VERRALL LAKE 2019

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

Swan Valley Sport Fishing Enhancement Inc. (SVSFE) is continuously interested in studying current fish populations and updating stocking strategies for lakes in the northern Parkland area. In 2019, SVSFE set out to assess the current fish community in Verrall Lake to provide feedback to anglers and to monitor stocking success.

An assessment geared towards targeting walleye populations was created and executed in 2019. Catchment of northern pike and walleye increased with northern pike dominating the overall species composition. Walleye catch-per-unit-effort(CPUE) increased with the majority of the population occurring the in the protected slot limit. General growth and progression of walleye are considered to be healthy at current. Trends in stocking success and return indicate a slight preference to stocking fingerlings/sub-adults from the Beautiful Lake Walleye Transfer as opposed to stocking walleye fry, especially given the prominent northern pike population.

Recommendations regarding stocking include a rate of 12.5 fish/ha every 2-3 years coinciding with Beautiful Lake. If fingerlings from Beautiful Lake are not available, stocking 100,000 walleye fry annually is recommended. A follow-up assessment in 5 years replicating the 2019 study after the standardized stocking rate is implemented is suggested at this time.

Table of Contents

List of Tables

List of Figures

1.0 Historical Data

Verrall Lake has been managed as a walleye fishery since the late 1980's. A perceived experimental initial stocking of splake took place in 1986 and the years immediately following has only been stocked with walleye(Table 1).

Table 1: Historical stocking records of Verrall Lake from 1986 to 2019

VERRALL LAKE			
YEAR	SPECIES	NUMBER	SIZE
1986	SPLAKE	20,000	FINGERLING
1987	WALLEYE	100,000	FRY
1988	WALLEYE	100,000	FRY
1990	WALLEYE	100,000	FRY
1991	WALLEYE	100,000	FRY
1992	WALLEYE	50,000	FRY
1993	WALLEYE	50,000	FRY
1994	WALLEYE	50,000	FRY
1995	WALLEYE	50,000	FRY
1996	WALLEYE	50,000	FRY
1997	WALLEYE	100,000	FRY
1998	WALLEYE	50,000	FRY
1999	WALLEYE	50,000	FRY
2000	WALLEYE	100,000	FRY
2001	WALLEYE	100,000	FRY
2002	WALLEYE	100,000	FRY
2003	WALLEYE	100,000	FRY
2004	WALLEYE	100,000	FRY
2005	WALLEYE	100,000	FRY
2006	WALLEYE	100,000	FRY
2007	WALLEYE	50,000	FRY
2008	WALLEYE	150,000	FRY
2009	WALLEYE	100,000	FRY
2010	WALLEYE	74	ADULT
2011	WALLEYE	300,000	FRY
2011	WALLEYE	57	ADULT
2012	WALLEYE	130	ADULT
2014	WALLEYE	200,000	FRY
2014	WALLEYE	100	FINGERLING
2015	WALLEYE	100,000	FRY
2015	WALLEYE	394	FINGERLING
2016	WALLEYE	200,000	FRY
2016	WALLEYE	603	FINGERLING
2017	WALLEYE	117	FINGERLING
2019	WALLEYE	22	FINGERLING

Prior to the stocking of splake in 86', there was a fish removal conducted by Fisheries Branch. They removed all species present which included northern pike (194), white sucker (1,439), walleye(25), yellow perch(2) and burbot(3). In 1987, the lake was chemically reclaimed. Following the switch to walleye only, Verrall Lake was used as a rearing pond to stock Wellman Lake by SVSFE from 1989-1999(Table 2). In 1990 a minimum size limit of 35 cm was implemented to aid the success of using Verrall as a rearing pond. Another noteworthy event on Verrall Lake occurred in August 1996 which indicated a potential summer die-off with large numbers of young-of-year(YOY) yellow perch dead/dying in the shallow water. The following week there was no further evidence of a summer-kill event. Besides stocking and transferring, there was no record of any further lake assessments until 2010 and 2011. These assessments were completed by SVSFE and will be included with the data collected in 2019. In 2015 a new management regulation was put into effect. The regulations changed from: "walleye limit is 4; all walleye shorter than 35 cm must be released" To: "walleye limit is 2; all walleye between 45 cm and 70 cm must be released."

Table 2: Records of walleye transferred from Verrall Lake to Wellman Lake 1989-1999

VERRALL LAKE TO WELLMAN LAKE			
YEAR	SPECIES	NUMBER	SIZE/AGE
1989	WALLEYE	546	1+
1990	WALLEYE	2000	2+
1991	WALLEYE	950	ADULT
1992	WALLEYE	90	ADULT
1993	WALLEYE	200	ADULT
1995	WALLEYE	168	ADULT
1998	WALLEYE	221	ADULT
1999	WALLEYE	35	ADULT

2.0 Study Rationale

Verrall Lake has been stocked with a combination of walleye fry, sub-adults and adults almost every year since 1987. Swan Valley Sport Fish Enhancement Inc. applied to the Fish and Wildlife Enhancement Fund(FWEF) in 2018 to conduct the following research on Verrall Lake in 2019:

1. Collect a current fish inventory and assess stocking efforts of walleye through trap netting

2. Create a standard non-lethal assessment that can be replicated in future years

3. Develop or maintain management recommendations for Verrall Lake to fully optimize the lake use and development

3.0 Study Area

Verrall Lake is located 49.5 km from Swan River, MB off PR #366 in the Duck Mountain Provincial Park. Access is off Regatta Bay Road (parallel to PR #366) along Designated Hunting Route C. The trail to the lake is 3.6 km on a currently unmaintained road. Because of road condition, access to Verrall can be limited to four wheel drive vehicles and smaller watercraft. Features include a dock with bench and an maintained boat launch with limited parking area. The lake is 41.6 ha, with 10.6 ha littoral habitat, a maximum depth of 13.3 m and an average depth of 5.6 m. The lake has two inflows in the north and northeast corner and one outflow in the southwest corner.

