

Sugar Lake fish population summary

Black Crappie

Historic data from 1982 – 1998 showed a decline in the relative abundance of black crappie in Sugar Lake (Figure 1). Due to this decline and a growing concern from the Lake Association, a reduced bag limit was proposed and put in place March 1, 2007. Since 2007, we have seen an increase in the relative abundance of black crappie (Figure 1). Prior to the regulation the gill net catch averaged 1.1/net compared to 3.5/net post regulation.

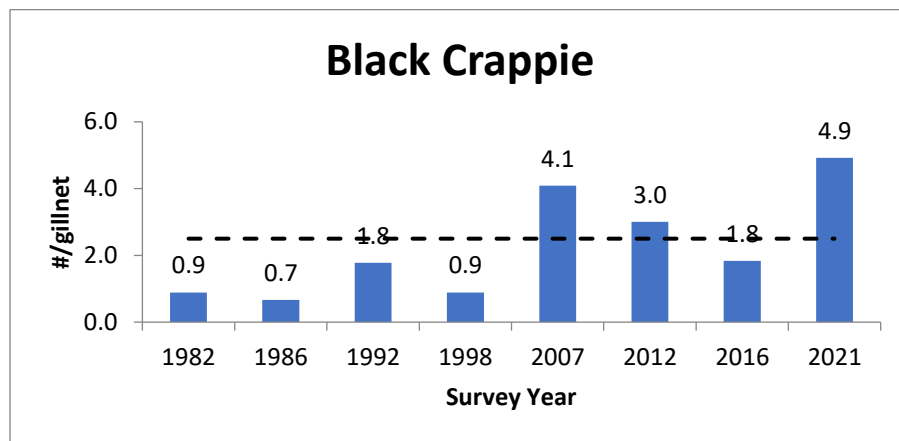


Figure 1. Historic gill net catch of black crappie during summer surveys (1982 - 2021). Dashed line is the lower level of what we would expect to see for lakes similar to Sugar Lake.

In 2023, 2,948 crappies were sampled in the spring and ranged in length from 4 ½ - 14 ½ inches with an average length of 9.4 inches. The crappie population appears to be stable and healthy as we have seen the average size of crappie increase over time as well as the percentage of fish over 8, 10, and 12 inches (Figure 2 and Table 1)!!!

Year	2023	2016	2007	2003	1998
N	2,948	1,789	770	279	212
Avg. TL	9.4	9.5	8.2	8.6	9.7
% > 8"	78	76	59	64	98
% > 10"	50	61	27	17	46
% > 12"	3	9	3	1	0

Table 1. Size structure comparison of Black Crappie from 1998 to 2023 collected during Spring Assessments. A five fish bag limit on crappie was put in place on March 1, 2007.

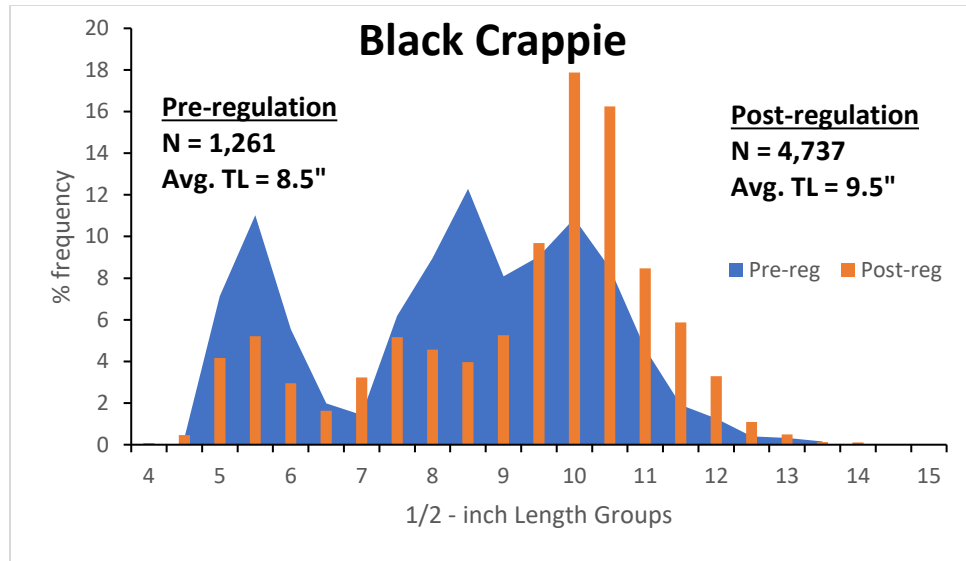


Figure 2. Pre-(1998 - 2007) and post-regulation (2016 - 2023) crappie length frequencies sampled during the spring.

