Fish and Wildlife Branch Report

2020

Index Netting and Fish Community Assessment Summary – Oak Lake

Natural Resources and Northern Development
2020

Manitoba

Introduction

Fish and Wildlife Branch staff carried out a fisheries assessment on Oak Lake using Manitoba Standard Index Gill Nets as part of a biennial schedule for southern lakes, which started in 1997, with the goal of assessment every 4-5 years on the following waters: Pelican Lake, Rock Lake, Lake Wahtopanah, Oak Lake, and Lake of the Prairies. Our objective is to provide a summary of the assessments and to evaluate the success of the supplemental stocking of walleye fry and fingerlings.

Fisheries has been assessing fish populations for decades using a variety of netting standards/techniques. Gill nets are typically used, as they are an effective tool, especially on large lakes where the amount of fish mortality will not negatively affect fish populations as a whole.

Overview

Oak Lake is a large recreationally fished lake in the southwestern portion of Manitoba along PR 254 located approximately 10 kilometres southwest of the community of Oak Lake, and 60 km southwest of Brandon, MB. (see *Figure 1*).

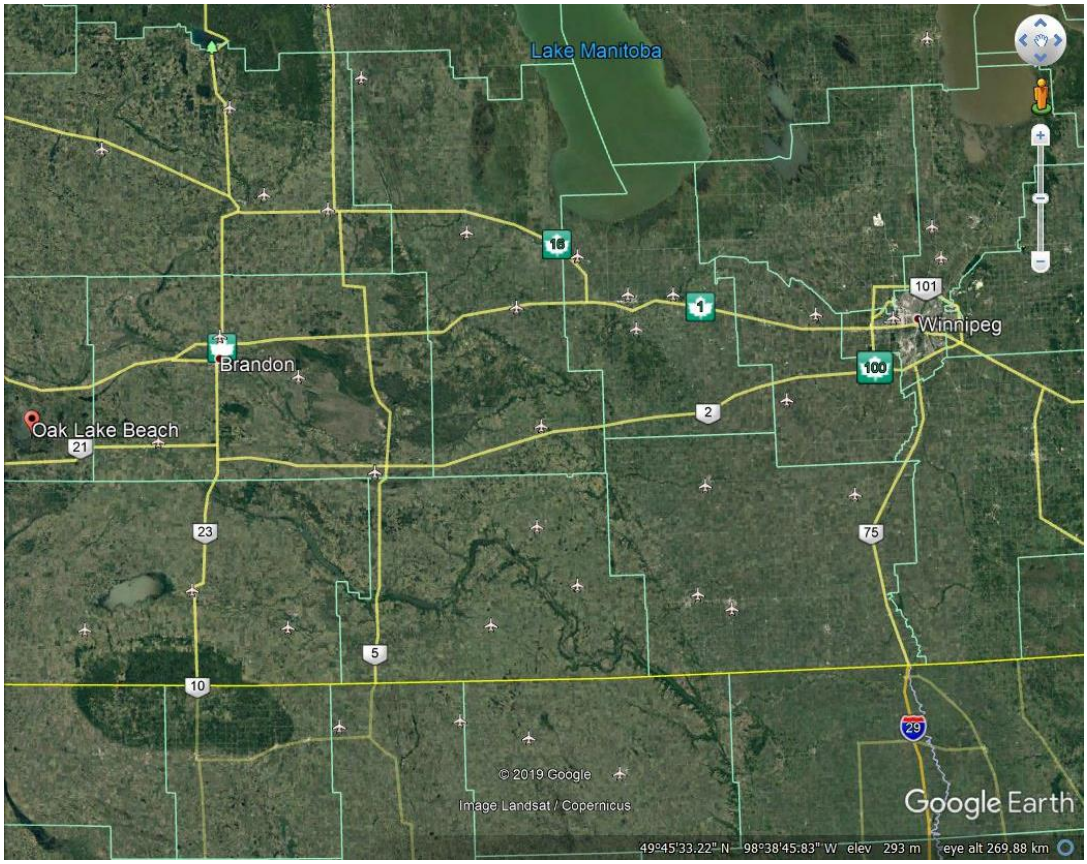

Figure 1: Map of location of Oak Lake.

Oak Lake is approximately 6-7 km in diameter with a relatively round and shallow basin (Figure 2). In 2015, the net set location depths ranged from 0.6 meters to 2 meters.

