2019 Wellman Lake Nearshore Community Index Netting & Walleye Recruitment Surveys

In part of reporting for FES Project 18-043 – Fisheries Projects within the North Parkland

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November 2019

Swan Valley Sport Fishing Enhancement Inc

Executive Summary

Historically, Wellman Lake was a high-quality walleye fishery that did not require artificial propagation. However, as access improved in the 1950's so did fishing pressure. Fishing pressure ultimately increased until the 1980's where the walleye fishery essentially collapsed. The common understanding of what happened from the 1950's-1980's can be summarized by the angling culture that existed during that time. Generally, walleye were kept (8 fish limit), and pike were released (unless it was a large pike). Supplemental stocking of walleye did not occur on a regular basis in those days. Four decades of this led to a composition shift, which ultimately resulted in the establishment of a hammer handle fishery.

Beginning in the late 1980's, SVSFE and Fisheries Branch began working deliberately to shift the species composition back to acceptable levels. Efforts throughout 1990s included: increased walleye stocking (fry, and rearing programs), limno-corral walleye rearing program, Loat Lake rearing program, spawning reef enhancement, pike removals through various netting efforts and fishing derbies, and most importantly walleye regulation changes from an 8 fish limit to a zero fish limit (1989), and then to a 2 fish limit, with a protected slot (1993). The pike removal programs were discontinued in 1993 and walleye stocking (fry and sub-adult) has occurred regularly since. The artificial reef was re-enhanced in the winter of 2017. Three decades later, we can see evidence of success; as the 2019 netting data shows a walleye composition of (45%); the highest it has been since 1967 (58%). This can also be supplemented by angling reports, suggesting satisfactory walleye angling quality in recent years.

The objectives of research conducted in 2019 were to (1) gather up-to-date information on the walleye population amongst other biological data (2) continue to monitor natural recruitment success, and (3) develop recommendations based on the findings. Results determined that the walleye population is a healthy one. Inconsistent stocking and lack of information on natural recruitment success made it difficult to determine a justifiable stocking strategy based on age class correlation.

From this point forward, it is recommended to continue with the OTC study until at least three years of data is acquired. At that point, a fry stocking strategy can be developed using results from the OTC study. Annual guzzling should occur on the reef and it is suggested that notes on sedimentation are made to determine if cleaning becomes necessary in the future. Barrel counts should continue annually, and replication of the near-shore community index netting program should occur every six-eight years from this point forward. If recruitment to younger cohorts becomes low following the natural recruitment/fry management strategy outlined through OTC results – fingerling stocking can be considered again; as there appears to be notable age class success resulting from plantings via the Beautiful Lake Walleye Transfer (2009-2017).

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Management and Stocking History

Wellman Lake has a rich research and management history. Below is a brief summary of research, management, stocking, and enhancement programs that have occurred from 1942 to 2019.

Table 1: Wellman Lake history

Wellman Lake History			
Year	**Researcher/ Management**	**Activity**	**Results**
1942	Dr J.A. McLeod	Biological Investigation	"Lake offers great opportunities for recreational angling & cottage/campground development"
1944	Dr J.A. McLeod	Experimental Netting	Species composition: 83% walleye, 17% white sucker
1951	R.K Stewart-Hay	Test Netting	Species composition: 61% walleye, 39% white sucker
1954	Stocking	Walleye Stocking	680,000 eyed eggs
1955	Stocking	Walleye Stocking	850,000 eyed eggs
1955	Fisheries Branch	Test Netting	Species composition: 25% walleye, 13% pike, 63% white sucker
1956	Fisheries Branch	Test Netting	Species composition: 58% walleye, 5% pike, 38% white sucker
1958	Fisheries Branch	Test Netting	Species composition: 40% walleye, 5% pike, 55% white sucker
1967	Fisheries Branch	Test Netting	Species composition: 58% walleye, 18% pike, 24% white sucker
1967	Sorochan & Andrews	Creel Census	149 parties (329 anglers) interviewed. Angling success = 0.65 fish/angler/hour (0.46 pike, 0.02 perch, 0.116 walleye).
1970	Fisheries Branch	Test Netting	Species composition: 16% walleye, 31% pike, 53% white sucker

1972	Harvey Harold	Walleye Stomach Analysis	Survey for diphyllobothriam (tapeworm) in walleye stomachs - Incidence low (1-2%) compared to 1955 (100%)
1975	Stocking	Smallmouth Bass Stocking	Introduction of smallmouth bass - 15,080 fingerlings
1979	Stocking	Walleye Stocking	8,885 walleye fingerlings reared at Deadhorse Lake
1979	Fisheries Branch	Test Netting	Species composition: 10% walleye, 35% pike, 55% white sucker
1980	Fisheries Branch	History and Data Summary	Recommends test netting and minnow trapping to monitor success of walleye stocking
1981	Stocking	Walleye Stocking	500,000 fry, and 1,905 walleye fingerlings reared at Hickey Lake
1982	Stocking	Walleye Stocking	31,546 walleye fingerlings reared at Dragline Lake
1982	Fisheries Branch	Test Netting	Species composition: 7% walleye, 40% pike, 53% white sucker
1984	Stocking	Walleye Stocking	150,000 walleye fry
1984	Stocking	Smallmouth Bass Stocking	15,500 fingerlings
1988	Stocking	Walleye Stocking	200,000 fry
1989	Fisheries Branch	Test Netting	Species composition: 8% walleye, 37% pike, 55% white sucker
1989	Fisheries Branch	Pike Removal	First physical removal of pike. Gill nets removed 1,200lbs
1989	Regulation Change	No Kill	Regulation introduced in 1989 - walleye limit 0
1989	Stocking	Walleye Stocking	545 (1+ from Verrall Lake), 139 (unknown size) from West Blue Lake
1990	SVSFE	Derby	280lbs removed by derby
1990	Stocking	Walleye Stocking	2,000 (2+) reared at Verrall Lake
1991	Fisheries Branch	Evaluation of Spawning Activity	Loat Creek not suitable, sucker creek not utilized, guzzled shoreline only sucker eggs, walleye eggs found on reef.

1991	Province	Test Netting	Species composition: 17% walleye, 24% pike, 53% white sucker, 6% smallmouth bass
1991	SVSFE	"Pro Pike Derby"	1610 pike moved from Wellman Lake to Spray Lake (June 1991)
1991	Stocking	Walleye Stocking	700,000 fry, 25,000 fry to limno-corral, 915 adult walleye reared at Verrall Lake
1991	SVSFE	"Family Derby"	98 Pike removed (all dead) - On December 28, 1991
1992	Fisheries Branch	Recruitment Survey/Guzzling	2.08 live walleye eggs/minutes on reef
1992	Stocking	Walleye Stocking	25,000 fry (limno-corral), 90 Adults from Verrall Lake
1992	SVSFE	"Gator Bowl"	97 Teams (194 Anglers) 1,021 pike caught. 1,325lbs caught. 5.3 pike/angler. Averaging 1.3 lbs/pike
1993	SVSFE	Reef Enhancement	Enhanced reef with clean washed rock in late winter 1993
1993	Fisheries Branch	Recruitment Survey/Guzzling	0.39 live eggs/minute on reef
1993	Regulation Change	2 Fish Limit	Walleye regulation change introduced in 1993
1993	SVSFE	"Gator Bowl"	61 Teams (122 anglers). 692 pike caught, 978lbs. 5.8 pike/angler, averaging 1.4lbs/pike.
1993	Stocking	Walleye Stocking	200 adults from Verrall Lake, limno-corral failed year - walleye held too long (25,000 fry)
1993	Fisheries Branch	Creel Survey	Currently, safe level of walleye harvest, pike catch appears to be down - removals no longer needed
1993	Alvin Weibe	"Wellman Lake Walleye/Pike Classic"	Live release tournament
1994	Regulation	Slot Limit	Slot limit. Walleye 45-70cm must be released
1994	Fisheries Branch	Recruitment Survey/Guzzling	7.36 live eggs/minutes on reef
1994	Stocking	Walleye Stocking	75,000 walleye fry (limno-corral)
1995	Fisheries Branch	Recruitment Survey/Guzzling	17.90 live eggs/minutes on reef
1995	Stocking	Walleye Stocking	200,000 walleye fry, 168 adults from Verrall Lake

1996	Stocking	Walleye Stocking	250,000 walleye fry
1996	Fisheries Branch	Test Netting	Species composition: 27% walleye, 25% pike, 46% white sucker, 1% smallmouth bass
1996	Province - Yake	Walleye Telemetry	Failed project due to equipment failure
1997	Stocking	Walleye Stocking	300,000 fry – limno-corral
1997-2008	Stocking	Walleye Stocking	Loat Lake walleye rearing program
1998	Stocking	Walleye Stocking	250,000 walleye fry, and 221 adults from Verrall Lake
1998	Province - Yake	Walleye Telemetry	Repeated telemetry project - 8/10 fish visited the reef for spawning in 1998
1999	Stocking	Walleye Stocking	150,000 walleye fry, and 35 adults from Verrall Lake
2000	Stocking	Walleye Stocking	250,000 walleye fry
2001	Stocking	Walleye Stocking	220,000 fry
2001	Fisheries Branch	Test Netting	Species composition: 24% walleye, 44% pike, 32% white sucker, 0% smallmouth bass
2002	Stocking	Walleye Stocking	200,000 fry
2003	Stocking	Walleye Stocking	200,000 fry
2004	Stocking	Walleye Stocking	300,000 fry
2005	Stocking	Walleye Stocking	200,000 fry
2006	Stocking	Walleye Stocking	150,000 fry
2006	Fisheries Branch	Test Netting	Species composition: 23% walleye, 23% pike, 28% white sucker, 26% smallmouth bass
2006	UCN	Ecological Investigation	"Wellman Lake has potential to sustain high quality fishery"

2007	Stocking	Walleye Stocking	450,000 fry (2007-2008)
2008	Regulation Change	Pike Restriction	All pike >75cm must be released
2009	Stocking	Walleye Stocking	200,000 fry, 49 1+ (Beautiful Lake)
2010	SVSFE	Recruitment Survey/Guzzling	0.39 live eggs/minutes on reef
2010	Stocking	Walleye Stocking	200,000 fry, 522 Beautiful Lake (35cm)
2010	SVSFE	NSCIN	Species composition: 32% walleye, 20% pike, 35% white sucker, 14% smallmouth bass
2011	SVSFE	Recruitment Survey/Guzzling	0 live eggs/minutes on reef
2011	SVSFE	Walleye Telemetry	2/3 fish believed to have spawned on the reef
2011	Stocking	Walleye Stocking	200,000 fry, 322 Beautiful Lake (34.5cm)
2011	SVSFE	NSCIN	Species composition: 40% walleye, 23% pike, 25% white sucker, 12% smallmouth bass
2012	SVSFE	Walleye Telemetry	7/8 fish believed to have spawned on the spawning reef
2012	SVSFE	Recruitment Survey/Guzzling	0.82 live eggs/minutes on reef
2012	Stocking	Walleye Stocking	1,000,000 fry, 153 Beautiful Lake (27.6cm)
2013	SVSFE	Walleye Telemetry	0/5 fish believed to have spawned on the spawning reef
2013	SVSFE	Recruitment Survey/Guzzling	0.04 live/eggs per minutes on reef. Recommendation to lightly enhance spawning reef
2013	Stocking	Walleye Stocking	144 Beautiful Lake (17.5cm)
2014	Stocking	Walleye Stocking	360 Beautiful Lake (24.4 cm)
2015	Stocking	Walleye Stocking	200,000 fry, 1,005 Beautiful Lake (32.2cm)

2015	Stocking	Pike Stocking	31 Adults from Glad Lake
2016	SVSFE	Recruitment Survey/Guzzling	1 live eggs/per minutes on reef
2016	Stocking	Walleye Stocking	2,860 Beautiful Lake (17cm), 8 adults (Glad Lake)
2016	Stocking	Pike Stocking	34 Adults from Glad Lake
2017	SVSFE	Reef Enhancement	Enhanced reef with light layer of clean gravel in April 2017
2017	SVSFE	Recruitment Survey/Guzzling	3.80 live eggs/minutes on reef
2017	Stocking	Walleye Stocking	1402 Beautiful Lake (24.4cm), and 2 adults (Glad Lake)
2017	Stocking	Pike Stocking	4 Adults from Glad Lake
2018	SVSFE	Recruitment Survey/Guzzling	10.10 live/eggs per minutes on reef
2019	SVSFE	Recruitment Survey/Guzzling	9.6 live/eggs per minutes on reef
2019	Stocking	Walleye Stocking	200,000 OTC fry, 3 adults from Glad Lake
2019	Stocking	Pike Stocking	2 adults from Glad Lake
2019	SVSFE	NSCIN	Species composition: 45% walleye, 11% pike, 30% white sucker, 14% smallmouth bass
2019	SVSFE	YOY Wall OTC Study	Year 1 - OTC survey, awaiting results
2011-2019	SVSFE/Fisheries Branch	Barrel Counts	See Chart (Page 26)

Historical information was acquired from The Wellman Lake File at the Sustainable Development District Office in Swan River, Manitoba and SVSFE database.

