Silver Creek Pond
Luce County, T47N, R11W, section 35
Tahquamenon River Watershed, Last Surveyed: 2016

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Environment

Silver Creek Pond is a horseshoe shaped 15-acre impoundment located approximately 8 miles northwest of the Village of Newberry, Michigan in Luce County (Figure 1). The pond is located at the origin (headwaters) of Silver Creek, a designated trout stream, flowing to the Tahquamenon River and ultimately to Lake Superior. Located in the Lake Superior State Forest the lake is surrounded entirely by land owned by the State of Michigan and has no development along its 1.9 miles of shoreline. The lake substrate is comprised mostly of sand and organic matter. Aquatic vegetation identified in 2016 was Bur-reed, Coontail, Elodea sp., Floating-leaf pondweed, and Milfoil sp. Abundant fish cover exists in the form of tree stumps and downed trees. Cover types in the riparian zone are comprised primarily of White Pine and White Spruce with some mixed deciduous species. The surrounding surface geology is comprised of coarse textured sandy soil types (Kalkaska and Wallace) created from glacial outwash. These soil types make the surrounding area highly drainable.

A designated Boating Access Site is maintained by Michigan Department of Natural Resources (DNR) Parks and Recreation Division. The site is unimproved meaning there are no hard surface structures or assistance piers and allows for carry-in watercraft only. Parking in the open area is large enough to accommodate approximately 5-6 vehicles without blocking the turn-around loop. A vault toilet building is located here. Users wishing to float or fish can access the water using the gradually sloped bank to the east of the dam structure by launching small-crafts like a kayak or canoe, or by simply walking in with a float tube. Anglers can also fish from the dam structure targeting the deepest area of the pond. Silver Creek Pond is also a stop along the 9.25 mile birding trail established and managed by Michigan DNR Wildlife Division where breeding and migrant birds occur through the spring, summer, and fall.

The existing dam was built in 1962 (full pool in spring of 1963), impounding what was formerly known as the West Branch and Lake Branch of Silver Creek. These two creeks were laden with active beaver dams providing for a desirable Brook Trout fishery and a favorable location to trap beaver. The dam structure is comprised of a 250 ft long earthen embankment with a structural height of 14 ft, creating a head of 11 ft. The water control structure is a spillway riser made from a 36-inch diameter corrugated metal pipe (CMP) connected to another 36-inch diameter CMP outlet pipe. The spillway riser is modified with an opening with keyway channels for stacked wooden stop logs for water level control. The Silver Creek Pond dam is classified as a low hazard potential dam. Michigan Department of Environment, Great Lakes, and Energy (EGLE) defines a low hazard potential dam as a dam located in an area where failure may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent (EGLE; Part 315: Dam Safety).

The trophic status of a lake refers to overall productivity (biomass). Lakes can be described as oligotrophic, mesotrophic, and eutrophic which are defined as low, medium, or high productivity, respectively. Water samples collected in September 2010 were examined for chlorophyll-a, total

phosphorus, total nitrogen, and alkalinity, which are parameters used to measure a lake's productivity. Chlorophyll-a concentration was reported to be 2.9 µg/L (medium). Total phosphorus was found to be high (60 µg/L) and total nitrogen was found to be medium (0.62 mg/L). Total alkalinity is a measure of buffering capacity and plays an important role in determining pH and consequently, overall lake productivity. In 2010, alkalinity was 57.7 mg/L in Silver Creek Pond. For a complete description of ranges for chlorophyll-a, total phosphorus, and total nitrogen for Michigan inland lakes, see Wehrly et al. (2015).

In addition, Secchi disk readings are a measure of water transparency and are an excellent indicator for primary production occurring in the water column. Secchi depth is often used to index the level of phytoplankton production and overall lake productivity (Wehrly et al. 2015). A Secchi disk reading was taken during an October 2016 netting survey and was reported at 10 feet (bottom). Water transparency for Silver Creek Pond is comparable to other inland waterbodies across the region and State of Michigan (Wehrly et al. 2015). These readings for productivity should be used with caution due to water samples being collected two weeks after a refilling of the impoundment following a drawdown. Carefully using the above attributes to characterize Silver Creek Pond, this waterbody can be characterized as an oligo-mesotrophic lake, which suggests low to moderate production and the capability to support a relatively simple fish community and moderate biomass.

