Long and Rattalee Lake

Oakland County, T4N, R7-8E; Sections 1, 7

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Environment

Long Lake and Rattalee Lake are glacial origin kettle lakes located in the headwaters segment of the Shiawassee River watershed and comprise part of the chain of lakes through which the upper Shiawassee River flows (Figure 1). Both lakes are in northwestern Oakland County, Michigan approximately 17 miles northwest of Pontiac with Long Lake located in Springfield Township and Rattalee Lake located in Rose Township. Downstream dams in Holly, Fenton and Byron have prevented Great Lakes fish from reaching this portion of the watershed for over 100 years. However, since 2009, dams further downstream in Chesaning, Shiatown, and Corunna have been removed and expanded the connectivity of the Shiawassee River.

Long Lake is approximately 42 acres in surface area with a maximum recorded depth of approximately 40 ft. Rattalee Lake is approximately 48 acres in -surface area with a maximum recorded depth of approximately 45 ft. Both lakes feature steep drop offs within 20 feet of shore and contain very little shallow water or shoal habitat in the littoral zones. The substrates are primarily marl with occasional pockets of silty organic material. Emergent vegetation is comprised mainly of Sedges, Bulrush, and Yellow Pond Lily. Submergent vegetation includes an algae in the Chara genus, Milfoil, and invasive Starry Stonewort algae.

The landscape context surrounding these lakes is typical of the Jackson interlobate ecoregion, with rolling uplands vegetated by Oak and Hickory forest types, and the riparian corridor containing groundwater influenced wetlands such as Tamarack swamps and prairie fens. Both lakes have extensive wetlands along the shoreline, with Long Lake being surrounded by one of the largest and highest quality prairie fens in Michigan. In addition to the buffering effect these wetlands have on maintaining water quality, prairie fens discharge cold, alkaline water into the lake through various seeps and rivulets observable along the shoreline. The upper Shiawassee River also has a considerable influence on these lakes where the inlet and outlet zones are located and facilitate sediment and nutrient transport through the lakes.

The upper Shiawassee River corridor is a biodiversity hotspot and provides habitat for numerous rare species. Notable wildlife species known to occur in the upper watershed include Mudpuppy, Blanding's turtles, Eastern Massasauga Rattlesnake and Poweshiek Skipperling. The presence of large high quality natural areas and rare wildlife species has guided conservation planning, protection, and management decision-making for decades.

There is very little development along the shorelines of Long and Rattalee lakes, with only one dock structure on Long Lake and three dock structures on Rattalee Lake (Figure 2). The natural shoreline and limited development in the uplands give a very `up north' feel to these two lakes that are within a rapidly developing area of Oakland County. Fortunately, Long Lake is largely surrounded by a Springfield Township park (Shiawassee Basin Preserve), and Rattalee Lake is surrounded entirely by private land

held in large tracts. Because the lakes are highly undeveloped and over 0.25 miles from the nearest road, access is best obtained by launching at road/stream crossings and using the river to float in. Paddlesport angling is a growing recreational pursuit, and the limited access and remote feel of these lakes provide an opportunity for adventurous anglers to enjoy a unique experience.

History

There is little historical information on the fisheries of Long Lake or Rattalee Lake. Fisheries Division had never sampled these lakes in the past, owing largely to the degree of difficulty in accessing them. The earliest account available for Long Lake was from 1968, when a report was commissioned by the Oakland County Planning Commission to describe the area surrounding Long Lake as consideration for the development of a recreation area. This report by Karl D. Bailey describes Long Lake as a spring fed "two-story lake" suitable for rainbow trout planting. It is unclear if trout were ever stocked but if so, none are known to persist today.

