



Frogs Sampled in the Inlet to Bone Lake from the Outlet of in Moody Lake, October 2015

Mini-Trapnet Fish Surveys and Submerged Obstacle Evaluation for Bone and Moody Lakes, 2015

Fish Surveys Conducted: October 7-9, 2015

Minnesota DNR Permit Number: 20691

Prepared for:
Comfort Lake/Forest Lake
Watershed District and
Minnesota DNR



Prepared by:
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Mini-Trapnet Fish Surveys and Submerged Obstacle Evaluation for Bone and Moody Lakes, 2015

Summary

Fish Surveys: A total of 8 fish species were sampled in 4 mini-trapnets over 2-days in Bone Lake on October 8-9, 2015. No carp were observed in the mini-trapnets. The fish catch was dominated by bluegill sunfish and black bullheads. The number of bluegills caught per net was low with the average haul of 5.0 per net (Table 2). This is lower than the normal range of 2.5-70 black bullheads per lift for a lake like Bone Lake but it is on the high end. A high young-of-the-year (YOY) catch of bluegills indicates that recruitment should be adequate for sustaining a healthy bluegill population. The mini-trapnet set in the waterbody to the west of Bone Lake (Net 4) had fairly good diversity but no carp were sampled. It is possible the carp barrier in Bone Lake may restrict migration into and out of this wetland (Figure S1).

A total of 3 fish species were sampled in Moody Lake on October 8-9, 2015. The fish catch consisted of black crappies, bluegill sunfish, and yellow bullheads. The catch rate for all 3 species was modest (Table 6). No carp were sampled in Moody Lake (Nets 1, 2, 3) nor in the net set in the Moody Lake outlet which is the inflow to Bone Lake (Net 4)(Figure S1).

Submerged Obstacle Surveys: Potential snags in the lake bottom of Bone and Moody Lakes were evaluated on October 2, 2015 using a high definition sonar and dragging a bottom rake over suspected obstacles. In Bone Lake, one submerged obstacle was found which appeared to be cement anchor for a waterski buoy. No submerged obstacles were found in Moody Lake.



Figure S1. [left] Carp barrier in Bone Lake in 2015. [right] Shaking down a mini-trapnet in the outlet pond of Moody Lake on October 8, 2015 (Net 4M).

Mini-Trapnet Fish Surveys and Submerged Obstacle Evaluation for Bone and Moody Lakes, 2015