Study Rationale

Wellman Lake is one of the most popular angling destinations in the Duck Mountains and arguably in the Swan Valley area. SVSFE has been actively involved in the management of the fishery since the late 1980s. Wellman Lake, however, has yet to be granted a regimented stocking strategy and monitoring schedule. The objectives of the research conducted on Wellman Lake in 2019 are as follows:

1) Replicate Near Shore Community Index Netting (NSCIN) conducted in 2010 & 2011 to monitor and assess current fish stocks.
2) Barrel counts are collected by parks staff and then reviewed as supplemental data. This information provides valuable harvest information.
3) As a method to quantify reef usage by walleye, a replicable guzzling protocol was conducted for monitoring purposes.
4) As an effort to determine natural recruitment success, year one of a three-year OTC study was conducted. This data will provide valuable natural recruitment success information, which will ultimately lead to the development of a long-term stocking strategy.
5) Using the data collected in 2019 – Develop a long term yet cost effective monitoring strategy for Wellman Lake.
6) Develop a technical report and data summary for Sustainable Development – Fisheries Branch, The Fish and Wildlife Enhancement Fund (FWEF), the SVSFE board of directors, and the Wellman Lake cottage owners/lake users.

Study Area

Wellman Lake is one of the largest waterbodies in the Duck Mountain Provincial Park. Located in the north-central portion of the park, Wellman Lake lies approximately 54km southeast of Swan River, Manitoba. The lake is 429.5 hectares and has a maximum depth of 18.7 meters. Wellman Lake is one of the most developed lakes in the Duck Mountains with 127 cottages, 105 campsites (seasonal & transient), and an additional 13 cottages at the nearby - Glad Lake. The destination has many public and private services. Wellman lake Lodge has 7 available cabins for rent, a private campground, boat rentals, a restaurant, and a convenience/grocery store amongst other services.

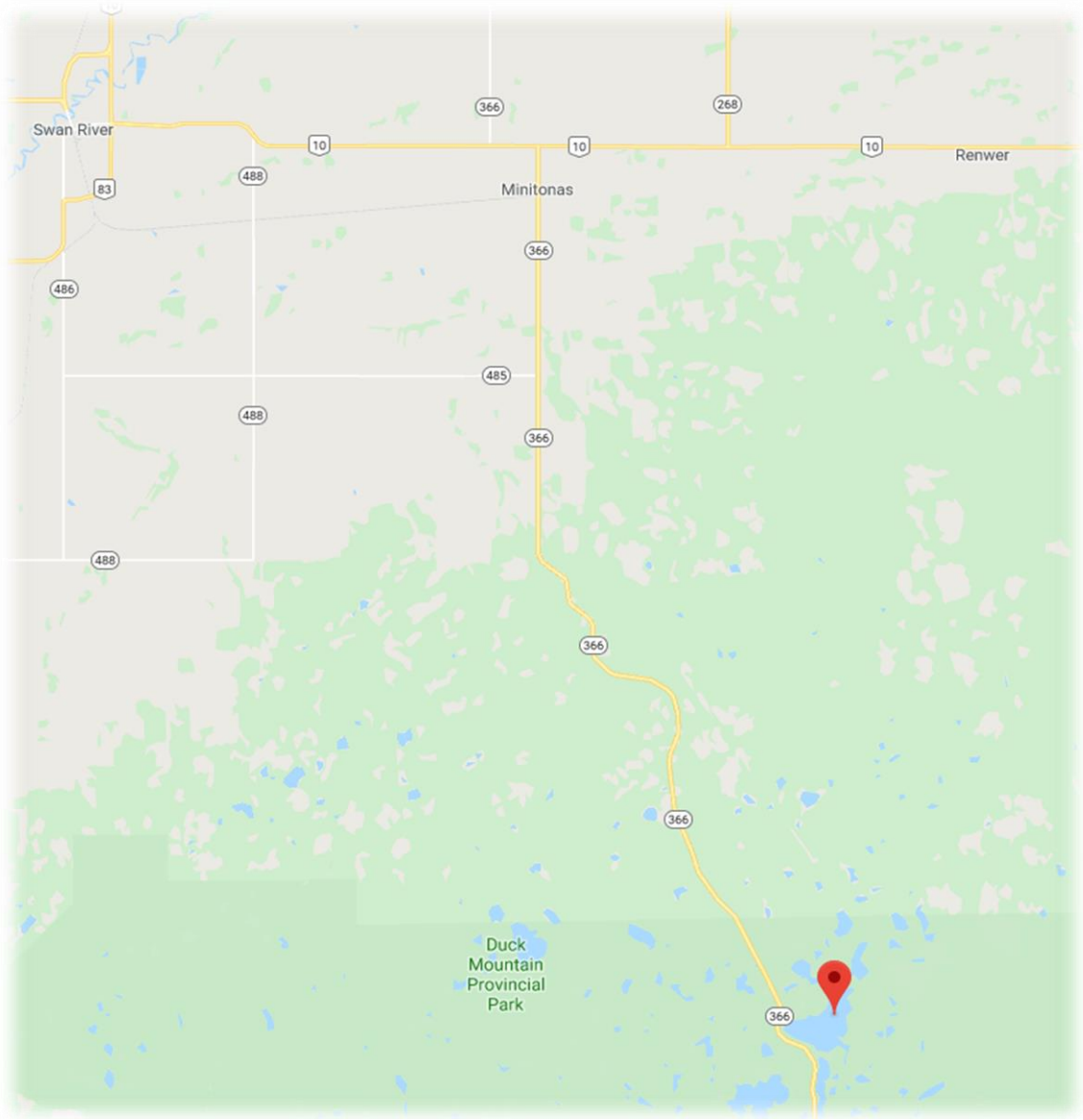


Figure 1: Study Area

Methods

Nearshore Community Index Netting (NSCIN)

The 2019 trap netting program replicated sites (n=16) established in the 2010 and 2011 trap netting program. Pre-survey activities included creating a netting schedule based on the NSCIN sampling design. Technicians were able to source an additional trap net therefore three nets were utilized daily during week 2 of the program as compared to only two nets per day in 2010 and 2011.

Standardized Lake Superior Trap Nets, or Spring Haul Nets were utilized and consist 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; project code, water-body, UTM coordinates of set location, project site code, site type (general substrate, fish cover) bottom type (substrate, fish cover), net set crew, set date, set time, lead length, distance off shore, angle to shore, start depth, mid depth, gap depth, and any comments.

Information recorded at net pull consisted of; net lift crew, lift date, lift time, effort status, duration of set, 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 cattle trough used as a live well. All game fish caught were identified by species, and sampled for fork/total length, weight, age and left pectoral fin clipped to identify recaptured fish. Age structures taken included spines from walleye/smallmouth bass, and scales from northern pike. Recaptures from 2019 (pec clips) were documented as recaps and released. White suckers were counted and released. Once all fish were sampled and released, traps were relocated and reset at the next assigned fishing location.

Guzzling

Guzzling the reef to determine walleye utilization has been the selected method since 1992. The guzzling equipment used from 1992-1995 was an electric pump, while eggs collected from 2011 to 2019 used a manual hand pump. The number of sites varied over the years with a minimum being 6, and a maximin being 10. Sites were randomly chosen each year and 1 square meter plots were guzzled for durations of 1 minute to 5 minutes. Since 2016, 10 random sites were guzzled for 60 seconds with a 30 second flush.

Oxytetracycline (OTC) Detection on Age 0+ walleye

Since 2003, the Whiteshell Fish Hatchery has been marking walleye fry using Oxytetracycline (OTC). OTC is a non-lethal, non-toxic internal dying agent that imprints a mark on boney structures of fish (i.e. otoliths). Prior to stocking, recently hatched walleye fry are immersed in an OTC solution for 6-7 hours; thus dying their bony structures. Efficacy trials for the Whiteshell Hatchery have reached the 95+% mark (Kansas, 2013).

On May 30th, 2019 - 200,000 fry supplied by the Whiteshell Fish Hatchery were stocked on the west shore of Wellman Lake. The surface water temperature was 19.1° C and fish were stocked on the windward shore to maximize the potential for the fry stocking location to overlap with the location of zooplankton.

Collection surveys began on Monday, September 9th and lasted until Thursday, September 12th, 2019. Electrofishing used DFO's Smith-Root SR20 electrofishing boat, which was the chosen method to target young-of-year (YOY) walleye. Surveys did not begin until after sundown, and areas targeted were those that were pre-determined based on YOY surveys conducted in previous years. At each transect, information collected included; the date, the crew, wind speed/direction, cloud cover, water temperature, conductivity, electrofishing settings, site name, site UTMs, time of start, effort (in seconds), boat speed, average depth, and the catch. The survey continued until the minimum sample size was met; (n=100) YOY walleyes.

All walleye were later sampled for fork length(mm), total length(mm) and weight (to a tenth of a gram). Otoliths were placed in micro-tubes to protect them from being damaged during shipping. When present, stomachs contents were recorded.

Otolith samples were sent to AAE Tech Services out of Winnipeg, Manitoba. AAE Tech Services (Mark Lowden), is known for their quality of work in all aspects of fisheries research and meet the aging standard and OTC detection standards set out by the Department of Fisheries and Oceans. For year 2, and 3 of the OTC study fry will be supplied by the Whiteshell Fish Hatchery, collection will be done by SVSFE staff, and OTC detection by AAE Tech Services.

Barrel Counts

Since 2011, Fisheries Branch in partnership with Parks Branch and SVSFE has been able to collect data on harvest by documenting the contents of fish barrels. Throughout the summer, parks staff document the contents of the Wellman Lake fish barrels (species and counts) and supply that information to Fisheries Branch and SVSFE for annual analysis.

Results

Near Shore Community Index Netting

Figure 2: NSCIN Site Map

Table 2: NSCIN Site Comparison

Species	Year	Site #																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Northern Pike	2010	5	1	3	4	3	2	6	9	2	1	8	3	5	2	4	4	62
	2011	0	4	1	1	0	1	5	0	2	4	11	2	2	1	12	1	47
	2019	1	1	3	0	3	5	1	3	1	3	2	3	3	2	4	2	37
Smallmouth Bass	2010	3	0	3	0	9	0	6	0	8	7	0	1	0	3	0	0	40
	2011	0	0	5	0	4	2	3	0	0	4	0	0	0	4	0	2	24
	2019	12	0	7	2	0	0	1	0	12	1	0	9	0	5	0	0	49
Walleye	2010	9	1	9	11	4	1	9	13	6	8	2	1	4	2	9	7	96
	2011	0	3	8	1	0	1	6	1	5	8	8	9	1	4	12	15	82
	2019	9	4	6	22	1	0	13	13	19	4	12	5	10	12	12	13	155
White Sucker	2010	6	2	21	0	10	0	6	4	2	5	7	6	14	7	9	6	105
	2011	3	1	4	2	3	0	3	4	0	4	5	5	1	3	10	3	51
	2019	11	3	6	10	0	0	4	6	9	2	3	4	8	2	7	29	104
Yellow Perch	2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2019	0	4	0	0	0	2	0	1	2	0	0	0	0	0	0	0	9

