2022 Deep Lake Stock Assessment

In part of reporting for FWEF Project 22-010 SVSFE Initiatives and Monitoring of Recreational Fisheries in the Swan Valley Area

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Executive Summary

SVSFE applied to the Fish and Wildlife Enhancement Fund to investigate walleye stock on Deep Lake in the Porcupine Provincial Forest. Featured in this report is the data and management considerations from the netting assessment.

Results found a healthy walleye population with multiple age classes. A total of 88 walleye were sampled during the assessment and fish were in excellent condition. Growth and condition were on par, if not slightly better than other walleye lakes in the Porcupine Provincial Forest. When correlating age estimates to stocking records, there appears to be a relationship between age class strength and past walleye plantings. Arguably 64/88 (74%) of the sample can be directly correlated with walleye plantings from 2007, 2008, 2014, and 2015. The fishery does sustain a naturalized walleye population, however based on the available evidence the walleye fishery benefits from supplemental walleye stocking.

Deep Lake has a total area of 91.8 hectares with 26.2ha littoral (28%). It is recommended to (1) add Deep Lake back on the walleye fry stocking list, or (2) replicate the netting survey again in the coming years to enhance the database. Data from a second or third survey would help further understand the walleye fishery and population dynamics. Based on lake size and littoral hectarage, 1 bag (100,000) of fry stocked every two years should be sufficient to establish a high-quality walleye fishery. This stocking plan makes sense from a logistical perspective, as Bell Lake, North Steeprock Lake, and Virgin Lake are all nearby and stocked with walleye fry every other year.

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Table 1: Stocking Records

Deep Lake Stocking Records			
Year	**Species**	**Stock**	**# of Fish**
1986	Splake	fingerling	20,000
1993	Walleye	fry	100,000
1994-1996		-	-
1997	Walleye	fingerling	6,745
1998 - 2006		-	-
2007	Walleye	fry	100,000
2008	Walleye	fry	100,000
2008	Walleye	fingerling	100
2009 - 2013		-	-
2014	Walleye	fingerling	5,286
2015	Walleye	fry	200,000
2016 - 2017		-	-
Total	Walleye	Fry	500,000
	Walleye	fingerling	12,131

The earliest documented biological work on Deep Lake was in the 1970's. The objectives were to identify parasites and parasite loads in lake whitefish populations. Two species of cestode (tapeworm) infestation were identified: diobthriocephalus latus, and triaenophorus crassus (Crowe, 1975.) in Deep Lake's lake whitefish population.

In June 1988, Trevor Smith set two overnight nets to assess the splake planting from 1986. 200 yards, and 100 yards of 3" and 2" respectively were set overnight. Total catch included: 74 whitefish, 84 pike, 68 suckers, and 13 walleyes. Trevor noted walleye populations are rather small due to high populations of rough fish and that some serious netting would have to be done to create a productive trout or walleye fishery (Smith, 1988).

A test net was set in early August 1997 to assess the walleye plantings from 1994-1996. 17 walleye spines were acquired for lab analysis with all fish ranging from 5-8lbs. All walleye samples were 8+ years or older suggesting that no fish from the acquired sample derived from the plantings preceding years (Yake, 1997).

On the evening of August 30th, 2017 SVSFE technicians beach seined five locations on Deep Lake as an effort to understand walleye recruitment success. Total catch from the five sites included 260 yellow perch, 1 young-of-year northern pike, and 98 young-of-year white suckers (Paterson, 2017). Other fish species present included spottail shiners, and blacksided darters. Invertebrates collected included snails, crayfish, caddisflies, and backswimmers. No young-of-year walleye were collected.

On the evening of September 4th 2018 SVSFE technicians electro-fished Deep Lake with the same objective as 2017 – to further assess walleye recruitment success. Many of the same beaches were targeted from 2017 (Figure 1). A total of six transects at 400 seconds each were completed. Total catch included 7 walleye, 13 northern pike, 295 yellow perch, 11 suckers, and 1 lake whitefish. 6/7 walleye were young-of-year and were captured at site 1 (n=1), site 4 (n=2), and site 5 (n=3). Recommendations following the recruitment surveys were to discontinue all walleye stocking and assess walleye population through a trap netting survey in 2022-2023 (Paterson, 2018).

