

Lake Name: Boot

Survey Type: Targeted Survey

DOW Number: 03-0030-00

Survey ID Date: 06/28/2021

TARGETED SURVEY

Electrofishing

Seining

Trap Netting

Lake Identification

Alternate Lake Name: N/A
 Primary Lake Class ID: 23

DNR Sounding Map Number: C0737
 Alternate Lake Class ID: N/A

Lake Location

Primary County: Becker

Nearest Town: Two Inlets

Legal Descriptions

Lake Center: Township - 142N Range - 36W Section - 32
 PLS Section Lake Center: 14203632

All Legal Descriptions:

Becker County: Township - 141N Range - 36W Sections - 5, 6
 Township - 142N Range - 36W Sections - 29, 32

Area Office

Area Name: Park Rapids
 Region Name: Northwest

ORG Code: F117
 Region Number: 1

Lake Access

(Information based on Population Assessment dated 08/16/2011)

Station ID	Ownership	Public Use	Type	Location / Comments
AC - 1	DNR	Open to Public use	Concrete	DNR access located on the north shore.

Lake Characteristics

Lake Area (planimetered acres):	348.00	GIS Shoreline Length (miles):	6.78
GIS Lake Area (acres):	385.10	Maximum Fetch (miles):	1.80
DOW Lake Area (acres):	401.00	Fetch Orientation (degrees):	45
Littoral Area (acres):	81.00	USGS Quad Map Number:	J08d
Area in MN (acres):	385.10	USGS Quad 24K GIS Index:	1916
Maximum Depth (feet):	109.0		
Mean Depth (feet):	N/A		

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Watershed Characteristics

Major Watershed

Name: Crow Wing River
 Watershed Number: 12
 Watershed size (acres): 1,268,954

Minor Watershed

Name: Basswood Cr
 Watershed Number: 54
 Watershed size (acres): 20,109

Surveys and Investigations

Initial Survey: 09/06/1951.

Re-Survey: 08/05/1991, 07/29/1974.

Population Assessment: 08/16/2011, 08/14/2006, 08/08/2001, 08/05/1996, 08/04/1986, 08/12/1981.

Special Assessment: 09/04/2008, 05/31/2006, 08/16/2004, 05/27/2004, 06/05/2002.

Standard Survey: 08/16/2021, 08/15/2016.

Targeted Survey: 06/28/2021, 08/12/2020, 09/27/2018, 07/12/2016.

Water Level History - Readings

<u>Station ID</u>	<u>Date</u>	<u>Level</u>	<u>Reading (feet)</u>	<u>Reading Type</u>
BM - 1	08/15/2016	Normal	-3.40	Above or below Benchmark
	08/11/2011	Normal	-3.34	Above or below Benchmark
	08/14/2006	Low	-3.95	Above or below Benchmark
BM - 2	08/17/2016	Normal	-1.15	Above or below Benchmark
	08/11/2011	Normal	-0.95	Above or below Benchmark
	08/16/2006	Low	-1.20	Above or below Benchmark
BM - 3	08/11/2011	Normal	-2.43	Above or below Benchmark
	08/14/2006	Low	-3.05	Above or below Benchmark

Water Level History - Station Summary

<u>Station ID</u>	<u>Minimum Level</u>		<u>Maximum Level</u>		<u>Range (feet)</u>	<u>Average Level (feet)</u>	<u>Reading Type (and number of readings)</u>
	<u>Feet</u>	<u>Date</u>	<u>Feet</u>	<u>Date</u>			
BM - 1	-3.95	08/14/2006	-3.34	08/11/2011	0.61	-3.56	Above or below Benchmark (3)
BM - 2	-1.20	08/16/2006	-0.95	08/11/2011	0.25	-1.10	Above or below Benchmark (3)
BM - 3	-3.05	08/14/2006	-2.43	08/11/2011	0.62	-2.74	Above or below Benchmark (2)

LAKE SURVEY REPORT
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Net Catch Summary by Numbers for TN

Standard 3/4-in mesh, double frame trap net sets

Number of Sets: 9
 First Set Date: 06/28/2021
 Last Lift Date: 06/30/2021
 Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 23 ¹		
				25%	50%	75%
BLG	Bluegill	182	20.22	7.74	19.83	43.38
GSF	Green Sunfish	2	0.22	0.61	1.33	2.00
HSF	Hybrid Sunfish	70	7.78	N/A	N/A	N/A
LMB	Largemouth Bass	16	1.78	0.39	0.83	1.53
NOP	Northern Pike	8	0.89	N/A	N/A	N/A
PMK	Pumpkinseed	17	1.89	1.41	2.71	5.94
RKB	Rock Bass	23	2.56	0.80	1.67	3.69
WTS	White Sucker	2	0.22	0.17	0.33	0.69
YEB	Yellow Bullhead	1	0.11	1.00	2.39	5.26
YEP	Yellow Perch	2	0.22	0.40	0.83	2.25
		Total Fish/Set:	35.89	¹ Quartiles for Number Per Set		

