Management Priority: 6

NA-01570-01

LAKE MANAGEMENT PLAN

Ecological Lake Class: 22

Region	Area	D.O.W. Number	County	D.O.W. Lake Name	Acreage
NE	Grand Rapids F216	31-0410	Itasca	Trout	1,753-surface 386-littoral

Long Range Goal: Maintain the Lake Trout deep-water gill-net catch at 1.0/set.

Operational Plan:

*** Base Stocking:** Stock Mountain Lake strain Lake Trout at a rate of 2.5 yearlings/surface acre (4,383 fish) in odd years. Stocked fish will be fin clipped to distinguish between stocked and natural fish.

* **Surplus stocking**: Stock up to 4,383 additional yearlings per year when available.

*** Surveys**: Conduct a targeted survey in early to mid-August, 2021 using 15 deep-water gill nets. Collect opercles and otoliths from Lake Trout for age estimation.

Midrange Objective: Monitor the Lake Trout population to determine if stocking rates and natural reproduction are maintaining the population.

Potential Plan: Consider stocking Splake in the opposite years as Lake Trout to improve the trout fishery. The addition of Splake would be contingent on changing the season and bag limits for Trout Lake and Bluewater Lake. The special regulation would reflect the Lake Trout seasons for inland waters and the bag limit would be an aggregate (2 fish) of both species.

TOTAL $ 0

NARRATIVE: (Historical perspectives - various surveys; past management; social considerations; present limiting factors; survey needs; land acquisition; habitat development and protection; commercial fishery; stocking plans; other management tools; and evaluation plans)

Initial Survey-August 1945
Re-survey-July 1954, August 1975, August 1985
Population Assessment-August-September 1947, August 2007
Standard Survey – August 2015
Special Lake Trout Assessment-1980, 1990, 1996, 2002
Trout Assessment Netting 1975, 1980-85
Summer Creel Survey 1982-84
Winter Creel Survey 1982-85, 1987
Natural Reproduction Field Check 1953-54, 1975
Boat-in Campsite Development Plan 1990
MNDNR Water Hydrographic Work Report 1991
Water Chemistry 1985, 1991
Lake Mapped 1975
PCA water quality update – 2000
Tullibee removal – 1997, 2000, 2002, 2006, 2015
Lake Management Plan 1992, 1998, 2008, 2010, 2016

Check the appropriate boxes below:

- ☐ **Superior National Forest**
- ☒ **Chippewa National Forest**
- ☐ **Leech Lake Indian Reservation**
- ☐ **1854 Ceded Territory**

Primary Species Management:	Secondary Species Management:	
Lake Trout		
Area Supervisor Signature:	**Date:**	
Regional Manager Signature:	**Date:**	

Various surveys and past management

Trout Lake is in ecological lake class 22 and is located in the Mississippi River Watershed (#9). Averages for lakes in this classification include: surface area of 3,545 acres, 38% littoral acres, maximum depth of 102 ft, 9.9 ft Secchi disk reading, and 146.8 ppm total alkalinity. Trout Lake has a surface area of 1,753 acres, of which 386 acres (22%) are littoral, and a maximum depth of 157 feet. Water chemistry analysis in 1991 indicated total phosphorus was 0.01 ppm, total alkalinity was 126 ppm, and total dissolved solids were 132 ppm. The Secchi disk reading was 15.5 ft in the 2015 survey. Several surveys have been completed since 1945 but the Lake Management Plan (LMP) only includes results of the surveys targeting Lake Trout with deep-water gill nets (Table 1).

Table 1. Selected catch rates for Trout Lake from 1990 to 2015. The gill nets were deep-water gill nets.

