

Lake Independence

T51N/R27W/Sec. 23

Yellow Dog River Watershed, last surveyed 2021

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Environment

Lake Independence is a natural inland lake located in Michigan's northern Marquette County (Figure 1). The lake has three inlets: Alder Creek, Johnson Creek, and the Yellow Dog River. The drainage area (Figure 2) contributing to Lake Independence is 96.3 square miles and the 1 percent chance peak flow is estimated to be 1,100 cubic feet per second. While Lake Independence is part of the lower reach of the Yellow Dog River, the outlet of the lake technically becomes the Iron River. The Iron River flows about 1-mile to its confluence at Lake Superior. Land use surrounding the Lake Independence lakeshed is comprised largely of forest (72.7%), followed by wetland (14.1%), water (5.4%), grassland (3.4%), urban (2.3%), and other uses (2.0%) (Figure 3). Nearly 80 percent of the lake within the Lake Independence watershed is unprotected and remains vulnerable to residential and agricultural development (MGLP 2023).

In 1913 a dam was constructed on the outlet of the of the existing lake, which enlarged the original lake to become a 2,000 acre inland impounded waterbody approximately 30-feet deep.

The dam at the outlet of the lake is described as a gravity concrete structure of 92.5 feet long. It presently provides the control to maintain the legally established lake level of 625.4 feet for Lake Independence. Abutments were constructed on both ends of the dam in 1982 to provide 2.5 feet of freeboard. At that time, voids were discovered beneath the downstream apron and were filled with concrete. Chain link fencing was installed at both ends of the dam in 1989 to prevent access to the dam.

Inspection reports have been filed since 1971. There are not any problems reported previously which need to be addressed. The most recent dam inspection is from May 4, 2017. The structure is owned by the Marquette County Drain Commission.

The overall condition assessment of the dam is rated as satisfactory. It is structurally sound and does not show any signs of differential settlement. A peak flow greater than the 1% chance (100 -year) flood would likely breach the earthen berm at South end of the dam, lowering the level of Lake Independence approximately four feet, but the dam is poured on the rock and should not fail. The small vertical crack located about 18 feet from the North end of the dam, which was noted during the previous inspection was not visible. The flow on May 4, 2017, was 0.79 feet above the crest of the dam and the approximate capacity of the dam is 2.5 feet head. Twice since 1990 sandbags have been needed to keep the water from going around the ends of the abutments. The closest property owner downstream of the dam said there has not been any deterioration of the dam.

History

In 1912 there was a Brunswick Lumber Company sawmill located on the north side of the lake and the 1913 impounding of the Yellow Dog River transformed the former shallow wetland lake area to allow for rafting logs to the mill. Brunswick's largest export was bowling pins. The slow growth of Northern Upper Peninsula hardwoods results in constricted annual growth rings in the timber bolts, thereby creating a strong and tight body bowling pin. It has been reported that at one time, 90 percent of the world's bowling pins were produced at the Brunswick Lumber Company Sawmill in Big Bay, Michigan.

Yellow Perch, Northern Pike, Smallmouth Bass, Cisco, and Walleye have been the historic desired gamefish of this lake. These fish species were first documented by John Lowe (Northern Michigan University professor) in 1926. In 1947, the largest Yellow Perch in Michigan was captured in Lake Independence measuring 21-inches; 3.7 pounds.

Spiny Water Flea and Rusty Crayfish are two of the primary aquatic invasive species that have colonized and impacted fisheries in Lake Independence and were documented in the 1989 fisheries survey. Spiny Water Flea (a zooplankton) are known to diminish the health of Yellow Perch through the intestinal perforations by the calcified spines (Michigan Technological University newsletter, Kerfoot 2014). Rusty Crayfish are documented to diminish soft-stem aquatic macrophyte plant communities that fish use for spawning and nesting.