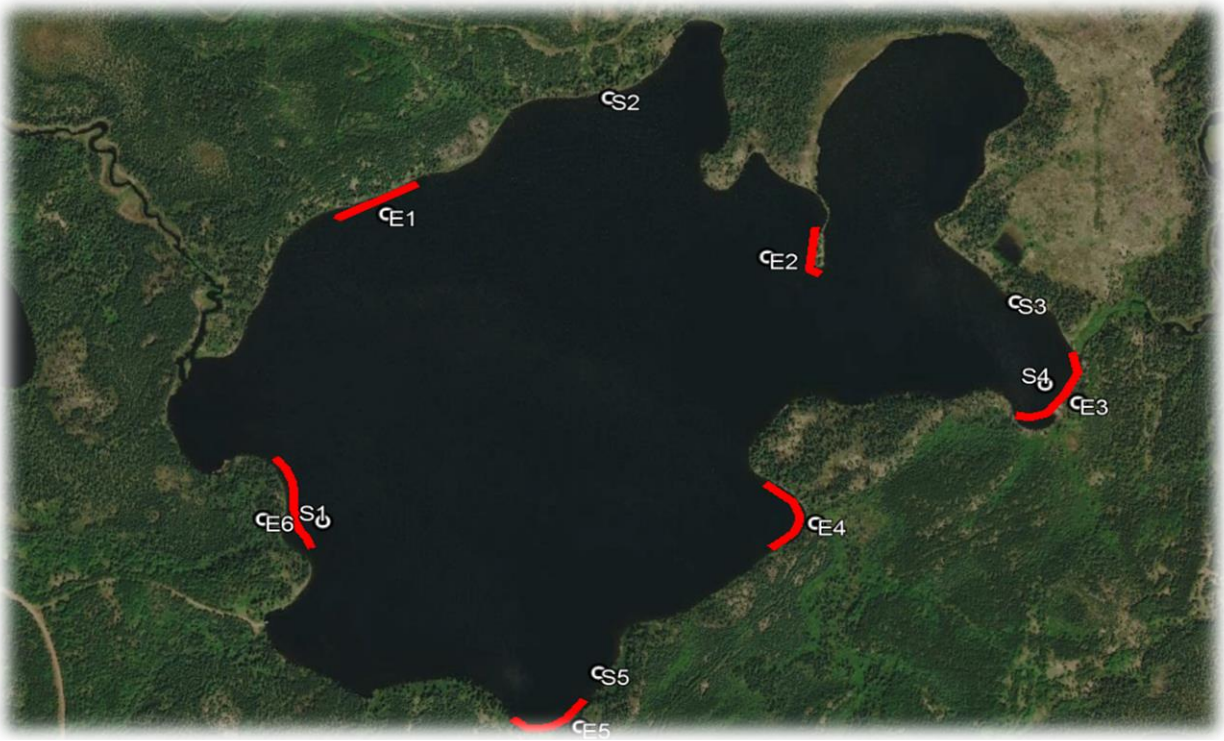

Figure 1: 2017(S) and 2018(E) Seining and Electrofishing Sites

Study Area

Deep Lake is located 76km north-west of Swan River, MB off PR367 along the National Mills Road within the Porcupine Provincial Forest. The waterbody is 94.5 hectares with a maximum depth of 12.8 meters and a mean depth of 5.6 meters (Figure 1). Targetable sport fish species include walleye, northern pike, lake whitefish, and yellow perch.

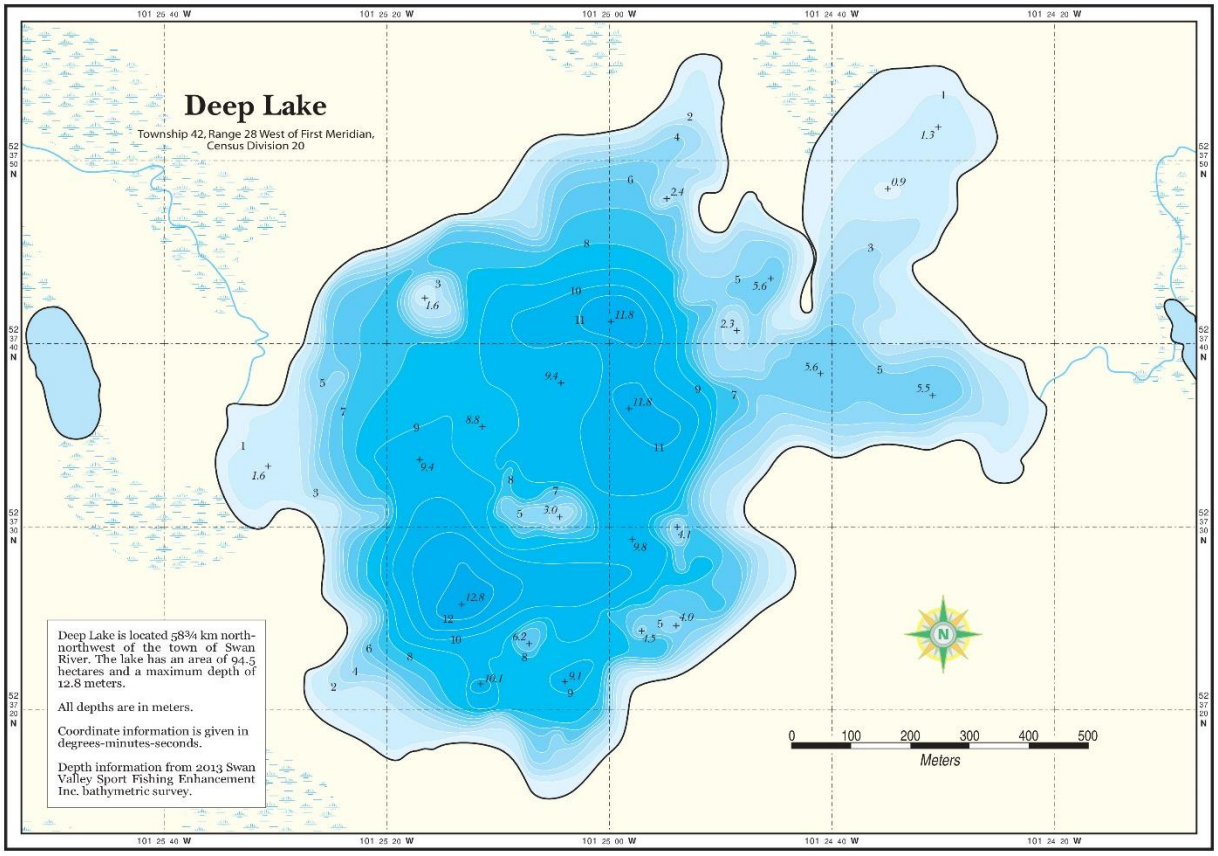

Figure 2: Deep Lake Bathymetry

Methods

The methodology used to assess Deep Lake was a variation of Ontario's End of Spring Trap Netting (ESTN) protocol. Trap nets were the sole method of capture and sites were chosen according to depth suitability. The assessment was designed to be achievable within a workweek, which consisted of 9 overnight sets fishing for a minimum of 21 hours. The netting schedule was created based on ESTN's netting requirements. Nets used were standard Lake Superior Trap Nets which consisted of a 6'x 6' x 11'4" crib and 150' lead. All nets were marked with several buoys and identification flags. Information recorded at set time included: UTM coordinates of set location, site codes, site type (general substrate, fish cover) bottom type (substrate, fish cover), net set crew, set date, set time, lead length, distance offshore, angle to shore, start depth, mid depth, gap depth, and any comments. Information recorded at net pull consisted of; net lift crew, lift date/time, effort status, water temperature, cloud cover, precipitation type, wind direction & speed, general weather for set duration, and surface conditions through set. As the trap was pulled, fish were placed in an onboard live-well. All game fish caught were sampled for fork/total length, weight, age and left pectoral fin clipped to identify recaptured fish. Age structures taken included scales from walleye, northern pike, and lake whitefish. Once all fish were sampled and released, traps were relocated and reset at the next assigned fishing location.

