



Snapping Turtle from Arctic Lake, September 2012

Fish Survey of Arctic Lake (ID #70-0085), Scott County, Minnesota in 2012

Survey Dates: September 18-20, 2012

MnDNR Permit Number: 18362

Prepared for:
Shakopee Mdewakanton
Sioux Community and
MnDNR



Prepared by:
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Introduction

Arctic Lake (ID: 70-085) is a 24-acre shallow lake, located in Scott County, Minnesota. In September 2012, the Shakopee Mdewakanton Sioux Community sponsored a fish survey conducted by Blue Water Science under permit number 18362 granted from the MnDNR. The objectives were to characterize the fish community in Arctic Lake.

Methods

Three standard trapnets and two mini trapnets were sampled for two days for a total of six standard lifts and four mini lifts to survey fish in Arctic 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 3/8 inch. The mini trapnet was MnDNR-style with a 2 x 3 feet square frame with one funnel mouth openings with 25-foot lead. The net mesh size was 3/16 inch. Three standard trap nets and two mini trap nets were set on Tuesday September 18, 2012. The nets were fished for the following 2 days (September 19, 20). Trapnet locations are shown in Figure 1 and pictures of a typical trapnet operation are shown in Figure 2.

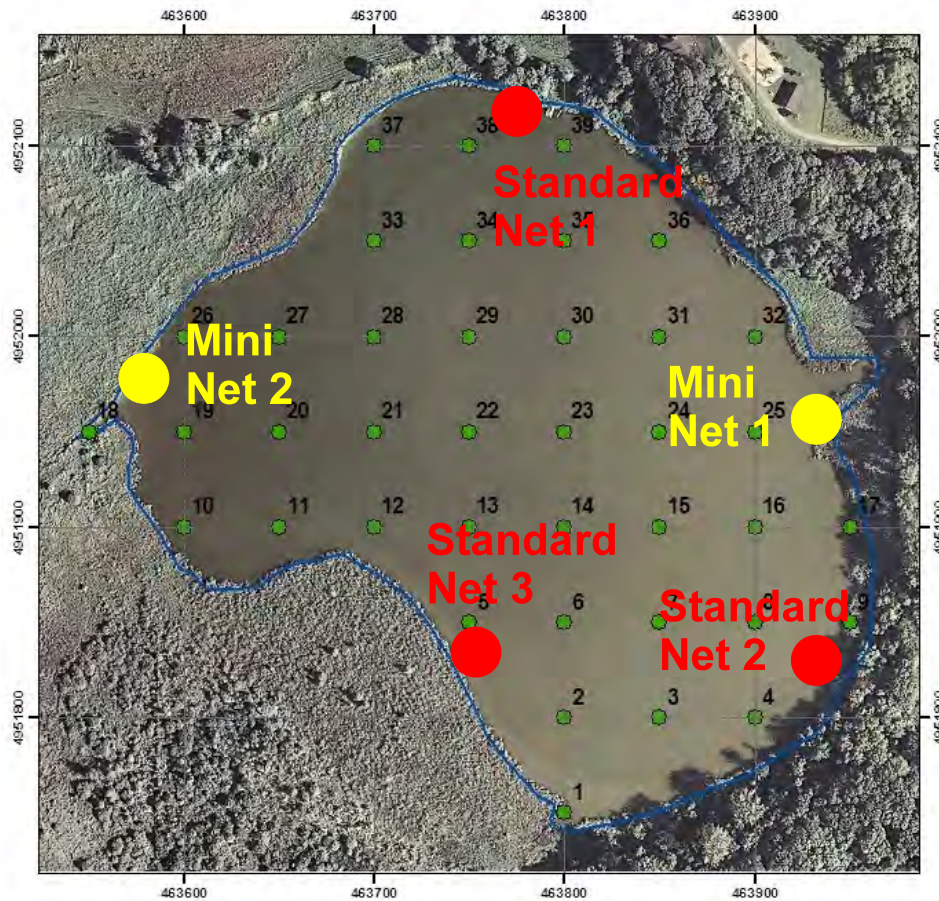


Figure 1. Map of trapnet sets in Arctic Lake (green dots represent aquatic plant sampling sites).



A trapnet (both standard size or mini) is a live fish trap. Fish run into a lead net attached to the shore and follow it back through a series of hoops with funnel mouths. Fish end up in the back hoop. The flag marks the end of the back hoop



A dip net is used to remove the fish from the back of the standard trapnet.



