Fisheries Branch Report

2016 – 00x

Singush Lake

Trapnetting Fish Population Assessment (15-038)

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Sustainable Development
2016

Manitoba

ABSTRACT

A fish stock assessment project was completed on Singush Lake in the spring of 2015 and 2016 by Western Region Wildlife and Fisheries Branch staff in cooperation with Intermountain Sport Fishing Enhancement (ISFE) and Swan Valley Sport Fishing Enhancement (SVSFE). This project was funded by the Fish and Wildlife Enhancement Fund (FWEF) under grant number 15-038. FWEF promotes and funds projects that enhance and conserve Manitoba's recreational fisheries resource. The multiyear assessment project on Singush Lake provided an updated assessment on the species composition and to evaluate the success of the walleye stocking regime for the lake. Information on length, weight, and age was collected from walleye (*Sander vitreus*), northern pike (*Esox lucius*) and smallmouth bass (*Micropterus dolomieu*) caught in trap nets, all other species were counted. White sucker (*Catostomus commersoni*) was the most abundant species caught in trap nets followed by northern pike, and walleye. Data analysis conducted includes Catch-per-unit-effort (CPUE), relative abundance, length frequencies, and species biomass.

Introduction

Wildlife and Fisheries Branch in cooperation with Intermountain Sport Fishing Enhancement (ISFE) and Swan Valley Sport fishing Enhancement (SVSFE) carried out a 2 year trap netting assessment on Singush Lake following the Ontario Ministry of Natural Resources - End of Spring Trap Netting (ESTN) protocol (Skinner and Ball 2004) through support from the provincial Fish and Wildlife Enhancement Fund (FWEF). Our objective is to provide an updated assessment of the fish populations in Singush Lake and to evaluate the success of the supplemental stocking of walleye fry and young-of-the-year (yoy) and adult walleye transferred from Beautiful Lake (walleye rearing lake).

Wildlife and Fisheries Branch 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 impact fish populations as a whole. On smaller water bodies, such as Singush Lake, information gathered using a gill netting assessment, although still valuable, has typically resulted in low catch numbers of certain target species given the limited number of nets set and would likely negatively impact fish stocks and be unacceptable to users and lake residents if we were to increase the number of gillnet sets. Using non-lethal assessment methods such as trap netting can result in larger sample sizes as more nets are able to be set without negatively impacting fish populations and reliable estimates of population abundance and stock status can be obtained using tag and recapture methods.

In addition to the population assessment, all walleye were anchor tagged (Hallprint anchor tag). The objective of the tagging program was to obtain additional data on fish populations and growth trends. Conclusions can then be made on walleye movements and population dynamics between areas of the lake.

Overview

Singush Lake is a small recreationally fished lake in the southeast portion of Duck Mountains Provincial Park along PR 367 located approximately 50 kilometres north of Grandview, MB (see *Figure 1*).

Figure 1: Map of location of Singush Lake.

It is approximately 5 kilometres long orientated from southwest to northeast (Figure 1). The net set location depths ranged from 1.7 meters to 3.9 meters with an average of 2.7 meters. The lake has a total surface area of 2.5498 km^2. The bottom substrate consisted mainly of a cobble/gravel/sand mixture. Most of the shoreline is rock with heavy vegetation and trees.

