KP Lake

Crawford County T28N, R02W, Sec. 28
Au Sable River watershed, last surveyed 2022

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Environment

KP Lake is a 109-acre natural lake located in Crawford County, approximately eight miles east of the town of Frederic (Figure 1). The lake has a maximum depth of 25 feet, but about 60% of the lake is 10 feet deep or less with a mostly sand and marl bottom (Figure 2). The lake catchment area is 3,691 acres, with a watershed that is primarily forested (66%), with 25% grass/shrub land, 6% urban development, and 3% wetland area (Figures 3 and 4). The surficial geology of the catchment is entirely ice contact/outwash (MDNR 2023).

KP lake is oriented in a SW to NE direction with a maximum length of 1.5 miles and a perimeter of 2.6 miles. There is a public boat ramp on the south end of the lake maintained by DNR Parks and Recreation Division. The gravel-surfaced ramp is suitable for small to medium sized boats, and parking is available for five vehicles and trailers. There is a special local watercraft control, or local ordinance, for KP Lake which prohibits the operation of a vessel powered by a motor other than an electric motor.

Water chemistry, temperature, and dissolved oxygen profiles were measured in KP Lake on August 9, 2022. Chlorophyll-a was 0.00252 ug/L and secchi depth was 12.5 ft which indicate that KP Lake is an oligotrophic lake (Table 2). The temperature profile measured the thermocline at 20 feet, and the surface temperature was 76 °F and bottom temperature was 71 °F (Table 1, Figure 5). Summer dissolved oxygen levels in KP Lake were suitable for most fish species down to 19 ft (7 ppm).

The shoreline of KP Lake has 41 small docks and 54 dwellings. Overall, shoreline armoring was present but minimal for a standard northern Michigan Lake. Submerged trees were present in all transects, with a total 134 submerged trees around the shoreline. Overall, the minimal development and armoring on KP Lake help maintain the natural shoreline and nearshore habitat for fishes.

History

Fisheries management records for KP Lake date back to 1937, when 500 Largemouth Bass (5-month-old) were stocked in the lake. The lake was stocked annually to 1945 with a mix of Largemouth Bass, Smallmouth Bass, and Bluegill. This was consistent with Fisheries Division's policy at that time when warmwater species were stocked in many lakes. Since that time period, evaluations have indicated that stocking in this class of lakes with many warmwater species including Bluegill and bass was not necessary since these species have sustained by natural reproduction.

KP lake was surveyed in late summer 1947 with two benthic gill nets. The catch included Smallmouth and Largemouth Bass, Bluegill, Pumpkinseed, and Rock Bass. Overall catch was low and fish sizes were generally small. The largest fish captured were two 8-inch Bluegill.

In 1947, there were repeated requests from the public to stock the lake with Rainbow Trout that were denied because the fishery survey indicated that KP Lake had marginal conditions for trout. Historic accounts indicated that KP Lake supported a good bass and Bluegill fishery and was one of few lakes in Crawford County rated as good fishing for warmwater species.

The next fishery management action for KP Lake was in 1957, when 150 hoad-style shelters were placed in the lake. These log-crib style structures were placed in 15 groups of 10 shelters. No evaluation was conducted to assess their effectiveness.

In 1986, Fisheries Division proposed stocking Walleye in KP Lake, at a rate of 5,500 spring fingerlings every three years. This prescription was not implemented and removed in 1987 due to opposition to the plan from riparian landowners.

KP Lake was again surveyed in 1992 using an experimental gill net (one lift), small-mesh fyke nets (6 lifts), and large-mesh fyke nets (6 lifts). Water clarity was high with Secchi disk reading at the lake-bottom of 24 ft. Although no legal-sized Largemouth Bass were captured, survey notes indicate a good fish community with good species balance, and that Yellow Perch and Bluegill populations were excellent. Bluegill 1-10 inches in length (ages 1-9) were present with many in the 8- to 9-inch range and exhibiting good growth. Yellow perch 1-12 inches (ages 1-9) were also present and demonstrated good growth.

By 1998, concerns from the public were expressed about low abundance of large Bluegill in KP Lake. Additional information about reasons for the decline in numbers of very large Bluegill was sought from Fisheries Division's Institute for Fisheries Research (IFR). The IFR response listed potential causes: 1) higher harvest of larger Bluegill; 2) a series of weak Bluegill year classes, produced by uncontrollable events like weather; 3) excessive predation by bass or perch on smaller Bluegill leading to less recruitment to larger sizes (note that the minimum size limit for bass increased from 12 inches to 14 inches in 1993); or 4) change in the lake's food supply by competing fish species, or increased Bluegill reproduction and more intraspecific competition. The management unit biologist recommended to the lake association that they reduce Bluegill harvest and thin out the bass population (increase harvest), cautioning that any change would take time.