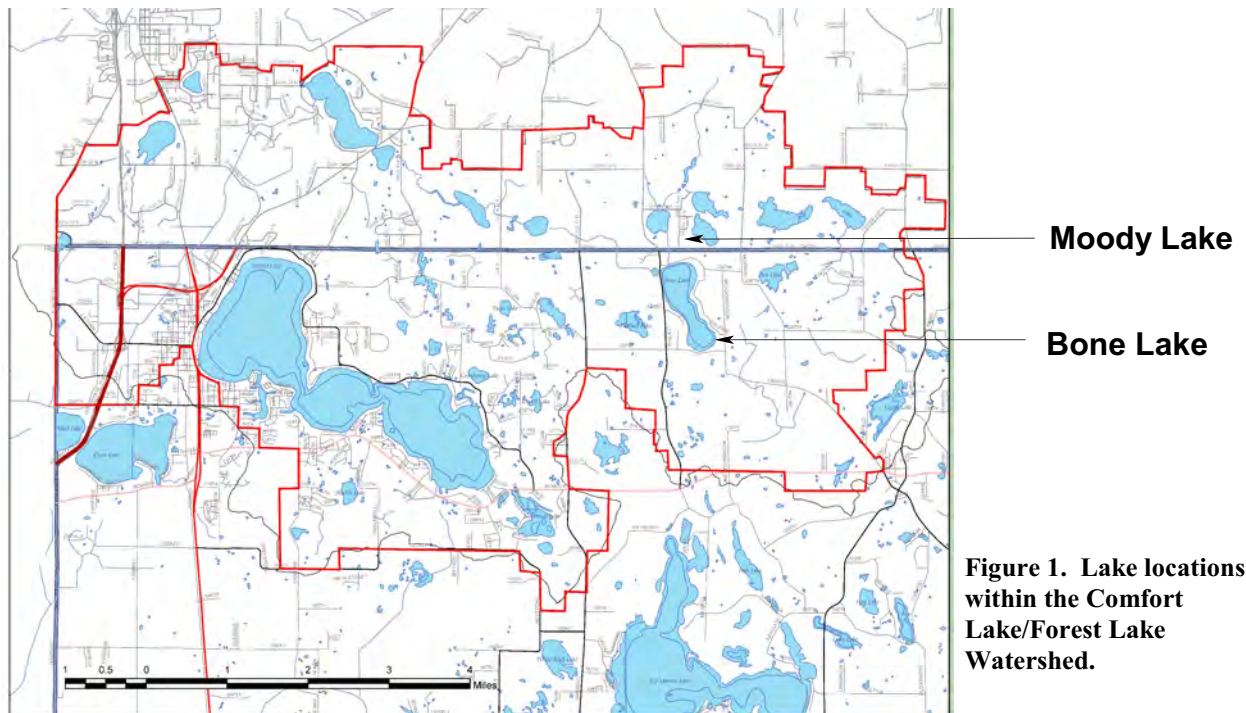
Introduction

The potential adverse impacts of carp on lake water quality are suspected in Bone and Moody lakes. A method to evaluate the potential fish impacts used in this study was the placement of mini-trapnets in Bone and Moody lakes as well as in 2 adjacent water bodies that flowed into the lakes. The fish surveys were conducted in October of 2015 with the objective to determine if young carp were present as well as to supplement the fish community data base. In addition, high definition downscan sonar was used in Bone and Moody lakes to determine if there were submerged objects present that could be snags if seining by commercial fishermen was employed.

Lake characteristics are summarized in Table 1 and lake locations are shown in Figure 1.

Table 1. Characteristics of Bone and Moody Lakes.

	Minnesota Protected Water ID	Size (ac)	Maximum Depth (ft)	Last Fish Survey MnDNR
Bone Lake	82-005400	221	30	2012
Moody Lake	13-002300	45	48	2012



Methods

Fish Survey: Fish were sampled using mini-trapnets that consisted of 2x3 foot frames with four hoops and one mouth with a 25-foot lead. The mesh size was 3/16 inches. In 2015, 4 mini-trapnets were set in Bone and Moody Lakes in October for two days. Three nets were set in Moody Lake and one net was set at the Moody outlet where it flows into Bone Lake (labeled as 4M in Figure 2). In addition, three nets were set in Bone Lake and one was set in an adjacent wetland on the northwest side of Bone Lake (Figure 2). The nets were set in mid-day and then sampled the following two days. All fish were counted, measured, and returned to the lake.

