Trapnet set in Birch Lake, September 2014

Fish Survey of Birch Lake (ID #62-0024), Ramsey County, Minnesota in 2014

Survey Dates: September 4 - 6, 2014

MnDNR Permit Number: 19905

Prepared for:

Birch Lake Improvement District and MnDNR

Prepared by:

Steve McComas
Blue Water Science

December 19, 2014

Fish Survey of Birch Lake (ID #62-0024), Ramsey County, Minnesota in 2014

Introduction

Birch Lake (ID: 62-0024) is a 145-acre shallow lake, located in Ramsey County, Minnesota. In September 2014, the Birch Lake District contracted for a fish survey with Blue Water Science with a permit number 19905 granted from the MnDNR. The objectives were to characterize the existing fish community structure, assess potential impacts of fish on water quality, and determine potential winterkill effects on the lake community

Methods

Six standard trapnets were sampled for two days for a total of twelve lifts to survey fish in Birch 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 either 3/8 inch or ½ inch. Six standard trap nets were set on Thursday, September 4, 2014. Six nets were fished for the following 2 days (September 5 and 6). Trapnet locations are shown in Figure 1 and pictures of a typical trapnet operation are shown in Figure 2.

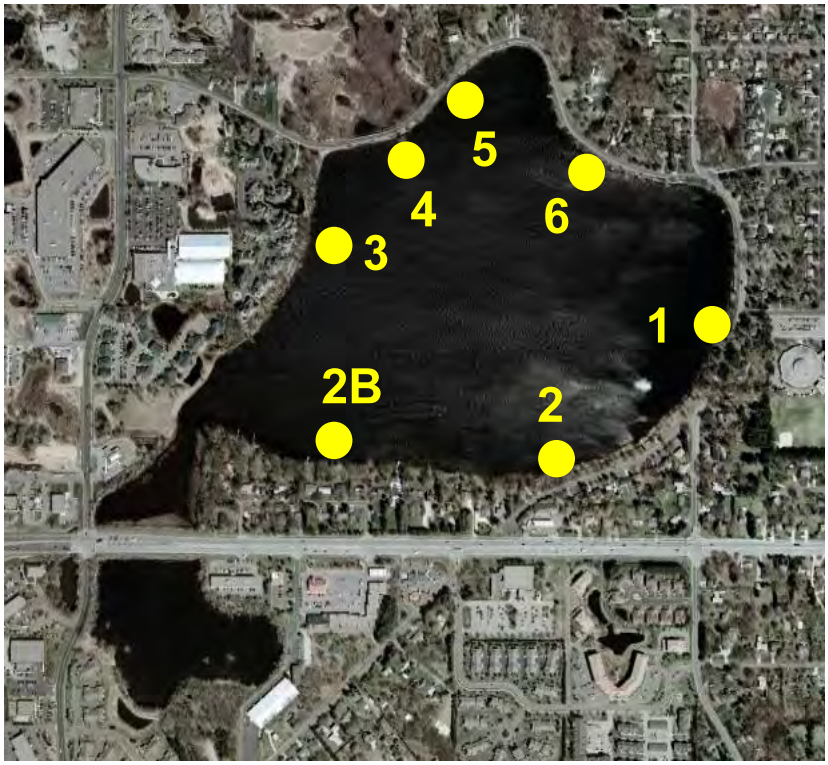

Figure 1. Map of trapnet sets. Trapnet 2 was moved to location 2B after the first netting day.

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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 flag marks the end of 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 Birch Lake fish survey.

Results

A total of 8 fish species were sampled in Birch Lake on September 5 and 6, 2014. Bluegill sunfish were the most abundant species followed by pumpkinseed sunfish. Nets 3 and 4, on the east end of the lake, were the most productive (Table 1).

The average number of bluegills caught per net was moderate with the average haul of 15 fish per net (Table 1). Pumpkinseed sunfish were found at moderate numbers and within a typical range for a lake like Birch, as defined by the MnDNR. Black crappie and black bullhead abundance was low based on standard ranges compiled by the MnDNR. Northern pike had a moderate population with an average of 1.3 fish per net.

Table 1 Birch Lake trapnet results for the fish survey conducted in September 4-6, 2014. (YOY = young of the year and were not included in the fish per net averages).