Walleye have always been a popular desired sport fish for this lake and numerous writings to the Michigan Department of Natural Resources (MDNR) have complained about the Walleye fishing being poor. Past surveys have identified that there is not a lack of Walleye in the lake, but the fish that were present consist of an abundance of sublegal size fish (less than 15-inches in length). The age analysis of Walleye shows that four-year-old fish range between 11.5 to 14.4 inches for an average length of 13.0 inches. These former surveys have documented good natural recruitment of walleye with abundant numbers of juvenile fish found in each survey.

Local sportclub participation has regularly been prominent in the interest of the Lake Independence fishery. Sportclub efforts aimed at improving the lake's fishery have included activities such as rough fish removals (White Sucker), fish stocking, fish crib construction, and transfers of adult Walleye into the lake.

Walleye annually migrate from Lake Superior into the Iron River below Lake Independence and these fish congregate below the outlet dam each spring. The local sportclub members have conducted transfers of adult Walleye by dip netting them from the Iron River and transferring them to the north end of Lake Independence. From the period of 1939 to 1949, Walleye transfers were implemented five times with the number of fish handled ranging from 4-129 individuals during these events. Transferred Walleye were either fin clipped or tagged to document that these fish originated from the Iron River. Evaluation of these transfer efforts concluded that these Walleye quickly migrated right back out of Lake Independence to the Iron River.

In addition to Walleye transfers from the Iron River, in 1945 a wooden fish passage ladder was constructed and placed on the outlet dam to try to pass Walleye upstream from the Iron River (Figure

4). Visual evaluation of the fish ladder showed that the Walleye did not ascend from the river to the lake.

The concept of establishing a Bluegill fishery into the lake was tried in 1950 with the stocking of 20,000 fingerlings. This stocking management effort failed to produce a bluegill fishery. Bluegill stocking was conducted again in 1998, with 6,000 fingerling size fish, with no documented success of establishing a fishery from that event.

Manual removals of White Suckers were a popular fisheries management activity in Michigan Upper Peninsula lakes during the 1980-1990 period. Michigan DNR-Fisheries staff conducted two White Sucker removals during spring fisheries survey netting efforts in 1989 and 2006. The remaining annual White Sucker removals were small project efforts conducted by the Big Bay Sportsmen's Club who operated a one fyke net operation for about 2-weeks each year at the mouth of Alder Creek. These fish were collected primarily for "cut-bait" for summer Lake Trout sport fishing on Lake Superior, or the fish were used for canning and smoking by residents. The MDNR allowed the Alder Creek net to be operated annually because it was considered non-detrimental to the lake's fishery and the sucker collection was well-liked with the local community. The practice of allowing sport groups to operate a single-net spring sucker collection program was a public MDNR permitted activity in the Upper Peninsula and these nettings were conducted on various other inland lakes.

The Big Bay Sportsmen's Club annual sucker removal effort grew to a larger operation in 2020 with the addition of more nets and a longer duration of harvest. The effort moved out into the main body of the lake in 2021 and the nets were interfering with the Walleye sportfishing opening date season. The permitted netting seemed to give unproven expectations to anglers and other lake associations about the believed benefits of larger Perch, and larger Walleye. The permitted netting activity was discontinued in 2021 following a directive from the Fisheries Division Chief and in accordance with Department Policy (MDNR 2009).

Peer reviewed studies of White Sucker removal efforts (Zorn et al. 2020) have shown that the improvement of associated sport fisheries occurs in only in waters with significantly overpopulations of suckers, and many of the lakes where White Suckers were removed did not result in benefits to gamefish.

Sucker removal efforts in Lake Independence were conducted as follows:

Michigan DNR

1989: 7,580 lbs.

2006: 10,400 lbs.

Big Bay Sportsmen's Club

2004: 410 fish

2005: 2,880 lbs.