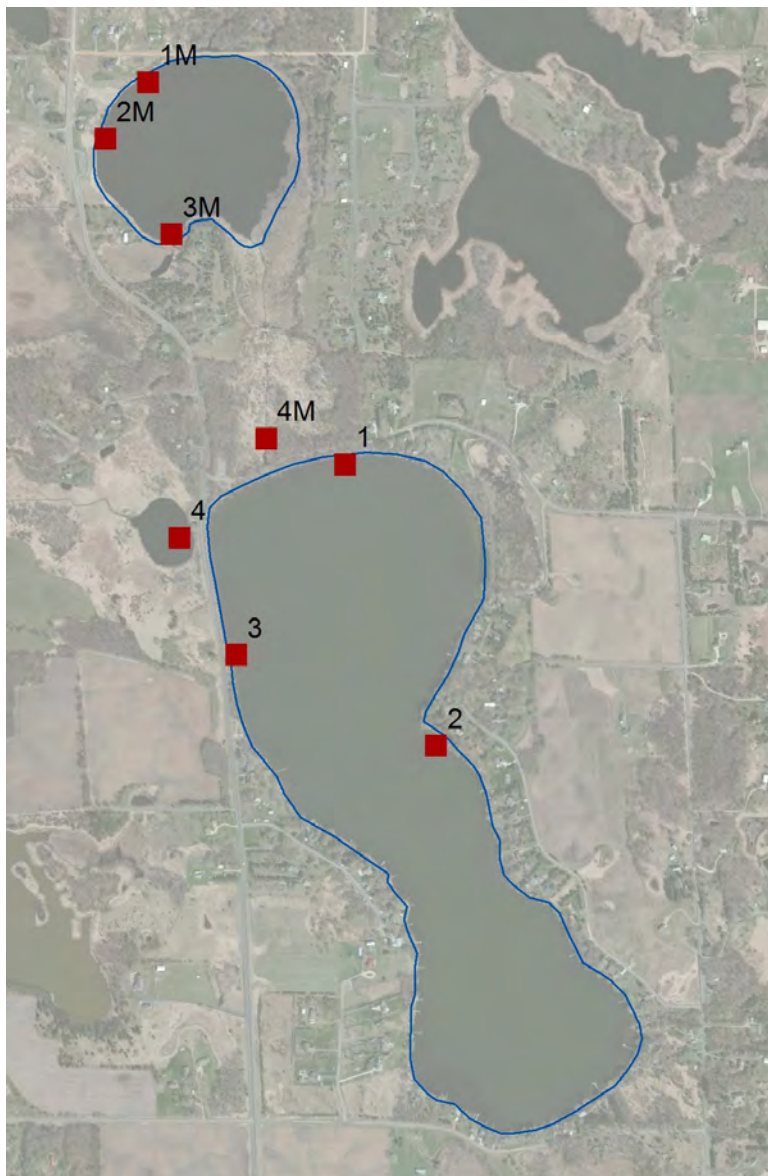


Figure 2. Net locations for the mini-trapnet survey in Bone and Moody Lakes.

Methods - continued



Figure 3. Fish sampling in the Bone and Moody Lakes fish survey. A mini-trapnet is a live fish trap. The net is staked on the shoreline. From the shoreline and running perpendicular to shore is the 25-foot lead, which looks like a seine. The lead net is attached to a frame which goes back through a series of hoops with funnel mouths. Fish end up in the back hoop. A buoy marks the end of the back hoop.

Methods - concluded

Submerged Obstacle Evaluation: Submerged obstacle surveys were conducted on Bone and Moody lakes. The objective was to determine if submerged objects on the lake bottom would snag seines pulled by commercial fishermen when harvesting carp. A Lowrance HDS 7 with downscan and sidescan capabilities was used. A split screen allowed tracking the path of the boat, water depths, and bottom conditions (Figure 4). When a suspected submerged obstacle was viewed, a throw rake was dragged behind the boat to try to find the obstacle (Figure 4). A way point was also taken at all suspected sites of submerged obstacles.



Figure 4. A high definition sonar (Lowrance HDS7) with downscan and sidescan features was used to identify potential submerged objects. A rake was dragged over the suspected obstacles to verify a potential snag.

Bone Lake Fish Survey Results

A total of 8 fish species were sampled in 4 mini-trapnets over 2-days in Bone Lake on October 8-9, 2015. No carp were observed in the mini-trapnets. The fish catch was dominated by bluegill sunfish and black bullheads. The number of bluegills caught per net was low with the average haul of 5.0 per net (Table 2). This is lower than the normal range of 2.5-70 black bullheads per lift for a lake like Bone Lake. A high young-of-the-year (YOY) catch of bluegills indicates that recruitment should be adequate for sustaining a healthy bluegill population (Table 2).