Year	No. of Nets (GN/TN)	Lake Trout (GN)	Yellow Perch (GN)	Walleye (GN)	Tullibee (GN)	Splake (GN)	Northern Pike (GN)	Largemouth Bass (TN)	Black Crappie (TN)
8/13/1990	15/10	2.2	0.1	0.1	41.9	0.6	0.5	2.0	0.1
8/12/1996	15/15	0.9	0.2	0	9.8	0.3	1.0	1.6	0.3
8/12/2002	15/15	1.3	0.5	0.1	10.5	0	1.0	0.5	0.1
8/13/2007	15/15	0.9	1.2	0.3	15.9	0	1.3	2.7	1.4
8/24/2009	20/0	0.1	1.1	0.6	17.7	0	0.9	-	-
8/17/2015	15/15	0.3	0.5	0.5	11.3	0	1.1	0.8	0.6
Lake mean		1.0	0.6	0.3	17.9	0.2	1.0	1.5	0.5
Lake median		0.9	0.5	0.2	13.6	0	1.0	1.6	0.3

Various management strategies have been attempted on Trout Lake since 1918. Early anecdotal reports suggest the trout population was heavily harvested for commercial purposes, resulting in a severe reduction in numbers of Lake Trout. It appears the Lake Trout fishery was maintained by natural reproduction and stockings from 1918 to 1943. Lake Trout, Walleye, Largemouth Bass, Black Crappie, and Northern Pike were commonly stocked prior to 1945. Rainbow Trout were stocked nine times from 1946 to 1950 while Walleye were stocked in 1954, 1955, and 1971, both with limited success. Lake Trout and Splake have been the only species stocked since 1977; and only Lake Trout since 1999 (Table 2).

Deep-water gill nets have been used since the 1990 assessment to improve evaluation of the Lake Trout population. Because deep-water gill nets are set in the cold, well-oxygenated depths preferred by Lake Trout, they do not effectively sample warmwater species. Consequently, catch rates for warmwater species are not useful as an indicator of abundance but presence/absence information, as well as length and growth data can provide some insight into the fish community.

Trout Lake has primarily been managed for Lake Trout. Lake Management Plan (LMP) goals were established based on what a lake's capable of producing. These goals are derived from previous catches or size structure for the individual lake, as well as data from lakes within the same Ecological Lake Classification. Lake Management Plan goals can change as additional information is collected on a lake. The previous LMP goal for Lake Trout was to maintain a deep-water gill-net catch of 1.3/net but it was reduced to 1.0/net in this LMP.

Lake Trout: The first survey did not sample Lake Trout in 1945. Lake Trout were only sampled once in six surveys when shallow-water gill nets were used (1.1/net, 1980) but have been sampled in every survey since deep-water gill nets replaced shallow-water nets. Deepwater catches have ranged from 0.1 to 2.2/net (Table 1). Due to speculation that natural reproduction was contributing to the population, all stocked Lake Trout since 1993 have been given a fin clip to differentiate from natural fish. Unclipped fish have been sampled in every assessment since 1996. The extent of natural reproduction was difficult to gauge initially because unclipped individuals were still in the system. Results from recent surveys indicate recruitment of natural and survival of stocked fish have been poor, perhaps in response to a reduction in cold water habitat in Trout Lake.

A strain evaluation project was initiated in 2005 that compared Gillis Lake and Mountain Lake strain Lake Trout throughout the state. Trout Lake was stocked with each strain at a rate of 2.5 fish/acre (4,383). All stocked fish were given a year and strain specific fin clip. The goal of the project was to evaluate growth and survival of the paired stockings. The 2007 special assessment evaluated ages 1 and 3 while the 2009 assessment evaluated ages 1, 3, and 5. Eleven yearling fish were sampled during the 2007 assessment; one was identified as Mountain strain and 10 were Gillis strain, which represented 91% of the target age fish. Only one clipped fish was sampled in 2009, a Mountain strain yearling. Gillis Lake strain represented 83% of the marked fish sampled in both assessments. Despite the small sample size, the Gillis Lake strain appeared to perform better in Trout Lake than the Mountain Lake strain. Results from Trout Lake were consistent with other area trout lakes included in the analysis. Combining the 2007 and 2009 special assessments, Gillis Lake strain represented 73% of the marked fish sampled in Caribou (11 of 15) and Bluewater (8 of 11). Although Gillis Lake strain performed better than Mountain Lake in the Grand Rapids area, the only strain available for inland stocking in the future will be Mountain Lake. Traditionally, Isle Royale and Gillis Lake strains were stocked in Trout Lake with some evidence of natural reproduction. It is unknown what effect the shift to Mountain Lake strain will have on the Lake Trout population.

