Donnell Lake

Cass County; T6S/R14W/Sec 35 and 36

Surveyed May 13 – 16, 2024

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Introduction

Donnell Lake is a 246-acre lake located near Cassopolis in Cass County. There is a Michigan Department of Natural Resources (DNR) boating access site located on the south side of the lake (Figure 1). DNR conducted a fisheries survey in spring of 2024 to evaluate the status of the fishery. The purpose of this report is to document preliminary results from the field survey efforts. Survey work is ongoing and a limnological survey will be conducted on August 8, 2024. Information presented in this report is preliminary and have not been quality checked. Information may change prior to the final report, but general trends and information is representative of what was observed in the survey.

Methods

Donnel Lake was surveyed in 2024 as part a DNR discretionary survey. Methods followed those of the DNR Status and Trends program (Wehrly et al. In Revision). Netting efforts took place during May 13-16, 2024. Two gill net sets were conducted overnight for one night for a total of two net nights). Three large-mesh fyke nets were set for three overnight sets for a total of 9 net nights. Two small-mesh fyke nets were set for two nights for a total of 4 net nights. Four seine hauls were conducted to enumerate minnow and prey species. Three 10-minute electrofishing transects were performed on May 16, 2024, for a total of 30 minutes of electrofishing. Limnological sampling will be conducted on August 8, 2024, and included a temperature and oxygen profile. Temperature and dissolved oxygen concentrations were recorded at one-foot increments at the deepest spot in the lake. All fish were identified, counted, and measured for total length, and aging structures were collected from 10 fish in each inch class for Largemouth Bass, Smallmouth Bass, Northern Pike, Walleye, Bluegill, and Black Cappie. Weights for all fish species were calculated using the length-weight regression equations compiled by Schneider et al. (2000).

The relative stock density for each fish species was assessed using catch per unit effort (CPUE) calculated as the number of fish caught per net night (gill, fyke, and trap nets), per hour of electrofishing (boomshocker), or per seine haul. CPUE data from this survey were compared to a summary of CPUE data from lakes surveyed in the Status and Trend Program from 2001 through 2022 on a statewide and regional level for the Southern Lake Michigan Management Unit (SLMMU). Weighted age compositions using length and age keys for each game fish species were calculated as described by Schneider (2000b). A growth index for each age class was calculated by subtracting the state average mean length from the mean length-at-age from the 2024 Donnell Lake survey. Growth indices for age classes represented by a minimum of five fish were averaged to provide a mean index of fish growth (Schneider et al. 2000a). Growth index scores between +1 and -1 are considered similar to the state average while scores less than -1 and greater than +1 are considered below or above the state average, respectively. Bluegill size structure was rated using an index based on the mean length and the proportion of fish >6 inches, >7 inches, and >8 inches collected using specific gear types (Schneider 2000a, Schneider 1990).

Results and Discussion

A total of 1,215 fish were collected in the 2024 fish survey (Table 2). A total of 27 species were observed. Bluegill were the most abundant (n = 436) making up 36% of the total catch by numbers. Bluegill CPUE was 11.7 fish per net night in large-mesh fyke nets and 29.3 fish per net night in trap nets. These catch rates were below the 25th percentile for lakes surveyed in SLMMU (fyke = 22.1; trap = 30.79 fish per net night), but close to the median for statewide lakes (fyke = 13.4; trap = 21.3 fish per net night). This indicates a moderate density of fish. Bluegill populations with moderate densities tend to have greater growth rates resulting in good size structure. We do not have growth data at this time to confirm this is the case, but size structure in Donnell Lake was very good. Bluegill ranged from 1 to 9 inches. A total of 36% of the Bluegill captured in large-mesh fyke and trap nets were 8 inches or larger with 9 fish over 9 inches caught. The Schnider index ranked the Bluegill size structure as excellent (5.8). Other Panfish were also collected in good numbers and exhibiting good size structure. Pumpkinseed (n = 71), Hybrid Sunfish (n = 28), and Rock Bass (n = 23) were also caught in good numbers. Pumpkinseed were large averaging 7.7 inches. Very few Yellow Perch and Black Crappie were captured in the survey (n = 14 and 6 respectively). These fish species are not targeted well by May surveys, but we would expect higher catch rates if there was significant contribution to the fishery.