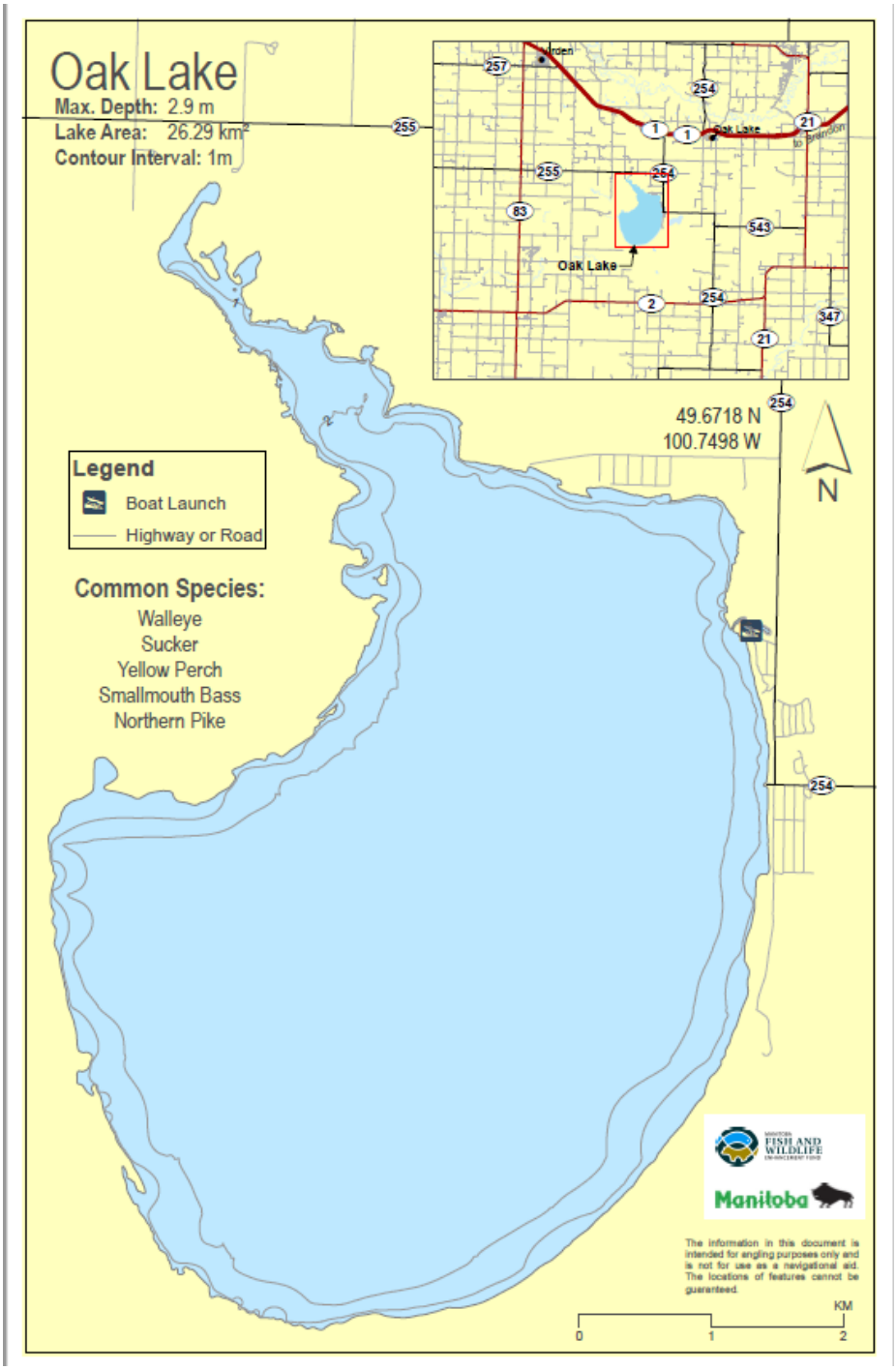

Figure 2: Bathymetry map and orientation of Oak Lake.

Oak Lake has been developed with cottages, park with beach, and has multiple boat launches.

Methods

Index netting surveys are conducted each spring or fall when water temperatures are 15-20°C, a range at which walleye are more equally distributed throughout lakes. Gill nets with mesh sizes of 1.5”, 2”, 3”, 3.75”, 4.25”, and 5” were set overnight at random locations. In 2020, North American Standard (NAS) Gillnets were used to assess the fish population, which are 24.8 m long, consisting of eight 3.1 m long by 1.8 m deep panels ordered 76, 114, 51, 89, 38, 127, 64, and 102

mm (3, 4.5, 2, 3.5, 1.5, 5, 2.5, and 4 inch) clear mono-filament nylon mesh. The previous assessments used 125 m of gillnet with panels consisting of the following sizes 1.5”, 2”, 3”, 3.75”, 4.25”, and 5”.