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

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

Results

Standard Trapnets: A total of ten fish species were sampled in Arctic Lake on September 19 and 20, 2012. Bluegill sunfish were the most abundant species followed by yellow bullheads. Net 3 was the most productive (Table 1).

The average number of bluegill sunfish caught per net was high with the average haul of 58 fish per net (Table 1). Yellow perch were found at moderate numbers and within a typical range for a lake like Arctic, as defined by the MnDNR. Black bullhead and yellow bullhead abundance were average based on standard ranges compiled by the MnDNR.

A total of 40 carp were sampled in three nets over two days for an average of 6.7 carp per net. That is a high abundance of carp.

Turtle Results: Snapping turtles and painted turtles were also sampled in the trapnets and were common in Arctic Lake. Painted turtles and snapping turtles likely do well because there is a high percentage of a natural shoreline area.

Mini-Trapnets: Mini-trapnets are smaller versions of standard trapnets with smaller mesh sizes and are intended to sample small fish. The mini trapnets sampled eight fish species with small bluegills dominating the catch. Fathead minnows were caught and golden shiners were sampled at a slightly higher rate than in regular trapnets. Yellow and black bullheads were sampled at lower rates and carp, white suckers, and yellow perch were not sampled at all, although these fish species were sampled in the regular trapnets. The minnow population was low in Arctic Lake based on mini-trapnet results.



Figure 3. [left] Typical tub of fish from a net set in Arctic Lake. Fish caught included carp, bluegills, yellow perch, and bullheads.

[right] Sunfish species (top to bottom: bluegill, pumpkinseed, green, and hybrid) caught in Arctic Lake during the 2012 fish survey.

Table 1. Arctic Lake standard trapnet results for the fish survey conducted in September 2012.

STANDARD NETS	September 19 and 20, 2012						Total Catch	Number per Net (n=6)	Normal Range (MnDNR)
	Net 1		Net 2		Net 3				
	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2			
Black bullheads (<i>Ameiurus melas</i>)	4	0	15	9	12	29	69	12	1.3 - 78.1
Bluegill sunfish (<i>Lepomis macrochirus</i>)	10	19	20	16	173	107	345	58	1.0 - 14.9
Carp (<i>Cyprinus carpio</i>)	4	1	12	16	3	4	40	6.7	0.7 - 5.1
Hybrid sunfish	2	0	2	3	1	3	11	1.8	NA
Golden shiner (<i>Notemigonus crysoleucas</i>)	1	0	0	2	5	5	13	2.2	0.2 - 1.1
Green sunfish (<i>Lepomis cyanellus</i>)	2	0	4	2	1	2	11	1.8	0.4 - 3.8
Pumpkinseed sunfish (<i>Lepomis gibbosus</i>)	1	0	1	1	17	4	24	4.0	0.4 - 4.5
White sucker (<i>Catostomus commersonii</i>)	0	1	0	5	0	0	6	1.0	0.3 - 1.3
Yellow bullhead (<i>Ameiurus natalis</i>)	0	0	10	15	16	50	91	15	0.5 - 4.1
Yellow perch (<i>Perca flavescens</i>)	15	6	3	30	3	13	70	12	0.2 - 2.6
TOTAL FISH	39	27	67	99	231	217	680	113	
Turtles - painted	0	0	1	2	1	5	9		NA
Turtles - snapping	0	0	1	1	1	1	4		

Table 2. Arctic Lake mini-trapnet results for the fish survey conducted in September 2012.

MINI NETS	September 19 and 20, 2012				Total Catch	Number per Net (n=4)
	Net 1		Net 2			
	Day 1	Day 2	Day 1	Day 2		
Black bullheads (<i>Ameiurus melas</i>)	1	0	0	0	1	0.3
Bluegill sunfish (<i>Lepomis macrochirus</i>)	26	121	43	11	201	50
Hybrid sunfish	3	1	0	0	4	1.0
Fathead minnow (<i>Pimephales promelas</i>)	0	0	9	0	9	2.3
Golden shiner (<i>Notemigonus crysoleucas</i>)	0	10	1	6	17	4.3
Green sunfish (<i>Lepomis cyanellus</i>)	2	5	5	0	12	3.0
Pumpkinseed sunfish (<i>Lepomis gibbosus</i>)	5	2	3	11	21	5.3
Yellow bullhead (<i>Ameiurus natalis</i>)	1	0	0	0	1	0.3
TOTAL FISH	38	139	61	28	266	67
Turtles - painted	5	12	0	0	17	4.3
Turtles - snapping	0	2	1	0	3	0.8