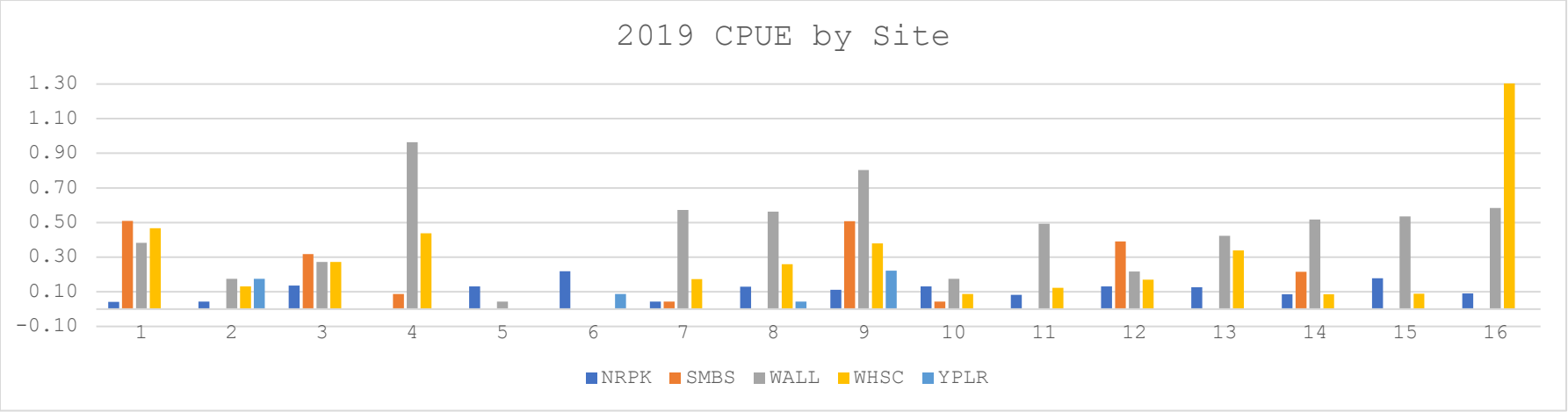


Figure 3: 2019 CPUE by Site

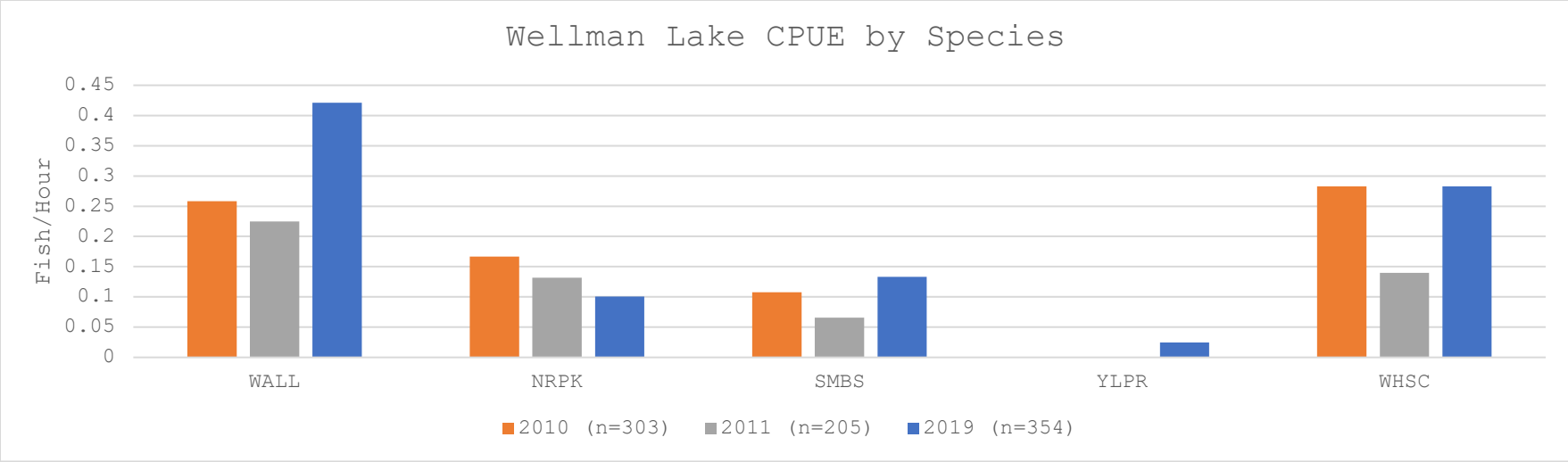


Figure 4: Wellman Lake CPUE by Species

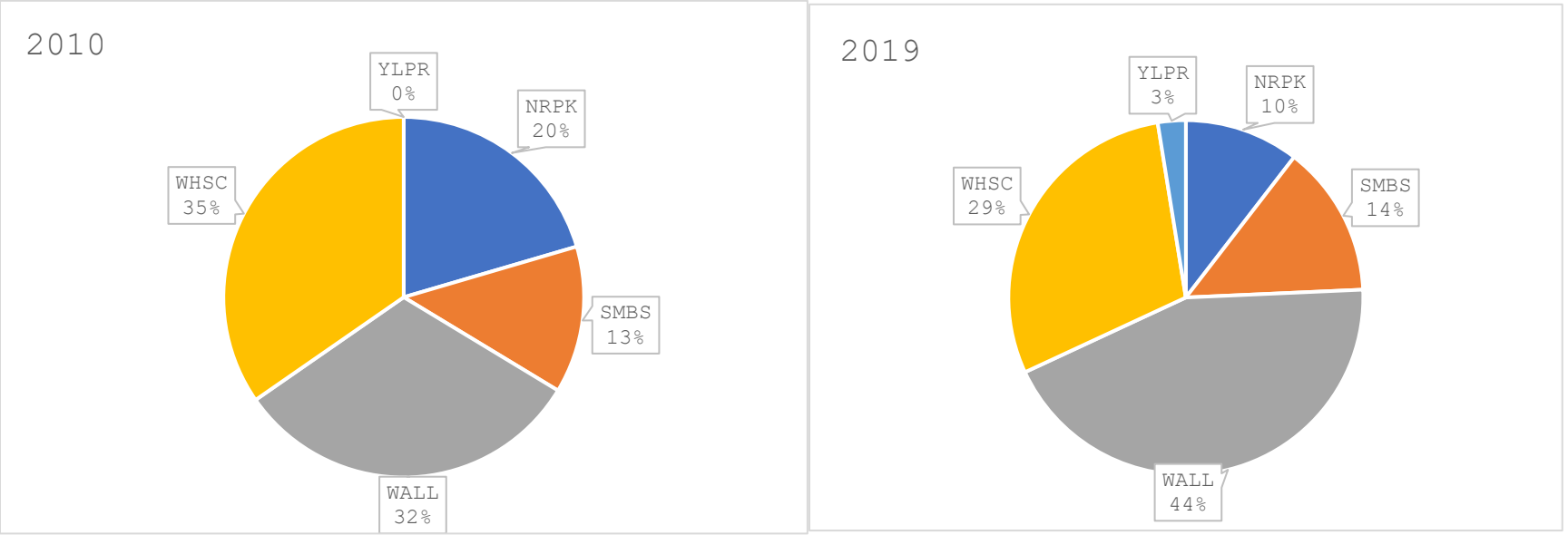


Figure 5: 2010 and 2019 Wellman Lake Species Compositions

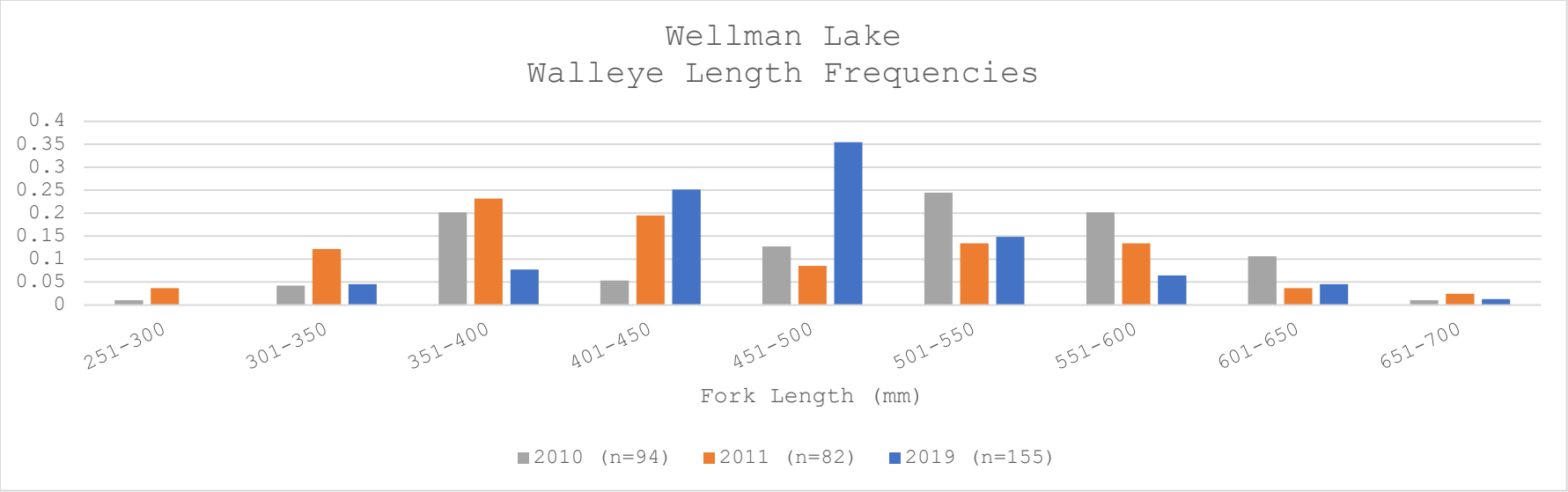


Figure 6: Wellman Lake Walleye Length Frequencies

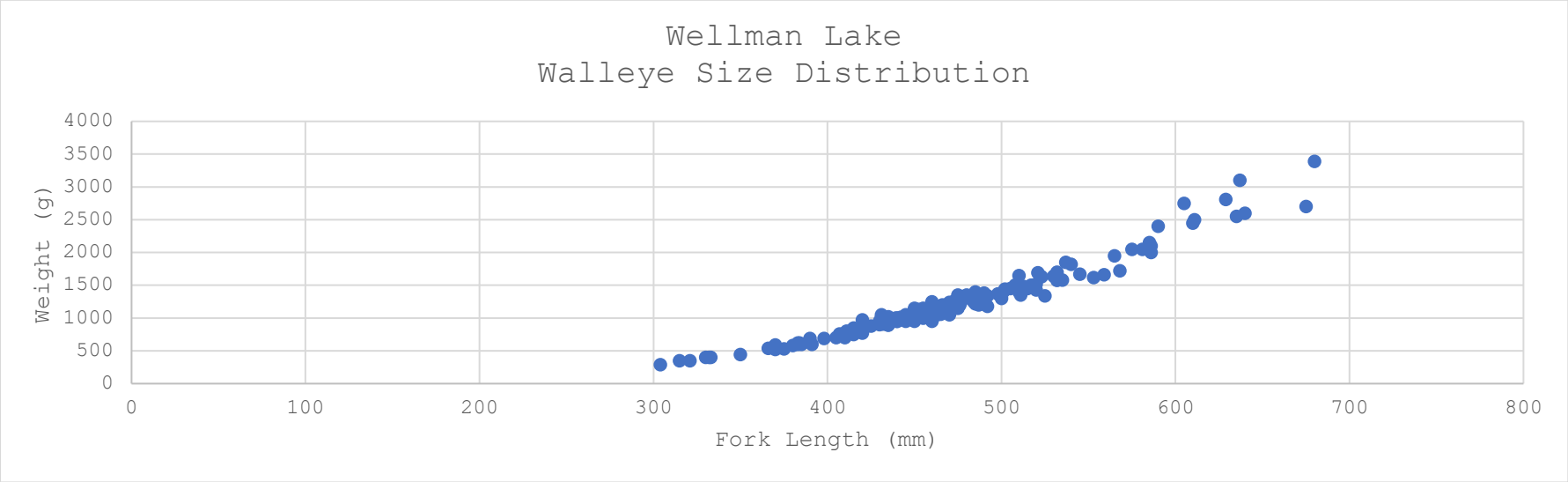


Figure 7: Wellman Lake Walleye Size Distribution

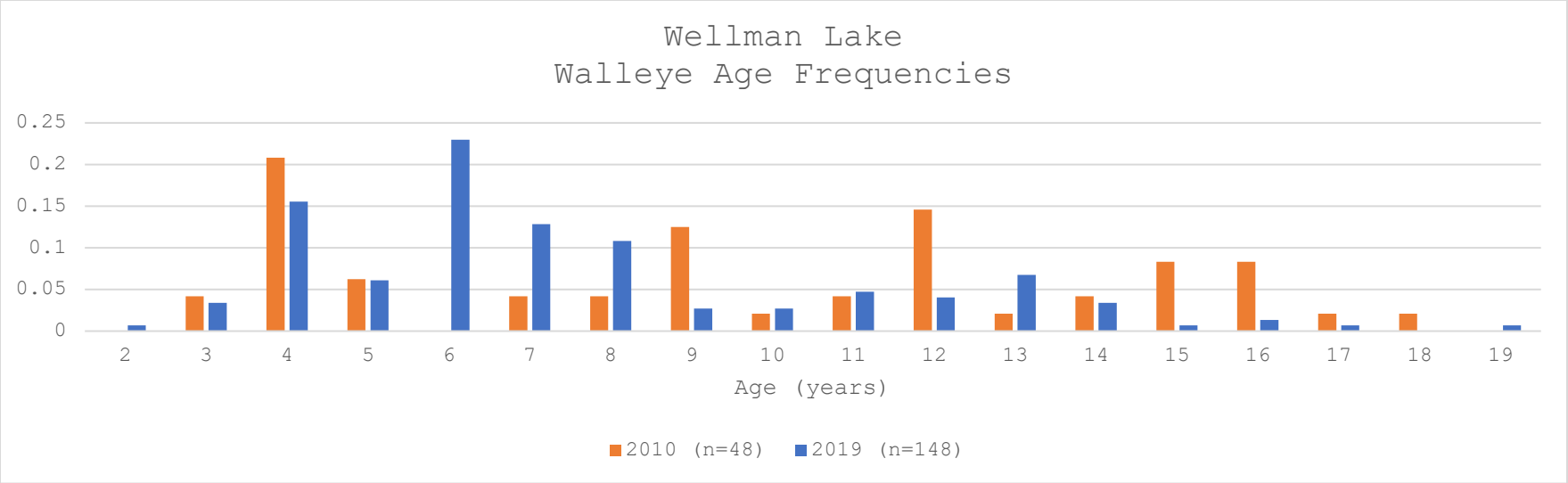


Figure 8: Wellman Lake Walleye Age Frequencies

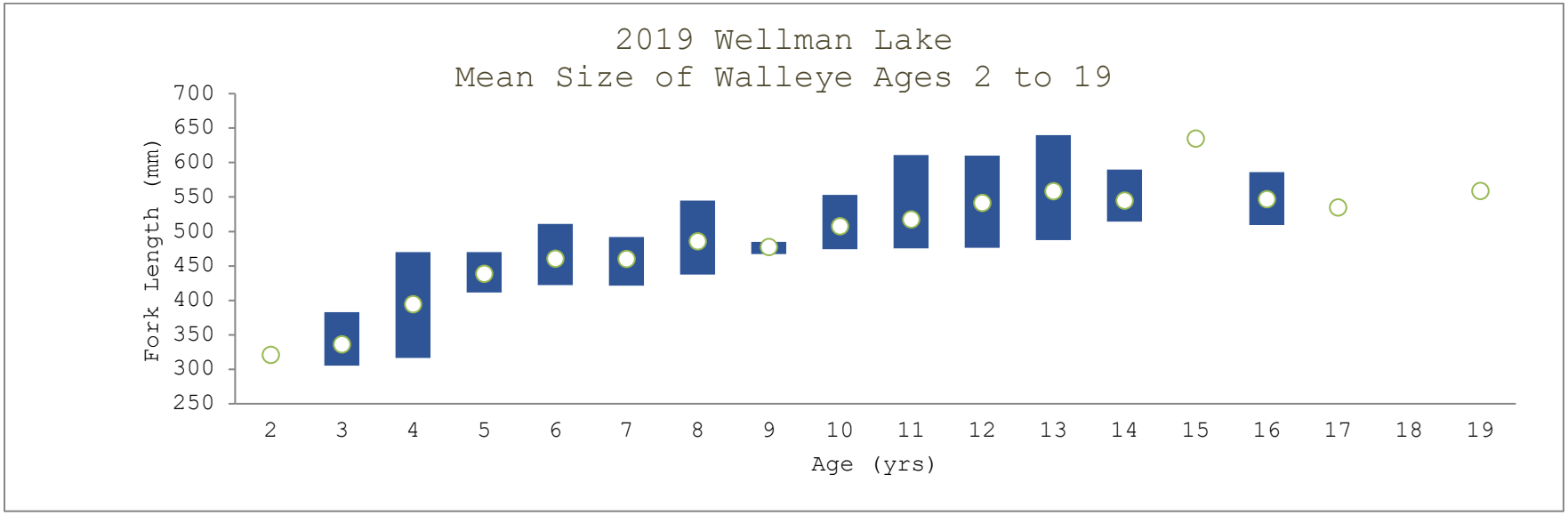


Figure 9: Wellman Lake Mean Size and Range of Walleye at Age

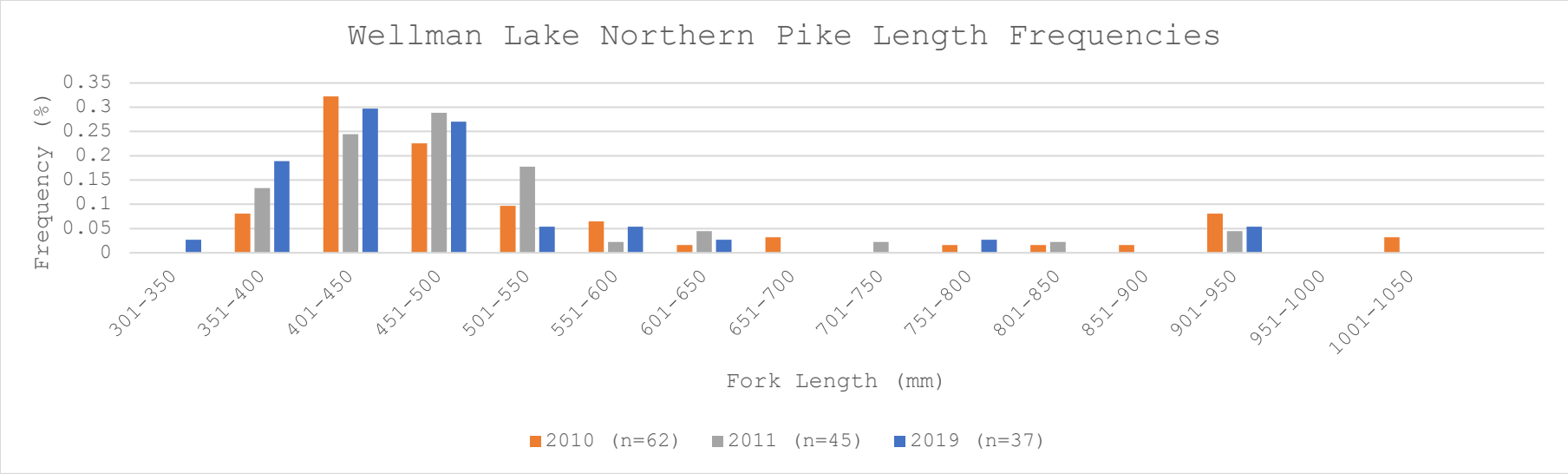


Figure 10: Wellman Lake Northern Pike Length Frequencies

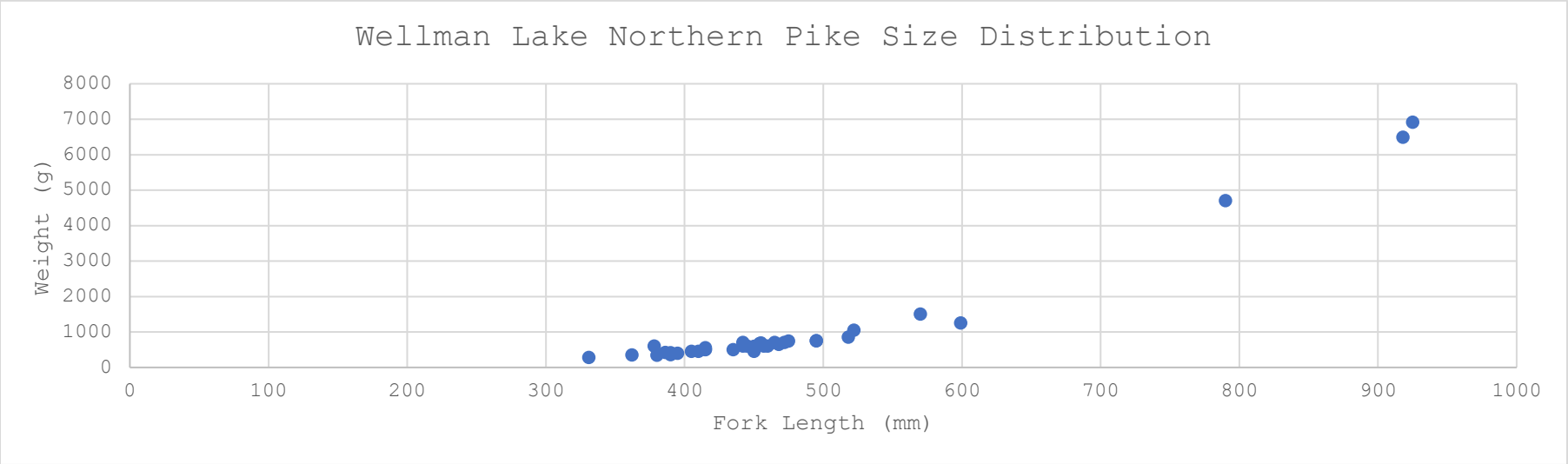


Figure 11: Wellman Lake Northern Pike Size Distribution

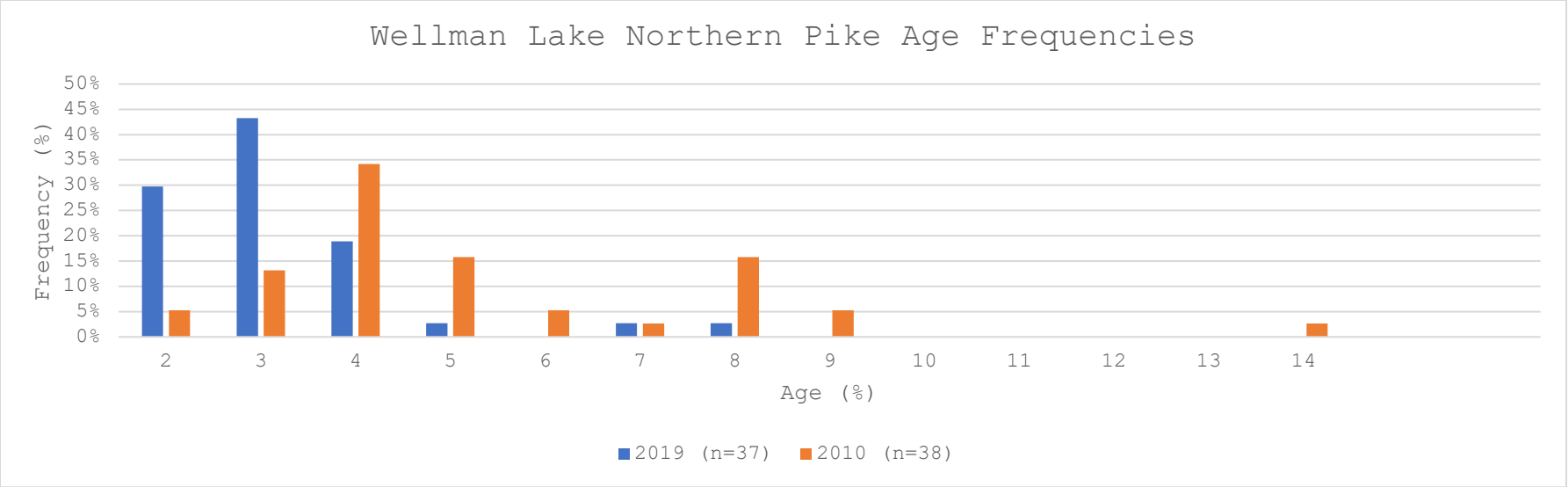


Figure 12: Wellman Lake Northern Pike Age Frequencies

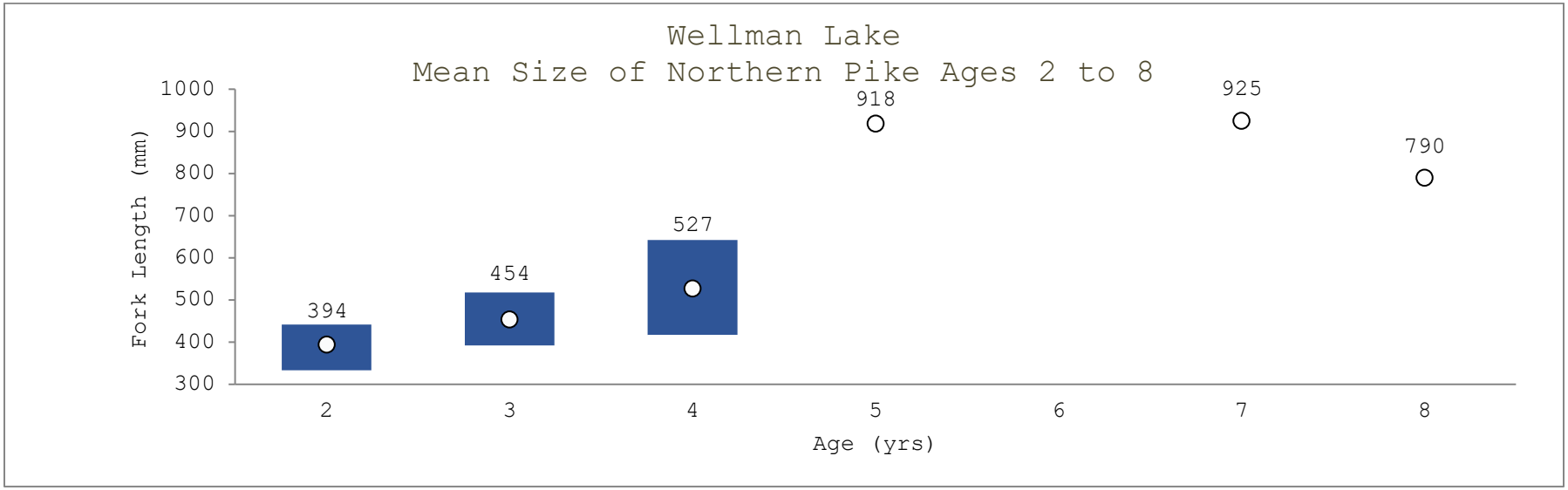


Figure 13: Wellman Lake Mean Size and Range of Northern Pike at Age

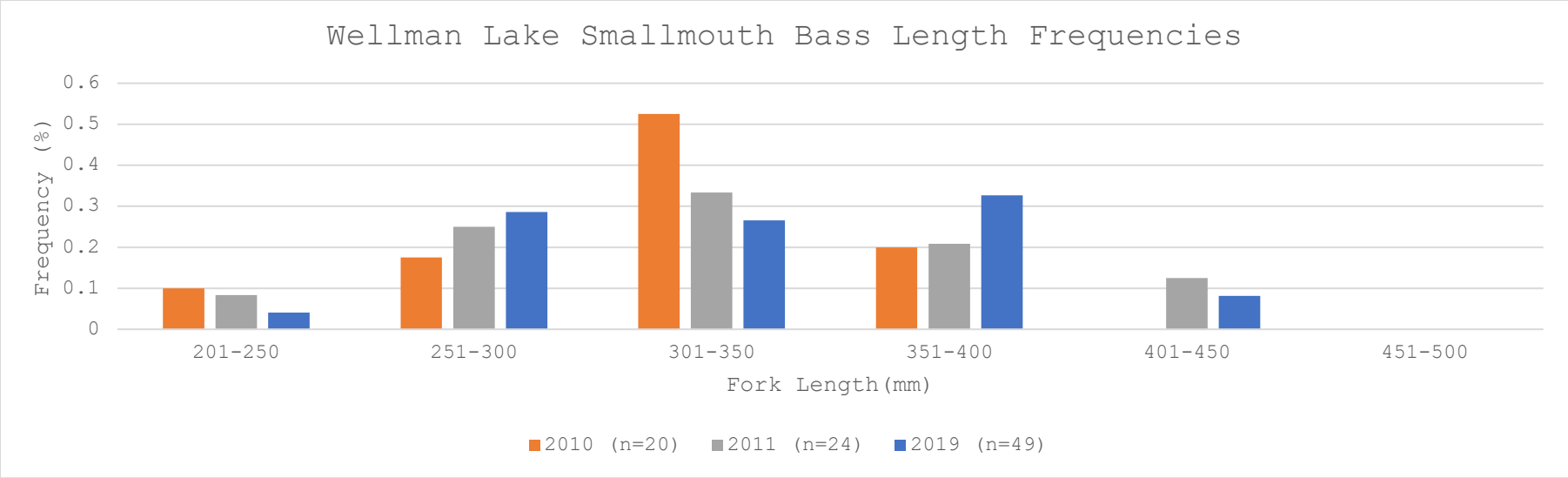


Figure 14: Wellman Lake Smallmouth Bass Length Frequencies

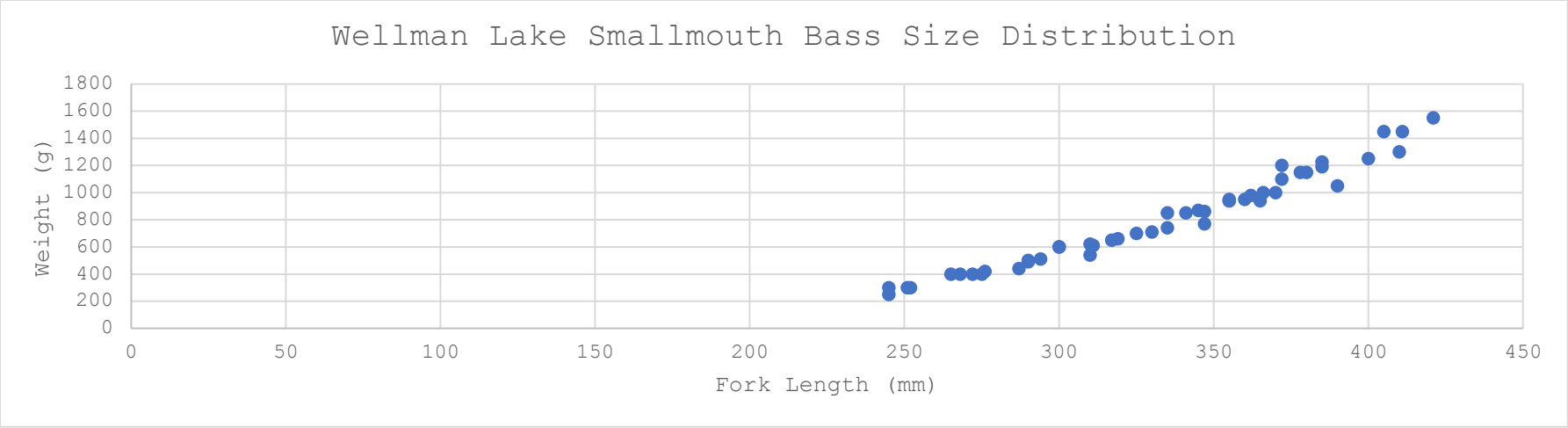


Figure 15: Wellman Lake Smallmouth Bass Size Distribution

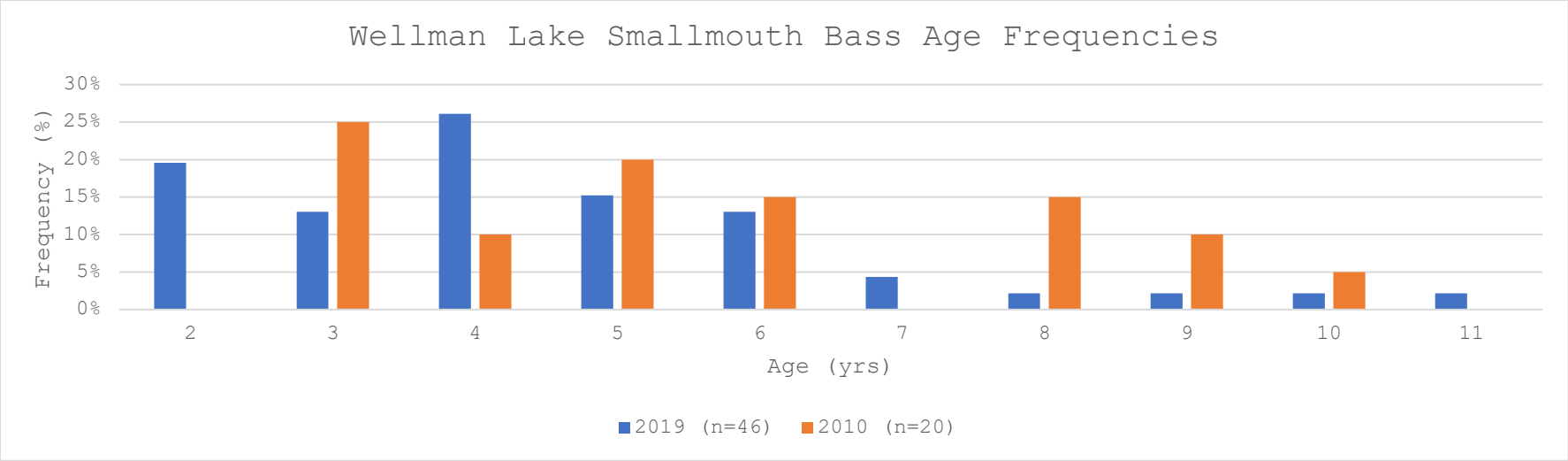


Figure 16: Wellman Lake Smallmouth Bass Age Frequencies

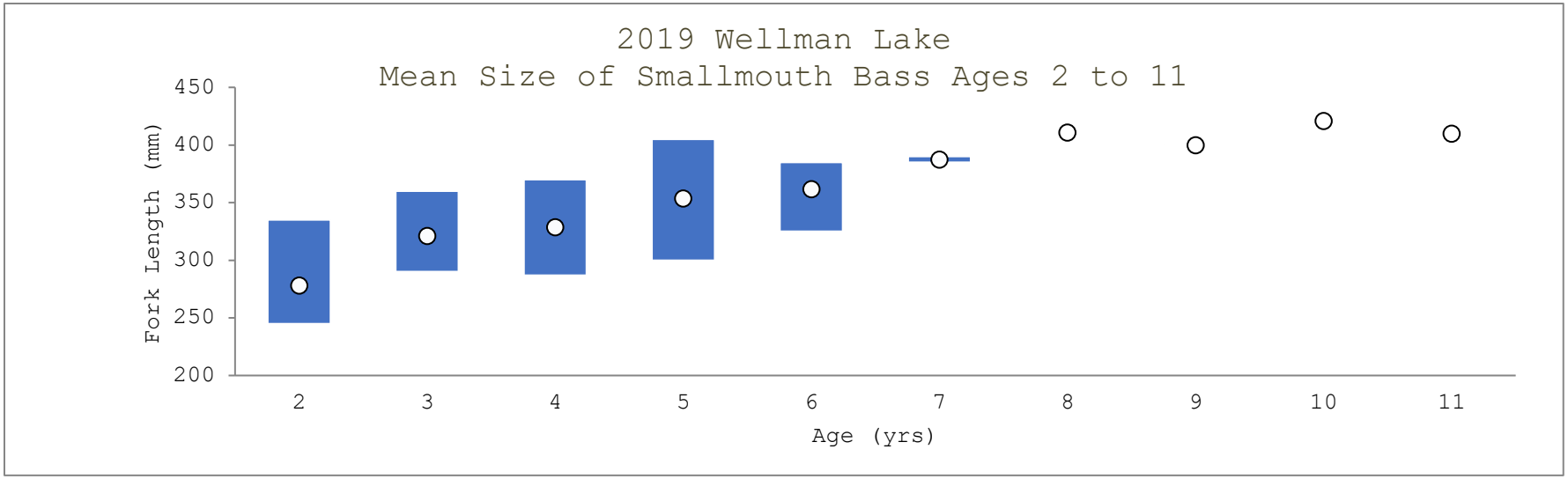


Figure 17: Wellman Lake Mean Size and Range of Smallmouth Bass at Age

Reef Guzzling

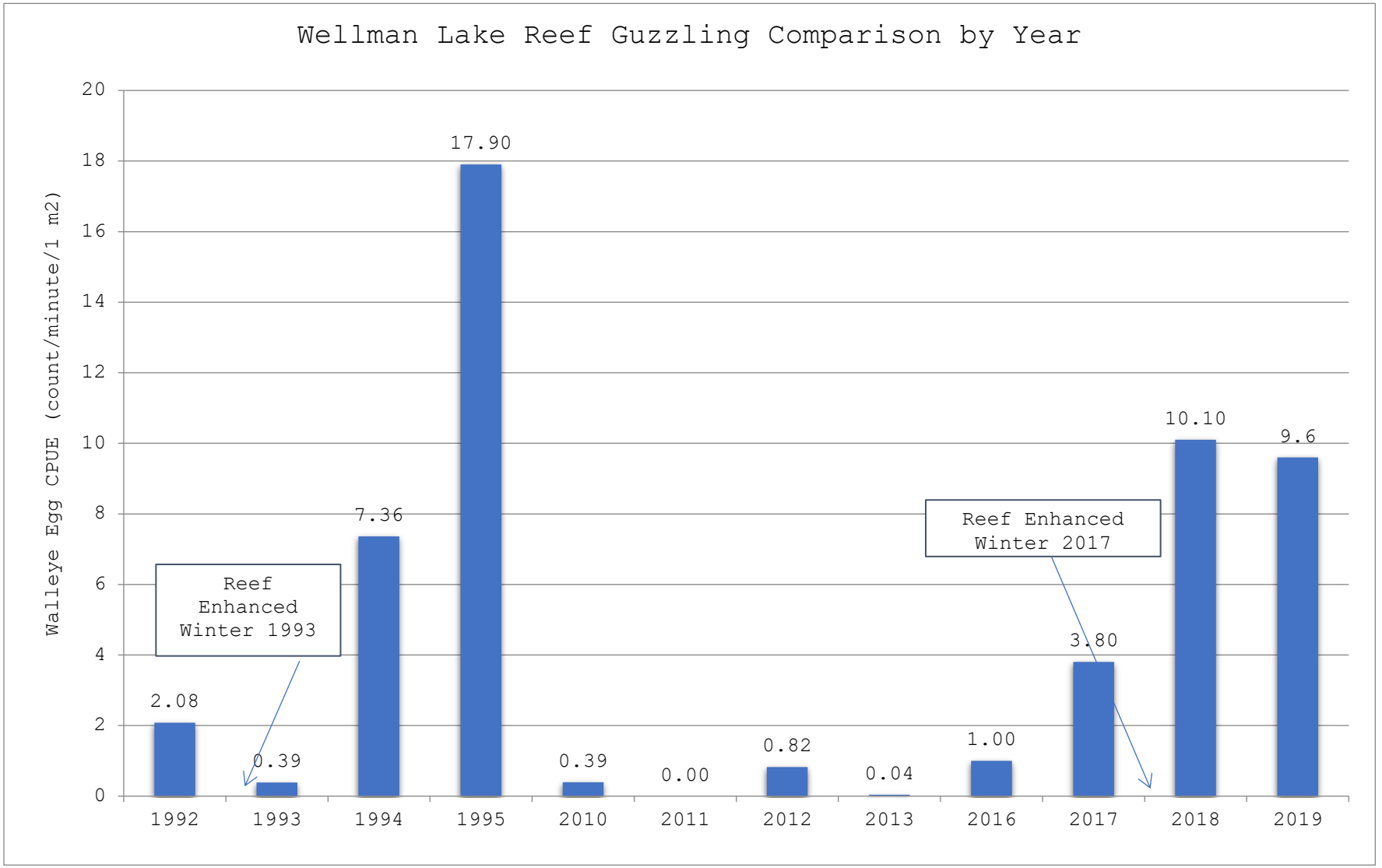


Figure 18: Wellman Lake Reef Guzzling Comparison by Year

Oxytetracycline (OTC) of 0+ Walleye

Figure 19: Wellman Lake OTC Detection Site Map

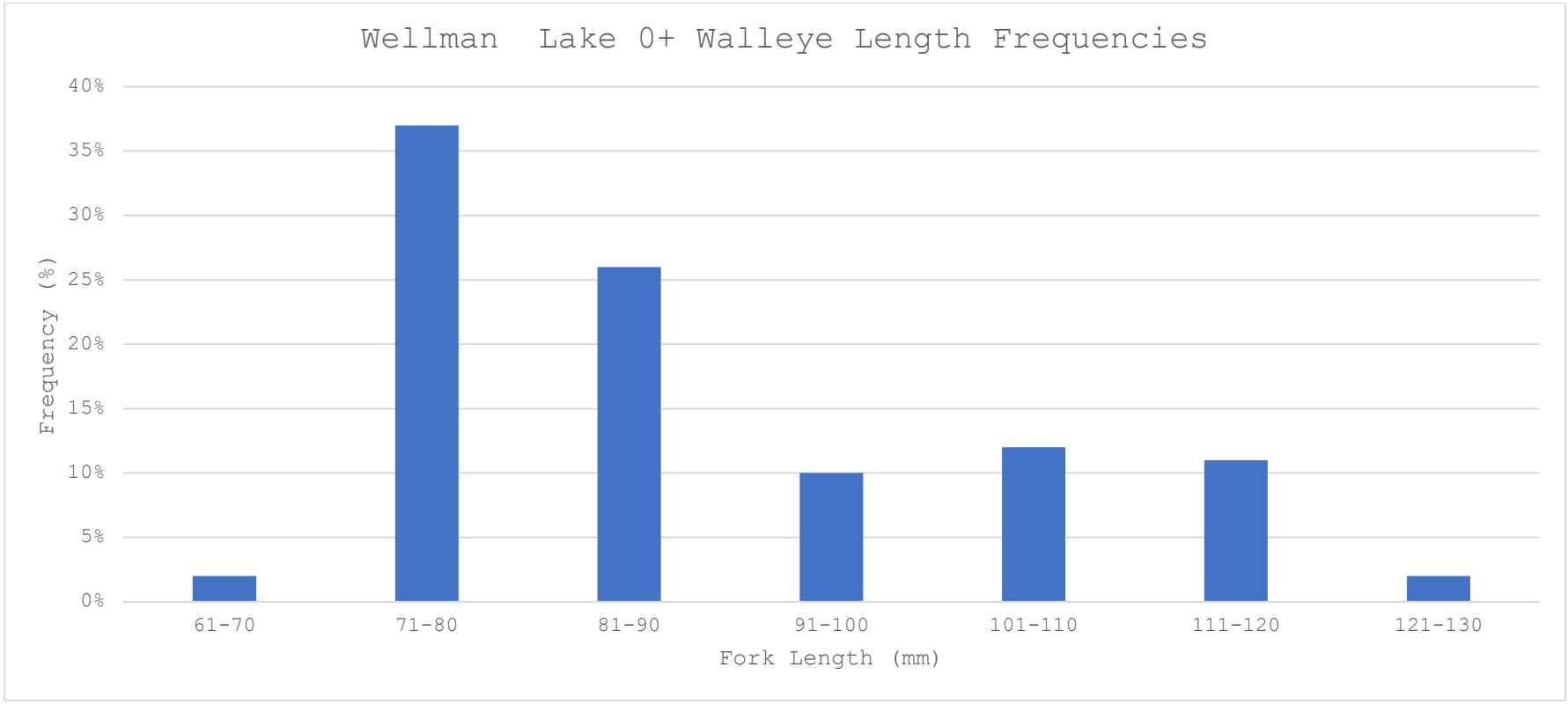


Figure 20: Wellman Lake 0+ Length Frequencies

Barrel Counts

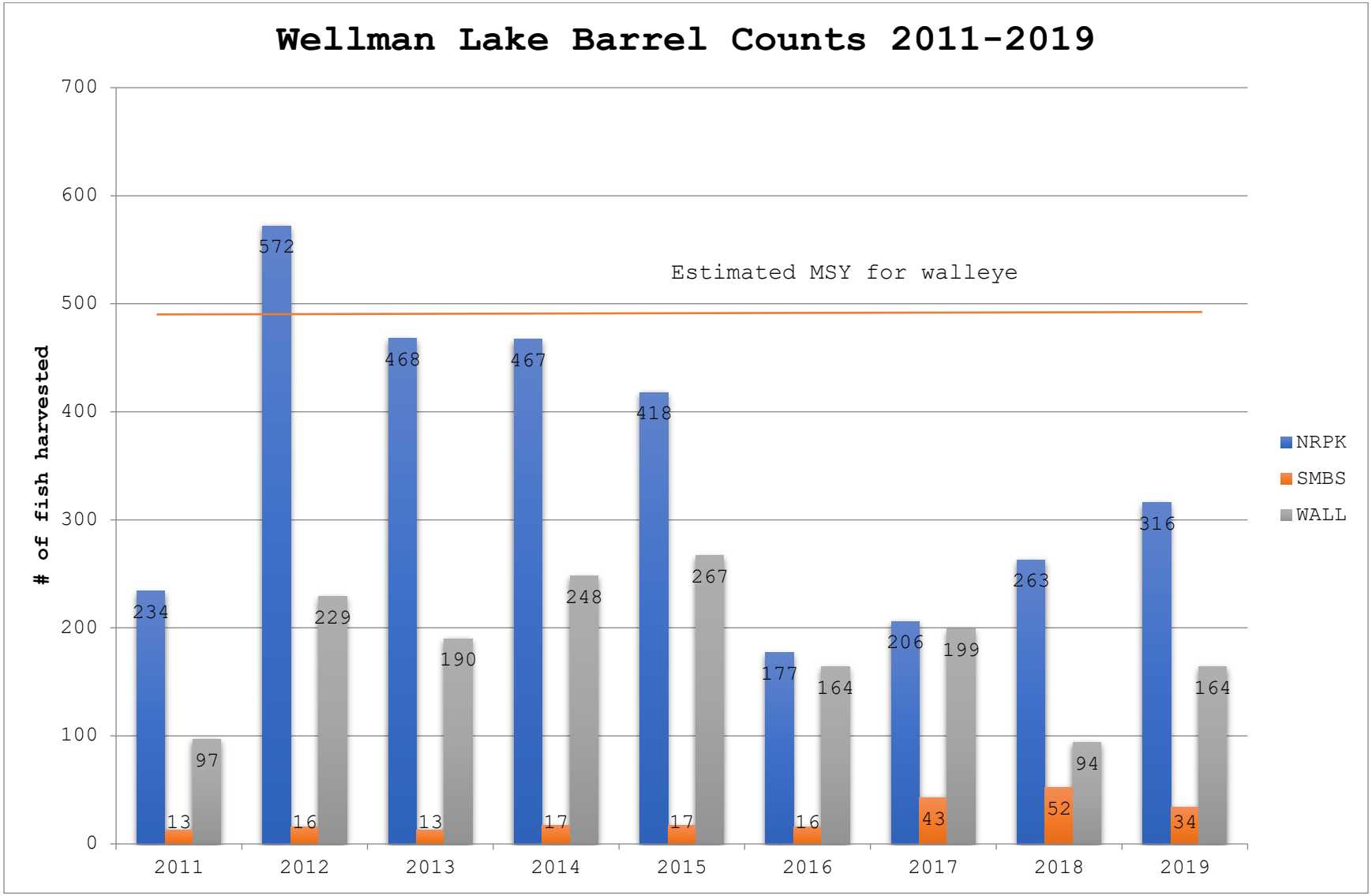


Figure 21: Wellman Lake Barrel Counts (2011-2019)

Discussion

Walleye

