DEPARTMENT OF NATURAL RESOURCES

Fisheries Management

LAKE SURVEY REPORT

Lake Name: Trout | **Survey Type: Standard Survey**

DOW Number: 16-0049-00 | **Survey ID Date: 07/24/2017**

Lake Identification

Alternate Lake Name: N/A
Primary Lake Class ID: 1
DNR Sounding Map Number: C1606
Alternate Lake Class ID: N/A

Lake Location

Primary County: Cook
Nearest Town: Grand Marais

Legal Descriptions

Lake Center: Township - 62N Range - 2E Section - 10
PLS Section Lake Center: 6210210

All Legal Descriptions:

Cook County: Township - 62N Range - 2E Sections - 10, 11

Area Office

Area Name: Grand Marais
Region Name: Northeast
ORG Code: F218
Region Number: 2

Lake Access

(Information based on Special Assessment dated 05/14/2008)

Station ID	Ownership	Public Use	Type	Location / Comments
AC - 1	US Forest Service	Open to Public use	Carry-In	Carry-in access to NW corner of lake from USFS Rd. 308. Parking for four vehicles.

Lake Characteristics

Lake Area (planimetered acres): 257.00
GIS Lake Area (acres): 259.32
DOW Lake Area (acres): 277.00
Littoral Area (acres): 59.00
Area in MN (acres): 259.32
Maximum Depth (feet): 77.0
Mean Depth (feet): N/A
GIS Shoreline Length (miles): 3.23
Maximum Fetch (miles): 1.17
Fetch Orientation (degrees): N/A
USGS Quad Map Number: G29c
USGS Quad 24K GIS Index: 1357

Watershed Characteristics

Major Watershed

Name: Lake Superior - North
Watershed Number: 1
Watershed size (acres): 1,015,865

Minor Watershed

Name: Kadunce Cr
Watershed Number: 24
Watershed size (acres): 7,075

Surveys and Investigations

Initial Survey: 07/17/1951.
Re-Survey: 08/05/1999, 08/26/1987, 08/22/1984, 08/11/1981.
Population Assessment: 07/22/2013, 07/25/2011, 07/20/2009, 08/05/2007, 08/05/1996, 08/02/1993, 08/13/1990, 09/02/1980.
Special Assessment: 10/20/2014, 09/22/2014, 05/21/2014, 09/23/2013, 08/05/2013, 05/16/2012, 07/01/2011, 07/19/2010, 07/05/2010, 06/22/2010, 04/28/2010, 07/13/2009, 06/23/2009, 05/12/2009, 05/11/2009, 08/18/2008, 07/30/2008, 07/28/2008, 06/02/2008, 05/14/2008, 08/06/1996, 08/14/1995, 08/03/1993.
Research Survey: 07/29/2014, 06/16/2014.
External Management Survey: 07/14/2009, 07/21/2008.
Standard Survey: 07/24/2017, 07/20/2015.
Targeted Survey: 10/16/2017, 08/21/2017, 06/14/2016, 08/04/2015, 06/01/2015.

Current Water Level

Station ID	Date	Level	Reading (feet)	Reading Type
BM - 1	10/16/2017	Normal	-2.26	Above or below Benchmark
	09/14/2017	Normal	-2.75	Above or below Benchmark
	08/14/2017	Normal	-2.45	Above or below Benchmark
	07/24/2017	Normal	-2.20	Above or below Benchmark
	07/12/2017	Normal	-1.90	Above or below Benchmark
	05/16/2017	Normal	-1.79	Above or below Benchmark
GA - 8	10/16/2017	Normal	11.10	Direct Gauge Reading
	09/14/2017	Normal	10.70	Direct Gauge Reading
	08/14/2017	Normal	10.85	Direct Gauge Reading
	07/24/2017	Normal	11.21	Direct Gauge Reading
	07/12/2017	Normal	11.44	Direct Gauge Reading
	06/14/2017	Normal	11.30	Direct Gauge Reading
	05/16/2017	Normal	11.56	Direct Gauge Reading

Benchmark and Gauge Descriptions / Locations

Station ID	Location Description
BM - 1	Top of 6'x4'x3' gray boulder in front of first cabin W of resort dock and 10 ft from water's edge. Established 5 Oct. 1976.
GA - 8	Temporary gauge at public access. Probably reset prior to 2016 sampling season.

Water Level History - Readings

Station ID	Date	Level	Reading (feet)	Reading Type
BM - 1	10/16/2017	Normal	-2.26	Above or below Benchmark
	09/14/2017	Normal	-2.75	Above or below Benchmark
	08/14/2017	Normal	-2.45	Above or below Benchmark
	07/24/2017	Normal	-2.20	Above or below Benchmark
	07/12/2017	Normal	-1.90	Above or below Benchmark
	05/16/2017	Normal	-1.79	Above or below Benchmark
	09/09/2016	Normal	-2.60	Above or below Benchmark
	07/08/2016	Normal	-2.05	Above or below Benchmark
	06/14/2016	Normal	-1.90	Above or below Benchmark
	09/02/2015	Normal	-2.68	Above or below Benchmark
	07/20/2015	Normal	-2.35	Above or below Benchmark
	07/02/2015	Normal	-2.20	Above or below Benchmark
	06/01/2015	High	-1.90	Above or below Benchmark
	10/30/2014	Low	-2.88	Above or below Benchmark
	10/01/2014	Normal	-2.71	Above or below Benchmark
	09/02/2014	Normal	-2.48	Above or below Benchmark
	08/01/2014	Normal	-2.20	Above or below Benchmark
	06/30/2014	Normal	-1.77	Above or below Benchmark
	05/21/2014	High	-1.46	Above or below Benchmark
	09/25/2013	Normal	-2.46	Above or below Benchmark
	06/28/2013	High	-1.92	Above or below Benchmark
	05/31/2013	High	-1.56	Above or below Benchmark
	06/29/2012	N/A	-1.94	Above or below Benchmark
	05/31/2012	Normal	-1.75	Above or below Benchmark
	06/01/2011	High	-1.80	Above or below Benchmark
	05/29/2009	High	-1.86	Above or below Benchmark
	05/15/2009	High	-1.50	Above or below Benchmark
	10/06/2008	N/A	-2.60	Above or below Benchmark
	07/28/2008	Normal	-2.10	Above or below Benchmark
	05/19/2008	Normal	-1.82	Above or below Benchmark
	08/05/1999	High	-2.46	Above or below Benchmark
	08/26/1987	Normal	-2.33	Above or below Benchmark
	08/23/1984	Normal	-2.75	Above or below Benchmark
	10/05/1976	Low	-3.50	Above or below Benchmark
BM - 2	09/02/2014	N/A	N/A	Destroyed
	08/01/2014	Normal	-0.90	Above or below Benchmark
	06/30/2014	Normal	-0.67	Above or below Benchmark
	05/21/2014	High	-0.27	Above or below Benchmark
	09/25/2013	Normal	-1.34	Above or below Benchmark
	08/30/2013	Normal	-1.33	Above or below Benchmark
	07/22/2013	High	-0.90	Above or below Benchmark
	06/28/2013	High	-0.75	Above or below Benchmark
	05/31/2013	High	-0.42	Above or below Benchmark
	10/01/2012	Low	-1.61	Above or below Benchmark
	07/31/2012	Normal	-0.91	Above or below Benchmark
	06/29/2012	N/A	-0.74	Above or below Benchmark
	05/31/2012	Normal	-0.63	Above or below Benchmark
	05/16/2012	Normal	-1.14	Above or below Benchmark
	09/30/2011	Low	-1.62	Above or below Benchmark
	09/02/2011	Low	-1.48	Above or below Benchmark
	08/01/2011	Normal	-1.05	Above or below Benchmark
	06/30/2011	Normal	-0.79	Above or below Benchmark
	06/01/2011	High	-0.48	Above or below Benchmark
	09/30/2010	Low	-1.75	Above or below Benchmark
	08/30/2010	N/A	-1.77	Above or below Benchmark
	07/23/2010	Normal	-1.21	Above or below Benchmark

Water Level History - Readings (*Continued*)

