Maceday Lake
Oakland County, T3N/R9E/Sec. 5, 6, 7, 8
Clinton River, 2019

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Environment

Maceday Lake is a 234-acre lake with a broad connection to the 185-acre Lotus Lake. The two lakes are in Oakland County, about 8 miles west of Pontiac. Maceday Lake has one large, deep basin reaching 117 feet deep, surrounded by sharply sloping drop-offs and two significant shoal areas (Figure 1). The southern shoal is a broad shelf extending 600-800 feet from shore with only scattered aquatic vegetation present and a sandy marl bottom. The northern shoal makes up the broad connection to Lotus Lake and is heavily vegetated with submerged and emergent aquatic vegetation and occasional stumps present. Lotus Lake has two deep basins separated by a shallow shoal containing two islands. The northern basin reaches 40 feet deep while the southeastern basin drops to 65 feet (Figure 1). Throughout Lotus Lake there are moderate amounts of emergent and submerged aquatic vegetation. Bottom substrates include organic muck, sand, and gravel.

The perimeter for the two lakes totals about 8.9 miles. Both lakes combined hold a water volume of 10,562 acre-feet and 27% of this volume is 10 feet deep or less. Despite the deep basins, about 52% of the lakes' area is less than 10 feet deep. The lakes are part of the Clinton River watershed, with an inlet from the Clinton River at the northeast end of Lotus Lake and an outlet at the south end of Maceday Lake, where a water level control structure regulates the surface elevation of both lakes.

The surficial geology of the surrounding area is glacial outwash sand, gravel and end moraines of course-textured till. This type of geology is well drained and allows good movement of groundwater. The land cover for the surrounding area and portion of the watershed upstream of Maceday and Lotus lakes is mostly urban (62%) with some forest (21%), additional lakes and streams (8%), and wetland (6%) (Fry et al. 2011). The population of Oakland County is around 1.25 million people (US Census Bureau, 2019), contributing to the high level of urban land use in the watershed. Much of the shoreline is developed into residential units and 74% of the shoreline is armored with vertical walls or artificial riprap. Maceday and Lotus lakes have about 43 dwellings and 41 docks each per mile of shoreline. The largest undeveloped section of shoreline is on the northwest side of Maceday Lake, which is owned by All Saints Cemetery. There is a public boat launch at the south end of Maceday Lake, off Williams Lake Road operated by the Michigan Department of Natural Resources.

Water temperature and dissolved oxygen profiles have been collected sporadically from 11 different years in Maceday Lake since 1947. Each profile was collected in the deepest portion of the main basin, intended to identify the stratification zones established throughout the water column along with the associated temperatures and dissolved oxygen levels, and were used to develop the following averages for Maceday Lake, 1947-2020. Lake stratification occurs where the water density gradient, caused by warming of the upper waters, is large enough that it prevents wind currents from mixing waters throughout the water column (Wehrly et al. 2015). The epilimnion is the upper layer of warm water that is well mixed with uniform temperature and dissolved oxygen levels. The epilimnion in Maceday Lake had an average depth of 17.4 feet (standard error: SE = 1.2) among the years. The metalimnion is

the middle layer of cool water in which the temperature changes rapidly with depth and averaged from 20.0 feet (SE = 1.0) to 31.6 feet (SE = 0.9) in Maceday Lake. The hypolimnion is the bottom layer of cold water where the temperature decreases slowly with depth, and in Maceday Lake it began at an average depth of 34.3 (SE = 1.2). Most fish species found in Michigan require dissolved oxygen levels of 3.0 mg/L or higher for suitable habitat (Schneider 2002). Dissolved oxygen levels in Maceday Lake were found suitable well into the hypolimnion among the years, with levels staying above 3.0 mg/L down to an average of 97.1 feet (SE = 2.1).

Water temperature and dissolved oxygen profiles in Lotus Lake have been collected on two occasions since 1947. The epilimnion in Lotus Lake had an average depth of 13.2 feet, the metalimnion averaged from 17.3 feet to 24.6 feet, while the hypolimnion began at an average depth of 27.3 feet. Unlike Maceday Lake, dissolved oxygen levels in Lotus Lake were found unsuitable in most of the hypolimnion as the dissolved oxygen dropped below 3.0 mg/L on average around 24 feet deep.

History

Maceday and Lotus lakes have consistently been managed as one waterbody due to the broad connection and will be discussed as a single unit (Maceday Lake) throughout the rest of this document. The lakes have a long history of fisheries management; the first investigation into the fish community was recorded in 1890 by the Michigan Fish Commission. As the second deepest lake in Oakland County, Maceday Lake has received numerous trial stockings over the years. Even prior to any introduced species, the lakes have supported a very diverse fish community that continues today (Table 1).