Fish Lengths: Fish lengths are shown in Figure 4 and Tables 3 and 4. Bluegill, hybrid sunfish, green sunfish, and pumpkinseed sunfish lengths ranged from <3 inches up to 9.5 inches with the majority of the population 5 inches or greater (Table 3 standard nets and Table 4 mini nets). The small fish, less than 3-inches, indicate bluegills are spawning in Arctic Lake. In this survey, two different species of bullheads were sampled, black and yellow. The yellow bullheads captured that were 4-inches long indicate adult bullheads are spawning in Arctic Lake (Table 2). There was one largemouth bass caught in the regular-sized trapnets that measured 14.5 inches (Table 3).

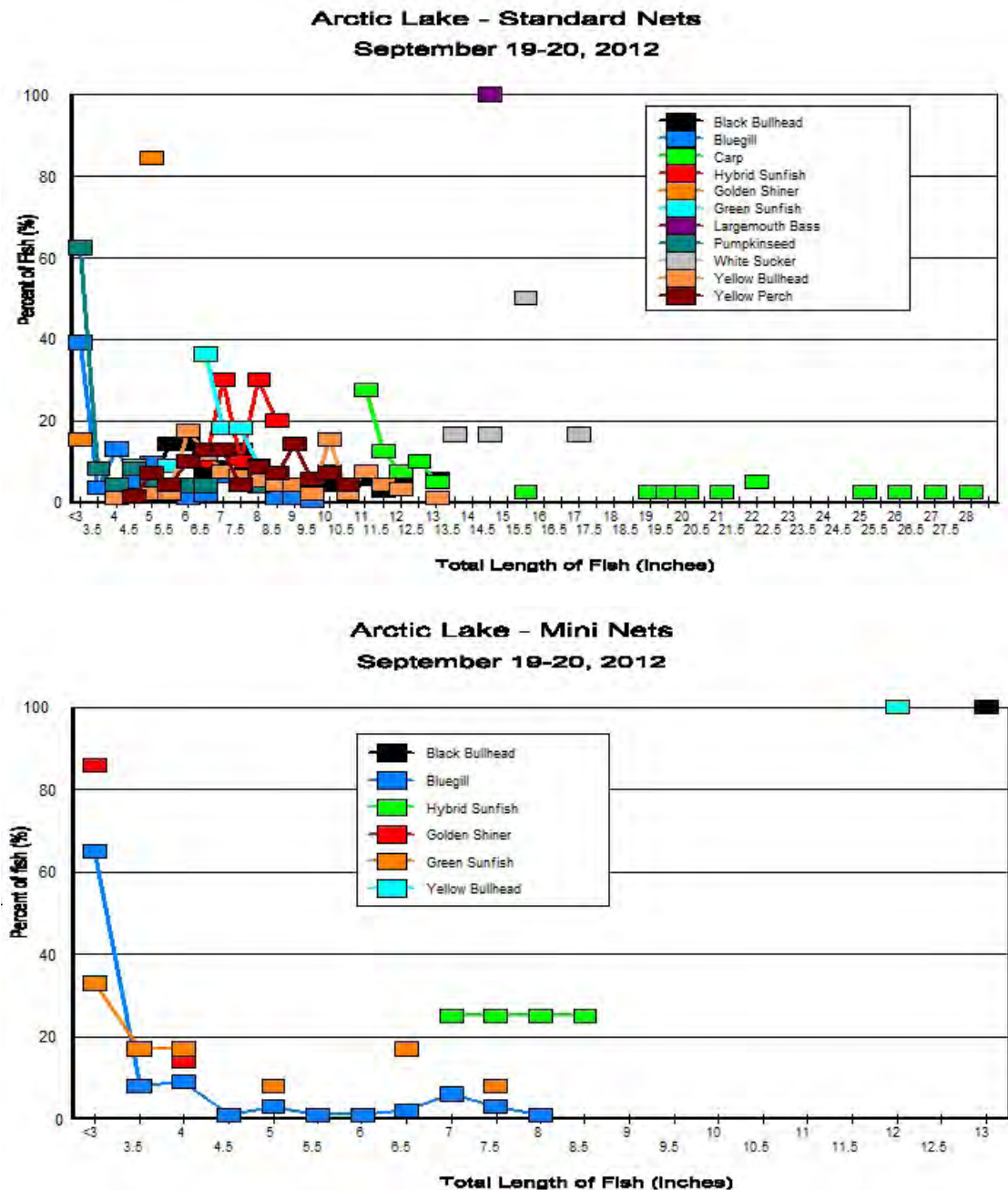


Figure 4. Length distribution of fish from the September 2012 survey in Arctic Lake. [top] Standard nets. [bottom] Mini-trapnets.

Table 3. Length frequency of fish species (as total length) for the Arctic Lake fish survey for the standard trapnet.

	Black Bullhead	Bluegill	Carp	Hybrid Sunfish	Golden Shiner	Green Sunfish	Large-mouth Bass	Pumpkin-seed	White Sucker	Yellow Bullhead	Yellow Perch
<3		135			2			15			
3.5		12						2			
4		45						1		1	
4.5		17				1		2			1
5	2	33			11			1		2	5
5.5	10	6				1				2	3
6	10	4						1		16	7
6.5	5	7		1		4		1		11	9
7	6	22		3		2				7	9
7.5	9	31		1		2				6	3
8	5	23		3		1		1		5	6
8.5	1	4		2						4	5
9	2	4								4	10
9.5	2	1	1							2	4
10	3		3							14	5
10.5	1									2	3
11	4		11							7	
11.5	2		5							4	
12	3		3							3	
12.5			4								
13	4		2						1	1	
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27			1								
27.5											
28			1								
Number of fish	69	344	40	11	13	11	1	24	6	91	70
Number of adult fish	69	209	40	11	11	11	1	9	6	91	70

Table 4. Length frequency of fish species (as total length) for the Arctic Lake fish survey for the mini trapnet.

	Black Bullhead	Bluegill	Hybrid Sunfish	Golden Shiner	Green Sunfish	Yellow Bullhead
<3		113		6	4	
3.5		14			2	
4		15		1	2	