Station ID	Date	Level	Reading (feet)	Reading Type
BM - 2	07/19/2010	Normal	-1.23	Above or below Benchmark
	07/01/2010	Normal	-1.06	Above or below Benchmark
	06/01/2010	Low	-1.10	Above or below Benchmark
	04/28/2010	Low	-1.20	Above or below Benchmark
	11/18/2009	Low	-1.60	Above or below Benchmark
	10/01/2009	Low	-1.82	Above or below Benchmark
	09/02/2009	Normal	-1.57	Above or below Benchmark
	07/31/2009	Low	-1.41	Above or below Benchmark
	07/22/2009	Low	-1.37	Above or below Benchmark
	07/20/2009	Low	-1.38	Above or below Benchmark
	07/01/2009	Low	-1.20	Above or below Benchmark
	05/29/2009	High	-0.66	Above or below Benchmark
	05/20/2009	High	-0.45	Above or below Benchmark
	05/18/2009	High	-0.41	Above or below Benchmark
	05/15/2009	High	-0.35	Above or below Benchmark
	05/13/2009	High	-0.31	Above or below Benchmark
	10/06/2008	N/A	-1.46	Above or below Benchmark
	07/28/2008	Normal	-1.07	Above or below Benchmark
	05/20/2008	Normal	-0.65	Above or below Benchmark
	05/19/2008	Normal	-0.61	Above or below Benchmark
	05/14/2008	Normal	-0.50	Above or below Benchmark
	08/05/1999	High	-1.21	Above or below Benchmark
BM - 3	05/16/2012	Normal	-4.50	Above or below Benchmark
	05/15/2009	High	-3.80	Above or below Benchmark
	05/20/2008	Normal	-3.90	Above or below Benchmark
	07/01/1964	N/A	-1.90	Above or below Benchmark
GA - 1	06/30/2008	N/A	2.98	Direct Gauge Reading
	06/25/2008	High	2.90	Direct Gauge Reading
	06/17/2008	High	3.00	Direct Gauge Reading
	06/07/2008	High	3.32	Direct Gauge Reading
	06/06/2008	High	3.30	Direct Gauge Reading
	06/02/2008	N/A	2.55	Direct Gauge Reading
GA - 2	10/31/2008	N/A	2.08	Direct Gauge Reading
	10/06/2008	N/A	1.92	Direct Gauge Reading
	09/04/2008	N/A	1.86	Direct Gauge Reading
	08/28/2008	N/A	2.00	Direct Gauge Reading
	08/27/2008	N/A	1.80	Direct Gauge Reading
	08/13/2008	N/A	2.04	Direct Gauge Reading
	08/01/2008	N/A	2.24	Direct Gauge Reading
	07/28/2008	Normal	2.32	Direct Gauge Reading
GA - 3	12/14/2011	Low	9.76	Direct Gauge Reading
	09/30/2011	Low	10.16	Direct Gauge Reading
	09/02/2011	Low	10.32	Direct Gauge Reading
	08/01/2011	Normal	10.80	Direct Gauge Reading
	06/30/2011	Normal	11.01	Direct Gauge Reading
	06/01/2011	High	11.25	Direct Gauge Reading
	10/29/2010	Normal	10.78	Direct Gauge Reading
	09/30/2010	Low	10.25	Direct Gauge Reading
	08/30/2010	N/A	10.28	Direct Gauge Reading
	07/30/2010	N/A	10.70	Direct Gauge Reading
	07/23/2010	N/A	10.80	Direct Gauge Reading
	07/19/2010	N/A	10.82	Direct Gauge Reading
	07/01/2010	Normal	10.98	Direct Gauge Reading
	06/01/2010	Low	10.90	Direct Gauge Reading
	04/28/2010	Low	10.86	Direct Gauge Reading
	11/18/2009	Low	10.62	Direct Gauge Reading

Water Level History - Readings (*Continued*)

Station ID	Date	Level	Reading (feet)	Reading Type
GA - 3	10/01/2009	Low	10.32	Direct Gauge Reading
	09/02/2009	Normal	10.64	Direct Gauge Reading
	08/04/2009	Normal	10.74	Direct Gauge Reading
	07/31/2009	Low	10.79	Direct Gauge Reading
	07/29/2009	Low	10.76	Direct Gauge Reading
	07/22/2009	Low	10.82	Direct Gauge Reading
	07/20/2009	Low	10.80	Direct Gauge Reading
GA - 4	05/31/2013	N/A	N/A	Destroyed
	10/01/2012	Low	10.50	Direct Gauge Reading
	07/31/2012	Normal	11.20	Direct Gauge Reading
	06/29/2012	N/A	11.42	Direct Gauge Reading
	05/31/2012	Normal	11.49	Direct Gauge Reading
GA - 5	09/25/2013	Normal	10.84	Direct Gauge Reading
	08/30/2013	Normal	10.85	Direct Gauge Reading
	08/05/2013	Normal	11.05	Direct Gauge Reading
	07/22/2013	High	11.30	Direct Gauge Reading
	06/28/2013	High	11.45	Direct Gauge Reading
GA - 6	10/30/2014	Low	10.55	Direct Gauge Reading
	10/01/2014	Normal	10.64	Direct Gauge Reading
	09/24/2014	Normal	10.70	Direct Gauge Reading
	09/22/2014	Normal	10.72	Direct Gauge Reading
	09/02/2014	Normal	10.93	Direct Gauge Reading
	08/01/2014	Normal	11.32	Direct Gauge Reading
	06/30/2014	Normal	11.58	Direct Gauge Reading
	05/21/2014	High	11.97	Direct Gauge Reading
GA - 7	09/02/2015	Normal	10.74	Direct Gauge Reading
	07/23/2015	Normal	10.90	Direct Gauge Reading
	07/02/2015	Normal	11.18	Direct Gauge Reading
	06/01/2015	High	11.51	Direct Gauge Reading
GA - 8	10/16/2017	Normal	11.10	Direct Gauge Reading
	09/14/2017	Normal	10.70	Direct Gauge Reading
	08/14/2017	Normal	10.85	Direct Gauge Reading
	07/24/2017	Normal	11.21	Direct Gauge Reading
	07/12/2017	Normal	11.44	Direct Gauge Reading
	06/14/2017	Normal	11.30	Direct Gauge Reading
	05/16/2017	Normal	11.56	Direct Gauge Reading
	09/09/2016	Normal	10.85	Direct Gauge Reading
	08/12/2016	Normal	10.97	Direct Gauge Reading
	07/08/2016	Normal	11.40	Direct Gauge Reading
	06/14/2016	Normal	11.50	Direct Gauge Reading

Water Level History - Station Summary

Station ID	Minimum Level Feet	Minimum Level Date	Maximum Level Feet	Maximum Level Date	Range (feet)	Average Level (feet)	Reading Type (and number of readings)
BM - 1	-3.50	10/05/1976	-1.46	05/21/2014	2.04	-2.20	Above or below Benchmark (34)
BM - 2	-1.82	10/01/2009	-0.27	05/21/2014	1.55	-1.03	Above or below Benchmark (43)
BM - 2	N/A	N/A	N/A	N/A	N/A	N/A	Destroyed - 09/02/2014 (0)
BM - 3	-4.50	05/16/2012	-1.90	07/01/1964	2.60	-3.53	Above or below Benchmark (4)
GA - 1	2.55	06/02/2008	3.32	06/07/2008	0.77	3.01	Direct Gauge Reading (6)
GA - 2	1.80	08/27/2008	2.32	07/28/2008	0.52	2.03	Direct Gauge Reading (8)
GA - 3	9.76	12/14/2011	11.25	06/01/2011	1.49	10.66	Direct Gauge Reading (23)
GA - 4	10.50	10/01/2012	11.49	05/31/2012	0.99	11.15	Direct Gauge Reading (4)
GA - 4	N/A	N/A	N/A	N/A	N/A	N/A	Destroyed - 05/31/2013 (0)
GA - 5	10.84	09/25/2013	11.45	06/28/2013	0.61	11.10	Direct Gauge Reading (5)
GA - 6	10.55	10/30/2014	11.97	05/21/2014	1.42	11.05	Direct Gauge Reading (8)
GA - 7	10.74	09/02/2015	11.51	06/01/2015	0.77	11.08	Direct Gauge Reading (4)
GA - 8	10.70	09/14/2017	11.56	05/16/2017	0.86	11.17	Direct Gauge Reading (11)

Fish Diseases and Parasites

Species Examined	Number of Fish Examined Internally	Externally	In Lab	Examination Results Condition Observed	Number of Fish
lake trout	22	-	-	None observed	22

Notes: All Lake Trout examined internally for diseases and parasites were checked only for the presence of bladderworm.