Fish stocking in Maceday Lake dates to the 1930s when stocking species such as largemouth bass, smallmouth bass, and yellow perch was common. Fisheries managers soon figured out these species, which naturally occurred in the lake, were self-sustaining and stocking them would not improve the fishery. The earliest coldwater fish species stocked in Maceday Lake were rainbow trout and lake trout, which were first stocked in 1947 and continue to be stocked today (Table 2). Splake (a hybrid between lake trout and brook trout) were first stocked in 1966 and also continue to be stocked (Table 2). Brown trout were stocked in Maceday Lake once in 1991 but those efforts were not continued. A small number (50 fish) of lake whitefish were also stocked in a single event during 2003. A walleye stocking program occurred in Maceday Lake from 1983 to 1995 but never resulted in a strong walleye fishery, leading fishery managers to terminate the program.

There have been multiple fisheries surveys conducted on Maceday and Lotus lakes, which ranged from targeting the whole fish community using multiple gear types to single species surveys using a single gear type. Over the years the lakes have consistently been reported to provide fair panfish and bass fisheries while also providing the only inland lake trout fishery in southeast Michigan (Francis 2010). Fish community surveys in the 1990s observed a stable bluegill population with growth rates slightly slower than state average and a Schneider's Index (Schneider 1990) of about 4.5, suggesting an average fishery. Largemouth bass have consistently been observed in good numbers and quality size, though growth rates were below the state average. Maceday Lake is one of the few lakes in southeast Michigan having supported a population of cisco (Latta 1995), a state threatened species (Derosier et al. 2015).

Angler surveys were conducted in 1986 and 2005. Although there was a substantial decline in angler effort observed in 2005, there were a few similarities in the overall fisheries between years. Bluegill was the primary species harvested, largemouth bass were the second most abundant species caught, and trout fishing accounted for about 10% of the fishing effort (Francis 2010; Waybrant and Thomas 1988). Catch rates were higher in 2005 than in 1986 but harvest was about 58% lower in 2005, which could be attributed to lower angler effort and increased catch-and-release fishing practices by anglers, especially bass anglers (Francis 2010).

Angler efforts on Maceday and Lotus lakes are regulated by the general, statewide fishing regulations for most species. For trout, Maceday Lake is regulated as a type C lake, which allows trout fishing all year with a daily possession limit of five fish, of which only 3 fish can be 15 inches or larger. The minimum size limit (MSL) for the three trout species currently being managed in Maceday Lake (lake trout, splake, and rainbow trout) is eight inches.

Current Status

Multiple survey efforts were carried out on Maceday Lake between 2019 and 2020. A fish community survey was conducted on Maceday Lake in May and June of 2019 as part of the random sampling for the Status and Trends Program (Wehrly et al. in press). Surveys were conducted in November 2019, along with efforts in August and September in 2020 to target trout and cisco. A passive creel survey was conducted during the winters of 2020 and 2021 to collect information on ice angling effort on Maceday Lake.

A variety of sampling gear was used for the fish community survey, including four large-mesh fyke nets, two small-mesh fyke nets, two experimental gill nets, a 25-foot seine and an electrofishing boat. During the week of May 20, 2019, both types of fyke nets and experimental gillnets were deployed, with large-mesh fyke nets and experimental gillnets set for 3 net nights and small-mesh fyke nets 2 net nights. On June 11, 2019, three seine hauls were conducted during the daylight hours and 3 electrofishing transects were conducted after dark for 10 minutes each. The objective of the survey was to evaluate the status of the fish community, providing information to direct management recommendations.

The trout and cisco targeted efforts in fall 2019 were completed with two straight-run gillnets and four experimental gillnets set for a single night in depths ranging from 7 feet to 36 feet. The trout and cisco targeted efforts in summer 2020 were completed over 3 individual nights using vertical gillnets ganged together following protocols described in the Minnesota Manual of Instruction for Lake Survey (MNDNR 2017). The vertical gillnets were set from the surface down to depths of 100 feet and 75 feet.

All sampling gears combined captured 1,992 fish, representing 28 species. Panfish (black crappie, bluegill, longear sunfish, pumpkinseed, rock bass and warmouth) composed 66% of the catch by number (Table 3). Large predators (Bowfin, channel catfish, largemouth bass, lake trout, longnose gar, northern pike, smallmouth bass, and splake) composed 7% of the catch by number (Table 3). Minnows, suckers, and darters (blackchin shiner, bluntnose minnow, brook silverside, Iowa darter, lake chubsucker, logperch, sand shiner, and spotfin shiner) made up 21% of the catch by number (Table 3).