Largemouth Bass were the primary predator in Donnell Lake. A total of 115 Largemouth Bass were captured ranging from 2 to 16 inches. Only 6.1% of Largemouth Bass were above the 14-inch legal length limit. It is unclear if the lack of larger fish is due to mortality or poor growth

rates. Analysis of growth data will inform the management recommendations. Catch rates of Largemouth Bass from electrofishing samples was 192 fish per hour. This is higher than the 75th percentile of surveys conducted on SLMMU lakes (147 fish per hour) and statewide lakes (103.2). The high abundance of Largemouth Bass could result in low growth due to competition for resources. Growth analysis will inform interpretation and management recommendations.

A total of 9 Northern Pike were captured. These fish ranged from 20 to 37 inches. Eight of these fish were over the 24-inch legal size limit. A total of 44% of Northern Pike captured were 35 inches or larger. Northern Pike are best surveyed using gill nets in late spring and summer. CPUE of Northern Pike in gill nets was 3 fish per net night. This catch rate is close to the median for SLMMU and statewide lakes (2.5 fish per net night for both). Additional Northern Pike would have been captured in this survey, but some mortality was observed in gill nets and DNR decided not to continue to deploy the gear. It is clear from the limited captures that large pike are found in good numbers in Donnell Lake. A total of 9 Walleye from past Lake Association stocking efforts were captured. These fish ranged from 16 to 24 inches. Age analysis will allow DNR to determine the contribution of fish from each stocking to the current fishery. The survey time period and methods was not ideal for evaluating Walleye populations. Capturing 9 fish despite this is an indication that stocking efforts was successful and there are larger fish available for anglers. DNR will determine the growth rates of these fish and other predators to determine if the number of predators in the lake are balanced with prey. Future stocking recommendations will depend on this analysis. Other native predators that were present were Longnose Gar, Spotted Gar, and Bowfin. These species prey on small Bluegill and prevent overabundance from impacting growth rates. They are an important component of the fish population and populations should be maintained.

Several minnow and other prey species were captured in the 2024 fish survey on Donnell Lake. Blacknose Shiner (n = 78), Blackchin Shiner (n = 71), Brook Silverside (n = 41), and Bluntnose Minnow (n = 41) were the most common species. Several minnow species were not identified in the field and reference samples were preserved to be identified in the laboratory. Catch of these minnows is not represented in the tables and summary provided. Minnows are abundant in the system which likely contributes to predator growth rates. Once minnow identification is complete, DNR will analyze the predator prey ratio to determine if they are in balance. Predator growth rates will also be analyzed to determine if there is enough available prey to promote good growth.

A total of 358 turtles were also captured during the DNR fisheries survey. The most common species was Map Turtle (n = 240), followed by Musk Turtle (54), Painted Turtle (23), Eastern Spiny Softshell Turtle (n = 21), and Eastern Snapping Turtle (n = 20). Unfortunately, there was some turtle mortality from individuals getting trapped in deeper set nets. The mortality was

limited and turtle numbers on Donnell Lake was high and should not be impacted. No threatened or endangered turtle species were captured or observed. Shoreline projects should continue to consider turtle passage to allow these populations to strive. Seawalls block turtle migrations from the lake to the upland where nesting occurs. Providing access through ramps can benefit nesting success. Basking habitat is also important for maintaining populations.

Cisco were first reported in Donnell Lake in 1887 and 1947 (Latta 1995). No Cisco were captured in fish surveys in 1956 and 1992 and the population in Donnell Lake was listed as extirpated in 1995 (Latta 1995). Cisco generally reside in cool oxygenated water where the temperature is less than 68 degrees F and the oxygen concentration is at least 3 ppm (Latta 1995). A limnology survey was conducted on August 31, 2016 to determine if water quality in Donnell Lake could still support Cisco populations. Gill netting surveys were also conducted for two nights on November 27 and 28, 2017. Five experimental gill nets were set on the first night and seven on the second for a total of 12 net nights. On the date of the limnology survey the water in Donnell Lake was below 68 degrees at 22 feet of depth and dissolved oxygen was 3.04 ppm (Figure 1). Dissolved oxygen dropped to below 3 ppm at 23 feet resulting in a 1-foot layer of very marginal habitat for Cisco during late summer. This layer was extremely thin and the dissolved oxygen concentration was barely above the critical minimum. Cisco populations may not be supported or are at least limited by available habitat. No Cisco were captured during the gill netting survey in 2016 or in the 2024 survey. Due to the marginal water quality measurements, limited Cisco habitat, and repeated surveys with no Cisco captures, it is unlikely that Cisco remain in Donnell Lake.