The number of nets set per lake was based primarily on netting for a 4 day period, re-visiting historical netting locations, and getting coverage of various habitat types. The number of nets set during a survey influences the reliability of the catch-per-unit-effort (CPUE) statistic. Nets were retrieved and returned to shore where fishes were removed, sorted and biological data were collected. All walleye, yellow perch, and northern pike were sampled for fork length, round weight, and additional biological data collected included: sex, sexual maturity, and aging structures taken. Combined weight (g) was recorded for other fish collected.

Stocking

Oak Lake has been stocked since the early/mid 1900’s with records starting in 1936 including a variety of species as follows:

Table 1: History of stocking efforts in Oak Lake.

Year	Species	Number	Size
2022	WALLEYE	600,000	Fry
2021	WALLEYE	1,500,000	Fry
2020	WALLEYE	1,500,000	Fry
2019	WALLEYE	1,000,000	Fry
2018	WALLEYE	500,000	Fry
2017	WALLEYE	1,500,000	Fry
2016	WALLEYE	1,100,000	Fry
2015	WALLEYE	1,100,000	Fry
2014	WALLEYE	1,400,000	Fry
2013	WALLEYE	300,000	Fry
2012	WALLEYE	1,000,000	Fry
2011	WALLEYE	400,000	Fry
2010	WALLEYE	300,000	Fry
2009	WALLEYE	300,000	Fry
2008	WALLEYE	800,000	Fry
2007	WALLEYE	600,000	Fry
2006	WALLEYE	700,000	Fry
2005	WALLEYE	700,000	Fry
2004	WALLEYE	600,000	Fry
2003	WALLEYE	600,000	Fry
2002	WALLEYE	400,000	Fry
2001	WALLEYE	350,000	Fry
2000	WALLEYE	1500000	Fry
2000	PERCH	7,000	Adult
2000	NORTHERN PIKE	3,300	Adult

1999	WALLEYE	300,000	Fry
1998	WALLEYE	350,000	Fry
1998	PERCH	30,918	Adult
1997	WALLEYE	400,000	Fry
1997	PERCH	2,792	Adult
1996	WALLEYE	400,000	Fry
1996	PERCH	2,763	Adult
1995	WALLEYE	2,000,000	Fry
1995	PERCH	3,816	Adult
1994	WALLEYE	1,500,000	Fry
1994	PERCH	1,600	Adult
1993	WALLEYE	500,000	Fry
1993	PERCH	3,383	Adult
1992	WALLEYE	1,900,000	Fry
1992	PERCH	3,000	Adult
1990	WALLEYE	100,000	Fry
1989	WALLEYE	200,000	Fry
1988	WALLEYE	500,000	Fry
1987	WALLEYE	500,000	Fry
1986	WALLEYE	500,000	Fry
1985	WALLEYE	150,000	Fry
1984	WALLEYE	150,000	Fry
1983	WALLEYE	100,000	Fry
1983	PERCH	5,000	Adult
1982	NORTHERN PIKE	950	Adult
1982	WALLEYE	100,000	Fry
1981	PERCH	6,000	Adult
1981	NORTHERN PIKE	880	Adult
1981	WALLEYE	100,000	Fry
1980	PERCH	10,000	Adult
1980	NORTHERN PIKE	1,725	Adult
1979	PERCH	9,600	Adult
1979	NORTHERN PIKE	1,910	Adult
1979	WALLEYE	500,000	Fry
1978	PERCH	11,800	Adult
1978	NORTHERN PIKE	500	Adult
1978	WALLEYE	500,000	Fry
1973	PERCH	3,000	Adult

1973	SMALLMOUTH BASS	6,000	Fingerlings
1972	WALLEYE	415	Adult
1972	PERCH	3,000	Adult
1972	SMALLMOUTH BASS	5,000	Fingerlings
1971	PERCH	3,000	Adult
1971	SMALLMOUTH BASS	2,000	Fingerlings
1970	WALLEYE	500,000	Fry
1970	PERCH	1,000	Adult
1966	NORTHERN PIKE	200	Adult
1966	WALLEYE	150,000	Fry
1965	PERCH	100	Adult
1965	NORTHERN PIKE	2,100	Adult
1965	WALLEYE	1,000,000	Fry
1964	PERCH	210	Adult
1964	NORTHERN PIKE	425	Adult
1962	NORTHERN PIKE	400	Adult
1960	NORTHERN PIKE	388	Adult
1957	NORTHERN PIKE	1,000,000	Fry
1956	WALLEYE	100	Adult
1956	WALLEYE	200	Adult
1949	WALLEYE	1,020,000	Fry
1948	WALLEYE	1,020,000	Fry
1947	WALLEYE	680,000	Fry
1936	WALLEYE	150,000	Fry

Results

During the most recent index netting program in 2020, 67 walleye were captured, 16 northern pike, and 10 yellow perch, which are the main sportfish angled in the lake. The mean walleye catch per unit effort (CPUE) in 2020 on Oak Lake was 48.7 walleye per 100 yards of net (Figure 3). The average age of walleye caught was 5.59 years. The walleye age class frequencies from 1999 to 2020 index netting are depicted in Figure 4. There were 11 age classes caught during the most recent index program.

