Lake Fifteen

Montmorency County, T30N, R02E, Section 15
Thunder Bay River watershed, last surveyed 2013

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Environment

Lake Fifteen is a two-story, 81-acre natural lake located two miles southwest of the town of Atlanta in Montmorency County, Michigan (Figure 1). The lake has a small drainage area, very narrow littoral zone with steep drop-offs, and ample deep, cold, oxygenated water that provides suitable habitat for trout (Figures 2 and 3). Although most of the shoreline is privately owned, it has remained naturally forested with little development (Figure 4). The Thunder Bay River enters Lake Fifteen from the southwest and exits to the north (Figure 2). McCormick Lake is located about six river miles upstream from Lake Fifteen by way of the Thunder Bay River and is stocked with Brown and Rainbow Trout. The river between the lakes is cool to warm with marginal trout populations that include some downstream emigrants from McCormick Lake. A small access site with a hard-surfaced ramp appropriate for use by small to medium sized boats is provided on state forest land along the south shore of Lake Fifteen (Figure 2). This access site has parking for about 10 boat trailers. Lake Fifteen has a moderately diverse warm and cool-water fish community that includes species like Northern Pike and Largemouth Bass.

The maximum depth of Lake Fifteen is about 55 feet (Figure 2). Sand, marl, and gravel are the dominant bottom types. The most recent dissolved oxygen and temperature profile was completed in August 2011. Results indicated a strong summer thermocline with high levels of dissolved oxygen present below the thermocline (Table 1). A thermocline is a summer separation between upper warm and deeper cool-water layers. A pH profile was also completed in August 2011, but results were highly variable throughout the water column. The most recent dissolved oxygen and temperature profile was consistent with earlier profiles completed in July and August 1950, June 1969, and July 1993. Results of another profile completed in October 1979 indicated autumn mixing with water temperatures ranging from 41–48ºF at all depths and high levels of dissolved oxygen present to depths of 40 feet.

History

A substantial number of fish have been stocked into Lake Fifteen since the early 1900s (Table 2). Early stocking records indicate that 5,000 four-month-old Bluegills were stocked in 1940. A total of 153,000 Rainbow Trout fry were then stocked in 1950. Rainbow Smelt were illegally introduced into Lake Fifteen or the surrounding watershed sometime during the early 1940s. This non-native species was first reported by anglers in 1947 and an “outstanding” winter fishery developed by 1950. A die-off occurred in 1953, and because of pressure from local anglers, a total of 6,400 adult Rainbow Smelt were stocked in April 1954 to re-establish the population. The next stocking events occurred in 1973 and 1974 when 5,000 yearling Rainbow Trout were stocked in each year. A total of 5,106 yearling Steelhead Trout were then stocked in 1975. During the next 43 years, nearly 154,000 yearling Brown Trout of various origins were stocked into Lake Fifteen, many of which were part of a state-wide strain evaluation study (MDNR 2016). These stocking events averaged more than 3,500 fish annually. A total of 34,225 surplus fall fingerling Rainbow Trout were also stocked in 2007 and 2009. Surveys designed to evaluate stocking success generally indicated that survival of hatchery fish was poor for both trout species. As a result,

neither species was stocked after 2019. Brown Trout in the 20–30-inch range can still be caught in Lake Fifteen, but due to poor survival of hatchery fish, most of these individuals are thought to be emigrants from upstream sources. McCormick Lake is located upstream from Lake Fifteen and has a relatively large population of stocked Brown Trout with some natural reproduction in its tributaries. Downstream movement of the McCormick Lake population likely supplies most of the Brown Trout caught in Lake Fifteen, although some yearlings stocked into Lake Fifteen may have survived to larger sizes historically.

The fish community of Lake Fifteen has undergone a few notable changes since the early 1900s. The first survey was completed in July 1925. Effort and gear descriptions were not provided. Catches included Rock Bass, Northern Pike, trout, "numerous" Yellow Perch fingerlings, and 11 other non-game fish species. Largemouth and Smallmouth Bass were absent in this survey and notes described an "urgent" need for stocking bass, preferably "small mouth". The next survey used a 500-foot experimental gill net set at one location for one night and was completed in October 1947. Like the first survey, catches were dominated by Yellow Perch, but also included Bluegill, Rock Bass, Cisco (a state threatened species today), Rainbow Smelt, White Sucker, Black Bullhead, and Common Shiner. Of note in the second survey were 12 Cisco ranging in size from 12–14 inches and one nine-inch Rainbow Smelt. Studies from other inland lakes indicate that native Cisco populations are often extirpated after Rainbow Smelt invasion, likely because of predation on Cisco larvae from Rainbow Smelt (Hrabik et al. 1998). Based on angler reports, the 1947 survey was likely the beginning of a transition period from a pelagic community dominated by Cisco to one dominated by Rainbow Smelt. Notes mention prospecting for Rainbow Smelt over two nights in 1950 and finding an "excellent population" of two and three-year-old fish up to 12 inches.