4.5		1				
5		6			1	
5.5		2				
6		1				
6.5		4			2	
7		11	1			
7.5		5	1		1	
8		1	1			
8.5			1			
9						
9.5						
10						
10.5						
11						
11.5						
12						1
12.5						
13	1					
Number of fish	1	173	4	7	12	1



Figure 5. Mini-trapnets are usually used in pond settings. However, they are also deployed on lakes to determine the forage base of smaller fish. Here a mini-trapnet is used in a City of Bloomington pond. The white float at the back indicates the end of the net.

Representative Fish Species of Arctic Lake



Bullhead



Bluegill sunfish (right)



Carp



Hybrid sunfish (bottom fish)



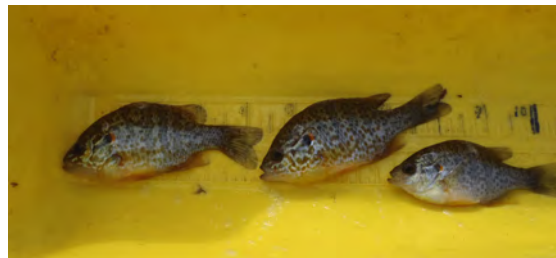
Golden shiner



Green sunfish



Largemouth bass



Pumpkinseed



White sucker



Yellow perch

General Findings of This Survey

- Carp are numerous in Arctic Lake and likely contribute to poor water quality.
- Fish effects may also contribute to the lack of aquatic plants on Arctic Lake. No rooted submerged aquatic plants were found in the 2012 aquatic plant survey (conducted by Blue Water Science).
- Bluegill sunfish were fairly abundant with a wide range of sizes found in Arctic Lake.
- A total of ten fish species were found in Arctic Lake, however piscivore species such as northern pike and walleye were absent and largemouth bass were rare with only one sampled.
- With low fish predation pressure in Arctic Lake other fish species populations, such as bluegills and bullheads, will likely increase.
- Fish winterkill observations in Arctic Lake have been reported, especially over the winter of 2010-2011. Arctic Lake is deep enough (Figure 6) that winterkill conditions should occur infrequently. However, a wide-range of fish sizes were found in this 2012 survey indicating many fish are three years old and older. It is likely fish are migrating into Arctic Lake from Upper Prior Lake or that the winterkill over the 2010-2011 winter was a partial winterkill and many fish survived.