2007: No harvest report

2009: No harvest report

2010: No harvest report

2011: 1,000 fish

2012: No harvest report

2013: No harvest report

2014: No harvest report

2015: No harvest report

2016: 0 fish

2017: 0 fish

2018: 0 fish

2019: 0 fish

2020: 417 fish

2021: 482 fish

Historically, fisheries survey efforts were conducted on Lake Independence in 1926, 1936, 1939, 1953, 1962, 1978, 1985, 1988, 1999, 1994, 1995, 2006, 2012, 2013, 2014, and 2021. These past surveys are difficult to compare from one operation to another because of the variables such as the timing of the survey, locations where the nets were set, survey gear (nets versus electrofishing) and the variability of recruitment of Yellow Perch and Walleye. Each of these variables influenced the catch rates in each survey. Overall, the abundances of sport fish (Walleye, Northern Pike, Yellow Perch) in Lake Independence are primarily dictated by the strength of the annual natural spawning recruitment and seasonal growth rates.

The sport fishery of Lake Independence has had many ups and downs relative to the recruitment and growth of any desired gamefish species. This lake is known from survey efforts to have an abundant forage base of Trout Perch, Spottail Shiners, and juvenile Yellow Perch.

Fisheries surveys report that the mud flats on the south end of the lake likely provides good habitat for aquatic insects such as mayfly nymphs (*Hexagenia*). In past survey notes it is mentioned that the abundances of these forage types makes the gamefish difficult to sport-catch. Additionally, Lake Independence has fairly clear light brown colored water with a secchi disc clarity of approximately 10-

feet. Walleye typically feed during low light periods, therefore the best angling for Walleye on Lake Independence is during morning or evening low-light hours.

Michigan DNR Fish Stocking in Lake Independence (Walleye fingerlings 1980 - 2023)

1994 - 63,745

1999 - 44,875

2004 - 15,000

2013 - 9,850

2022 - 11,240

Big Bay Sportsmen's Club Fish Stocking

1998 - 1,000 fall fingerling Walleye

5,300 fall fingerling Black Crappie

6,000 fall fingerling Bluegill

Current Status

A Walleye evaluation survey was conducted on Lake Independence in May 2014, with another evaluation scheduled for 2025. In 2014, Walleye were found to be abundant with 1,096 fish between 4-21 inches caught (averaging 14.7 inches) in three nights of netting effort and five evenings of electrofishing effort. At that time, 51 percent of the Walleye were of legal size (15-inches) and larger. In comparison to other large lakes in Michigan, the average percent of legal-size walleye from lakes other than Lake Independence was 68 percent (MDNR, personal communication). The 2014 survey estimated the Walleye population to be 2,229 adult Walleye consisting of about 1.1 fish per acre. Northern Pike, Smallmouth Bass, Bluegill, Pumpkinseed Sunfish, Yellow Perch, Rock Bass, and assorted minnows (Golden Shiner, Mottled Sculpin, Spottail Shiner, Trout Perch, and White Sucker) were also caught. Northern Pike (N=95) ranged from 7- 37 inches averaging 22.4 inches, Smallmouth Bass (N= 98) ranged from 5- 19 inches averaging 15.7 inches, and Yellow Perch (N=270) ranged from 2-9 inches averaging 4.9 inches. Only one Bluegill was caught in the 2014 netting effort.

A summer limnological profile sampling survey was conducted on Lake Independence during August 26, 2021 (Figure 5). Freshwater Cisco (also known as Herring) have been documented here in the past (1985 and 1994). This 2021 limnological survey was part of a Statewide effort to document inland Cisco lake-water regimes. Cisco prefer water temperatures of 68F or colder for summer survival conditions and dissolved oxygen levels of 6 parts per million to persist. The August 2021 water profile results documented that summer water dissolved oxygen conditions are suitable in Lake Independence for Cisco throughout the entire the water column, however water temperature levels were unsuitable at any portion of the water depth for Cisco occupancy during the time of this survey.

Walleye also prefer cool water temperatures in the mid-60F range. The late August 73F temperature from the lake's surface to the 24-foot depth may be reaching the upper limits for optimal Walleye occupancy.