Walleye were captured in all sites but one. Past telemetry data shows that Wellman Lake walleye travel quite freely throughout the lake during the open water season. The best sites where ones on the windward shores during the sampling period as expected. There was one 2019 walleye recapture during the assessment. Fish #246 was first captured at site 9 on September 10th and was recaptured at site 15 on September 13th. Walleye CPUE was the highest recorded (0.42 fish/hour) when comparing to 2010 (0.26 fish/hour), and 2011 (0.22 fish/hour)(*Figure 5*). Although assessment methods are have changed since the 1940's it is interesting to note that walleye composition in 2019 (44%) was the highest its been since 1967 (58%) (*Appendix 4*). Looking at length frequencies, the population shows healthy distribution with multiple age/size classes (*Figure 8*). Of the 2019 sample size 97/155 (63%) fish were >45cm and within the protected slot (*Figure 6*).

Figure 9 represents range along with the mean length at a specific age for Wellman Lake walleye. When correlating the strongest walleye age classes (6+, 4+, 7+, and 8+) with stocking records, no conclusions can be drawn. Knowing these compositions may include the naturally recruited population; the 6+ frequency could either be 0+ walleye stocked in 2013 (n=144), 1+ walleye stocked in 2014 (n=360), or the 2+ walleye in 2015 (n=1004) from Beautiful Lake. No fry stocking correlates with this age class. The 4+ age class can be correlated with 200,000 fry from 2015, and the 7+ age class correlates with the 1,000,000 fry planted in 2012. The fourth strongest age class, 8+ could either be 200,000 fry planted in 2011, or 153 1+ planted from Beautiful Lake in 2012. It is important to state that fish ages are essentially estimates, and therefore not always reliable. This information illustrates the importance of understanding natural recruitment success in Wellman Lake, and further justifies the requirement for an OTC study in order to develop an effective stocking strategy.

