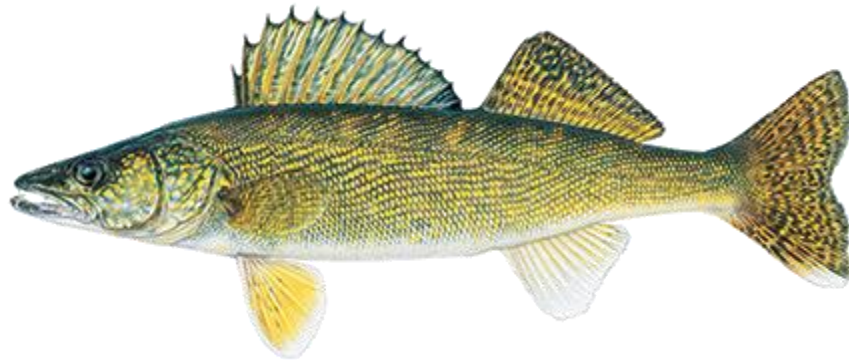


Holloway Reservoir – 2020 Fall Walleye Survey

2020 Discretionary Survey Report



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On the cover: Walleye. Credit: Joe Tomelleri ©

Introduction

Walleye were stocked into Holloway Reservoir starting in the late 1970s, but stocking stopped in 1992 due to sufficient natural reproduction. Holloway Reservoir now supports a self-sustaining Walleye population that does not rely on supplemental stocking which is uncommon for lakes in southeast Michigan. Anglers are drawn to the fishery because of the abundant Walleye and good access for a variety of sizes of fishing boats. Typically, anglers use large boats or charters to target walleye on the Great Lakes. Holloway Reservoir is long, and narrow providing some protection for smaller boats and still allows anglers to fish during unfavorable conditions (i.e. wind) for other larger bodies of water. Relative abundance estimates of age-0 Walleye are consistently high in Holloway Reservoir. This system represents a productive, turbid reservoir with high growth rates of young Walleye. In contrast, many successful northern Michigan Walleye fisheries are found in large, deep, clear lakes. This goes to show how a Walleye population can thrive in two vastly different environments if the proper forage and habitat are present.

Holloway Reservoir is a productive waterbody, likely due to runoff from agriculture fields in the surrounding watershed. The turbidity of Holloway Reservoir is typical of a river impoundment and the reservoir supports both cool- and warmwater species. The two most recent general fish community surveys on Holloway Reservoir were completed in 2009 and 2016 and found that Common Carp, Channel Catfish, Walleye, and Black Crappie were consistently abundant. Gizzard Shad, Brook Silverside, and Round Gobies made up most of the forage fish community and likely supported the abundant predators (Leonardi 2009).

The Fisheries Division began monitoring the Walleye population in Holloway Reservoir in 2011 on an annual basis. Our survey objectives were to 1) estimate age-0, age-1, and total Walleye abundance 2) determine mean length of age-0 and age-1 Walleye, and 3) determine the mean growth index for Walleye. This survey data is added to our long-term dataset for Holloway Reservoir which tracks trends in Walleye recruitment, growth, and relative abundance.

Study Area

Holloway Reservoir is a 1,973-acre impoundment of the Flint River. The reservoir is located northeast of Flint on the border of Genesee and Lapeer counties and about 8.5 miles upstream of Mott Reservoir (Figure 1). It is formed by Holloway Dam on the west side and is approximately 7.25 miles long. Holloway Reservoir was created in 1955 to be a water source for the city of Flint but is no longer used for this purpose. Since 1967, secondary water supply, flow augmentation, and recreational use have been the primary objectives of the reservoir since the City of Flint began purchasing potable water from Detroit via their Lake Huron pipeline. General operating procedures for the dam strive to achieve a spring elevation of 755 feet (above mean sea level) by May 1 of each year. This elevation is maintained throughout summer. During the first two weeks of November, the reservoir is drawn down to a winter elevation of 751 feet to prevent structural damage to the dam from freezing. The reservoir has two sections connected by a channel. The lower portion is about 3.5 miles long and 0.75 miles across at the widest point (Figure 2). The upper portion is shorter (2.5 miles long) and narrower (0.4 miles wide; Figure 2). The connecting channel is approximately 1.25 miles long.

