Dickinson Lake
Oakland County, T05N R07E Sec. 30
Swartz Creek Watershed, Last Surveyed 2024

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Environment

Dickinson Lake is located in Seven Lakes State Park approximately 2 miles northwest of the Village of Holly in Oakland County, Michigan (Figure 1). Dickinson Lake lies within the Swartz Creek sub-basin of the Flint River Watershed. Its principal outlet (unnamed) exits Dickinson Lake on the north shore flowing to Big Seven Lake which discharges into West Branch Swartz Creek. Small seepage inlets enter Dickinson Lake from Spring and Mud lakes to the west, and another small unnamed inlet enters from the south shore. Dickinson Lake lies in a depression of land within Seven Lakes State Park. Vegetation on the uplands is characterized as oak-hickory forest. The immediate shoreline of Dickinson Lake is characterized as marsh with a succession of bulrush and tamarack growth toward the upland. This marsh fringe has been documented to provide important habitat for the Eastern Massasauga Rattlesnake *Sistrurus catenatus* and Northern Water Snake *Nerodia sipedon sipedon* in addition to other reptiles, amphibians, and aquatic shore birds (Michigan Natural Features Inventory 2026). The entire shoreline is undeveloped except for the Michigan Department of Natural Resources (DNR) boat access site. The access site is paved and has a barrier-free design. A floating fishing pier is also located adjacent to the launch site.

Dickinson Lake is a 44 ac lake characterized as a small (< 100 ac), deep (thermally stratified), lake supporting warm- and cool-water fish species. Dickinson is a marl lake. Marl lakes are characterized by relatively high pH and alkalinity concentrations. In these lakes, calcium carbonate ($CaCO_3$) precipitates out of solution forming crusty white mineral deposits (marl) on all surfaces including aquatic plants. Nutrients such as phosphorus bind with marl and are unavailable for use by phytoplankton. As a result, marl lakes tend to be very clear because of limited primary production and tend to support fewer fish and other biota compared with other lakes having relatively high alkalinity (Wehrly et al. 2015). Consequently, Dickinson Lake has aqua blue color, the bottom substrate is dominated by clay and marl, and submerged structures in the lake, like vegetation and wood, are covered in calcium carbonate. Dickinson Lake was part of an old marl mining operation, and the bottom contour reflects that with a large deep basin and steep sides. The lake reaches a maximum depth of 68 ft and approximately 25% of the lake is ≤ 10 ft deep (Figure 2).

The Dickinson Lake catchment area covers 395 ac (Figure 3). There are a variety of land cover types within the watershed, but the majority is forested (57%) or wetland (24%). Dickinson Lake is a unique inland lake in southeast Michigan because there is very little development along the shoreland. It is estimated that only 11% of the Dickinson Lake watershed and 14% of the Dickinson Lake shoreland are disturbed according to the Midwest Glacial Lakes Partnership Conservation Planner (Midwest Glacial Lakes Partnership 2019; Figure 3).

Fishery Resource

History
The original property that created Seven Lakes State Park came under DNR ownership in 1969. Originally, nine small dwellings were present around the lake. The dwellings were removed, and a boating access site was developed. Dickinson Lake has been surveyed many times, and previous DNR

survey reports indicate the fish community was comprised of Black Crappie *Pomoxis nigromaculatus,* Bluegill *Lepomis macrochirus*, Common Carp *Cyprinus carpio,* Largemouth Bass *Micropterus salmoides,* Northern Pike *Esox lucius,* and Yellow Perch *Perca flavescens.* A partial eradication project utilizing antimycin, a fish toxicant, was completed in 1973 to reduce overall abundance of the fish community and provide an opportunity to manage for trout. Dickinson Lake was managed primarily for trout up to 1985 and was annually stocked with trout during that time (Table 1). A survey of the trout population in 1983 found poor survival and stocking was subsequently stopped in 1985. Additionally, the 1983 survey indicated the fish community represented pre-antimycin status with small, slow growing Bluegill dominating the system. The fish community was again assessed in 1992, and Bluegill size-structure had improved with a strong presence of 7-inch fish. Management objectives for Dickinson Lake in the mid-1990s focused on providing a more diverse fishery and nonnative Redear Sunfish *Lepomis microlophus* were stocked for three years (Table 1). A 1998 stocking evaluation reported marginal survival by Redear Sunfish, and the stocking program was discontinued. Additionally, results from this survey suggested Bluegill size structure had declined.