Dissolved oxygen (DO) is a critical component to suitable habitat in aquatic ecosystems. Dissolved oxygen in lakes derives from the atmosphere as well as from aquatic plants during photosynthesis. Concentration of DO in lakes can limit the distribution and growth of fish as well as the size composition and biomass of zooplankton, which is a primary food resource for juvenile and prey fishes. Concentrations of DO begin to limit fish populations at approximately 4.0 mg/L and are often lethal below 0.5 mg/L. Profiles of the water column in Silver Creek Pond have been conducted in the summer of 2010 and winter 2022 (Figure 2). The summer 2010 profile found suitable DO throughout the water column, never dropping below 7.25 mg/L. The profile conducted in winter 2022, also reported suitable DO throughout the water column. Both profiles suggest that Silver Creek Pond never reaches limiting (≤4.0 mg/L) or lethal concentrations (≤0.5 mg/L), therefore winter-kill events are unlikely or infrequent.

As part of the survey in 2010, a habitat assessment was conducted that traditionally documents dwelling density, dock density, shoreline armoring, and large woody debris density nearshore. Given the land surrounding Silver Creek Pond is State Forest, there are no developments or improvements along the shoreline. The shoreline was characterized as highly intact.

Large woody debris is an important habitat component offering cover for fishes and other aquatic organisms as well as offering stability for the lake bottom and shorelines. Since Silver Creek Pond is an impoundment, large woody debris presence is expected to be high with good recruitment. The amount of large woody debris in Silver Creek Pond in 2010 was recorded to be 374 trees per mile which is considered high for any inland lake in Michigan.

History

Before construction of the Silver Creek Pond dam, a 2.5-acre pond (Silver Lake) existed naturally from a series of beaver dams on Silver Lake Branch Creek. This pond was stocked with legal size (≥ 7 inches) Brook Trout in most years from 1933 to 1962. Anglers reported excellent fishing and many catches of legal sized Brook Trout in the lake as well as West Branch Silver Creek. Since 1950, Silver Lake (Silver

Creek Pond) has been managed as a designated trout lake, restricting use of minnows for bait. In 1950, a cursory gill net survey captured Brook Trout confirming carryover of stocked fish and angler reports of the existing desirable Brook Trout fishery.

In 1955, the first proposal and concept of constructing a dam at the confluence of West Branch and Lake Branch Silver creeks were considered. Initial opposition by the Tahquamenon Area Sportsmen's Club was circumvented during a meeting with local Fisheries Biologist, Leland Anderson. In that meeting, the club unanimously voted for construction of the dam, stating the existing fishery was declining due to reduced activity by beaver resulting in lower water levels and failed survival of the stocked Brook Trout.

Following the impoundment reaching full pool in 1963, Michigan Department of Conservation (now Michigan DNR), began stocking an average of 1,700 legal sized Brook Trout annually. At 15 acres, the impoundment was much larger than the original pond, thus requiring a stocking rate approximately three times higher than previously prescribed. Brook trout stocking from 1966 to 1978 varied between the use of spring fingerlings and fall fingerlings, with yearlings being stocked in most years. During this period, the average number of spring fingerlings stocked was 4,666, fall fingerlings at 1,291, and yearlings at 1,000. Angler reports through the 1970's continued to be positive with limits of fish taken in most years indicating any life stage stocked would be successful. Beginning in 1978, fisheries managers recommended the use of spring fingerlings for Silver Creek Pond citing lower costs for stocking to maintain a popular fishery.

In September 1978, to verify stocked Brook Trout survival, a fisheries survey was conducted using two fyke nets for one night. A total of 40 Brook Trout were captured with an average total length of 7.9 inches and a length range of 6 to 16 inches (38% ≥ 10 inches (legal size)). Fisheries surveys in 1983 and 1988 were conducted using three half-inch mesh fyke nets to continue monitoring Brook Trout survival and growth. The 1983 netting survey was conducted in September for one night and captured 44 Brook Trout with an average total length of 6.6 inches and a length range of 3 to 14 inches (41% ≥ legal size). Brook Trout age and growth estimation from scales indicated three cohorts present and growing 1.6 inches faster than the statewide average. The 1988 netting survey was conducted in May for one night and captured five Brook Trout with an average total length of 10.5 inches and a length range of 6 to 13 inches (80% ≥ legal size). Also captured in the 1988 spring netting survey were five Redbelly Dace and three Brook Stickleback.