Analysis and Discussion

Although supplemental Walleye stocking had occurred periodically from 1994-2013, the Lake Independence Walleye population has been sustained almost entirely by natural reproduction. Age analysis through length-at-age calculations have indicated that Walleye growth is much slower than the state average, which is typical for northern region Upper Peninsula Lakes. Walleyes larger than 20 inches have been rare in past surveys. Age-6 (VI, per Figure 6 below) Walleye were representative of the legal size (15-inches) in past surveys. Walleye growth beyond Age-6 slows down with regular samples of 16–20-inch size Walleye being 10-15 years old.

Past fisheries survey discussions state that the 4- to 5-year-old walleye made up 50% of the total survey catch. Comments from the 1963 survey state that there was no lack of recruitment of young Walleye to the populations, and their growth is so slow that it takes until their fifth summer in the lake before they reach legal size. The assessment of management at that time was that little or nothing could be done to increase the Walleye growth rate other than a decrease in the number of walleye and an increase in the number of small Perch. The fisheries managers at that time suggested a decrease in the minimum size limit for sportfishing Walleye.

Michigan developed a Statewide Walleye Management Plan in 2021 (Herbst et al. 2021) which recommends four sport fishing regulation options for Walleye fisheries, of which one is a 13-inch minimum size limit. This plan suggests consideration of the following sportfishing regulation for lakes that have an abundance of slow growing walleye,

13-inch minimum size limit and daily possession limit of 5+

Goal: Provide anglers with increased harvest opportunities while attempting to reduce density of consistently slow growing populations that are primarily sexually mature prior to reaching 15 inches.

This sportfishing regulation may be worth considering when discussing future management options with area stakeholders and anglers, however more data on walleye growth and annual mortality will be needed before any decisions are put forth for consideration.

Management Direction

Fisheries Management goals for Lake Independence will remain focused on maintaining a diverse and quality sport fishery consisting primarily of Walleye, Northern Pike, Yellow Perch, and Smallmouth Bass. Yellow Perch provide an attractive gamefish for both summer and winter fishing enthusiasts, and they also provide a strong forage base for other piscivorous (fish eating) gamefishes. Management direction will also recommend surveying this lake on a 10-year rotation.

Each of the historic fish surveys on Lake Independence have documented strong natural recruitment of Walleye, whereby supplementing the fishery through periodic stocking or through fish transfers was not a necessary action to maintain the Walleye fishery. Walleye fingerling stocking through the 1990's-2000's was conducted as a social measure to satisfy angler requests for stocking attention to be given to the lake. In 2021, MDNR developed a peer-reviewed statewide Walleye management plan which recommends that Walleye stocking allocations should not be implemented on lakes that have naturally reproducing populations. The Walleye that the MDNR annually produces in rearing ponds

often do not meet the Statewide requests for the number of lakes/rivers that do not have naturally producing populations of Walleye. The Walleye management plan recommends that the annually reared fingerlings should be allocated to the waters that do not have natural recruitment occurrences (Herbst et al. 2021). A 2014 Wisconsin DNR review of Michigan's Walleye management also states that stocking is not recommended for lakes with a healthy, naturally reproducing Walleye population (WDNR correspondence, Gilbert and Hennessey 2014).

The Michigan DNR reviewed data and information on the effectiveness of Walleye stocking efforts, from which the Fisheries Division Walleye stocking policy goals were refined to maximize the return on investment and the likelihood of achieving the management goal associated with any given Walleye stocking effort. Michigan DNR Fisheries Division concluded that they needed to be more strategic by accounting for the tradeoffs between the cost of increased stocking rates and the expected contribution to a fishery because reduced budgets no longer allow for the extensive stocking activities that were historically common.

When looking at the decision tree for water that should be stocked with Walleye, prescribed within the Michigan Walleye Management Plan (Figure 7), Lake Independence falls within the recommendation of a waterbody that should not be stocked.

Walleye stocking in Lake Independence will be temporarily reserved from the current management prescription to allow for a further assessment of the annual recruitment strength to the lake's fishery.

References

Gilbert, S., and J. Hennessey. 2014. Guidelines to Evaluate Walleye Stocking Success in Inland Lakes. Wisconsin Department of Natural Resources.