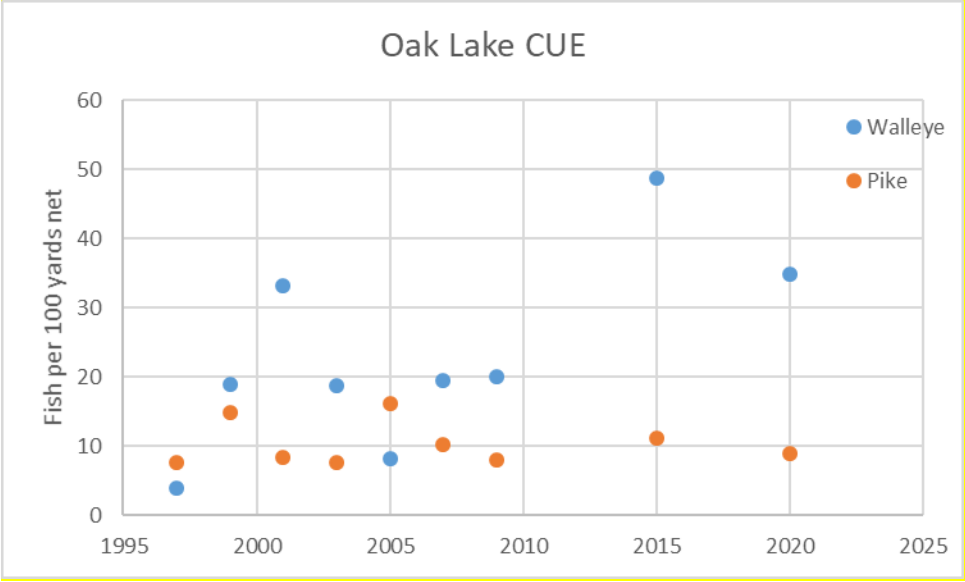

Figure 3. Walleye and pike catch per unit effort from 1997 to 2020 index netting.