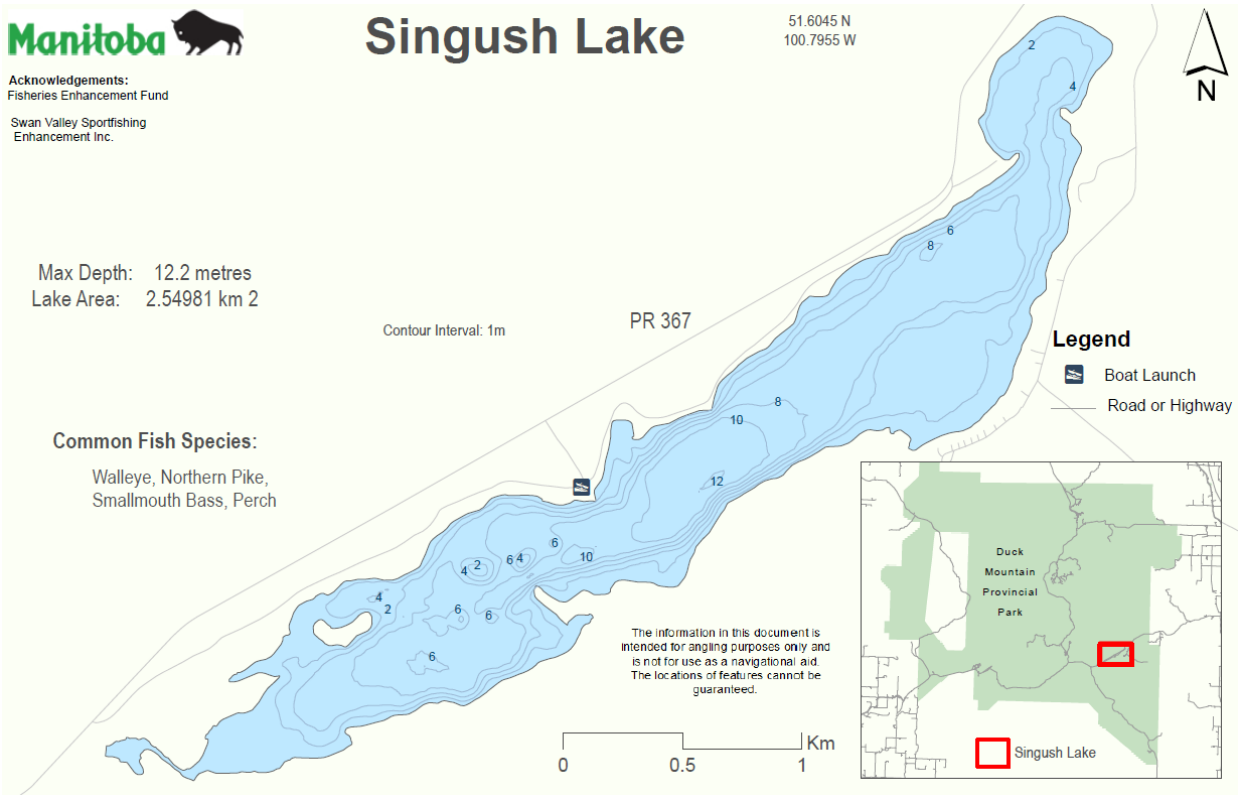

Figure 2: Singush Lake Contour Map and Location.

Singush Lake is a headwater lake of the Valley River. It's limited drainage area and elevation in the Duck Mountains with cooler weather tends to restrict the lakes reproductive and fish growth potential. Singush Lake has been developed with cottages and a campground with boat launch.

Methods

The Ontario Ministry of Natural Resource's End of Spring Trap Netting (ESTN) protocol was used to design the Singush Lake inventory (Ball and Skinner 2004). Trap nets were set overnight for 8 nights in May – June at random locations (Figure 3). A 1.82 m square (6 foot) trap nets with a 45.7 m (150 foot) lead were set at predetermined locations. All nets were set perpendicular to shore at a maximum depth of 4.2 m.

All walleye, northern pike, and small mouth bass were sampled for fork and total length, round weight, aging structures taken, and marked with a colour coded and numbered Hallprint anchor tag (used to identify recaptures and facilitate Jolly-Seber population estimates) before live release.

Data were entered into an Excel spreadsheet and submitted to the Regional Fisheries Biologist for analysis as well as being used to assess fish population status in Singush Lake.