Between 1988 and 1994, Silver Creek Pond was partially drawn down twice for maintenance work on the dam (See Dam Maintenance). A 1994 netting survey confirmed carryover for Brook Trout despite the recent water level fluctuations. The survey was conducted in late August with three half-inch mesh fyke nets for one night capturing a total of 33 Brook Trout. Brook Trout average total length was 11.1 inches and the length range was 3 to 17 inches (61% ≥ legal size). Brook Trout survival was good with three year classes captured and were estimated to be growing 0.9 inches above statewide average.

In October 1999, 500 fall fingerling (average 5.7 inches) Nipigon strain Brook Trout were stocked with an adipose clip as part of a survival experiment for this strain. The Nipigon strain were stocked in addition to the spring fingerlings (Assinica strain) already stocked in May. A netting survey conducted from May 31 to June 2, 2000 captured 46 Brook Trout with an average total length of 11 inches and a length range of 6 to 16 inches. No adipose clipped Brook Trout were captured. Age classes captured

were 1, 2, 3, and 4. Growth estimates from scales for Assinica strain Brook Trout and Temiscame strain (age 3; stocked in 1997) were 1.9 inches and 2.6 inches above statewide average, respectively.

In 2001, a management prescription was continued for 1,000 spring fingerling Brook Trout (67 per acre) to be stocked annually. In 2004, a netting survey was conducted to investigate visual observations of reported very small Brook Trout. From April 19 to April 22, three small mesh fyke nets were used for three nights (9 net nights) and a backpack electrofishing unit was used for 0.1 hours on the upper end of the east arm. Using all gear types, a total of 34 Brook Trout were captured. Of those 34, the backpack electrofishing unit captured 27 Brook Trout averaging 0.6 inches. Since Michigan DNR had not yet stocked spring fingerlings, the 27 Brook Trout were identified as young of year (age -0) and from natural reproduction. Also captured in this survey were Brook Stickleback, Fathead Minnow, Mottled Sculpin, and Northern Redbelly Dace. In fall of 2005, the management prescription for Silver Creek Pond was revised to request 1,000 spring fingerling Brook Trout in alternate years allowing for some natural reproduction to supplement the fishery.

In April 2010, a Status and Trends Survey was conducted using three large mesh fyke nets and one small mesh fyke net for two nights. The effort captured 604 fish comprised of five species. A total of 122 Brook Trout were captured with and average length of 9.8 inches and a length range of 2 to 18 inches. Brook Trout were growing 0.3 inches above the statewide average and six year classes were represented in the sample (ages 0-5). Also captured in the survey was Brook Stickleback, Fathead Minnow, Mottled Sculpin, and Northern Redbelly Dace.

Dam Maintenance

In a Memorandum of Understanding between MDNR and EGLE (formerly DEQ), dam inspections are required every 3, 4, or 5 years (depending on hazard classification) for dams constructed with a height of 6 ft or greater and impounding 5-acres or more. Dam inspections on record are 1982, 1990, 1993, 1998, 2003, 2008, 2013, and 2018. Dam inspections conducted in 1982, 1990, and 1993 recommended maintenance and repair work to be completed including, placement of toe drains, removal of beaver debris around spillway riser, and completion of an operation and maintenance plan. The operation and maintenance plan was completed in 1990 and in 1991 a drawdown took place to install a toe drain on the left downstream slope of the embankment. A second drawdown occurred in 1992 to remove beaver debris and sediment built up around the spillway riser. The impoundment was refilled, and stocking resumed in 1993 with Brook Trout spring fingerlings.

Following a visual inspection by Fisheries Division that documented beaver debris accumulated around the spillway riser, another drawdown took place in 2010. Fisheries Division began the drawdown in June and completed it in August, removing the beaver debris and replacing rotten stoplogs in the spillway riser. The extended drawdown period was also intended to consolidate the flocculent organics and to reduce areas of dense vegetation. Since 2010, routine maintenance checks have been completed in the spring and fall of each year. Per request by the EGLE Dam Safety Program, in 2014 a visual inspection of the outfall stack and CMP was conducted and recorded using a portable camera. The inspection found no substantial deterioration of either structure.