Herbst, S.J., D.B. Hayes, K. Wehrly, C. LeSage, D. Clapp, J. Johnson, P. Hanchin, E. Martin, F. Lupi and T. Cwalinski. 2021. Management Plan for Walleye in Michigan's Inland Waters, Michigan Department of Natural Resources, Lansing, Michigan.

MDNR. 2009. Selective Harvest Permits/Fish Eradication Proposals. Michigan Department of Natural Resources, Lansing Michigan. Fisheries Division Policy No. 02.02.022.

MGLP. 2023. Midwest Glacial Lakes Partnership: MGLP Conservation Planner: [Midwest Glacial Lakes Partnership](#). Access April 2023.

Zorn, T. G., M. S. Mylchreest, and A. W. Abrahamson. 2020. Effects of White Sucker removal and stocking on growth of fishes in northern lakes. North American Journal of Fisheries Management 40:718-725.

Figure 1. Map of the location of Lake Independence in Michigan’s Upper Peninsula. The blue dot on the Michigan map indicates the location of the lake.



Figure 2. Lakeshed drainage area for Lake Independence in Marquette County, Michigan.

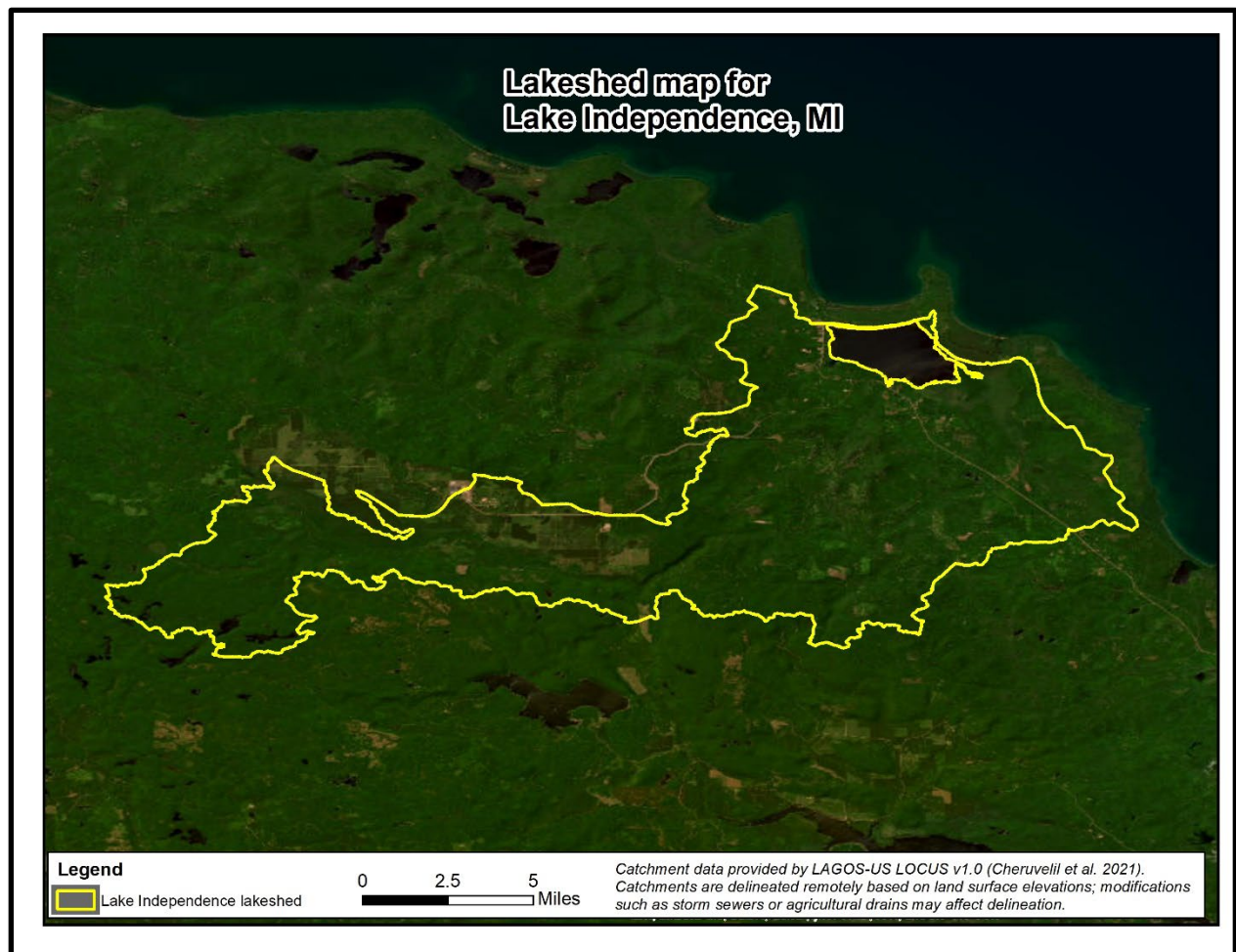


Figure 3. Land use map for the Independence Lake lakeshed region.