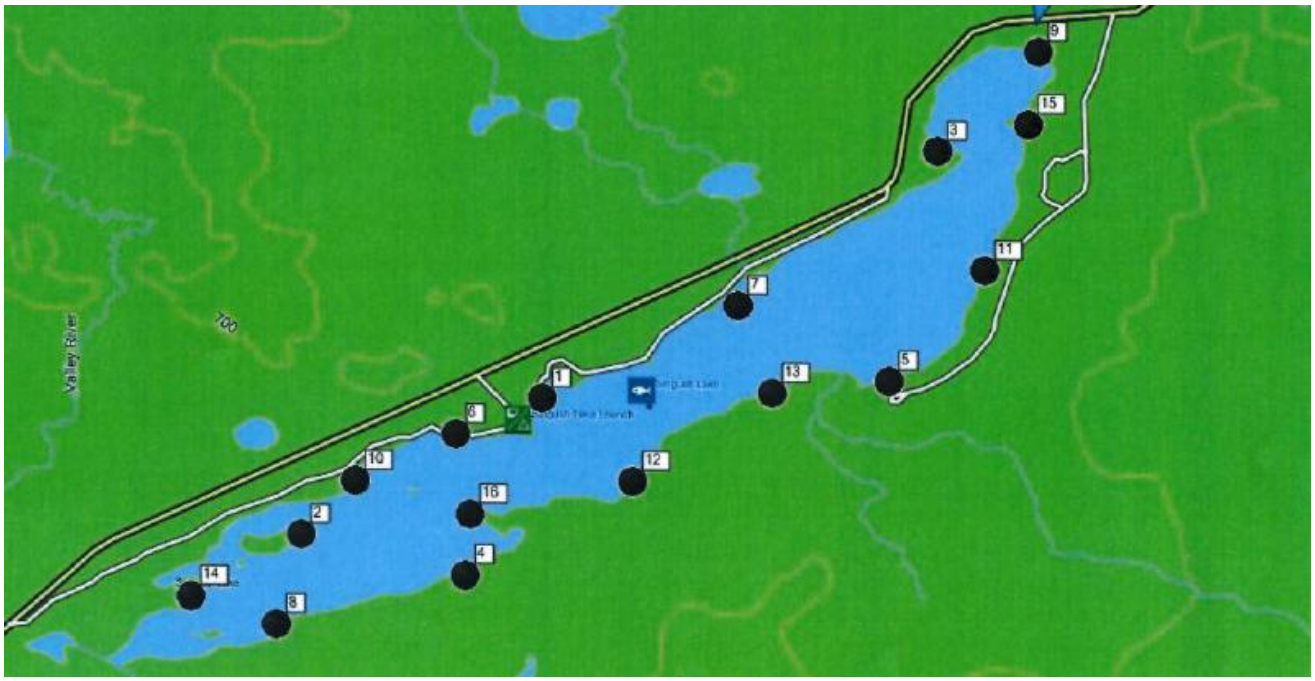

Figure 3. Location of 16 trap net set locations on Singush Lake, MB (2015-2016).

Stocking

Singush Lake has been stocked with walleye, smallmouth bass, and lake trout as follows:

Table 1: History of stocking efforts in Singush Lake

Year	Species	Number	Size
2016	WALLEYE	400,000	Fry
2015	WALLEYE	205	Fingerling
2015	WALLEYE	400,000	Fry
2014	WALLEYE	662	Fingerling
2014	WALLEYE	600,000	Fry
2013	WALLEYE	200	Fingerling
2013	WALLEYE	300,000	Fry
2012	WALLEYE	500,000	Fry
2012	WALLEYE	77	Adult (>30 cm)
2011	WALLEYE	200,000	Fry
2010	WALLEYE	300,000	Fry
2009	WALLEYE	650	Adult (>30 cm)
2009	WALLEYE	200,000	Fry
2008	WALLEYE	300,000	Fry
2007	WALLEYE	350,000	Fry
2006	WALLEYE	350,000	Fry
2005	WALLEYE	100,000	Fry
2005	WALLEYE	300,000	Fry
2004	WALLEYE	300,000	Fry
2003	WALLEYE	300,000	Fry
2002	WALLEYE	200,000	Fry
2001	WALLEYE	200,000	Fry
1997	WALLEYE	13,000	Fingerling
1996	WALLEYE	150,000	Fry
1996	WALLEYE	4,500	Fingerling
1995	WALLEYE	300,000	Fry
1994	WALLEYE	250,000	Fry
1992	WALLEYE	100,000	Fry
1990	WALLEYE	300,000	Fry
1989	WALLEYE	500,000	Fry
1987	WALLEYE	50,000	Fry