Another fish community survey was completed in 2010. This survey found similar results to previous surveys with a fishery dominated by Bluegill. Overall abundance remained consistently low and growth rates for most species collected were below the statewide average. In 2011, the management objectives once again shifted, this time to focus on providing an inland Walleye *Sander vitreus* fishery in Dickinson Lake. Walleye were stocked every 2 years from 2011 to 2017, but Walleye survival did not meet management targets during an evaluation survey in 2017, and stocking was discontinued.

Current status of the fish community

Methods

The most recent survey for Dickinson Lake was a fish community survey completed May 13 to May 16, 2024. This survey utilized three large-mesh fyke nets, two small-mesh fyke nets, two experimental gill nets, and one trap net to capture a wide variety of the fish community (Wehrly et al. 2015). Total effort for the survey was nine net-nights for large-mesh fyke nets, four net-nights for small-mesh fyke nets, four net-nights for experimental gill nets, and three net-nights for trap nets. The purpose of this survey was to collect information on a range of fish species and size classes by using multiple gear types in different habitats. The objectives were to determine the fish species present and relative abundance, size-structure, and mean growth index for select sportfish species. Additionally, we determined the amount of residential development around Dickinson Lake.

All fish captured were identified to species and measured for total length (TL; inch group). For game species, the ages of up to 10 fish per inch group were estimated from scale and spine samples. To estimate age from scales, four to six scales were pressed onto acetate film and the impressions were viewed under a microscope. For estimating age from dorsal spines, a thin cross-section of the dorsal spine was cut using a Dremel grinding and cutting tool. Mineral oil was added to the section for clarity when viewed under a microscope. Mean growth indices were calculated as described by Schneider et al. (2000) for age groups represented by five or more fish.

Limnological data and shoreline features were also assessed in August 2024. Temperature and dissolved oxygen (DO) were collected using a multiprobe handheld sonde in the deepest part of the lake. Shoreline data were collected along 1,000 ft segments until the entire shoreline was surveyed. The number of dwellings, large (>2 boat slips) and small (1-2 boat slip) docks, submerged and partially submerged logs and large diameter tree limbs (≥3 in diameter, hereafter referred to as coarse woody material), and percent shoreline armoring were determined following methods described by Wehrly et al. 2015.

Results

A total of 829 fish representing 15 species were collected during this survey (Table 2). A variety of panfish were captured including Bluegill, Black Crappie, Green Sunfish *Lepomis cyanellus*, Hybrid Sunfish, Pumpkinseed *Lepomis gibbosus*, Redear Sunfish, Warmouth *Lepomis gulosus* and Yellow Perch. Bluegill were the most frequently captured panfish species in the survey, with individuals ranging from 1-9 in (mean TL = 4.7 in; Table 2). Over 30% of the 400 Bluegill captured were larger than 6 in (Table 2), which is the assumed minimum length at which anglers typically consider suitable for harvest. The mean growth index of Bluegill was -0.3, which suggests growth rates are similar to the statewide average, and the oldest individual captured was estimated to be ten years old. The Bluegill population in Dickinson Lake scored an "acceptable/good" rating using the Schneider Index for classifying Bluegill populations (Schneider 1990).

Redear Sunfish, the next most frequently captured panfish species in the survey, ranged in size from 4-9 in (mean TL = 7.1 in; Table 2). Almost 90% of the Redear Sunfish captured were above the angler-preferred 6 in minimum length for harvest (Table 2) but the mean growth index was -1.7, suggesting the population may be stunted, and the oldest individual captured was estimated to be twelve years old.

Largemouth Bass and Walleye were the top predators captured in Dickinson Lake. A total of 13 Largemouth Bass up to 15 in long (mean TL = 7.8 in; Table 2) were collected; only 15% of the fish exceeded the 14 in minimum size limit (Table 2). Too few Largemouth Bass were collected to calculate a mean growth index and make inferences about growth rates. One 21-inch Walleye was captured in the survey and was estimated to be ten years old.