SVSFE has been involved in various fish tagging programs over the years, and therefore have gathered some interesting tagging information during the 2019 NSCIN survey and historical review. In 2019, one tagged walleye was captured. SVSFE Blue Tag #277 was originally tagged September 16th, 2011 at site 15. The fish had a total length of 496mm and weighed 1,120grams. On September 10th, 2019 #277 was captured at site 8 and measured 548mm and weighted 1,500 grams. In 8 years, the fish had grew 52mm (~2"), and gained 380 grams (~0.8lbs). Interestingly, the fish was caught in the same area of the waterbody both years and has grown very little in nearly a decade. Between 2009 and 2014 a total of 876 tagged walleye from Beautiful Lake were transferred to Wellman to quantify the

success of the program. Since 2009, 21 tagged walleye from Beautiful Lake were reported to SVSFE as recaptures.

Figure 7 represents the Wellman Lake size distribution. In addition, walleye were noted to be in excellent condition, and average condition of the sample size (n=155) was k=1.114.

In addition, walleye angling quality has been on the rise at Wellman Lake over the past few years. Trends were not only noted by SVSFE staff and volunteers but also amongst many cottage owners who fish Wellman walleye annually. Based on non-consistent stocking, little information on natural recruitment success, and the complexities of ecosystem dynamics it is very difficult to determine the reason for the high composition, healthy population, and increasing walleye angling quality. There appears to be notable age class success correlating with plantings from the Beautiful Lake walleye transfer, however one cannot recommend future stocking programs that rely on this program for the following reasons: Walleye rearing programs are expensive and funding/staffing for the Beautiful Lake walleye transfer cannot be guaranteed long-term. Secondly, rearing lakes tend to cycle in terms of the species compositions and abundance of available forage naturally; therefore rearing success cannot be guaranteed. For example; the Beautiful Lake walleye transfer was not successful in fall of 2019. Fry survival was low, and at this point the reason is unknown. Probable factors include poor fry condition at the time of planting, or increased predation following the planting. In 2019, brook stickleback and fathead minnows