Table 2. Stocking history of Trout Lake from 1985 to 2015.

Year	Species	Size (Strain)	Number	Year	Species	Size (Strain)	Number
1985	Lake Trout	Yrl	16,020	1997	Lake Trout	Yrl (GIL)	8,765
1985	Splake	Fgl	44,013	1998	Splake	Fgl	47,284
1986	Lake Trout	Yrl	20,994	1999	Lake Trout	Yrl (GIL)	8,698
1986	Lake Trout	Fgl	17,000	2001	Lake Trout	Yrl (GIL)	8,915
1989	Lake Trout	Yrl	10,008	2003	Lake Trout	Yrl (GIL)	8,812
1989	Splake	Fgl	28,272	2005	Lake Trout	Yrl (GIL)	4,320
1990	Lake Trout	Yrl	11,000	2005	Lake Trout	Yrl (MTN)	4,422
1991	Lake Trout	Yrl	16,000	2007	Lake Trout	Yrl (GIL)	4,485
1991	Splake	Fgl	43,690	2007	Lake Trout	Yrl (MTN)	4,498
1992	Splake	Fgl	45,000	2009	Lake Trout	Yrl (GIL)	4,535
1993	Lake Trout	Yrl (IRY)	8,874	2009	Lake Trout	Yrl (MTN)	4,525
1993	Splake	Fgl	30,640	2011	Lake Trout	Yrl (MTN)	4,382
1994	Splake	Fgl	43,820	2013	Lake Trout	Yrl (MTN)	4,378
1995	Lake Trout	Yrl (GIL)	8,742	2015	Lake Trout	Yrl (MTN)	4,663
1996	Splake	Fgl	43,565				

(GIL)- Gillis Lake strain, (MTN)-Mountain Lake strain, (IRY)-Isle Royale strain.

The LMP goal of maintaining a deep-water gill-net catch of 1.3 fish/net was not achieved in 2015. The goal was lowered to 1.0 fish/net in this LMP in order to reflect the declining cold water habitat in the lake. The five sampled Lake Trout resulted in a catch of 0.3 fish/net (Table 1). The sampled fish ranged from 26.5 to 33.4 inches and had a mean length of 31.1 inches. The lack of smaller fish likely indicates natural recruitment and the various stocking strategies were not successful in the 10 years prior to 2015. Age and growth information was not collected in 2015 but fish have been estimated to exceed 30 years old in previous surveys.

Black Crappie: Black Crappie trap net catches have varied from 0 in 1975 to 1.4/net in 2007. Gill-net catch rates ranged from 0.1 to 1.6 from 1954 to 1980, when standard nets were used. Few Black Crappie have been sampled in recent surveys when deep-water gill nets have been used. Test netting tends to inadequately sample crappie populations due to their open-water schooling nature. Anglers are reported to target Black Crappie in the south end of the lake.

Largemouth Bass: Largemouth Bass were stocked in 1942-43, and 1951. The 1954 survey described Largemouth Bass fishing as good, the 1975 assessment described it as fair, the 1985 survey described it as good, and the 1990 assessment noted most anglers staying at Kastner's (currently Mayen's Northvue) Resort were fishing for Largemouth Bass, Northern Pike and panfish. Bass are difficult to sample in trap nets, therefore the results may not accurately reflect the abundance or size structure of the population in Trout Lake. Catch rates have varied from 0.3 to 4.5/trap net (Table 1). The catch was 0.8/trap net in 2015. The sampled bass ranged from 5.9 to 16.3 inches and had a mean length of 11.2 inches. Growth was last evaluated in the 1996 assessment and was slower than the statewide average for ages 1 to 5. The quality of the Largemouth Bass population does not appear to warrant the additional effort of spring night electrofishing.

Northern Pike: Northern Pike are not abundant in Trout Lake; deep-water gill net catches have ranged from 0.5 to 1.3/net (Table 1). Although catch rates have been low, size structure has been good (Table 3). Northern Pike were sampled at a rate of 1.1/net in the 2015 survey. The sampled fish ranged from 24.3 to 32.5 inches and had a mean length of 28.1 inches. Low density populations tend to have larger individuals, especially when there is an adequate cool water refuge and a prey species like Tullibee present. Also, the low density of Northern Pike is favorable in managed trout lakes because it results in lower predation rates on stocked fish. Growth in the 1996 assessment was slightly higher than the statewide average.