A continuously recording (1-hr interval) temperature logger was deployed April 23, 2024 and retrieved October 2, 2024. The device was attached to a t-stake and submerged approximately 1 ft below the surface. July had the highest mean monthly surface temperature and the August 1, 2024 had the highest mean daily surface temperature (Figure 4).

Limnological parameters were measured August 22, 2024. A thermocline was developed at this time around 16 ft and dissolved oxygen concentration became limited (< 3 ppm) at depths greater than 34 ft (Figure 5). Additionally, a metalimnetic oxygen maximum was present in Dickinson Lake. Dissolved oxygen concentrations are typically highest and stable in the epilimnion then decrease significantly through the metalimnion and reach a low stable state in the hypolimnion for mesotrophic lakes with a thermocline present (Eberly 1964). The dissolved oxygen concentration in Dickinson Lake spiked up to 16 parts-per-million in the metalimnion. This unique phenomenon can occur under certain conditions. Phosphorus levels may be depleted in the epilimnion due to the amount of production that has already occurred during summer. This causes phytoplankton to migrate into the metalimnion to reach higher phosphorus levels. Production from phytoplankton in the metalimnion releases oxygen into the water and the oxygen is not able to dissipate due to the relative differences in water density across the temperature gradient from the epilimnion to the metalimnion (Wilkinson et al. 2015). Therefore, a local increase in dissolved oxygen concentration occurs.

Water chemistry sampling was completed at the same location as the temperature and dissolved oxygen profile. Total alkalinity was 188 mg/L, total nitrogen was 0.701 mg/L, total phosphorous was 0.005 mg/L, and the chlorophyll a concentration was 2.560 mg/L. The Secchi depth was 6 ft, indicating light penetration to 12 ft. The pH was 8.11 at the surface.

The natural shoreline of Dickinson Lake only has one small reach of development where the public boat launch is located. The site has a concrete pad, capable of launching small and medium-sized watercraft, and a seasonal dock. Nearshore vegetation was sparse along most of the littoral zone and

there were 41 pieces of coarse woody material along the 1.45 mi of shoreline (28/mi), which provide additional habitat.

Analysis and Discussion

The fish community of Dickinson Lake can be described as follows:

1. Panfish community dominated by Bluegill and Redear Sunfish with consistent reproduction and recruitment. Growth rates for Bluegill are near the statewide average while Redear Sunfish are long-lived but growing slowly.
2. Black Crappie, Yellow Perch, and other panfish are present at lower abundances.
3. Largemouth Bass relative abundance is low and overall predator abundance is low.
4. Productivity is low given the marl/clay characteristics and likely limits fish growth and abundance, especially abundance of larger predators like Walleye and Largemouth Bass.

The survey in Dickinson Lake captured 15 different fish species and is similar to the mean number of species captured in fish community surveys for other lakes within the Southern Lake Huron Management Unit (mean = 14.3) and statewide (13.8; Wehrly et al. 2015). However, most species present in relatively low abundances. The alkalinity levels in Dicksinson Lake were high (>141.5 mg/L), while the nutrient levels were low (total phosphorous <0.009 mg/L) when compared to lakes across Michigan (Wehrly et al. 2015). Dickinson Lake is a hardwater system, and this is consistent with a marl lake. The water quality characteristics likely limit fish growth and abundance and can limit the capacity of the lake to produce many larger predators. This is likely to explain why efforts to improve size structure and attempts to produce a Walleye fishery were unsuccessful.

The development around the Dickinson Lake shoreline was lower than expected for inland lakes in the Southern Lake Huron Management Unit (SLHMU). There were no dwellings along Dickinson Lake, and dwelling density was well below the SLHMU mean of 26 dwellings/mi. This trend was similar for dock density with only one present compared to the SLHMU mean of 19 docks/mi. Large woody material in Dickinson Lake (41/mi) was more abundant than the 12/mi mean for other SLHMU lakes and similar to the statewide mean (48/mi).