were noted in higher abundance than previous years. Perhaps this composition shift lead to considerable predation of recently stocked fry. At this time the limited success of the rearing program is unknown, and the only probable way to determine if Beautiful Lake is still a suitable rearing lake will be to try again in the following years.

Fry stocking can be very successful under the proper circumstances. With good fry condition and planting in areas with high cover and an abundance of zooplankton – walleye fry survival can be considerable. Fry stocking is also a consistent option for future walleye management in Manitoba. The province runs two different walleye spawn camps each spring; therefore acquiring fry on an annual basis is more reliable than having the available staff and dollars to conduct walleye rearing/transfer programs on a regular basis. Wellman Lake is a high-traffic, high pressure walleye fishery in the Duck Mountains. For this reason, a consistent/long-term stocking strategy, and regimented monitoring program will assist in managing the fishery for future generations.

Year one of the Wellman Lake OTC study can be considered a success as the target sample size (n=100) was obtained. The samples have been sent off for analysis and should be completed by early 2020. Perhaps the most interesting observation made while targeting YOY walleye was the abundance in the narrows and the beach on the east shore of Regatta Bay

(*Figure 19*). It appears Regatta Bay provides important nursery habitat for juvenile walleye in Wellman Lake. In the past YOY walleye were found in abundance at the main beach, whereas in 2019 the CPUEs at the beach were very low. It will be interesting to correlate OTC marked walleye with the locations they were captured. Also, of the sample 67/100 had fish remains in the stomach. Of the identifiable species – spottail shiners, and darters were noted. Year 2, and 3 of the OTC study are expected to be completed in 2020/2021. If the marking confidence is low in any of the sample years, an additional year or year(s) may become recommended.