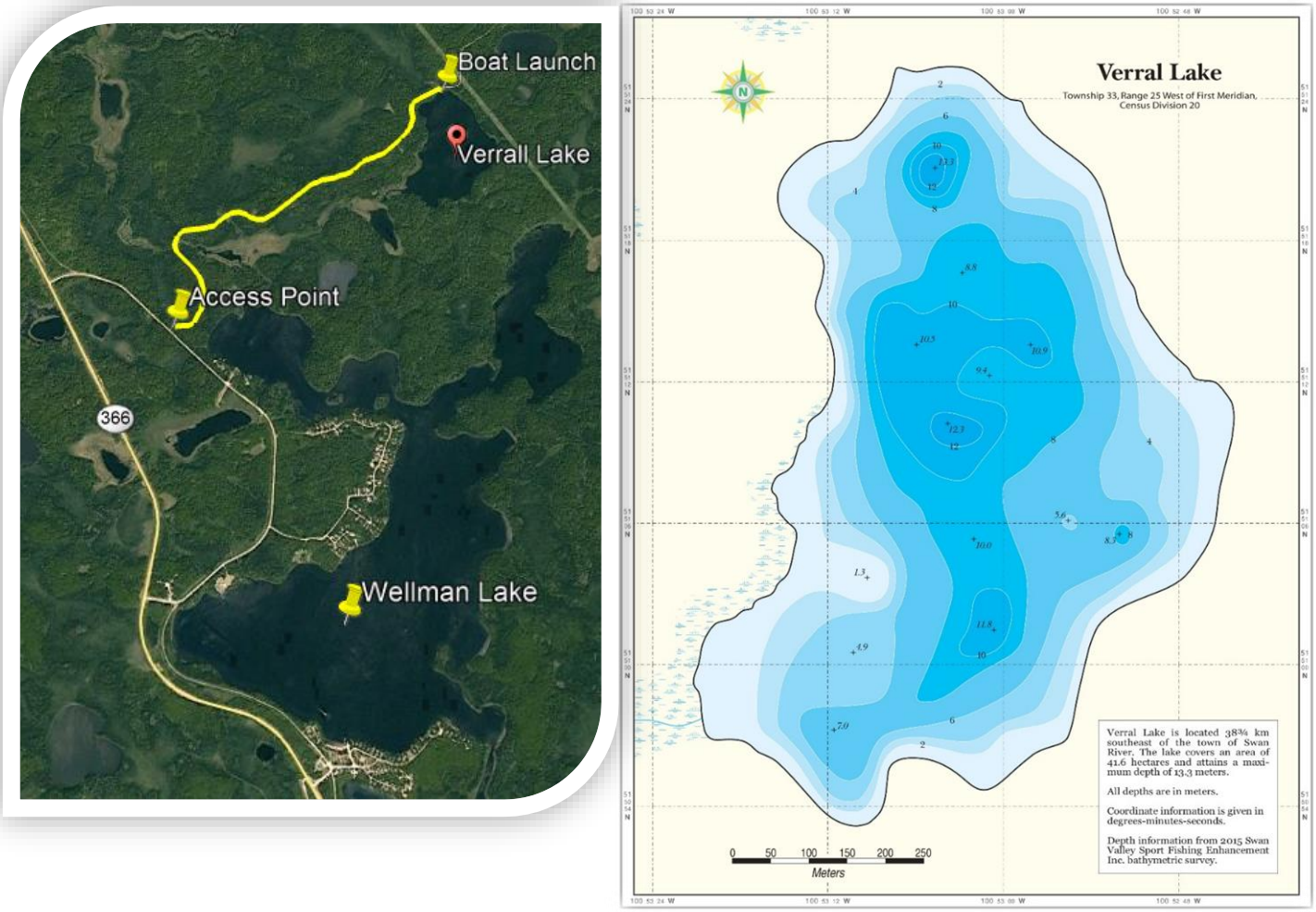


Figure 1: Access information and contour data for Verrall Lake

4.0 Methods

Trap Netting

An updated live release trap netting program was developed for Verrall Lake in 2019. Trap net sites were chosen according to depth suitability and walleye targetability. The target for sampling occurred in the spring, post-spawn, between between 12°C and 18°C. Custom designed trap nets had two funnels and cribs (10" funnel and 4" funnel). The idea is to allow smaller fish to swim to the back of the second portion and the larger fish would stay in the front portion of the trap. The trap is 4 ft wide x 11 ft long x 6 ft high. Leads are 100 ft(33 m) and the mesh for the leads and trap is 1 3/4".

Information recorded at set time included; 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. Tag information was also analyzed for recapture growth rates. Age structures taken included spines from walleye and scales from northern pike. Recaptures from 2019 (pec clips) were documented as recaps and released. Once all fish were sampled and released, traps were relocated and reset at the next assigned fishing location.

Sought after data included various measurements pertaining the overall health of the walleye fishery but more specifically, assessments are typically designed to monitor catch-per-unit effort (CPUE). Evaluating number of fish caught by hours of trap netting is represented as # of fish caught per hour. CPUE is much more reliable for reflecting changes in population density within a lake (Schneider, 1998b) than differences in density between lakes. By comparing annual CPUE, managers can rate the success or failure of the program over time. Secondly, evaluating the current species composition and size/age distributions compared to other years to determine general walleye 'health'.

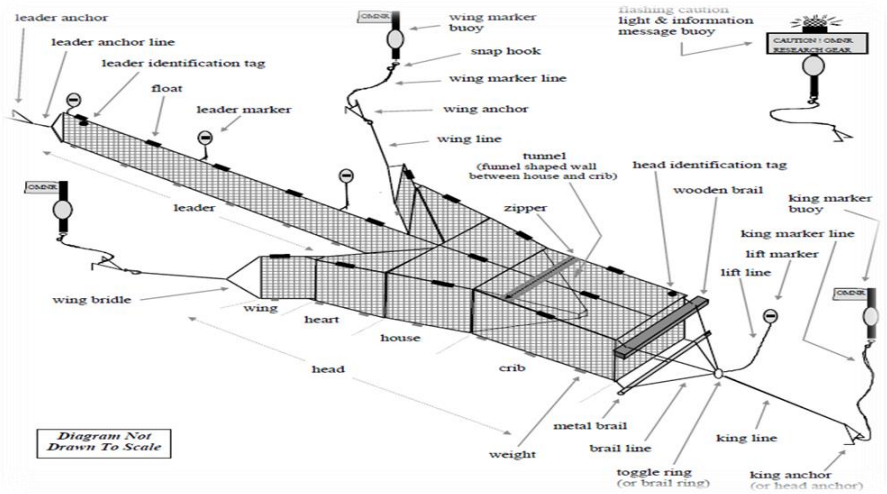


Figure 2: An example a trap net (similar but not identical to the ones used in Verrall Lake)

5.0 Results

Trap Netting

Post spawn trap netting was conducted during the week of June 3rd – 6th , 2019. Trap netting efforts equated to a total of 136.55 fishing hours. Six different sites were selected with two different trap nets in the water at a time(Figure 3). The water remained 14.1-14.8°C throughout the program.

Walleye

A total of 119 fish were captured in 2019 and of these, 30% were walleye (Figure 4). Also illustrated in Figure 4 are the species compositions from the 3 years of data collected. Walleye composition between 2011 and 2019 is similar but overall has shifted in favour of northern pike since 2010. Total catchment of both northern pike and walleye has increased considerably in 2019, however, two more trap nets were added to the program compared to the 2010 and 2011 assessments. Walleye CPUE was highest at site 3 in 2019 (Figure 5). CPUE has shifted from 1.08 fish/hour in 2010, to 0.89 in 2011 up to 1.59 fish/hour in 2019 respectively(Figure 6).

The most frequently occurring size class for 2019 was 501-550mm(Figure 7). 2019 also displayed the widest size class range compared to 2010 and 2011. Walleye in the protected slot made up 76% of the catch in 2019 and interestingly, walleye in the protected slot made up 100% of the catches in 2010 and 40% in 2011. Figure 8 represents the size distribution of walleye over the years and 2019 depicts the most linear weight-to-length relationship for the sample. A condition factor(k) was applied to the Verrall Lake walleye which utilizes the weight(g) and fork length(mm) in a formula to determine a relative robustness(Carlander 1950). The average k value in Verrall is 0.96(Figure 9).