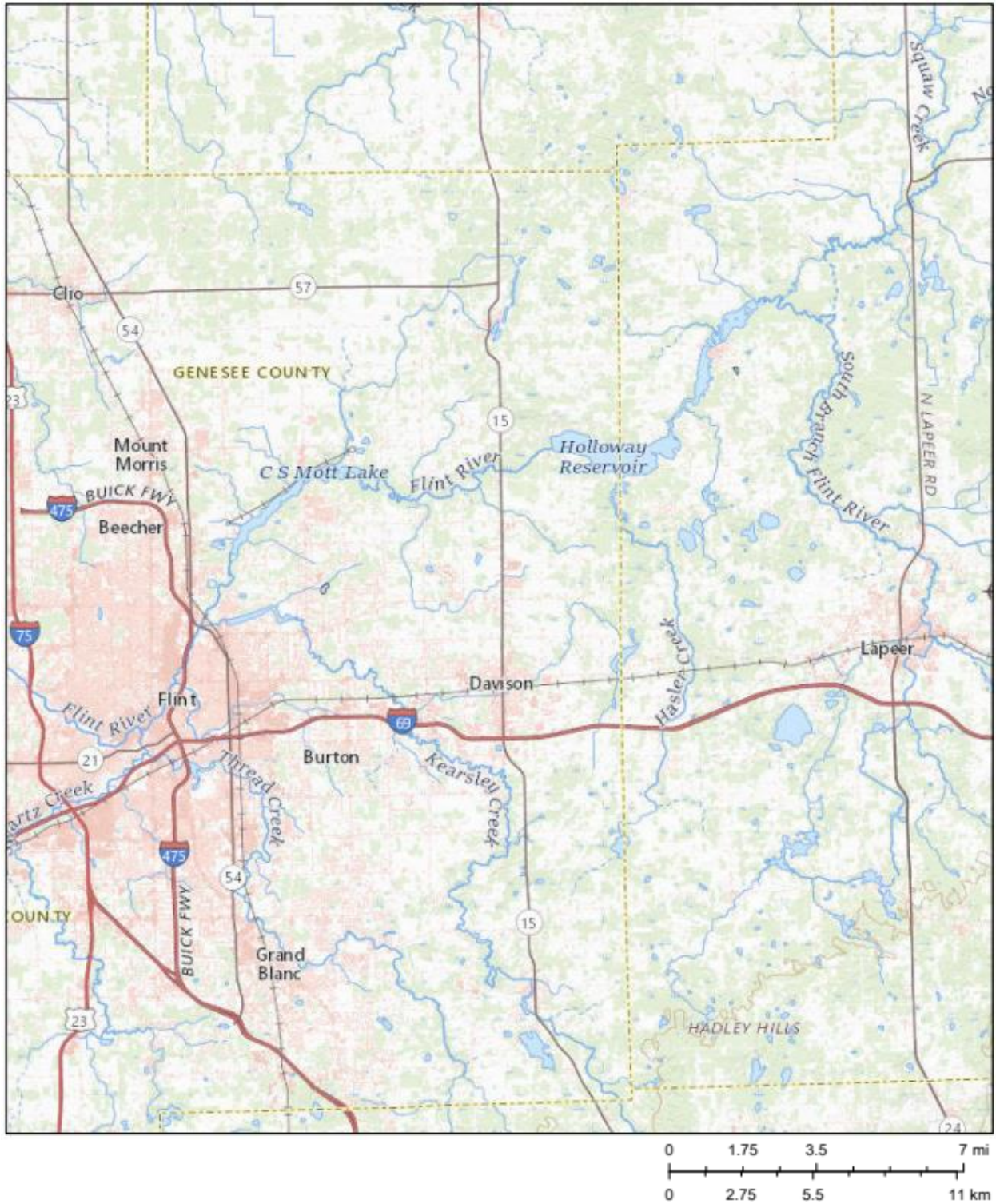


Figure 1. Holloway Reservoir in Lapeer and Genesee County, Michigan.