In 2019 and 2021, qualitative assessments were conducted on segments of the Shiawassee River and the littoral zone of Davis Lake which are upstream of Long Lake (https://www.springfield-twp.us/departments/natural_resources/guides_studies.php). These surveys were done in advance of planned stream restoration projects to provide a baseline of pre-project conditions and assessed the fish, macroinvertebrates, mussels, habitat, and water quality in these reaches between Long Lake and the Davisburg Mill Pond Dam. The fish sampling was conducted using a backpack electrofishing unit and documented populations of numerous common fish typical of warmwater stream headwaters, including Rock Bass, Yellow Bullhead, Largemouth Bass, Bluegill, Grass Pickerel, Rainbow Darter, and Common Shiner. Interestingly, the non-native Oriental Weatherfish was also documented in this stretch and a larval phase Mudpuppy (an amphibian listed as a Species of Special Concern) was also captured. The mussel survey documented a state special concern mussel species, the Rainbow Mussel among several other common mussel species. It is likely the stream segments of the Shiawassee River provide important spawning and nursery habitat for the fish of Long Lake and Rattalee Lake and provides a corridor for seasonal movements.

Also in 2021, a fish survey of the littoral zone of Davis Lake was conducted by staff and volunteers from the group Friends of the Rouge (https://www.springfield-twp.us/departments/natural_resources/guides_studies.php). This survey was done using a 12-foot seine and documented many of the same common gamefish but also included forage fish such as Least Darter, Central Mudminnow and Blackchin Shiner.

Current Status

A discretionary survey for Long Lake occurred from September 14 to September 16, 2022, and Rattalee Lake was sampled from September 27 to September 28, 2022. The objective for each survey was to determine what fish species are present in the lake. Undeveloped access, narrow littoral zones, and steep contours limited the types of gear to experimental and straight-run gill nets. Multiple 100-ft and 125-ft gill nets were stratified by basin within each lake (Table 1). Only experimental gill nets set along the bottom were used in Long Lake (total effort = 8 net-nights). Both experimental (total effort = 3 net-nights) and straight-run (total effort = 1 net-night) gill nets were used in Rattalee Lake. Experimental gill nets were set along bottom, while the straight-run gill net was suspended 4 ft off the bottom. All fish captured were identified to species and measured for total length (TL; inch group). Additionally, a multi-

probe handheld sonde was used to determine if a thermocline was present. A vertical profile of the lake documented water temperature and dissolved oxygen concentration from the surface to the bottom.

Across the two systems a total of 88 fish representing 11 different species were collected during the surveys (Table 2). Interestingly, both lakes had eight species captured, and all three thermal guilds (e.g., warm-, cool-, and cold-water) represented. Overall, 7 of the 11 species collected are typically found in warm rivers and lakes (Table 2). In general, the fish communities in each lake were comprised of species with similar habitat and thermal requirements. A variety of panfish were captured between the two systems including Black Crappie, Bluegill, and Yellow Perch (Table 2). Largemouth Bass, Longnose Gar, and Northern Pike were the top predator species collected (Table 2). Cursory observations suggest panfish, Largemouth Bass, and Cyprinid sp. were abundant in the Shiawassee River between Long Lake and Rattalee Lake. Furthermore, Cisco were collected in both systems. All the Cisco captured in both systems were sexually mature adults and ranged in size from 7-13 in TL. Fewer Cisco were captured in Long Lake (n = 6) than Rattalee Lake (n = 29; Figure 3).

A limnological lake profile and Secchi depth were collected in both lakes during their respective week of sampling. Long Lake was sampled one week earlier than Rattalee Lake and this likely influenced the surface water temperature. Long Lake was 71°F at the surface on September 15, 2022, while surface water temperature was 62°F at Rattalee Lake on September 27, 2022. Both lakes were stratified at the time of sampling and had low (< 3 ppm) dissolved oxygen (DO) concentrations in the bottom 5-10 ft of water (Figure 4). The equation developed by Jacobson et al. 2008 was used to determine where DO fell below the suspected lethal limit for Cisco in both systems based on the thermal profile. Suitable DO concentrations were detected across the range of temperatures observed in Long Lake up to ~27 ft and up to ~33 ft in Rattalee Lake (Figure 4). Furthermore, Secchi disk readings were approximately 15 ft in both systems.