Dissolved Oxygen and Temperature Profile of Lake Water

Station ID	Sampling Date	Bottom Depth (Feet)	Sample Depth (Feet)	Water Temperature (°F)	Dissolved Oxygen (ppm)
WQ - 8	10/16/2017	74.3	Surface	53.2	9.7
			3.3	53.2	9.6
			6.6	53.2	9.9
			9.9	53.2	9.6
			13.2	53.2	9.5
			16.5	53.2	9.5
			19.8	53.2	9.5
			23.1	53.2	9.5
			26.4	53.2	9.4
			29.7	53.2	9.4
			33.0	53.2	9.4
			36.3	52.3	8.0
			39.6	48.0	5.4
			42.9	45.7	4.0
			46.2	44.8	3.0
			49.5	44.8	2.9
			52.8	43.9	1.7
			56.1	43.7	1.2
			59.4	43.5	0.8
			62.7	43.3	0.6
			66.0	43.2	0.5
			69.3	43.2	0.5
			72.6	43.2	0.4
WQ - 8	09/14/2017	N/A	Surface	64.6	9.2
			3.3	64.2	9.3
			6.6	63.7	9.2
			9.9	63.1	9.3
			13.2	62.8	9.2
			16.5	62.4	9.2
			19.8	62.1	9.1
			23.1	61.3	9.1
			26.4	58.5	8.8
			29.7	52.5	7.9
			33.0	48.7	7.0
			36.3	47.3	6.1
			39.6	46.0	5.9
			42.9	45.5	6.0
			46.2	45.0	4.5
			49.5	44.1	3.5
			52.8	43.7	2.8
			56.1	43.5	2.2
			59.4	43.2	1.5
			62.7	43.2	1.1
			66.0	43.0	0.6
			69.3	43.0	0.5
			72.6	43.0	0.3
WQ - 8	08/14/2017	79.2	Surface	68.9	8.5
			3.3	69.1	8.5
			6.6	69.1	8.5
			9.9	68.9	8.5
			13.2	68.4	8.6
			16.5	68.0	8.5
			19.8	66.9	8.7
			23.1	58.6	10.0

Dissolved Oxygen and Temperature Profile of Lake Water (*Continued*)

Station ID	Sampling Date	Bottom Depth (Feet)	Sample Depth (Feet)	Water Temperature (°F)	Dissolved Oxygen (ppm)
WQ - 8	08/14/2017 (*Continued*)	79.2	26.4	52.3	9.6
			29.7	49.3	8.8
			33.0	47.8	8.2
			36.3	46.9	8.0
			39.6	46.2	7.5
			42.9	45.3	7.1
			46.2	45.0	6.8
			49.5	44.4	6.2
			52.8	43.7	5.0
			56.1	43.5	4.6
			59.4	43.3	3.8
			62.7	43.2	3.2
			66.0	43.0	2.2
			69.3	43.0	1.9
			72.6	42.8	1.0
			75.9	42.8	0.4
			79.2	42.8	0.3
WQ - 8	07/24/2017	73.0	Surface	69.1	7.8
			3.0	68.9	7.8
			6.0	68.7	7.8
			9.0	68.5	7.8
			12.0	68.5	7.8
			15.0	68.4	7.8
			18.0	67.6	7.9
			21.0	62.4	8.1
			24.0	56.5	9.1
			27.0	50.9	9.0
			30.0	49.1	8.9
			33.0	47.8	8.5
			36.0	46.9	8.1
			39.0	46.2	7.8
			42.0	45.3	7.5
			45.0	45.0	7.1
			48.0	44.6	6.8
			51.0	44.2	6.4
			54.0	43.9	6.1
			57.0	43.5	5.6
			60.0	43.3	5.2
			63.0	43.2	4.6
			66.0	43.0	4.2
			69.0	43.0	0.8
			72.0	43.2	0.4
WQ - 8	07/12/2017	79.2	Surface	66.7	8.6
			3.3	67.3	8.6
			6.6	67.5	8.6
			9.9	67.5	8.6
			13.2	66.0	8.9
			16.5	64.0	9.0
			19.8	63.7	9.0
			23.1	56.8	10.1
			26.4	51.1	10.5
			29.7	48.2	10.0
			33.0	47.1	9.6
			36.3	46.0	9.1

Dissolved Oxygen and Temperature Profile of Lake Water (*Continued*)

Station ID	Sampling Date	Bottom Depth (Feet)	Sample Depth (Feet)	Water Temperature (°F)	Dissolved Oxygen (ppm)
WQ - 8	07/12/2017 (*Continued*)	79.2	39.6	45.5	8.9
			42.9	45.0	8.7
			46.2	44.2	8.3
			49.5	43.9	7.9
			52.8	43.5	7.5
			56.1	43.2	7.3
			59.4	43.0	6.9
			62.7	42.8	6.0
			66.0	42.8	5.6
			69.3	42.6	5.3
			72.6	42.6	4.8
			75.9	42.6	2.6
			79.2	42.6	0.5
WQ - 8	06/14/2017	78.0	Surface	63.1	8.3
			3.0	63.1	8.3
			6.0	63.1	8.3
			9.0	63.0	8.3
			12.0	62.8	8.3
			15.0	60.3	9.0
			18.0	55.6	9.7
			21.0	52.5	9.9
			24.0	49.8	10.1
			27.0	48.2	10.1
			30.0	46.8	9.8
			33.0	46.2	9.7
			36.0	45.7	9.5
			39.0	45.0	9.3
			42.0	44.8	9.2
			45.0	44.2	9.0
			48.0	44.1	8.9
			51.0	43.3	8.8
			54.0	43.2	8.7
			57.0	43.0	8.7
			60.0	42.6	8.3
			63.0	42.4	8.1
			66.0	42.4	8.0
			69.0	42.3	7.7
			72.0	42.3	6.8
			75.0	42.3	0.8
			78.0	42.3	0.1
WQ - 8	05/16/2017	76.0	Surface	49.1	11.5
			3.0	49.1	11.5
			6.0	48.9	11.5
			9.0	47.7	11.6
			12.0	46.8	11.7
			15.0	46.4	11.7
			18.0	45.5	11.7
			21.0	44.4	11.8
			24.0	43.7	11.6
			27.0	43.3	11.6
			30.0	42.6	11.5
			33.0	42.4	11.3
			36.0	42.1	11.2
			39.0	41.9	11.1

Dissolved Oxygen and Temperature Profile of Lake Water (*Continued*)

Station ID	Sampling Date	Bottom Depth (Feet)	Sample Depth (Feet)	Water Temperature (°F)	Dissolved Oxygen (ppm)
WQ - 8	05/16/2017 (*Continued*)	76.0	42.0	41.9	11.1
			45.0	41.7	11.1
			48.0	41.7	11.1
			51.0	41.7	11.0
			54.0	41.5	10.9
			57.0	41.5	10.9
			60.0	41.5	10.9
			63.0	41.4	10.8
			66.0	41.4	10.8
			69.0	41.4	10.7
			72.0	41.2	10.5
			75.0	41.2	1.1

Field Measurements of Water Quality

Station ID	Sampling Date	Sample Depth (Feet)	Secchi Depth (Feet)	Field pH	Alkalinity (ppm)	Water Color	Color Cause
WQ - 8	10/16/2017	Surface	20.2	N\A	N/A	Clear	Low fertility
	09/14/2017	Surface	20.0	N\A	N/A	Clear	N/A
				Color Description:		light green	
	08/14/2017	Surface	20.2	N\A	N/A	Lt Green	Low fertility
	07/24/2017	Surface	15.0	N\A	N/A	Clear	Low fertility
				Color Description:		clear-green	
	07/12/2017	Surface	16.0	N\A	N/A	Clear	Low fertility
	06/14/2017	Surface	20.4	N\A	N/A	Lt Green	N/A
	05/16/2017	Surface	12.5	N\A	N/A	Lt Green	Algae

Notes: A string of HOBO temperature loggers was set at WQ-8 (711856E 5305808N) on 1/19/2017. Those loggers were recovered, and the string was redeployed (at 711855E 5305808N) on 1/8/2018, for recovery next winter (2019). As in all previous deployments, loggers on the string were set at intervals of 1.0 m at depths (from the surface) of 1.5 to 12.5 m, and at intervals of 2.0 m at depths of 12.5 to 20.5 m. Temperature loggers have been deployed annually on Trout Lake since 2008.