Methods

Boat electrofishing was used to collect Walleye at eight index locations on 24 September 2020. Electrofishing power settings were set at a pulse rate of 60/second, 40% duty cycle, and seven amps with alternating current to target young (age-0 and age-1) Walleye. Each index site took ten minutes to shock. Total shock time was 1.3 hours and total distance shocking was 2.5 miles. All Walleye were collected and measured to the nearest 0.1-inch total length (TL). Aging structures (dorsal spines for Walleye ≥ 10 in or scales for Walleye < 10 in) were collected for age and growth analysis (10/in group). For estimating age from dorsal spines, a thin cross section of the dorsal spine was cut using a Dremel grinding and cutting tool. Mineral oil was added to the section for clarity and age estimation occurred under a microscope. To estimate age from scales, four-to-six scales were pressed onto acetate film. Scale impressions were viewed under a microscope. Mean growth index was calculated using only those age groups represented by five or more fish. Relative abundance was estimated as number of Walleye-per-hour and number of Walleye-per-mile. Water temperature was measured with a handheld temperature probe.

Results

A total of 330 Walleye were collected (TL range = 4.4 – 19.8 in; Table 1; Figure 2). Mean Walleye relative abundance was 248 Walleye/hr (standard error [SE] = 49.5; Table 1) or 132 Walleye/mi (SE = 25.8; Table 2). The mean growth index for age-0 to age-4 Walleye in Holloway Reservoir was 1.7, suggesting the growth rate for these age-classes is higher than the state average. Older individuals were not used in this calculation because too few aging structures were collected.

There were an estimated 217 age-0 Walleye (weighted mean TL = 7.6 in; Table 2; Figure 2) collected during the survey with mean relative abundance estimates of 167 age-0 Walleye/hr (Table 2; Figure 2) or 87 age-0 Walleye/mi (Table 2). The number of age-0 Walleye collected during the survey accounted for over 65% of the overall catch. The mean total length for age-0 Walleye in Holloway Reservoir was 7.6 in and slightly above the state average (Figure 3).

There were an estimated 77 age-1 Walleye (weighted mean TL = 13.0 in; Table 2) collected during the survey with mean relative abundance estimates of 59 age-1 Walleye/hr (Table 2; Figure 2) or 31 age-1 Walleye/mi (Table 2). The mean total length for age-1 Walleye was over 3 in above the statewide average and suggests a suitable amount of forage and habitat is available for this age-class (Figure 3).

There were 35 Walleye collected which were above the minimum length limit on Holloway Reservoir of 15 in and classified as adults. The adult fish comprised 11% of the total catch. Mean relative abundance of adult walleye was 27 fish/hr (Table 2) or 14 fish/mi (Table 2).

Table 1. Survey metrics including catch-per-effort (CPE) and mean total length (TL) for total Walleye catch, age-0 Walleye catch, and age-1 Walleye catch. Also, percent of total Walleye catch ≥ 15 in, which is the legal length for harvest.

Metric	Year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CPE (number/hour)	119	106	310	1054	262	145	474	259	180	248
CPE (number/mile)	79	70	206	527	139	77	258	144	99	132
All - mean TL (inches)	10.4	12.9	6.6	6.9	9.2	8.5	7.6	8.3	8.5	9.9
Age-0 CPE (number/hour)	97	38	303	876	86	89	456	229	127	163
Age-0 CPE (number/mile)	52	20	161	466	45	47	247	127	70	87
Age-0 mean TL (inches)	9.0	9.2	6.4	6.4	6.7	6.0	7.3	7.3	6.4	7.6
Age-1 CPE (number/hour)	0	16	0	141	98	4	5	5	26	58
Age-1 CPE (number/mile)	0	8	0	75	52	2	3	3	14	31
Age-1 mean TL (inches)	-	10.6	-	9.8	9.1	9.6	12.7	13.3	9.8	13.0
Percent total catch ≥ 15 in	18	34	2	<1	<1	4	1	7	7	11

