2017 Gull Lake Stillwater Stocked Trout Littoral Sampling (SSTLS)

Swan Valley Sport Fishing Enhancement Inc.

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Submitted to:
Manitoba Sustainable Development
SVSFE Board of Directors

Executive Summary

A fish inventory and trout stocking success assessment was completed for Gull Lake Lake in 2017. The fish inventory utilized the Stillwater Stocked Trout Littoral Sampling (SSTLS) protocol. This program was created by SVSFE in early 2017 as a non-lethal assessment protocol to monitor stocked trout fisheries in the Parkland region. Trout stocking success was determined through age, growth, and abundance of trout through data acquired though SSTLS. A summary and recommendations are as follows.

Rainbow and brook trout stocking success was found at variable rates; and it was determined that success is largely influenced by the current ecological complexities of the lake. This includes loss of stock from predation of birds and fish, along with intraspecific and interspecific competition with perch, suckers, and stocked trout. Based on trout abundance, correlation with stocking records, and literature review a recommended stocking plan was developed.

Rainbow trout should be stocked twice annually; once in the spring and once in the fall. Spring stocking of yearling trout (18+) should be stocked with 6,000 fish annually. This equates to 50 fish/hectare or 20 fish/acre. Fall stocking of fingerling rainbow trout should be stocked at 15,000 fish annually (minimum 12,000 to maximum 18,000). This equates to 125 fish/hectare or 50 fish per acre.

Brook trout should also be stocked with both yearlings and fingerlings annually. Spring stocking of yearling trout (18+) should be stocked with 4,800 fish annually. This equates to 40 fish/hectare or 16 fish/acre. Fall stocking of fingerling brook trout should be stocked at 9,000 fish annually (minimum 6,000 to maximum 12,000). This equates to 75 fish/hectare or 30 fish/acre.

Splake were found in low numbers which was a direct result of low stocking rates in recent years (most recently stocked in fall 2010). Splake were found at large sizes and impressive condition. Stocking success in the past has verified from SVSFE 2010-2011 BTIN results along with master anger submissions following perch and sucker encroachments. Splake rearing was discontinued in 2010, and the province has not been stocked splake since. Each year, a request is sent in for splake stock destined for the Duck Mountains, but it is unknown how long it will be before they will be available again. Future stocking rates are as follows, and have been adapted from "Splake – an Annotated Bibliography (Kerr, 2000), in conjunction with Gull Lake stocking rates in recent years. Both Fraser (1988), and Liskauskas & Quinn (1991) recommend that splake should not be stocked annually, and that stocking should occur every 2 years at relatively low rates. Stocking frequency should occur once biennially, at a rate of 60-130 fish/hectare. This equates to 3,000-6,000 fish biennially, spring or fall, whichever is available. This stocking rate simply mirrors what has been successful in the past, and is the best recommendation based on available information.

Executive Summary

Under no circumstances should smaller fingerlings (<4”) be stocked into Gull Lake as to avoid perch predation. Also, in terms of stocking method it is highly recommended that scatter stocking in both spring and fall over deep water be priority. These high rates are meant to incorporate loss of stock of yearling trout to bird predation over the summer months, and also loss of stock of fingerling trout to starvation over the winter months. Of course, there in no guarantee that stocking at these suggested rates are going to “turn the lake around”, however based on literature review it is believed that this program will result in increased angling success of both rainbow and brook trout.

Also, for the first time in documented history the presence of both pike (n=1) and walleye (n=1) have been confirmed within the waterbody since reclamation. Historically, Gull Lake was a pike and sucker lake that had been reclaimed at some point in the late 1950’s. Since this time, a variety of non-salmonid species have began re-appearing in the lake including yellow perch, white sucker, and more recently; northern pike and walleye. Based on available evidence it is believed that these species have found their way to Gull Lake through connectivity with Child’s Lake. For this reason it is recommended that these connective tributaries be evaluated, and that control structures be installed if necessary to prohibit further encroachment of pike and walleye to Gull Lake.

Furthermore, follow up assessments (SSTLS) should be conducted in 4-6 years to monitor the success of adapted stocking rates along with the status of non-trout encroachment.

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1.0 Historical Data

Below is a summarized timeline of Gull Lake's initial stockings, assessments, and management objectives since the 1950's. An in depth summary of the lake's history can be found in PRJ. 15-036 – IFAMM: Gull Lake Historical Literature Review, 2016 Assessments and Management Options.