1984	SMALLMOUTH BASS	15,500	Fingerling
1982	WALLEYE	1,208	Fingerling
1981	WALLEYE	20,145	Fingerling
1980	WALLEYE	1,983	Fingerling
1979	WALLEYE	600	Fingerling
1978	WALLEYE	150,000	Fry
1972	SMALLMOUTH BASS	5,000	Fingerling
1971	WALLEYE	20,000	Fry
1966	MUSKELLUNGE	10,000	Fry
1965	MUSKELLUNGE	10,000	Fry
1962	SMALLMOUTH BASS	25,000	Fingerling
1961	WALLEYE	340,000	Egg
1959	WALLEYE	500,000	Egg
1958	SMALLMOUTH BASS	164	Adult (>30 cm)
1955	LAKE TROUT	24,000	Fingerling
1954	LAKE TROUT	10,000	Fingerling
1953	LAKE TROUT	9,000	Fingerling
1952	LAKE TROUT	2,500	Fingerling
1951	LAKE TROUT	1,500	Fingerling
1950	WALLEYE	1,105,000	Egg
1949	WALLEYE	1,020,000	Egg
1948	WALLEYE	1,020,000	Egg
1947	WALLEYE	510,000	Egg
1946	LAKE TROUT	1	Adult (>30 cm)
1945	WALLEYE	500,000	Fry
1944	WALLEYE	500,000	Fry
1938	WALLEYE	50,000	Fry
1936	WALLEYE	150,000	Fry
1935	WALLEYE	150,000	Fry
1934	WALLEYE	150,000	Fry
1930	WALLEYE	50,000	Fry

Results

A total of 5160 fish were captured and released during the 2015 (n=2236) and 2016 (n=2924) Singush Lake Trap Netting Assessment. The most commonly captured species was white sucker followed by northern pike, and walleye (Table 2). Small mouth bass were also captured to a lesser degree.

Table 2. Summary of species total catch by net site and year.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Grand Total
2015																	
NRPK	27	2	23	23	53	19	29	28	26	24	35	31	10	42	13	24	409
SMBS	1	5		2			1			1		6	1	1		1	19
WALL	29	16	20	34	25	24	9	55	11	15	8	13	7	8	16	4	294
WHSC	80	18	57	202	210	87	68	56	16	298	48	52	133	15	28	146	1514
2016																	
NRPK	5	15	16	19	39	14	13	21	22	23	10	11	2	23	12	2	247
SMBS	3	2			1	4				6		11		1			28
WALL	13	4	6	7	19	13	15	27	7	10	16	30	8	24	6	5	210
WHSC	188	1	66	179	248	23	44	42	6	34	269	78	259	68	169	765	2439

Walleye captured during the trap netting program numbered 504 fish with 16 recaptures in 2015 and 37 in 2016. An early estimate of the walleye population ranges from 6,741 to 16,292. Northern pike were also quite numerous in the study with 656 fish caught, with 18 recaptures in both 2015 and 2016. The pike population is estimated to be between 4,155 and 14,543. Over the two years of the study walleye ranged in size from 246 to 680 mm (total length) and averaged 466 mm (Table 3). The average weight of walleye was 1034 g (100–3150 g, n=408). Size classes were quite variable between the years, as seen in Figure 4, possibly due to the nature of the lake being heavily supplemented by stocking of both fry and sub adult walleye on an annual basis.

Table 3. Trap netting walleye size characteristics by year.

	Total Length (mm)			Round Weight (g)		
Year	Avg.	Min	Max	Avg.	Min	Max
2015	467	246	675	1020	100	3150
2016	465	264	680	1053	160	2760