The mini-trapnet set in the waterbody to the west of Bone Lake (Net 4) had fairly good diversity but no carp were sampled. It is possible the carp barrier in Bone Lake may restrict migration into this wetland (barrier is shown in Figure 8).

Table 2. Bone Lake mini-trapnet results for the fish survey conducted in October 2015.

	Fish Captured (October 8-9, 2015)								Total Catch	2015 Fish per Net (n=8)	Normal Range (MnDNR)
	Net 1		Net 2		Net 3		Net 4				
	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2			
Black bullhead (<i>Ameiurus melas</i>)		12				2		5	19	2.4	0.7-25.7
Black crappies (<i>Pomoxis nigromaculatus</i>)	1	2				1		3	7	0.9	1.8-21.2
Bluegill sunfish (<i>Lepomis macrochirus</i>)	13		5	1	12	6		3	40	5.0	7.5-62.5
Golden shiner (<i>Notemigonus crysoleucas</i>)		8							8	1.0	0.2-0.8
Largemouth bass (<i>Micropterus salmoides</i>)	1	1		1	3		1	1	8	1.0	NA
Walleye (<i>Sander vitreus</i>)	1								1	0.1	0.3-1.2
Yellow bullhead (<i>Ameiurus natalis</i>)						2	1		3	0.4	0.9-5.7
Yellow perch (<i>Perca flavescens</i>)		1					4		5	0.6	0.3-1.7
TOTAL FISH	16	24	5	2	15	11	6	12	91	11.4	
Young Of the Year (YOY) and Minnows Captured (October 8 and 9, 2015)											
Bluegill sunfish YOY (<i>Lepomis macrochirus</i>)	90	65	20	12	13	2	2	2	206	25.8	NA
Minnows											
Mudminnow		4							4	0.5	NA
Shiner	14			1	8	2		2	27	3.4	NA
Frogs		1							1	0.1	NA

Fish Lengths: Fish lengths are shown in Table 3. Young bluegills dominated the net results with lengths less than 3 inches.

Table 3. Length frequency of fish species (as total length) for the Bone Lake fish survey. Blue shading indicates bullheads and crappies were young-of-the-year. Young-of-the-year were not included in statistics of fish per net.

size (inches)	Black bullheads	Black crappies	Bluegills	Largemouth bass	Walleye	Yellow bullheads	Yellow perch
<3	6	3	206	1			
3				2			
3.5			19	3			1
4							
4.5			2				1
5		1	2				1
5.5		1					2
6	1		3				
6.5	6		5	1			
7	4		6				
7.5	2		3				
8						1	
8.5		1		1			
9		1					
9.5							
10							
10.5							
11							
11.5							
12							
12.5							
13							
13.5						1	
14						1	
14.5							
15							
15.5							
16							
16.5							
17							
17.5							
18							
18.5							
19					1		



Figure 5. Fish are transferred to tubs, then they are counted, measured, and released.

Bone Lake - Mini-Trapnet Results



Figure 6. Bone Lake had a number of fish species caught in the 2 days of sampling.
[top-left] Walleye (net 1). [top-right] Black bullhead, largemouth bass, sunfish, and yellow perch (net 4).
[bottom-left] Largemouth bass and bluegill (net 3). [bottom-right] Young of the year bluegill sunfish (net 1).

Bone Lake - Trapnet 1



Figure 7. Trapnet 1 was at the inflow area from Moody Lake. Inflowing water is known to attract carp. However young bluegills and black bullheads dominated the net results. Several mud minnows (lower right), which are somewhat rare, were also sampled.

Bone Lake - Trapnet 4 - Set in Wetland Adjacent to Bone Lake



Figure 8. Shallow wetland adjacent to Bone Lake has the potential as a carp refuge. No carp were sampled in min-trapnet sets although yellow bullheads, crappies, bluegills, and yellow perch were sampled. A carp exclusion structure (lower right) may prevent carp from leaving and entering Bone Lake from the wetland connection.