Northern Pike

Northern Pike have always been abundant and small (average length of 19 inches) in Sugar Lake despite having a remnant tullibee (Cisco) population (Figure 3). Due to their high abundance and small size an experimental 24 – 36-inch protected slot limit with one over 36 inches allowed in a possession limit of three was put in place on March 1, 2007. Since that time relative abundance has come down some post-regulation (19.1/net vs 12.2/net) although the average size hasn't changed much (19.3 inches and 1.9 lbs. vs 19.0 inches and 1.8 lbs.).

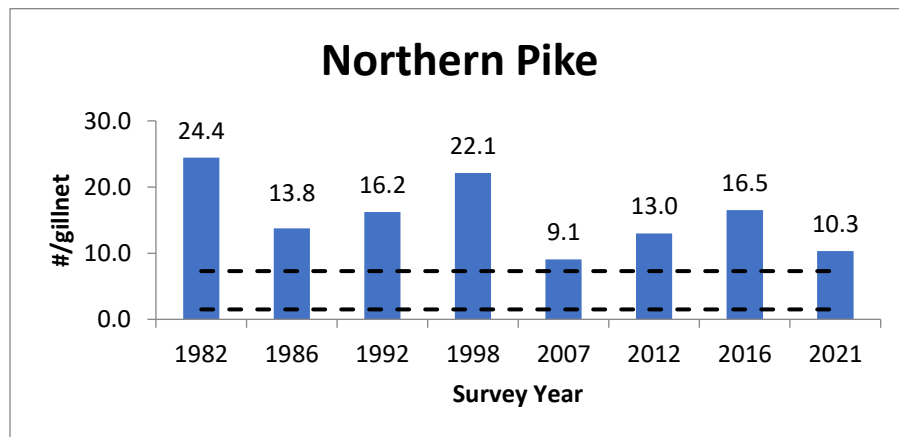


Figure 3. Historic gill net catch of northern pike caught during summer gill net surveys (1982 - 2021). The dashed lines are the upper and lower level of what we would expect to see in lakes similar to Sugar Lake.

In 2023, 417 northern pike were sampled during the spring and ranged in length from 11 – 38.7 inches with an average length of 20.7 inches. While the pike population is still relatively abundant, spring

targeted surveys show that there appears to be some positive changes in the size structure of the pike population as we are now seeing a higher percentage of fish over 24- and 30-inches post-regulation (Table 2).

Table 2. Size structure comparison of Northern Pike from 1998 to 2023 collected during Spring Assessments. A special 24 – 36-inch protected slot with a bag limit of three was put in place on March 1, 2007.

Year	2023	2016	2007	2003	1998
N	417	1,650	1,784	363	1,198
Avg. TL	20.7	18.8	19.9	19.0	19.3
% > 21"	27	25	27	30	26
% > 24"	20	18	13	9	10
% > 30"	12	8	3	2	2

Muskellunge

Sugar Lake was designated for muskie management in 1967 and was stocked with Shoepac strain from 1967 – 1979, Wisconsin strain from 1983 – 1988, and since 1988 Leech Lake strain. Along with the different strains, stocking rates have changed dramatically over time. 500 – 1,000 fingerlings/yearlings were stocked annually from 1967 – 2006 then dropped to 357 fingerlings every other year from 2006 to 2017. Since 2019, 180 fingerlings are stocked annually. The goal of muskie management is to manage the lake for an adult (> 30 inches) population of 0.2 – 0.4 muskies per acre. Basically, one adult for every 4 acres of water.

A number of muskie assessments have been conducted, but only four population estimates have been computed. As with the stocking rates, the population estimates have declined over time from 0.26 adults/acre to 0.11 adults/acre (Table 3.). There are plenty of factors that play into the decline, but one that sticks out is the reduction in the number of fish stocked.

Table 3. Peterson population estimates for the Sugar Lake muskellunge population from 2007 – 2023. Issues during the recap phase in 2023 did not allow for the calculation of the Peterson population estimate. * - population estimate based on the Schnable method.