Table 1: History Table

Year	Researcher	Activity	Results
1957	Unknown	Reclamation	"Pike and suckers removed to prepare lake for trout stocking" - Harvey House - Daily Bulletin Article from September 1972
1960	Unknown	Bathymetric Mapping	Detailed contour map avaialble at this time
1962	Fisheries Branch	Stocking	Initial trout stocking - Splake - 111,040 fry
1962	Fisheries Branch	Stocking	Initial lake whitefish stocking - 400 (1+)
1963	Fisheries Branch	Stocking	Initial stocking of dace - Unknown rate
1964	Fisheries Branch	Stocking	Initial stocking of spottail shiners - Unknown rate
1964	Fisheries Branch	Stocking	Initial Kokanee stocking - 60,000 fingerlings
1964	Andrews	Test Netting	One overnight gang yeilded 42 splake (average 0.84lbs) and 1 brook trout (1.9lbs)
1965	Fisheries Branch	Stocking	Initial stocking of fatheads and stickleback - Unknown rate
1967	Fisheries Branch	Netting	Length, weight, age, sex, distribution data of splake and kokanee available
1969	Unknown Angler	Angling Report	4lb 2oz. Brook trout angled on a fly - Idenfication confirmed by Fisheries Branch Camp - West Blue Lake
1970	Fisheries Branch	Stocking	Initial rainbow trout stocking - 6,000 (1+)
1978	Fisheries Branch	DO Testing	July 13th, 1978 found evidence of summer stratification
1978	Fisheries Branch	Seining	2 seine hauls - blacknose dace, fatheads, brook stickleback, johnny darters
1978	Fisheries Branch	Report	Kokanees and Rainbows doing well - Creel consists mostly of kokanee, 2-5lb rainbows observed spawning near shore
1979	Fisheries Branch	Stocking	Initial brook trout stocking - 6,000 (1+)
1979	Fisheries Branch	Test Netting	Four sets in unknown locations yeileded whitefish (8), rainbow trout (10), kokanee (16), splake (7), and brook trout (1)
1982	Matkowski	Research Thesis	Study of angler harvest and other causes of stocked trout mortality in the Duck Mountains
1983	Valiant, Smith	Creel Census	Gull Lake stocking should consist of 0+ splake or brook trout in combination with small numbers of 2+ rainbows
1991	G. Edwards	Angling	Angled spawning Kokanee for age, growth, and matruity data
1993	NRO Partrols	Creel Check	May-August 1993 15 checks - Average 0.28 trout angled per hour
2010	SVSFE	BTIN	30 BTIN nets - Avg set of 27mins. Yielded SPLA(66), BRTR(83), RNTR(36), LKWH (87), WHSC(1), and YLPR(3)
2011	SVSFE	BTIN	30 BTIN nets - Avg set of 21mins. Yielded SPLA(94), BRTR(24), RNTR(11), LKWH (95), WHSC(18), and YLPR(53)
2016	Fisheries Branch	DO Testing	March 7th, 2016 - One site found very high oxygen levels
2016	SVSFE	Trout Maintenance	Netting (136hrs) and Electrofishing (1.75hrs) Efforts removed; 37.24kg of yellow perch, and 77.6kg of white-suckers
2017	SVSFE	SSTLS	See below:

Citations: House (1979), Unknown (1982), Edwards (1991), Hagenson (1997), Rowe (2016), Bruenen & Bilenduke (1978), Matkowski (1984), WRSD (2017), SVSFE (2010), SVSFE (2011), SVSFE (2016), Valiant (1984)

1.0 Historical Data

Figure 1: Rainbow Trout MA Submissions (1990-2017)