Walleye length at age is displayed in Figure 10 with the greatest variance of 10.6 cm FL aged at 8+. The strongest age class for walleye in 2019 was age 8+, following by age 6+ and 7+ respectively(Figure 11). Walleye aged at 8+ can potentially be correlated to the stocking of 300,000 fry in 2011 or 130 1+ walleye from Beautiful Lake in 2012. Walleye aged at 6+ can potentially be correlated to the stocking of 100 1+ walleye in 2014 or 394 2+ walleye in 2015 from Beautiful Lake. No conclusions can be drawn from the 7+ age class in regards to supplemental stocking. It is important to state that ages of fish are estimates and can differentiate depending on the estimator, quality of sample and type of age structure, etc.

Recapture growth data was collected from two walleye in 2019. Both walleye were stocked in the spring as fry in Beautiful Lake, caught during fall transfer, tagged and transferred to Verrall Lake. After introduction, tagged walleye are growing an average of 26.6 mm a year (Figure 12).

5.0 Results

Northern Pike

Northern pike has exceeded walleye as the dominant species throughout 2011 and most recently in the 2019 assessment at 70% composition(Figure 4). At site 3, northern pike CPUE was highest at 1.26 fish/hour. Total northern pike CPUE was 3.67 fish/hour, more than double the walleye CPUE(1.67). The most common length frequency in all assessment years has been 450-500 mm(Figure 13). Figure 13 also depicts the widest range of population length frequencies which occurred in 2019. Figure 14 illustrates an exponential trendline in the size distribution northern of pike over the assessment years. Strong age classes for northern pike are depicted in Figure 15 as 3+, 4+ and 2+ respectively.

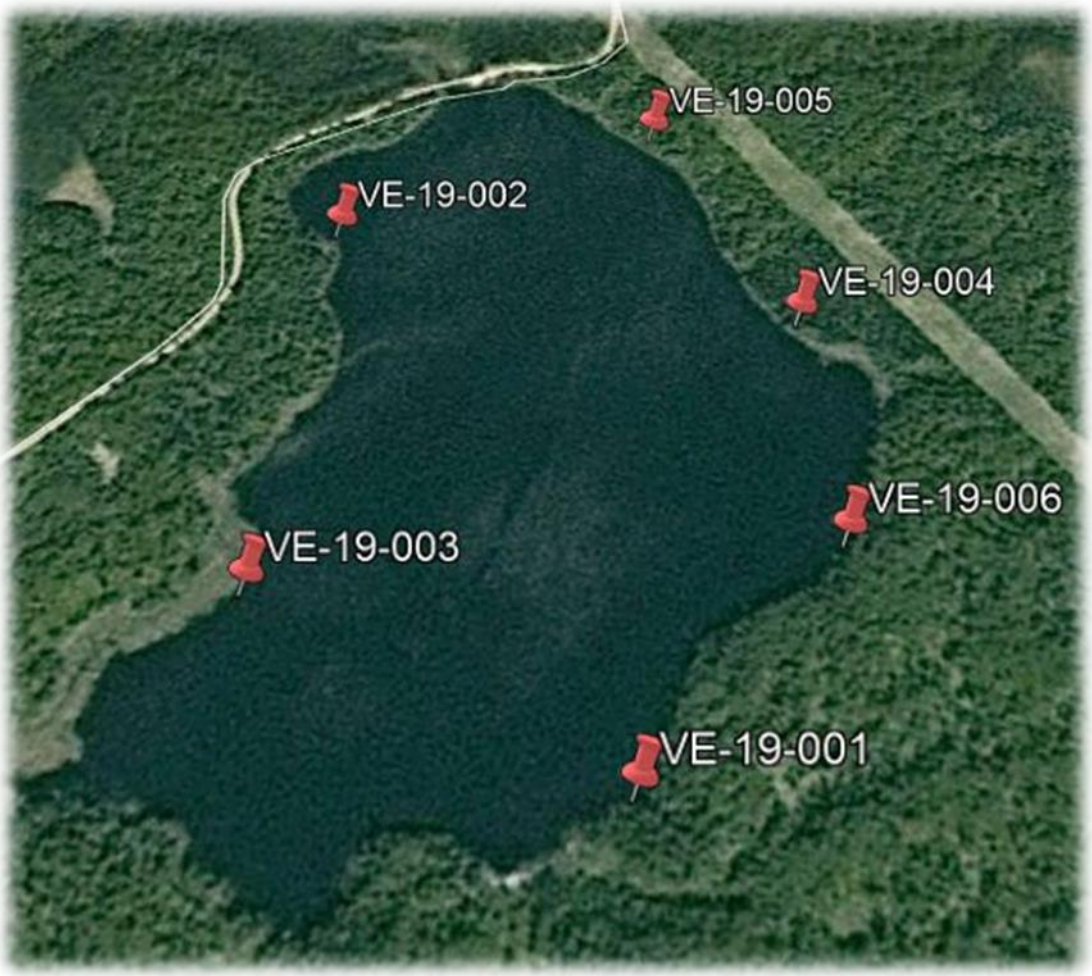
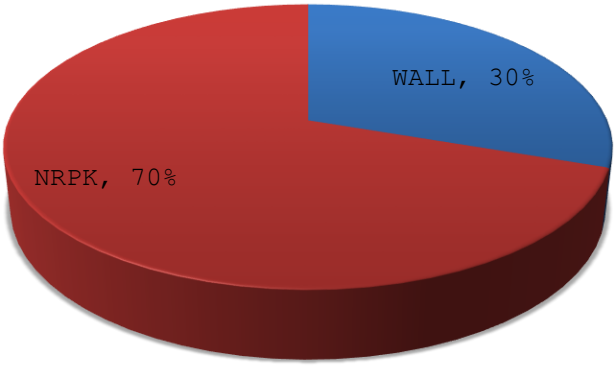


Figure 3: Trap net site locations on Verrall Lake in 2019

5.0 Results

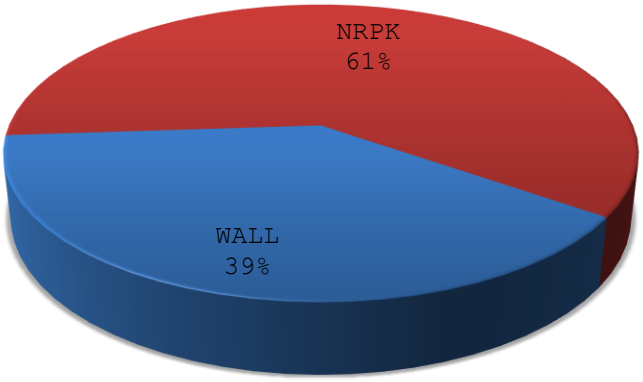
2019 SPECIES COMPOSITION

n=119



2011 SPECIES COMPOSITION

n=51



2010 SPECIES COMPOSITION

n=21

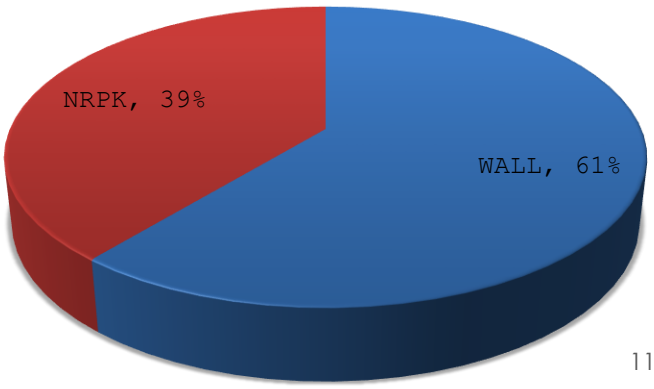


Figure 4: Species composition for trap netting in 2019, 2011 and 2010 in Verrall Lake