During May 2002, a fish community survey of KP Lake was conducted following resource inventory protocols (Wehrley et al., in press). Sampling gear and effort consisted of 3 seine hauls, 4 experimental gill-net lifts, 6 large-mesh fyke-net lifts, and three 10-minute boat nighttime electrofishing transects. Fish species captured during the survey, in decreasing order of abundance, were Sand Shiners, Bluegill, Largemouth Bass, Yellow Perch, Rainbow Darter, and Walleye. Although some larger individual Bluegill were captured, including a 10-inch Bluegill (age-7), only four Bluegill captured were two inches or longer. Yellow Perch were doing better, with 45 of the 46 perch captured in the 11-13 inch range. The average length of Yellow Perch in the survey was 12 inches.

Current Status

A survey of the KP Lake fish community was conducted in May 2022 by the DNR Fisheries Division's Northern Lake Huron Management Unit. A variety of net types and sizes were deployed consistent with the Status and Trends protocol. Status and Trends surveys use a methodology developed by Fisheries Division in which the gear types are standardized throughout the state and survey effort is a function of

lake size (Wehrly et al. in press). The various gear types and mesh sizes are intended to sample different sizes of fish, species, and life stages to give a more complete view of the overall community and allow for spatial and temporal comparisons. Unless otherwise noted, a lift is equal to one net night. Survey effort consisted of 6 experimental gill-net lifts, 9 large-mesh fyke-net lifts, 2 small-mesh fyke-net lifts, and 4 seine hauls. Additionally, three 10-minute nighttime boat electrofishing transects were done on June 1 of the same year. Gear types were similar to the 2002 survey, with some additional effort included 2022.

During the 2022 survey of KP Lake, 15,416 fish were captured representing 12 species (Table 3). Mimic Shiners dominated the catch and biomass. Other species captured, in decreasing order of abundance, included Bluntnose Minnow, Bluegill, Largemouth Bass, Yellow Perch, Rock Bass, Pumpkinseed, Northern Pike, White Sucker, Iowa Darter, Hybrid Sunfish, and Smallmouth Bass.

Large predators in KP Lake include Largemouth Bass, Northern Pike, and Smallmouth Bass and comprised 1% of survey catch. Largemouth Bass were present in good numbers with a broad length distribution with fish ranging from 4 to 21 inches. Most Largemouth Bass captured were sublegal size (less than 14 inches) and growing slightly slower than the statewide average growth rate for this species. Consistent natural reproduction was indicated by the presence of nine age-classes of Largemouth Bass (Table 5). Only seven Northern Pike were captured during the survey, with a size range from 21-38 in (Table 4). Few sub-legal (less than 24 inches) Northern Pike were caught in the survey, which may be due to limited spawning habitat. Northern Pike appear to be growing well, with some lengths at age above the statewide average (Table 5). One Smallmouth Bass was captured during the survey, indicating they are present but in low abundance. This group comprises a relatively small portion of the overall fish community but are still important to the overall health of the lake.

The panfish community in KP Lake consists of Bluegill, Yellow Perch, Rock Bass, Pumpkinseed, and Hybrid Sunfish. Bluegill were the most abundant fish species in this group, representing 3.5% of the total catch numerically and 17% of the catch by weight (Table 3). Size distribution of Bluegill was good, with fish present from 1-9 inches in total length (Table 4). Natural reproduction of Bluegill was consistent, with each age class represented from age 1-9 (Table 5). Bluegill are growing slightly above statewide average in KP Lake. The absence of larger Bluegill in the catch may be due to angler harvest of large fish. The Pumpkinseed population in KP Lake was similar to Bluegill in terms of size structure, but in lower numbers with lengths ranging from 2-9 in, and all year-classes represented to age-9. Growth of Pumpkinseed was good, with fish averaging a half inch larger than the statewide average.

Rock Bass and Yellow Perch were also present in the panfish community. The Rock Bass population was unremarkable, with relatively low catch rates in size ranges from 4-9 inches. Yellow Perch were present in most size classes from 1-12 inches, although many of these length bins were represented by just one or two individuals (Table 4). Most perch sampled were juvenile fish. Eight year-classes of perch were present from age 1-9, with eight-year-olds the only group absent (Table 5). Growth of Yellow Perch was poor, with a growth index of -1.0, or one inch smaller than statewide average lengths-at-age.