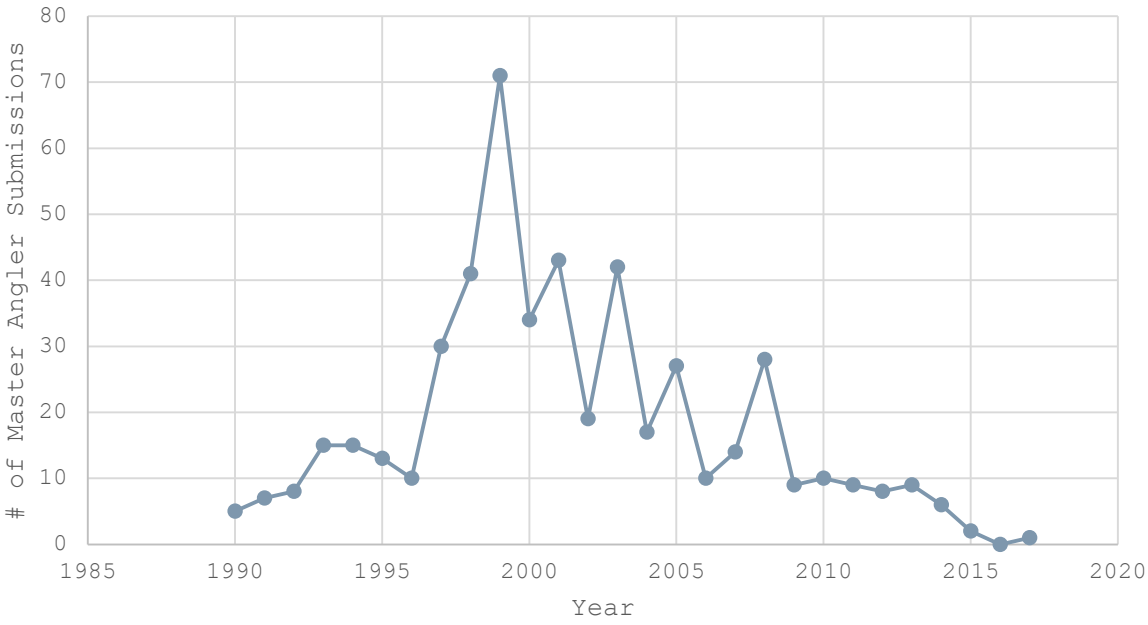
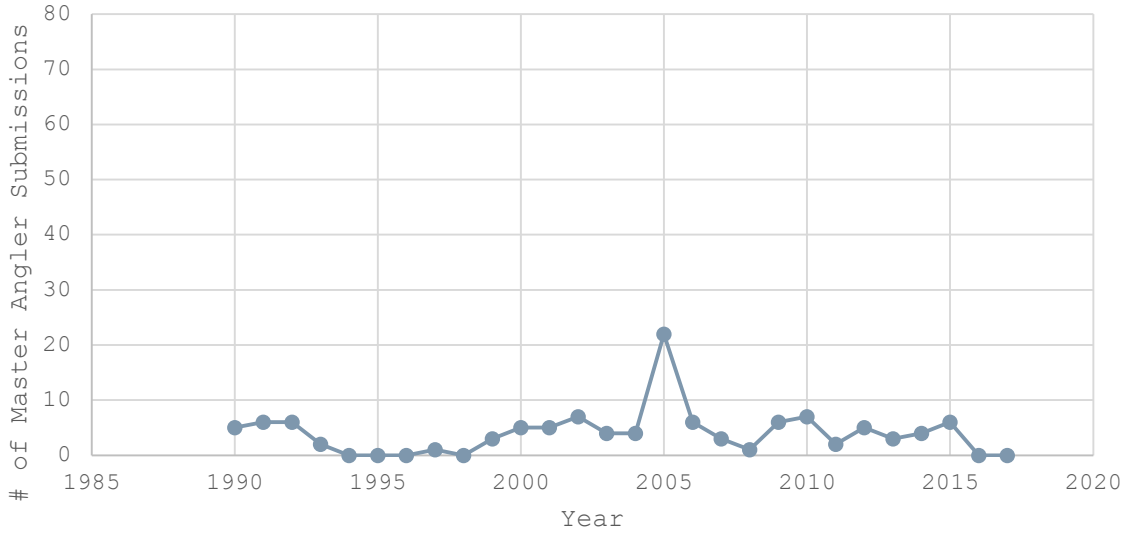


Figure 2: Brook Trout MA Submissions (1990-2017)



1.0 Historical Data

Figure 3: Splake MA Submissions
(1990-2017)