5.0 Results

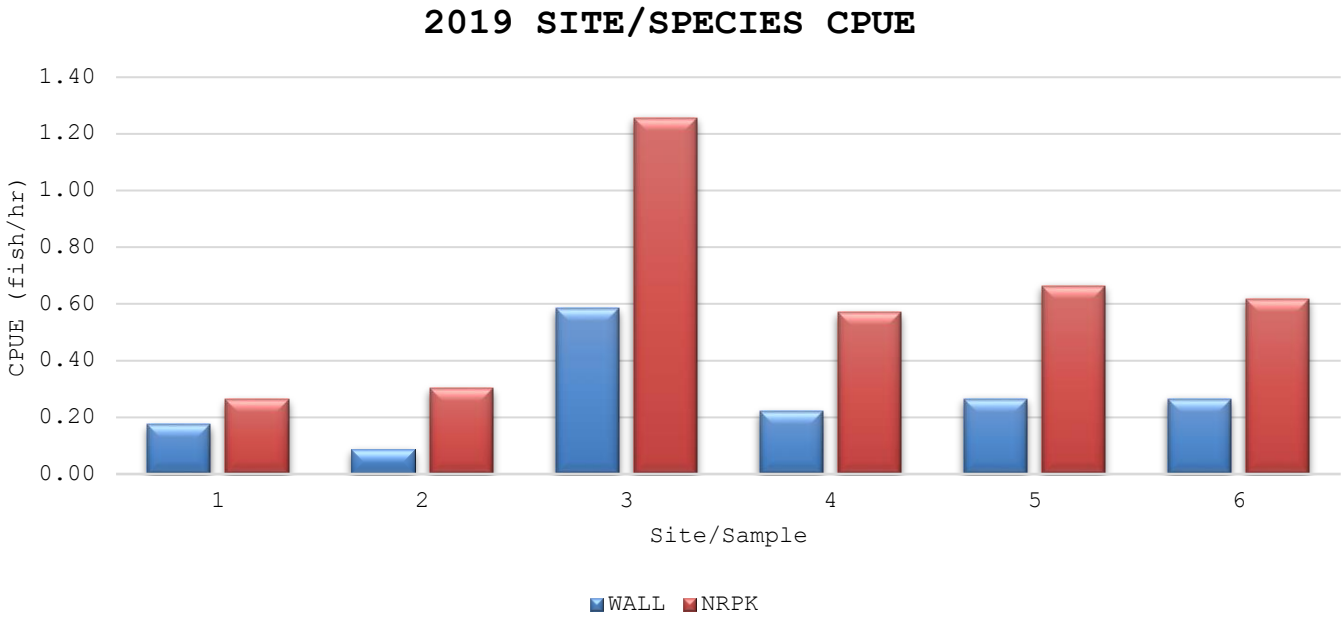


Figure 5: Trap netting site and species CPUE for Verrall Lake 2019

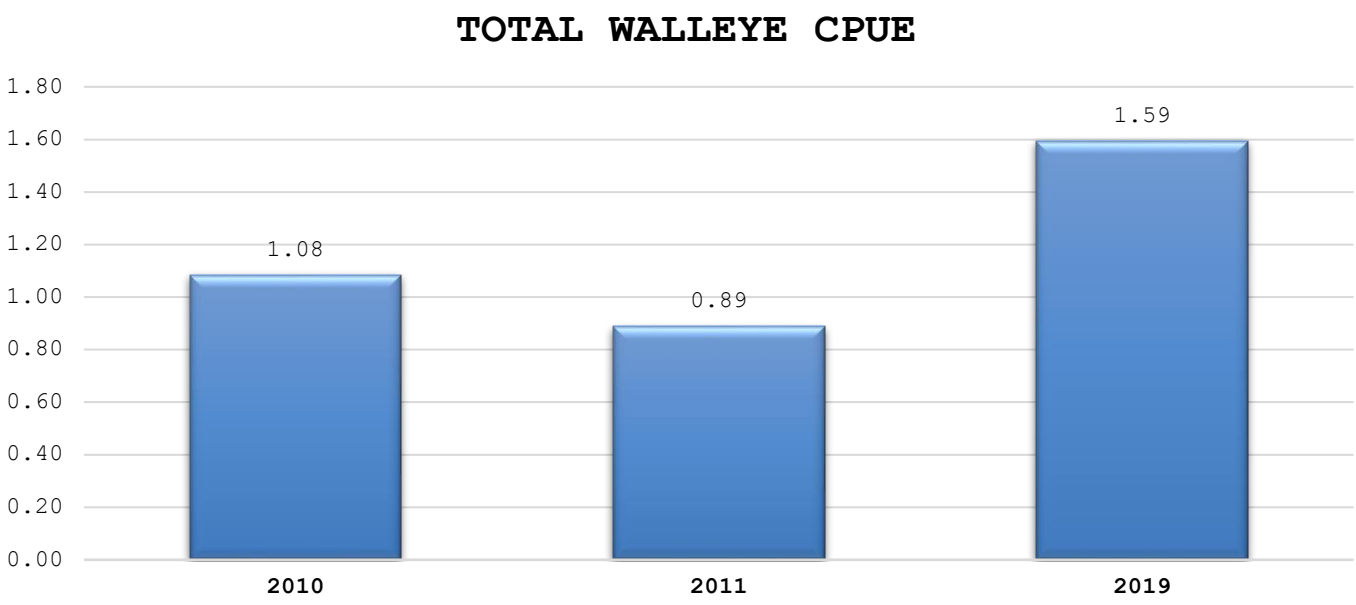


Figure 6: Total walleye CPUE for trap netting in 2010, 2011 and 2019

5.0 Results

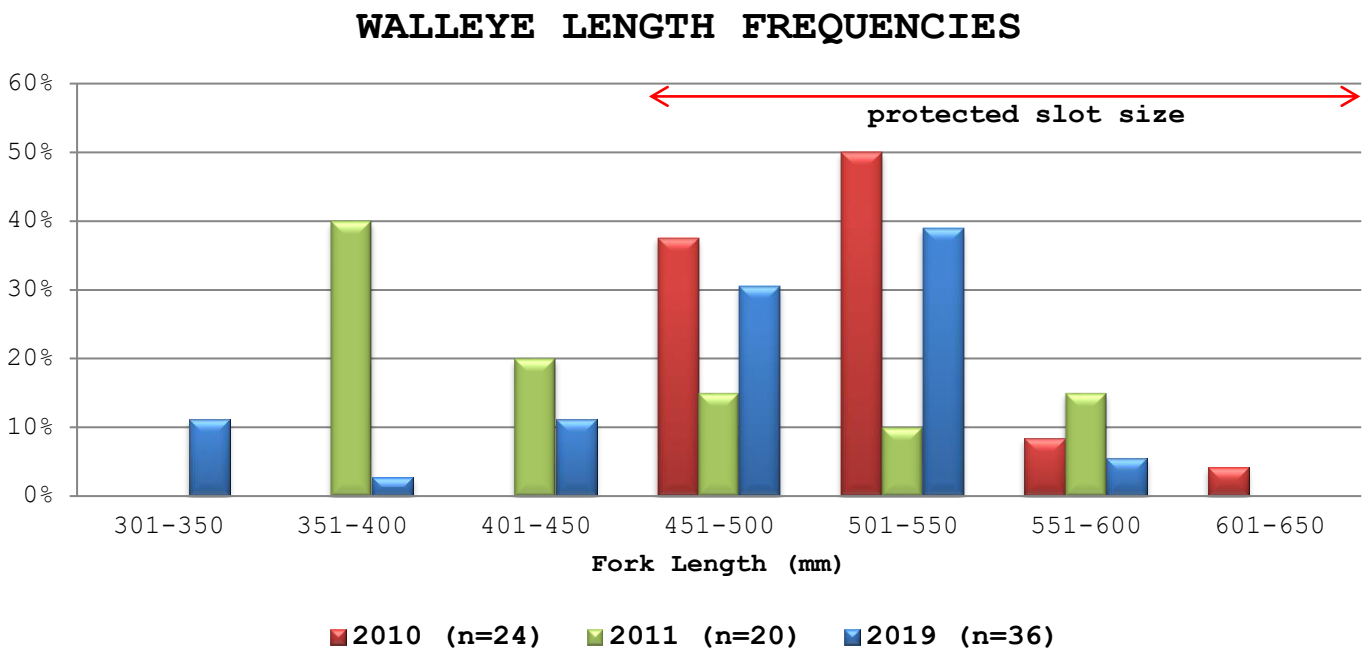


Figure 7: Walleye fork length frequency in Verrall Lake 2010,2011 and 2019

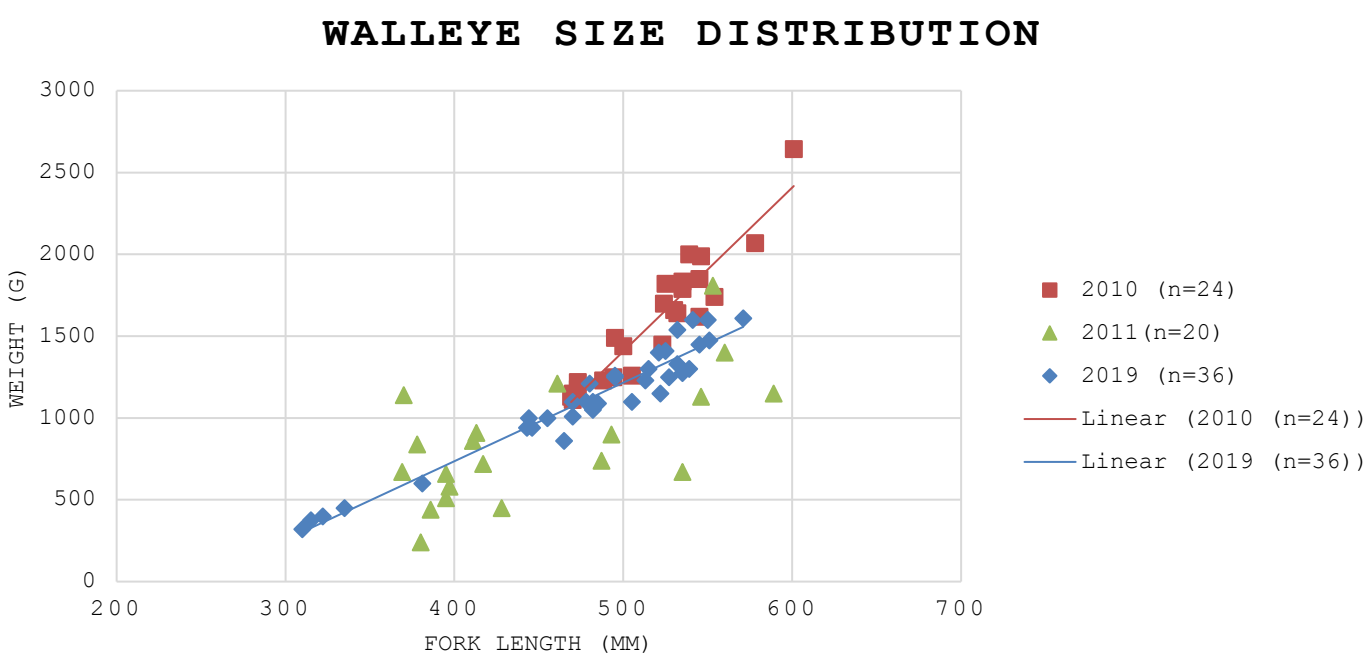