Bluegill was the most abundant species overall, comprising 55% of the catch by number (Table 3). Bluegill ranged from 1 to 9 inches and averaged 3.7 inches overall, with 23% larger than seven inches (Table 4). Bluegill ages ranged from 1 to 8 years old and 80% were 1 to 4 years old (Table 5). The mean growth index (MGI) for bluegill was +0.2, suggesting the growth rate for bluegill is near average for populations around the state. The catch per unit effort (CPE) of bluegill in large-mesh fyke nets was 34.8 fish per net night and 20.0 fish per net night in small-mesh fyke nets (Table 6).

One way to classify the quality of a bluegill population is to use Schneider's Index (Schneider 1990), which provides a relative measure of the quality of bluegill size in a lake. It is based on a relative scale from one to seven, with seven being the best. Metrics used in the index include catch data from specific gear types (e.g. large-mesh fyke nets) and the MGI. The average size bluegill caught in large-mesh fyke nets was 7.1 inches and 79% were larger than six inches, 59% were seven inches or larger and 27% exceeded 8 inches. The Schneider Index (Schneider 1990) for Maceday Lake was 5.6, indicating the bluegill size structure is good to excellent.

Other abundant panfish included pumpkinseed, which was the third most abundant species captured, and rock bass, the sixth most abundant species overall (Table 3). Pumpkinseed ranged in size from one to eight inches, with an average length of 6.2 inches (Table 3), and 45% were seven inches long or larger. The CPE for pumpkinseed caught in large-mesh fyke nets was 9.8 fish per net night (Table 6). Rock bass ranged in size from 3 to 8 inches, with an average length of 5.6 inches and 27% were 7 inches long or larger. Rock bass CPE was highest in large-mesh fyke nets (3.7 fish/net night; Table 6). Other panfish (black crappie, warmouth, and longear sunfish) were caught in low numbers (Table 3).

Largemouth bass and smallmouth bass made up 5% of the overall catch by number. Largemouth bass were captured in higher numbers, making up 4% of the overall catch alone (Table 3) and having a higher CPE than smallmouth bass in electrofishing and large-mesh fyke net efforts (Table 6). Largemouth ranged in size from 2 to 19 inches, averaging 9.3 inches (Table 3). Of the 89 largemouth bass captured, only five were larger than the 14-inch minimum size limit (MSL) (Table 4). Largemouth bass captured ranged from 1 to 11 years old, with 82% being between 3 to 6 years old (Table 5). The MGI for largemouth bass was -2.3 suggesting they are growing significantly below the state average (Table 5). Based on catch rates, Smallmouth bass were less abundant than largemouth bass and ranged in length from 3 to 19 inches (Table 3). Smallmouth bass length averaged 8.3 inches and 15% were larger than the 14-inch MSL. Smallmouth bass ages ranged from 1 to 6 years old, though too few were captured to calculate the MGI (Table 5). Both species had representation from multiple year classes, indicating annual recruitment to the population.

Coldwater species (lake trout and splake) made up 1% of the overall catch (Table 3). Lake trout ranged from 16 to 35 inches, and all individuals were larger than the MSL of 8 inches (Table 6). Splake ranged in size from 7 to 21 inches and 64% were larger than the MSL of 8 inches. No rainbow trout or cisco were captured during any of the survey efforts, even when gear such as the vertical gillnets were used to target them.

A diverse group of forage species were caught during the fish community survey, though bluntnose minnow was the only species that was relatively abundant. Ranging in size from 1 to 3 inches, bluntnose minnow was the second most abundant species caught in the survey (Table 3). This small

size range is common for many forage species. Sand shiner was the 7th most abundant species caught and is another small-bodied species that ranged from 1 to 2 inches (Table 3).

Passive angler counts were collected using a Plotwatcher camera focused on the public access site of the lake and set to capture images every five seconds from daylight until dark each day. Fisheries staff then used GameFinder software to view the images as a time lapse video. This method captured a total of 544 fishing trips in 2020 and 762 trips in 2021 on Maceday Lake (Table 7). Ice fishing was the dominant method of fishing observed during both winters making up 94% of the trips in 2020 and 100% of the trips in 2021. The 2020 observations began on December 20, 2019, prior to ice forming, which allowed for the observation of additional angling modes including kayak (4%), boat (1%) and a single shore angler (<1%). The 2021 observations began on January 9, 2021 when ice was formed. Both years, the observations stopped in early March when ice deteriorated enough to discourage angler access. We were able to identify about 83% of the trips each year as completed (Table 7) wherein an individual angler was observed going out on the lake and then coming back off the lake. Based on the completed trip information, anglers spent an average of 3.1 hours/trip in 2020 and 3.2 hours/trip in 2021.