Previous Bone Lake Fish Surveys: In 2012, a MnDNR fish survey in Bone Lake found black crappies were the dominant fish. However in 2015 the dominant fish is bluegill sunfish (Table 4). Both black crappies and bluegill sunfish are considered to be panfish. The stocking of walleyes by the MnDNR (Table 5) should exert predation pressure on the panfish community and possibly control their numbers in the long run.

Table 4. Bone Lake trapnet results for the fish survey conducted in 2012 by the MNDNR and in 2015 by Blue Water Science. Fish data are shown as fish/trapnet.

	2012 May 7 (MnDNR)	2015 October 8-9 (8 nets) (Blue Water Science)	DNR Range
Black Bullhead	0.80	2.4	0.7-25.7
Black Crappie	31.40	0.9	1.8-21.2
Bluegill	7.20	5.0	7.5-62.5
Bowfin (Dogfish)	0.10	--	0.4-1.3
Golden Shiner	0.80	1.0	0.2-0.8
Hybrid Sunfish	0.20	--	NA
Largemouth Bass	--	1.0	NA
Northern Pike	0.30	--	NA
Pumpkinseed	0.10	--	0.7-4.2
Walleye	0.20	0.1	0.3-1.2
Yellow Bullhead	3.20	0.4	0.9-5.7
Yellow Perch	0.30	0.6	0.3-1.7

Table 5. Bone Lake fish Stocking Activities for the Last Ten Years (MnDNR)

Year	Species	Size	Number	Pounds
2014	Walleye	adults	2	2.5
	Walleye	fingerlings	5,285	118.0
2013	Walleye	fingerlings	4,894	124.0
2012	Black crappies	adults	75	15.0
	Walleye	fingerlings	7,580	128.5
2011	Walleye	fingerlings	4,874	146.0
2010	Walleye	fingerlings	3,312	124.0
2009	Walleye	yearlings	22	22.0
	Walleye	fingerlings	8,764	175.0
2008	Walleye	fingerlings	1,413	124.0
2007	Walleye	fingerlings	5,808	132.0
2006	Walleye	fingerlings	1,240	124.0
2005	Walleye	fingerlings	2,730	130.0

Moody Lake Fish Survey Results

A total of 3 fish species were sampled in Moody Lake on October 8-9, 2015. The fish catch consisted of black crappies, bluegill sunfish, and yellow bullheads. The catch rate for all 3 species was modest (Table 6). No carp were sampled in Moody Lake (Nets 1, 2, 3) nor in the net set in the Moody Lake outlet which is the inflow to Bone Lake (Net 4).

Table 6. Moody Lake trapnet results for the fish survey conducted in October 2015.

	Fish Captured (October 8-9, 2015)								Total Catch	2015 Fish per Net (n=8)	Normal Range (MnDNR)
	Net 1		Net 2		Net 3		Net 4				
	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2	Day 1	Day 2			
Black crappies (<i>Pomoxis nigromaculatus</i>)	2	1		1		1			5	0.6	1.8-18.1
Bluegill sunfish (<i>Lepomis macrochirus</i>)				7	5	7			19	2.4	6.5-59.6
Yellow bullhead (<i>Ameriurus natalis</i>)		2		2					4	0.5	0.8-5.0
TOTAL FISH	2	3	0	10	5	8	0	0	28		
Bluegill sunfish YOY (<i>Lepomis macrochirus</i>)	7	2	2	18		7	1		37	4.6	NA
Minnows											
Fathead							1		1	0.1	NA
Mudminnow								1	1	0.1	NA
Stickleback							6		6	0.8	NA
Frogs							17	13	30	3.8	NA
Tadpoles							3	1	4	0.5	NA

Fish Lengths: Fish lengths are shown in Table 7.