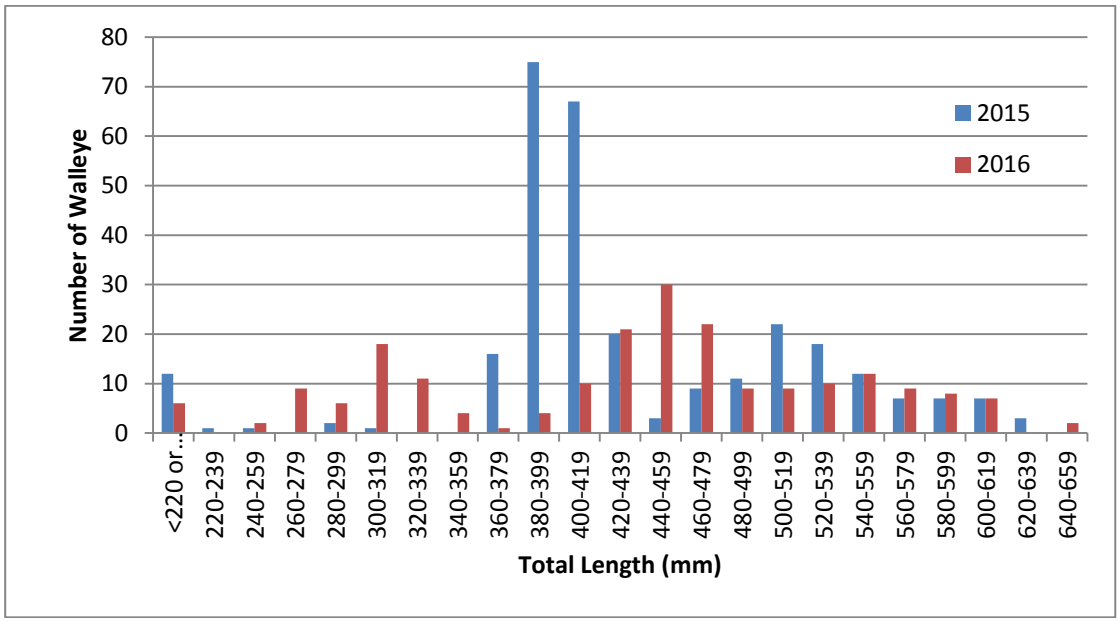

Figure 4: Walleye total length size class frequency from trap net sets from 2015 to 2016.

Figure 5 shows the age composition of walleye stocks from 2016. A subsample of the aging structures were submitted with 199 of the 210 walleye being aged showing a total of 15 age groups being caught during 2016, ranging in age from 2 to 16 years. The strong 2011 year class (age 5) was the most abundant year class in the sample (32%).

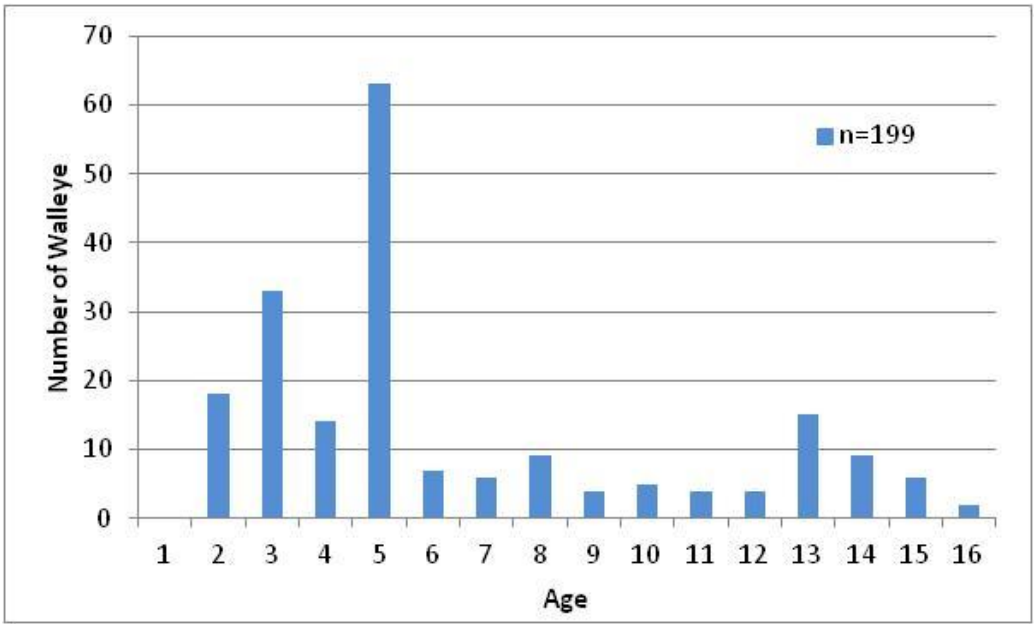

Figure 5: Age Composition of walleye from 2016 trap netting survey.

A subsample of pike aging structures was also done with 219 of the 247 pike aged showing relatively few strong age classes in the lake (Figure 6).