Management Direction

Future management ideas for Dickinson Lake include:

1. Protect undeveloped areas of the watershed.
2. Install new fishing pier for park visitors.
3. Creel survey.

The highest priority action recommended for Dickinson Lake is continuing to protect the undeveloped areas of the watershed. Additionally, installing a new fishing pier for park visitors would provide social benefits. No specific fisheries management actions are proposed for Dickinson Lake and no changes to fishing regulations are recommended. Natural recruitment is sustaining the fish community in this system, and no stocking efforts are recommended. However, an inland creel survey would be beneficial to determine how much fishing pressure occurs on the lake and to generate estimates of mortality for harvest-oriented species like panfish.

References

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Tables and Figures

Table 1. Stocking year, species, number, and life stage of fish stocked into Dickinson Lake, Oakland County, Michigan.

Year	Species	Number	Life stage
1974	Rainbow Trout	1,500	Yearling
1977	Rainbow Trout	2,200	Yearling
1978	Rainbow Trout	2,115	Yearling
1979	Rainbow Trout	2,000	Yearling
1979	Rainbow Trout	500	Adult
1980	Rainbow Trout	2,446	Yearling
1981	Rainbow Trout	650	Adult
1981	Brown Trout	350	Adult
1982	Rainbow Trout	4,400	Yearling
1983	Rainbow Trout	4,400	Yearling
1984	Rainbow Trout	4,300	Yearling
1985	Rainbow Trout	4,400	Yearling
1995	Redear Sunfish	6,000	Fall fingerling
1996	Redear Sunfish	5,000	Fall fingerling
1997	Redear Sunfish	5,769	Fall fingerling
2011	Walleye	4,477	Spring fingerling
2013	Walleye	2,280	Spring fingerling
2015	Walleye	3,276	Spring fingerling
2017	Walleye	5,572	Spring fingerling

Table 2. Species, catch, length range (inches), and average length (inches) for all species collected during 2024 survey in Dickinson Lake, Oakland County, Michigan. Percent of individuals above legal size or estimated acceptable size for harvest for select species collected. Harvestable size is assumed to be 6 in for Bluegill, Hybrid Sunfish, Pumpkinseed, Redear Sunfish and Warmouth, and 7 in for Black Crappie and Yellow Perch. Legal size for harvest is 14 in for Largemouth Bass.

Species	Catch	Length range (in.)	Mean length (in.)	Percent harvestable
Black Crappie	91	4-13	9.5	30
Bluegill	401	1-9	4.7	31
Bluntnose Minnow	43	1-2	2.5	--
Brook Silverside	1	3-3	3.5	--
Green Sunfish	13	4-7	6.2	69
Hybrid Sunfish	5	5-9	6.9	80
Iowa Darter	3	2-2	2.5	--
Largemouth Bass	13	2-15	7.8	15
Pumpkinseed	4	4-7	6.0	50
Redear Sunfish	206	4-9	7.1	91
Walleye	1	21-21	21.5	100
Warmouth	8	5-8	7.0	88
White Sucker	5	16-21	18.3	--
Yellow Bullhead	23	5-13	11.2	--
Yellow Perch	12	7-12	9.7	100