Table 3. Trout Lake Proportional Stock Density (PSD), Relative Stock Density (RSD) indices for preferred-length and memorable-length **Northern Pike**. Standardized lengths were used to calculate structural indices (Stock length = 14 in., Quality length = 21 in., Preferred length = 28 in., Memorable length = 34 in.).

Year	Stock Sample Size	PSD	RSD-P	RSD-M
1954	23	78	13	0
1975[a]	9	78	44	22
1980	16	100	44	6
1985[a]	21	100	38	10
1990[b]	8	100	39	0
1996[b]	15	100	33	0
2002[b]	15	100	27	0
2007[b]	19	100	26	5
2009[b]	18	100	17	0
2015[b]	16	100	44	0

[a]Combined gill net and trap net captured fish.
[b]Deepwater gill nets used.

Splake: Splake were initially stocked in 1977 to provide trout fishing opportunities while the Lake Trout population was developing. Splake were stocked nearly annually from 1977 to 1998 (Table 2). In four assessments from 1980 to 1996, the catch rates ranged from 0.1 to 0.6/net. Splake were not sampled in the 2002 assessment though anglers reported occasional catches at that time. Splake provided some quality fishing opportunities based on the gill net size distributions; the sampled fish consistently ranged from 14 to 26 inches in the three surveys from 1985 to 1996. Splake stocking was discontinued in 1998 because the Lake Trout population became established which create difficulties in identification, and the possibility of hybridization.

Tullibee: Tullibee are difficult to sample in gill nets because they often suspend during the summer months. Tullibee catch rates have ranged from 9.8 to 41.9/deepwater gill net (Table 1). Assessments conducted since 1996 indicate a relatively stable population. The 2015 survey sampled Tullibee at a rate of 11.3/gill net. Tullibee in Trout Lake are smaller than in other area lakes. In the 2015 survey, the sampled fish ranged from 6.8 to 11.9 inches. Trout Lake has been used to stock other lakes to establish new Tullibee populations. From 1997 to 2008, roughly 25,000 Tullibee were removed and stocked in other waters. In the fall of 2015, 330 pounds of Tullibee were removed and stocked in Johnson Lake a few miles southwest. The removal of an important prey species like Tullibee should be discontinued if it is suspected to limit recruitment.

Yellow Perch: Yellow Perch catch rates ranged from 0.1 to 1.2/deepwater gill net (Table 1). The 2015 survey sampled perch at a rate of 0.5/net. Standard gill-net catches from 1954 to 1985 ranged from 2.5 to 20.1/net. Yellow Perch have generally been small with few fish large enough to interest anglers.

Bluegill: Bluegill catch rates have ranged from 5.5/net in 1985 to 46.6/trap net in 2007. The catch rate in the 2015 survey was 22.8/trap net, exceeding the lake class median. Size structure has generally been poor. In 2015, only six fish exceeded 8 inches and the mean length was 5.6 inches.

Walleye: Walleye had low catch rates in five of the six surveys with deep-water gill nets (Table 1). Walleye sampled in Trout Lake have typically been large. Lengths from the 2015 sample ranged from 22.2 to 29.5 inches with a mean length of 25.8 inches. The mean weight was nearly six pounds. Walleye were last stocked in 1971 and first observed in 1980. Walleye are probably self-sustaining in Trout Lake; however, immigration from Wabana Lake is also likely occurring. Anecdotal reports suggest a relatively large spring Walleye run was observed in 2008 and 2009 from Wabana into Trout Lake.

Other species: Smallmouth Bass have occasionally been sampled at very low numbers. Other species sampled included Banded Killifish, Bluntnose Minnow, Green Sunfish, Hornyhead Chub, Hybrid Sunfish, Iowa Darter, Johnny Darter, Mimic Shiner, Mottled Sculpin, Pugnose Shiner, Pumpkinseed Sunfish, Rock Bass, and Spottail Shiner. The Pugnose Shiner is a species of concern for the Chippewa National Forest.

