was serving as a refuge for smaller fish.
5. The Alimagnet fish community, from a sport fishery perspective, is in good shape. Bluegill abundance is above average. If largemouth bass are to become established, stocking at 1 pound of fish per acre (100 lbs) or 4,000 fish may be needed to establish a significant bass population.
6. From a water quality perspective, fish do not appear to be adversely impacting water quality. Other factors may be contributing to phosphorus loading including unmonitored runoff or phosphorus translocation by rising benthic algae off lake sediments.

APPENDIX

**Fish Permit and Notification E-Mail for 2020
2012 through 2018 Length Frequencies**

Fish Permit and Notification Email

From: Steve McComas [mailto:mccomas@pclink.com]
Sent: Tuesday, October 13, 2020 8:26 AM
To: DeBates, TJ (DNR); Capt. Jason Peterson
Cc: Samantha Berger (Samantha.Berger@applevalleymn.gov); Caleb Ashling; Linnea Wier (Linnea.Wier@burnsvillemn.gov)
Subject: Fish survey on Alimagnet Lake, Dakota County

Hello all,

Blue Water Science will be conducting a fish survey in Alimagnet Lake (MN ID 19-002100), Dakota County starting on Tuesday, October 13, 2020. We will set 6 standard fyke nets in Alimagnet Lake. In Alimagnet Lake, the nets will be monitored daily on Wednesday and Thursday and all fish will be weighed and measured and returned to the water body. The nets will be removed on Thursday, October 15, 2020. The fish survey is sponsored by the Cities of Apple Valley and Burnsville 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: 29777.

Thank you,

Steve McComas

BLUE WATER SCIENCE

550 South Snelling Avenue

St. Paul, MN 55116

651 690 9602

mccomas@pclink.com

Length Frequencies, September 25-26, 2012

Bluegills

Total Length (in)	September 25, 2012							September 26, 2012							Totals	%
	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot		
<3.0																
3.0						3	3			2				2	5	1
3.5			15	2	3	11	62	2		23		52		77	139	19
4.0	4	3	20	5	58	25	115	1	1	35		28	1	66	181	25
4.5	4			2	15	6	27		1	3		1		5	32	4
5.0	1	3	2		6	2	14		11	9	1	8		29	43	6
5.5	4	3			11	5	23		12	5	1	10		28	51	7
6.0	2	4	1	2	2	9	20		2	3	1	10		16	36	5
6.5		7		1	3	2	13	1	4	5	3	10		23	36	5
7.0	2	9	1	5	6	3	26	5	6	14	12	22		59	85	12
7.5	7	12	5	5	10	2	41	5	9	7	8	22		51	92	13
8.0	2	4			1		7		2	2		2		6	13	2
8.5																
9.0																
	26	45	44	22	146	68	351	14	48	108	26	164	1	362	713	

Black Bullheads

Total Length (in)	September 25, 2012							September 26, 2012							Totals	
	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot		
<3.0																
3.0																
3.5																
4.0																
4.5																
5.0																
5.5																
6.0																
6.5																
7.0																
7.5																
8.0																
8.5																
9.0												1		1	1	
9.5																
10.0				1			1								1	
10.5																
11.0												1		1	1	
11.5								1						1	1	
12.0																
12.5																
13.0																
13.5																
14.0																
	0	0	0	1	0	0	1	1	0	0	0	2	0	3	4	

Crappies

Total Length (in)	September 25, 2012							September 26, 2012							Totals
	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	
<3.0															
3.0															
3.5						1	1								1
4.0	3				4	12	19	1	2			4	3	10	29
4.5	2	1			1	2	6		1	1				2	8
5.0								1						1	1
5.5															
6.0		1			3	1	5			3		2		5	10
6.5	1					1	2		3	1				4	6
7.0	1						1								1
7.5					1		1								1
8.0		1			1		2			1	1	1		3	5
8.5		1		1			3		2		6	2		10	13
9.0				1	1		3			1	1			2	5
9.5				1		1	1		1		2	2		5	6
10.0						1	1								1
	7	4	0	4	11	19	45	2	9	7	10	11	3	42	87