Figure 8: Walleye size distribution in Verrall Lake 2010, 2011 and 2019

5.0 Results

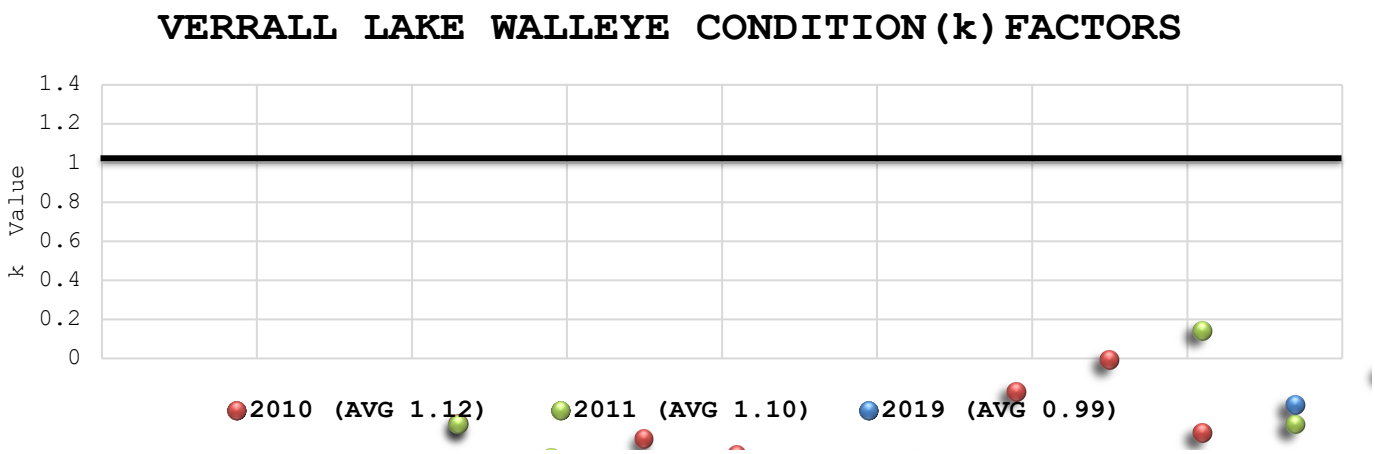


Figure 9: Verrall Lake walleye condition(k) factors for 2010, 2011 and 2019

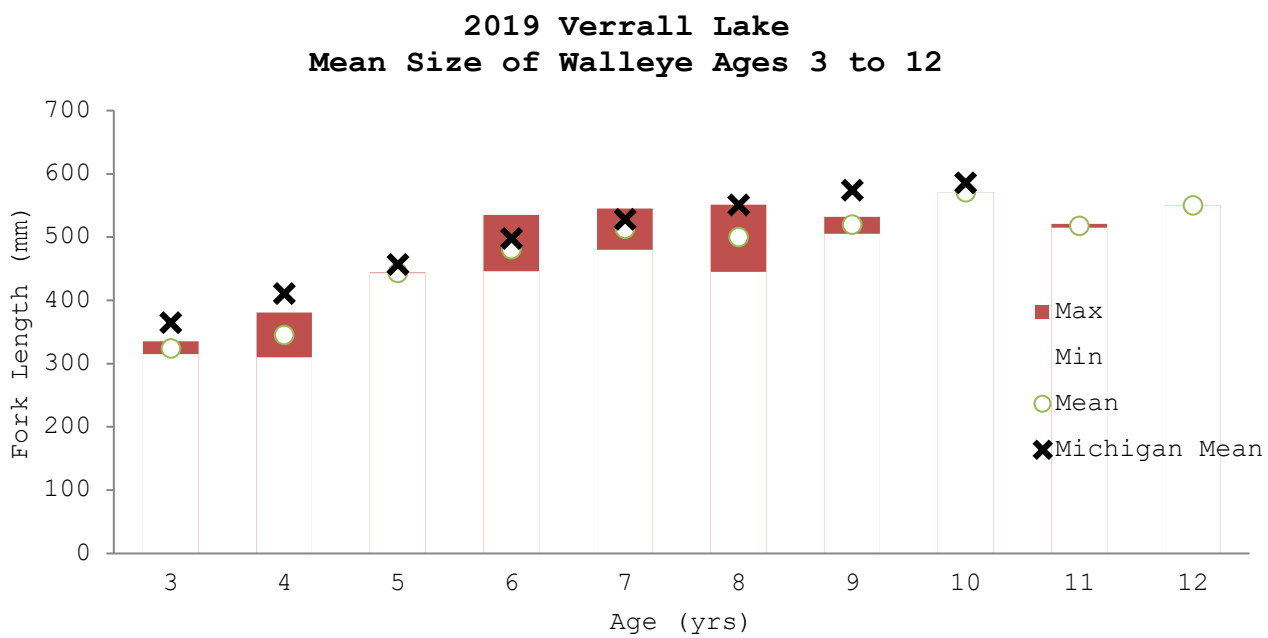


Figure 10: Walleye mean, minimum and maximum fork length(mm) at age (years) for Verrall Lake in 2019

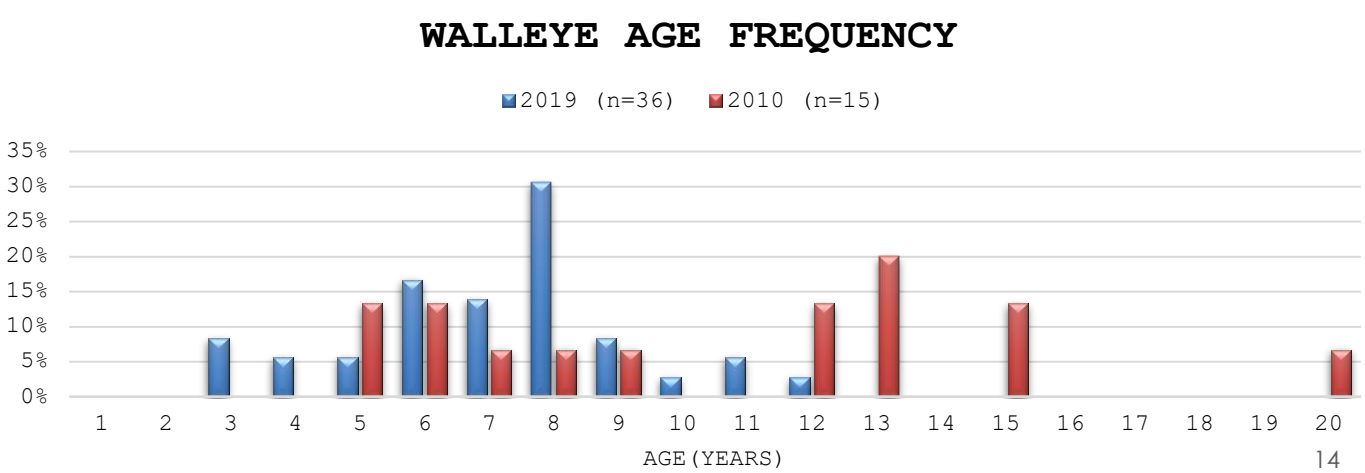


Figure 11: Walleye age frequencies for 2019 and 2010 in Verrall Lake

5.0 Results

TAG 724		
TAG CODE	SMALL - YELLOW	
DATE	FL (MM)	TL(MM)
OCT 7 2010	350	
JUL 7 2012	431	
GROWTH	81	
JUN 13 2015	571	
GROWTH	140	
JUN 5 2019	571	600
GROWTH	221	IN 9 YEARS
	24.56	PER YEAR

TAG 2422			
TAG CODE	SVSFE - BLUE		
DATE	FL (MM)	TL(MM)	WT(G)
SEPT 26 2012	270	288	240
JUN 6 2019	465	495	860
GROWTH	195	207	620
	IN 7 YEARS		
	27.86		
	PER YEAR		

Figure 12: Growth rates for tagged walleye in Verrall Lake (n=2)