Table 7. Length frequency of fish species (as total length) for the Moody Lake fish survey. Blue shading indicates bullheads and crappies were young-of-the-year. Young-of-the-year were not included in statics of fish per net.

size (inches)	Black crappies	Bluegills	Yellow bullheads
<3		30	
3			
3.5		2	
4		3	
4.5		3	
5		5	
5.5		1	
6			
6.5		2	
7	1	1	
7.5		2	
8			
8.5			1
9			
9.5	1		
10	2		
10.5	1		
11			1
11.5			
12			
12.5			2
13			

Moody Lake - Mini-Trapnet Results



Figure 9. Representative fish from Moody Lake mini-trapnets (1, 2, 3).

Moody Lake - Trapnet 4



Figure 10. Mini-trapnet 4 was set in a small pool in the outlet from Moody which is the inlet to Bone. A fish barrier is present at the outlet of this pond as it goes into Bone Lake. The only fish sampled were fathead minnows (1), mudminnows (1), and stickleback (6)(shown in lower left). No carp were observed. Frogs were the dominant species sampled in the net.

Previous Moody Lake Fish Surveys: In 2012, a MnDNR fish survey found black crappies were the dominant fish. However in 2015 the dominant fish is bluegill sunfish (Table 8). Both black crappies and bluegill sunfish are considered to be panfish. Carp were sampled in 2012 but not in 2015. Carp are likely present in Moody Lake, but probably at low densities.

Table 8. Moody Lake trapnet results for the fish survey conducted in 2012 by the MNDNR and in 2015 by Blue Water Science. Fish data are shown as fish/trapnet.

	2012 June 12 (MnDNR)	2015 October 8-9 (8 nets) (Blue Water Science)	DNR Range
Black Bullhead	0.89	--	1.3-26.0
Black Crappie	16.22	0.6	1.8-18.1
Bluegill	13.11	2.4	6.5-59.6
Bowfin (Dogfish)	0.44	--	0.3-1.0
Common carp	0.11	--	0.3-2.6
Golden Shiner	0.11	--	0.2-1.4
Northern Pike	0.44	--	NA
Pumpkinseed	0.56	--	0.8-5.3
Yellow Bullhead	1.00	0.5	0.8-5.0
Yellow Perch	0.22	--	0.3-1.5



Figure 11. Moody Lake looking out from a shoreline fishing area.

Bone and Moody Lake Mini-Trapnet Results

More fish species were sampled in Bone Lake compared to Moody Lake in the mini-trapnets. Bone Lake has a typical fish community for a lake in this area. Moody Lake has a good bluegill and crappie population.

Table 9. Mini-trapnet results for Bone and Moody Lakes and adjacent ponds for the October 2015 surveys.

	Bone Lake 2015 Fish per Net (n=8)	Moody Lake 2015 Fish per Net (n=8)
Black bullhead (<i>Ameiurus melas</i>)	2.4	0.0
Black crappies (<i>Pomoxis nigromaculatus</i>)	0.9	0.6
Bluegill sunfish (<i>Lepomis macrochirus</i>)	5.0	2.4
Golden shiner (<i>Notemigonus crysoleucas</i>)	1.0	0.0
Largemouth bass (<i>Micropterus salmoides</i>)	1.0	0.0
Walleye (<i>Sander vitreus</i>)	0.1	0.0
Yellow bullhead (<i>Ameiurus natalis</i>)	0.4	0.5
Yellow perch (<i>Perca flavescens</i>)	0.6	0.0
TOTAL FISH	11.4	3.5
Bluegill sunfish YOY (<i>Lepomis macrochirus</i>)	25.8	4.6
Minnows		
Fathead	0.0	0.1
Mudminnow	0.5	0.1
Shiner	3.4	0.0
Stickleback	0.0	0.8
Frogs	0.1	3.8
Tadpoles	0.0	0.5

Results of Submerged Obstacle Surveys for Bone and Moody Lakes

Potential snags in the lake bottom of Bone and Moody Lakes were evaluated on October 2, 2015. Boat tracks are shown in Figures 12 and 13. In Bone Lake, one submerged obstacle was found at Way point 7 (Figure 12). No submerged obstacles were found in Moody Lake (Figure 13).