Management Recommendations

DNR will make recommendations regarding stocking and fisheries management for Donnell Lake. These recommendations will rely heavily on age and growth data. Scales and spines will be processed during the winter of 2024/5. Data analysis and reporting for the Donnell Lake survey are required to be completed by October 1, 2026. Final reporting requirements are delayed from the survey date due to reporting backlogs, data processing timelines, and the internal review process for reports. DNR hopes to provide a final report well ahead of the reporting deadline. This report provides interim information to assist fisheries discussion regarding Donnell Lake.

Based on catch rates and size structure, Donnell Lake is a quality fishery. The fish populations are in good shape and there is no indication that significant management is required. Walleye

stocking can continue while growth data is being processed as there is no sign of predator unbalance or over abundance.

References

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Figure 1. Bathymetric map of Donnell Lake surveyed by DNR in 1947 and 1956.

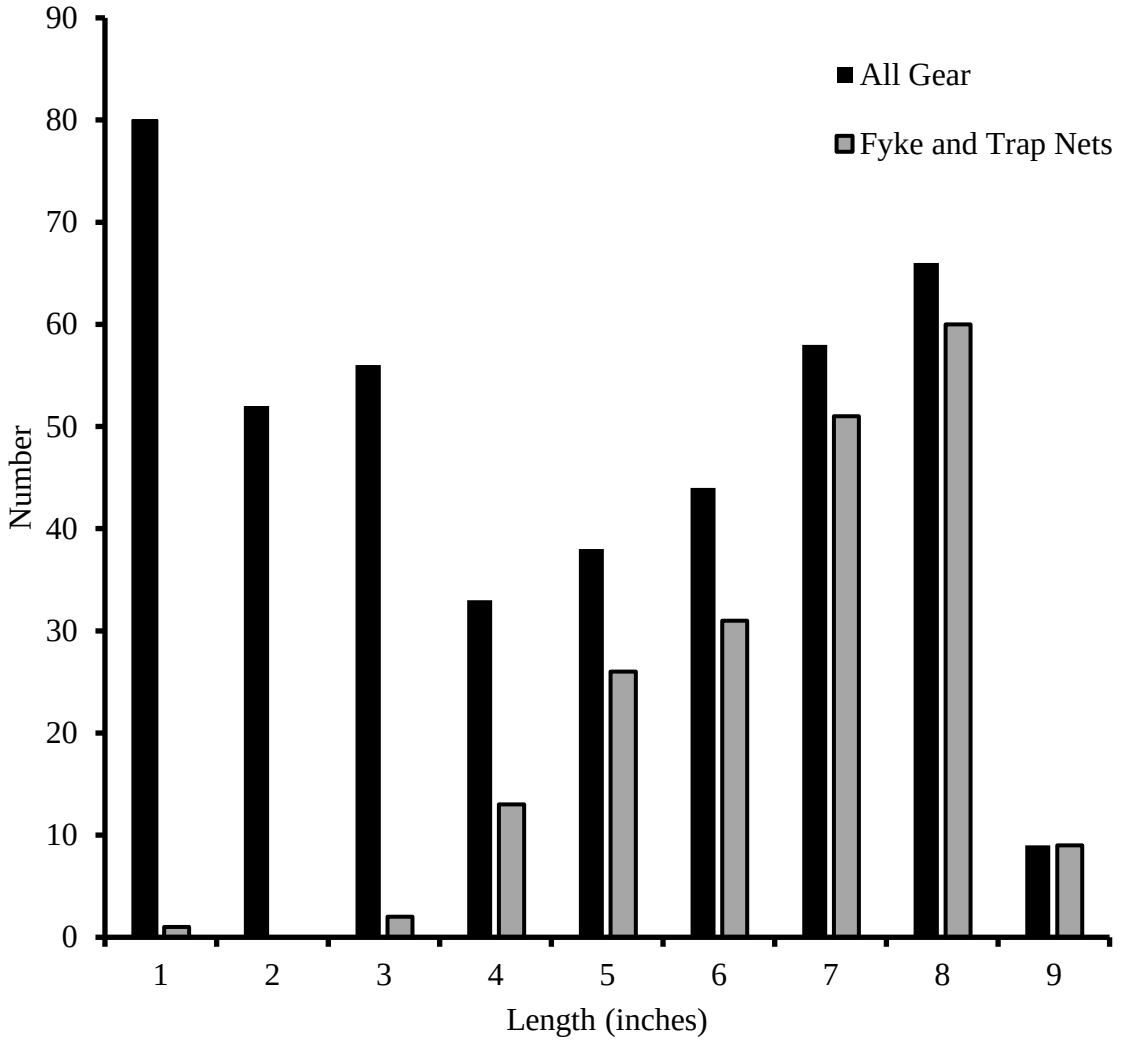

Figure 2: Length frequency for Bluegill captured across all gear types and in fyke and trap nets during the 2024 fish survey on Donnell Lake.