Social Considerations

An access is located on the north side of the lake at a resort. No parking is available near the access, except for fee at the resort. Access is also possible by boat from the Wabana-Little Trout chain of lakes. Lakeshore development was limited from 1945 to 1985. No resorts and nine homes were recorded in the 1945 survey. Two resorts and six homes were recorded in 1954. Two resorts with 16 cabins and 11 homes were recorded in 1985. The 2010 assessment noted 14 residences and one resort with eight cabins. Eighty percent of Trout Lake's shoreline was contained within the Joyce Estate, which was minimally developed by the previous owner. The USFS owns the Joyce Estate land now and manages it as a semi-wilderness non-motorized area. Attempts have been made by local residents to ban jet-skis from the lake, which has been unsuccessful to date.

Creel surveys were conducted during the open water season from mid-May through the end of September from 1982-1984. Angler hours ranged from 6,928 to 8,202 hours/season or 4.0 to 4.7 hours/acre. In 1982, 12% of anglers indicated they targeted trout species, 13% targeted Largemouth Bass, and 3% targeted Northern Pike. The majority of anglers (72%) indicated they were targeting all species. An estimated 83 Splake and 40 Lake Trout were harvested during the summer season. Bluegill and Rock Bass were the most harvested species with an estimated 4,207 fish harvested. Largemouth Bass were the most harvested species by weight with 516 fish weighing 589 pounds. Fishing pressure was also estimated from January through March from 1982-1985. Estimated fishing pressure ranged from 386 hours to 2,000 hours. No harvest information was available.

An aerial creel survey was conducted from mid-May through September 15th, 2001 and from December 15th through mid-February in 2001-2002. Estimated fishing pressure in the summer season was 7,216 hours or 4.1 hours/acre. Estimated fishing pressure in the winter season was 711 hours or 0.4 hours/acre. The pressure estimates were below lake class 22 first quartiles of 11 and 0.8 hours/acre for the summer and winter seasons.

Present Limiting Factors

Lake Trout require cold, well-oxygenated water to survive. Preferred Lake Trout habitat is defined as having at least 5 ppm of dissolved oxygen, water temperatures not exceeding 55 degree F, and a minimum of five vertical feet of separation between the two limits. The preferred habitat range was 28 to 135 feet in 1996, signifying 107 feet of separation. The preferred habitat range decreased to about 90 feet in 2002; continued decreasing to 19 feet in 2007; and less than 5 feet in 2009 (Figure 1). The preferred habitat improved to 30 feet of separation in 2015

(34 to 64 feet). The declines in Lake Trout deep-water gill-net catches are likely related to the reduction in cold water habitat, affecting summer survival. It is unclear why there has been a reduction in cold water habitat but there is probably more than one variable contributing to the decline. Changing the stocking from Gillis strain to Mountain strain Lake Trout in recent years may also be contributing to the decline.

The 1945 survey commented on spawning habitat for Lake Trout, "If water levels remain high enough to cover the mid-lake shoals, Lake Trout might be able to spawn successfully". However the same report did not recommend stocking Lake Trout and one reason was "...a lack of good spawning areas free from depredations of sunfishes and Rock Bass...". The 1954 and 1985 surveys do not mention Lake Trout spawning habitat. Past assessments suggest limited natural reproduction of Lake Trout was occurring, but the extent was unknown. Continued stocking appears to be necessary to provide a recreational fishery.

Based on Tullibee being common in Trout Lake, it does not appear their habitat is limited. However, Tullibee do not grow large, which may be related to a lack of adequate food or suitable habitat. Spawning habitat for Yellow Perch was described as excellent in 1945, spawning habitat for Northern Pike as limited, and habitat for bass and panfish as present, but restricted to narrow shoal areas. The 1954 survey described spawning habitat for Largemouth Bass, sunfish, and crappies as fair and for Northern Pike as poor. The 1985 survey described spawning habitat for Northern Pike and centrarchids as good. Prey for Northern Pike was abundant, as they exhibited good growth in 1996. Prey may be limited for Largemouth Bass, which showed below average growth.