Net Catch Summary by Weight for TN

Standard 3/4-in mesh, double frame trap net sets

Abbr	Species	Total Weight (Pounds)	Pounds Per Set	Mean Weight ²	Quartiles for Lake Class 23 ¹		
					25%	50%	75%
BLG	Bluegill	31.19	3.47	0.17	0.11	0.15	0.21
GSF	Green Sunfish	0.13	0.01	0.07	0.08	0.12	0.17
HSF	Hybrid Sunfish	20.80	2.31	0.30	N/A	N/A	N/A
LMB	Largemouth Bass	6.80	0.76	0.43	0.22	0.40	0.71
NOP	Northern Pike	9.01	1.00	1.13	N/A	N/A	N/A
PMK	Pumpkinseed	4.47	0.50	0.26	0.12	0.18	0.23
RKB	Rock Bass	4.43	0.49	0.19	0.19	0.27	0.40
WTS	White Sucker	2.20	0.24	1.10	1.00	1.63	2.81
YEB	Yellow Bullhead	0.33	0.04	0.33	0.52	0.66	0.86
YEP	Yellow Perch	0.33	0.04	0.17	0.11	0.16	0.23
		Total Pounds Fish/Set:	8.86	¹ Quartiles for Mean Weight			

² Mean Weights are based on measured fish counts only.

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Electrofishing Catch Summary for EFB

Electrofishing, Backpack

Number of Stations: 10
Total run-time for all stations: 02:16:00
Total on-time for all stations: 01:47:44
First Sampling Date: 06/28/2021
Last Sampling Date: 06/30/2021
Daylight Sampling: Yes
Target Species: N/A

Abbr	Species	Summary By Numbers			Summary By Weight (pounds)			
		Total Number	Number per Hour		Total Weight	Lbs per Hour		Mean Weight
			Run-Time	On-Time		Run-Time	On-Time	
IOD	Iowa Darter	24	10.59	13.37	0.00	0.00	0.00	0.00
JND	Johnny Darter	2	0.88	1.11	0.00	0.00	0.00	0.00
BKF	Banded Killifish	9	3.97	5.01	0.00	0.00	0.00	0.00
BLG	Bluegill	12	5.29	6.68	0.00	0.00	0.00	0.00
BNM	Bluntnose Minnow	15	6.62	8.35	0.00	0.00	0.00	0.00
CNM	Central Mudminnow	16	7.06	8.91	0.00	0.00	0.00	0.00
CSH	Common Shiner	2	0.88	1.11	0.00	0.00	0.00	0.00
GSF	Green Sunfish	22	9.71	12.25	0.00	0.00	0.00	0.00
HSF	Hybrid Sunfish	7	3.09	3.90	0.00	0.00	0.00	0.00
LED	Least Darter	21	9.26	11.70	0.00	0.00	0.00	0.00
MTS	Mottled Sculpin	1	0.44	0.56	0.00	0.00	0.00	0.00
PMK	Pumpkinseed	1	0.44	0.56	0.00	0.00	0.00	0.00
RKB	Rock Bass	2	0.88	1.11	0.00	0.00	0.00	0.00
TPM	Tadpole Madtom	7	3.09	3.90	0.00	0.00	0.00	0.00
BND	Western Blacknose Dace	1	0.44	0.56	0.00	0.00	0.00	0.00
YEB	Yellow Bullhead	19	8.38	10.58	0.00	0.00	0.00	0.00
YEP	Yellow Perch	5	2.21	2.78	0.00	0.00	0.00	0.00

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Natural Reproduction Catch Summary for S58

Seining, 50 foot 1/8 in Beach Seine for IBI

Number of Hauls: 9
First Haul Date: 06/28/2021
Last Haul Date: 06/29/2021
Target Species: N/A

Abbr	Species	Age	Total Number	Number Measured	Mean	Length Range (inches)	
					Length (inches)	Minimum	Maximum
IOD	Iowa Darter	All	7	0	N/A	N/A	N/A
BKF	Banded Killifish	All	119	0	N/A	N/A	N/A
BCS	Blackchin Shiner	All	3	0	N/A	N/A	N/A
BLG	Bluegill	All	625	0	N/A	N/A	N/A
BNM	Bluntnose Minnow	All	156	0	N/A	N/A	N/A
CSH	Common Shiner	All	64	0	N/A	N/A	N/A
GSF	Green Sunfish	All	2	0	N/A	N/A	N/A
HSF	Hybrid Sunfish	All	26	0	N/A	N/A	N/A
LMB	Largemouth Bass	All	3	0	N/A	N/A	N/A
LED	Least Darter	All	9	0	N/A	N/A	N/A
PMK	Pumpkinseed	All	28	0	N/A	N/A	N/A
RKB	Rock Bass	All	3	0	N/A	N/A	N/A
YEP	Yellow Perch	All	137	0	N/A	N/A	N/A