Based on available notes, the next two surveys of Lake Fifteen appear to have been completed in either 1954 or 1961 (no year was provided with survey data) and June 1969. The 1954 or 1961 survey likely used a variety of gears set at 15 locations distributed along the shoreline. Like previous surveys, catches were dominated by Yellow Perch, but Rock Bass, White Sucker, Northern Pike, and Rainbow Smelt appeared to be more abundant. Catches also included Largemouth Bass and Brown Trout. Cisco were absent in this survey, which suggests they were extirpated sometime after 1947, within about a decade after Rainbow Smelt were illegally introduced. The 1969 survey used experimental gill nets set at six locations throughout the lake. The overall fish community composition was like that in the previous survey, but Rock Bass and Rainbow Smelt appeared to be less abundant. Catches were dominated by Yellow Perch and White Sucker.

Surveys completed after 1969 focused less on evaluating overall fish community composition and more on evaluating the survival of trout stocked into Lake Fifteen. The next survey used experimental gill nets set at 15 locations throughout the lake and was completed in mid-October 1975. This survey was designed to evaluate the survival of yearling Rainbow Trout stocked in 1973 and 1974. A total of 206 fish were captured in the 1975 survey. Catches were dominated by Yellow Perch, Northern Pike, White Sucker, and Rock Bass. Northern Pike made up over 20% of the total catch by number. Mean growth indices indicated that Northern Pike grew at rates below the state average, whereas Yellow Perch and Rock Bass grew at rates above the state average. Rainbow Trout were absent in this survey. Notes indicated that predation from Northern Pike and competition from Rainbow Smelt and Yellow Perch made the lake unsuitable for Rainbow Trout. Additional notes recommended stocking Brown Trout as the large Rainbow Smelt population could provide suitable forage.

The next two surveys of Lake Fifteen were structured like the 1975 survey but had varying levels of effort. A survey that used experimental gill nets set at 15 locations throughout the lake was completed in late October 1979. A total of 246 fish were captured in the 1979 survey. Catches were dominated by Rock Bass, Yellow Perch, Northern Pike, and White Sucker, with Northern Pike making up about 20% of the total catch by number. Mean growth indices indicated that Rock Bass grew at rates below the state average, whereas Yellow Perch, Northern Pike, and White Sucker grew at rates above the state average. Only two Brown Trout were captured in this survey. Notes indicated that survival of Brown Trout stocked in 1978 and 1979 was low and that fishing success was probably no different than before stocking. Additional notes indicated that a fishery for Brown Trout developed during February–March 1980 with anglers taking fish in the 12–14-inch range. This was the first confirmed evidence of successful Brown Trout stocking. It was suggested that netting surveys missed these fish. The next survey used experimental gill nets set at six locations throughout the lake and was completed late October 1992. A total of 48 fish were captured in the 1992 survey. Catches were dominated by White Sucker, Northern Pike, Yellow Perch, and Rock Bass, with Northern Pike making up 23% of the total catch by number. Mean growth indices indicated that Northern Pike, Yellow Perch, and Rock Bass grew at rates below the state average. Only one Brown Trout was captured in this survey. Notes indicated that Northern Pike may be affecting the survival of stocked Brown Trout.

Current Status

From 2010–2013, Lake Fifteen was surveyed annually as part of a state-wide Brown Trout strain evaluation study in which equal numbers of Sturgeon River and Wild Rose strain fish were stocked in each year and targeted surveys were designed to evaluate the survival of each strain (MDNR 2016). Stocked trout were clipped in various ways to distinguish between strains. The 2010 survey was completed during October–November and used a combination of one nighttime boomshocking pass and four inland gill net lifts. A total of 41 fish were captured in the 2010 survey. Catches were dominated by Northern Pike and White Sucker, with Northern Pike making up over 50% of the total catch by number. Only two large Brown Trout were captured in this survey. Notes indicated that managers may need to consider removing Lake Fifteen from the stocking list if "survival of stocked fish does not improve, and pike densities remain high". The 2011–2013 surveys were completed in October and used one nighttime boomshocking pass. A total of four large, wild (unclipped) Brown Trout were captured across all three surveys, with no other fish species noted. The conclusion from the strain evaluation study was that survival of stocked Brown Trout, regardless of strain, was generally low state-wide. Lake Fifteen was subsequently removed from the stocking list. No angler complaints have been received since the last hatchery fish were stocked in 2019 (Table 2).