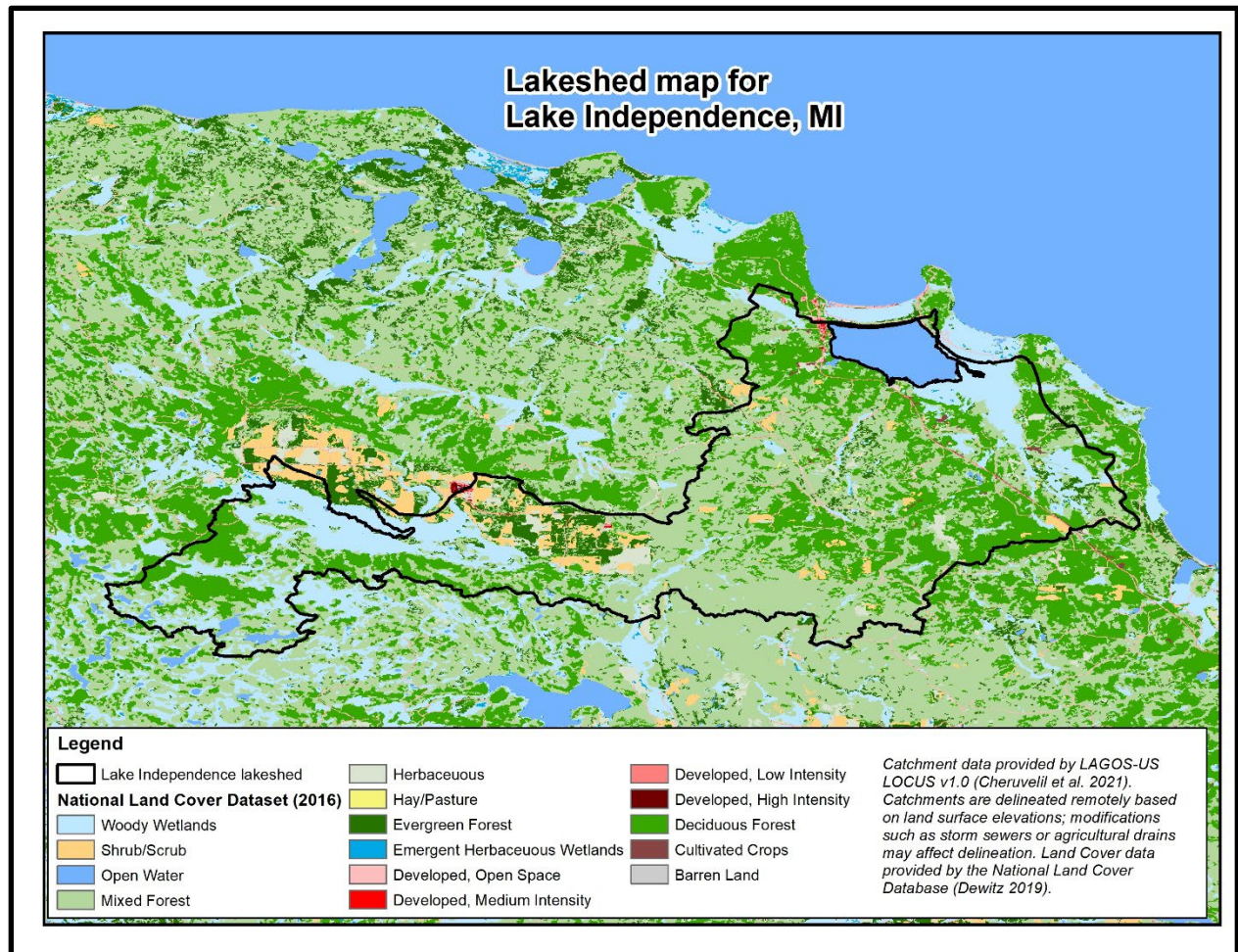


Figure 4. 1945 fish ladder.



Figure 5. Lake Independence 2021 August limnological profile.


	Michigan Dept. of Natural Resources Fish Collection System	Lake Independence Water Survey 08/26/2021 - 08/26/2021	Page 1			
<u>Water:</u> Lake Independence <u>Primary county:</u> Marquette <u>Dis. county:</u> Marquette		<u>T/R/S:</u> 51N 27W 24 <u>Status:</u> In Progress <u>Survey begin:</u> 08/26/2021 <u>end:</u> 08/26/2021				
<u>Special regs:</u> <u>Purpose:</u> Discretionary survey <u>Gear:</u> LIMNO						
Effort #	Gear Type	Effort start, end	Effort meas.	Net Inv. #	Location	
1	Limnology	08/26/2021 14:23 - 08/26/2021 14:24				
Water temperature/oxygen readings						
Date/time	Reading depth	Temperature	Oxygen	pH	Collection/index site no.	SpCond mS/cm
08/26/2021 14:23:00	2	73.70	8.58	6.88		0.1270
08/26/2021 14:23:00	2	73.80	8.45	7.48		0.1280
08/26/2021 14:23:00	4	73.80	8.48	7.72		0.1260
08/26/2021 14:23:00	6	73.80	8.50	7.77		0.1260
08/26/2021 14:23:00	8	73.80	8.46	7.80		0.1260
08/26/2021 14:23:00	10	73.80	8.51	7.85		0.1260
08/26/2021 14:23:00	12	73.80	8.40	7.87		0.1260
08/26/2021 14:23:00	14	73.80	8.48	7.89		0.1260
08/26/2021 14:23:00	16	73.80	8.46	7.93		0.1260
08/26/2021 14:23:00	18	73.80	8.49	7.94		0.1260
08/26/2021 14:23:00	20	73.80	8.49	7.93		0.1260
08/26/2021 14:23:00	22	73.80	8.43	7.94		0.1260
08/26/2021 14:23:00	24	73.20	7.58	7.84		0.1290

Figure 6. Length at Age assessment of Lake Independence Walleye.