Analysis and Discussion

Long Lake and Rattalee Lake still have the conditions of "two-story lakes" as described by Karl D. Bailey in 1968, supporting both warm and cold water species. Warm water species like bass and panfish prefer the shallower, vegetated areas along the littoral zone and tolerate elevated temperatures during summer. Data from both systems suggest the pelagic areas provide adequate DO at greater depths to support Cisco, a true cold water species. Intermediately, Northern Pike, a cool water species, use the shallow vegetation for spawning but prefer deeper, colder water during summer. Given the limited number of gear types used and short survey timeframe it is likely not all species present in these systems were captured. However, this snapshot does provide some coarse insight about the fish community present and can serve as a baseline dataset for future surveys.

Documenting the presence of Cisco in these systems was a significant finding. Cisco are a state threatened species with a long history of habitat degradation and local extirpation. Latta (1995) determined Cisco were known to exist in 153 lakes in Michigan but described populations were believed to be stable in only 80 of those lakes. They go on to state "All [Cisco] lakes in Michigan should be protected from eutrophication and any proposed fish introductions should be evaluated." Presumably, the Cisco populations in Long Lake and Rattalee Lake have persisted through time due to the lack of development along the shore. Each lake is estimated to have less than 5% of the shoreland disturbed, but around 40% of their watershed disturbed according to the Midwest Glacial Lakes Partnership Conservation Planner (http://ifrshiny.seas.umich.edu/mglp/).

Management Direction

In the case of Rattalee and Long Lakes, protecting the existing conditions of these lakes and their riparian zones should be the primary fisheries management direction. Glacial kettle lakes and their fisheries are increasingly under pressure from shoreline development, habitat degradation and eutrophication in Southeast Michigan. Despite these pressures, Long Lake and Rattalee Lake have persisted within this region as high-quality glacial kettle lakes, evidenced by a diverse fish community. Furthermore, the presence of a well oxygenated cold-water layer that supports the Cisco population and the impressive riparian wetlands that surround the lakes contribute to the integrity, functions, and exemplary condition of the headwaters of the upper Shiawassee River.

Michigan's Wildlife Action Plan lists Cisco as a species of greatest conservation need and identifies two goals for inland Cisco lakes: 1) protect known populations of inland Cisco and 2) improve Cisco status from threatened to special concern (Derosier et al. 2015). Fisheries management and local conservation should focus on Cisco with the understanding that improvements will benefit several species and habitats in the area.

Several river restoration projects have been planned in recent years, resulting in the removal of the Trout Pond Dam at the DNR's Davisburg State Game Area property in 2022 and the upcoming removal of the Davisburg Mill Pond Dam scheduled for 2023. These projects will enhance aquatic connectivity in the upper watershed above Long and Rattalee Lakes. Furthermore, Shiawassee River connectivity is listed as a high priority within Fisheries Division's Priority Habitat Conservation Projects list.

One major environmental impact at Long Lake is the presence of a large and steeply eroding ditch along the north shore of the lake. This ditch and associated berm were created in the 1950s to install a pump system for watering livestock in the adjacent uplands. Unfortunately, these activities disrupted the hydrology of the wetland and destabilized the highly erodible fen soils, resulting in a ditch that at present is approximately 150 ft long, 60 ft wide and 12 ft deep, with an overall drop of 40 ft across the site. The sediment from this ditch is being deposited into Long Lake and a sediment delta at the outlet of the ditch has formed. Designing and implementing a mitigation strategy for this unnatural erosion is important for upland species as well as Cisco and the aquatic community.

Developing a watershed management plan and delineating the catchment areas for Long Lake and Rattalee Lake would help prioritize where protection and rehabilitation should take place. While the shoreland at both lakes is primarily undisturbed, additional actions can be taken to ensure it remains that way in the future. Conservation easements should be pursued around both lakes to limit future development.

The status of these fisheries will continue to be monitored into the future with additional fish surveys and water quality measurements. Given the upcoming restoration projects in areas upstream from these lakes, the 2022 survey work will serve as a useful snapshot for comparative analysis in the future. Currently, no stocking or regulation changes are being considered. Both Long Lake and Rattalee Lake offer anglers a quality fishing opportunity with the current species available. Additionally, the presence of Cisco does not warrant proposing stricter regulations than the general statewide regulations.