The most recent evaluation of the overall fish community composition and status of Lake Fifteen was completed by MDNR Fisheries Division during summer 2011. Fish community sampling was completed in late May and early June and included 11 inland gill net lifts, six standard and three large mesh fyke net lifts, and three nighttime boomshocking passes. Procedures followed the state-wide Status and Trends protocol in which sampling effort is a standard product of lake size but were modified to account for the very narrow littoral zone and steep drop-offs present in Lake Fifteen. These conditions are less suitable for near-shore sampling and required more gill net and fewer fyke net lifts than would normally be used. Limnological sampling was completed in August and included water quality samples and a dissolved oxygen, temperature, and pH profile.

A total of 378 fish were captured in the 2011 survey of Lake Fifteen (Table 3). Catches were dominated by White Sucker, Common Shiner, Rock Bass, Bluegill, and Yellow Perch. Other abundant fish species included Largemouth Bass, Brown Trout, Shiner species, and Rainbow Smelt. Only three Northern Pike were captured in 2011, but given the relatively large catches in earlier surveys, this species was likely undersampled. Length-frequency distributions for fish species commonly targeted by anglers (Table 4) indicated that panfish, including Rock Bass, Bluegill, and Yellow Perch, were generally small, with most fish less than six inches in length. Largemouth Bass ranged from 6–19 inches and 44% of these fish were larger than the minimum size limit of 14 inches. Of the 15 total Brown Trout captured, 11 were wild (unclipped) and four were hatchery (clipped) fish, which included three Wild Rose and one Sturgeon River strain. Brown Trout ranged from 4–21 inches and just under half of these fish were larger than 12 inches. Rainbow smelt were small and ranged from 4–6 inches. The largest Northern Pike was 22 inches in length. Mean growth indices indicated that Rock Bass, Bluegill, and Yellow Perch grew at rates below the state average, whereas Largemouth Bass and Brown Trout grew at rates above the state average (Table 5). Aging data were insufficient to make growth rate comparisons for other species. Due to the unproductive nature of Lake Fifteen, warm water species like Rock Bass, Bluegill, and Yellow Perch would be expected to have poor growth, whereas cool-water species like Brown Trout would be expected to have much better growth. An abundance of smaller prey fish could have led to better-than-expected growth for Largemouth Bass.

Limnological sampling was completed August 17, 2011. The dissolved oxygen, temperature, and pH profile was taken at a depth of 53 feet. Water temperature ranged from 71ºF at the surface to 42ºF on the bottom with a strong thermocline in the 20–30-foot range, whereas dissolved oxygen ranged from 8.9 ppm at the surface to 0.1 ppm on the bottom with levels greater than 3.0 ppm present to depths of about 30 feet (Table 1). These results are typical for deep, sterile, headwater lakes throughout northern Michigan during the period of late summer stratification. Results for pH are not provided because they were highly variable throughout the water column, which indicated a possible equipment malfunction or sampling issue. Water quality samples indicated that Lake Fifteen has relatively high alkalinity (200 mg/L) and extremely limited productivity (chlorophyll-a = 0.00131 mg/L) and nutrient inputs (total phosphorus = 0.0057 mg/L) for a northern Michigan lake (Fuller and Minnerick 2008). Collectively, water quality samples indicated that Lake Fifteen is relatively oligotrophic, even within a region where oligotrophic lakes are common. Oligotrophic lakes have limited biological productivity and are characterized by relatively low chlorophyll-a (less than 0.0022 mg/L) and total phosphorus (less than 0.010 mg/L) levels (Fuller and Minnerick 2008).

Lake Fifteen was previously managed by the Michigan Department of Natural Resources (MDNR) Fisheries Division as a trout lake, but trout regulations were subsequently removed. The lake is currently managed under general, state-wide regulations, which can be found in the annual Michigan Fishing Guide (MDNR 2023). Walleye were likely present in Lake Fifteen historically but have not been reported by anglers since 1947. Smallmouth Bass have been reported by anglers in the past, but not for several years. Lake Fifteen is unique in that it also has a self-sustaining, non-native Rainbow Smelt population that supports a popular winter fishery, although this population has experienced periodic die-offs, notably in late spring or summer 1953 and June 2002.

Analysis and Discussion

The environment and fish community of Lake Fifteen can generally be characterized as having: (1) extremely oligotrophic conditions with a strong summer thermocline and high levels of dissolved oxygen throughout most of the water column, including parts of the deeper cool-water layer; (2) a moderately diverse warm and cool-water fish community that supports sportfishing opportunities for Rainbow Smelt, Northern Pike, and to a lesser extent, Brown Trout, Largemouth Bass, and panfish; (3) a prey fish community dominated by small Rock Bass and Yellow Perch; (4) a predator community dominated by Northern Pike, and to a lesser extent, Largemouth Bass; and (5) a non-game fish community dominated by White Suckers and Common Shiners.