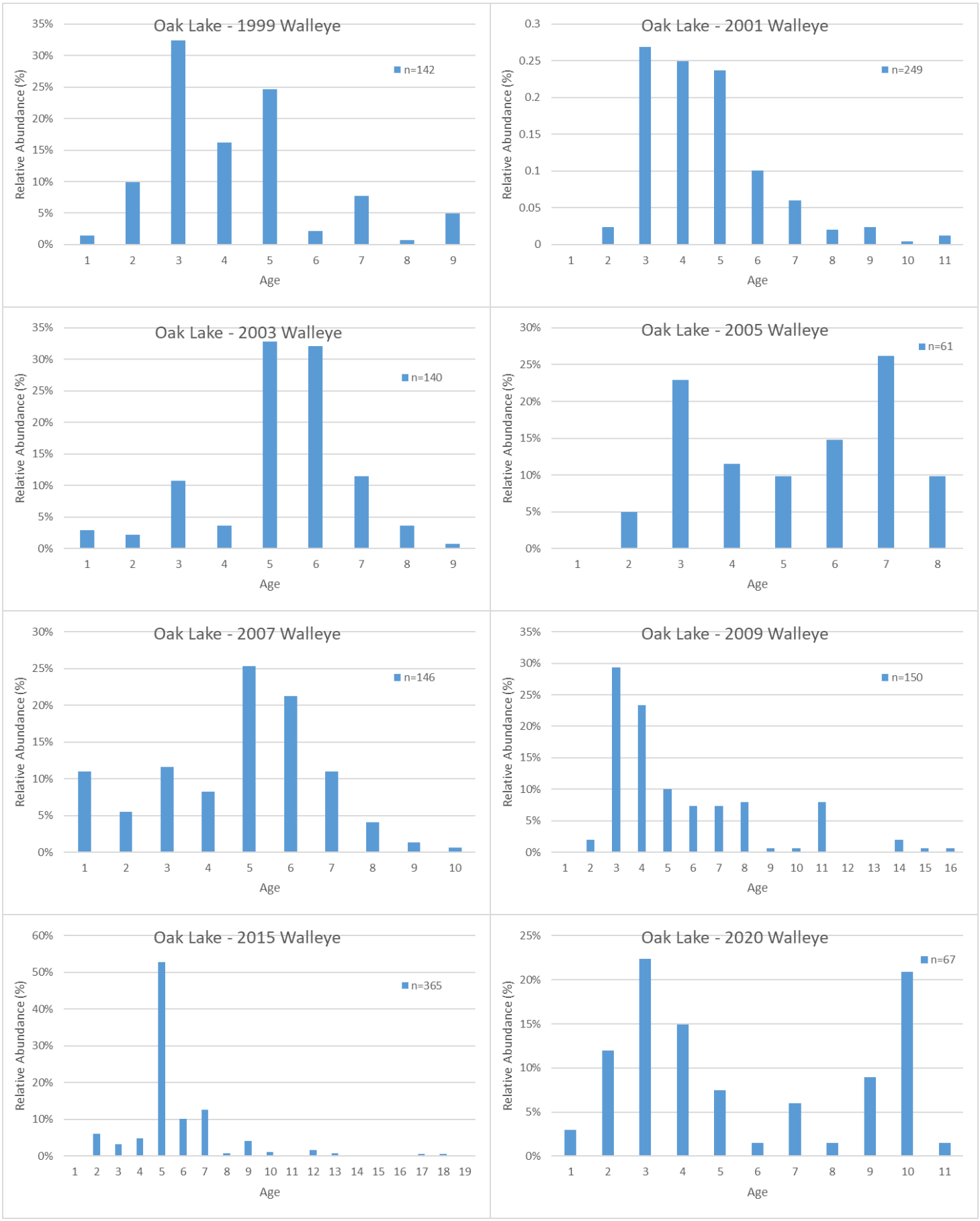

Figure 4. Walleye age size class frequency from index netting.

Of the 16 pike caught in 2020, 14 were aged and showed relatively few strong age classes in the lake older than 5 years of age (Figure 5 – 2020 Pike).