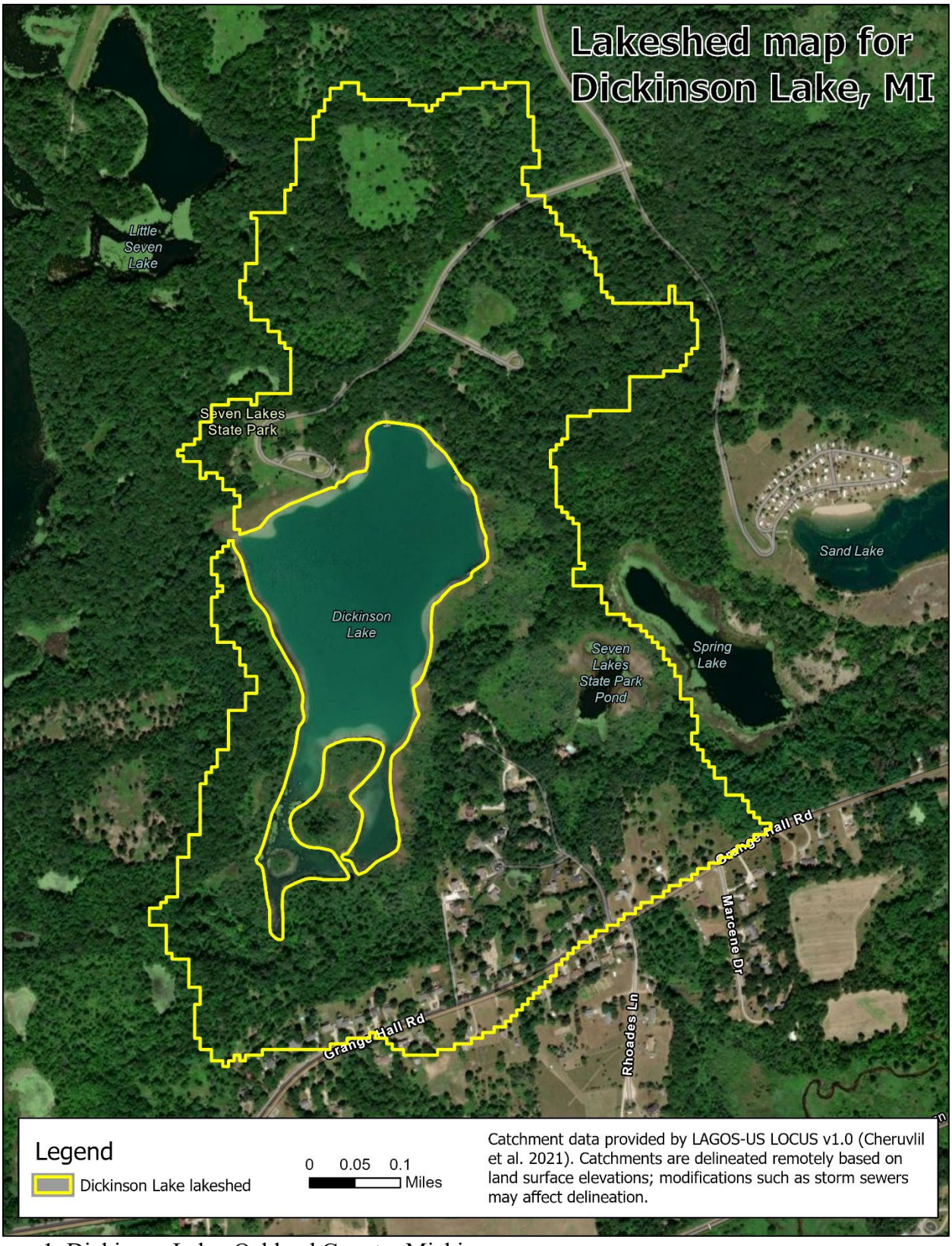

Figure 1. Dickinson Lake, Oakland County, Michigan.