Analysis and Discussion

Maceday Lake continues to support a diverse fish community and quality fishery. During the 2019 and 2020 surveys there were 28 fish species observed, including four fish not native to Maceday Lake (channel catfish, common carp, lake trout, and splake). This high number of species is above average for lakes in LEMU (18 species) and almost twice that of the state median (14 species) found through the status and trends program (Wehrly et al. 2015). Eighty-five percent of the native fish species historically found in Maceday Lake were observed during the surveys and it is likely the remaining 15% continue to persist. The predator and prey ratio appears to be in good balance with a high number of forage species, good panfish size structure and a fair number of large predators.

Maceday Lake offers a quality panfish fishery with a variety of species for anglers to target. Panfish make up high percentage (>90%) of the harvest on Maceday Lake, according to the angler survey conducted in 2005 (Francis 2010). Bluegill is one of the dominant species in Maceday Lake, as evidenced by these surveys, and is one of the most captured fish by anglers (Francis 2010). The relatively high bluegill catch rates (Table 6), average growth rates, and the good Schneider Index rating suggest Maceday Lake supports a high-quality bluegill fishery. The statewide regulations appear to be sufficient to keep this population at a sustainable level, as it has been over the years. Rock bass, pumpkinseed and black crappie contribute to the quality panfish fishery as well. Rock bass and pumpkinseed were captured at a quality rate, when compared regionally and statewide (Table 6). Black Crappie were caught in low numbers in the 2019 fish community survey, but that may not be representative of the population, as they were the second most harvested species behind bluegill (Francis 2010).

Largemouth bass are part of another popular fishery found in Maceday Lake. They were the second most abundant species caught in Maceday Lake during the 2005 angler survey (Francis 2010) and their relative density was higher than the regional and statewide median for electrofishing and large-mesh fyke nets. Slow growth in largemouth bass observed in Maceday Lake is not uncommon in southeast Michigan Lakes. Even though largemouth bass are growing slowly, longer-lived individuals can attain large sizes as evidenced by fish reaching 19 inches. During 2005, smallmouth bass were caught by

anglers in lower relative density than the regional and statewide average and made up a much smaller portion of angler catch (Francis 2010). While smallmouth bass are not as abundant in Maceday Lake, they can attain large sizes. Since 2007, there have been three smallmouth bass recorded in the Master Angler Program, which acknowledges an angler's catch of a smallmouth bass reaching 21" or larger. Tournament fishing on Maceday Lake averages less than 4 tournaments per year. The low competitive interest could be due to the small boat launch size, which only has 18 parking spaces.

Trout in Maceday Lake continue to provide a unique fishery in southeast Michigan. Trout fishing accounted for about 10% of the angler effort in the 2005 angler survey. The 2019 and 2020 surveys provide evidence of continued survival of splake and lake trout. Maceday Lake is the only inland lake in southeast Michigan where anglers can target splake and lake trout. The smaller splake caught throughout Maceday Lake during the surveys were likely stocked in 2019. Larger splake and lake trout were caught only in the deepest basin of the lake where temperature and oxygen profiles indicated adequate habitat for coldwater species (average of 97 feet). The lack of other coldwater species such as rainbow trout and cisco in the survey is concerning, especially since rainbow trout were as readily caught as splake in the 2005 angler survey and prior fisheries surveys on Maceday Lake. Predation from large splake and lake trout could be negatively impacting rainbow trout and cisco populations, but there is uncertainty about the level of impact the larger predators are having. There were few northern pike captured during the surveys, a trend also observed in the 2005 angler survey when too few were recorded to generate a catch estimate. Northern pike are a voracious large predator and given the management of Maceday Lake as a trout lake, low northern pike abundance is a positive feature as it limits predation on the stocked trout.

Maceday Lake has a substantial amount development in the nearshore area, but the lake continues to support good water quality and habitat in the deeper offshore areas. When compared regionally, the 43 dwellings/mile and 41 docks/mile found on Maceday Lake is higher than the LEMU averages of 35.9 dwellings/mile and 38.9 docks/mile. This dense development is likely the reason for so few submersed trees (2.7 trees/mile) compared to the LEMU average (13.8 trees/mile). O'Neal and Soulliere (2006) reported that alterations or development of the shoreline that is higher than 25% can have detrimental effects on a lake's nearshore ecosystem through habitat degradation and loss of woody material. There remain vestiges of natural shoreline, including wetland complexes that are beneficial for the aquatic community, and those remaining natural shorelines should be protected. The deep, well oxygenated portions of Maceday Lake contribute to the quality aquatic habitat available.