The non-gamefish community in KP was represented in the catch by Mimic Shiners, Bluntnose Minnow, White Sucker, and Iowa Darter, all species that are often found in northern Michigan natural lakes. The prey fish community dominated the survey catch, with Mimic Shiners alone composing almost 87% of

the catch numerically. Most of these were caught in the small-mesh fyke nets set along the shoreline near overhanging or flooded shrubs and trees. The larger-bodied species White Sucker was also present. The non-gamefish species composed 16% of the total survey catch biomass.

Analysis and Discussion

KP Lake has a healthy fish population and is a typical bass-Bluegill lake. The KP Lake fish community can be characterized as having: 1) a small predator community comprised primarily of Largemouth Bass, and to a lesser degree Northern Pike; 2) a panfish community comprised primarily of Bluegill and Pumpkinseed, with less abundant populations of Rock Bass and Yellow Perch; and 3) an abundant non-gamefish community dominated by Mimic Shiners and Bluntnose Minnows. Game fish species are generally at lower abundance, especially in the larger size groups. This may be due to angling pressure and harvest of larger individuals. We did, however, capture two Northern Pike in the 37-38-inch size range. Growth rates of gamefish were generally acceptable in 2022, with growth rates of most fish around the statewide average. Yellow Perch, however, were slow-growing, and were about one inch smaller than statewide average. Lengths at age for Bluegill, Pumpkinseed, and Yellow Perch have declined since previous surveys (Table 5) but were surviving to older ages. The abundant forage base in KP Lake likely helps keep growth rates acceptable, considering several limnological parameters of the lake characterize it as a fairly unproductive oligotrophic lake. The low lake productivity influences the potential carrying capacity of fish in this lake.

Although some lake residents complained about the high abundance of Northern Pike in the lake during our survey, the catch data do not show that this predator is over abundant. Little is known about the fishery on KP Lake since angler reports are relatively minimal in recent decades. The few reports obtained classify it as having a fair fishery.

Management Direction

1. Maintain the standard statewide fishing regulations, which are appropriate for the protection of this fish community.
2. Minimize development/armoring of the shoreline. Much of the shoreline is undeveloped and not armored, which helps the aquatic community.

References

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Michigan Department of Natural Resource (MDNR). 2023. Aquatic Habitat Viewer. https://ifr.seas.umich.edu/wab/ahviewer/ Accessed: April 2023.

Wehrly, K.E., G.S. Carter, and J.E. Breck. In press. Standardized sampling methods for inland lakes status and trends program. Michigan Department of Natural Resources, Fisheries Special Report, Ann Arbor.

Table 1. Dissolved oxygen and temperature measured along a profile of KP Lake on August 9, 2022.

Depth	Temperature (°F)	Oxygen (ppm)
0	76.7	7.89
1	76.4	7.84
2	75.9	7.85
3	75.7	7.83
4	75.5	7.88
5	75.5	7.90
6	75.4	7.99
7	75.3	7.99
8	75.3	7.96
9	75.3	7.91
10	75.2	7.85
11	75.2	7.90
12	75.1	8.00
13	75.0	7.91
14	74.9	7.86
15	74.9	7.88
16	74.8	7.94
17	74.6	7.48
18	74.6	7.14
19	74.5	6.96
20	74.2	3.56
21	73.7	1.94
22	72.8	0
23	71.7	0

Table 2. Water chemistry data for KP Lake measured on August 9, 2022.

Parameter	Value	Notes
Alkalinity, total (mg/L)	54	
Chlorophyll a (ug/L)	0.00252	
Nitrogen, ammonia (mg/L0	0.013	
Nitrogen, nitrate + nitrite (mg/L)	0.003	<0.0034 mg/L
Nitrogen, total Kjeldahl (mg/L)	0.337	
Phosphorus, total (mg/L)	0.0117	

Table 3. Number, weight, and length by species captured in the May 2022 fish community survey at KP Lake. The asterisk indicates the deviation in growth across all ages for this species when compared to the statewide average for each species (if a growth index was available and sample sizes were sufficient).