Historically, Lake Fifteen supported a native Cisco population, but this population was replaced by non-native Rainbow Smelt sometime after 1947. A popular winter fishery for Rainbow Smelt developed by 1950, but angler accounts suggest this fishery has declined in recent years. During 1973–2019, a total of more than 200,000 yearling and fall fingerling trout were stocked into Lake Fifteen. These fish were mostly Brown Trout, but some Rainbow Trout were also stocked. Hatchery fish were thought to prey on an abundant Rainbow Smelt population and contribute to a popular trophy Brown Trout fishery, but surveys indicated that overall survival of both trout species was poor. Survey notes indicated that predation from Northern Pike and competition from Rainbow Smelt and Yellow Perch made the lake unsuitable for Rainbow Trout, whereas predation from Northern Pike likely limited the survival of Brown Trout. Trophy Brown Trout can still be caught in Lake Fifteen, but most of these individuals are thought to be from upstream sources. To escape predation from Northern Pike, most of the Brown Trout found in Lake Fifteen were likely relatively large before entering the lake. Currently, Lake Fifteen supports targeted Rainbow Smelt, Northern Pike, and to a lesser extent, Brown Trout fisheries during winter and a general, low-quality fishery for all species during summer.

Management Direction

Annual surveys completed during 2010–2013 indicated a poor return for trout stocked into Lake Fifteen, regardless of species or strain, likely due to heavy predation from Northern Pike and competition with other species. Lake Fifteen was subsequently removed from the stocking list, which was the first major change in management direction since consistent trout stocking began in 1973. No angler complaints have been received since the last hatchery fish were stocked in 2019, only reinforcing the change in management direction. Due to a very narrow littoral zone with steep drop-offs, Lake Fifteen is difficult to survey with most sampling gear and standard surveys with trap or fyke nets are not recommended. We will continue to monitor angler reports and survey Lake Fifteen on a very limited basis, but there is no need for a survey in the near future. If substantial declines in the Northern Pike population are observed in the future, additional trout stocking could be considered. Cisco reintroduction could also be considered if both the Northern Pike and Rainbow Smelt populations collapse, although this scenario seems unlikely given current conditions in Lake Fifteen.

References

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Table 1. Results of the most recent water temperature and dissolved oxygen profile for Lake Fifteen. Profile was completed August 17, 2011.

Depth (feet)	Temperature (ºF)	Dissolved Oxygen (ppm)
Surface	71	8.9
3	71	8.9
6	70	9.0
9	69	9.1
12	67	9.0
16	65	8.9
19	57	9.9
21	50	9.0
24	48	7.0
27	46	4.7
30	46	2.8
33	45	2.1
36	44	1.8
39	43	1.6
42	43	0.5
45	43	0.3
48	42	0.2
51	42	0.2
53	42	0.1

Table 2. Stocking history for Lake Fifteen.