Current Status

A management evaluation conducted in October of 2016 was used to determine the current status of the Silver Creek Pond fishery. Data for the fishery was collected from October 10 to October 12 using small and large mesh fyke nets.

A total of 113 fish were captured during the survey (Table 1). Four species comprised the catch including, Bluntnose Minnow, Brook Stickleback, Brook Trout, and Mottled Sculpin. Brook Trout comprised 95% of the total catch and 99% of the total biomass. Total catch for Brook Trout was 108. Brook Trout average total length was 10 inches and a length range of 3 to 16 inches. A total of 47 Brook Trout or 44% were greater than legal size (≥ 10 inches). Age and growth analysis using scales and spines found five year classes of Brook Trout (ages 0, 1, 2, 3, 4, and 5). Brook Trout growth was estimated at 1 inch below statewide average. The catch rate for Brook Trout was 12 per net night.

In 2017, MDNR Fisheries Division staff deployed trail cameras at the Silver Creek Pond dam structure and at a small access area on the north end of the pond to estimate angler use. The trail cameras were deployed for the trout season opener (last Saturday in April; April 29) and retrieved following the trout season closure (September 30). Cameras were positioned so the dam and access area were visible and in frame. Photos were taken on the trail cameras using the motion sensor option. All photos were reviewed to count the number of anglers in a fishing party, calculate fishing trip length using start and end time, and count any visible harvested fish. A total of 135 individual fishing trips were estimated from the trail cameras deployed from April 29 to September 30, 2017. A total of 147.3 angler hours were estimated. Starting with the average trip expenditure of $39.00/day from the 2011 Michigan summary of the Natural Survey of Fishing, Hunting, and Wildlife -Associated Recreation (U.S. Fish and Wildlife Service and U.S. Census Bureau. 2011) and then adjusting this value to 2022 using a Consumer Price Index calculator to $50.24, a cost per angler trip was estimated. The $50.24 was applied to each individual angler (not party) as is done by the MDNR Fisheries Division inland creel program (Tracy Claramunt, MDNR Fisheries Division, personal communication). Using 135 fishing trips for the period of April 29 to September 30, the return to the economy (based on 2022 dollars) for the fishing component was $6,782.40. This estimate was only calculated for anglers from photos and did not include hunting, trapping, camping, paddle sports, and wildlife watching enthusiasts. The cameras used were only positioned at the most common use areas, although there may certainly be additional access to the pond from other locations. Estimates for the activities and unaccounted anglers would likely increase the return to the economy at Silver Creek Pond.

In 2019, the stocking regime for Brook Trout was changed from spring fingerling to yearlings annually. As part of the typical rearing process for Brook Trout at the Marquette State Fish Hatchery, raceways need to be thinned to allow for space to produce yearlings. As the statewide request for Brook Trout has declined, Marquette State Fish Hatchery staff has found space within their current rearing assignment to allow for additional requests of yearling Brook Trout. Spring and fall fingerlings have produced a fishery in Silver Creek Pond; however, switching to yearlings will alleviate any survival concerns associated with younger life stages. The revised management prescription has a request for 30 yearling Brook Trout per acre for Silver Creek Pond annually. This stocking rate was based on the average stocking rate for yearling Brook Trout in other Eastern Lake Superior Management Unit lakes.

Analysis and Discussion

Silver Creek Pond is a small-sized, oligo- mesotrophic lake with an intact shoreline containing a simple fish community. Silver Creek Pond (Silver Lake) has been managed solely as a Brook Trout fishery for nearly 90 years. The success of the fishery is due impart to the biological and chemical parameters of the lake allowing for continuous suitable DO, an acceptable amount of nutrients, and cool water temperatures during warm weather months.