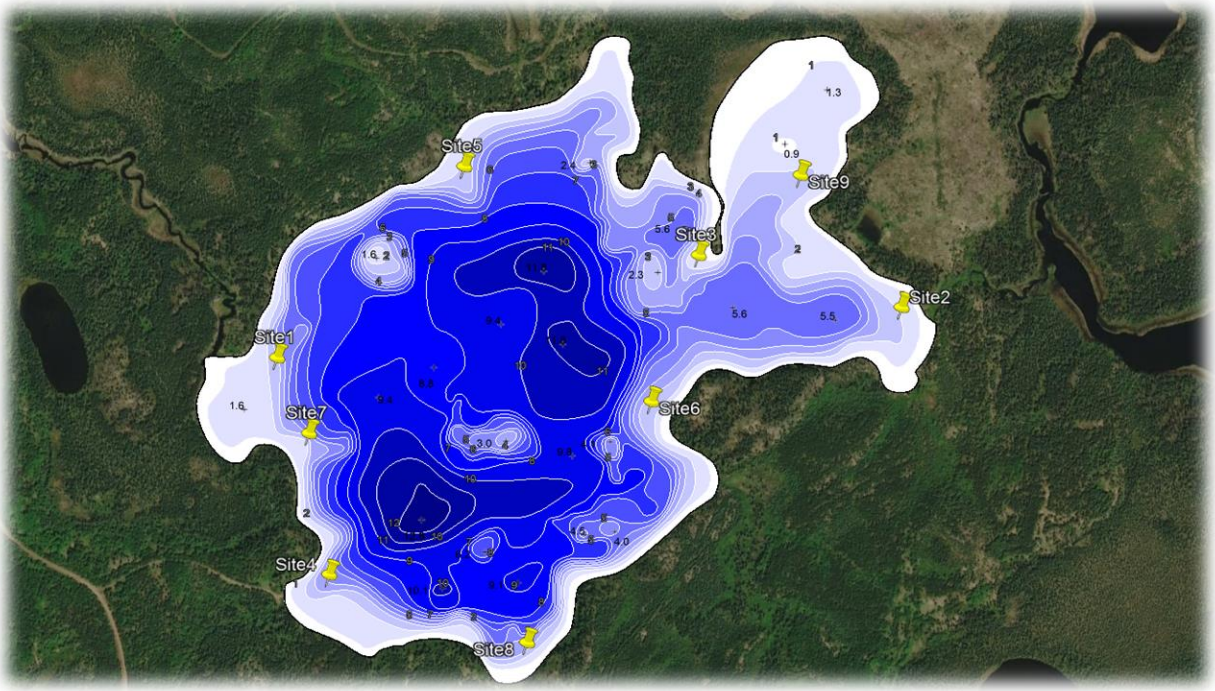

Figure 3: Net Locations

Results

Netting occurred between June 6th-9th, 2022. Effort equated to 207.5 fishing hours which yielded a catch of 234 game fish and 2,452 suckers (Table 3). Nine trap net locations were selected with 3 trap nets fishing at a time. Surface temperatures were between 10.9°C - 13.9°C throughout the assessment. Catch results are summarized as follows:

Table 2: Catch Summary

Sample	Hours Fished	Total Fish Caught	Total CPUE	Walleye		Northern Pike		Whitefish		White Sucker		Totals
				Total	CPUE	Total	CPUE	Total	CPUE	Total	CPUE	
1	23.3	217	9.33	18	0.77	33	1.42	0	0.00	166	7.14	217
2	24.8	846	34.18	0	0.00	4	0.16	0	0.00	842	34.02	846
3	26.2	98	3.75	5	0.19	24	0.92	3	0.11	66	2.52	98
4	22.5	80	3.56	5	0.22	8	0.36	0	0.00	67	2.98	80
5	21.6	121	5.61	7	0.32	13	0.60	1	0.05	100	4.63	121
6	21.5	718	33.40	8	0.37	8	0.37	0	0.00	702	32.65	718
7	22.7	23	1.01	6	0.26	12	0.53	1	0.04	4	0.18	23
8	22.5	317	14.09	39	1.73	26	1.16	0	0.00	252	11.20	317
9	22.7	267	11.78	0	0.00	14	0.62	0	0.00	253	11.16	267
Totals	**208**	**2687**		**88**		**142**		**5**		**2452**		**2687**
Averages			**12.97**		**0.43**		**0.68**		**0.02**		**11.83**	