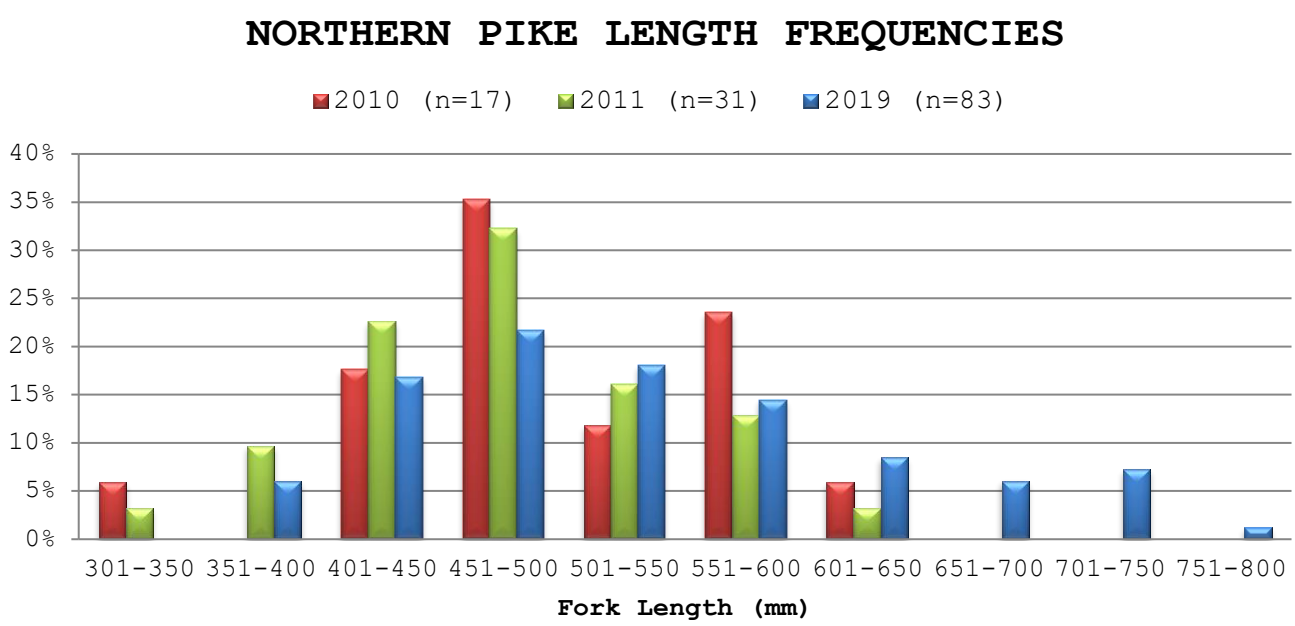


Figure 13: Northern pike fork length frequency in Verrall Lake 2010,2011 and 2019

5.0 Results

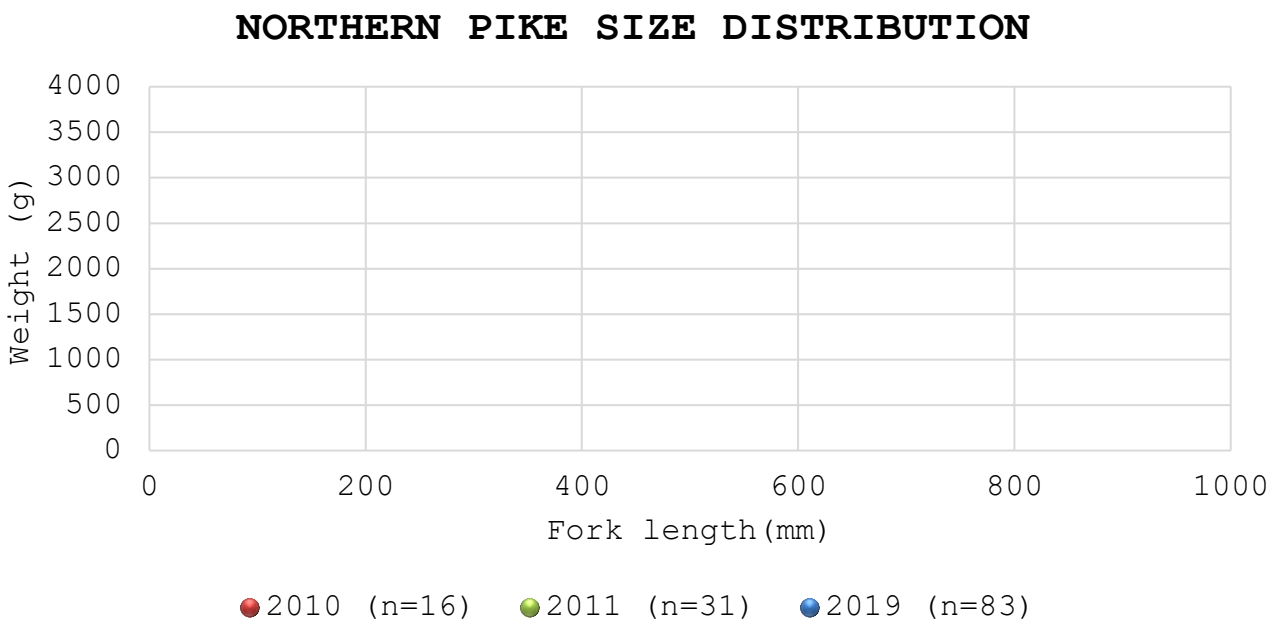


Figure 14: Northern pike size distribution in Verrall Lake in 2010, 2011 and 2019

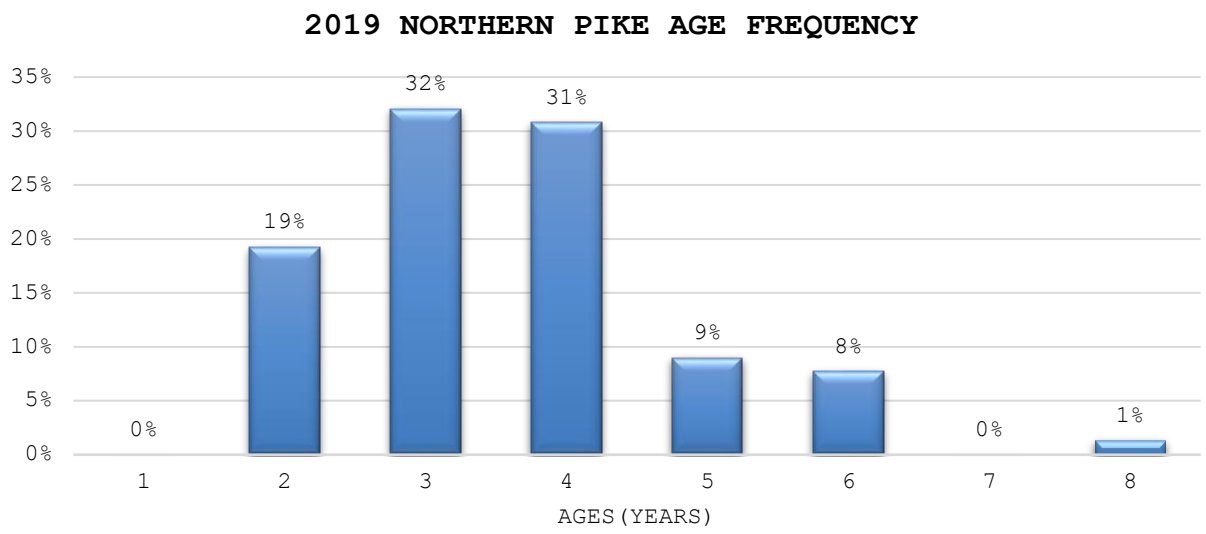


Figure 15: Northern pike age frequencies for Verrall Lake in 2019

6.0 Discussion

Verrall Lake is a unique walleye fishery off the 'beaten path' in the Duck Mountain Provincial Park. Well documented research has only been conducted on Verrall in the most recent decade, however stocking efforts have been made almost continuously since 1987. This discussion will attempt to interpret the assessment as a whole, the resident fish populations and future recommendations.