The Brook Trout population in Silver Creek Pond has good survival of stocked fish and contribution from natural reproduction in most years. Brook Trout here display longevity and above average growth in most years allowing some to achieve 15 inches or greater. When comparing catch per unit effort (CPUE) from netting surveys since 1983, Brook Trout greater than 15 inches have become more common (Table 2). Overall, CPUE from netting surveys have shown a steady Brook Trout population over the years. Angler reports reflect this same trend with many reporting consistent catches of Brook Trout and fish in their creel exceeding 15 inches.

The dam for Silver Creek Pond was constructed in 1962 and has provided many years of valuable angling and recreation opportunities for the public. At $6,782 the return to the economy estimate for Silver Creek Pond exceeds that of the estimated annual maintenance cost for the fishery at $3,000. Items and activities considered in the estimated annual cost to maintain the Silver Creek Pond fishery include dam inspection (every 5 years at $1,500), staff checks twice a year ($100 in transportation cost), and annual fish stocking (450 fish x $5.36 per fish). The net gain from maintaining the Silver Creek Pond Brook Trout fishery is estimated at $3,800 annually. For a small remote stocked trout lake, Silver Creek Pond is providing a return on investment and more importantly value to the public.

Management Direction

Brook Trout stocking has occurred since 1933 at this location and has remained consistent through the years. The biological, chemical, and physical characteristics of Silver Creek Pond have offered suitable conditions for Brook Trout at an early life stage to be stocked with success. Spring and fall fingerling Brook Trout provided an acceptable fishery at a low cost; however, the change to yearlings was an adjustment without any additional changes in hatchery production. The use of yearlings should be evaluated and whether they are necessary to maintain the fishery at Silver Creek Pond. Additionally, natural reproduction has been documented in multiple surveys since 2004. The contribution from wild fish has not been formally investigated and would be important to understand. Silver Creek Pond should continue to be managed as a Brook Trout fishery under Type-A regulations. The following should be prioritized for Silver Creek Pond when considering management actions:

1. Maintain the Brook Trout fishery through stocking while allowing natural reproduction to supplement the population.

2. Determine which Brook Trout life stage is appropriate for stocking at Silver Creek Pond. Evaluate whether yearlings are necessary or keep spring fingerlings in an alternate year capacity.

3. Continue to monitor and administer necessary actions to control beaver activities in the pond to avoid significant impacts to dam functionality.

4. Maintain the dam for fishing purposes.

References

Michigan Department of Environment, Great Lakes, and Energy. 1994. Natural Resources and Environmental Protection Act (451-1994-III-1-Inland Waters) Chapter 324. Part 315: Dam Safety.

U.S. Fish and Wildlife Service and U.S. Census Bureau. 2011. National Survey of Fishing, Hunting, and Wildlife-Associated Recreation - Michigan.

Wehrly, K. E., D. B. Hayes, and T. C. Wills. 2015. Status and trends of Michigan inland lake resources, 2002-2007. Michigan Department of Natural Resources, Fisheries Report 08, Lansing.

Table 1.- Numbers, lengths, and mean growth indices for fish species collected during the S&T survey on Silver Creek Pond, Luce County in October 2016. Fish were captured using large- and small- mesh fyke nets.

Species	Number	Percent by number	Length range (inches)	Average Length (inches)	Percent legal[1]	Growth Index[2]
Brook Trout	108	95.6	3-16	10.0	44	-1
Mottled Sculpin	3	2.6	3-4	3.8	-	-
Bluntnose Minnow	1	0.9	2-2	2.5	-	-
Brook Stickleback	1	0.9	1-1	1.5	-	-
Total	113	100				

[1] Legal minimum size for Brook Trout is 10 inches.

[2] Average deviation from the statewide average length at age. Mean growth indices <-1 indicate below average growth, indices between -1 and +1 indicate average growth, and indices >+1 indicate growth is faster than statewide average.

Table 2.- Summary of Silver Creek Pond, Luce County catch per unit effort (CPUE) of Brook Trout captured during netting surveys from 1983 to 2016. Total number of Brook Trout captured in survey indicated by "N", "Brook Trout CPUE" is for all Brook Trout captured in survey, and "CPUE ≥ 15 inches" is for Brook Trout 15 inches or greater captured in survey.