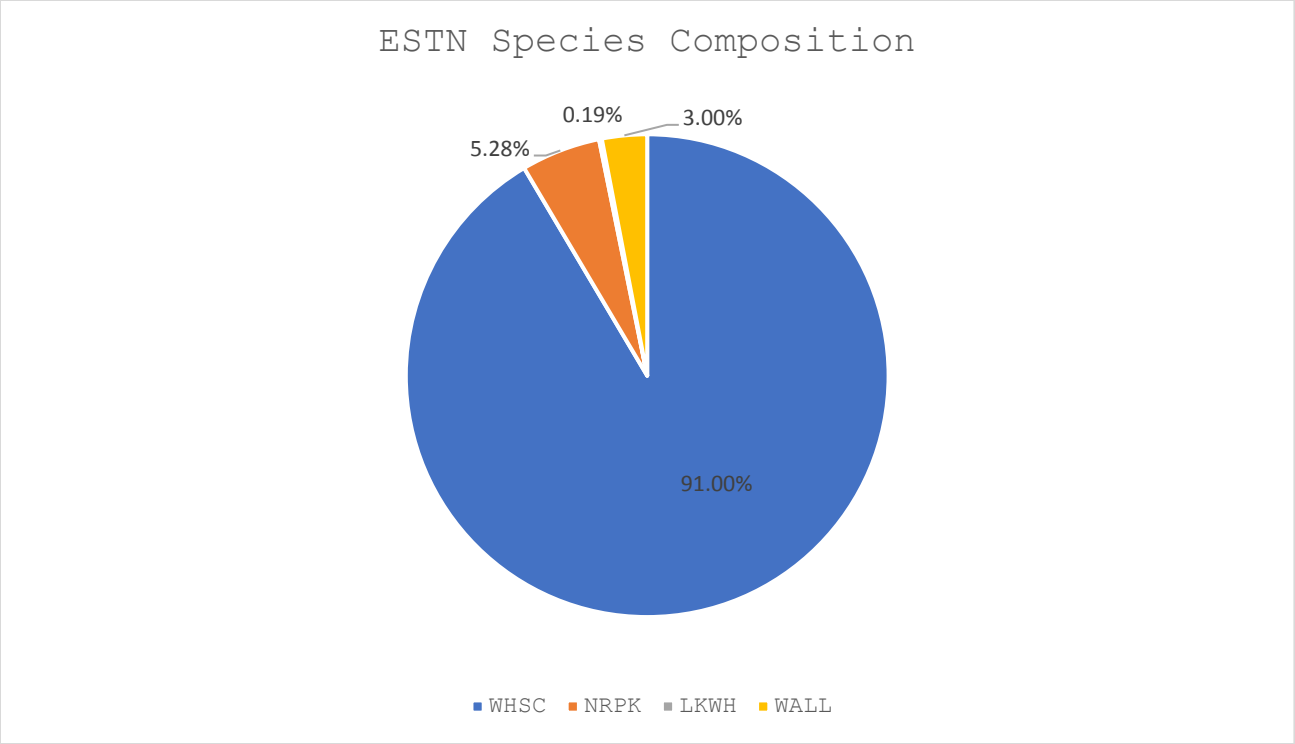

Figure 4: Catch Composition

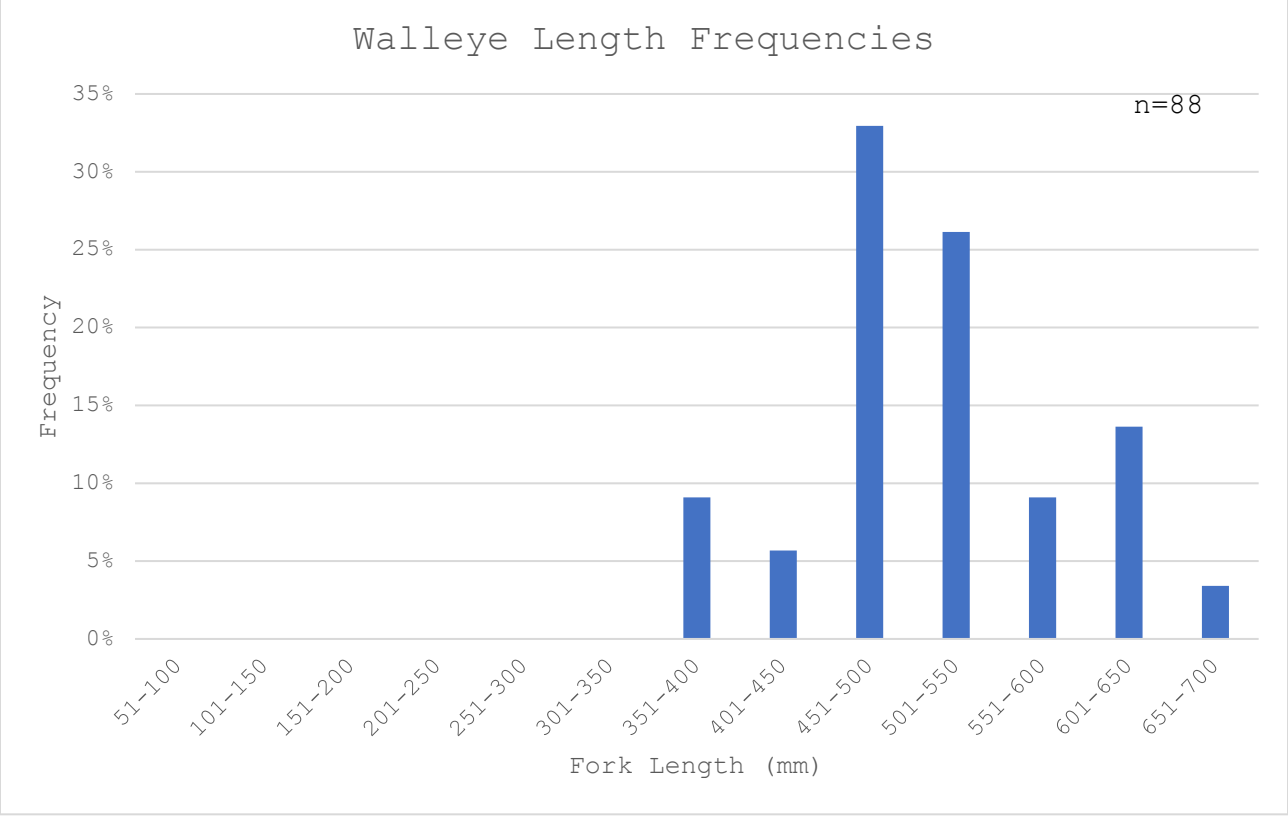

Figure 5: Walleye Length Frequencies

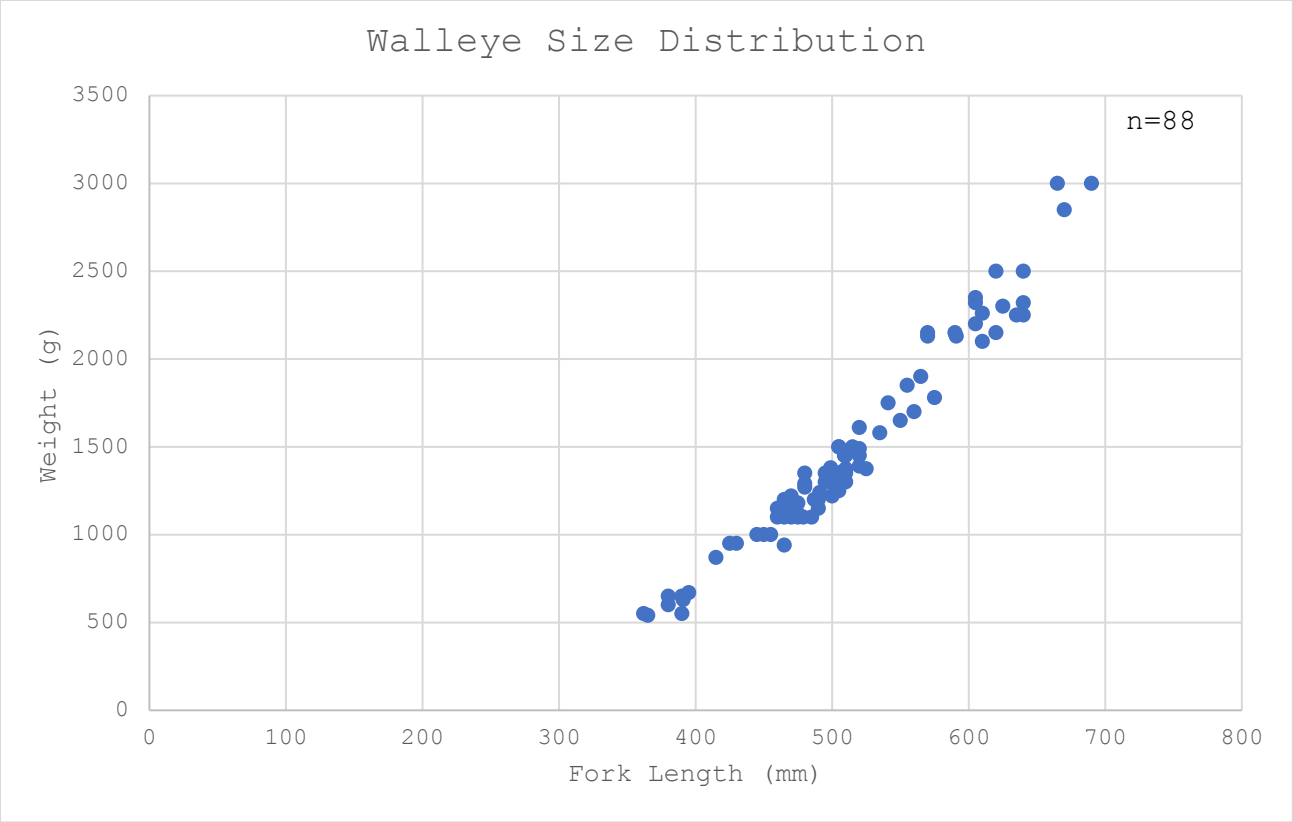

Figure 6: Walleye Size Distribution

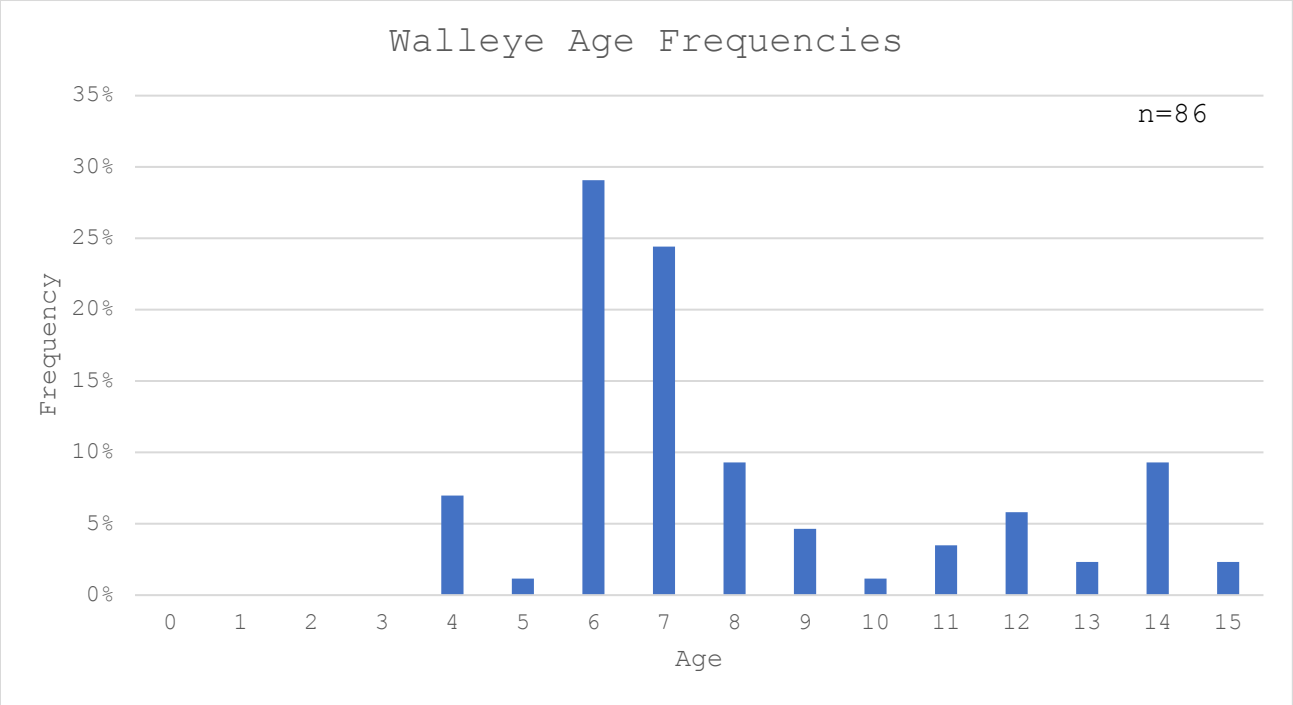