Survey Needs

A targeted survey will be conducted in mid-August 2021, setting 15 deep-water gill nets at the same locations set in 2015. If time permits, monthly DO profiles should be collected beginning in mid-June 2021 through September 2021. Due to the difficulty of ageing Lake Trout scales, otoliths and opercles will be collected. The purpose for the survey is to evaluate the success of stocking Mountain Lake strain Lake Trout at a rate of 2.5 yearlings/surface acre biennially. The lake management plan will be updated at that time.

Habitat Development and Protection

Most of Trout Lake shoreline is owned by the Chippewa National Forest, and little new development is expected. At this time there are adequate rules protecting the lands within the national forest. Continued enforcement of shoreland ordinances and current septic regulations will be important to maintain present water quality for lands in private ownership. Caution should be exercised when applying the dust controlling agent on Co Rd 326, due to the proximity to Trout Lake. It is likely that rain will cause direct runoff into the lake and the effects are unknown at this time.

Commercial Fishery

A commercial fishery for Lake Trout may have existed on Trout Lake in the early 1900's. No commercial fishery presently exists.

Stocking Plans

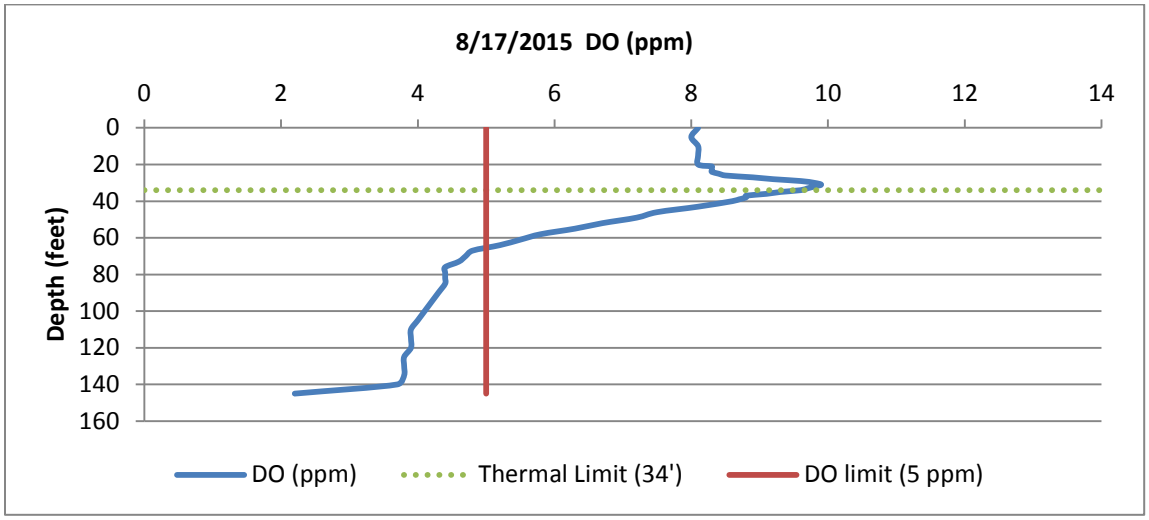
Base stocking - Mountain Lake strain yearling Lake Trout will be stocked biennially at a rate of 2.5/acre (4,383) continuing in 2017. Stocked fish will receive a fin clip to differentiate them from natural fish. If survival of Mountain Lake strain fish continues to be poor, alternative Lake Trout strains should be considered. Lake Trout management may need to be discontinued if alternative strains do not become available or cold water habitat continues to decline.

Public Comments

This plan was available for public review in the winter of 2015/16. No comments have been received yet.

Comments from previous years: One lake shore resident commented Lake Trout fishing has declined. He noticed the thermocline was not set up in the north basin of the lake in 2009. The south basin had a thermocline and he had caught a couple of Lake Trout in 2009. Another person liked the DO monitoring planned for Trout Lake in 2010, but suggests monitoring be conducted for several years. The comment also recommended testing of the possible effects of the chemical dust control on Co Rd 326, and the cause of the darkening water observed in 2009.

Revised by: Steve Mero
This plan replaces the 2010 management plan.