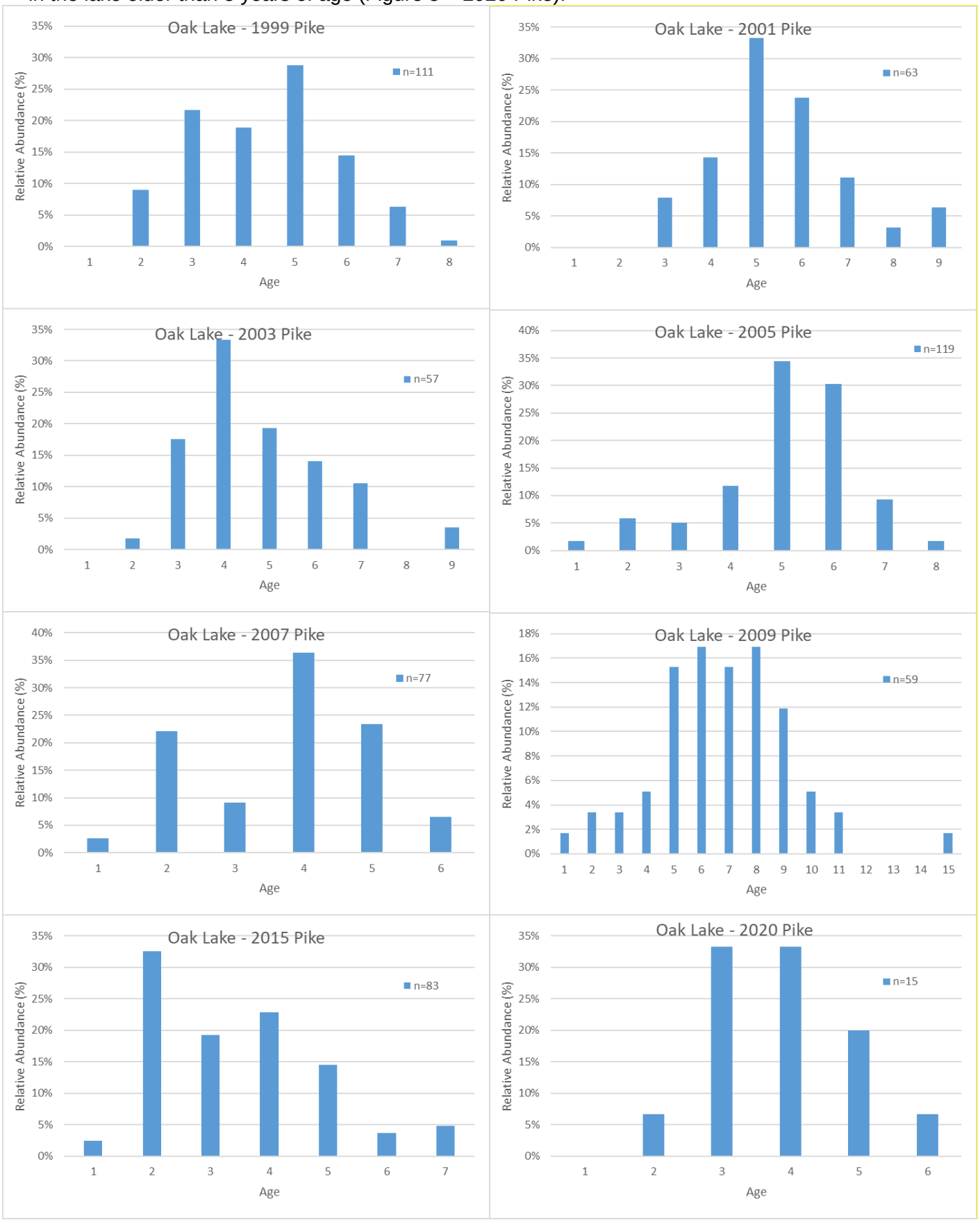

Figure 5: Northern pike age frequency from 1999-2020 index netting surveys.

Relatively few yellow perch were caught in 2020, with 7 of the 10 perch caught being aged, and abundance is shown in Figure 6.

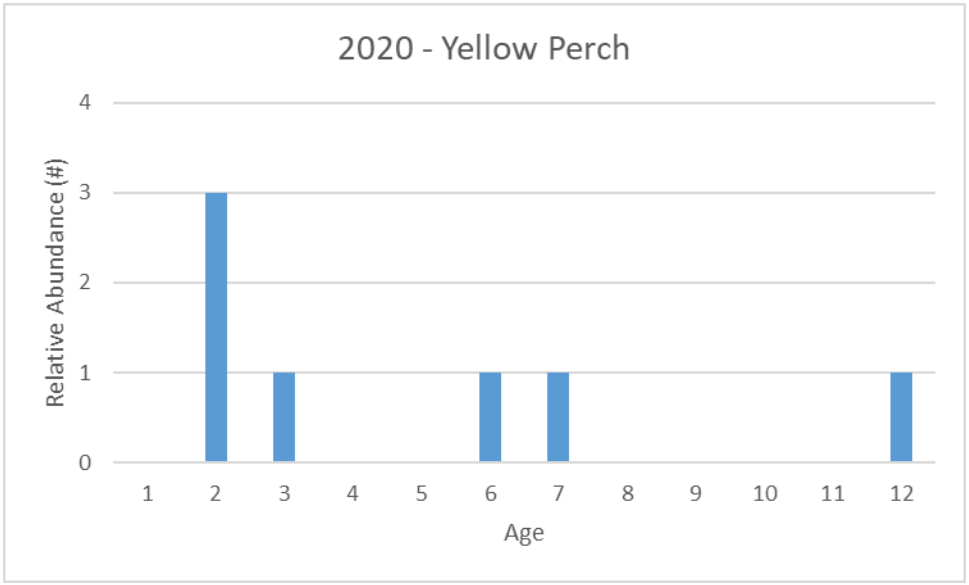

Figure 6: Yellow perch age class abundance from 2020 index netting surveys.

Figure 7 shows the catch composition from the assessments from 1997 to 2020. Walleye were the dominant species in the catch in most years, followed by northern pike and white sucker. Historical netting information is provided in the appendix, but due to lack of information some years were left off the figure below. The variation in species composition is likely due to partial winterkill events and the ability of northern pike and sucker being able to tolerate lower dissolve oxygen (DO) conditions than walleye. The walleye fry stocking and natural recruitment seem to be able to re-establish the population within a short period.