Species	Number	Percent by Number	Weight (lb.)	Percent by Weight	Length range (in.)	Growth Index*
Mimic Shiner	13,361	86.7	43.4	14.2	1-2	--
Bluntnose Minnow	1,174	7.6	3.2	1.0	1-3	--
Bluegill	535	3.5	52.8	17.2	1-9	+0.3
Largemouth Bass	155	1	119.2	38.9	4-21	-0.4
Yellow Perch	76	0.5	5.4	1.8	1-12	-1
Rock Bass	58	0.4	18.8	6.1	4-9	--
Pumpkinseed	44	0.3	15.3	5.0	2-9	+0.6
Northern Pike	7	<0.1	44.7	14.6	21-38	--
White Sucker	2	< 0.1	3.2	1.1	15-16	--
Iowa Darter	2	< 0.1	<0.1	<0.1	1-1	--
Hybrid Sunfish	1	<0.1	0.3	0.1	7-7	--
Smallmouth Bass	1	<0.1	0.2	0.1	7-7	--

Table 4. Length frequency of fish captured during the May 2022 survey of KP Lake.

Inch Group	Bluegill	Largemouth Bass	Northern Pike	Pumpkinseed	Rock Bass	Smallmouth Bass	Yellow Perch
1	277						1
2	27			3			57
3	9						2
4	23	1		1	5		4
5	44			4	4		1
6	56	8		9	12		1
7	65	8		14	12	1	2
8	31	22		10	23		2
9	3	18		3	2		2
10		20					
11		19					2
12		36					2
13		13					
14		6					
15		1					
16							
17		1					
18							
19		1					
20							
21		1	1				
22							
23							
24							
25			2				
26			1				
27							
28			1				
29							
30							
31							
32							
33							
34							
35							
36							
37			1				
38			1				

Table 5. Mean length (inches) at age for game fishes of KP Lake from 1992, 2002, and 2022. Number in parentheses represents the number aged.

		Mean length (n)		
Species	**Age Group**	**1992**	**2002**	**2022**
Bluegill	I			1.7 (27)
	II	4.7 (1)	3.9 (1)	4.3 (9)
	III	5.8 (5)	5.9 (1)	5.4 (11)
	IV	7.4 (7)	--	6.5 (8)
	V	8.3 (7)	--	7.0 (6)
	VI	9.0 (10)	9.6 (1)	7.7 (6)
	VII	9.5 (5)	10.4 (1)	8.2 (10)
	VIII	--	--	9.1 (1)
	IX	--	--	9.5 (2)
Largemouth Bass	I	--	--	5.6 (5)
	II	--	7.5 (6)	6.9 (14)
	III	9.6 (14)	--	9.3 (27)
	IV	10.8 (9)	12.3 (1)	11.8 (11)
	V	--	13.2 (9)	12.5 (10)
	VI	--	13.6 (5)	13.1 (12)
	VII	--	13.7 (3)	14.4 (6)
	VIII	--	--	17.1 (1)
	IX	--	--	--
	X	--	--	--
	XI	--	--	20.5 (2)
Northern Pike	III	--	--	23.2 (2)
	IV	--	--	25.5 (1)
	V	--	--	27.3 (2)
	VI	--	--	--
	VII	--	--	38.4 (1)
	VIII	--	--	37.6 (1)
Pumpkinseed	I	--	--	2.2 (2)
	II	4.3 (1)	--	2.3 (1)
	III	7.1 (1)	--	4.4 (3)
	IV	7.8 (2)	--	5.9 (7)
	V	8.1 (4)	--	6.5 (3)
	VI	8.4 (2)	--	7.1 (9)
	VII	--	--	8.2 (8)
	VIII	--	--	9.1 (4)
	IX	--	--	9.8 (1)
Smallmouth Bass	II	--	--	7.7 (1)

Table 5. – continued.

Species	Age Group	1992	2002	2022
Yellow Perch	I	--	--	2.3 (10)
	II	--	--	4.6 (4)
	III	--	--	6.9 (3)
	IV	--	--	8.3 (3)
	V	10.9 (5)	--	9.5 (1)
	VI	11.3 (5)	11.4 (1)	11.3 (2)
	VII	11.8 (6)	12.3 (26)	12.3 (1)
	VIII	12.1 (6)	12.1 (3)	--
	IX	--	--	12.7 (1)

Figure 1. Locator Map for KP Lake, Crawford County.