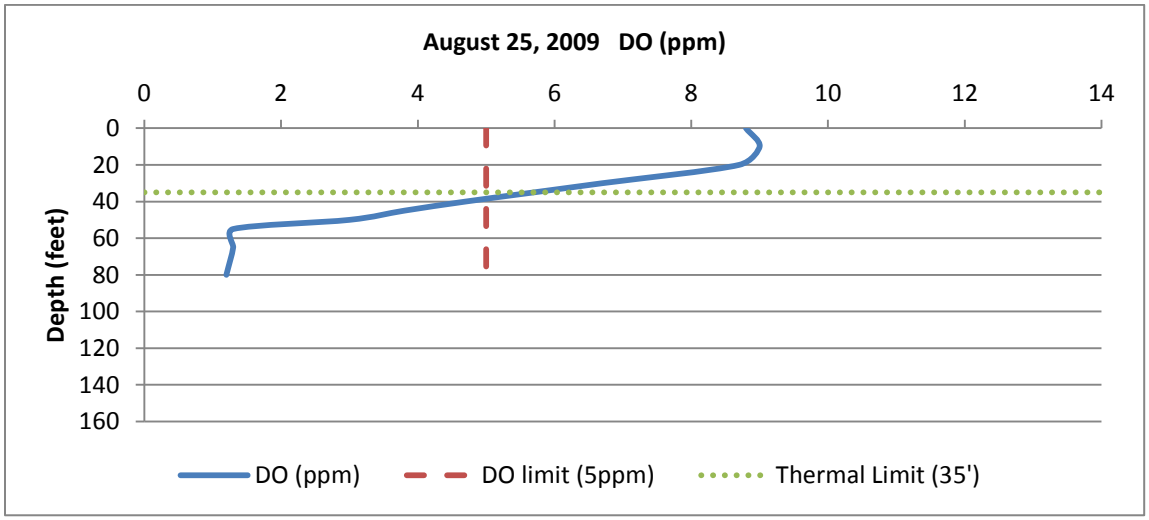
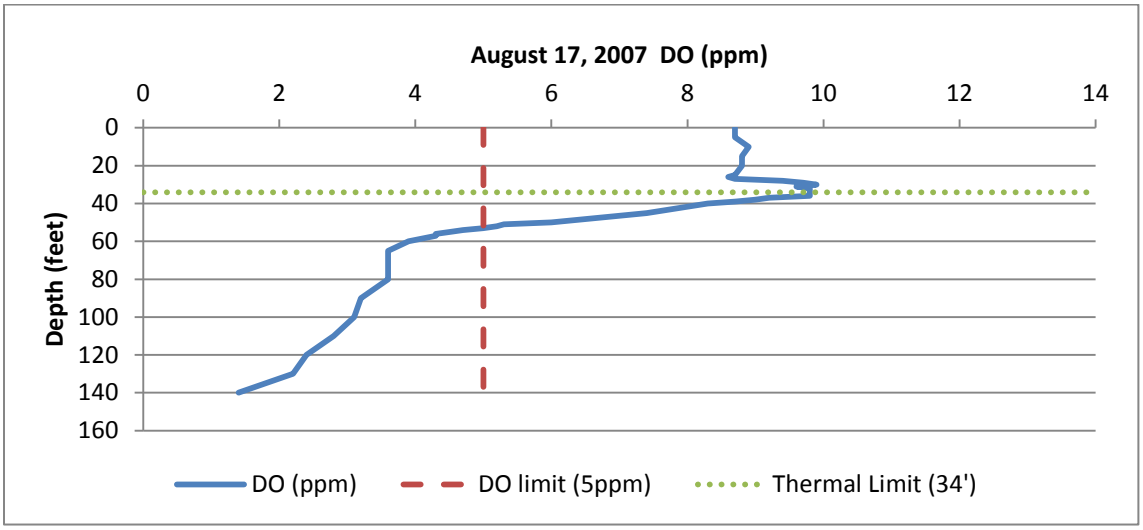
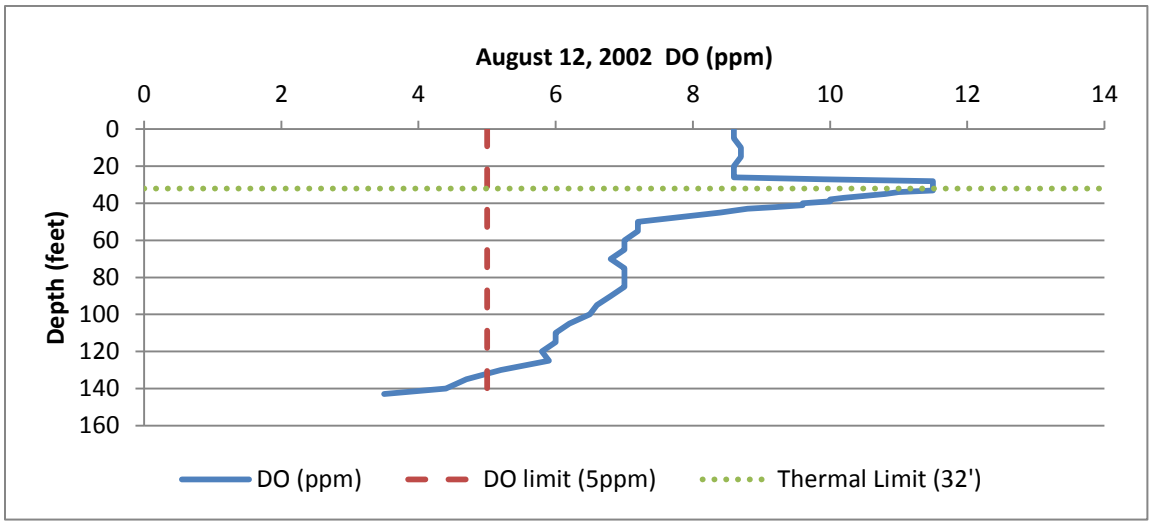