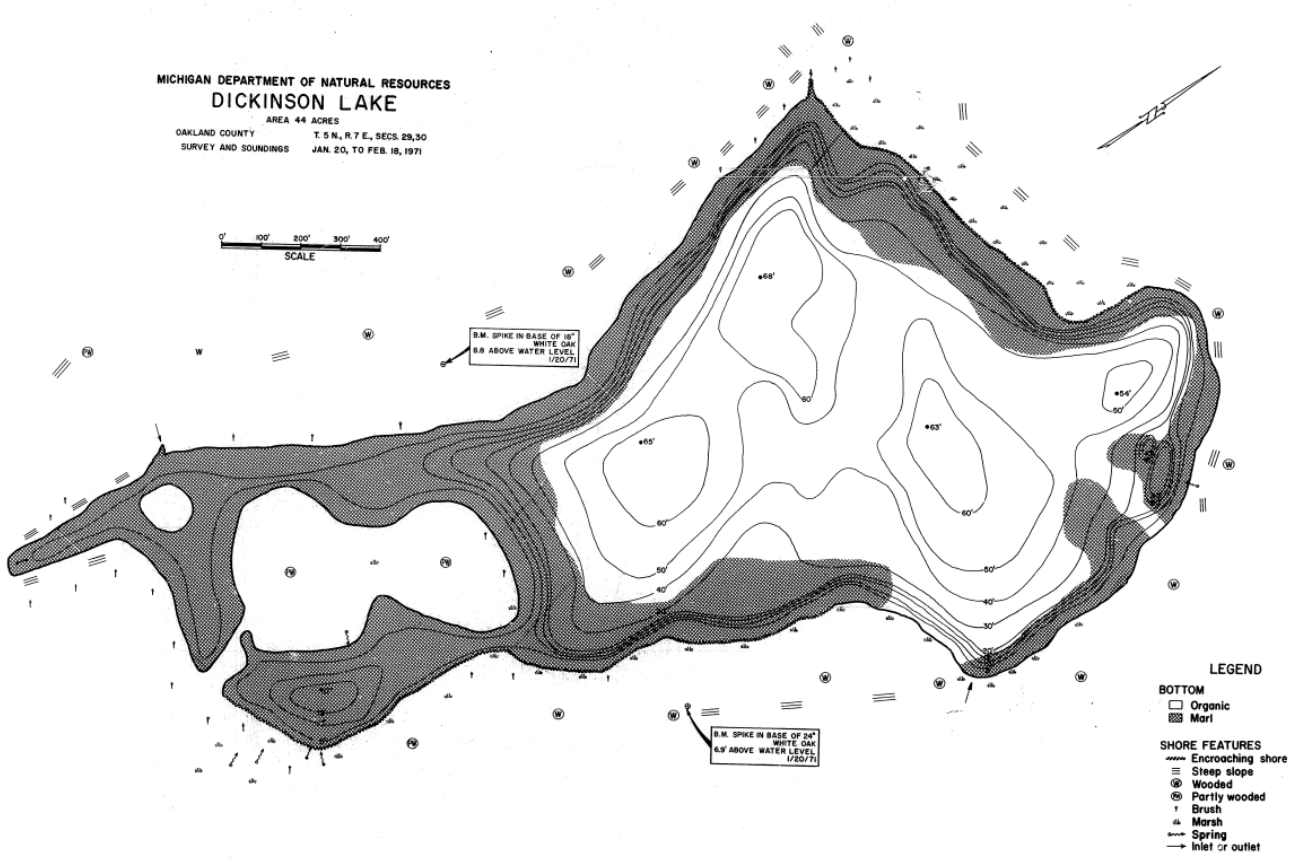

Figure 2. Dickinson Lake, Oakland County, Michigan bathymetric map.