References

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Latta, W. C. 1995. Distribution and abundance of Lake Herring (Coregonus artedi) in Michigan. Michigan Department of Natural Resources, Fisheries Research Report 2014, Ann Arbor, Michigan.

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Table 1. Gear specifications for the 2022 fish community surveys in Long Lake and Rattalee Lake, Oakland County, Michigan.

Gear Type	Stretch Mesh Size (in)	Panel Dimensions (length x width, ft)	No. of Panels
Experimental gill net	1.5, 2.0, 2.5, 3.0, 4.0	25 x 6	5
		Total Length (ft)	**Width (ft)**
Straight-run gill net	1.5	100	4

Table 2. Species, number, length range (in group), presence, and thermal guild for all fish captured during the 2022 survey in Long Lake and Rattalee Lake, Oakland County, Michigan.

Species	Number	Length Range (in group)	Present		Thermal Guild
			Long Lake	Rattalee Lake	
Black Crappie	3	6-8	X		Warm
Bluegill	17	4-7	X	X	Warm
Brown Bullhead	3	6-13	X		Warm
Cisco	35	7-13	X	X	Cold
Lake Chubsucker	1	6-6	X		Warm
Largemouth Bass	10	6-11	X	X	Warm
Longnose Gar	1	34-34		X	Warm
Northern Pike	11	20-31	X	X	Cool
Pumpkinseed	1	6-6		X	Warm
Yellow Bullhead	1	8-8		X	Warm
Yellow Perch	5	5-8	X	X	Cool
Total	88				