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Length Frequency Distribution for TN

Standard 3/4-in mesh, double frame trap net sets

(Field work conducted between 06/28/2021 and 06/30/2021)

	<u>BLG</u>	<u>GSF</u>	<u>HSF</u>	<u>LMB</u>	<u>NOP</u>	<u>PMK</u>	<u>RKB</u>	<u>WTS</u>	<u>YEB</u>	<u>YEP</u>
< 3.00	1	-	-	-	-	-	-	-	-	-
3.00 - 3.49	1	-	-	-	-	-	-	-	-	-
3.50 - 3.99	5	-	1	-	-	-	-	-	-	-
4.00 - 4.49	22	1	1	-	-	-	3	-	-	-
4.50 - 4.99	15	1	2	-	-	-	4	-	-	-
5.00 - 5.49	18	-	5	-	-	3	2	-	-	-
5.50 - 5.99	23	-	5	-	-	2	2	-	-	-
6.00 - 6.49	25	-	6	1	-	-	2	-	-	1
6.50 - 6.99	41	-	16	-	-	7	2	-	-	-
7.00 - 7.49	23	-	16	4	-	3	3	-	-	-
7.50 - 7.99	7	-	11	1	-	2	4	-	-	-
8.00 - 8.49	1	-	5	3	-	-	1	-	-	1
8.50 - 8.99	-	-	1	1	-	-	-	-	-	-
9.00 - 9.49	-	-	-	2	-	-	-	-	1	-
9.50 - 9.99	-	-	-	1	-	-	-	-	-	-
10.00 - 10.49	-	-	-	-	-	-	-	-	-	-
10.50 - 10.99	-	-	-	-	-	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-	-	-	-	-	-
11.50 - 11.99	-	-	-	-	-	-	-	-	-	-
12.00 - 12.99	-	-	-	1	-	-	-	-	-	-
13.00 - 13.99	-	-	-	2	1	-	-	2	-	-
14.00 - 14.99	-	-	-	-	2	-	-	-	-	-
15.00 - 15.99	-	-	-	-	-	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-	-	-	-	-	-
17.00 - 17.99	-	-	-	-	-	-	-	-	-	-
18.00 - 18.99	-	-	-	-	2	-	-	-	-	-
19.00 - 19.99	-	-	-	-	1	-	-	-	-	-
20.00 - 20.99	-	-	-	-	1	-	-	-	-	-
21.00 - 21.99	-	-	-	-	1	-	-	-	-	-
22.00 - 22.99	-	-	-	-	-	-	-	-	-	-
23.00 - 23.99	-	-	-	-	-	-	-	-	-	-
24.00 - 24.99	-	-	-	-	-	-	-	-	-	-
25.00 - 25.99	-	-	-	-	-	-	-	-	-	-
26.00 - 26.99	-	-	-	-	-	-	-	-	-	-
27.00 - 27.99	-	-	-	-	-	-	-	-	-	-
28.00 - 28.99	-	-	-	-	-	-	-	-	-	-
29.00 - 29.99	-	-	-	-	-	-	-	-	-	-
30.00 - 30.99	-	-	-	-	-	-	-	-	-	-
31.00 - 31.99	-	-	-	-	-	-	-	-	-	-
32.00 - 32.99	-	-	-	-	-	-	-	-	-	-
33.00 - 33.99	-	-	-	-	-	-	-	-	-	-
34.00 - 34.99	-	-	-	-	-	-	-	-	-	-
35.00 - 35.99	-	-	-	-	-	-	-	-	-	-
= > 36.00	-	-	-	-	-	-	-	-	-	-
	<u>BLG</u>	<u>GSF</u>	<u>HSF</u>	<u>LMB</u>	<u>NOP</u>	<u>PMK</u>	<u>RKB</u>	<u>WTS</u>	<u>YEB</u>	<u>YEP</u>
Total	182	2	69	16	8	17	23	2	1	2
Min. Length	2.99	4.49	3.82	6.30	13.15	5.20	4.13	13.46	9.17	6.06
Max. Length	8.11	4.57	8.74	13.94	21.06	7.80	8.07	13.50	9.17	8.11
Mean Length	5.90	4.53	6.82	8.98	17.51	6.55	6.08	13.48	9.17	7.09
# Measured	182	2	69	16	8	17	23	2	1	2
No Lengths for	0	0	1	0	0	0	0	0	0	0

Note: Unless all fish were measured in the catch, totals shown for some length-frequency distributions may differ from the total number of fish in the catch, due to rounding of fractions used in the estimation of length frequency from a subsample of measured fish

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Other Species

Gear Type (1)	Other Species (Gender) (2)	Total Num	Number Measured	Length (inches) Min - Mean - Max	Number Weighed	Weight (pounds) Min - Mean - Max
TN	Painted Turtle	14	14	5.31 - 6.41 - 7.17	0	N/A
	Snapping Turtle	9	9	4.92 - 11.84 - 16.02	0	N/A

(1) Key to sampling gear abbreviations:

TN = Standard 3/4-in mesh, double frame trap net sets

(2) Gender: If identified and reported.