Trap Netting

The 2019 trap netting assessment was created with multiple factors in mind. End of spring trap netting allows managers to evaluate fish abundance and other biological parameters, especially for walleye. A spring assessment, as opposed the late summer one done in the past, targets walleye that are active in the littoral areas post-spawn. Utilizing nets with a shorter lead, 30 m compared to ESTN standard of 46 m, allowed more nets to be allocated in the assessment while following target depth requirements. Effort was also increased from four trap net sets to six. Schneider (2000) recommends lakes with a surface area of 25-250 acres have 5-15 sets. Verrall has an area of 100 acres and therefore the 6 net sets falls into the recommendations for a representative sample target.

Walleye

The species composition of walleye has decreased from previous assessments, but the total number of individuals collected has increased most recently in 2019. It is important to note that with change in sample season, gear and effort that the 2019 data may skew in favour of walleye capture. Schneider (2000) found a walleye CPUE of 1 fish/hour to be average on inland lakes. Verrall Lake assessments averaged 1.08 in 2010, 0.89 in 2011 and 1.69 in 2019, so the lake can presumably be considered slightly above average at current.

Slot regulation protected walleye accounted for approximately 76% of the walleye population sample. The information gap in smaller-bodied walleye can be attributed to multiple factors such as;

1) Gear selectivity: it is atypical to capture walleye smaller than 8-9" in the selected trap nets given the mesh size(Schneider 2000)
2) Predation: with a stable population of both larger walleye and northern pike, smaller-bodied fish will be preyed upon easily
3) Stocking effort: Verrall has been stocked with sub-adult walleye in recent years and with the assumption natural recruitment is non-existent, the lack of smaller walleye is not surprising.

Given this study was geared towards evaluating stocking success and current population dynamics, the lack of smaller walleye captured is not of concern at this time.

6.0 Discussion

Walleye continued

Size distribution between the assessment years has been variable at best. Length-weight regression in 2010 displayed an accentuation to heavier walleye whereas 2019 displayed a more constant linear growth regression which is likely a result of sampling post-spawn vs late summer. No conclusions could be drawn from the 2011 data due to many erratic outliers within the sample. When considering the average condition of walleye, Carlander(1950) found k values of >1.02 were excellent, 0.89-0.97 average, and <0.83 were poor. Averages of the past 3 assessments were excellent in 2010/2011 and at the top end of average in 2019. The data on walleye size and condition appears displaying a decline on the 'health' of the current walleye population, however, it is important to consider the time of year when comparing 2019 to previous assessments. Assessments in 2010/2011 occurred in August which would allow gonad development as a factor to relative mass of the sampled walleye. The relative size and condition of the walleye currently in Verrall Lake are not worrisome at this point in time, but can be monitored by assessment replication in the future.

Information on walleye ages are of great interest to fishery managers. Ages allow interpretation of population dynamics, stocking success, and angler quality. Schneider (2000) proposes that if fish are aged 10+, suggested mortality is relatively low. Verrall does have a portion of the population aged 10+ but the highest frequency of ages is 8+ which Schneider (2000) proposes as indicative of a typical lake mortality rate. The population as a whole is displaying average length-at-age with comparable yearly growth standards. In regard to stocking success, strong age classes correlate with fry stocking, but more commonly Beautiful Lake sub-adult walleye stocking. Angler quality can be considered 'high' due to the proportion of larger fish present (Schneider 2000).

Northern Pike

Although emphasis on the northern pike population is not the focal point of this study, collected data will be briefly discussed. Pike are the dominant predatory species in Verrall Lake comprising 70% on the catch in 2019. Assessments previous and current indicate pike as the dominate species excluding the catch in 2010 which placed walleye as the dominant species. This year displayed a higher frequency of larger pike(>650mm) within the population than in previous assessments. Pike ages display a rather 'young' population which, as stated earlier by Schneider(2000), suggests a mortality of typical-high. As pike are a top predator and relatively easy to catch, angling is probably the factor contributing to this phenomenon.

6.0 Discussion

Recommendations

Moving forward with Verrall Lake, the existing fish community within the lake appears to stable and considered healthy. A glimpse into forage life was not assessed but technicians observed an abundance of freshwater shrimp on nets during assessment which is considered great forage for not only walleye, but all fish species at multiple life stages. Also not included in catch was the presence of yellow perch, which is specifically a preferred forage fish for walleye (Morgan 2015).

In regards to stocking, lakes without sufficient spawning habitat should be stocked as a put-grow-and-take fisheries(Morgan 2015). As Verrall Lake has a competent existing walleye population but appears to lack adequate spawning habitat, management should continue to aim for maintenance stockings of walleye in order to be successful. The Guidelines for Stocking Fish in Ontario(Morgan 2015) for walleye are as follows:

Eyed Eggs: 5000 eggs/ha
Fry: 2000 fry/ha
Summer Fingerlings:100-125 fish/ha
Advanced Fingerlings:25-50 fish/ha
Adult/Sub-Adult Walleye for small lakes 80-450 ha: 150-200 fish total

Verrall Lake has proven to be successful at both fry stocking and fingerling/sub-adult stocking in the past. However, given the increase of the resident northern pike population, lack of nursery habitat for early life stages(ie. fry) and strong age classes in association with Beautiful Lake stockings, fingerling/sub-adult stocking should be the preferred method of supplemental stocking. The size of walleye transferred from Beautiful Lake are much larger than the typical advanced fingerling, measuring 170 mm (7”) in some years. Furthermore, the age of walleye being transferred can change year to year depending on overwinter survival in Beautiful Lake, therefore alternative stocking rates should be considered. It is important to note that stocking sub-adults on a supplemental basis should only be conducted once every 2-3 years(Morgan 2015). Moreover, stocking walleye at intervals of every 2-3 years will avoid suppression of existing walleye populations (Kerr 2008). With all these factors in mind, it is recommended Verrall Lake be stocked with Beautiful Lake walleye every 2-3 years at the rates suggested below, depending on stock size available through the transfer program and monitoring results of success.

1) 150 - 200 sub-adult walleye (>= 1+)
Or
2) ~500 advanced fingerlings (0+). This equates to 12.5 fish/ha, half the recommended rate due to size of Verrall Lake and the size of young of the year walleye transferred from Beautiful Lake.

If the Beautiful Lake project ceases to exist, fry stocking may also be considered again at a rate of:

3) 100,000 walleye fry on a yearly basis

To monitor success of the new standardized stocking strategy and newly designed assessment, replication should be completed 5 years following stocking of desirable rates(estimated 2027).

7.0 Literature Cited

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8.0 Appendix-Pictures