

Holloway Reservoir – 2021 Fall Walleye Survey

2021 Discretionary Survey Report



Jason Gostiaux, Fish Biologist, MI DNR

**Southern Lake Huron Management Unit
Bay City Customer Service Center
3580 State Park Drive
Bay City, Michigan 48706**

On the cover: Martin Hefter, Holloway Reservoir angler, with a 25-in Walleye October 2021, with permission. Credit: J. Gostiaux

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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 population 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 recruitment 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.

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.

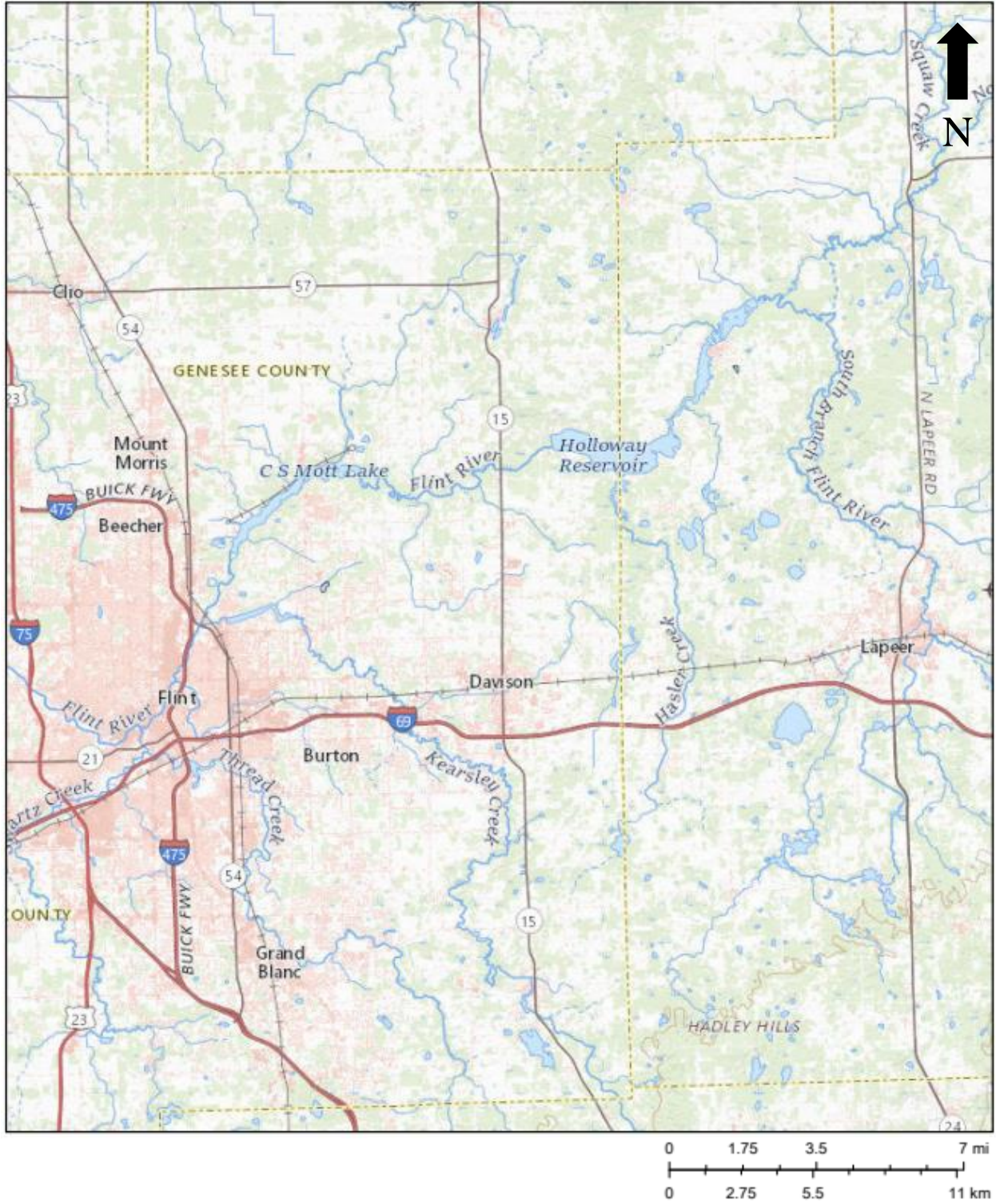


Figure 1. Holloway Reservoir in Lapeer and Genesee County, Michigan.