Month	Species	Year	Strain	No.	No./Acre	Age	Avg. Length (inches)
--	Bluegill	1940	--	5,000	62	4-month	--
--	Rainbow Trout	1950	--	153,000	1,889	fry	0.9
April	Rainbow Smelt	1954	--	6,400	79	adult	7.5
--	Rainbow Trout	1973	--	5,000	62	yearling	--
--	Rainbow Trout	1974	--	5,000	62	yearling	--
--	Steelhead Trout	1975	--	5,106	63	yearling	--
--	Brown Trout	1977	--	2,200	27	yearling	--
--	Brown Trout	1978	--	2,200	27	yearling	--
May	Brown Trout	1979	--	2,000	25	yearling	6.9
June	Brown Trout	1980	--	1,000	12	yearling	5.7
June	Brown Trout	1981	Harrietta	2,000	25	yearling	5.1
May	Brown Trout	1982	Harrietta	3,000	37	yearling	6.5
May	Brown Trout	1983	Harrietta	3,000	37	yearling	5.9
May	Brown Trout	1984	Harrietta	3,000	37	yearling	5.7
May	Brown Trout	1985	--	3,000	37	yearling	6.9
April	Brown Trout	1986	Plymouth Rock	3,000	37	yearling	5.6
May	Brown Trout	1987	Harrietta	3,000	37	yearling	6.5
May	Brown Trout	1988	Plymouth Rock	3,500	43	yearling	6.2
April	Brown Trout	1989	Plymouth Rock	3,500	43	yearling	6.1
April	Brown Trout	1990	Plymouth Rock	5,225	65	yearling	7.5
May	Brown Trout	1991	Seeforellen	3,500	43	yearling	5.7
May	Brown Trout	1992	Plymouth Rock	3,460	43	yearling	6.5
May	Brown Trout	1993	Wild Rose	3,490	43	yearling	8.1
April	Brown Trout	1994	Wild Rose	3,680	45	yearling	6.7
April	Brown Trout	1995	Soda Lake	3,300	41	yearling	5.9
June	Brown Trout	1996	Wild Rose	3,060	38	yearling	7.2
May	Brown Trout	1997	Wild Rose	3,770	47	yearling	7.0
April	Brown Trout	1998	Seeforellen	3,400	42	yearling	6.0
April	Brown Trout	1999	Seeforellen	3,500	43	yearling	6.1
April	Brown Trout	2000	Wild Rose	4,000	49	yearling	6.3
April	Brown Trout	2001	Wild Rose	3,500	43	yearling	6.6
April	Brown Trout	2002	Gilchrist Creek	3,810	47	yearling	4.9
April	Brown Trout	2003	Wild Rose	3,500	43	yearling	7.2
May	Brown Trout	2003	Wild Rose	1,500	19	yearling	7.0
April	Brown Trout	2004	Gilchrist Creek	3,600	44	yearling	8.1
May	Brown Trout	2005	Gilchrist Creek	3,500	43	yearling	5.9
April	Brown Trout	2006	Seeforellen	3,800	47	yearling	4.8
May	Brown Trout	2007	Wild Rose	3,200	40	yearling	7.8
September	Rainbow Trout	2007	Eagle Lake	16,225	200	fall fingerling	3.8
April	Brown Trout	2008	Wild Rose	3,500	43	yearling	7.6
April	Brown Trout	2009	Seeforellen	6,120	76	yearling	5.7
October	Rainbow Trout	2009	Eagle Lake	18,000	222	fall fingerling	3.8
April	Brown Trout	2010	Sturgeon River	2,225	28	yearling	4.0
April	Brown Trout	2010	Wild Rose	2,225	28	yearling	6.4
April	Brown Trout	2011	Sturgeon River	2,225	28	yearling	4.2
April	Brown Trout	2011	Wild Rose	2,225	28	yearling	7.3
April	Brown Trout	2012	Sturgeon River	2,225	28	yearling	4.3

Table 2.-Continued.

Month	Species	Year	Strain	No.	No./Acre	Age	Avg. Length (inches)
April	Brown Trout	2012	Wild Rose	2,225	28	yearling	7.2
April	Brown Trout	2013	Wild Rose	2,225	28	yearling	7.3
April	Brown Trout	2013	Sturgeon River	2,225	28	yearling	5.0
June	Brown Trout	2014	Sturgeon River	2,225	28	yearling	5.7
June	Brown Trout	2014	Wild Rose	2,069	26	yearling	7.9
April	Brown Trout	2015	Wild Rose	4,455	55	yearling	7.4
April	Brown Trout	2016	Wild Rose	4,050	50	yearling	7.6
April	Brown Trout	2017	Wild Rose	4,200	52	yearling	7.6
May	Brown Trout	2018	Wild Rose	4,050	50	yearling	7.4
April	Brown Trout	2019	Wild Rose	3,690	46	yearling	7.5

Table 3. Species and relative abundance of fishes captured with survey gear during the Status and Trends survey of Lake Fifteen completed during summer 2011. Of the 15 total Brown Trout captured, 11 were wild (unclipped) and four were hatchery (clipped) fish, which included three Wild Rose and one Sturgeon River strain.

Common Name	No.	Percent (%)	Length Range (inches)	Total Weight (pounds)	Percent (%)
White Sucker	93	25	5–19	115.4	65
Common Shiner	86	23	2–6	1.9	1
Rock Bass	62	16	2–7	6.1	3
Bluegill	35	9	1–7	5.9	3
Yellow Perch	30	8	3–8	2.4	1
Largemouth Bass	18	5	6–19	24.1	14
Brown Trout	15	4	4–21	15.8	9
Shiner species	12	3	2–3	--	--
Rainbow Smelt	10	3	4–6	0.3	<1
Bluntnose Minnow	6	2	2–3	0.1	<1
Northern Pike	3	1	14–22	4.4	4
Pumpkinseed Sunfish	3	1	4–6	0.4	<1
Green Sunfish	1	<1	2	<0.1	<1
Iowa Darter	1	<1	1	<0.1	<1
Johnny Darter	1	<1	1	<0.1	<1
Mottled Sculpin	1	<1	2	<0.1	<1
Yellow Bullhead	1	<1	11	0.7	<1
Total	**378**			**177.5**	

Table 4. Length-frequency distributions for selected fish species captured with survey gear during the Status and Trends survey of Lake Fifteen completed during summer 2011. Selected fish species are those commonly targeted by anglers.