In 2014, SVSFE technical staff identified that over recent years walleye utilization of the enhanced spawning reef was declining. The consensus was that the rock used to enhance the reef back in 1993 had over-time become silted over, which had led to decreased walleye utilization and increased egg mortalities. The recommendation was to "lightly enhance" the spawning reef by placing a thin layer of washed gravel over the reef which was completed in March of 2017. Since the reef was re-enhanced, live-egg per minute CPUE has increased (*Figure 18*). It is recommended that this short assessment continue annually, and that notes be taken on siltation as to determine if cleaning becomes necessary or not.

Figure 21 represents harvest information from the Wellman Lake fish barrels from 2011-2018. Assuming the barrels represent a significant portion of the annual walleye harvest, it becomes necessary to continue to monitor harvest using this cheap and effective monitoring method and comparing data with the estimated maximum sustainable yield (MSY) of Wellman Lake walleye.

Northern Pike

Northern pike were captured in all sites except one and no specific site had a pike CPUE that stood out against the rest (*Table 2*). Overall pike CPUE has dropped to 0.1 fish/hour when compared to 2011 (0.13 fish/hour) and 2010 (0.16 fish/hour)(*Figure 4*). Although assessment methods have changed since the 1940's it is interesting to note that pike composition in 2019 (11%) was the lowest its been since 1958 (5%) (*Appendix 4*). Length frequencies of the pike population appear to be similar when comparing to length data from 2010, and 2011 (*Figure 10*). There is an obvious gap in the population between 600 and 900mm. This gap in the population may represent the best eater size pike and the protection regulation (pike >750mm) and the carry over of this regulation. Data from the fish barrels show that pike are the most frequently harvested fish in Wellman Lake (Figure 21). Age distribution appears to show significant recruitment success and decreasing composition with age which again may represent harvest (*Figure 12*). Figure 13 represents range along with the mean length at a specific age for Wellman Lake pike.

Tagged fish information from past assessments and transfer programs also provides interesting information on the pike population. Since 2013, SVSFE has been live transferring pike from Glad Lake to Wellman Lake as an effort to re-establish Glad Lake as a stocked trout waterbody. The required length to be eligible for transfer to Wellman was determined to be a minimum of 650mm (FL); all smaller pike were transferred to other nearby pike lakes including Chain Lakes and Kulhavy Lake. Although a few pike <650mm were transferred to Wellman due to logistical and cost reasons – the idea to stock large pike had two objectives (1) to increase trophy pike opportunities in Wellman Lake, and (2) to help manage the hammer-handle population.

Since 2013, SVSFE has transferred a total of 75 adult pike from Glad Lake to Wellman Lake. Data from 3 tagged pike were acquired in 2019, all of which had been transferred from Glad Lake. Tag 2923 was transferred to Wellman Lake on September 11th, 2013 and measured 645mm with a weight of 1,950g. On September 12th, 2019, 2923 was captured measuring 835mm, weighing 4,808g. In approximately 6 years, Tag 2923 had grown 190mm (7.4”) in length and 2,858g (6.3lbs) in weight.

Tag 4021 was transferred to Wellman Lake on May 14th, 2015 and measured 632mm with a weight of 1,575g. On September 12th, 2019, 4021 was captured measuring 965mm, weighing 6,492g. In approximately 4 summers, Tag 4021 had grown 333mm (13”) and 4,917g (10.8lbs) in weight.

Tag 4008 was transferred to Wellman Lake on May 13th, 2015 and measured 740mm with a weight of 2,540grams. On August 18th, 2019, 4008 was angled measuring 825mm. In approximately 4 summers, Tag 4008 had grown 85mm (3.34”) in length. As annual pike removals continue to occur on Glad Lake, it is recommended that only pike >550mm (fork length) are relocated to Wellman Lake; smaller pike should be moved to other candidate waterbodies.

Figure 11 represents northern pike size distribution. Also, pike were noted to be in good condition, and average condition of the sample size (n=36) was k=0.69. When looking at the barrel counts it becomes apparent that the pike are the most frequently harvested species on Wellman Lake (*Figure 21*).

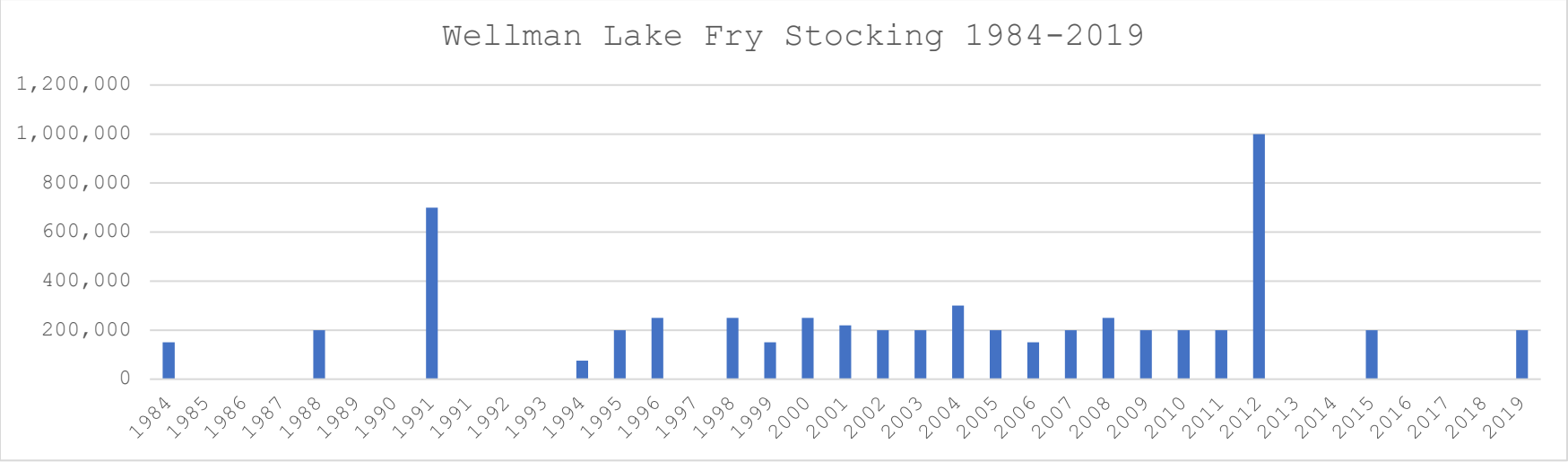
Smallmouth Bass

Smallmouth Bass were first introduced in 1975 as an effort to increase angling opportunity on Wellman Lake. Bass were captured in 8/16 sites in 2019 (*Table 2*). No specific site appears to consistently yield bass, and CPUES by year have remained relatively consistent from 2010-2019 (*Figure 4*). The composition has also remained consistent over the past decade (*Figure 5*). Looking at length frequencies, the population shows healthy distribution with multiple age/size classes (*Figure 14*).

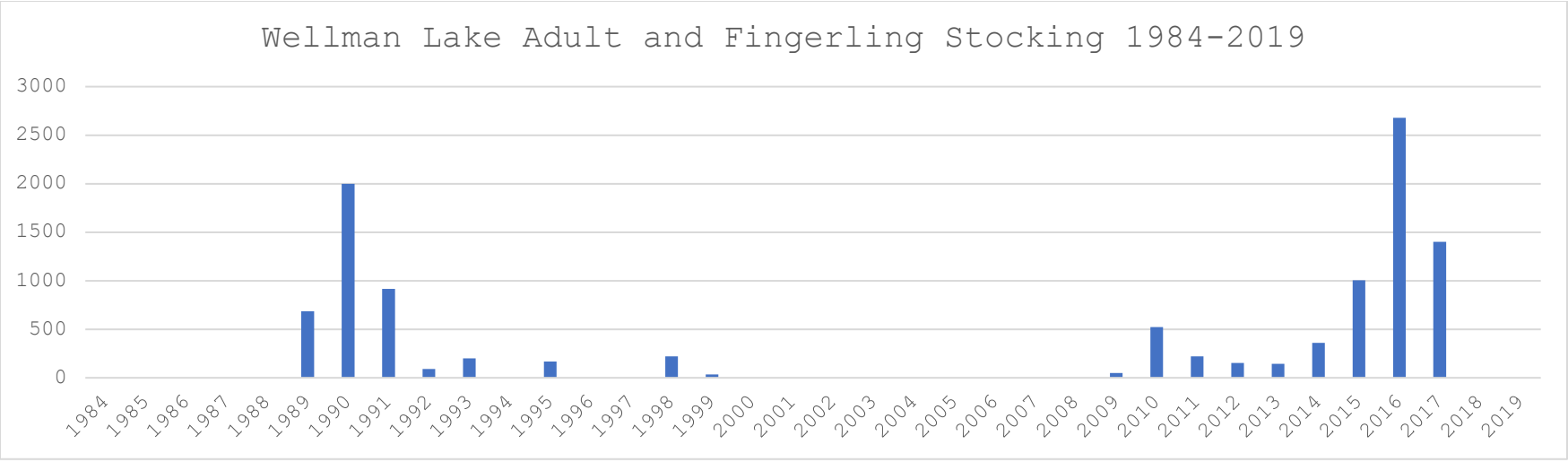
Wellman Lake provides smallmouth with ideal shoreline habitat for spawning activity – this is further represented through age class frequencies (*Figure 16*). Smallmouth were noted to be in excellent condition, and average condition of the sample size (n=49) was k=1.99. Figure 15 represents the size distribution of the Wellman Lake smallmouth population, while Figure 17 represents mean fish length at a specific age.

The smallmouth fishery has become more and more popular in recent years. This can be confirmed through angler reports, the master angler database (*Appendix 7*), and barrel counts. From 1984-2014 master angler submissions never exceeded 5 per year on Wellman Lake. Submissions have increased exponentially since then, with a total of 34 currently registered in 2019. Interestingly, smallmouth are turning up in the barrels more and more every year (*Figure 21*). The interspecific relationship between walleye and smallmouth bass is poorly understood in Wellman Lake.