Methods

Nighttime boat electrofishing was used to collect Walleye at eight index locations on 6 October 2021. Electrofishing power settings were set at a pulse rate of 60/second, 40% duty cycle, and 6 amps with pulsed direct current to target young (age-0 and age-1) Walleye. Each index site was sampled for ten minutes along the shoreline. Total shock time was 1.3 hours and total shocking distance was 2.5 miles. Total length (TL; inch group) was recorded for all Walleye collected. Up to ten aging structures (dorsal spines for Walleye ≥ 10 in TL; scales for Walleye < 10 in TL) were collected per inch group for age estimation and growth analysis. 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. Walleye 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. Surface water temperature was measured with a handheld temperature probe.

Results

A total of 315 Walleye were collected (TL range = 7-25 in; Table 1; Figure 2) and surface water temperature was 66°F during the survey. Mean Walleye relative abundance was 236 Walleye/hr (standard error [SE] = 26.1; Table 1) or 119 Walleye/mi (SE = 12.4; Table 2). The mean growth index for Walleye in Holloway Reservoir was 0.9, suggesting good growth for this species compared to mean Walleye length-at-age across the state. Ten age-classes were estimated, and longevity peaked at age 11.

There were an estimated 172 age-0 Walleye (weighted mean TL = 8.8 in; Table 1) collected during the survey with mean relative abundance estimates of 128 age-0 Walleye/hr (SE = 27.2; Table 1) or 68 age-0 Walleye/mi (SE = 15.2; Table 2). The 2021 relative abundance estimate for age-0 Walleye-per-hour is slightly below average for the time-series (Figure 3). The number of age-0 Walleye collected during the survey accounted for 55% of the overall catch by number.

There were an estimated 15 age-1 Walleye (weighted mean TL = 12.8 in; Table 1) collected during the survey with mean relative abundance estimates of 11 age-1 Walleye/hr (SE = 2.2; Table 2; Figure 2) or 6 age-1 Walleye/mi (SE = 1.1; Table 2). Like age-0 Walleye, the relative abundance of age-1 Walleye-per-hour is also slightly below average for the time-series (Figure 3). The number of age-1 Walleye collected during the survey accounted for 5% of the overall catch by number.

There were 72 Walleye collected which were above the minimum length limit on Holloway Reservoir of 15 in and classified as adults. The adult fish comprised 23% of the total catch by number. Mean relative abundance of adult Walleye was 54 fish/hr (SE = 10.6; Table 2) or 28 fish/mi (SE = 5.4; Table 2).

Table 1. Survey metrics including total catch, mean catch-per-effort (CPE) and mean total length (TL) for all Walleye caught, the proportion estimated to be age-0 Walleye, the proportion estimated to be age-1 Walleye, and Walleye ≥ 15 in, which is the legal length for harvest.

Metric	Year										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total catch	141	141	412	1402	348	193	631	345	239	330	315
Total CPE (#/hour)	119	106	310	1054	262	145	474	259	180	248	236
Total CPE (#/mile)	79	70	206	527	139	77	258	144	99	132	119
Total catch mean TL (inches)	10.4	12.9	6.6	6.9	9.2	8.5	7.6	8.3	8.5	9.9	12.1
Mean age-0 CPE (#/hour)	97	38	303	876	86	89	456	229	127	163	128
Mean age-0 CPE (#/mile)	52	20	161	466	45	47	247	127	70	87	68
Mean age-0 TL (inches)	9.0	9.2	6.4	6.4	6.7	6.0	7.3	7.3	6.4	7.6	8.8
Mean age-1 CPE (#/hour)	0	16	0	141	98	4	5	5	26	58	11
Mean age-1 CPE (#/mile)	0	8	0	75	52	2	3	3	14	31	6
Mean age-1 TL (inches)	-	10.6	-	9.8	9.1	9.6	12.7	13.3	9.8	13.0	12.8
Total # ≥ 15 inches	24	48	8	2	3	8	8	24	12	35	72
Mean # ≥ 15 inches CPE (#/hour)	18	36	6	2	2	6	6	18	9	26	54
Mean # ≥ 15 inches CPE (#/mile)	12	19	3	1	1	3	3	9	5	14	28