Length (inches)	Rock Bass	Bluegill	Yellow Perch	Largemouth Bass	Brown Trout	Rainbow Smelt	Northern Pike
1		4					
2	3	2					
3	7	1	4				
4	25	2	6		1	6	
5	17	2	8			3	
6	9	15	10	3		1	
7	1	9			4		
8			2		1		
9				1	1		
10				3	1		
11							
12				1	1		
13				2	1		
14				4	3		1
15							
16				2			
17				1			
18							1
19				1			
20					1		
21					1		
22							1

Table 5. Comparison of weighted mean length-at-age for selected fish species captured with survey gear during the Status and Trends survey of Lake Fifteen completed during summer 2011. Growth comparisons in the last column are across all ages for 2011. Selected fish species are those commonly targeted by anglers with sufficient aging data for comparisons.

Species	Age Group	Weighted Mean Length-at-Age (inches)	2011 Growth Compared to State Avg. (inches)
Rock Bass	I	--	-1.7
	II	--	
	III	4.1	
	IV	4.5	
	V	5.5	
	VI	5.8	
Bluegill	I	--	-0.6
	II	--	
	III	4.6	
	IV	5.8	
	V	6.2	
	VI	6.8	
	VII	7.2	
Yellow Perch	I	4.1	-0.5
	II	5.0	
	III	6.1	
	IV	6.5	
	V	8.7	
	VI	8.8	
Largemouth Bass	I	--	+0.4
	II	6.3	
	III	10.6	
	IV	11.4	
	V	13.6	
	VI	14.3	
	VII	16.1	
	VIII	16.1	
	IX	18.2	
Brown Trout	I	7.2	+1.3
	II	11.4	
	III	16.6	

Figure 1. General location of Lake Fifteen in Montmorency County, Michigan. Red circle indicates location of Lake Fifteen.

Figure 2. Depth contour map in five-foot intervals and location of access site for Lake Fifteen. Red circle indicates location of access site. The Thunder Bay River enters Lake Fifteen from the southwest and exits to the north.