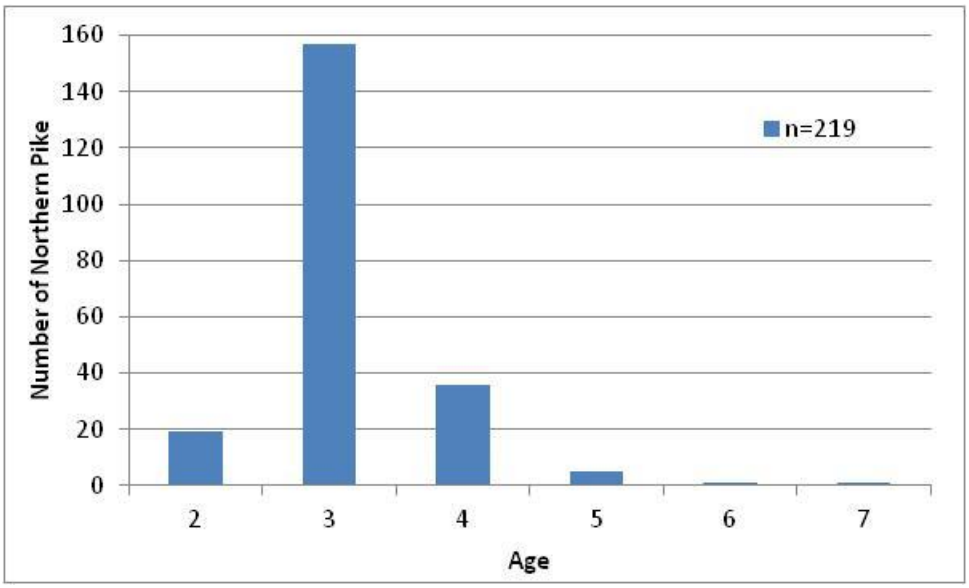

Figure 6: Age Composition of northern pike from 2016 trap netting survey.

For smallmouth bass, 20 out of the 34 aging structures were submitted, which show a relatively even age distribution (Figure 7). The even distribution is likely due to the fact that most people who fish for the smallmouth bass practice catch and release.

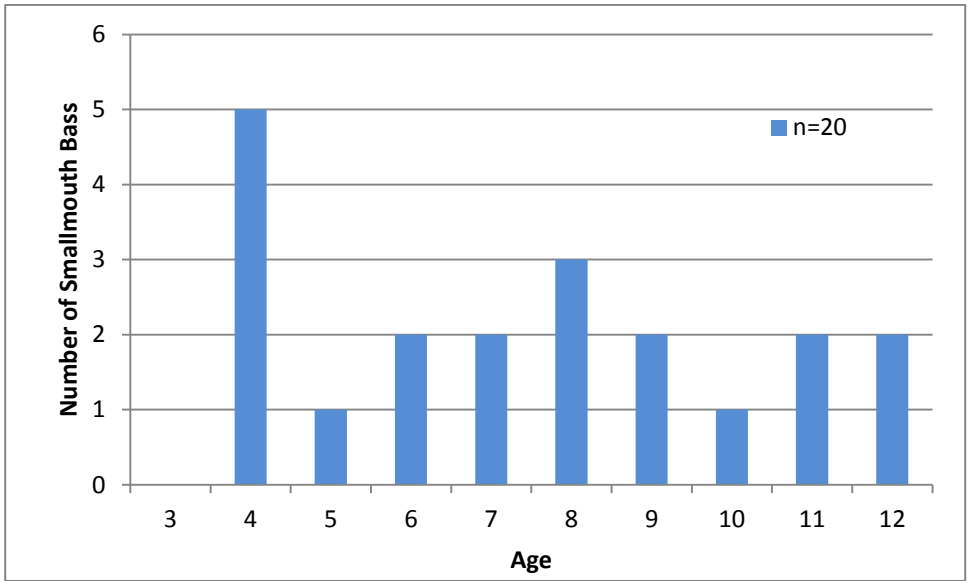

Figure 7: Age Composition of smallmouth bass from 2016 trap netting survey.

Figure 8 shows the catch composition from trap net assessments in 2015-2016. White sucker were the dominant species in the catch in both years. It should be noted that the trap netting assessment was done during the sucker spawning period in both years and could explain the greater representation of the catch compared to historical gill netting as the sucker were congregated in the shallows certain nets had much larger catch than others.