Figure 7: Walleye Age Frequencies

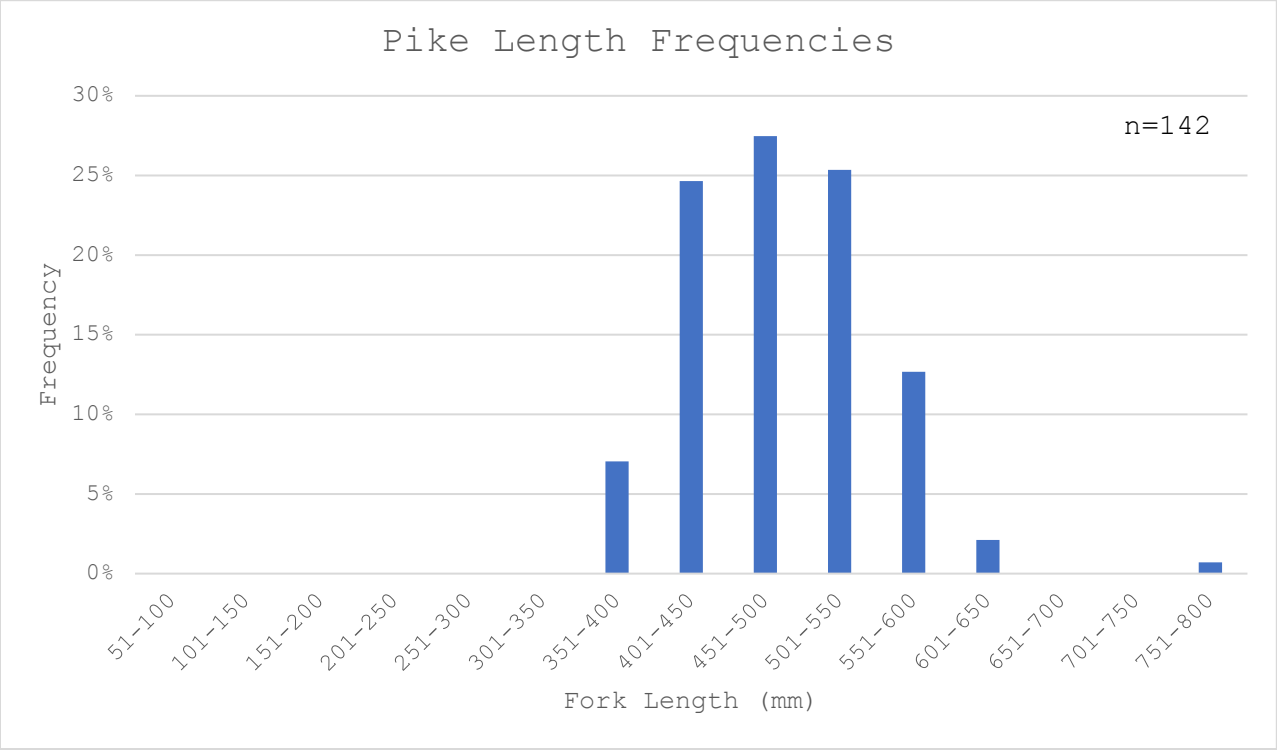

Figure 8: Pike Length Frequencies

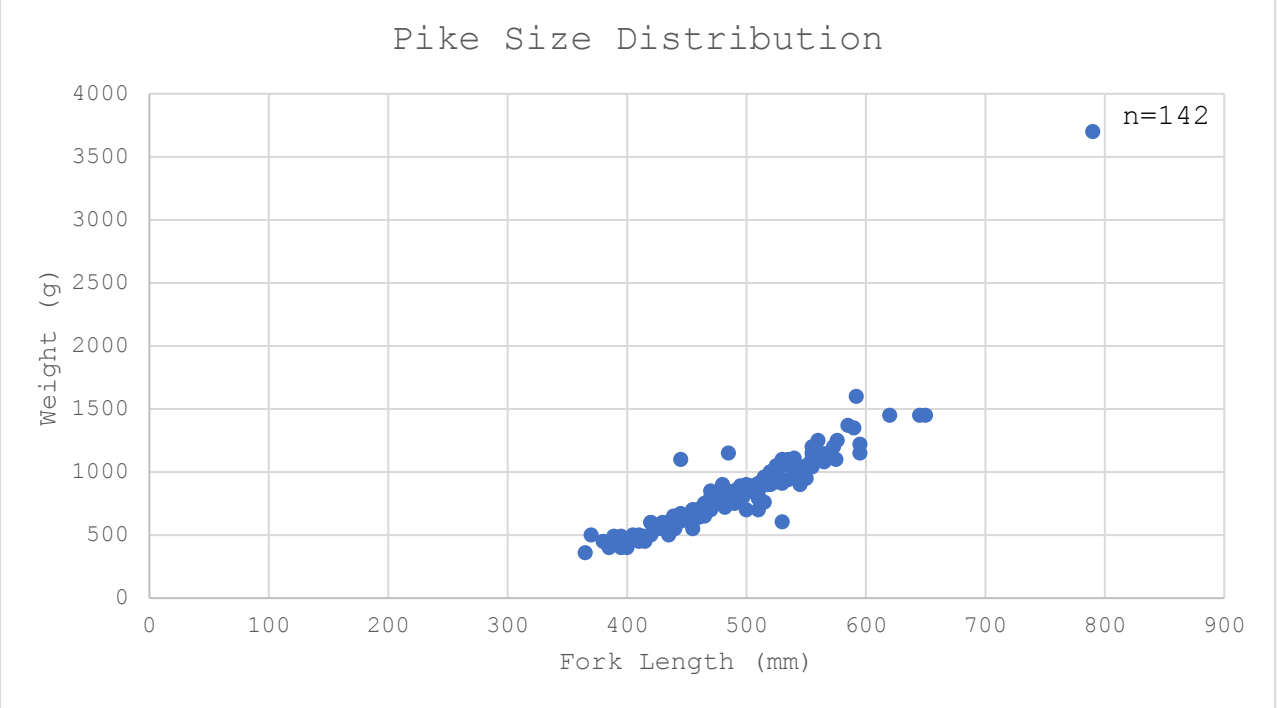

Figure 9: Pike Size Distribution

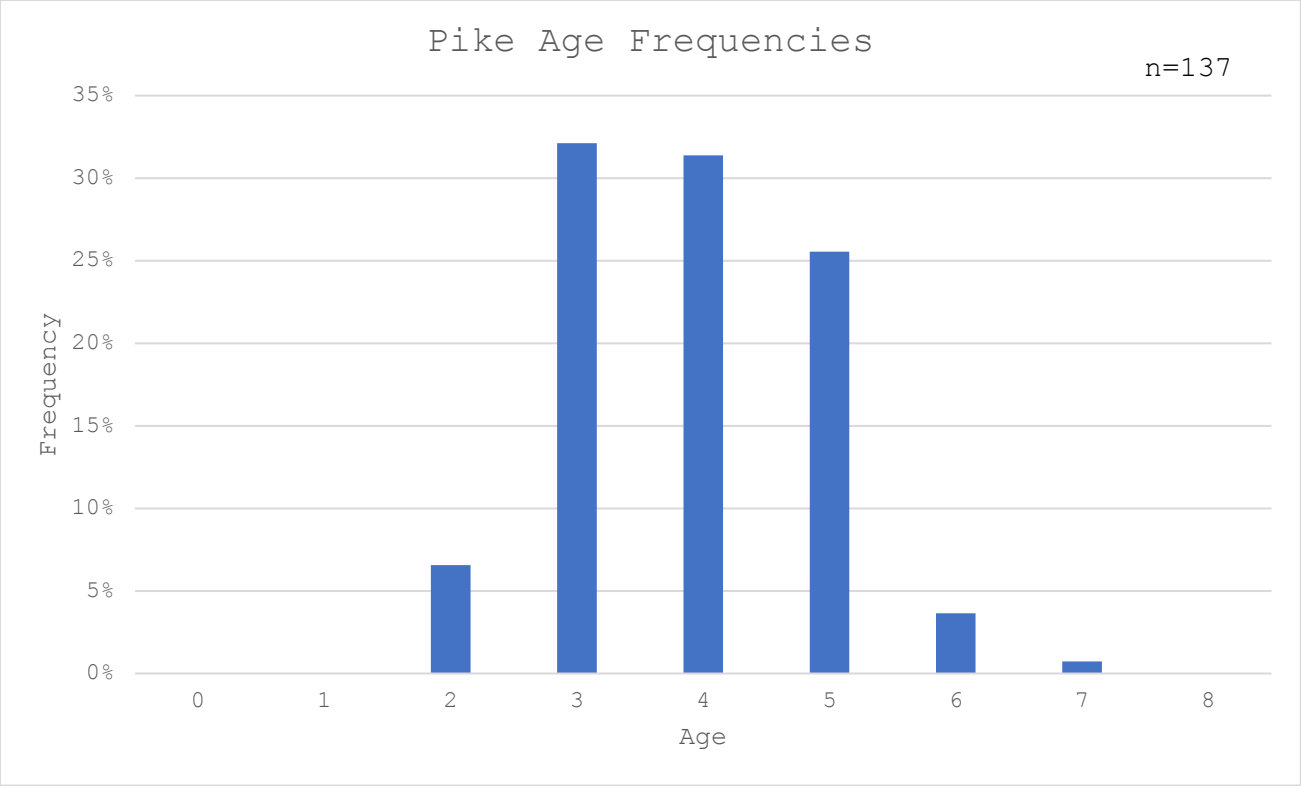

Figure 10: Pike Age Frequencies

Table 3: Lake Whitefish Catch Information

Deep Lake Whitefish 2022					
Species	Fork Length (mm)	Total Length (mm)	Weight (g)	Sex	Age
LKWH	480	530	1800		
LKWH	480	535	1800		
LKWH	465	525	1650		9
LKWH	485	555	1900		9
LKWH	430	485	1350		7