Temperature logger data from 2017 suggested surface water temperatures peaked at the end of July, and dropped fairly steadily thereafter (Figure 1). Stratification appeared to have begun on about 9 May, and lasted through at least 1 November, when fall mixing reached a depth of 20.5 m (67.7 ft). The fall turn-over process probably began in late August, with mixing reaching greater depths until the process was complete, probably shortly after 1 November.

Temperature-oxygen profiles:

DNR Fisheries measurements of temperature and dissolved oxygen profiles, Secchi depth, and water level were planned for near the middle of each month during the 2017 open water season. Trout Lake maintained temperature-oxygen conditions suitable for Lake Trout throughout the summer of 2017. It appeared that cold-water habitat available for Lake Trout reached a minimum in about mid September, when suitable conditions (water temperature < 55 F, dissolved oxygen > 5.0 ppm) were confined to depths of about 28 to 44 feet. Depths at which dissolved oxygen dropped to 5 ppm decreased throughout the summer, from about 73 feet on 14 June to about 53 feet on 14 August. Over the same period, depths at which waters became cool enough for Lake Trout (55 F) increased from about 19 feet on 14 June to about 25 feet by 14 August. By 13 October, temperatures had dropped to 55 F even in surface waters (Figure 1).

Net Catch Summary by Numbers for GSH

Standard gill nets, set shallow in stratified assessment

Number of Sets: 3
First Set Date: 07/25/2017
Last Lift Date: 07/28/2017
Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	3	1.00	N/A	N/A	N/A
PRD	Northern Pearl Dace	1	0.33	N/A	N/A	N/A
RBS	Rainbow Smelt	2	0.67	N/A	N/A	N/A
RBT	Rainbow Trout	1	0.33	N/A	N/A	N/A
YEP	Yellow Perch	17	5.67	N/A	N/A	N/A
	Total Fish/Set:		8.00	* Quartiles for Number Per Set		

Net Catch Summary by Weight for GSH

Standard gill nets, set shallow in stratified assessment

Abbr	Species	Total Weight (Pounds)	Pounds Per Set	Mean Weight	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	2.35	0.78	0.78	N/A	N/A	N/A
PRD	Northern Pearl Dace	N/A	N/A	N/A	N/A	N/A	N/A
RBS	Rainbow Smelt	0.06	0.02	0.03	N/A	N/A	N/A
RBT	Rainbow Trout	2.04	0.68	2.04	N/A	N/A	N/A
YEP	Yellow Perch	2.15	0.72	0.13	N/A	N/A	N/A
	Total Pounds Fish/Set:		2.20		* Quartiles for Mean Weight		

Net Catch Summary by Numbers for GDE

Standard gill nets, set deep in stratified assessment

Number of Sets: 5
First Set Date: 07/24/2017
Last Lift Date: 07/28/2017
Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	19	3.80	N/A	N/A	N/A
RBS	Rainbow Smelt	11	2.20	N/A	N/A	N/A
		Total Fish/Set:	6.00	* Quartiles for Number Per Set		

Net Catch Summary by Weight for GDE

Standard gill nets, set deep in stratified assessment

Abbr	Species	Total Weight (Pounds)	Pounds Per Set	Mean Weight	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	26.93	5.39	1.42	N/A	N/A	N/A
RBS	Rainbow Smelt	0.54	0.11	0.05	N/A	N/A	N/A
		Total Pounds Fish/Set:	5.49		* Quartiles for Mean Weight		

Net Catch Summary by Numbers for GSM

Small mesh gill nets, 3/8 and 1/2-in mesh, 200 x 6 ft

Number of Sets: 4
First Set Date: 07/24/2017
Last Lift Date: 07/28/2017
Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	2	0.50	N/A	N/A	N/A
MTS	Mottled Sculpin	3	0.75	N/A	N/A	N/A
RBS	Rainbow Smelt	231	57.75	N/A	N/A	N/A
	Total Fish/Set:		59.00	* Quartiles for Number Per Set		

Net Catch Summary by Weight for GSM

Small mesh gill nets, 3/8 and 1/2-in mesh, 200 x 6 ft

Abbr	Species	Total Weight (Pounds)	Pounds Per Set	Mean Weight	Quartiles for Lake Class 1* 25%	50%	75%
LAT	Lake Trout	0.15	0.04	0.07	N/A	N/A	N/A
MTS	Mottled Sculpin	0.08	0.02	0.03	N/A	N/A	N/A
RBS	Rainbow Smelt	7.83	1.96	0.03	N/A	N/A	N/A
	Total Pounds Fish/Set:		2.01		* Quartiles for Mean Weight		

Net Catch Summary by Numbers for TN

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

Number of Sets: 12
First Set Date: 07/24/2017
Last Lift Date: 07/28/2017
Target Species: N/A

Abbr	Species	Total Fish	Number Per Set	Quartiles for Lake Class 1* 25%	50%	75%
BKT	Brook Trout	17	1.42	N/A	N/A	N/A
CRC	Creek Chub	17	1.42	N/A	N/A	N/A
GOS	Golden Shiner	14	1.17	0.10	0.25	1.60
PRD	Northern Pearl Dace	1	0.08	N/A	N/A	N/A
YEP	Yellow Perch	43	3.58	0.25	0.50	2.33
	Total Fish/Set:		7.67	* 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	Quartiles for Lake Class 1* 25%	50%	75%
BKT	Brook Trout	1.79	0.15	0.11	N/A	N/A	N/A
CRC	Creek Chub	2.10	0.17	0.12	N/A	N/A	N/A
GOS	Golden Shiner	0.90	0.07	0.06	N/A	0.02	N/A
PRD	Northern Pearl Dace	N/A	N/A	N/A	N/A	N/A	N/A
YEP	Yellow Perch	5.32	0.44	0.12	0.14	0.21	0.36
	Total Pounds Fish/Set:		0.84		* Quartiles for Mean Weight		

Length Frequency Distribution for GSH

Standard gill nets, set shallow in stratified assessment

(Field work conducted between 07/25/2017 and 07/28/2017)

	LAT	PRD	RBS	RBT	YEP
< 3.00	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-
3.50 - 3.99	-	-	1	-	-
4.00 - 4.49	-	-	-	-	-
4.50 - 4.99	-	-	-	-	-
5.00 - 5.49	-	-	-	-	-
5.50 - 5.99	-	-	1	-	-
6.00 - 6.49	-	1	-	-	-
6.50 - 6.99	-	-	-	-	5
7.00 - 7.49	-	-	-	-	9
7.50 - 7.99	-	-	-	-	2
8.00 - 8.49	-	-	-	-	1
8.50 - 8.99	-	-	-	-	-
9.00 - 9.49	-	-	-	-	-
9.50 - 9.99	-	-	-	-	-
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	1	-	-	-	-
14.00 - 14.99	1	-	-	-	-
15.00 - 15.99	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-
17.00 - 17.99	-	-	-	1	-
18.00 - 18.99	-	-	-	-	-
19.00 - 19.99	-	-	-	-	-
20.00 - 20.99	-	-	-	-	-
21.00 - 21.99	-	-	-	-	-
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	-	-	-	-	-

	LAT	PRD	RBS	RBT	YEP
Total	3	1	2	1	17
Min. Length	12.60	6.22	3.94	17.24	6.69
Max. Length	14.49	6.22	5.71	17.24	8.19
Mean Length	13.53	6.22	4.82	17.24	7.16
# Measured	3	1	2	1	17
No Lengths for	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.