Survey Month	Survey Year	Effort (net nights)	Gear	N	Brook Trout CPUE	CPUE ≥15 inches
September	1983	3	Small Mesh Fyke	44	14.7	0
May	1988	3	Small Mesh Fyke	5	1.6	0
August	1994	3	Small Mesh Fyke	33	11	0.67
May/June	2000	8	Small and Large Mesh Fyke	46	5.8	0.63
April	2010	8	Small and Large Mesh Fyke	122	15.3	2
October	2016	9	Small and Large Mesh Fyke	108	12	1.4

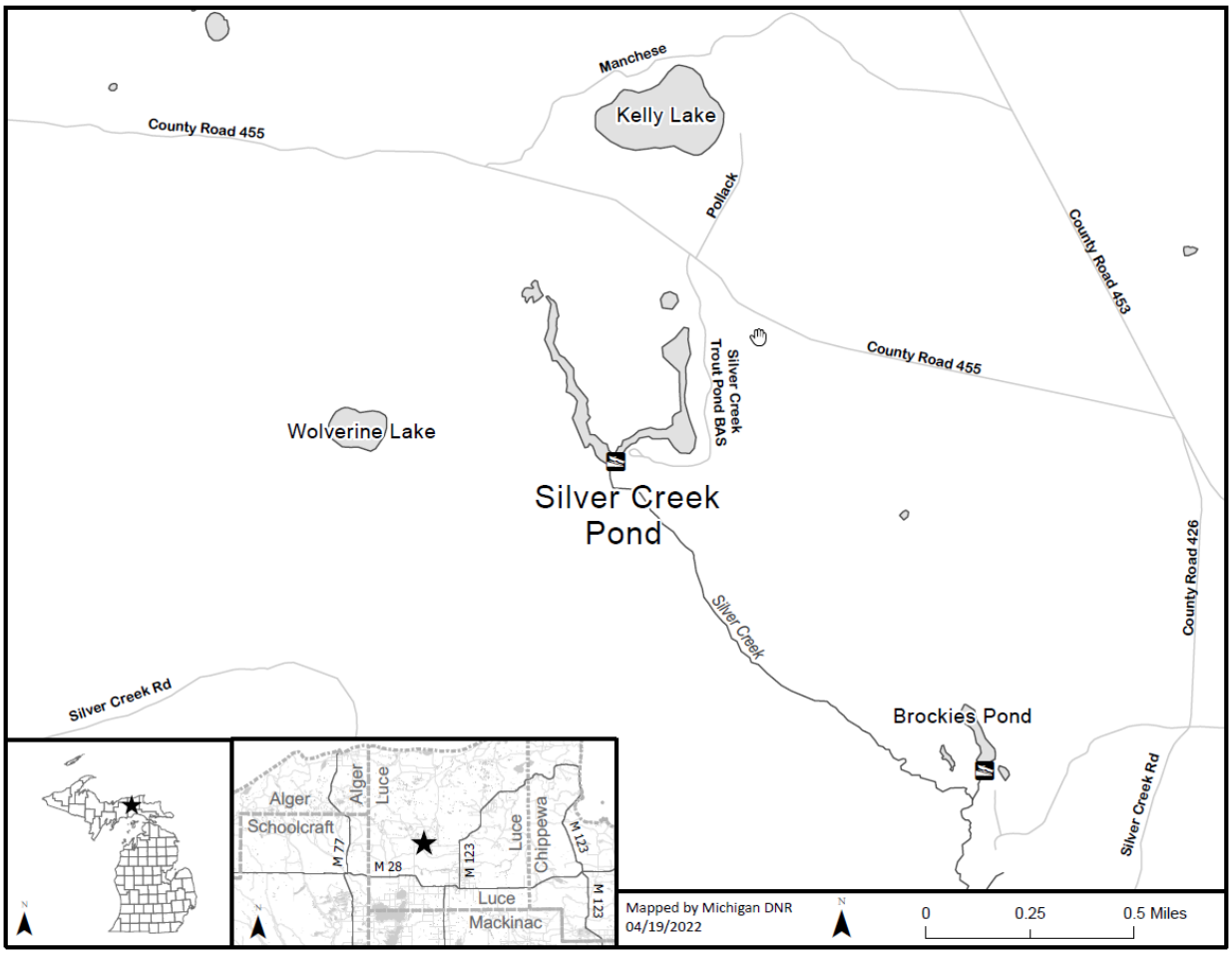

Figure 1.- Location map for Silver Creek Pond, Luce County.