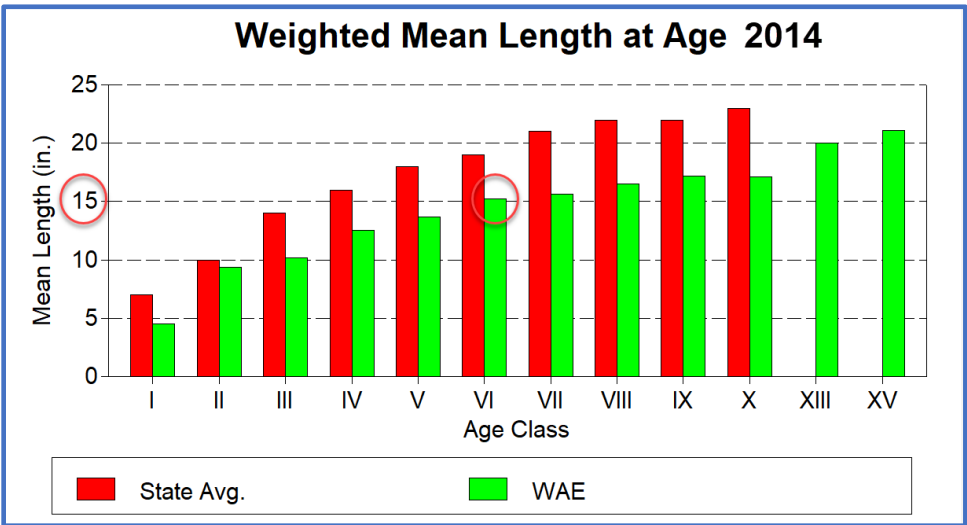
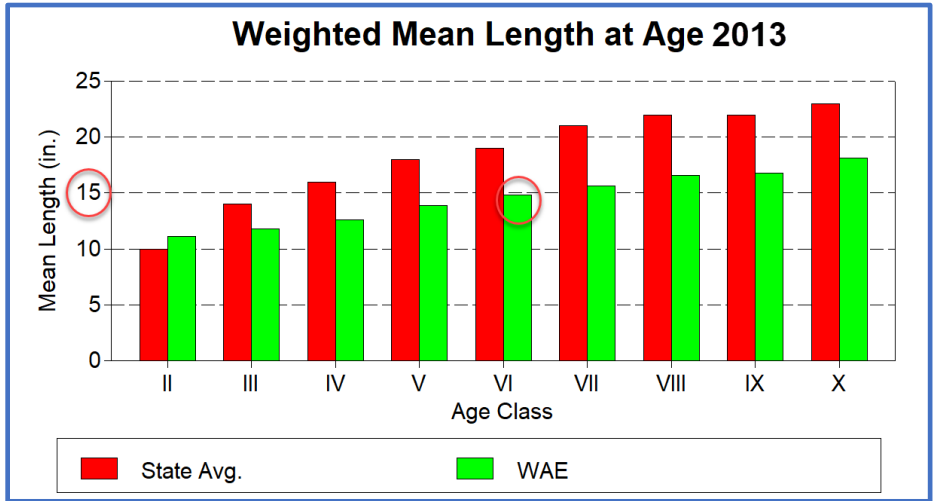
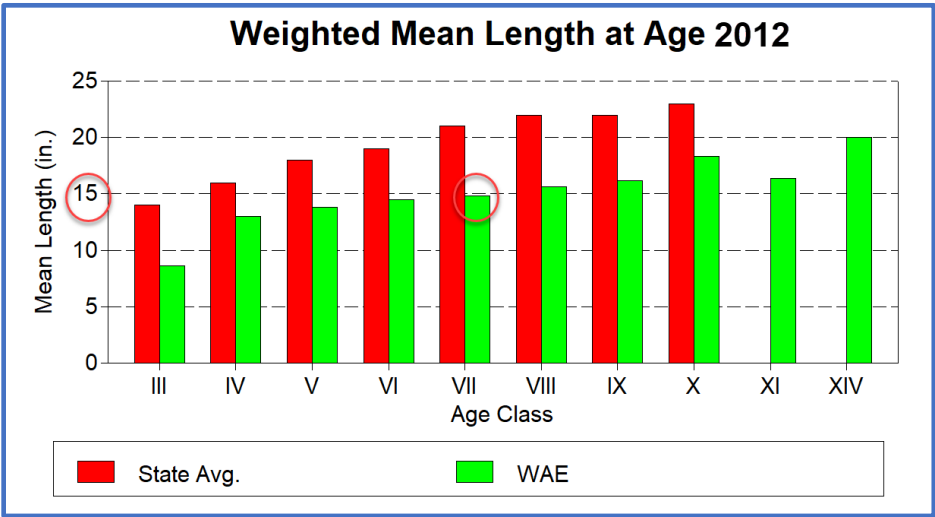


Figure 7. Decision tree for water that should be stocked with Walleye, prescribed within the Michigan Walleye Management Plan