Length Frequency Distribution for GDE

Standard gill nets, set deep in stratified assessment

(Field work conducted between 07/24/2017 and 07/28/2017)

	LAT	RBS
< 3.00	-	-
3.00 - 3.49	-	-
3.50 - 3.99	-	1
4.00 - 4.49	-	-
4.50 - 4.99	-	-
5.00 - 5.49	-	-
5.50 - 5.99	-	1
6.00 - 6.49	-	5
6.50 - 6.99	-	4
7.00 - 7.49	-	-
7.50 - 7.99	-	-
8.00 - 8.49	1	-
8.50 - 8.99	-	-
9.00 - 9.49	1	-
9.50 - 9.99	-	-
10.00 - 10.49	1	-
10.50 - 10.99	2	-
11.00 - 11.49	-	-
11.50 - 11.99	1	-
12.00 - 12.99	3	-
13.00 - 13.99	1	-
14.00 - 14.99	2	-
15.00 - 15.99	-	-
16.00 - 16.99	2	-
17.00 - 17.99	-	-
18.00 - 18.99	1	-
19.00 - 19.99	1	-
20.00 - 20.99	-	-
21.00 - 21.99	1	-
22.00 - 22.99	-	-
23.00 - 23.99	-	-
24.00 - 24.99	1	-
25.00 - 25.99	1	-
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	-	-

	LAT	RBS
Total	19	11
Min. Length	8.07	3.74
Max. Length	25.59	6.61
Mean Length	14.90	6.11
# Measured	19	11
No Lengths for	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

Length Frequency Distribution for GSM

Small mesh gill nets, 3/8 and 1/2-in mesh, 200 x 6 ft

(Field work conducted between 07/24/2017 and 07/28/2017)

	LAT	MTS	RBS
< 3.00	-	-	-
3.00 - 3.49	-	-	-
3.50 - 3.99	-	-	-
4.00 - 4.49	-	2	32
4.50 - 4.99	-	2	83
5.00 - 5.49	-	-	18
5.50 - 5.99	-	-	7
6.00 - 6.49	-	-	35
6.50 - 6.99	2	-	49
7.00 - 7.49	-	-	8
7.50 - 7.99	-	-	-
8.00 - 8.49	-	-	-
8.50 - 8.99	-	-	-
9.00 - 9.49	-	-	-
9.50 - 9.99	-	-	-
10.00 - 10.49	-	-	-
10.50 - 10.99	-	-	-
11.00 - 11.49	-	-	-
11.50 - 11.99	-	-	-
12.00 - 12.99	-	-	-
13.00 - 13.99	-	-	-
14.00 - 14.99	-	-	-
15.00 - 15.99	-	-	-
16.00 - 16.99	-	-	-
17.00 - 17.99	-	-	-
18.00 - 18.99	-	-	-
19.00 - 19.99	-	-	-
20.00 - 20.99	-	-	-
21.00 - 21.99	-	-	-
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	-	-	-

	LAT	MTS	RBS
Total	2	4	232
Min. Length	6.61	4.33	4.06
Max. Length	6.77	4.96	7.17
Mean Length	6.69	4.65	5.55
# Measured	2	2	206
No Lengths for	0	1	25

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.

Length Frequency Distribution for TN

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

(Field work conducted between 07/24/2017 and 07/28/2017)

	BKT	CRC	GOS	PRD	YEP
< 3.00	-	-	-	-	-
3.00 - 3.49	-	-	-	-	-
3.50 - 3.99	-	-	-	-	-
4.00 - 4.49	-	-	-	-	-
4.50 - 4.99	-	-	1	-	-
5.00 - 5.49	-	1	4	-	-
5.50 - 5.99	3	-	8	1	3
6.00 - 6.49	5	1	1	-	13
6.50 - 6.99	4	8	-	-	11
7.00 - 7.49	5	5	-	-	5
7.50 - 7.99	-	2	-	-	3
8.00 - 8.49	-	-	-	-	6
8.50 - 8.99	-	-	-	-	1
9.00 - 9.49	-	-	-	-	-
9.50 - 9.99	-	-	-	-	-
10.00 - 10.49	-	-	-	-	1
10.50 - 10.99	-	-	-	-	-
11.00 - 11.49	-	-	-	-	-
11.50 - 11.99	-	-	-	-	-
12.00 - 12.99	-	-	-	-	-
13.00 - 13.99	-	-	-	-	-
14.00 - 14.99	-	-	-	-	-
15.00 - 15.99	-	-	-	-	-
16.00 - 16.99	-	-	-	-	-
17.00 - 17.99	-	-	-	-	-
18.00 - 18.99	-	-	-	-	-
19.00 - 19.99	-	-	-	-	-
20.00 - 20.99	-	-	-	-	-
21.00 - 21.99	-	-	-	-	-
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	-	-	-	-	-

	BKT	CRC	GOS	PRD	YEP
Total	17	17	14	1	43
Min. Length	5.51	5.31	4.72	5.59	5.91
Max. Length	7.20	7.72	6.34	5.59	10.04
Mean Length	6.54	6.86	5.57	5.59	6.96
# Measured	17	17	14	1	43
No Lengths for	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.

Length At Capture with Last Incremental Length

(Body-Scale constant, all lengths, and all length increments in inches)

Species: Brook Trout
Body-Scale Constant: 1.81
Total Sample Size: 13

Length at Capture in 2017 for Each Age Class, with Incremental Lengths for 2017

Year Class	Age	Sample Size	Length At Capture: Average Length	Length At Capture: Maximum Length	Length At Capture: Minimum Length	Length At Capture: Standard Error	Length Increments: Increment	Length Increments: Standard Error
2016	1	13	6.56	7.20	5.51	0.142	1.73	0.105

Species: Lake Trout
Body-Scale Constant: 1.18
Total Sample Size: 24

Length at Capture in 2017 for Each Age Class, with Incremental Lengths for 2017

Year Class	Age	Sample Size	Length At Capture: Average Length	Length At Capture: Maximum Length	Length At Capture: Minimum Length	Length At Capture: Standard Error	Length Increments: Increment	Length Increments: Standard Error
2015	2	2	6.69	6.77	6.61	0.079	1.17	0.279
2014	3	5	9.82	10.63	8.07	0.491	1.62	0.228
2013	4	1	11.50	11.50	11.50	N/A	1.59	N/A
2012	5	3	12.52	12.60	12.44	0.045	1.38	0.095
2011	6	4	13.57	14.29	12.99	0.268	0.84	0.140
2010	7	4	15.39	16.38	14.49	0.473	1.11	0.041
2009	8	3	19.99	21.06	18.98	0.603	1.83	0.093
2008	9	0	-	-	-	-	-	-
2007	10	1	24.21	24.21	24.21	N/A	1.85	N/A
2006	11	1	25.59	25.59	25.59	N/A	1.16	N/A

Species: Rainbow Trout
Body-Scale Constant: 1.30
Total Sample Size: 1

Length at Capture in 2017 for Each Age Class, with Incremental Lengths for 2017

Year Class	Age	Sample Size	Length At Capture: Average Length	Length At Capture: Maximum Length	Length At Capture: Minimum Length	Length At Capture: Standard Error	Length Increments: Increment	Length Increments: Standard Error
2013	4	1	17.24	17.24	17.24	N/A	1.06	N/A

Length At Capture with Last Incremental Length (*Continued*)

Species: Yellow Perch
Body-Scale Constant: 1.18
Total Sample Size: 44

Length at Capture in 2017 for Each Age Class, with Incremental Lengths for 2017

Year Class	Age	Sample Size	Length At Capture: Average Length	Length At Capture: Maximum Length	Length At Capture: Minimum Length	Length At Capture: Standard Error	Length Increments: Increment	Length Increments: Standard Error
2014	3	4	6.31	7.01	5.91	0.247	0.78	0.267
2013	4	29	7.01	8.03	6.02	0.099	0.43	0.026
2012	5	10	7.81	8.82	6.46	0.261	0.45	0.030
2011	6	1	10.04	10.04	10.04	N/A	0.37	N/A

Back-Calculated Lengths for Each Age Class and Average Annual Increments of Back-Calculated Lengths

Species: Brook Trout
Gear Type: Combined Gear Types (TN)

Class	Age	N	1
2016	1	13	4.83
			4.83
Mean Length			4.83
Mean Increment			4.83
Total N			13

Species: Lake Trout
Gear Type: Combined Gear Types (GDE, GSH, GSM)