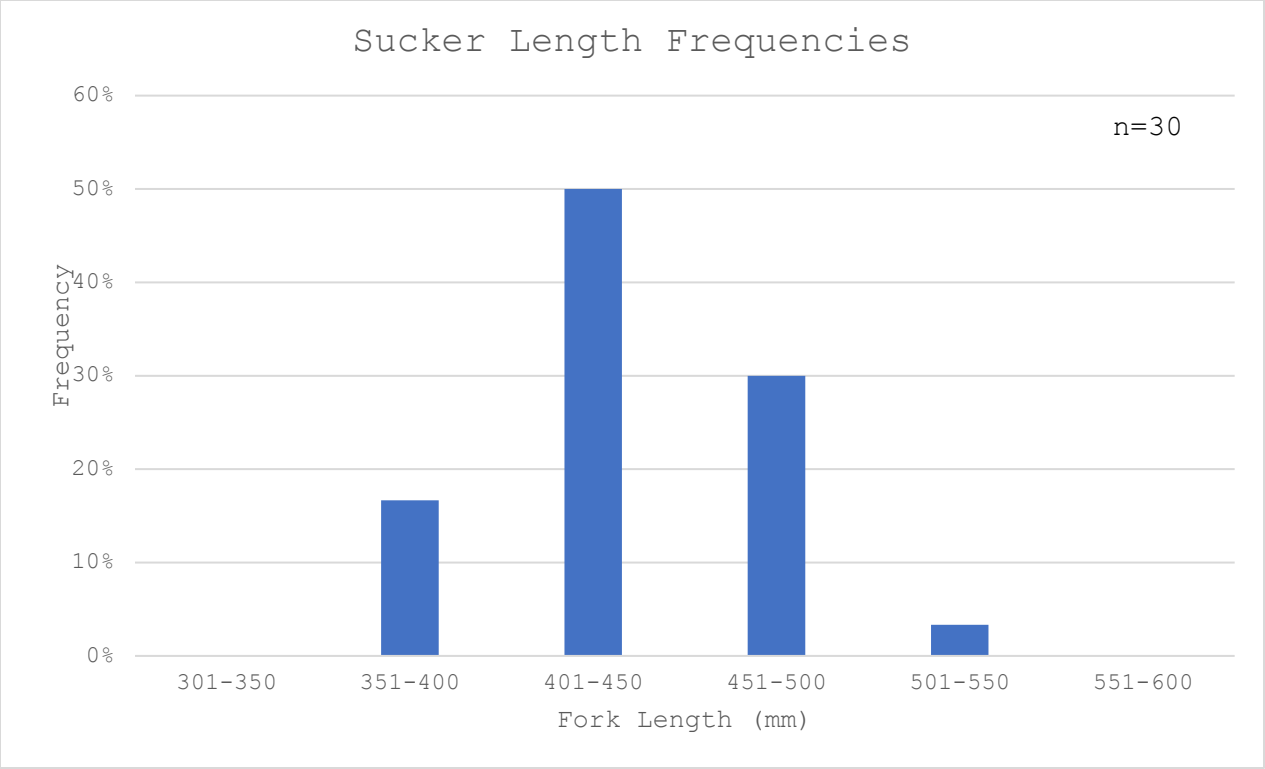

Figure 11: Sucker Length Frequencies

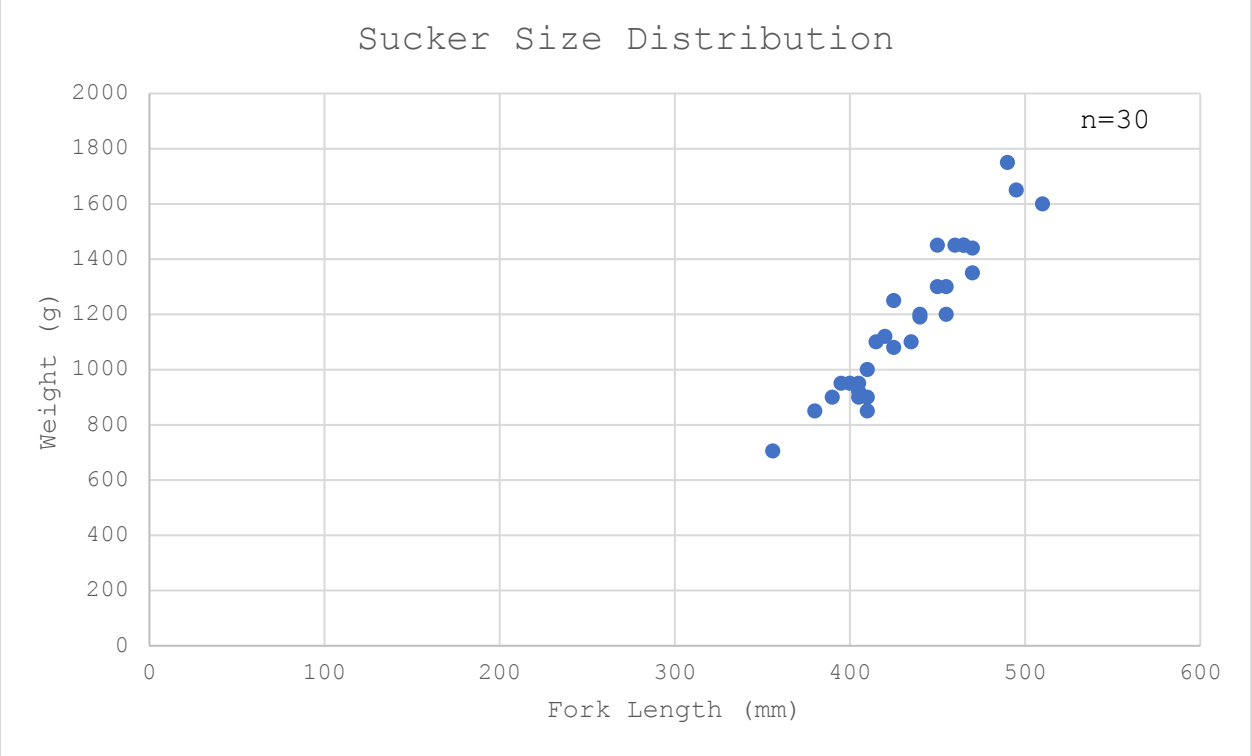

Figure 12: Sucker Size Distribution

Discussion

Spring trap netting is an excellent method to monitor walleye populations. The target timeline for ESTN is when water temperatures are between 12-18°C. In 2022, the assessment occurred a little early when water temperatures were between 11-14°C. Walleye and pike were post spawn, while the suckers were still actively spawning. This likely affected the catch composition of suckers, who made up over 91% of the catch. In addition, the spring of 2022 was a was much wetter than usual. Above average snow accumulations and a spring rainstorm on May 13th resulted a very saturated water table. In fact, many of the bridges and water crossings on the east side of the escarpment were compromised because of these spring conditions. On the first day of the assessment (June 6th) technicians noticed high numbers of pelicans at the primary outflow of Deep Lake. Upon further investigation, it became apparent that the pelicans were actively feeding on suckers that had been congregated in the creek. Over the course of the week, net numbers 2, 6, and 9 had the highest catches of suckers which were the three closest netting locations to the outflowing tributary. It has been hypothesised that due to above average water levels in 2022, Deep Lake is now home to a significantly larger mature white sucker population that emigrated from North Steeprock Lake, which is ~3.5km stream distance downstream from Deep Lake.

Past fish assessment efforts in Deep Lake utilized gill nets as the fish capture method. The data from these assessments (1975, 1988, 1997) found high compositions of lake whitefish. Spring trap netting fishes the littoral areas of the lake and targets post spawn fish while they are actively feeding in the shallows. The low catches of lake whitefish in 2022 was expected, as the method is not necessarily effective at capturing and sampling whitefish at this time of year. It is very likely that Deep Lake homes a much higher population of lake whitefish than the 2022 netting results suggests. Of the five whitefish caught, the fish appeared to be healthy and in good condition. Parasite cysts were not counted or quantified in the 2022 assessments.

Pike are plentiful in the waterbody, with a majority of the fish caught between 400 and 550mm (16-22”). The ages classes associated with these length frequencies were 3-5 years. Lake Superior trap nets are not effective at catching smaller fish and hence why there were none in the dataset. Only one larger pike was caught during the netting assessment (30” TL). Pike were noted to be healthy and in fair condition. Approximately 43% of fish sampled to be infested with the neascus(blackspot) parasite. One individual had dermal sarcoma.