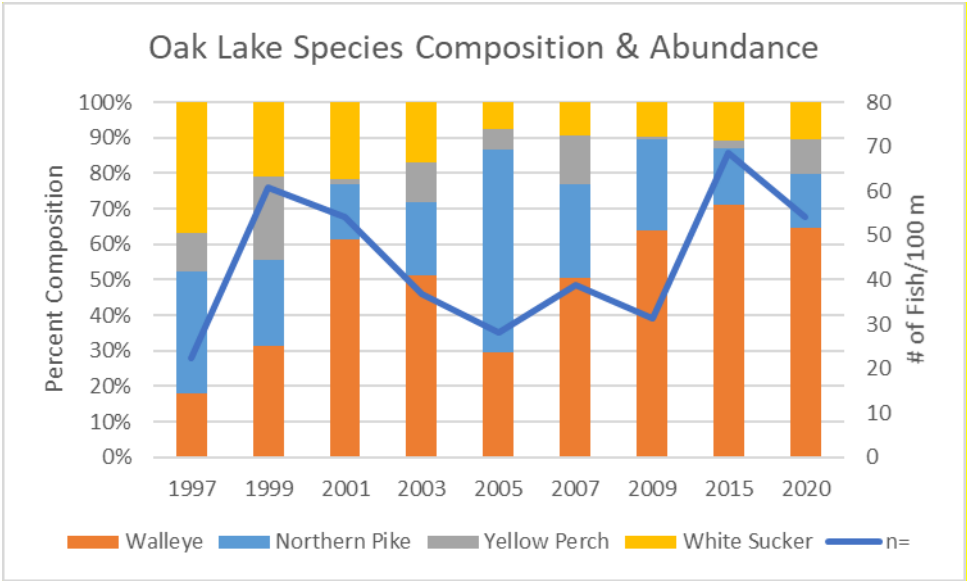

Figure 7: Catch composition of species from index assessments.

Based on 2020 stock monitoring results, the annual mortality rate of walleye ages 3 to 8 was 37.7%. This mortality rate is higher than recently published sustainable exploitation rates (Lester et al. 2014). Figure 8 shows the mortality rate of all walleye from index assessments, which had

sufficient sample size from 1997 to 2020, some of which were within sustainable limits in the low to mid 30% annual mortality rate.

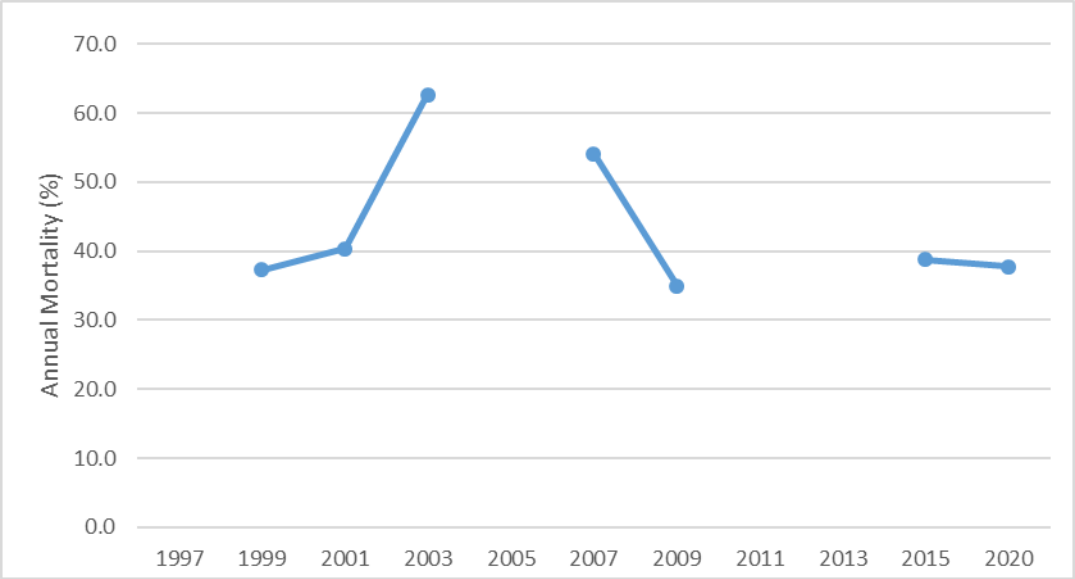

Figure 8: Walleye annual mortality rate from index assessments.

The Target Reference Point of H = 0.60 (determined by Gangl and Pereira) is the mean value of the studied stocks and H = 0.58 the lower threshold of the 80% confidence interval, is selected as the Upper Stock Reference Point. The Lower Limit Reference Point of H = 0.31, the average of the Red Lakes' diversities before and after collapse, was selected as the Lower Limit Reference Point (Figure 9). Monitoring of the volatility of H will continue through the index netting program. The years with poor diversity were likely due to the influence of winterkill events and die-off of large portions of the population, which were re-established by the annual walleye fry stocking program.