Class	Age	N	1	2	3	4	5	6	7	8	9	10	11
2015	2	2	3.84	5.52	-	-	-	-	-	-	-	-	-
			3.84	1.68	-	-	-	-	-	-	-	-	-
2014	3	5	4.68	6.58	8.20	-	-	-	-	-	-	-	-
			4.68	1.90	1.62	-	-	-	-	-	-	-	-
2013	4	1	4.65	6.62	8.40	9.90	-	-	-	-	-	-	-
			4.65	1.97	1.78	1.50	-	-	-	-	-	-	-
2012	5	3	3.94	5.69	7.82	9.64	11.14	-	-	-	-	-	-
			3.94	1.75	2.13	1.83	1.50	-	-	-	-	-	-
2011	6	4	4.68	6.89	8.68	10.33	11.75	12.73	-	-	-	-	-
			4.68	2.21	1.79	1.65	1.43	0.98	-	-	-	-	-
2010	7	4	4.88	6.89	8.86	10.31	11.82	13.11	14.28	-	-	-	-
			4.88	2.01	1.97	1.45	1.52	1.29	1.17	-	-	-	-
2009	8	3	5.39	7.72	10.14	12.07	14.41	15.90	17.25	18.16	-	-	-
			5.39	2.32	2.42	1.93	2.34	1.49	1.35	0.91	-	-	-
2007	10	1	4.31	5.87	8.43	11.77	14.90	17.67	19.38	20.73	21.72	22.36	-
			4.31	1.56	2.56	3.34	3.13	2.77	1.71	1.35	0.99	0.64	-
2006	11	1	6.22	9.50	11.82	14.55	16.53	18.91	20.20	21.64	22.66	23.61	24.43
			6.22	3.28	2.32	2.73	1.98	2.38	1.29	1.44	1.02	0.95	0.82
Mean Length			4.69	6.72	8.80	10.82	12.65	14.43	16.49	19.37	22.19	22.99	24.43
Mean Increment			4.69	2.03	1.98	1.84	1.77	1.44	1.30	1.11	1.01	0.80	0.82
Total N			24	24	22	17	16	13	9	5	2	2	1

Species: Rainbow Trout
Gear Type: Combined Gear Types (GSH)

Class	Age	N	1	2	3	4
2013	4	1	5.01	10.56	14.47	16.18
			5.01	5.55	3.91	1.71
Mean Length			5.01	10.56	14.47	16.18
Mean Increment			5.01	5.55	3.91	1.71
Total N			1	1	1	1

Back-Calculated Lengths for Each Age Class and Average Annual Increments of Back-Calculated Lengths (*Continued*)

Species: Yellow Perch
Gear Type: Combined Gear Types (GSH and TN)

Class	Age	N	1	2	3	4	5	6
2014	3	4	3.19	4.67	5.53	-	-	-
			3.19	1.48	0.86	-	-	-
2013	4	29	2.88	4.19	5.51	6.59	-	-
			2.88	1.31	1.32	1.08	-	-
2012	5	10	3.03	4.34	5.56	6.52	7.36	-
			3.03	1.32	1.22	0.95	0.85	-
2011	6	1	4.15	5.10	6.67	7.52	8.95	9.67
			4.15	0.95	1.57	0.85	1.43	0.72
Mean Length			2.97	4.29	5.55	6.59	7.51	9.67
Mean Increment			2.97	1.32	1.26	1.04	0.90	0.72
Total N			44	44	44	40	11	1

Age Class Frequency Distribution

Species & SS Type (1)	Number of Fish (2)			Number of Fish in Year Class ('yy) and Age Class														
				'17	'16	'15	'14	'13	'12	'11	'10	'09	'08	'07	'06	'05	'04	'03	<'03
	Aged	Keyed	Unaged	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Brook Trout																			
TN	13	4	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Trout																			
GDE	19	0	0	0	0	0	5	1	2	3	3	3	0	1	1	0	0	0	0
GSH	3	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
GSM	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	24	0	0	0	0	2	5	1	3	4	4	3	0	1	1	0	0	0	0
Rainbow Trout																			
GSH	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Yellow Perch																			
GSH	13	4	0	0	0	0	1	15	1	0	0	0	0	0	0	0	0	0	0
TN	31	12	0	0	0	0	6	24	12	1	0	0	0	0	0	0	0	0	0
Totals:	44	16	0	0	0	0	7	39	13	1	0	0	0	0	0	0	0	0	0

(1) Key to Sampling Station (SS) Type abbreviations:

TN = Standard 3/4-in mesh, double frame trap net sets
GDE = Standard gill nets, set deep in stratified assessment
GSH = Standard gill nets, set shallow in stratified assessment
GSM = Small mesh gill nets, 3/8 and 1/2-in mesh, 200 x 6 ft

(2) Notes:

Number of Fish Aged: Fish that were aged from bony parts.
Number of Fish Keyed: Fish assigned an age with an age-length key or by expansion of mesh or station age distributions.
Number of Fish Unaged: Fish that were not aged and were not assigned an age.

Field Notes - General Field

Recent stocking:

Year - Species - Strain - Size - Number - Fin clip
2017 - Rainbow Trout (RBT) - ARL - Yrl - 4,000 - none
2017 - RBT - ARL - Fgl - 7,000 - Ad (stocked 9/26/2017)
2016 - RBT - ARL - Yrl - 4,000 - none
2016 - RBT - ARL - Fgl - 7,000 - none
2015 - RBT - ARL - Yrl - 4,004 - none
2015 - RBT - ARL - Fgl - 7,000 - Ad
2014 - RBT - ARL - Yrl - 3,996 - none
2014 - RBT - ARL - Fgl - 7,000 - Ad
2013 - RBT - ARL - Yrl - 4,000 - none
2013 - RBT - ARL - Fgl - 5,650 - Ad
2012 - RBT - ARL - Yrl - 4,000 - none
2012 - RBT - ARL - Fgl - 6,800 - Ad
2011 - RBT - ARL - Yrl - 7,500 -none
2011 - RBT - ARL - Fgl - 7,000 - none
2010 - RBT - ARL - Yrl - 7,498 - none

Trout Lake has been stocked with Rainbow Trout annually since 1984, and has been managed for Rainbow Trout since the 1930s. No Lake Trout have been stocked since 1984.

Ice dates:

The State Climatology Office reported an ice-out date for Trout Lake of 26 April 2017, and that corresponded well with the date derived from the surface water temperature logger (27 April). No ice-on reports were received from Trout Lake in the fall of 2017; temperature logger data suggested the logger site became ice-covered on about 7 December 2017.

Diet:

Stomach contents were checked for 20 Lake Trout taken in this survey. Five stomachs were empty. Ten contained unidentified invertebrates. Six stomachs contained fish, including three with Rainbow Smelt, two with unidentified fish, and one with Sculpin.

Discussion

All references to gill net catch in this narrative will be to the combined catch in deep (GDE) and shallow (GSH) sets, unless otherwise noted. Catches of major fish species in the combined gears are reported in Table 1.

This was the second of two surveys scheduled in the 2015 lake management plan to complete the evaluation of Rainbow Trout stocking changes that began in 2011. This survey also continued regular long-term monitoring under the MNDNR Fisheries Long Term Monitoring Sentinel Lakes program, and was the last of five baseline surveys done since 2009 for that program.

The Lake Trout gill net catch in 2017 was above the median for the lake class, but fell just short of the long range goal for the species in the 2015 lake management plan (3.0 fish/set). The catch was similar to catches seen in this lake over the past twenty years, but low compared to earlier catches (Table 1). Although the mean weight for Lake Trout taken in gill nets was below the median for the lake class, it was typical for this lake. Nine year classes, all naturally produced, contributed to the 2017 catch, although none appeared to have been exceptionally strong. The 2011 and 2010 year classes, identified as moderately strong in the 2015 survey, together accounted for 33% of the 2017 catch. Growth of young Lake Trout had been slow; fish reached a mean length of 10.8 inches at age-4 annulus formation (across all age classes), compared to an area mean of 12.1 inches for Class 1 lakes (1984-2014 data).

Examination of stomach contents for Lake Trout taken in survey nets in 2017 indicated invertebrates remained an important source of forage for Lake Trout in this lake, with small, unidentified organisms found in two-thirds of stomachs

Discussion (*Continued*)

with contents (10 stomachs). Fish or fish remains were found in six stomachs. Identifiable fish included Rainbow Smelt and Sculpins.

The Rainbow Trout gill net catch was low, both for a stream trout lake in this area, and for this lake historically (Table 1). No Rainbow Trout were collected in 0.75-in-mesh trap nets, providing a further indication of low abundance. Surface water temperatures during this survey should have been tolerable for Rainbow Trout, even in nearshore areas, and the species was once commonly collected in summer trap netting in this lake (Table 4). One of the goals for this survey was to determine the contribution of fall-stocked fingerlings to the Rainbow Trout population. The Rainbow Trout catch was too low to allow that to be done. The single Rainbow Trout sampled did not bear a fin clip idenfitying it as a fall-stocked fingerling.