	Fish Captured (September 5 and 6, 2014)												Total Catch	2014 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 (*Ameiurus melas*)			2	1		1			11		2		17	1.4	2 - 61
Black crappies (*Pomoxis nigromaculatus*)			1		4	3	8	7	19	1	6	2	51	4.3	2 - 18
Bluegill sunfish (*Lepomis macrochirus*)			3	22	34	8	24	64	23	49		3	230	19	6 - 60
Green Sunfish (*Lepomis cyanellus*)				1			2				1		4	0.3	0.3 - 2.8
Hybrid sunfish							1		1	1			3	0.3	NA
Northern pike (*Esox lucius*)		2		1		2	1	1	1	1	3	2	14	1.2	NA
Pumpkinseed sunfish (*Lepomis gibbosus*)				4	8	1	13	16	6	5	1	1	55	4.6	1 - 8
Yellow perch (*Perca flavescens*)											1		1	0.1	0.3 - 1.5
TOTAL FISH	0	2	6	29	46	15	49	88	61	57	14	8	375	31.3	
Turtles - painted									1		1		2	1.5	NA
Turtles - snapping					4				1				5	0.9	NA
Black bullhead YOY (*Ameiurus melas*)				13			4	8	30	73		1	129	11	NA
Black crappies YOY (*Pomoxis nigromaculatus*)		2		2			1		28				33	2.8	NA
Bluegill sunfish YOY (*Lepomis macrochirus*)			1	5			11	15	7	22			61	5.1	NA
Green Sunfish YOY (*Lepomis cyanellus*)				2				2					4	0.3	NA

Fish lengths are shown in Table 2. Bluegill lengths ranged were from <3 inches up to 8 inches with the majority of the population 6 inches or greater. Northern pike were present with lengths measured up to 22 inches and were the only predator fish caught in 2014. At these lengths, only a portion of northern pike population has the capacity to capture and ingest small to medium-sized fish. This may not be enough predation pressure to keep sunfish and bullheads from becoming overpopulated and producing stunted growth conditions. However, largemouth bass stocking could apply additional pressure on the young panfish and the bullheads.

Table 2. Length frequency of fish species (as total length) for the Birch Lake 2014 fish survey. Fish numbers in the yellow row (<3 inches) represent young-of-the-year fish and these numbers were not used in the statistics.

Total Length (inches)	Black bullhead	Black crappie	Bluegill sunfish	Green sunfish	Hybrid sunfish	Northern pike	Pumpkinseed sunfish	Yellow perch
<3	129	35	61	4				
3					1			
3.5	1							
4	4	2	15				1	
4.5	3		13	2			11	
5	4		38	2	1		16	
5.5	1	2	72				8	
6		14	70				7	
6.5		10	11		1	1	4	1
7	1	6	8			3	5	
7.5		1	2			1	3	
8			1					
8.5		1				1		
9		1				2		
9.5	1	5						
10		4						
10.5		5						
11								
11.5								
12	1					1		
12.5								
13	1							
13.5								
14								
14.5								
15								
15.5								
16								
16.5								
17								
17.5								
18								
18.5								
19								
19.5								
20						3		
20.5								
21						1		
21.5								
22						1		
Total	17	51	230	4	3	14	55	1

Representative Fish Species of Birch Lake

Figure 3. Top - left: Black bullhead.
Top - right: Black crappie.
Middle top - left: Bluegill sunfish.
Middle top - right: Green sunfish.
Middle bottom- left: Northern pike.
Middle bottom - right: Pumpkinseed sunfish.
Bottom - left: Yellow perch.

Recent Stocking Records

Table 3. Recent fish stocking records.

	Largemouth Bass	Walleye	Yellow Perch	Black Crappie	Bluegill
April 2007	700 (4-7")	300 (3")			
April 2010	500 (4-7")	500 (4-7")	75 (2-3")		
July 2011	1,000 (3-5")		800 (3-4")	300 (4-7")	800 (3-5")
Fish Survey Results (Fish/trapnet) (August 2011)	1.0	0	0	0.6	15
Fish Survey Results (September 2014)	0	0	0.1	4.3	19
Fall 2014	2,000 (3-5")				

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

Table 4. Painted turtle and snapping turtle catch per net for the two netting days.

Net	Painted Turtles	Snapping Turtles
September 5, 2014		
1		
2		
3		3
4		
5	1	1
6	1	
subtotal	2	4
September 6, 2014		
1		
2		
3		
4		
5		
6		
subtotal	0	0
Total Turtle (12 nets)	2	4
Turtle/Trapnet (12 lifts)	**0.17**	**0.33**

Comparing 2011 and 2014 Fish Survey Results

The fish community in Birch Lake changed from 2011 to 2014. A winterkill over the 2013-14 winter was suspected based on finding dead bullheads after ice-out in the spring of 2014. The winterkill may have impacted the fish community.