The Maceday Lake fishery continues to attract anglers all year, whether it is open water or ice covered. Francis (2010) identified a decreased fishing effort from 1986 to 2005, though a substantial amount of effort continued to take place on Maceday Lake. Ice fishing effort was not captured as part of the 2005 angler survey but was during the 1986 survey (Francis 2010). In 1986, ice fishing effort totaled 20.3 hours/acre, making up about 23% of the total fishing effort on Maceday Lake (Waybrant and Thomas 1988). Based on the information collected from the passive cameras, ice fishing effort totaled about 4 hours/acre in 2020 and 5.7 hours/acre in 2021, when the number of trips totaled 762 trips (Table 7). Due to differing methodologies in data collection, direct comparisons should not be made but this information suggests a similar decrease of ice fishing effort as observed in the open water fishery in 2005. Even though the ice fishing numbers seem low, they still identify that a fair amount of angler effort is deployed on Maceday Lake when ice covered as well as during the open water season.

Management Direction

Maceday Lake provides a quality fishery for many species, which is partly due to the small remaining areas of natural shoreline and the high lake volume with suitable dissolved oxygen. Efforts should be made to protect the remaining natural shoreline around Maceday Lake as it benefits many fish species and other wildlife. With the vast amount of deeper water in the lake and sparse vegetation throughout most areas, nuisance vegetation control treatments should be limited only to isolated areas for invasive species control. When the opportunity exists, riparian owners wanting new or to repair existing armored shorelines should be made aware of shoreline softening options that could be more beneficial to the aquatic community compared to hard armoring.

The trout stocking program continues to be successful and allows a unique fishery to thrive in the southeast region of the state. The lack of rainbow trout in the catch, along with angler reports of not being able to catch rainbow trout, suggests further investigation should occur to understand the survival of stocked rainbow trout and subsequent recruitment into the fishery. At this time, it is recommended to continue the stocking program at the prescribed rate of 24 splake/acre and 29 rainbow trout/acre for the combined surface acres of Maceday and Lotus Lakes. Rainbow trout stocking survival should be evaluated further with vertical gillnets when the lake is stratified to better evaluate the success or failure of this stocking program in combination with angler feedback. Adult lake trout should continue to be stocked opportunistically, when federal or state hatcheries have fish available, to provide anglers with the unique opportunity of catching a lake trout in an inland lake. This opportunistic approach should consider prior stockings and the ability for lake trout to persist for many years following stocking to protect from too many large predators overwhelming the smaller native species. Further evaluation of the coldwater fish community will lend data to inform the decision of future lake trout stockings. If available, analysis of lake trout stomach contents should be completed with future evaluations, as that could provide a better understanding about the other species being targeted by this top predator (e.g. rainbow trout and cisco).

Since eutrophication is one of the largest threats to cisco (Jacobson et al. 2008; Latta 1995), emphasis should be put on reducing or eliminating sources of nutrient loading in the watershed. Public properties in the watershed should incorporate best management practices such as wetland protection, buffer strips, and vegetation treatment processes that address nutrient loading. When residents in watershed are engaged, the importance of using best management practices should be conveyed to protect the lake against eutrophication. These actions will help maintain the quality fisheries on Maceday Lake. Since no cisco were caught during these surveys, future efforts should investigate if this rare resource continues to thrive in Maceday Lake, knowing that adequate cold and well oxygenated habitat is available.

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Tables

Table 1. Fish species historically found in Maceday Lake. Origin: N = Native, I = Introduced; Status: P = Present, O = Extirpated, U = Unknown (followed by year it was last collected in the lake); 2019: an X indicates the species was caught in the most recent fisheries surveys during 2019 and 2020.