Pumpkinseed Sunfish

Total Length (in)	September 25, 2012							September 26, 2012							Totals
	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	
<3.0															
3.0															
3.5															
4.0					1		1	1		1		1		3	4
4.5	1	1	1		3		6			1		3		4	10
5.0	2		1				3								3
5.5	1		1		1		3		3			1		4	7
6.0		4	1	1	1	1	8	2	4	4	1	2		13	21
6.5		3	2	1	4	2	12		1		2	4		7	19
7.0				2	1	1	4	3	1		1	4	1	10	14
7.5	1		1		2	1	5					3		3	8
8.0					1		1								1
8.5									1					1	1
9.0															
	5	8	7	4	14	5	43	6	10	6	4	18	1	45	88

Yellow Perch

Total Length (in)	September 25, 2012							September 26, 2012							Totals
	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	Net 1	Net 2	Net 3	Net 4	Net 5	Net 6	tot	
<3.0															
3.0															
3.5															
4.0															
4.5												1		1	1
5.0															
5.5															
6.0															
6.5															
7.0		2	1		3		6			3		2		5	11
7.5			3		2		5			4		1		5	10
8.0	1	1			2		4		4	4		1		9	13
8.5		1		1	4		6		2	1	1	4		8	14
9.0	1	3			4		8	2	6	4	4	2		18	26
9.5	3		1				4		5	1	1	1		8	12
10.0					1		1		5		1			6	7
10.5		1					1								1
11.0															
	5	8	5	1	16	0	35	2	22	17	7	12	0	60	95

Channel Catfish

Total Length (in)	Totals
<3.0	
3.0	
3.5	
4.0	
4.5	
5.0	
5.5	
6.0	
6.5	
7.0	
7.5	
8.0	
8.5	
9.0	
9.5	
10.0	
11.0	
12.0	
13.0	
14.0	
15.0	
16.0	
17.0	
18.0	
19.0	
20.0	
21.0	
22	1
	1

Golden Shiner

Total Length (in)	Totals
<3.0	
3.0	
3.5	
4.0	
4.5	
5.0	
5.5	
6.0	
6.5	1
7.0	
7.5	
8.0	
8.5	
9.0	
	1

Green Sunfish

Total Length (in)	Totals
<3.0	
3.0	
3.5	
4.0	
4.5	
5.0	1
5.5	
6.0	
6.5	
7.0	
7.5	
8.0	
8.5	
9.0	
	1

2013: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey.

Length (inches)	Black bullhead	Black crappie	Bluegill sunfish	Channel catfish	Green sunfish	Hybrid sunfish	Largemouth bass	Northern pike	Pumpkin-seed	White sucker	Yellow perch
<3			1								
3			45								
3.5		1	52								
4			128						2		
4.5		2	265		1				7		
5		49	214						8		1
5.5		149	78			1			25		2
6		130	99			6			31		1
6.5		72	67			2			16		
7		15	71			1			26		3
7.5		5	40				1		5		1
8		21	17								
8.5		43	1								
9		17									
9.5	2	4									
10											
10.5	2										
11											
11.5	1										
12	2										
12.5	1										
13											
13.5											
14											
14.5											
15							1				
15.5											
16							1				
16.5											
17											
17.5											
18							1				
18.5											
19											
19.5											
20								1			
20.5											
21										1	
21.5											
22											
22.5											
23				1							
23.5											
24								2			
24.5											
25											
26								1			
27											
28											
29											
30											
31											
32											
33											
34								1			
Number of fish caught	8	508	1077	1	1	10	4	5	120	1	8

2014: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on September 11-12, 2014.

Length (inches)	Black bullhead	Black crappie	Bluegill sunfish	Channel catfish	Green sunfish	Hybrid sunfish	Largemouth bass	Northern pike	Pumpkin-seed	Yellow bullhead	Yellow perch
<3		2	37								
3											
3.5			1				1				
4			1						4		
4.5			8						9		
5			87		1	1			26		
5.5		8	161						26		1
6		115	76						22		1
6.5		173	20			4			19		
7		36	7			2			16		
7.5		2	5						7		
8		7							1		
8.5		5									1
9		2									
9.5		1									
10	1	1									
10.5	3										
11											
11.5											
12											
12.5											
13											
13.5										1	
14											
14.5											
15											
15.5											
16											
16.5											
17											
17.5											
18											
18.5											
19							1				
19.5											
20											
20.5											
21											
21.5											
22											
22.5				1							
23				1				1			
23.5											
24											
24.5											
25											
25.5											
26				1							
26.5				1							
27.5											
28											
28.5											
29								1			
29.5											
30				1							
Number of fish measured	4	350	366	5	1	7	2	2	130	1	3
Number of fish caught	4	741	2,420	5	1	7	2	2	130	1	3
Percent of fish measured	100%	47%	15%	100%	100%	100%	100%	100%	100%	100%	100%

2015: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on October 14-15, 2015.