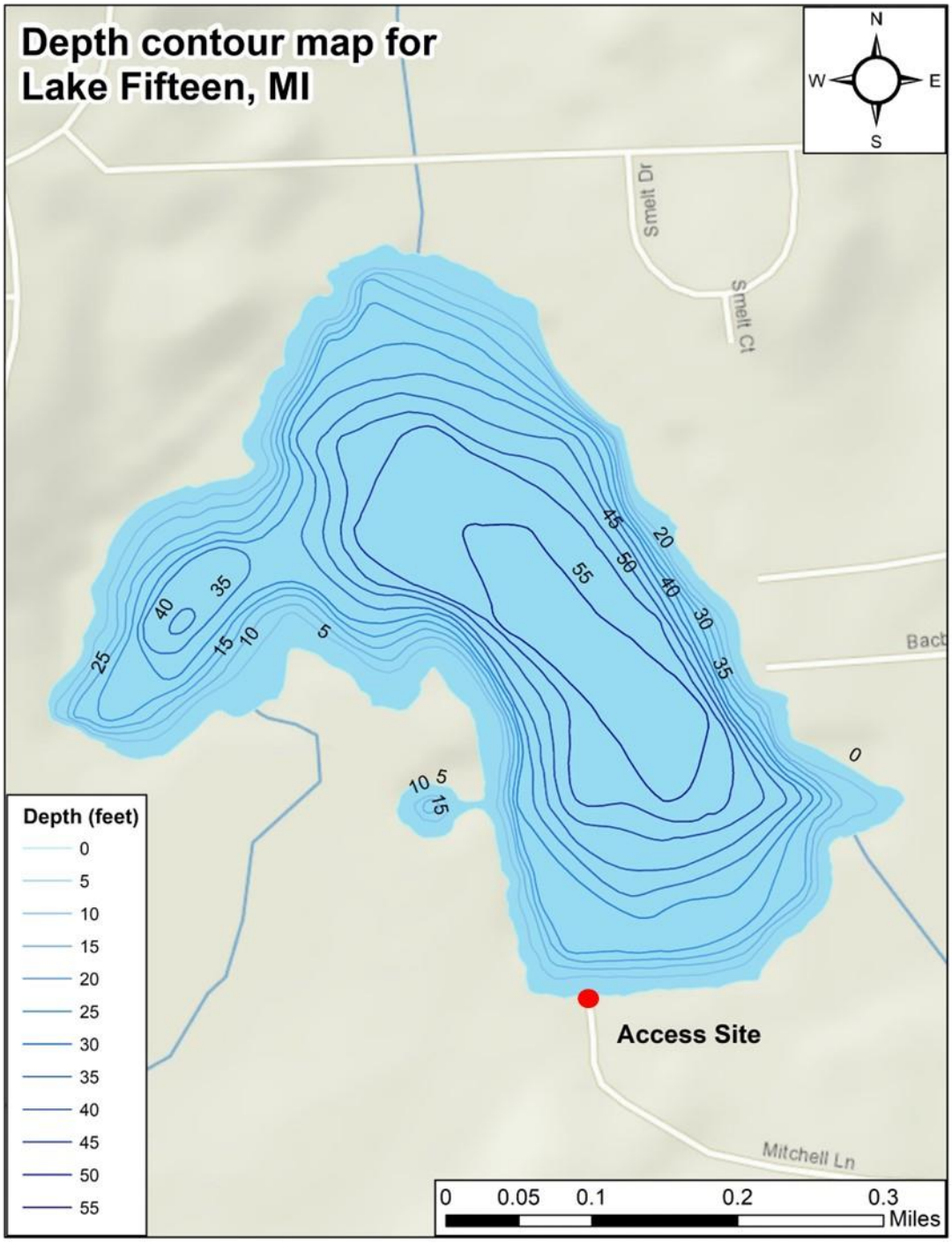


Figure 3. Lakeshed map for Lake Fifteen. Red circle indicates location of Lake Fifteen.