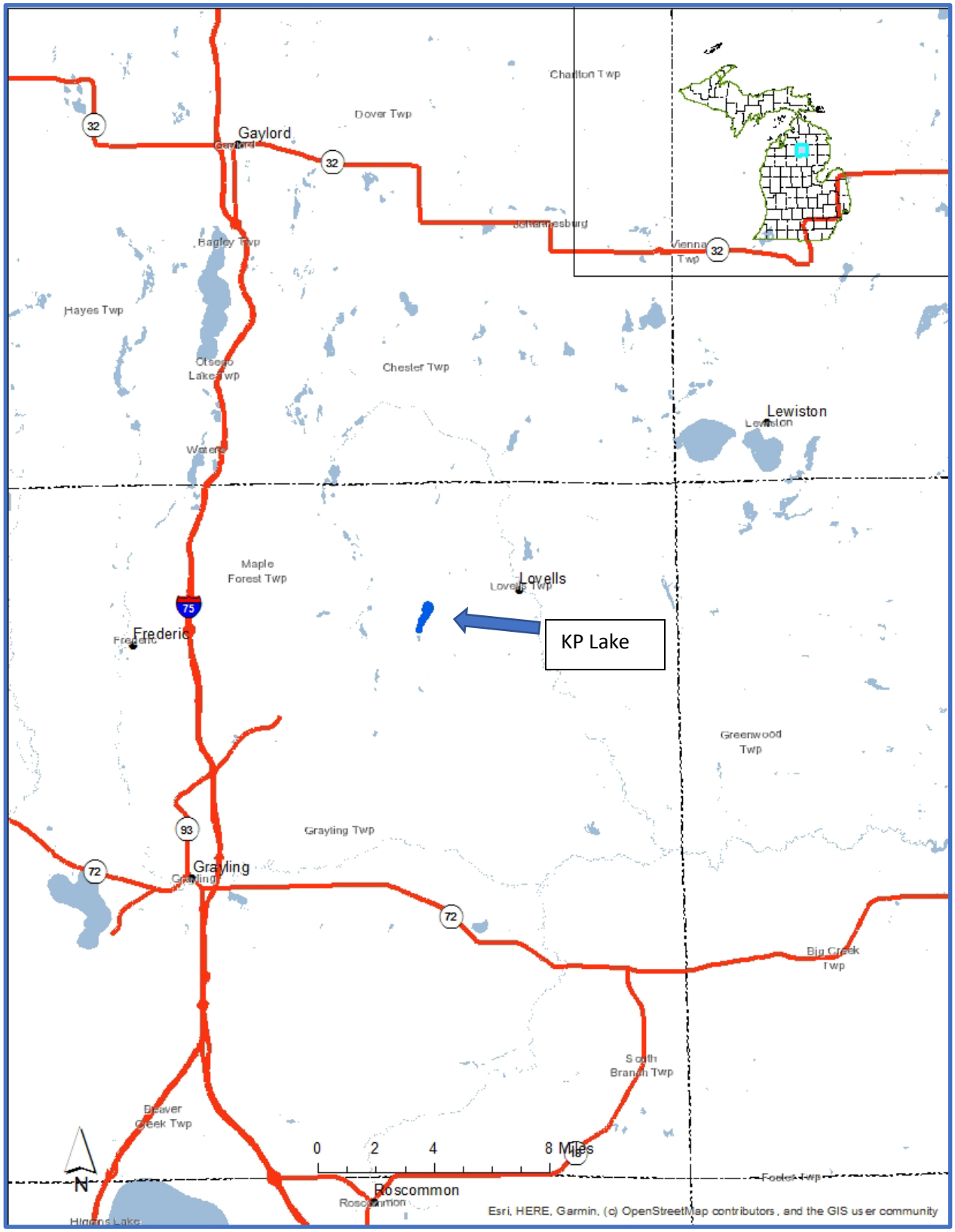


Figure 2. Depth Map for KP Lake, Crawford County. Contours are at 5-foot intervals.