Common name	Family	Scientific name	Origin	Status	2019/2020
Bowfin	Amiidae	*Amia calva*	N	P	X
Brook silverside	Atherinidae	*Labidesthes sicculus*	N	P	X
Lake chubsucker	Catostomidae	*Erimyzon sucetta*	N	P	X
Rock bass	Centrarchidae	*Ambloplites rupestris*	N	P	X
Green sunfish	Centrarchidae	*Lepomis cyanellus*	N	P	
Pumpkinseed	Centrarchidae	*Lepomis gibbosus*	N	P	X
Warmouth	Centrarchidae	*Lepomis gulosus*	N	P	X
Bluegill	Centrarchidae	*Lepomis macrochirus*	N	P	X
Longear sunfish	Centrarchidae	*Lepomis peltastes*	N	P	X
Smallmouth bass	Centrarchidae	*Micropterus dolomieu*	N	P	X
Largemouth bass	Centrarchidae	*Micropterus salmoides*	N	P	X
Black crappie	Centrarchidae	*Pomoxis nigromaculatus*	N	P	X
Spotfin shiner	Cyprinidae	*Cyprinella spiloptera*	N	P	X
Common carp	Cyprinidae	*Cyprinus carpio*	I	P	X
Golden shiner	Cyprinidae	*Notemigonus crysoleucas*	N	P	
Blackchin shiner	Cyprinidae	*Notropis heterodon*	N	P	X
Sand shiner	Cyprinidae	*Notropis stramineus*	N	P	X
Bluntnose minnow	Cyprinidae	*Pimephales notatus*	N	P	X
Grass pickerel	Esocidae	*Esox americanus*	N	P	X
Northern pike	Esocidae	*Esox lucius*	N	P	X
Black bullhead	Ictaluridae	*Ameiurus melas*	N	P	X
Yellow bullhead	Ictaluridae	*Ameiurus natalis*	N	P	X
Brown bullhead	Ictaluridae	*Ameiurus nebulosus*	N	P	X
Channel catfish	Ictaluridae	*Ictalurus punctatus*	I	P	X
Longnose gar	Lepisosteidae	*Lepisosteus osseus*	N	P	X
Rainbow smelt	Osmeridae	*Osmerus mordax*	I	U (1985)	
Iowa darter	Percidae	*Etheostoma exile*	N	P	X
Yellow perch	Percidae	*Perca flavescens*	N	P	X
Logperch	Percidae	*Percina caprodes*	N	P	X
Walleye	Percidae	*Sander vitreus*	I	O	
Cisco	Salmonidae	*Coregonus artedi*	N	U (2005)	
Rainbow trout	Salmonidae	*Oncorhynchus mykiss*	I	P	
Brown trout	Salmonidae	*Salmo trutta*	I	O	
Splake	Salmonidae	*Salvelinus fontinalis x S. namaycush*	I	P	X
Lake trout	Salmonidae	*Salvelinus namaycush*	I	P	X

Table 2. Fish stocking records for lake trout, rainbow trout, and splake in Maceday Lake, 2000 – 2020.

Year	Lake trout		Rainbow trout		Splake	
	Number	Average size (in.)	Number	Average size (in.)	Number	Average size (in.)
2000			12,000	6.4	9,000	7.2
2001			12,090	5.3	10,550	7.0
2002			19,490	5.9	11,500	7.0
2003	250	17.0	19,200	6.1	11,000	7.0
2004			12,000	7.4	12,060	6.1
2005			12,000	7.4	15,000	6.9
2006	300	23.9	16,000	7.7	10,200	7.2
2007			12,000	7.5	9,600	7.4
2008			12,000	7.2	10,000	7.2
2009	1,000	13.1	12,000	7.2	15,000	6.7
2010	300	25.4	12,760	6.6	13,300	7.1
2011	270	27.5	12,400	6.5	10,300	7.2
2012			12,000	6.9	10,300	7.8
2013			12,200	7.3	10,000	7.0
2014			12,400	6.6	10,000	7.5
2015			12,400	6.6	9,300	7.5
2016	430	15.7	12,000	7.7	10,000	7.4
2017	10,110	4.5	12,003	6.7	10,000	7.4
2018			12,000	7.4	10,000	8.0
2019	250	25.3	12,000	6.9	10,000	6.9
2020					10,000	7.1

Table 3. Species catch summary of fish collected with all gear types combined during the Maceday Lake fisheries surveys, spring 2019, fall 2019, and summer 2020.

Species	Number	Percent by number	Length Range (in.)	Average length (in.)
Bluegill	1099	55%	1 - 9	3.7
Bluntnose minnow	328	16%	1 - 3	1.5
Pumpkinseed	132	7%	1 - 8	6.2
Largemouth bass	89	4%	2 - 19	9.3
Yellow bullhead	60	3%	4 - 11	8.1
Rock bass	59	3%	3 - 8	5.6
Sand shiner	42	2%	1 - 2	1.7
Yellow perch	30	2%	2 - 8	3.9
Black bullhead	27	1%	8 - 12	9.3
Splake	17	1%	7 - 21	10.0
Logperch	15	1%	2 - 6	3.8
Lake trout	13	1%	16 - 35	27.7
Smallmouth bass	13	1%	3 - 19	8.3
Northern pike	9	<1%	18 - 35	23.3
Brook silverside	7	<1%	2 - 3	2.9
Black crappie	7	<1%	6 - 12	10.2
Iowa darter	6	<1%	1	1.0
Spotfin shiner	6	<1%	2 - 3	2.3
Longnose gar	6	<1%	24 - 42	34.8
Blackchin shiner	5	<1%	1 - 2	1.6
Brown bullhead	5	<1%	8 - 12	9.5
Warmouth	4	<1%	5 - 7	6.0
Bowfin	3	<1%	18 - 19	18.3
Common carp	3	<1%	9 - 31	22.3
Grass pickerel	2	<1%	6 - 10	8.0
Lake chubsucker	2	<1%	8 - 9	8.5
Channel catfish	1	<1%	17	17.0
Hybrid sunfish	1	<1%	6	6.0
Longear sunfish	1	<1%	3	3.0
Total caught	1992			

Table 4. Number per inch group of select species collected with all gears combined, during the Maceday and Lotus lakes fishery surveys, spring 2019, fall 2019, and summer 2020.