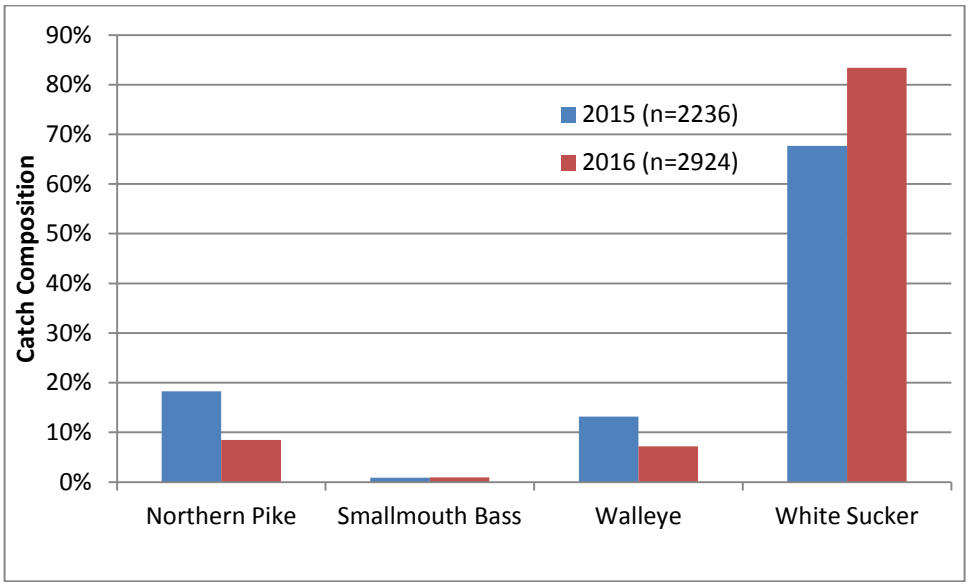

Figure 8: Catch composition of species from trap net sets from 2015 to 2016.

Relative abundance of all species from trap netting, by weight, generally exhibited an increasing trend from 2015 to 2016 (Table 4).

Table 4. Trap netting catch per unit effort and average biomass (kg) per trap net by year.

Year	CPUE (# fish)	Avg. Wt./net (kg)
2015	140	164
2016	183	238

In addition to the trap netting project, an electrofishing assessment targeting yoy walleye was carried out in 2015 and 2016. A total of 1441 fish were captured and released during the 2015 (n=1014) and 2016 (n=427) electrofishing assessments. The most commonly captured species was yellow perch followed by small mouth bass, northern pike, and walleye (Table 5).

Table 5. Summary of species total catch by electroshocking transect and year.

	SI-ES-001	SI-ES-002	SI-ES-003	SI-ES-004	SI-ES-005	SI-ES-006	SI-ES-007	SI-ES-008	Total
2015									
NRPK	2	5	3			6	5	1	**22**
SMBS			6	1		25	5	2	**39**
WALL		1	4	1	1	2		2	**11**
WHSC	2	1		1	3	1	9	4	**21**
YLPR	16	128	159	70	108	147	95	198	**921**
2016									
NRPK	1	3	1		6	4	3	4	**22**
SMBS			2	1		28	2	1	**34**
WALL	2			2		1	1		**6**
WHSC	1	1	2	1	2	2	2	1	**12**
YLPR	44	32	82	36	78	55	26		**353**
Grand Total	**68**	**171**	**259**	**113**	**198**	**271**	**148**	**213**	**1441**

Discussion

Data acquired during trap netting indicate that the walleye population appears to be in good health with a wide range of age and size classes present. CPUE in the nets indicate that overall biomass abundance has increased year-over-year.

It was not possible to determine whether walleye exhibited early maturity in this project as the methods of capture were non-lethal. It should be noted that success of year classes is usually associated to suitable spring temperatures and associated forage base in Singush Lake shortly after the spawning period upon fry emergence.

Singush Lake also supports a northern pike population. Unlike walleye, northern pike were found to have a narrow range of age classes with any size. The broad size distribution found in trap net catches is suggestive of both young and older year classes. Length and weight data indicates that a high proportion of these fish are of a size to provide a quality angling experiences.

One change in catch noted from the study was an absence of yellow perch in the trap nets. This could be a result of trap net mesh size (2”) as smaller fish would not be as likely to be captured. Gill net assessments in the past have had a wide range of abundance in yellow perch catch with the majority being caught in the 1.5” mesh. The increase in white sucker percentage of catch is also notable as the species was 68% of the trap net catch in 2015 and 83% of the catch in 2016. East Blue Lake in the Duck Mountain Provincial Parks has also experienced a notable increase in the presence of white sucker in the past decade. Historical gill net index assessments on Singush Lake have had varied white sucker catch ranging from as low as 17% of the catch in 1995 as well as composing the majority of the catch in 1981 and in the current study. It should be noted that the trap netting assessment was done during the sucker spawning period in both years and could explain the greater representation of the catch compared to historical gill netting as the sucker were congregated in the shallows certain nets had much larger catch than others. Another factor that may affect sucker population changes is long term climate, hydrological, and ecological cycles influence on the reproductive health of the species.