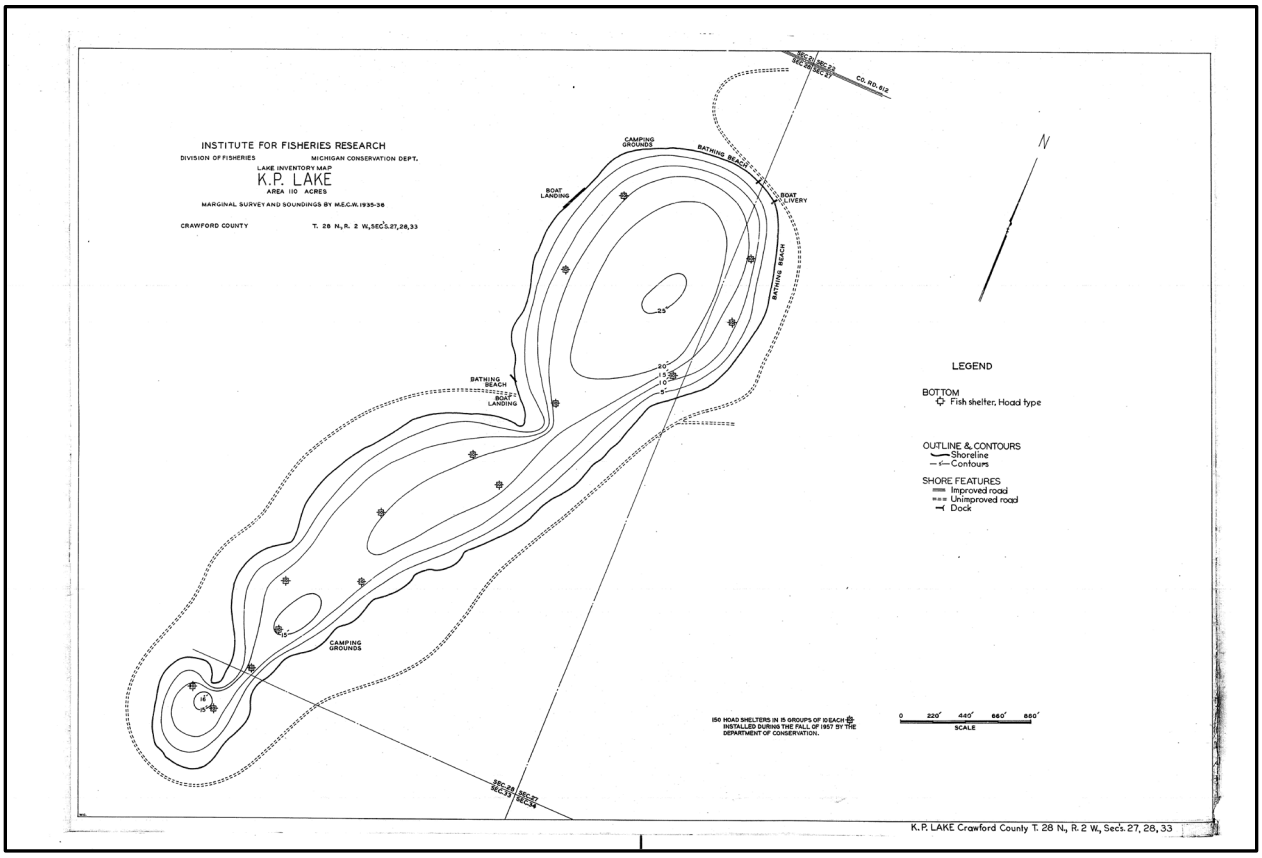


Figure 3. Catchment map and satellite imagery of the KP Lake Watershed. Catchment data delineated by Cheruvelil et al. (2021).