Inch group	Bluegill	Lake trout	Largemouth bass	Pumpkinseed	Rock bass	Smallmouth bass	Splake
1	334			3			
2	195		3	2			
3	73		3	5	1	2	
4	66			2	9	2	
5	82			12	21	1	
6	97			49	12	2	
7	137		8	54	11		7
8	114		9	5	5	1	6
9	1		27				
10			18			1	
11			9			1	
12			5				1
13			2			1	
14			2				
15							1
16		1	1			1	
17			1				1
18		1					
19		2	1			1	
20		1					
21							1
28		2					
29		1					
31		1					
32		1					
33		1					
35		2					
Total	1099	13	89	132	59	13	17

Table 5. Weighted mean length and age composition of select species collected during the fisheries survey of Maceday and Lotus lakes, May 20 through June 11, 2019.

Species	Age	Number aged	Length range (in.)	State avg. length (in.)	Weighted mean length (in.)	MGI*
Bluegill	I	17	1.2 – 2.5	1.8	1.68	-0.2
	II	3	2.5 – 2.8	3.8	2.63	
	III	9	3.1 – 6.2	5.0	3.68	
	IV	23	3.7 – 7.0	5.9	5.19	
	V	11	5.4 – 7.4	6.7	6.35	
	VI	10	6.8 – 8.6	7.3	7.57	
	VII	6	7.7 – 8.3	7.8	8.00	
	VIII	7	8.0 – 9.3	8.2	8.47	
Largemouth bass	I	6	2.5 – 3.8	4.2	3.02	-2.3
	II	2	7.2 – 7.3	7.1	7.25	
	III	14	7.5 – 9.7	9.4	8.50	
	IV	12	8.8 – 11.3	11.6	9.61	
	V	19	9.0 – 13.2	13.2	10.68	
	VI	20	10.4 – 16.4	14.7	11.22	
	VII	10	11.6 – 14.9	16.3	12.90	
	IX	1	13.2	18.3	13.20	
	X	1	17	19.3	17.00	
	XI	1	19.6	--	19.60	
Smallmouth bass	I	4	3.2 – 4.5	3.75	3.75	--
	II	4	4.6 – 6.7	7.5	5.80	
	III	3	8.1 – 11.4	10.8	9.10	
	IV	1	13.0	12.6	13.00	
	VI	2	16.5 – 19.6	15.3	18.05	

*Mean growth index is the average deviation from the state average length at age.

Table 6. Comparison of catch-per-effort (CPE) for select species in Maceday Lake along with statewide and Lake Erie Management Unit (LEMU) CPE generated from the Status and Trends Program (Wehrly et al. 2015). CPE for electrofishing is number of fish per minute. CPE for Large-mesh fyke, and small-mesh fyke is number of fish per lift.

		Statewide CPE				
Species	Gear	25th percentile	Median	75th percentile	**Maceday Lake 2019**	LEMU Median CPE
Bluegill	Electrofishing	1.2	3.9	7.6	**5.5**	8.4
	Large-mesh fyke net	2.5	11.7	31.9	**34.8**	21.8
	Small-mesh fyke net	2.3	8.5	36.5	**20.0**	25.5
Pumpkinseed	Electrofishing	0.2	0.4	1	**0.3**	0.2
	Large-mesh fyke net	0.7	1.9	5.5	**9.8**	1.7
	Small-mesh fyke net	0.5	2.3	8	**0.5**	1.3
Rock bass	Electrofishing	0.1	0.3	0.7	**0.4**	0.6
	Large-mesh fyke net	1.3	3.6	8.2	**3.7**	2.7
	Small-mesh fyke net	1	2.8	6	**0.3**	1
Largemouth bass	Electrofishing	0.3	0.8	1.6	**1.0**	0.9
	Large-mesh fyke net	0.5	1.4	2.7	**4.5**	1.6
	Small-mesh fyke net	0.5	1	2.8	**0.5**	0.88
Smallmouth bass	Electrofishing	0.1	0.2	0.4	**0.4**	0.1
	Large-mesh fyke net	0.3	0.6	1.5	**0.1**	0.3
	Small-mesh fyke net	0.3	0.5	1.3	**0.0**	0.1

Table 7. Passive angler count data from winters of 2020 and 2021.