Other sampling done in 2017 failed to collect any Rainbow Trout. None were taken in vertical gill netting done during the summer, or in nearshore sampling done in late August. Finally, none were taken in 60 short-term gill net sets done around and across the entire lake in October. Despite these discouraging results, anglers were reported to have enjoyed some good Rainbow Trout fishing over the summer of 2017.

Results of surveys done since 2011 suggest management goals for Rainbow Trout in this lake will not be met under the current stocking regime. As a result, a proposed 2018 lake management plan revision will discontinue the stocking of fall fingerlings, and double the current quota (from 4,000 to 8,000) for annual spring yearling stocking, beginning in 2020. The goal for Rainbow Trout will be reduced to what should be a more realistic 2.25 fish/gill net set. Because there are some indications that Rainbow Trout strains other than the Arlee strain have performed better in this lake (Table 2), we will pursue the use of Lake Superior Steelhead for at least part of the yearling stocking quota.

Rainbow Smelt remained present in fairly high numbers in 2017. The catch in small-mesh gill nets (GSM) had increased compared to catches seen in 2013 and 2015 (Table 3), but still fell within the normal range (10.75-62.33 fish/net) for lakes in this area where the species has been found (1989-2014 data). Although smelt can provide high-value forage for Lake Trout, analysis of smelt stomach contents in 2013 indicated they also competed with Lake Trout for invertebrate forage, including Mysis and deepwater amphipods.

Yellow Perch catches in gill nets and trap nets, which were down in 2015 compared to 2013, remained low in 2017, although they were still comparable to catches seen in both gears in this lake historically (Tables 1 and 4). Four year classes contributed to the 2017 catch, with no fish older than age 6 collected. Growth of Yellow Perch collected in 2017 was similar to growth rates observed among fish taken in 2013 and 2015. Age-4 fish collected in 2017 reached a mean length of 6.6 inches at last annulus formation, not far below the mean (7.1 inches) for lakes in this area (all lake classes, data through 2014).

No new undesirable fish species, and no species new to this lake, were collected in this assessment. Sampling of the nearshore fish community in 2017 (a targeted survey dated 8/21/2017) also added no new species.

Status Of The Fishery

This was the second of two surveys scheduled in the 2015 lake management plan to complete the evaluation of Rainbow Trout stocking changes that began in 2011. This survey also continued regular long-term monitoring under the MNDNR Fisheries Long Term Monitoring Sentinel Lakes program, and was the last of five baseline surveys done since 2009 for that program.

Lake Trout were fairly abundant in Trout Lake in 2017, although most were small. Both conditions were typical for this lake, which has long been known more for numbers than size of fish. The Lake Trout gill net catch in 2017 (2.75 fish/set in deep and shallow sets combined) was above average for this type of lake, but fell just short of the long range goal for the species in the 2015 lake management plan (3.0 fish/set). The catch was similar to catches seen in this lake over the past twenty years, but low compared to earlier catches. Although the mean weight for Lake Trout taken in gill nets was below average for the lake class, it was typical for this lake. Nine year classes, all naturally produced, contributed to the 2017 catch, although none appeared to have been exceptionally strong. The 2011 and 2010 year classes, identified as moderately strong in the 2015 survey, still accounted for a third of the 2017 catch. Growth of young Lake Trout had been slow; fish reached a mean length of 10.8 inches at the end of their fourth year, compared to an area average of 12.1 inches.

Although anglers reported good Rainbow Trout fishing on Trout Lake in 2017, survey results were disappointing. The Rainbow Trout gill net catch (0.13 fish/set in deep and shallow nets combined) was low, both compared to other stream trout lakes in this area, and compared to past catches in this lake. No Rainbow Trout were collected in 0.75-in-mesh trap nets, providing a further indication of low abundance. One of the goals for this survey was to determine the contribution of fall-stocked fingerlings to the Rainbow Trout population. The Rainbow Trout catch was too low to allow that to be done. The single Rainbow Trout sampled did not bear a fin clip idenfitying it as a fall-stocked fingerling.

Results of surveys done since 2011 suggest management goals for Rainbow Trout in this lake will not be met under the current stocking regime. As a result, a proposed 2018 lake management plan revision will discontinue the stocking of fall fingerlings, and double the current quota (from 4,000 to 8,000) for annual spring yearling stocking, beginning in 2020. Because there are some indications that Rainbow Trout strains other than the Arlee strain used recently have performed better in this lake, we will pursue the use of another strain for at least part of the yearling stocking quota.

Rainbow Smelt remained present in fairly high numbers in 2017. The catch in small-mesh gill nets had increased compared to catches seen in 2013 and 2015, but still fell within the normal range (10.75-62.33 fish/net) for lakes in this area where the species has been found. Although smelt can provide high-value forage for Lake Trout, they also compete with Lake Trout (and Rainbow Trout) for invertebrate forage.

Fair numbers of Yellow Perch were found in 2017, but most were too small to have been of much interest to anglers. Yellow Perch catches in gill nets and trap nets, which were down in 2015 compared to 2013, remained low in 2017, although they were still comparable to catches seen in both gears in this lake historically. Growth of Yellow Perch collected in 2017 had been close to average for lakes in this area.

No new undesirable fish species, and no species new to this lake, were collected in this survey. Sampling of the nearshore fish community in 2017 (a targeted survey dated 8/21/2017) also added no new species.

Table 1. Catch (fish/set) and mean weight (lb/fish) of Lake Trout, Rainbow Trout, Cisco, Yellow Perch, and Rainbow Smelt in gill nets (deep and shallow sets combined) set in Trout Lake, Cook County, Minnesota, 1951-2017.

Survey	No.	Lake Trout		Rainbow Trout		Cisco		Yellow Perch		Rainbow Smelt	
Date	Sets	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight
7/17/51	6	4.17	0.76	0.17		0.17		2.33	0.13		
9/2/80	6	6.00	0.66	3.17	0.88	4.00	2.15	7.33	0.12		
8/11/81	4	4.25	1.25	1.50	0.63	4.25	2.12				
8/22/84	4	7.25	1.04	2.50	0.37	4.00	2.42			1.50	0.18
8/26/87	4	5.25	0.70	10.50	0.54	1.75	2.03	9.25	0.14	1.00	
8/13/90	4	4.50	1.22	6.50	0.90	2.50	2.44	2.00	0.17		
8/2/93	6	4.33	1.31			0.50	2.37	2.33	0.30	0.17	
8/5/96	6	1.50	3.71	1.83	0.61	0.50	2.22	6.83	0.19	0.33	
8/5/99	6	3.00	2.10	0.33	0.68	0.50	2.32	4.17	0.25	0.50	0.07
8/5/07	6	5.00	0.75	0.33	1.17			0.50	0.31		
7/20/09	8	3.00	1.15	2.75	0.53						
7/25/11	8	2.25	1.25	0.50	0.62			2.88	0.15	1.25	0.05
7/22/13	8	3.25	1.30	0.13				4.38	0.15	2.00	0.09
7/20/15	8	3.13	1.34	0.63	0.50			2.00	0.13	5.13	0.14
7/24/17	8	2.75	1.33	0.13				2.13	0.13	1.63	0.05
Class 1											
Median		2.08	1.79			7.65	0.42	1.50	0.16	ND	ND
1st Q		0.85	1.22			1.40	0.14	0.28	0.12		
3rd Q		4.25	3.06			17.38	0.72	2.83	0.20		
Local*											
Median				2.25	0.87						
1st Q				1.00	0.52						
3rd Q				6.25	1.47						

* Median and quartiles for gill net catches in summer (July-August) assessments of stream trout lakes in the Grand Marais area, 1950-2014.

Table 2. Rainbow Trout catch (fish/gill net set, deep and shallow combined) and mean weight (lb/fish) in assessments done on Trout Lake, Cook County, Minnesota, 1980-2017, with number of Rainbow Trout yearlings stocked, by strain, in the year of and each of the three years preceding each assessment.