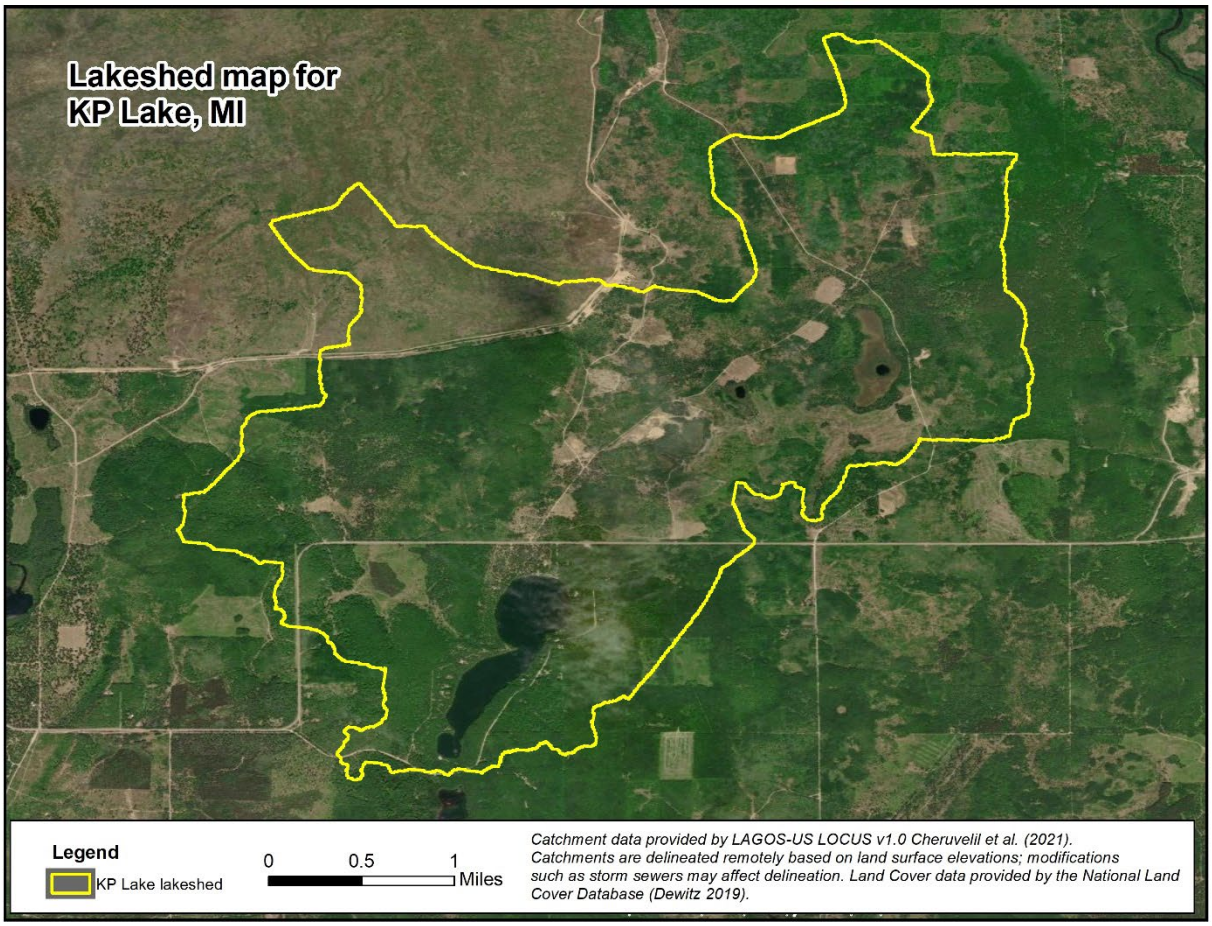


Figure 4. Catchment map and land use of the KP Lake Watershed. Catchment data delineated by Cheruvelil (2021) and land use data provided by the National Landcover Database (Dewitz 2021).