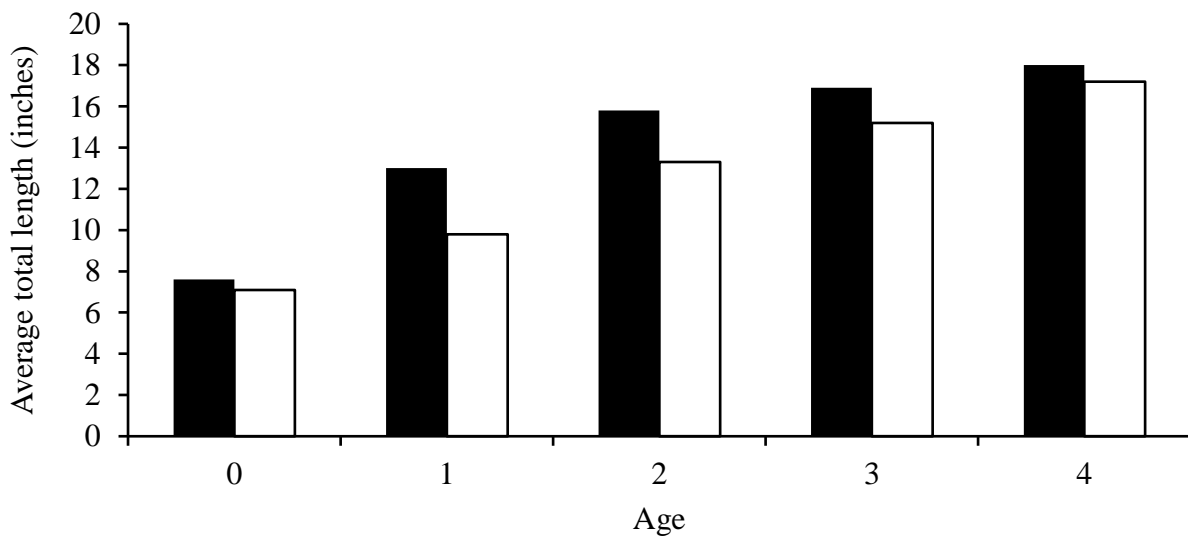


Figure 2. Weighted average length-at-age for Walleye collected in Holloway Reservoir 2020 fall electrofishing survey (black bars) and statewide average Walleye length-at-age (white bars).

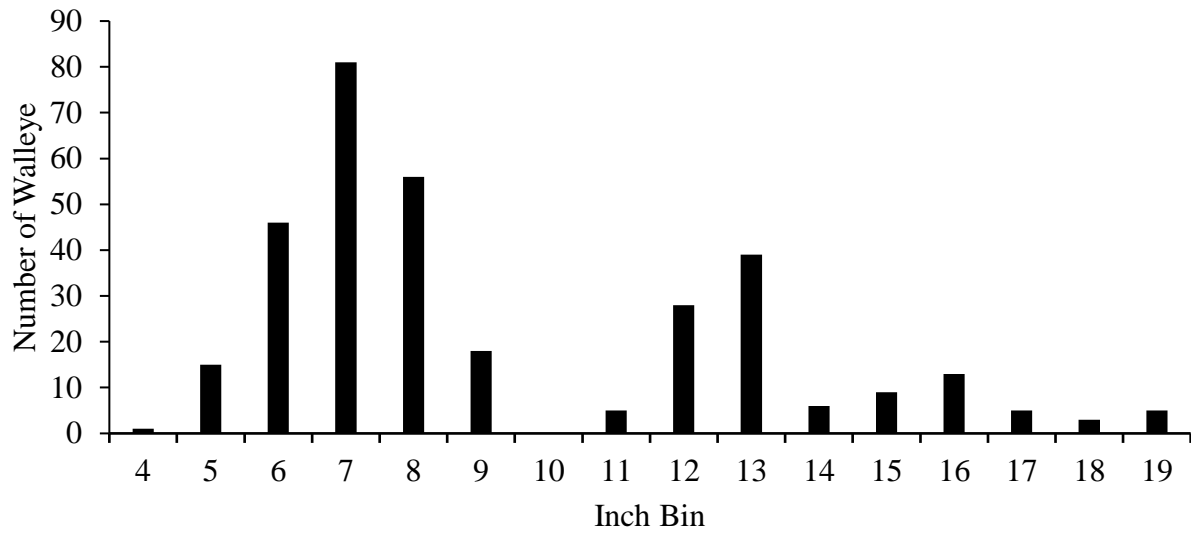


Figure 3. Length-frequency for Walleye collected in Holloway Reservoir on 24 September 2020.