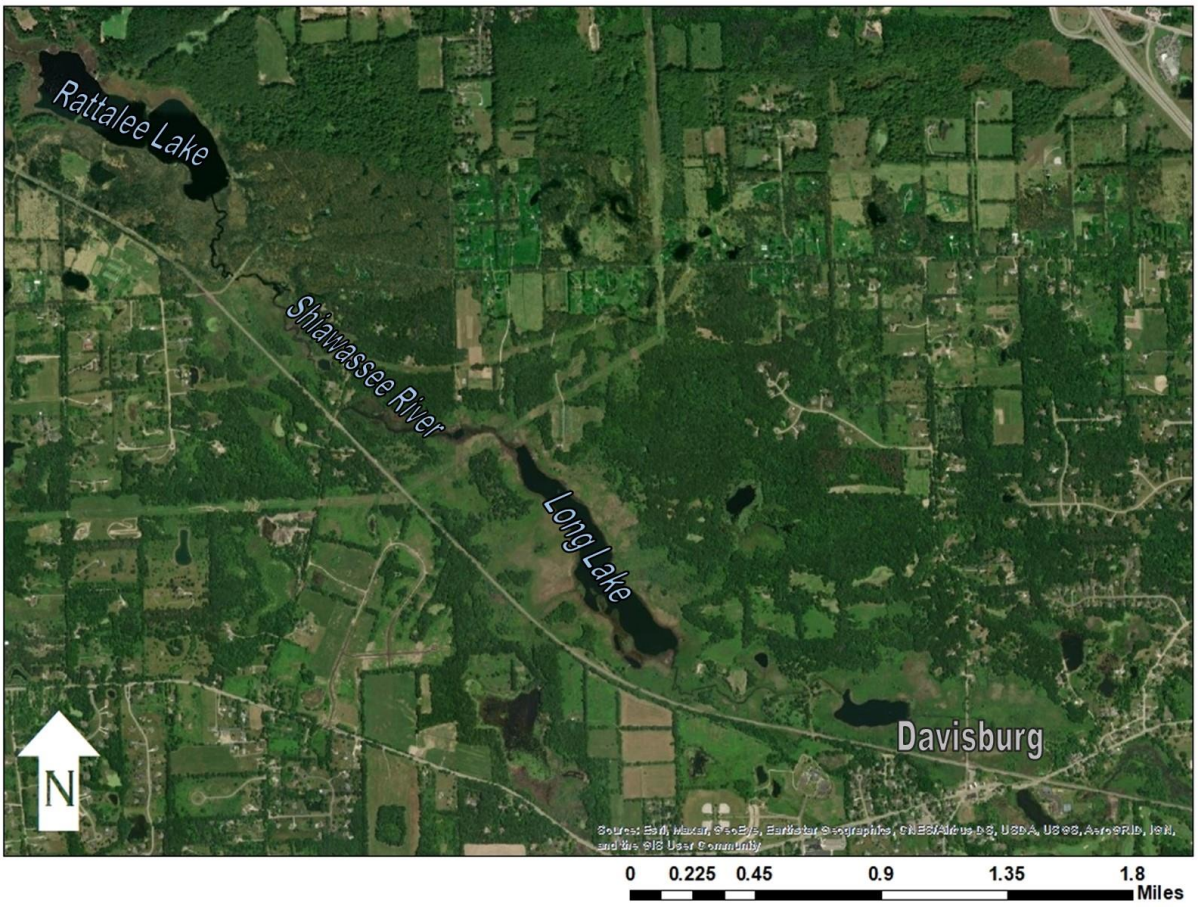

Figure 1. Upper Shiawassee River and select kettle lakes near Davisburg, Oakland County, Michigan.