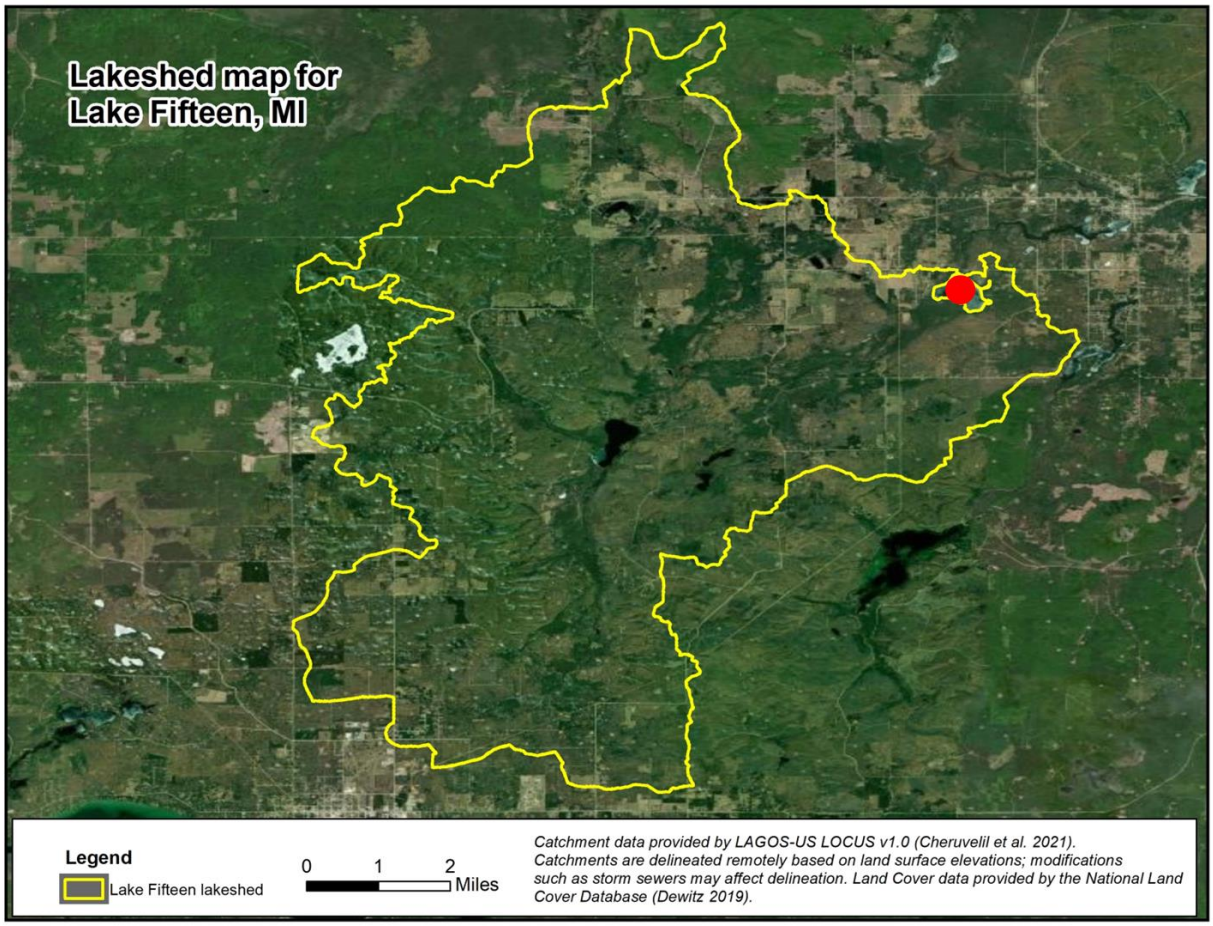
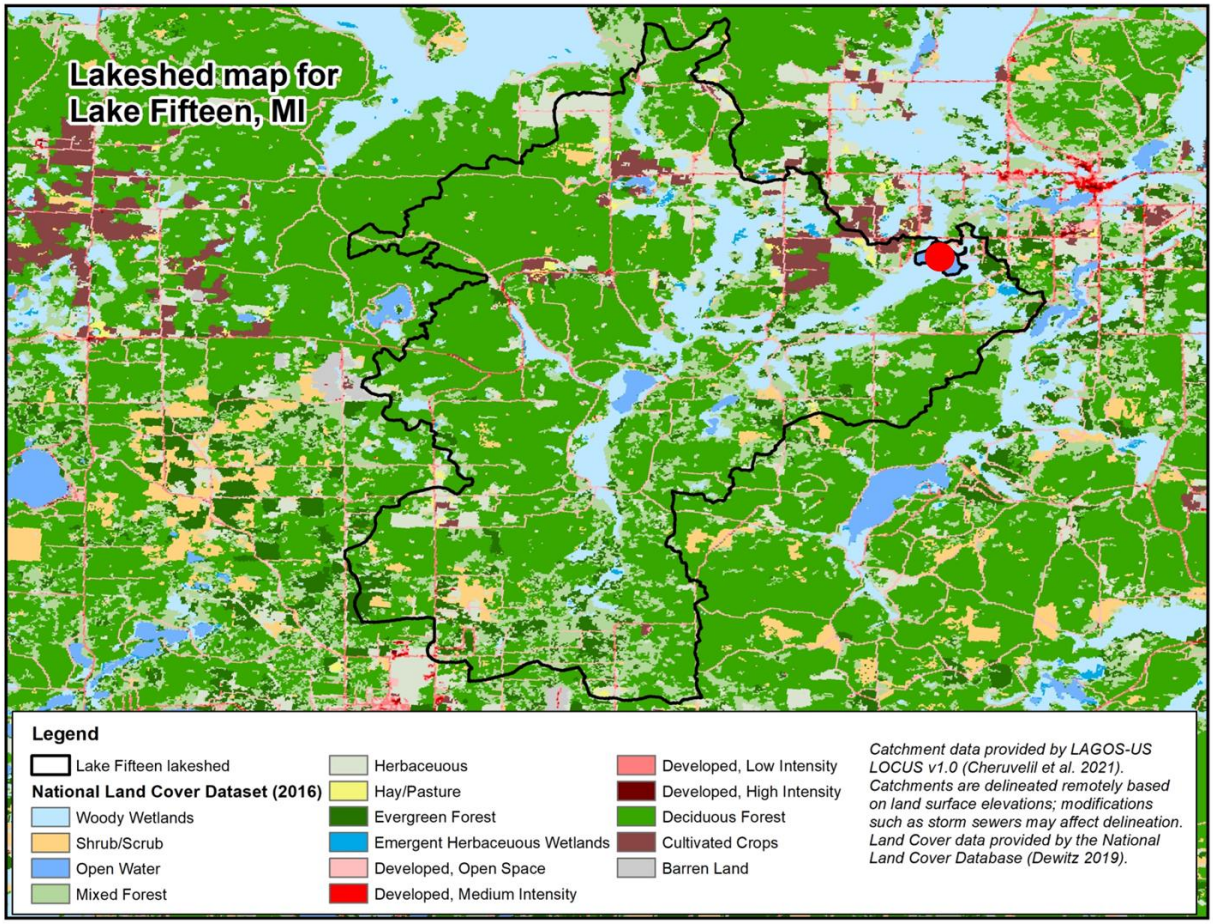


Figure 4. Lakeshed map and land cover type categories for Lake Fifteen. Red circle indicates location of Lake Fifteen.



Received April 26, 2023; published May 4, 2023

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