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Survey Crew Notes

This targeted survey includes the nearshore and trap net components of an IBI survey. Survey work was conducted by IBI Program staff. Nine stations were sampled with a 50' seine and backpack electrofisher and one was sampled with backpack electrofishing only due to dense bulrushes and water depth.

Conditions during sampling were clear, air temperatures varied from 70 to 85F, and surface water temperatures were in the mid 70s.

Minor adjustments were made to species counts on 10/30/2021 based on voucher verification. No species were added or removed.

Discussion

A targeted survey of nearshore and littoral fish species in Boot Lake was conducted beginning on June 28, 2021, by Index of Biological Integrity (IBI) Program staff. Data collected during this nearshore and trap net survey were combined with gill net data to calculate a Fish-based IBI (FIBI) score for the lake.

An aquatic life use assessment will be completed using data collected during this nearshore and trap net survey and a gill net survey conducted the week of August 16, 2021. The FIBI tool 2 was used for scoring, which resulted in an FIBI score of 79. This score is above both the general use impairment threshold (45) and exceptional threshold (64) for this tool. All metrics contributed positively to the score, and those that contributed most positively included the relatively high number of small benthic-dwelling species, low number of omnivore species, high proportion of biomass from insectivores in the trap nets, and presence of an intolerant species in the gill nets.

Results from this survey will be considered when the biological health of Boot Lake is assessed during the Crow Wing River Watershed assessment process, which will be completed in coordination with MN Pollution Control Agency.

Status Of The Fishery

A targeted survey of nearshore fish species in Boot Lake was conducted on June 28-30, 2021, by Index of Biological Integrity (IBI) Program staff. Sampling sites were evenly spaced around the lake, and each was sampled by backpack electrofishing and seining with a 50-foot or 15-foot seine, where possible. Backpack electrofishing was completed at all 10 sampling stations. Similarly, a 50-foot seine was used to sample nine stations and site conditions prevented the use of a seine at one station. Nearshore sampling captured 18 species of fish including six species that are intolerant of disturbance (i.e., Banded Killifish, Blackchin Shiner, Iowa Darter, Least Darter, Mottled Sculpin, and Rock Bass) and one that is tolerant of disturbance (i.e., Green Sunfish).

A concurrent summer trap net survey was also conducted by IBI Program staff. Nine trap nets were set along the shoreline in locations that encompassed multiple habitat types. Trap net sampling captured nine species of fish, including one that is intolerant of disturbance (i.e., Rock Bass). Bluegill comprised a majority of the catch by number and biomass.

The nearshore and trap net data were combined with gill net data from an August 2021 survey to describe the fish community and provide a Fish-based IBI (FIBI) score. The FIBI uses fish community data to measure a lake's health, and the types of fish species present can help identify any stressors that may be negatively affecting the lake environment. In Minnesota lakes, certain fish species cannot survive without clean water and a healthy habitat (e.g., Blackchin Shiner, Iowa Darter, and Rock Bass), while other species are tolerant of degraded conditions (e.g., Green Sunfish). The FIBI score, composed of several fish community diversity and composition metrics, indicates the overall health of a lake by comparing it to what is expected for a healthy lake. For additional information on the FIBI, search for "lake index of biological integrity" on the mndnr.gov website.

Results from this survey indicate that the fish community in Boot Lake is healthy as indicated by an FIBI score that exceeds the exceptional use threshold determined for similar lakes. These results will be considered when the biological health of the lake is assessed during the Crow Wing River Watershed assessment process, which will be completed in coordination with MN Pollution Control Agency.

Survey Attachments

Note: The following attachments are excluded from this report:

- (1) Boot_Map.jpg
 - (2) Boot_Station_Photos.pdf
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Approval Notice

Program Manager Signed



Minnesota Department of Natural Resources

By accepting the data in this report, the user agrees the data will be used for personal benefit and not for profit. Any other uses or publication of the data needs the consent of the Department. The Minnesota Department of Natural Resources assumes no responsibility for actual or consequential damage incurred as a result of any user's reliance on the data.

Lake Survey Report revision: 20210824-RJE. Data Date: 04/07/2022 at 11:22 am .