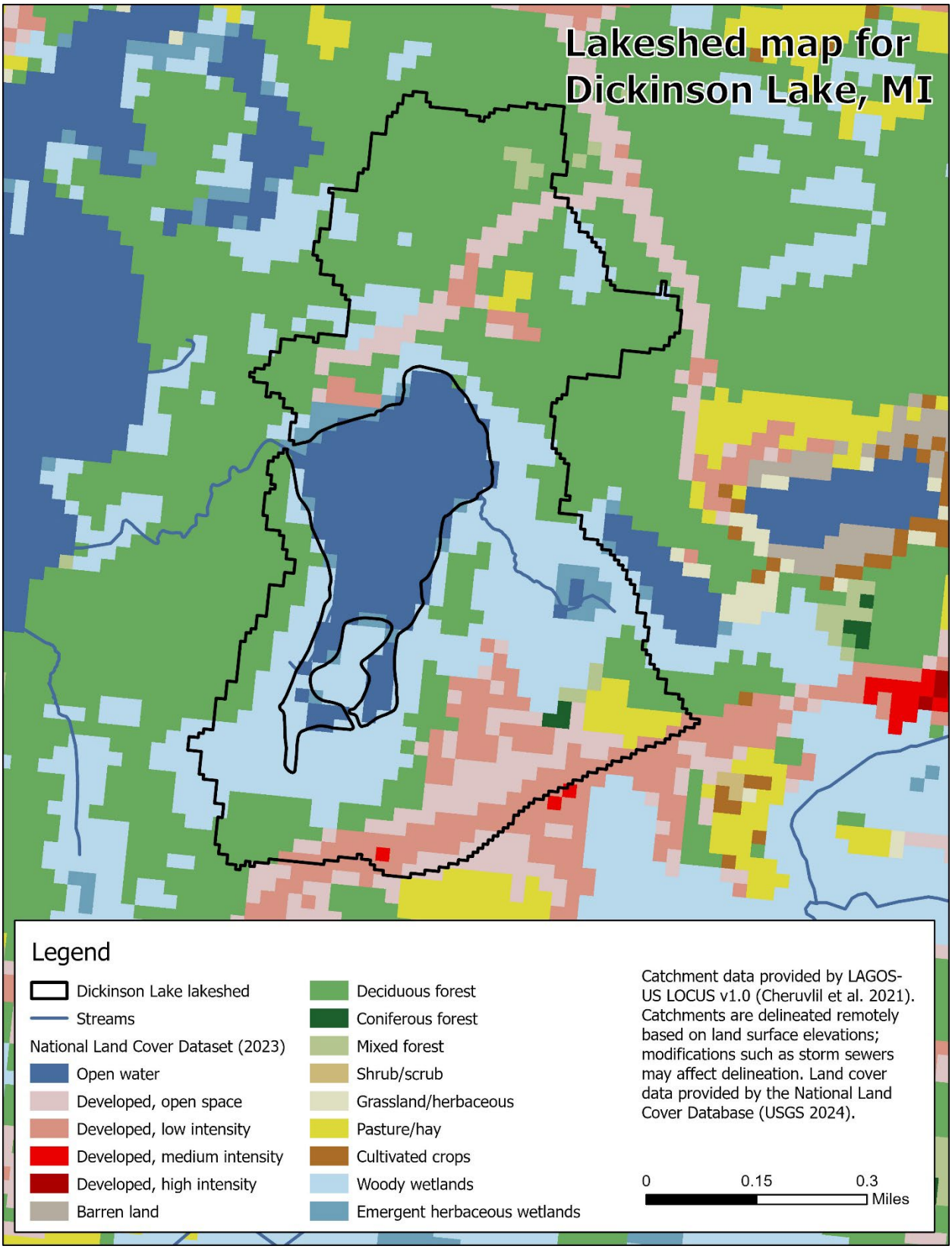

Figure 3. Land cover within the network catchment for Dickinson Lake, Oakland County, MI.