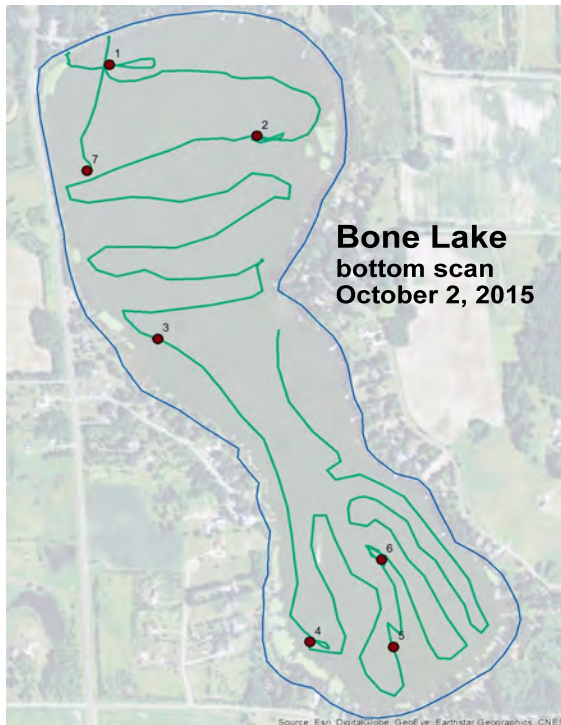


Figure 12. Bone Lake bottom scan possible obstructions found on October 2, 2015.

Way Point	Notes
1	2 feet from surface, possible log.
2	possible obstruction, no verification.
3	4 feet of water depth.
4	EWM at surface, 4 feet of water depth.
5	20 feet deep, no verification.
6	23 feet deep possible obstruction, no confirmation with rake.
7	2 waterski channel markers, verified.

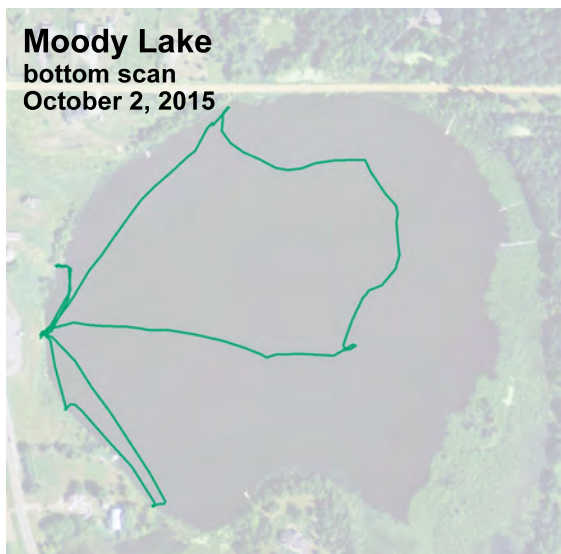


Figure 13. Moody Lake boat tracks for a submerged obstacle evaluation. No obstacles were found.

Submerged Obstacle Survey Overview: A spilt screen sonar was used to identify potential submerged snags. An example of a sonar screen is shown in Figure 14. In this case, no submerged snag signatures were observed. In Bone Lake, one submerged obstacle was identified and in Moody Lake no submerged obstacles were observed. However, in Moody Lake, a large floating island was observed to be moving around. It ended up on the northwest side of the lake in October, 2015 (Figure 15). It should not impact future winter netting operations.