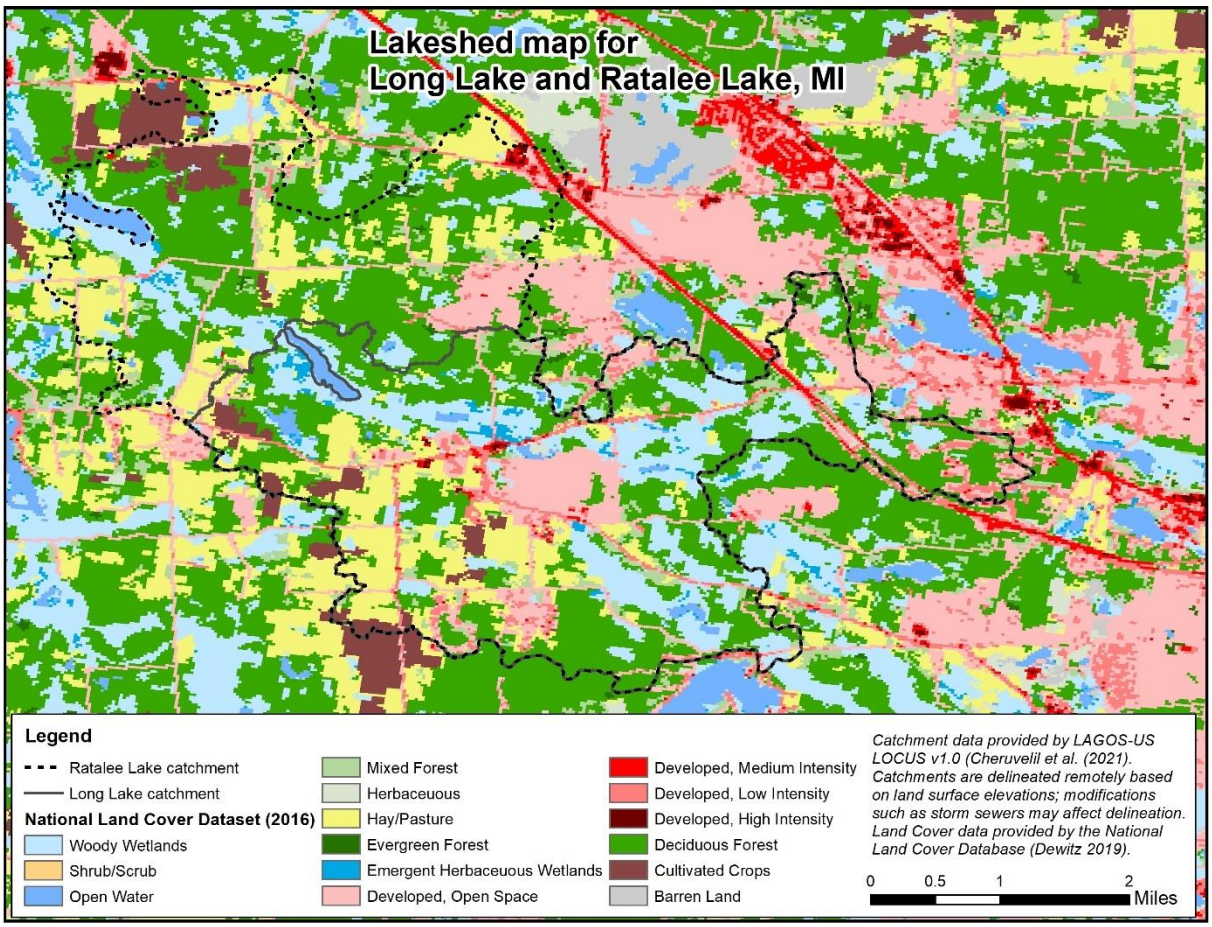

Figure 2. Land cover within the network catchment for Long Lake and Rattalee Lake, Oakland County, MI.

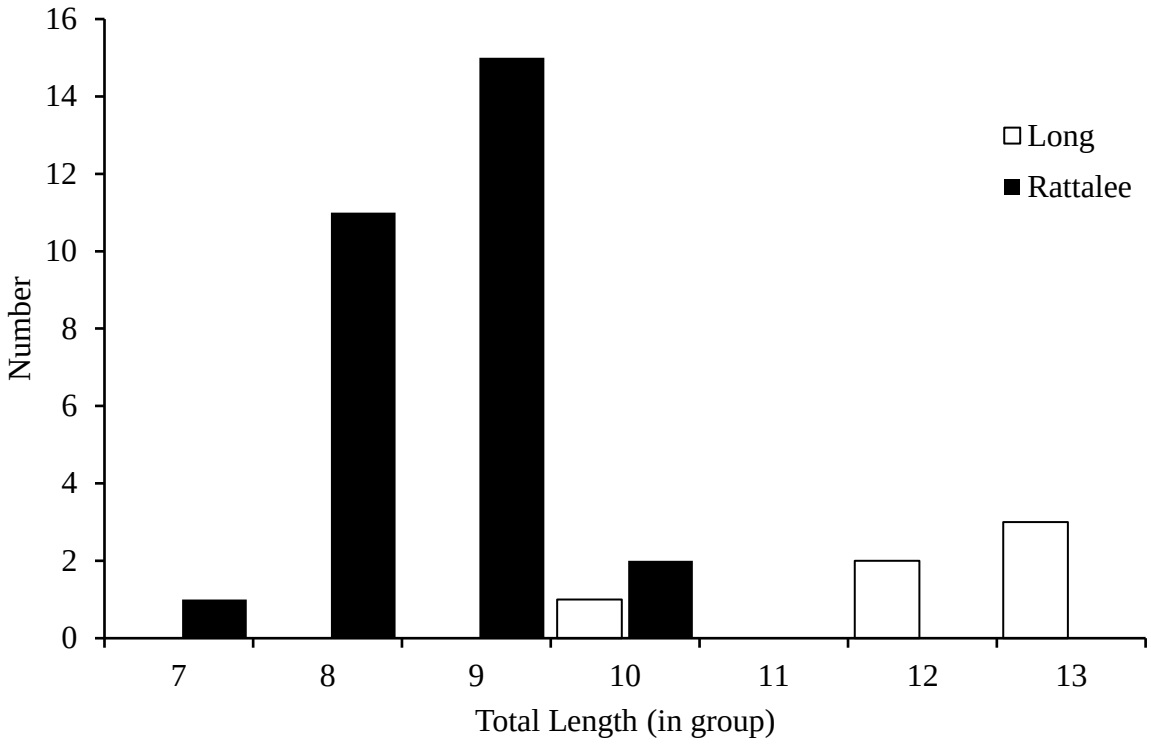

Figure 3. Length frequency of Cisco captured in Long Lake and Rattalee Lake, Oakland County, Michigan during September 2022.