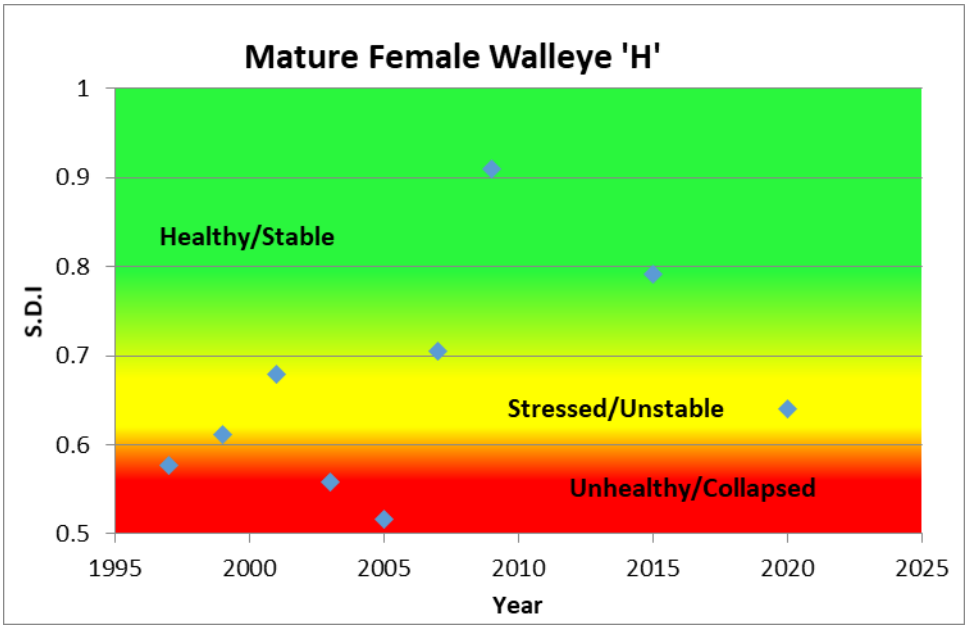

Figure 9: Walleye spawning stock diversity (SSD) index summary from 1997 to 2020.

Summary

Data acquired during index netting assessments indicate that the walleye population appears to be in good health with a wide range of age and size classes present in most years not affected by winterkill events and a reasonable annual mortality rate. In 2020, Catch per unit effort (CPUE) for walleye was 34.9 fish per 100 yards of net. Compared to historical netting efforts, the lakes fish population looks to be in good health with more age classes present and a higher CUE than the 2009 assessment with a similar mortality rate. Continued stocking and maintaining the minimum slot size for juvenile walleye on the lake will ensure sustainability of the fishery in the future.

APPENDIX

References

Lester, N.P., Shuter, B.J., Venturelli, P. and Nadeau, D. 2014. Life history plasticity and sustainable exploitation: A theory of growth compensation applied to walleye management. Ecological Applications 24:38–54.

Historcial netting information

OAK LAKE

Test netting has been twice in the 1970s, 3 times in the 1980s and twice in the 1990s. Usually, 1 to 4 standard gangs were set overnight (24 hours), consisting each of 5 different mesh sizes. The results are as follows:

DATE	WALLEYE	PIKE	PERCH	SUCKER	BURBOT	BULLHEAD	CARP
1975							
JUNE 17	40	42	36	90			
1979							
?		11	1	26			
1980							
MAY 05		6					
1982							
MAY 07		152	4	2			
1989							
MAY 05	3	7		2			
1991							
OCT 01	13	22	2	30			
1996							
JUNE 13	17	56	2	41			

Oak Lake Winterkill Frequency

1975/76 - 2004/05

(D.O. <1.50ppm)

Year	Outcome	Type of Aeration Used
1975/76	no winterkill	none
1976/77	no winterkill	none
1977/78	winterkill	none
1978/79	winterkill	diesel pump
1979/80	winterkill	unknown
1980/81	no winterkill	none
1981/82	winterkill	snow clearing and diesel pump
1982/83	no winterkill	snow clearing
1983/84	no winterkill	none
1984/85	no winterkill	none
1985/86	no winterkill	snow clearing
1986/87	no winterkill	none
1987/88	no winterkill	none
1988/89	no winterkill	windmills
1989/90	no winterkill	“ejector” pump and diesel pump
1990/91	winterkill	“ejector” pump and diesel pump
1991/92	winterkill	electric pump and diesel pump
1992/93	no winterkill	electric pump and diesel pump
1993/94	winterkill	electric pump and diesel pump

1994/95	**winterkill**	**electric pump and diesel pump**
1995/96	**no winterkill**	**electric pump and diesel pump**
1996/97	**winterkill**	**electric pump**
1997/98	**no winterkill**	**none**
1998/99	**no winterkill**	**none**
1999/00	**no winterkill**	**none**
2000/01	**winterkill**	**electric pump**
2001/02	**no winterkill**	**none**
2002/03	**no winterkill**	**none**
2003/04	**winterkill**	**snow clearing and diesel pump**
2004/05	**no winterkill**	**none**

1975/76 – 2004/05 **30 years of data**

12 documented winterkill in that time period

Frequency of 40.0%