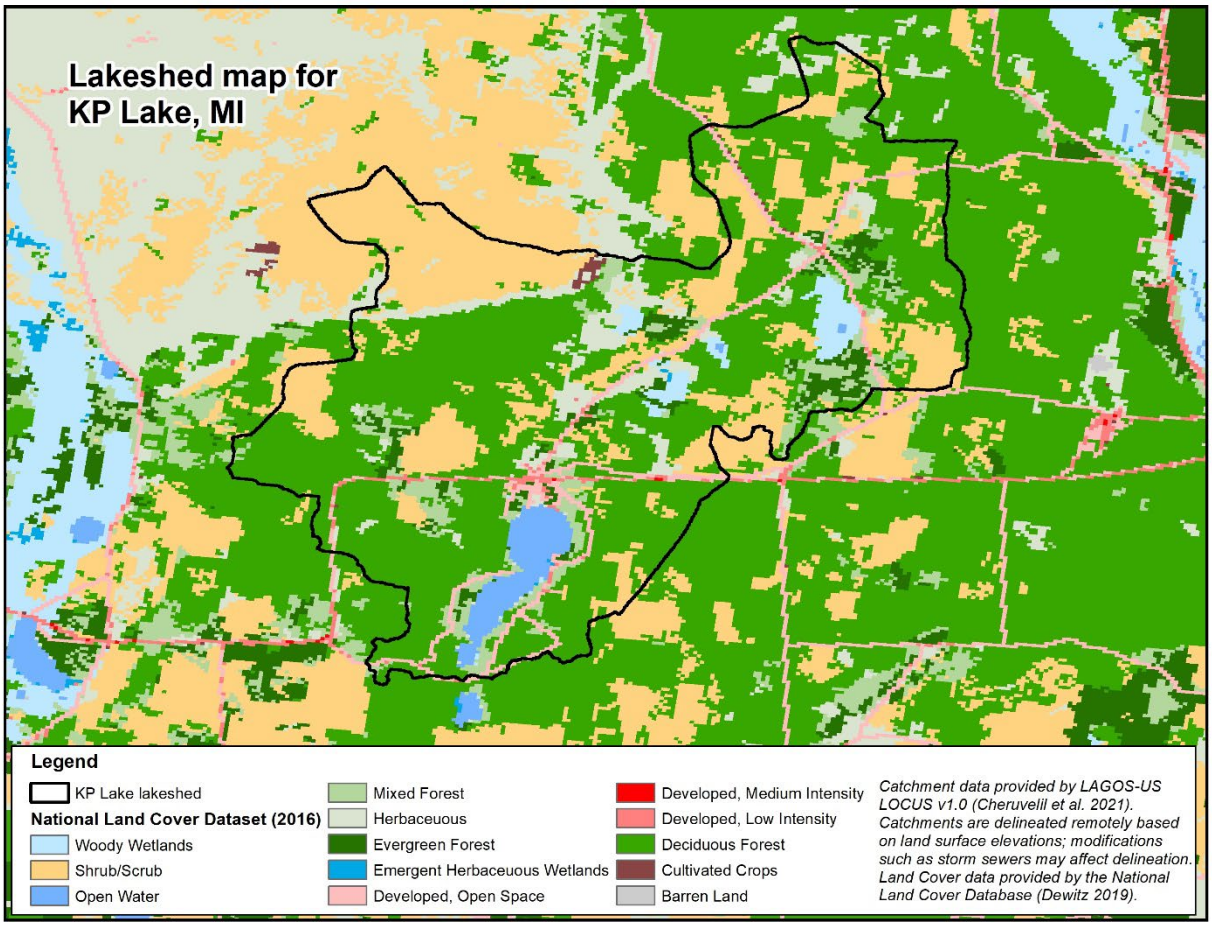
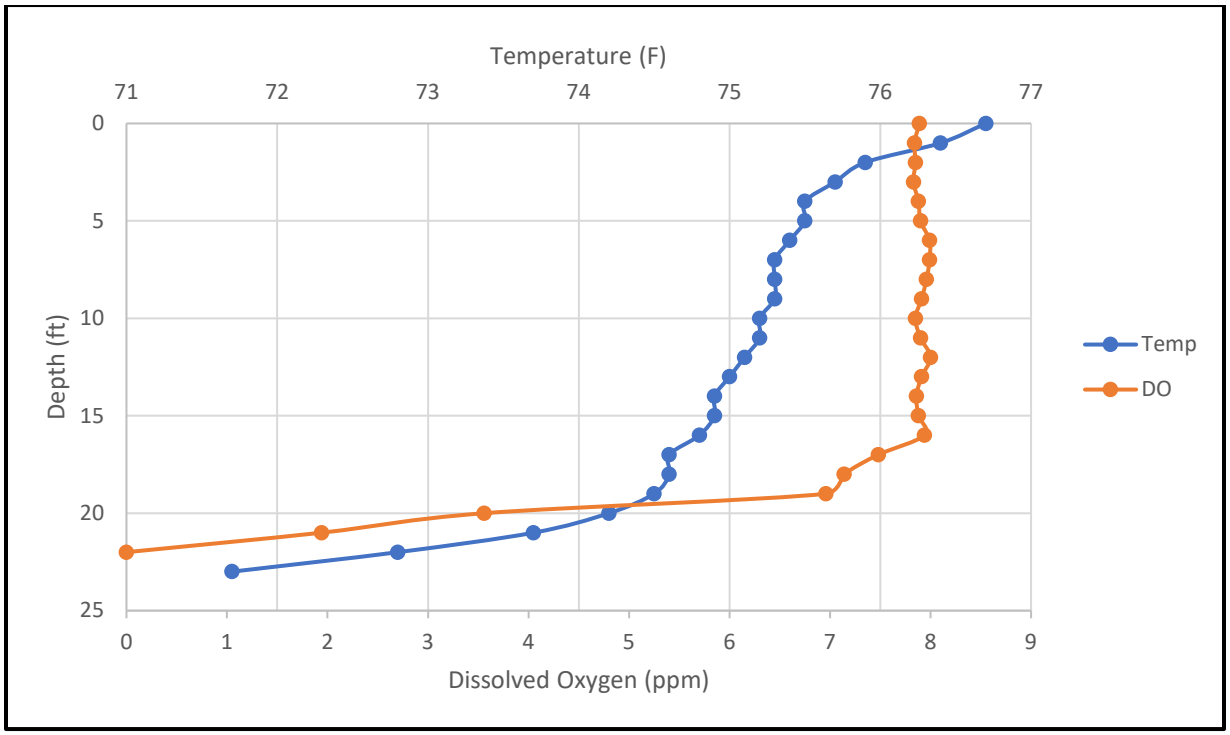


Figure 5. Temperature and dissolved oxygen measured along a profile of KP Lake, Crawford County, on August 9, 2022.



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