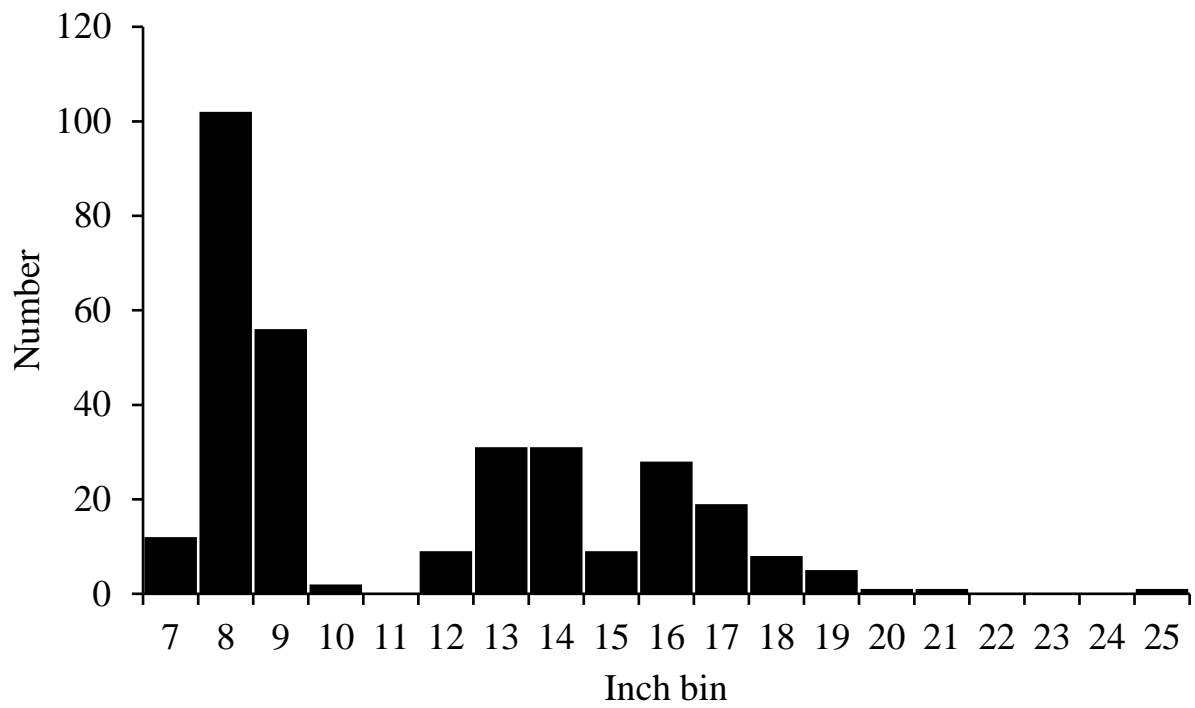


Figure 2. Length-frequency for Walleye collected in Holloway Reservoir on October 6 2021.