Black bullheads increased slightly from 2011 to 2014. Black crappies also increased and the population in 2014, as measured by fish per net, falls within a typical MnDNR range (Table 5). The fish lengths have a wide distribution and indicate several year classes are present as well (Table 6).

In addition, bluegill sunfish were at regional abundances with a good length distribution indicating a balanced condition (Table 6).

The winterkill did not appear to impact bullheads and bluegills. However, it appears largemouth bass may have been impacted. No largemouth bass were netted in 2014 while they were present in 2011 (Tables 5 and 6). Northern pike numbers were similar for both surveys, but the lengths in 2014 were dominated by young fish up to 9 inches. Larger pike were sampled in 2011 (Table 6).

It appears stocking largemouth bass would reestablish the bass community. The other fish species in Birch Lake should continue to do well.

Table 5. Birch Lake trapnet results for the fish survey conducted in 2011 and in 2014 by Blue Water Science. Fish data are shown as fish/trapnet.

	2011 August 23-24 (12 nets)	2014 Sept 5-6 (12 nets)	DNR Range (fish/net)
Black Bullhead	0.6	1.4	2 - 61
Black Crappie	0.6	4.3	2 - 18
Bluegill	15	19	6 - 60
Green Sunfish	--	0.3	0.3 - 2.8
Hybrid Sunfish	--	0.3	NA
Largemouth Bass	1.0	--	0.3 - 1
Northern Pike	1.3	1.2	NA
Pumpkinseed	3.4	4.6	1 - 8
Yellow Perch	--	0.1	0.3 - 1.5

Table 6. Length frequency of fish species (as total length) for the Birch Lake 2011 and 2014 fish surveys. Fish numbers in the yellow row (<3 inches) represent young-of-the-year fish and these numbers were not used in the statistics.

Total Length (inches)	Black bullhead		Black crappie		Bluegill sunfish		Green sunfish		Hybrid sunfish		Largemouth bass		Northern pike		Pumpkinseed sunfish		Yellow perch	
	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014
<3		129		35	28	61		4							1			
3			4							1	6							
3.5		1	1		10						1				1			
4		4		2	11	15										1		
4.5		3			7	13		2							1	11		
5		4			11	38		2		1					2	16		
5.5		1		2	25	72										8		
6				14	34	70									1	7		
6.5				10	19	11				1				1	5	4		1
7		1		6	15	8								3	11	5		
7.5				1	10	2								1	12	3		
8					9	1									6			
8.5				1										1	1			
9				1										2				
9.5	1	1		5														
10	1			4														
10.5	3			5														
11	2		1															
11.5																		
12		1	1											1				
12.5																		
13		1																
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20.5													1					
21														1				
21.5																		
22													1	1				
23													1					
24													3					
25													3					
26													3					
27																		
28																		
29													1					
Total	7	17	7	51	179	230	0	4	0	3	12	0	15	14	41	55	0	1

Discussion

General Findings In This Survey: Birch Lake offers good fishing opportunities based on the sizes of bluegills and crappies found in this survey. Winter aeration likely has sustained the fish community. Fish stocking may have helped increase the number of largemouth bass but walleyes and perch were not sampled in this survey and they have been stocked in the past.

Stocking small torpedo-shaped fish like perch and walleyes into a lake with a well established bass population generally is not successful. The size and shape of young perch and walleye are a preferred forage choice for bass and pike. If yellow perch and walleyes are present in Birch Lake, their abundance is low.

In terms of gamefish, largemouth bass apparently are performing better than northern pike and walleyes. Largemouth bass should spawn in Birch Lake and sustain a population. It would be difficult to establish a walleye population even if large walleyes were stocked. They would not likely reproduce and forage availability would be lower compared to what the bass could handle, based on the gape of gamefish mouth as a function of their length (Figure 5).

Gamefish Control to Prevent Bluegill Stunting: The existing fish community in Birch Lake has good piscivore pressure (piscivores in Birch Lake are bass and pike) that may prevent the development of stunted sunfish and bullhead populations. Based on theoretical piscivore lengths and converting fish length to gape width (Figure 5) it is apparent that the piscivore lengths in Birch Lake, when converted to gape widths, should exert predation pressure and prevent stunted bluegill (typical around 4-inches) or black bullhead populations. This type of fish community structure is a benefit for fishing and for water quality.