Survey Date	Catch	Mean Weight	Year of	One year before	Two years before	Three years before
9/2/1980	3.17	0.88		5003 DON 4897 KAM 5000 ND		500 DON 2461 KAM 2000 ND
8/11/1981	1.50	0.63	5005 KAM 5005 ND		5003 DON 4897 KAM 5000 ND	
8/22/1984	2.50	0.37	7847 DON 7497 KAM		5014 DON 5014 KAM 5005 MAD	5005 KAM 5000 ND
8/26/1987	10.50	0.54	4885 MAD	4999 MAD 4995 KAM	3999 MAD 7525 KAM	7847 DON 7497 KAM
8/13/1990	6.50	0.90	8000 KAM	10143 MAD	5022 KAM	4885 MAD
8/2/1993	0.0		4993 ARL 5000 KAM	5438 ARL	5000 WYT 5000 KAM	8000 KAM
8/5/1996	1.83	0.61	5000 ARL 5000 KAM	3021 WYT 5002 KAM	5000 WYT 5028 KAM	5000 ARL 5000 KAM
8/5/1999	0.33	0.68	7500 ARL	10000 ARL	5000 ARL 4999 KAM	5000 ARL 5000 KAM
8/5/2007	0.33	1.17	7499 ARL	7500 ARL	7500 ARL	3750* ARL
7/20/2009	2.75	0.53	7500 ARL	4461 ARL 3039 KAM	7499 ARL	7500 ARL
7/25/2011	0.50	0.62	7500 ARL	7498 ARL	7500 ARL	4461 ARL 3039 KAM
7/22/2013	0.13		4000* ARL	4000* ARL	7500 ARL	7500 ARL
7/20/2015	0.63	0.50	4004* ARL	3996* ARL	4000* ARL	4000* ARL
7/24/2017	0.13		4000* ARL	4000* ARL	4004* ARL	3996* ARL

Strain abbreviations: DON - Donaldson, KAM - Kamloops, MAD - Madison, WYT - Wytheville, ARL - Arlee, ND - no strain recorded.

* Year class also included ARL-strain fingerlings stocked the preceding fall (7,000 in fall 2016 (unclipped), 7,000 in fall 2015 (Ad clipped), 7,000 in fall 2014 [Ad clipped], 5,650 in fall 2013 [Ad clipped], 6,800 in fall 2012 [Ad clipped], 7,000 in fall 2011, and 3,749 in fall 2003).

Table 3. Rainbow Smelt catches (fish/set) in standard graduated-mesh gill nets (deep and shallow sets combined), 0.5-in-mesh gill nets, and small-mesh graduated-mesh gill nets (0.375 and 0.5-in-mesh) in Trout Lake, Cook County, Minnesota, 1980-2017.

Survey Date	Catch by Gill Net Type		
	Standard	0.5-in Mesh	Small Mesh
9/2/1980	0.0		
8/11/1981	0.0	0.0	
8/22/1984	1.5		
8/26/1987	1.0	10.5	
8/13/1990	0.0	4.0	
8/2/1993	0.2		54.0
8/5/1996	0.3		186.3
8/5/1999	0.5		26.3
8/5/2007	0.0		10.8
7/20/2009	0.0		0.5
7/25/2011	1.3		82.8
7/22/2013	2.0		18.3
7/20/2015	5.1		11.25
7/24/2017	1.6		57.8

Table 4. Catch (fish/set) and mean weight (lb/fish) of Brook Trout, Rainbow Trout, and Yellow Perch in 0.75-in-mesh trap nets in Trout Lake, Cook County, Minnesota, 1980-2017.

Survey	No.	Brook Trout		Rainbow Trout		Yellow Perch	
Date	Sets	Number	Weight	Number	Weight	Number	Weight
9/2/1980	6			5.33	0.51	1.00	0.12
8/13/1981	4	0.75	0.25	0.50		2.00	0.13
8/23/1984	4			1.75	0.11	3.50	0.15
8/27/1987	8	0.25		1.25	0.73	3.25	0.15
8/15/1990	10	0.20		0.70	0.59	3.90	0.16
8/2/1993	10	0.40	0.20	0.60	0.49	2.50	0.16
8/5/1996	12	0.33	0.10	0.25	0.59	6.17	0.13
8/5/2007	12					2.00	0.10
7/28/2008	12	0.08				3.92	0.11
7/20/2009	12	1.08	0.16	0.08		2.17	0.13
7/19/2010	10	0.30	0.23			3.80	0.12
7/25/2011	12	0.08				3.50	0.14
7/22/2013	12	0.08		0.17		5.50	0.14
7/20/2015	12	0.33	0.14			2.42	0.17
7/24/2017	12	1.42	0.11			3.58	0.12

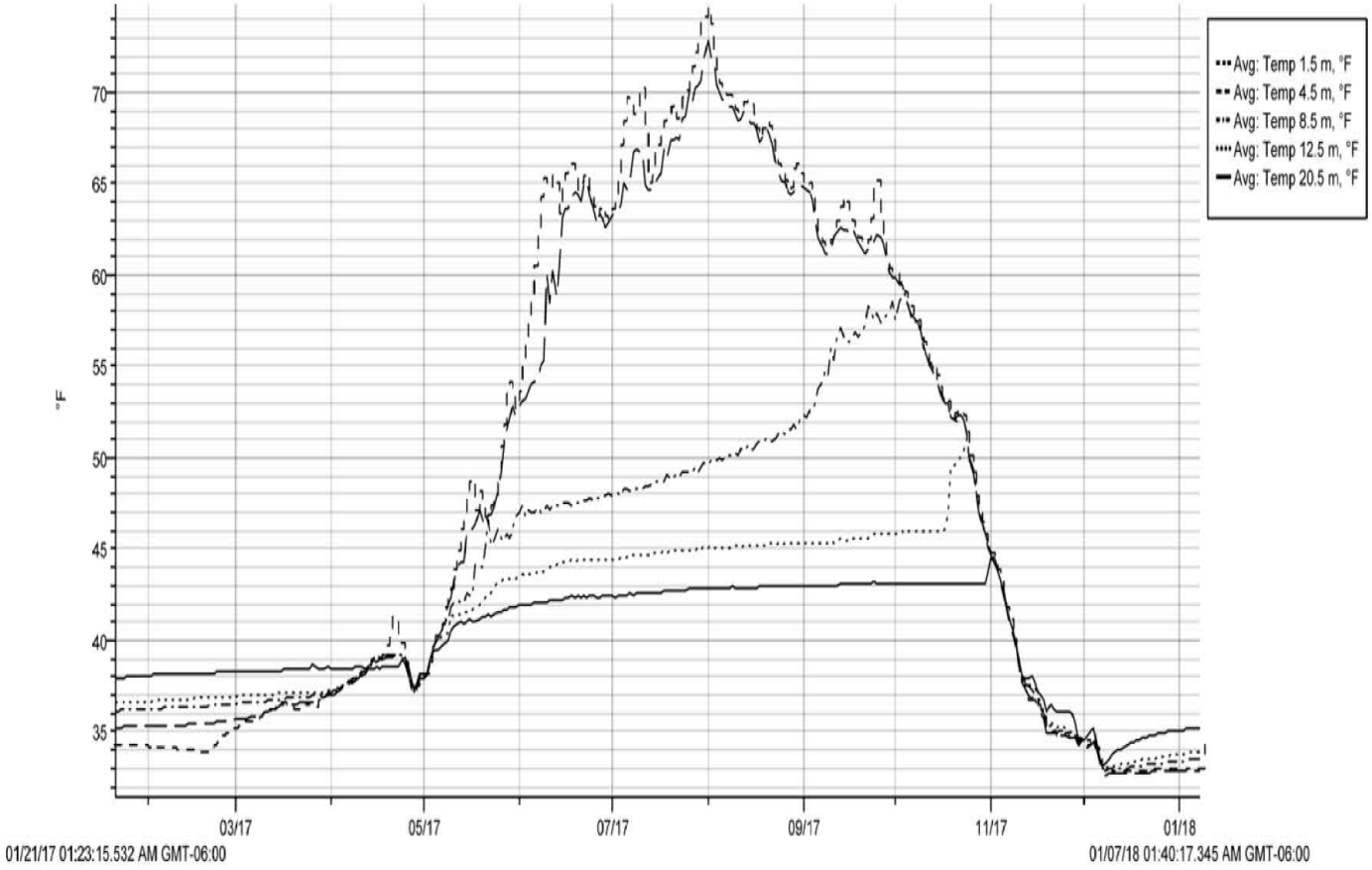

Figure 1. Mean daily water temperatures recorded at various depths in Trout Lake, Cook County, Minnesota, 21 January 2017 – 7 January 2018.

Approval Dates And Notices

Date Approved By Grand Marais Area Fisheries Supervisor: **03/23/2018**

Date Approved By Northeast Region Fisheries Manager: _____