Figure 1. Mid-August dissolved oxygen (DO) profiles for Trout Lake (31-0410) from 1996 to 2015. Preferred habitat limits defined as a thermal maximum of 55°F and a DO minimum of 5 ppm for Lake Trout habitat.





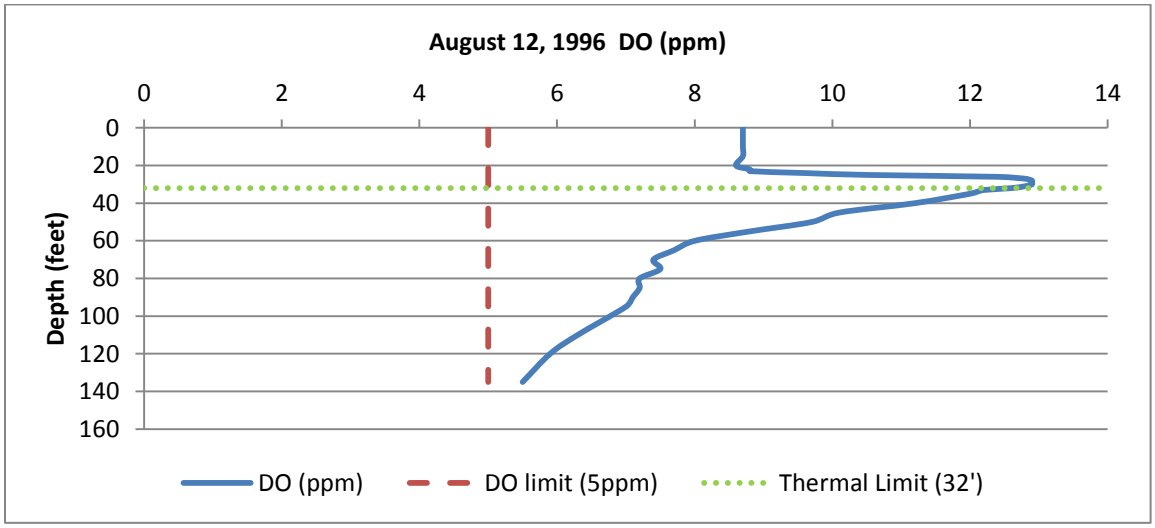


Figure 1. Continued.