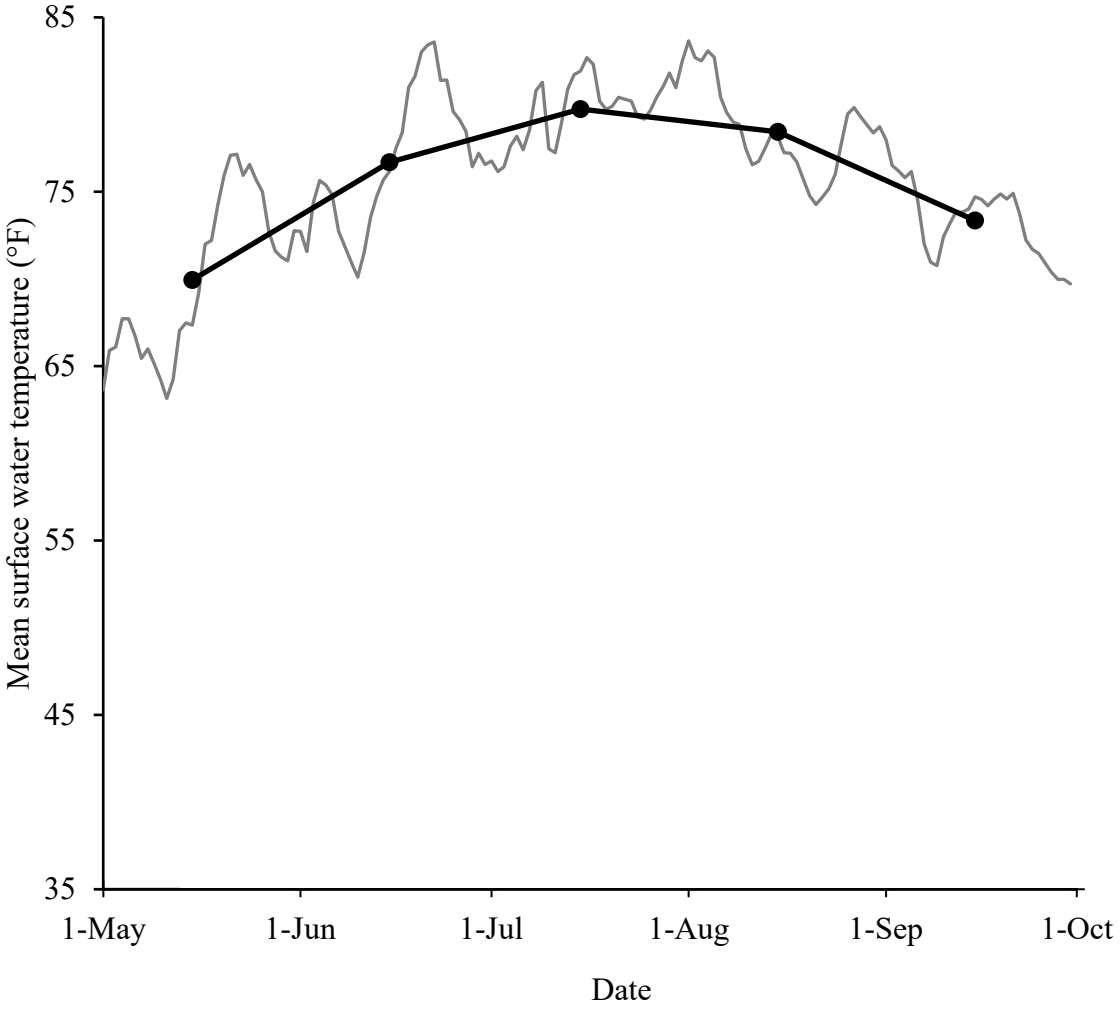

Figure 4. Mean daily (grey line) and mean monthly (black line) surface water temperature in Dickinson Lake, Oakland County, Michigan from May to October 2024.

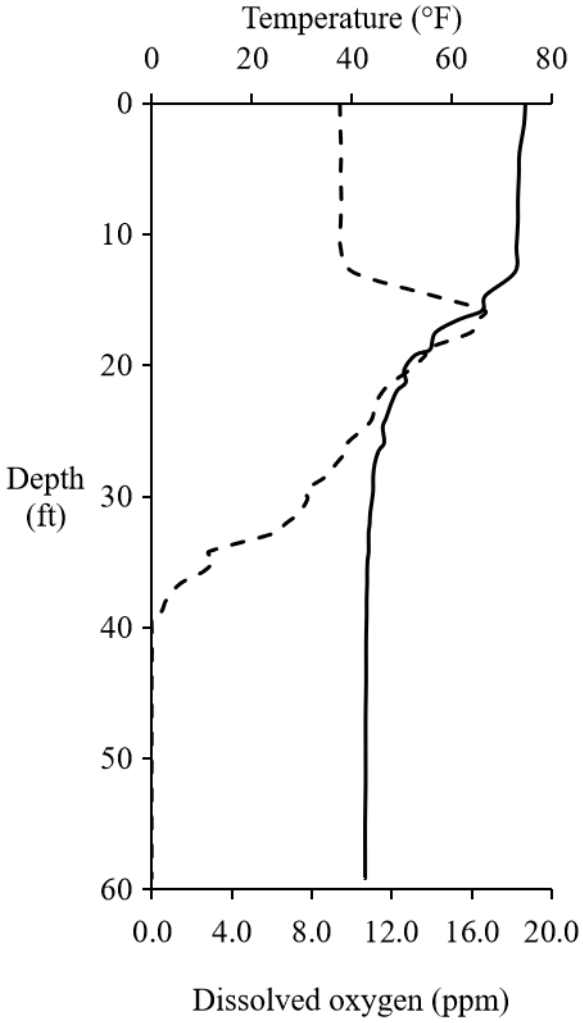

Figure 5. Temperature (°F; solid line) and dissolved oxygen concentration (parts-per-million [ppm]; dashed line) from the surface to bottom on August 22, 2024, in Dickinson Lake, Oakland County, Michigan.

Literature Path

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Jeffrey Jolley, Unit Review and Approval
Kevin Wehrly, External Reviewer
John Bauman, SFR Facilitator
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