Figure 4. Gamefish (piscivores) usually select prey that can be swallowed, which is a function of the piscivore gape verses the prey body depth. This 24-inch northern pike from White Bear Lake made a mistake. It attempted to ingest a seven inch bluegill. The 24-inch pike has a 2.0 inch gape, but a 7-inch bluegill has a body depth of 2.3 inches. This pike was found floating and basically choked on the bluegill.

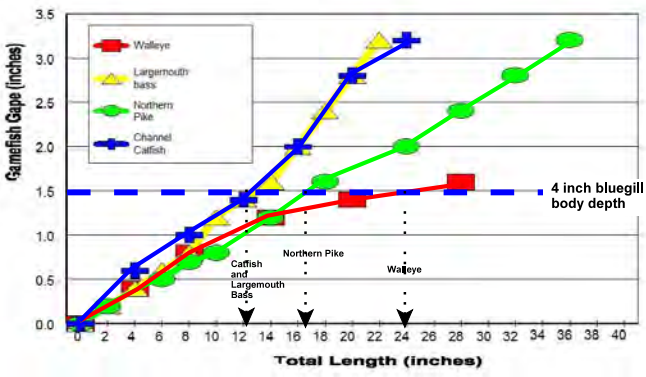

Figure 5. Gamefish gape increases as a function of it's total length. The gape determines the size of the prey fish that can be swallowed. For example, a 4-inch bluegill has a body depth of 1.5 inches. To ingest a 4-inch bluegill it would take a 12-inch bass that has a gape of 1.5 inches. There are bass and northern pike in Birch Lake that should be able to ingest 4-inch bluegills or smaller.

Conclusions and Recommendations

The trapnet survey in 2014 found the fish community was composed of 8 species. The bluegill, black crappie, and pumpkinseed sunfish abundance were within standard ranges for trapnet catches. Bluegills and black crappies are not stunted indicating there has been some control from the piscivores. Several year classes of the fish species indicate winter aeration is keeping a majority of fish alive over most winters.

Recommendations and future considerations include the following:

- In Birch Lake, northern pike are the dominant gamefish, although their average length is relatively small. Walleyes and perch have been stocked in the past and have not become established. Future stocking of walleyes and perch are unnecessary at this time.
- Stocking 2,000 largemouth bass in 2014 should reestablish the bass population and add another predator to the fish community.
- Because sunfish currently spawn in the lake, the young fish should produce a forage base on an annual basis. The fish carrying capacity of Birch Lake will be established naturally which is a good long-term management strategy.
- The winter aeration system is essential to maintain the existing fish community. It is recommended that efforts continue to insure proper operation of the winter aeration system.
- Water quality remains good in Birch Lake and fishing has the potential to be very good for panfish and largemouth bass. In three to four years another fish survey should be conducted to evaluate conditions and re-evaluate recommendations.

Table 7. Birch Lake trapnet results for the fish survey conducted in 2011 and in 2014 by Blue Water Science. Fish data are shown as fish/trapnet.

	2011 August 23-24 (12 nets)	2014 Sept 5-6 (12 nets)	DNR Range (fish/net)
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Hybrid Sunfish	--	0.3	NA
Largemouth Bass	1.0	--	0.3 - 1
Northern Pike	1.3	1.2	NA
Pumpkinseed	3.4	4.6	1 - 8
Yellow Perch	--	0.1	0.3 - 1.5

Appendix A

Minnesota DNR Fish Survey Notification

From: Steve McComas [mailto:mccomas@pclink.com]
Sent: Tuesday, September 02, 2014 4:01 PM
To: DeBates, TJ (DNR) (Timothy.Debates@state.mn.us); Greg Salo
Cc: Jim Grisim
Subject: Fish survey notification for Birch Lake, Ramsey County

Hello all,

Blue Water Science will be conducting a fish survey in Birch Lake (MN ID 62-0024), Ramsey County, starting on Thursday, September 4, 2014. We will set 6 fyke nets on Thursday. The nets will be monitored daily on Friday and Saturday and all fish will be weighed and measured and returned to the lake. The nets will be removed from the lake on Saturday, September 6. The fish survey is sponsored by the Birch Lake District with the objectives of characterizing the existing fish community structure, assessing potential impacts of fish on water quality, and determining potential winterkill effects on the lake community.

This survey is being conducted under the permit number: 19905.

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