	Year	
	2020	2021
Complete trips	452	637
Incomplete trips	92	125
Total trips	544	762
Average trip length (hours/trip)	3.1	3.2
Total hours per acre	4.0	5.7

Figures

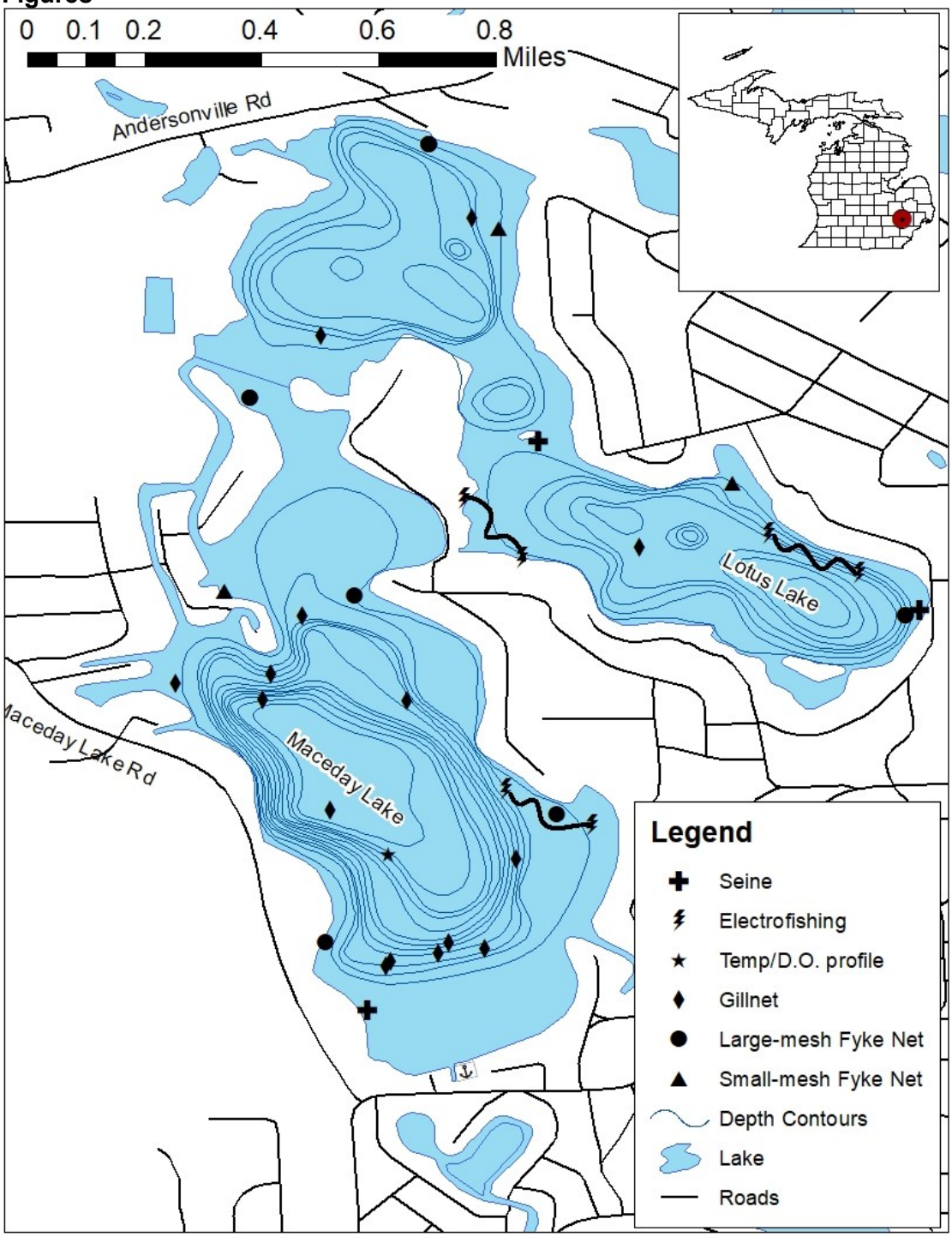

Figure 1. Map of Maceday and Lotus lakes, Oakland County with gear effort indicators for the fisheries surveys conducted, spring 2019, fall 2019, and summer 2020. Dark blue lines represent contour lines with the outer two representing 5 and 10 feet contours then 10 feet increments for the inner lines.

Received May 9, 2022; published September 1, 2022

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