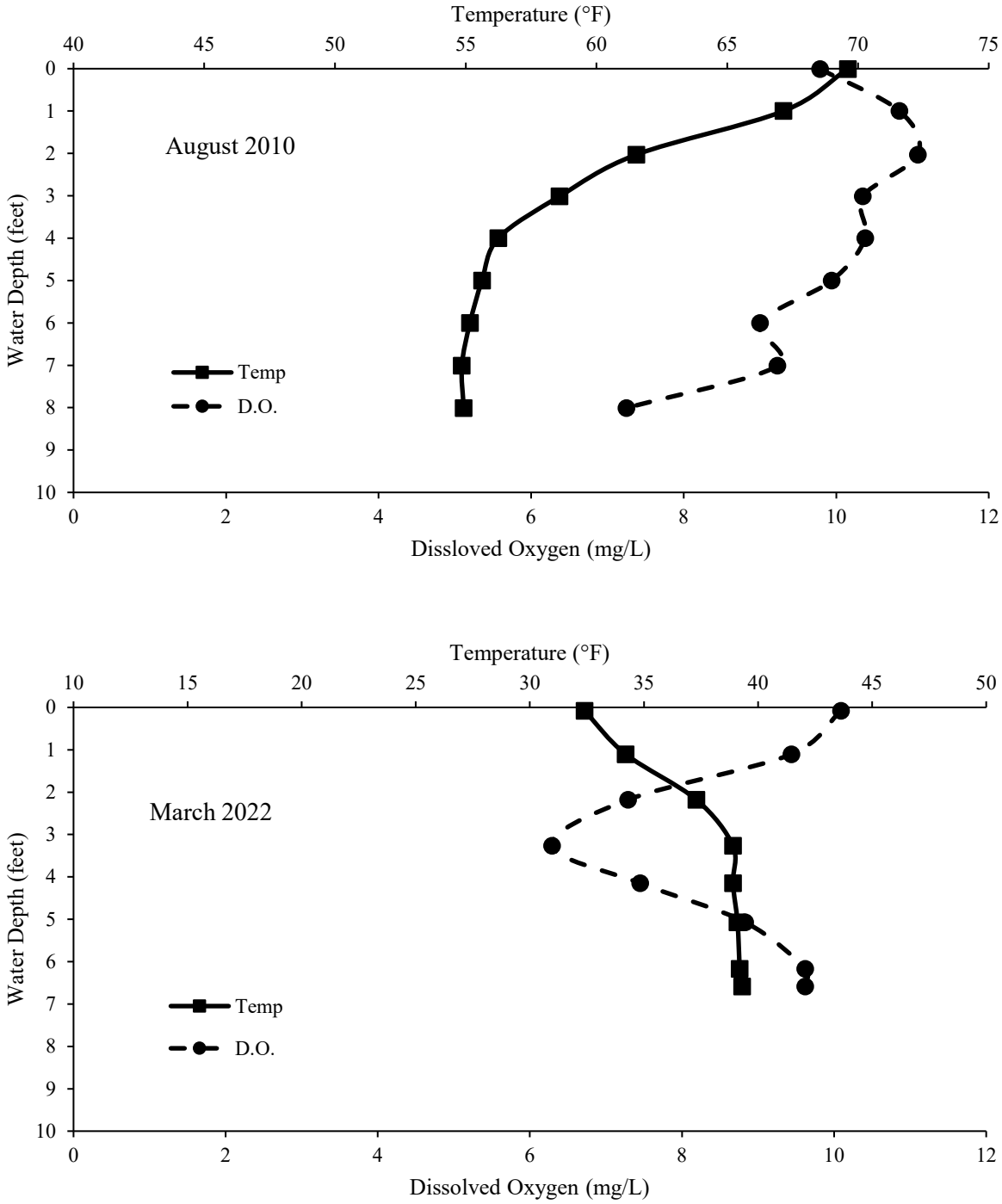

Figure 2.- Limnological profiles for Silver Creek Pond, Luce County conducted in August 2010 and March 2022.

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