Year	Estimate	# > 30"/acre
2007	144 < 268 < 549	0.26
2012	105 < 222 < 513	0.22
2016	95 < 150 < 250	0.15
2023*	76 < 116 < 243	0.11

In 2023, the fourth muskie population estimate was conducted from May 1 to May 24. A total of 55 muskies were sampled during the survey and ranged from 33 – 53 ½ inches with an

average length of 43.9 inches (Figure 4; Table 4). The 53 ½ inch fish was the largest muskie that has ever been sampled on the lake.

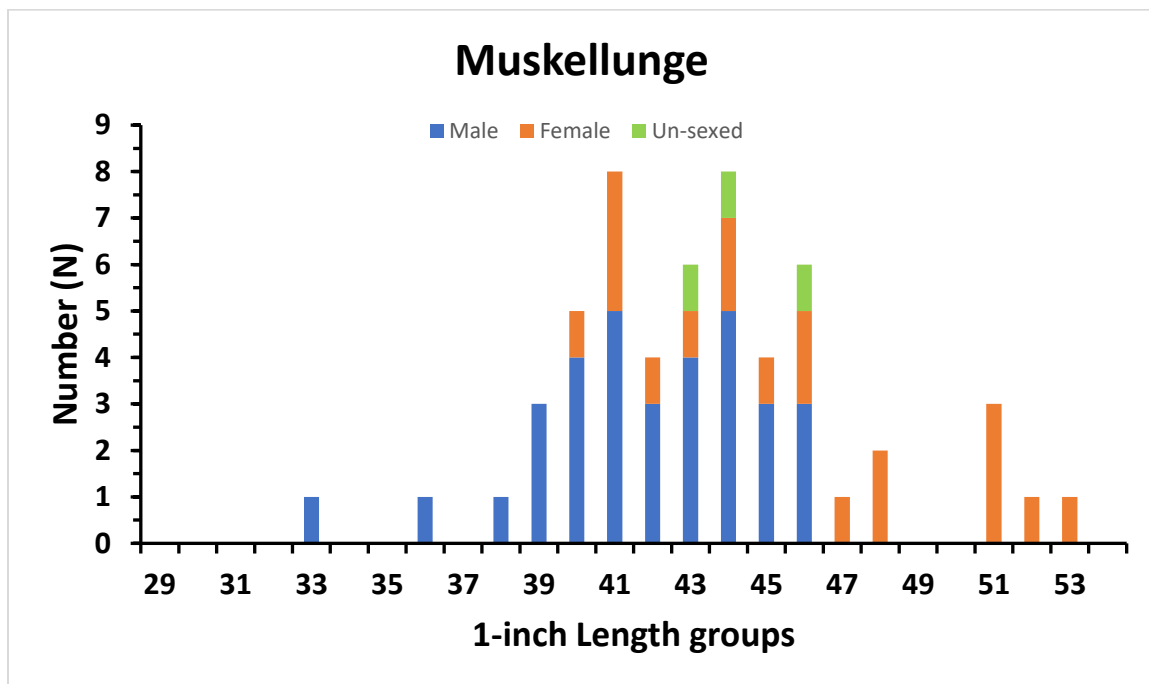


Figure 4. Length frequency of muskellunge caught during the 2023 Spring Assessment.

Even though the muskie population appears to be declining number wise, the size structure continues to improve compared to past muskie assessments (Table 4).

Table 4. Size structure comparison of muskellunge from 1998 - 2023 collected during spring assessments.

Year	2023	2016	2012	2007	2003	1998
N	55	91	74	106	72	30
Avg. TL	43.9	44.5	42.4	41	39	37
% > 30"	100	100	98	99	97	97
% > 38"	96	91	87	84	62	48
% > 42"	64	76	57	37	42	21
% > 50"	9	11	2	2	0	0

Walleye

Walleye were first stocked into Sugar Lake in 1946 and for the most part have been stocked almost annually ever since. The current stocking rate is 1 lb. of fingerlings per littoral acre. The littoral area is any part of the lake that is < 15 feet deep so for Sugar Lake there are

357 littoral acres. Fingerlings are the preferred size to stock, but we have stocked yearlings and adults in years when fingerlings are not readily available.

Even with the annual stocking walleye have never been overly abundant; however, catches have always fallen within the range of what we would expect to see for lakes similar to Sugar Lake (Figure 5).