It must also be noted that any given lake can only produce a finite amount of fish each year based on nutrient availability, climate, and other physical factors. In Singush Lake, this finite production is partitioned amongst white sucker, walleye, smallmouth bass northern pike, and yellow perch. Continued monitoring efforts are recommended every 10 years using the ESTN trap netting standard to respond to any changes in the fish community composition or stressors that may be affecting stocks and to track general trends in regional fisheries.

References:

Ball, H. and Skinner, A. 2004. Manual of Instructions: End of Spring Trap Netting (ESTN). Ontario Ministry of Natural Resources, Fisheries Section.

Acknowledgements

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APPENDIX

Manitoba Fish Species - Standard Abbreviations		
Common Name	**Scientific Name**	**Species Abbreviations** (denotes abbreviations used by North/South)
Family Acipenseridae		
lake sturgeon	*Acipenser fulvescens*	LKST
Family Hiodontidae		
goldeye	*Hiodon alosoides*	GOLD
mooneye	*Hiodon tergisus*	MOON
Family Cyprinidae		
common carp	*Cyprinus carpio*	CARP
Family Catostomidae		
quillback	*Carpiodes cyprinus*	QUBK (QUIL)
longnose sucker	*Catostomus catostomus*	LNSK (LNSC)
white sucker	*Catostomus commersoni*	WHSK (WHSC)
bigmouth buffalo	*Ictiobus cyprinellus*	BMBF (BGBF)
silver redhorse	*Moxostoma anisurum*	SVRH (SLRD)
golden redhorse	*Moxostoma erythrurum*	GDRH (GLRD)
shorthead redhorse	*Moxostoma macrolepidotum*	SHRH (SHRD)
Family Ictaluridae		
black bullhead	*Ameiurus melas*	BKBH (BLBL)
brown bullhead	*Ameiurus nebulosus*	BRBH (BRBL)
channel catfish	*Ictalurus punctatus*	CCAT (CHCT)
stonecat	*Noturus flavus*	SCAT (STON)
tadpole madtom	*Noturus gyrinus*	TPMT (TDMD)
Family Esocidae		
northern pike	*Esox lucius*	NRPK
muskellunge	*Esox masquinongy*	MUSK
Family Osmeridae		
rainbow smelt	*Osmerus mordax*	RSMT (RNSM)
Family Salmonidae		
cisco	*Coregonus artedi*	CISC
lake whitefish	*Coregonus clupeaformis*	LKWF (LKWH)
shortjaw cisco	*Coregonus zenithicus*	SJCI (SHCS)
round whitefish	*Prosopium cylindraceum*	RDWF (RNWH)
Arctic grayling	*Thymallus articus*	ARGR
westslope cutthroat trout	*Oncorhynchus clarki lewisi*	CTTR
rainbow trout	*Oncorhynchus mykiss*	RBTR (RNTR)
kokanee	*Oncorhynchus nerka*	KOKN (KOKA)
brown trout	*Salmo trutta*	BRTR (BWTR)
Arctic char	*Salvelinus alpinus*	ARCR (ARCH)
brook trout	*Salvelinus fontinalis*	BKTR (BRTR)

lake trout	*Salvelinus namaycush*	LKTR
Family Gadidae		
burbot	*Lota lota*	LOTA (BURB)
Family Moronidae		
white bass	*Morone chrysops*	WHBS
Family Centrarchidae		
rock bass	*Ambloplites rupestris*	RKBS (RCBS)
pumpkinseed	*Lepomis gibbosus*	PKSD (PUMP)
sunfishes	*Lepomis* spp.	
smallmouth bass	*Micropterus dolomieu*	SMBS
largemouth bass	*Micropterus salmoides*	LMBS (LRBS)
white crappie	*Pomoxis annularis*	WHCP (WHCR)
black crappie	*Pomoxis nigromaculatus*	BKCP (BLCR)
Family Percidae		
yellow perch	*Perca flavescens*	YLPR
sauger	*Sander canadensis*	SAUG
walleye	*Sander vitreus*	WALL
Family Sciaenidae		
freshwater drum	*Aplodinotus grunniens*	FWDR (FRDR)