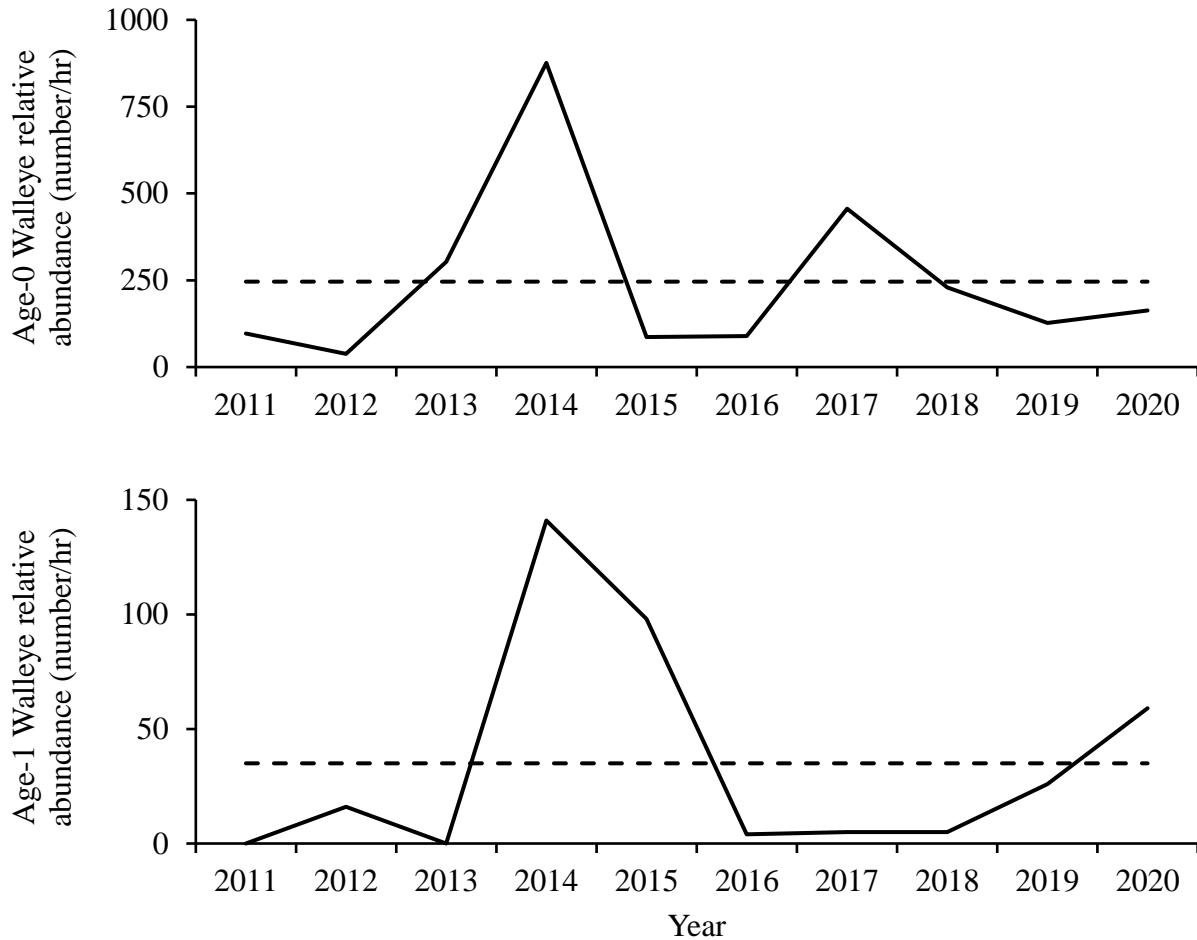


Figure 4. Age-0 (top panel) and age-1 (bottom panel) Walleye relative abundance (number/hr) for Holloway Reservoir from 2011 to 2020. Dotted lines represent the ten-year average relative abundance for the respective age class.