Length (inches)	Black bullhead	Black crappie	Bluegill sunfish	Channel catfish	Golden shiner	Largemouth bass	Northern pike	Pumpkin-seed	White sucker	Yellow perch
<3										
3										
3.5		2	1							
4										
4.5			1							
5		1	17					2		
5.5		3	58					1		
6		32	59		1			14		
6.5		111	10					8		1
7		96						10		
7.5		8	1			1		2		1
8		3			1					
8.5		1								
9										
9.5										
10										
10.5	1									
11										
11.5	1									
12	5									
12.5	4									
13	2									
13.5										
14										
14.5										
15						1				
15.5										
16						3				
16.5						1				
17										
17.5										
18										
18.5										
19										
19.5										
20									1	
20.5										
21									1	
21.5										
22										
22.5										
23										
23.5										
24										
24.5										
25				1			1			
26							1			
27				1						
28							2			
29										
30										
31										
32							1			
Number of fish measured	13	257	147	2	2	6	5	37	2	2
Number of fish caught	13	442	3671	2	2	6	5	37	2	2
Percent of fish measured	100%	58%	4%	100%	100%	100%	100%	100%	100%	100%

2016: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on October 12-13, 2016.

Alimagnet	Black bullhead	Black crappie	Bluegill	Channel catfish	Golden shiner	Largemouth bass	Northern pike	Pumpkinseed	Yellow perch
<3.5		1	9					1	
3.5		3	7					1	
4		42	3			1		6	
4.5			6					6	
5		4	8					8	
5.5		26	69					2	
6		16	75					2	
6.5		45	28					4	
7		65	1					1	1
7.5		13							
8		5							
8.5		1							
9		2							
9.5					1				
10									
10.5									
11									
11.5	1								
12	3								
12.5	2								
13	1								
13.5	1								
14									
14.5									
15									
15.5									
16						1			
16.5						1			
17									
17.5									
18									
18.5									
19									
19.5						1			
20									
20.5									
21									
21.5									
22									
22.5									
23									
23.5									
24				1					
24.5									
25									
25.5									
26									
26.5									
27									
27.5							1		
28									
28.5									
29							1		
29.5									
30									
30.5									
31							1		

2017: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on October 12-13, 2017.

Alimagnet	Black bullhead	Black crappie	Bluegill	Golden shiner	Northern pike	Pumpkinseed	White sucker	Yellow perch
<3.5		2						
3.5		2	1					
4			9			2		
4.5			57			2		
5		37	80			17		
5.5		112	116			9		
6		66	172			13		
6.5		182	83			9		
7		178	5			4		
7.5		34						1
8		5		1				
8.5		1						
9		1						
9.5		2						
10	1							
10.5								
11		1						
11.5								
12								
12.5								
13	2							
13.5								
14	1							
14.5								
15								
15.5								
16								
16.5								
17								
17.5								
18								
18.5								
19								
19.5								
20								
20.5								
21							1	
21.5								
22								
22.5								
23								
23.5								
24								
24.5								
25								
25.5								
26								
26.5								
27					1			
27.5								
28					1			
28.5								
29								
29.5								
30								
30.5								
31								
31.5								
32					1			
Total	4	623	523	1	3	56	1	1

2018: Length frequency of fish species (as total length) for the Alimagnet Lake fish survey on October 23-24, 2018.

	Black bullhead	Black crappie	Bluegill	Green sunfish	Hybrid sunfish	LM Bass	Madtom	Pumpkin-seed	Yellow perch
<3.5			31						
3.5			1						
4			2	1			1	1	
4.5			6	4		1		1	
5			15	2					
5.5		1	90	3	1			6	
6		2	140		5			27	
6.5		27	230		1			16	
7		39	145		2			5	
7.5		23	20		1			1	
8		2	2						1
8.5									
9									
9.5						1			
10									
10.5									
11						0			
11.5						1			
12	1								
12.5									
13									
13.5	1								
14						1			
14.5									
15									
15.5									
16						1			
Counted not measured			585						
Total	2	94	682	10	10	5	1	57	1