The first documented walleye stocking was in 1993. Although there were multiple undocumented walleye plantings by DFO in in 1970's it is likely walleye naturally inhabited Deep Lake. High populations of "rough fish" including suckers and whitefish likely influence the abundance of walleye, however the waterbody still appears to be a decent walleye lake with signs of naturalization. Past walleye recruitment surveys found evidence of successful natural recruitment but not in quantities that would be considered sustainable. The location of Deep Lake's suitable walleye spawning habitat is unknown. Walleye catch in proximity to the primary inflowing creek may suggest that this is an attractive area to spawning walleye.

When looking at fish age estimates one should be hesitant to draw too many conclusions, as fish ages are only estimates. However, when looking at age class strength and correlating those frequencies to stocking records there appears to be some correlation between age class strength and stocking records. Based on available information including current netting, historical netting, and angling reports, the evidence suggests that Deep Lake benefits from supplemental walleye stocking. There are three nearby waters that are recipients for walleye fry every other year. These include Bell Lake, North Steeprock Lake, and Virgin Lake. Therefore, stocking Deep Lake makes sense not only from a fisheries management perspective, but from a logistical perspective as well. However, one year of data may not be sufficient to justify adding Deep Lake to the biennial stocking list. If this is the case, replicating this program for one or two more years may shed further light on the situation and justification to begin stocking walleye fry again.

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Appendices

Appendix 1: Deep Lake High Water May 17th

Appendix 2: Deep Lake – North Steeprock Lake

Appendix 3: Deep Lake Walleye

Appendix 4: Deep Lake Walleye

Appendix 5: Deep Lake Pike

Appendix 6: Deep Lake Pike

Appendix 8: Deep Lake Whitefish

Appendix 7: Deep Lake Whitefish

Appendix 9: Deep Lake Suckers

Age	Count	Frequency	Hatch Year (Bold Indicates Stocking Years)
0	0	0%	
1	0	0%	2021
2	0	0%	2020
3	0	0%	2019
4	6	7%	2018
5	1	1%	2017
6	25	29%	2016
7	21	24%	**2015**
8	8	9%	**2014**
9	4	5%	2013
10	1	1%	2012
11	3	3%	2011
12	5	6%	2010
13	2	2%	2009
14	8	9%	**2008**
15	2	2%	**2007**
	86		

Appendix 10: Walleye Stock Correlation Chart