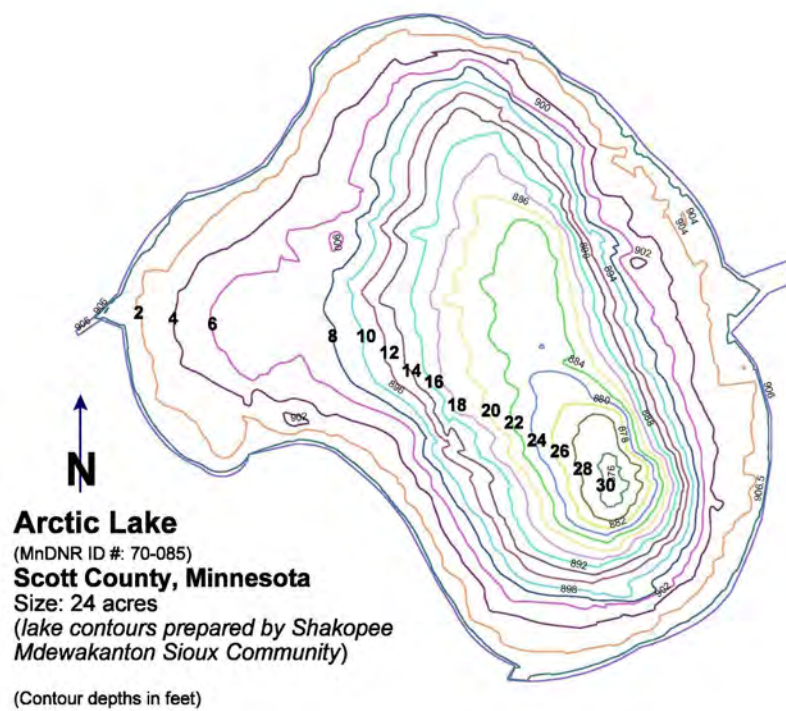


Figure 6. Arctic Lake depth contour map.

- Fish may migrate into Arctic Lake but migration does not occur every year. Stream flows and lake levels need to be high enough to allow lake access. In 2012, carp did not make it into Arctic Lake (Figure 7).
- Although 1,752 carp were tagged in Spring Lake in February of 2012, no tagged carp were found in the 40 carp that were sampled in the Arctic Lake fish survey. However, since fish immigration into Arctic Lake is primarily from Upper Prior Lake and because it is unlikely there is much movement of carp from Spring Lake to Upper Prior Lake, it is improbable that Spring Lake tagged carp would make it to Arctic Lake.
- The beaver dam may be helpful to serve as a barrier to prevent immigration of carp into Arctic Lake from Upper Prior. Without a barrier, carp could swim into Arctic Lake, spawn and young carp would be somewhat free of heavy predation pressure. The beaver dam also serves to keep carp from emigrating out of Arctic Lake and into Upper Prior. If the beaver dam is not causing lake level problems, the beaver dam is an effective carp barrier and should be kept in place.



Figure 7. These carp did not make it into Arctic Lake in 2012. Arctic Lake is on the left side of the photograph and carp in the stream likely came up from Upper Prior Lake and did not get into Arctic Lake to spawn (source: Shakopee Mdewakanton Sioux Community).

Appendix A

Minnesota DNR Fish Survey Notification

Steve McComas

From: Steve McComas <mccomas@pclink.com>
Sent: Monday, September 17, 2012 11:04 AM
To: Daryl Ellison ; Greg Salo
Cc: Scott Walz (CC)
Subject: Fish survey on Arctic Lake (70-008500)

Hello all,

Blue Water Science will be conducting a fish survey in Arctic Lake (70-008500), Scott County, starting on Tuesday, September 18, 2012. We will set 3 standard fyke nets on Tuesday in the lake. The nets will be monitored daily and all fish will be weighed, measured, and returned to the lake. The nets will be removed from the lake on Thursday, September 20, 2012. The fish survey is sponsored by the Shakopee Mdewakanton Sioux Community with the objectives to characterize the existing fish community structure, assess potential impacts of fish on water quality, and determine potential winterkill effects on the fish community.

This survey is being conducted under the permit number: 18362

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