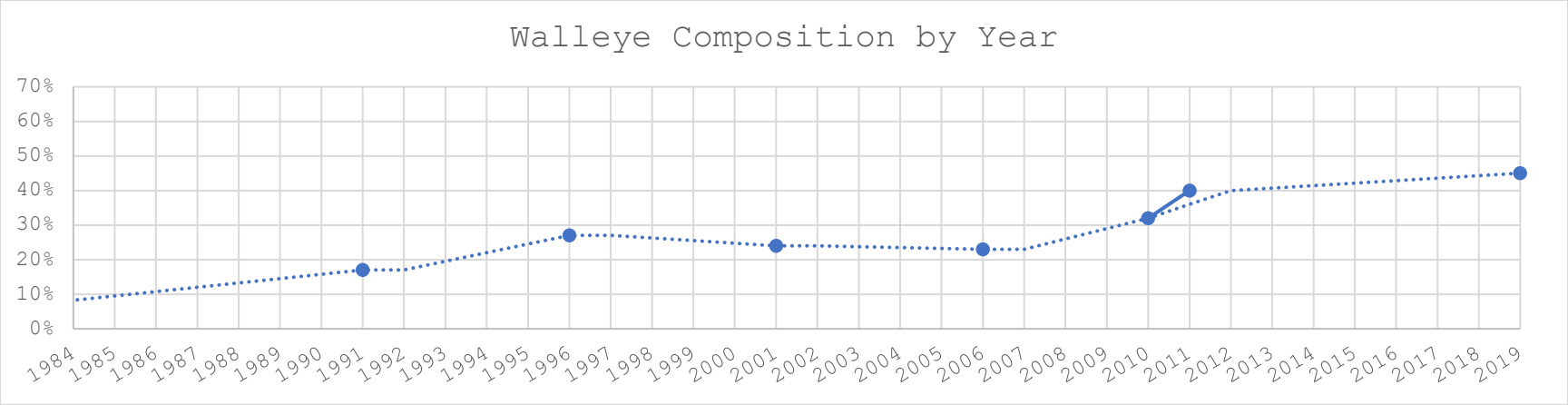
Appendix



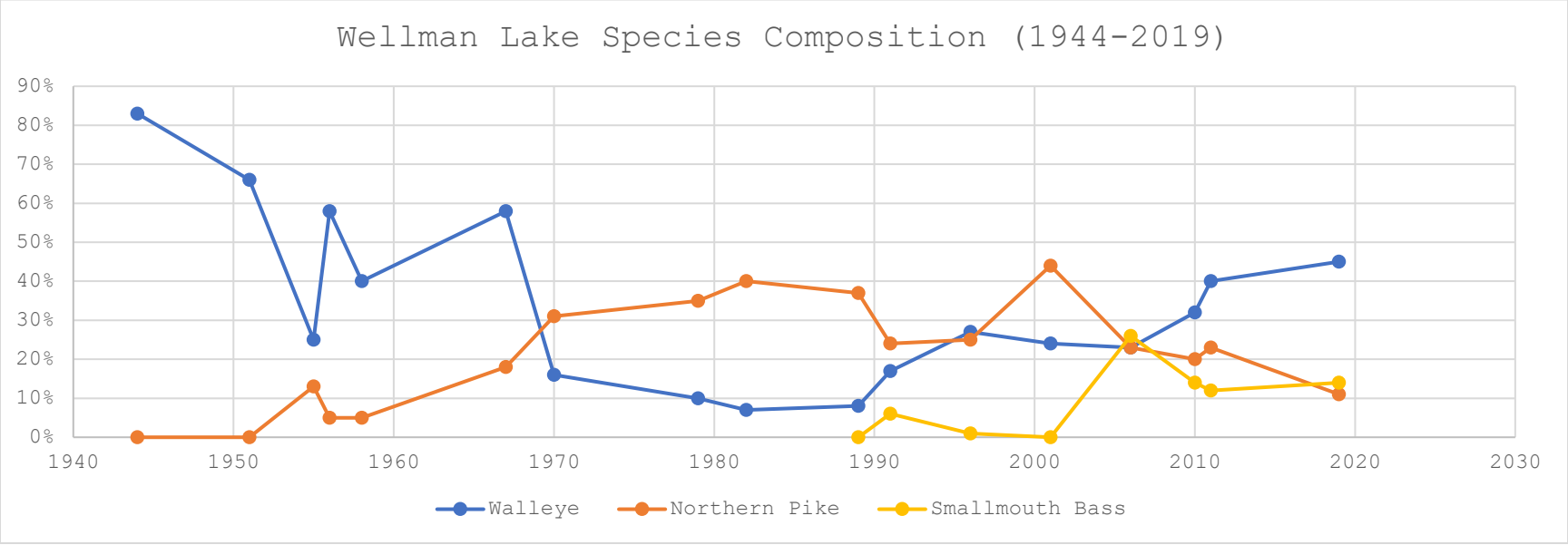
Appendix 1: Fry Stocking 1984-2019



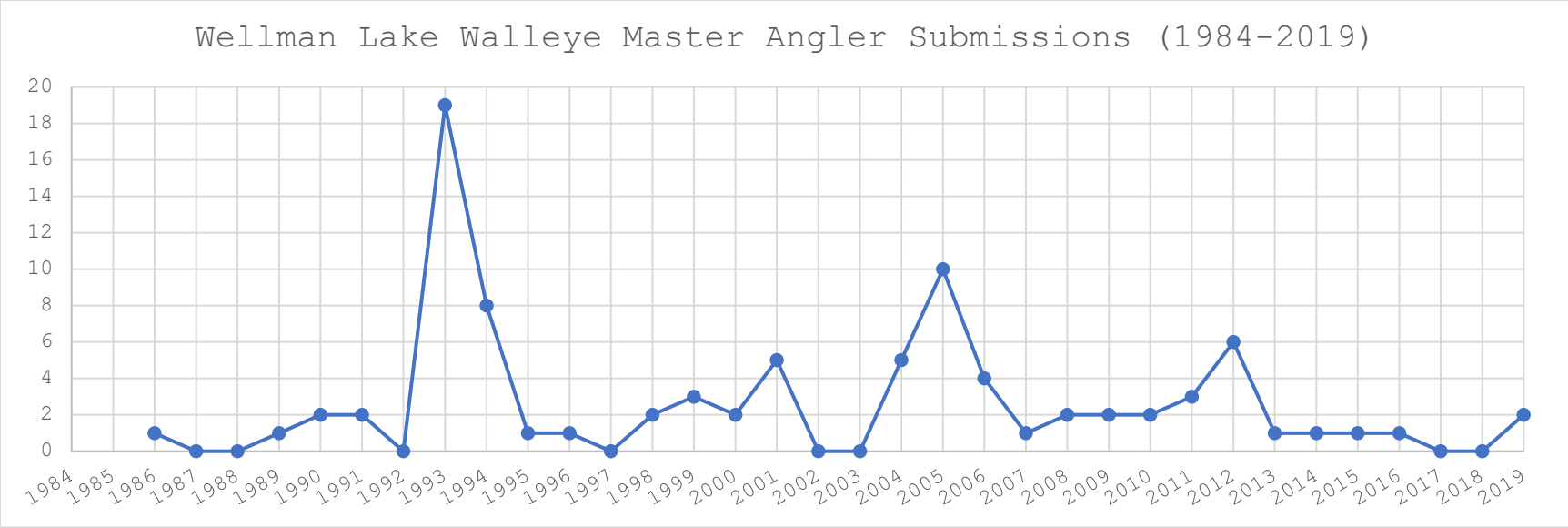
Appendix 2: Adult/Fingerling Stocking 1984-2019



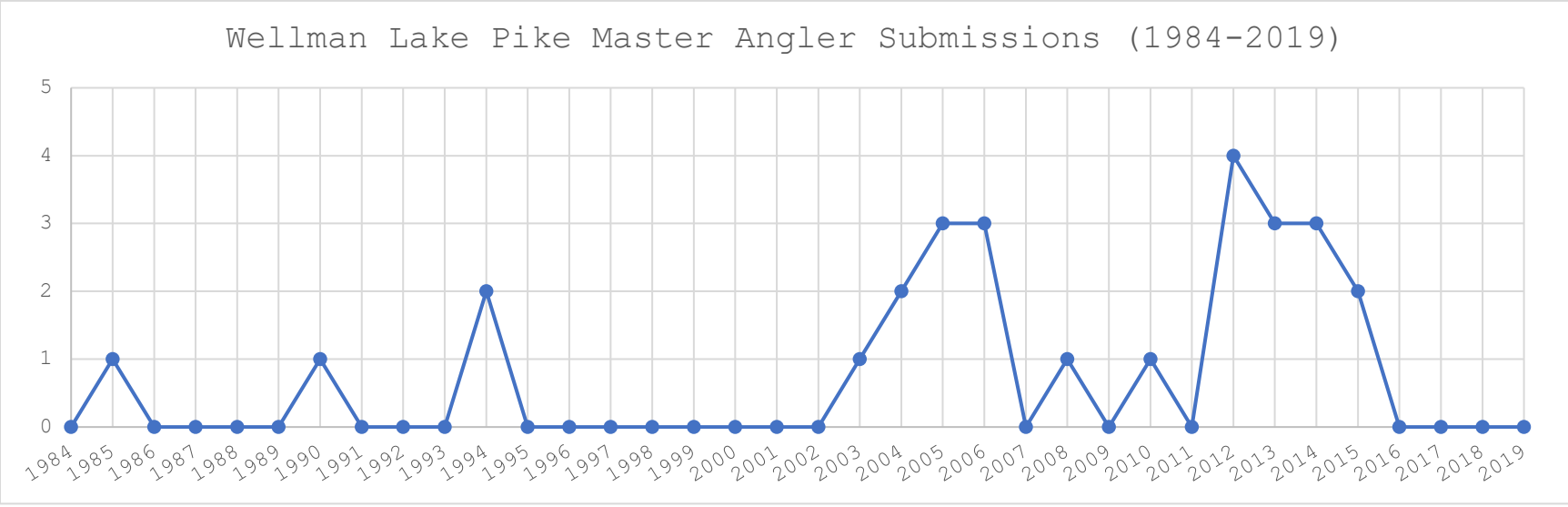
Appendix 3: Walleye Composition by Year (1984-2019)



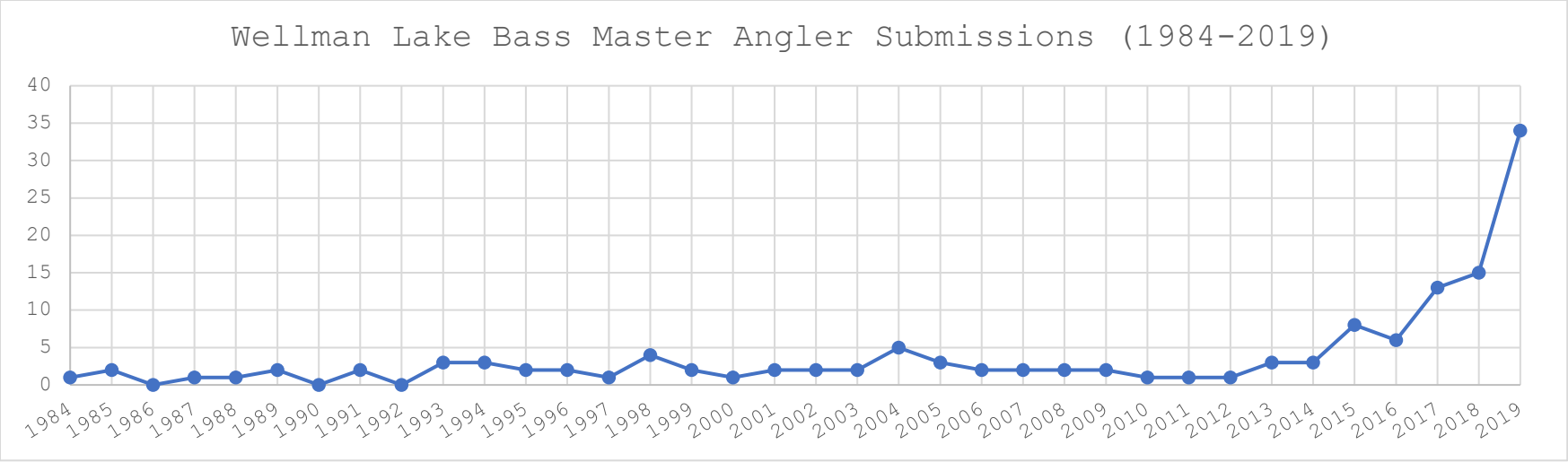
Appendix 4: Species Composition (1944-2019)



Appendix 5: Wellman Lake Walleye Master Angler Submissions



Appendix 6: Wellman Lake Pike Master Angler Submissions



Appendix 7:Wellman Lake Bass Master Angler Submissions

Appendix 8: Wellman Lake Walleye

Appendix 9:Wellman Lake Pike

Appendix 10: Wellman Lake Smallmouth

References

Edwards. G.E. 1993. A creel census of Wellman Lake. File Folder. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch. 1955. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch. 1956. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch. 1958. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch. 1967. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch. 1979. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch. 1982. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada

Fisheries Branch. 1989. Wellman Lake index netting. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch, and SVSFE, 1990-1993. Pike removal initiatives in Wellman Lake. File Folder. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch. 1991. Project Summary – Fisheries Branch and SVSFE. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada.

Fisheries Branch. 1991. Wellman Lake index netting. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch. 1970. Wellman Lake fish populations experimental netting. File Report. Acquired from Sustainable Development District Fish Shop, Swan River, Manitoba, Canada.

Fisheries Branch, and SVSFE. 1992-2019. Wellman Lake reef guzzling. Data summary from reef guzzling 1992-2019. Acquired from Sustainable Development District Fish Shop, SVSFE Electronic Copy, Swan River, Manitoba, Canada

Fisheries Branch. 1996. Wellman Lake index netting. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch. 2001. Wellman Lake index netting. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Fisheries Branch. 2006. Wellman Lake index netting. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Groening, L.D. 2015. The use of oxytetracycline marking to monitor stocking success of walleye fry in eastern Manitoba, a thesis to the Faculty of Graduate Studies of the University of Manitoba

Kansas, K. 2014 Multi-year OTC study (FEF Project 10-004) Internal Report. Unpublished project summary

Koutecky, B. Urban, H., 2013. Walleye telemetry Wellman Lake & Swan River FEF Project 12-025. Acquired from Sustainable Development Fish Shop, SVSFE Electronic Copy. Swan River, Manitoba, Canada

Manitoba Fisheries Branch. 1980. A summary of the history and future recommendations for the management of Wellman Lake. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

McLeod, J.A., and Moir, D.R., .1942. An investigation of certain waters in Duck Mountains. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada.

McLeod, J.A., and Moir, D.R., .1944. An investigation of certain waters in Duck Mountains. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada

Sorochan, R.S. and Andrews, R.R. 1969. An investigation into the sport fishery of Wellman Lake, summer 1967. Manitoba Department of Mines and Natural Resources. Fisheries Branch Report No. 69.

Stewart-Haye, R.K., 1951. A biological survey of Wellman Lake. Department of Mines and Natural Resources. Game and Fisheries Branch.

SVSFE, 2010. Wellman Lake near shore community index netting. File Report. Acquired from Sustainable Development Fish Shop, SVSFE Electronic Copy. Swan River, Manitoba, Canada

SVSFE, 2011. Wellman Lake near shore community index netting. File Report. Acquired from Sustainable Development Fish Shop, SVSFE Electronic Copy. Swan River, Manitoba, Canada

Swan Valley Sport Fishing Enhancement. 2017. Project HCAA 16-00408 Wellman Lake spawning reef project summary. File Report. Submitted to Recreational Fisheries Partnership Conservation Program, and Department of Fisheries and Oceans Canada.

University College of the North, 2006. Wellman Lake ecological investigation. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada.

Western Region Stocking Database. 2019. Manitoba Sustainable Development. Acquired from: https://swanvalleysportfishing.com/stocking-reports/

Yake, B., 1998. Wellman Lake walleye telemetry project. File Report. Acquired from Sustainable Development District Office, Swan River, Manitoba, Canada