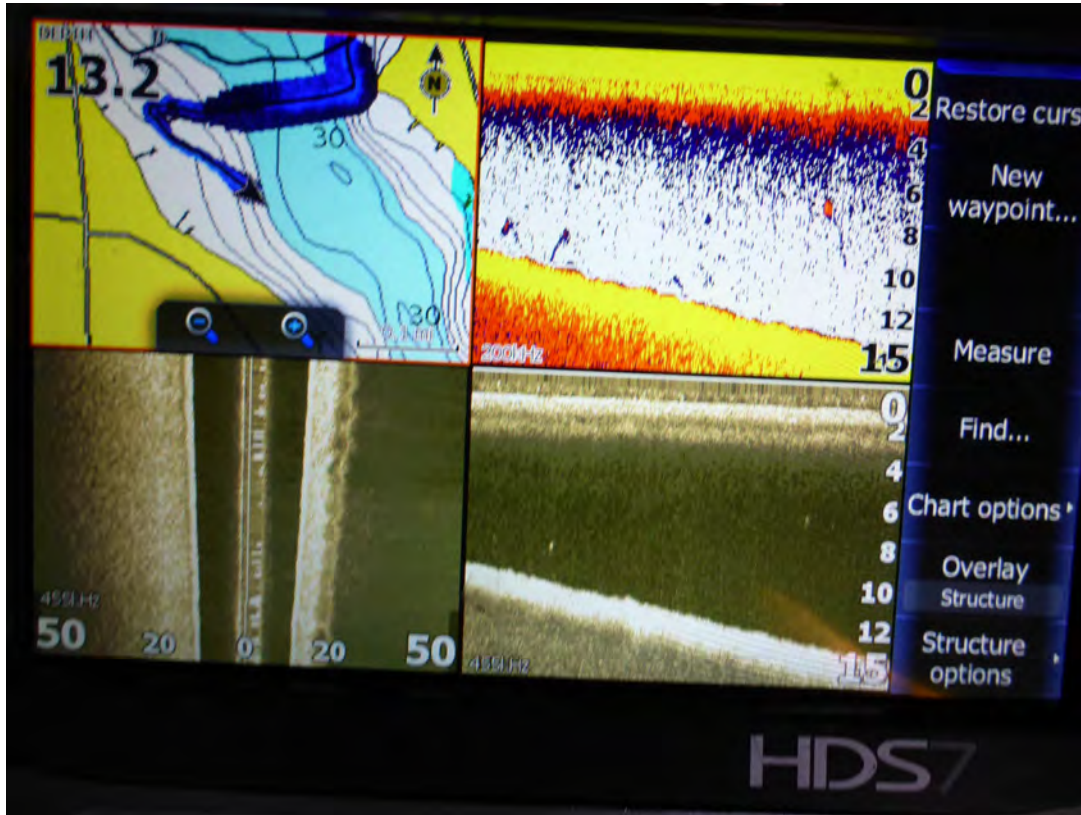


Figure 14. Example of a spilt screen view on the Lowrance sonar in Bone Lake.



Figure 15. A large floating island was on the move in Moody Lake. In October it came to rest on the NW shoreline.

Appendix - Notification

From: Steve McComas [mailto:mccomas@pdink.com]
Sent: Monday, October 05, 2015 2:38 PM
To: DeBates, TJ (DNR); Leslie George (DNR); Deb Sewell (DNR); Capt. Jason Peterson
Cc: Michael Kinney; Emily Schmitz
Subject: Fish survey notification for Bone and Moody Lakes, Washington County

Hello all,

Blue Water Science will be conducting a fish survey in Bone Lake (MN ID 82--005400), Washington County and Moody Lake (13-002300), Chisago County, starting on Wednesday, October 7, 2015. We will set 4 mini- fyke nets in each Lake. The nets will be monitored daily on Thursday and Friday and all fish will be weighed and measured and returned to the lakes. The nets will be removed from the lakes on Friday, October 9. The fish surveys are sponsored by the Comfort Lake/Forest Lake Watershed District 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: 20926.

Thank you,

Steve McComas

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