Conclusions

For many years, Holloway Reservoir has consistently provided anglers an inland Walleye fishery in Southeast Michigan. Originally, this fishery was reliant on stocking but now sustains itself through natural reproduction. This unique inland experience should be preserved and continuing to monitor recruitment will provide managers an opportunity to document any severe changes or prolonged periods of poor recruitment. This continued monitoring strategy allows quick changes to be made if numerous poor year-classes are observed.

The relative abundance of age-0 Walleye in Holloway Reservoir goes through upward and downward trends. This cycle of relatively strong and weak year-classes is common in self-sustaining Walleye populations. 2018 and 2019 showed decreasing relative abundance of age-0 Walleye but the 2020 survey suggests the recruitment is beginning another rebound. A couple years of declining recruitment is not cause for concern but if those decreasing trends continued for at least five years then management actions would need to be taken.

It appears the Walleye in Holloway Reservoir are growing above the state average for most age-classes and suggests adequate resources are available. The age data from the current survey estimates the age-0 fish are growing slightly above the state average. In addition, age-1 Walleye are growing extremely fast. This may be a function of density-dependent growth and intraspecific competition. The 2019 year-class was one of the smallest in the last five years and lower abundance may be contributing to increased growth rates. Although growth rates are primarily high, Holloway Reservoir does not produce many Walleye above 20 inches. The Walleye fishery is popular, and Walleye anglers are generally harvest-oriented. The popularity of the fishery through anecdotal angler reports, the limited number of Walleye above 20 in, and the above average growth of older fish may suggest high fishing mortality. Similarly, to the 2019 year-class, few large, old fish in the system can grow quickly because of limited competition for resources. Although this benefits individual fish, this situation may not produce a highly desirable fishery for trophy seeking anglers if they value large Walleye rather than abundant smaller fish.

A population estimate was last completed on Holloway Reservoir in 1995. This effort utilized a combination of marked and recaptured Walleye from trap nets and from tournament angler return. The population of adult Walleye in 1995 was estimated to be 11,000 to 18,000 fish or 6 to 9 fish/ac. A more recent population estimate should be conducted given the time that has elapsed. The reservoir has consistently been sampled during fall since 2011 but those surveys were designed to target age-0 and age-1 Walleye to understand recruitment in this system. The previous population estimate effort was completed within the reservoir, but it is believed that many Walleye from Holloway Reservoir migrate up the Flint River to spawn. The 1995 survey demonstrates that at least a portion of the Walleye population are susceptible to capture during spring. In addition, if Walleye from the reservoir migrate upstream then a survey in the reservoir would produce a conservative estimate of the number of adult Walleye in the system.

If this is the case, a spring electrofishing survey could be used to document spawning activity in the river as well as help estimate some adult Walleye metrics (i.e., growth rate, relative abundance, sex ratio). This sampling method and time of year may allow managers to better understand the adult population while being more efficient and effective than a netting survey given the Channel Catfish abundance.

Future management of Holloway Reservoir will continue to focus on Walleye. A spring netting survey to estimate the adult Walleye population will occur within the next five years and continue at a five-year interval. In addition, annual fall electrofishing surveys will continue. Many inland Walleye populations in Michigan are experiencing changes in success of natural recruitment. It is important to maintain an understanding of the Walleye population and recruitment in Holloway Reservoir to be able to adapt to a changing system.

Surveys provide some insight for managers, but Holloway Reservoir Walleye management would also benefit from direct angler communication to understand some fishing metrics like effort and harvest, as well as success rate and satisfaction with the current fishery. Holloway Reservoir has a reputation of having a self-sustaining Walleye population where anglers can target Walleye on an inland lake but may struggle to catch many fish over 15 inches. It is unknown whether this is due to natural mortality limiting survival to larger sizes or high fishing

mortality removing Walleye once they reach legal size for harvest. Furthermore, documenting Walleye spawning upstream in the Flint River would highlight the importance of riparian habitat management within this reach of the Flint River watershed.

References

Leonardi, J. M. 2009. Holloway Reservoir. Status of the Fishery Resource Report 2009-60.
Michigan Department of Natural Resources, Fisheries Division, Lansing, MI.

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