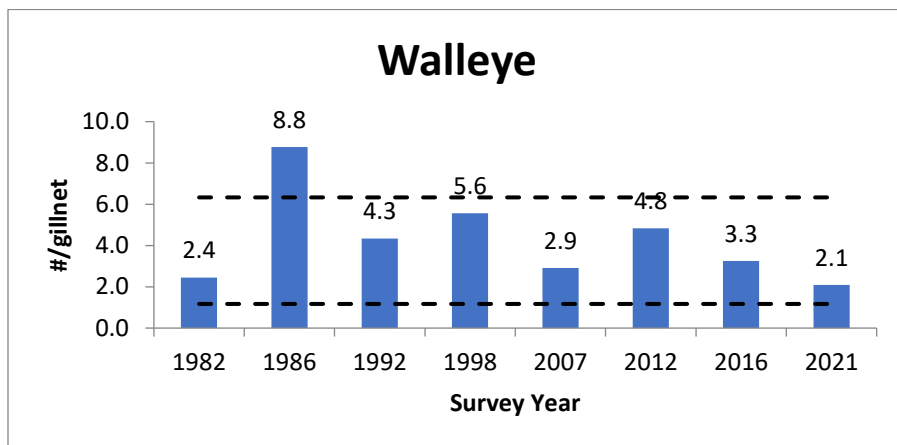


Figure 5. Historic gill net catch of walleye caught during summer gill net surveys (1982 - 2021). The dashed lines are the upper and lower level of what we would expect to see in lakes similar to Sugar Lake.

Two hundred and seven walleyes were sampled during the 2023 spring assessment and ranged in length from 12 – 31.8 inches with an average length of 21.1 inches (Figure 6 and Table 5). Based on spring netting the walleye population appears to be stable as the average length and most size structure indices have changed little since 1998 (Table 5).

Table 5. Size structure comparison of Walleye from 1998 - 2023 collected during spring assessments.

Year	2023	2012	2007	2003	1998
N	207	361	353	212	166
Avg. TL	21.1	21.0	21.3	21.1	21.0
% > 15"	89	97	99	99	100
% > 20"	55	55	57	58	56
% > 25"	23	16	25	13	14

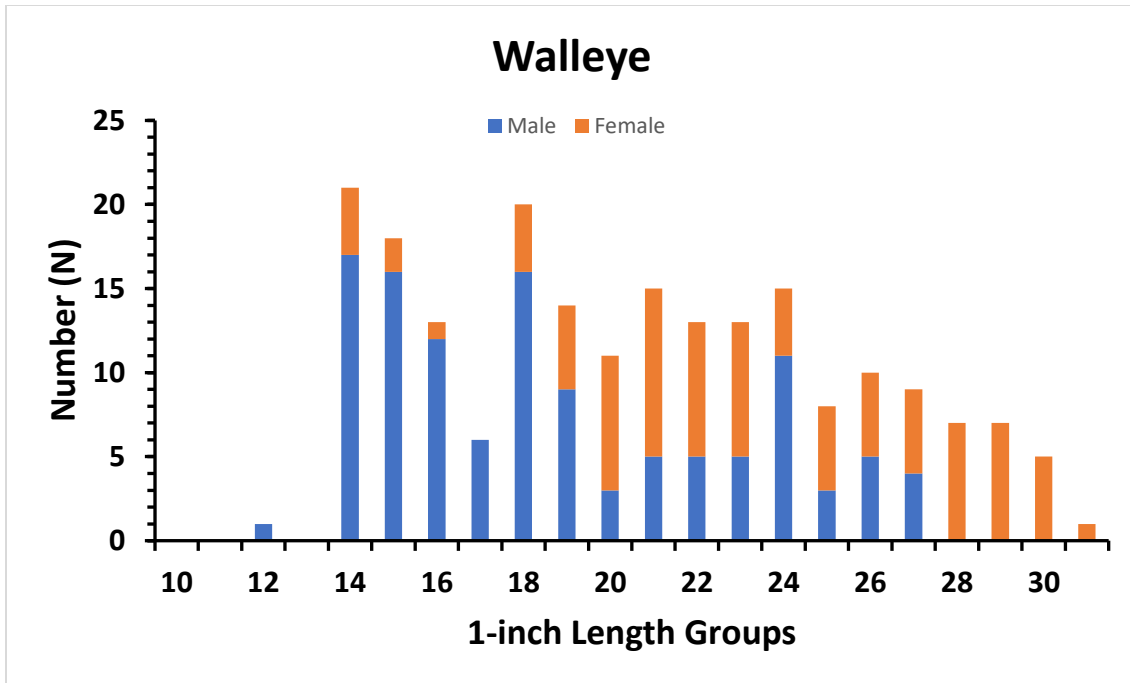


Figure 6. Length frequency of walleye caught during the 2023 Spring Assessment.