Table 1: Fish stocking history for Donnell Lake.

Species	Year	Number	Length (Inches)/Age	Operation
Lake Whitefish	1877	20,000	Swim-up Fry	DNR
Bluegill	1933	7,000	4 month	DNR
Largemouth Bass	1933	1,000	5 month	DNR
Bluegill	1934	15,000	5 month	DNR
Largemouth Bass	1934	2,500	5 month	DNR
Bluegill	1935	20,000	4 month	DNR
Largemouth Bass	1935	1,000	3 month	DNR
Bluegill	1936	10,000	4 month	DNR
Largemouth Bass	1936	750	4 month	DNR
Bluegill	1937	25,000	4 month	DNR
Bluegill	1938	75,000	4 month	DNR
Largemouth Bass	1938	3,000	6 month	DNR
Yellow Perch	1938	15,000	5 month	DNR
Bluegill	1939	75,000	4 month	DNR
Largemouth Bass	1939	3,000	4 month	DNR
Bluegill	1940	2,000 / 20,000	4 month / yearling	DNR
Bluegill	1940	2,000	Yearling	DNR
Largemouth Bass	1940	2,000	Yearling	DNR
Bluegill	1941	60,000	4 month	DNR
Largemouth Bass	1941	500	4 month	DNR
Yellow Perch	1941	4,000	7 month	DNR
Bluegill	1942	55,000	4 month	DNR
Largemouth Bass	1942	500	4 month	DNR
Bluegill	1943	5,000	4 month	DNR
Largemouth Bass	1943	500	4 month	DNR
Largemouth Bass	1944	2,000	3.5 month	DNR
Bluegill	1945	10,000	4 month	DNR
Largemouth Bass	1945	2,000	3.5 month	DNR
Walleye	1975	500,000	Fingerling	DNR
Walleye	1976	50,000	Fingerling	DNR
Yellow Perch	2008	400	4.5	Private Plant (under permit)
Channel catfish	2008	500	7	Private Plant (under permit)
Walleye	2017	1,000	7.09	Private Plant (under permit)
Walleye	2021	1,000	7	Private Plant (under permit)
Yellow Perch	2022	1,000	4	Private Plant (under permit)

Table 2: Fish captured during the fish survey conducted on Donnell Lake May 13 through 16, 2024.

Species	Number	Mean Length (inches)	Total Weight (lbs)	Length Range (inches)
Banded Killifish	118	5.0	13.1	1 - 9
Black Crappie	6	8.0	1.8	5 - 10
Blackchin Shiner	71	2.5	0.4	1 - 2
Blacknose Shiner	78	2.4	0.4	1 - 2
Bluegill	436	5.0	68.7	1 - 9
Bluntnose Minnow	41	2.4	0.3	1 - 3
Bowfin	5	23.1	22.4	20 - 26
Brook Silverside	41	2.8		2 - 3
Brown Bullhead	11	13.0	11.6	10 - 15
Green Sunfish	3	4.2	0.2	3 - 5
Hybrid Sunfish	28	5.7	4.8	2 - 9
Iowa Darter	2	2.0	0.0	1 - 2
Largemouth Bass	115	11.4	97.7	2 - 16
Longnose Gar	30	31.0	86.7	14 - 37
Northern Pike	9	30.5	65.6	20 - 37
Pumpkinseed Sunfish	71	7.7	28.7	3 - 8
Rock Bass	23	6.5	5.8	1 - 8
Sand Shiner	19	2.1	0.1	1 - 2
Smallmouth Bass	4	11.3	4.3	3 - 15
Spotfin Shiner	6	3.3	0.1	2 - 3
Spotted Gar	8	25.5	18.2	22 - 29
Tadpole Madtom	1	1.5	0.0	1 - 1
Walleye	9	21.9	32.4	16 - 24
Warmouth	13	5.1	1.6	3 - 7
White Sucker	1	16.5	1.8	16 - 16
Yellow Bullhead	52	12.0	43.4	7 - 14
Yellow Perch	14	6.2	2.0	3 - 10
Grand Total	1,215	6.9	511.8	1 - 37