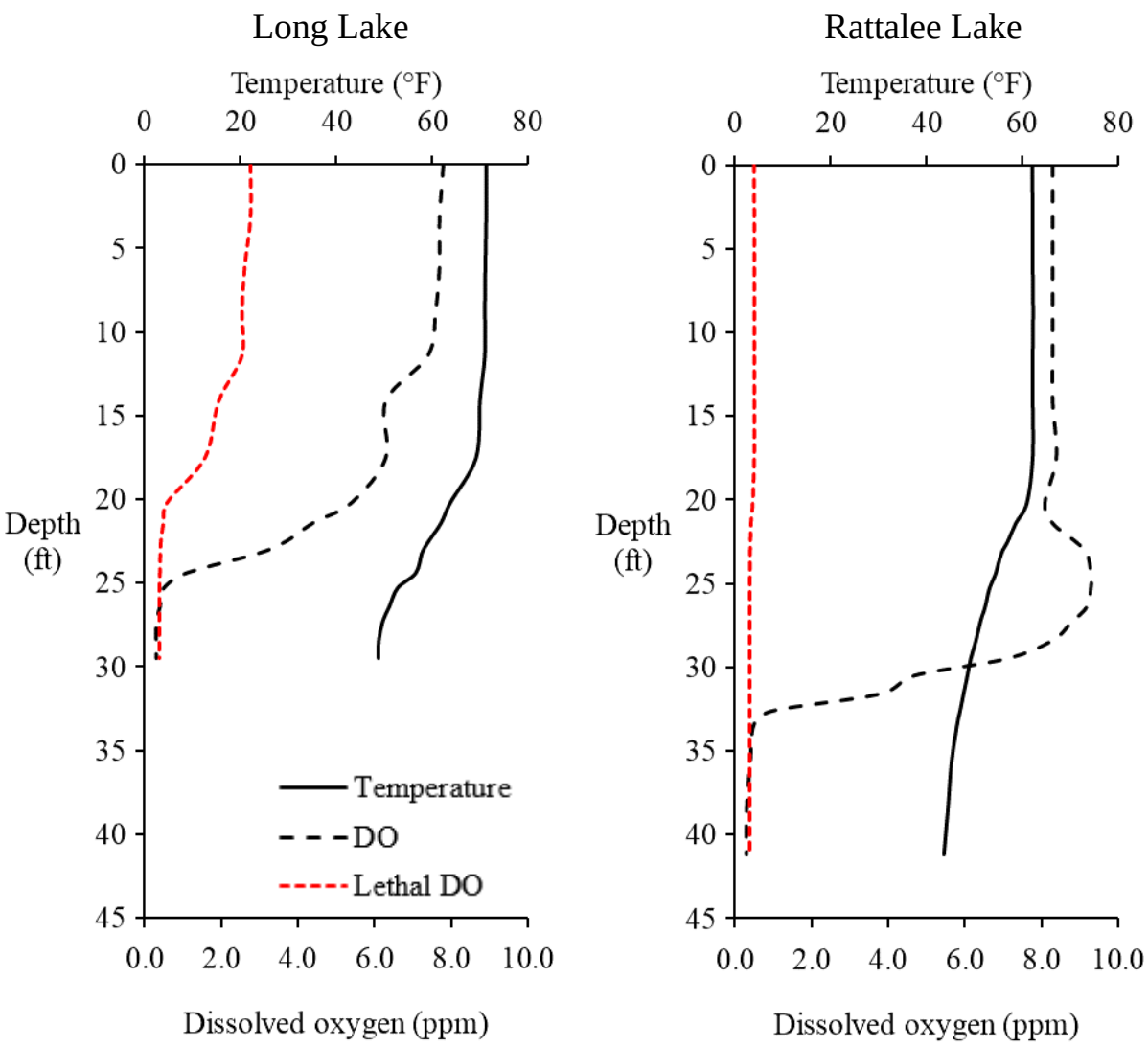

Figure 4. Temperature (°F), dissolved oxygen concentration (DO; ppm), and the estimated minimum DO required for Cisco across the temperature profile using the equation developed by Jacobson et al. (2008) for Long Lake and Rattalee Lake, Oakland County, Michigan.

Received August 16, 2023; September 22, 2023

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Darren Kramer, External Reviewer

John Bauman, SFR Facilitator

John Bauman, Desktop Publisher and Approval