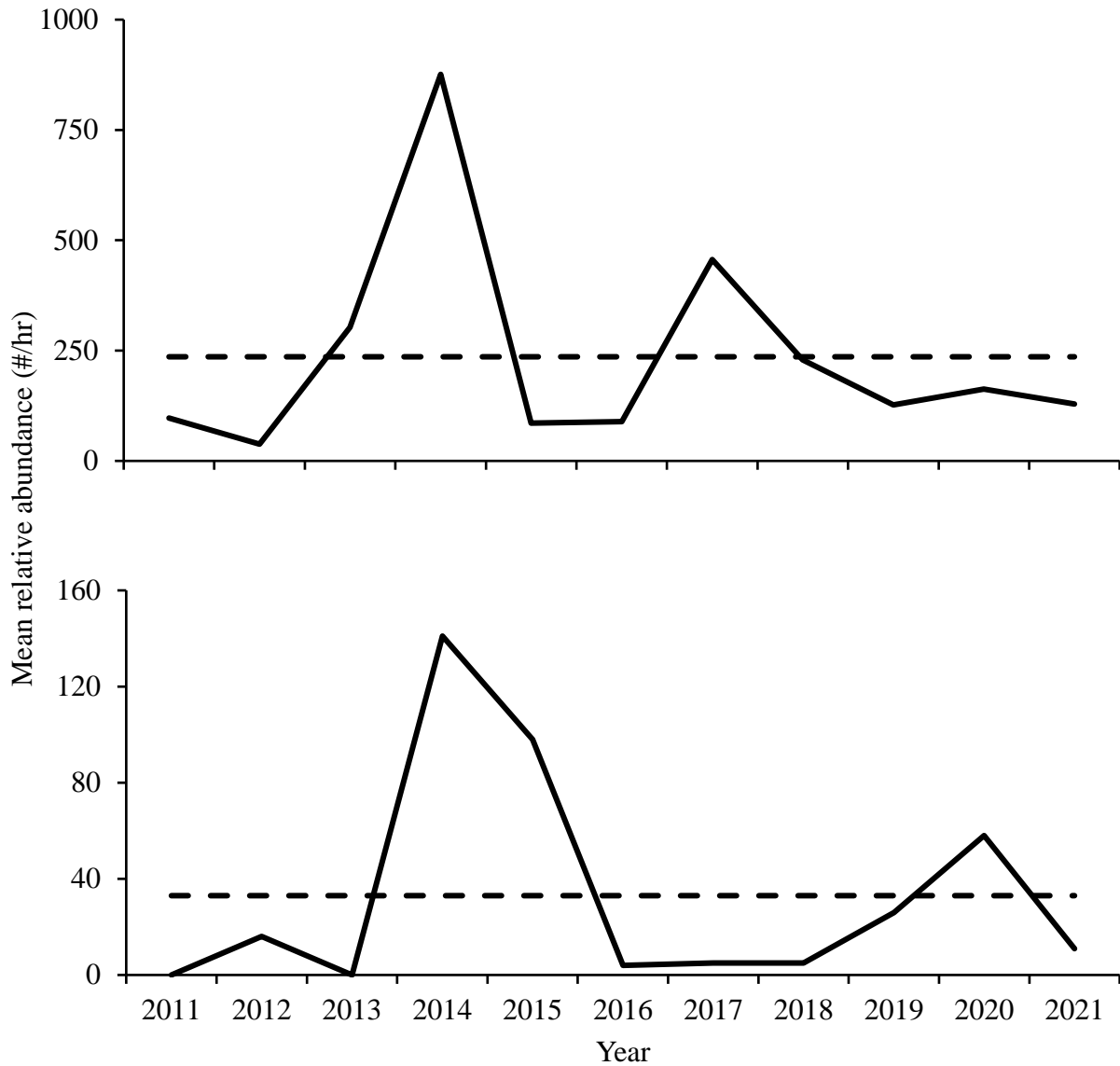


Figure 3. Mean age-0 (top panel) and age-1 (bottom panel) Walleye relative abundance (number/hr; black line) for Holloway Reservoir from 2011 to 2021. The dashed line represents the average relative abundance for the respective age class across the time-series.

Conclusions

Since 2011, age-0 Walleye relative abundance estimated from nighttime boat electrofishing at Holloway Reservoir has been variable. The two highest year-classes were estimated in 2014 and 2017, while the lowest year-class was estimated in 2012. Fluctuations in year-class strength are normal, and to be expected, for a healthy Walleye population sustained through natural reproduction. Data from the last four years has estimated age-0 Walleye relative abundance at or near (within 50%) the long-term average. This suggests the population may be high, but relatively stable, given the current resources like prey and habitat. If a large year-class is

estimated, like the 2014 survey, that could be interpreted as the population attempting to bolster adult numbers or a significant increase in resources which improved survival of age-0 fish. Although fall electrofishing surveys are not the preferred gear to target adult Walleye, our data suggests adult Walleye relative abundance is the highest since sampling began in 2011. This bodes well for the future of the Holloway Reservoir Walleye population and angler satisfaction. Local managers have consistently received comments from anglers describing a fishery dominated by sug-legal Walleye. This is contrary to the most recent survey results in 2021 and tournament results at Holloway Reservoir from 2019 and 2021 (no tournament in 2020 due to COVID pandemic). Potentially, the Walleye population was dominated by smaller fish but it appears now relative abundance of legal Walleye is increasing and should provide more harvest opportunity for anglers.

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 if resources allow. 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 Walleye recruitment in Holloway Reservoir to be able to adapt to a changing system.

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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