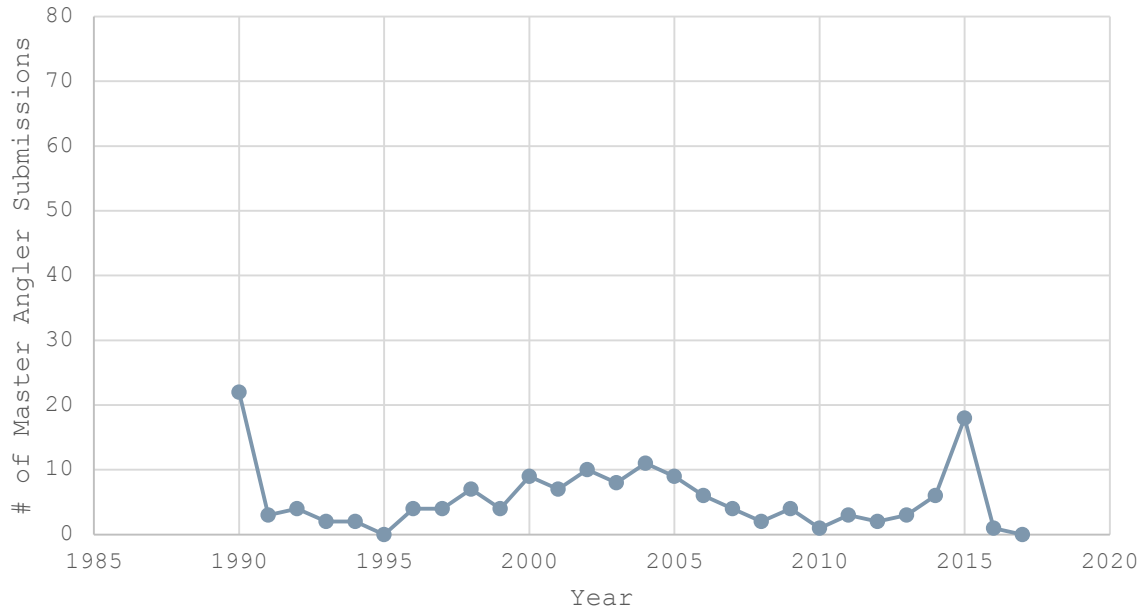
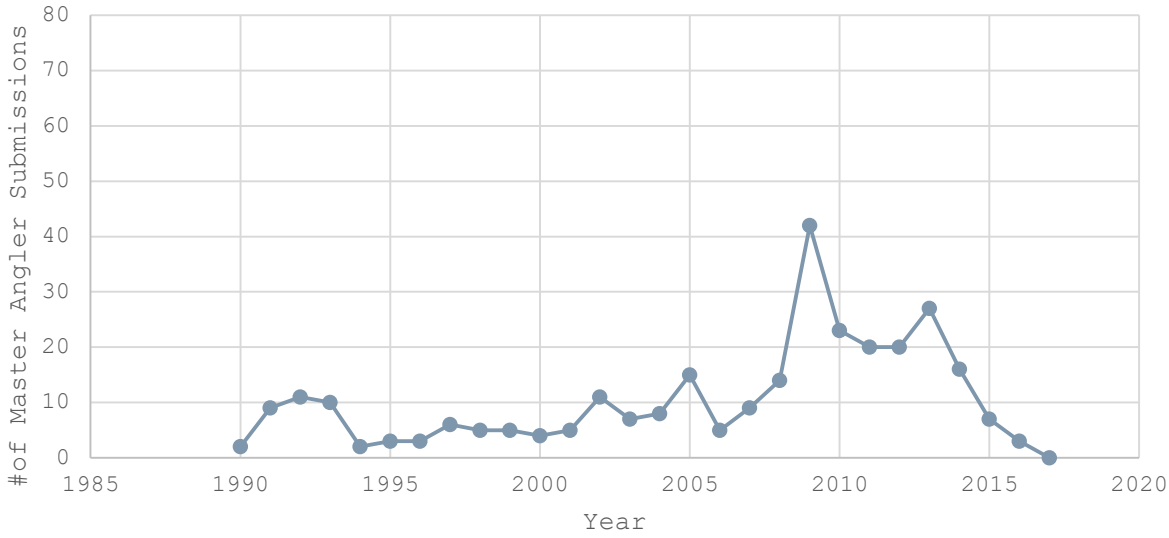


Figure 4: Lake Whitefish MA Submissions
(1990-2017)

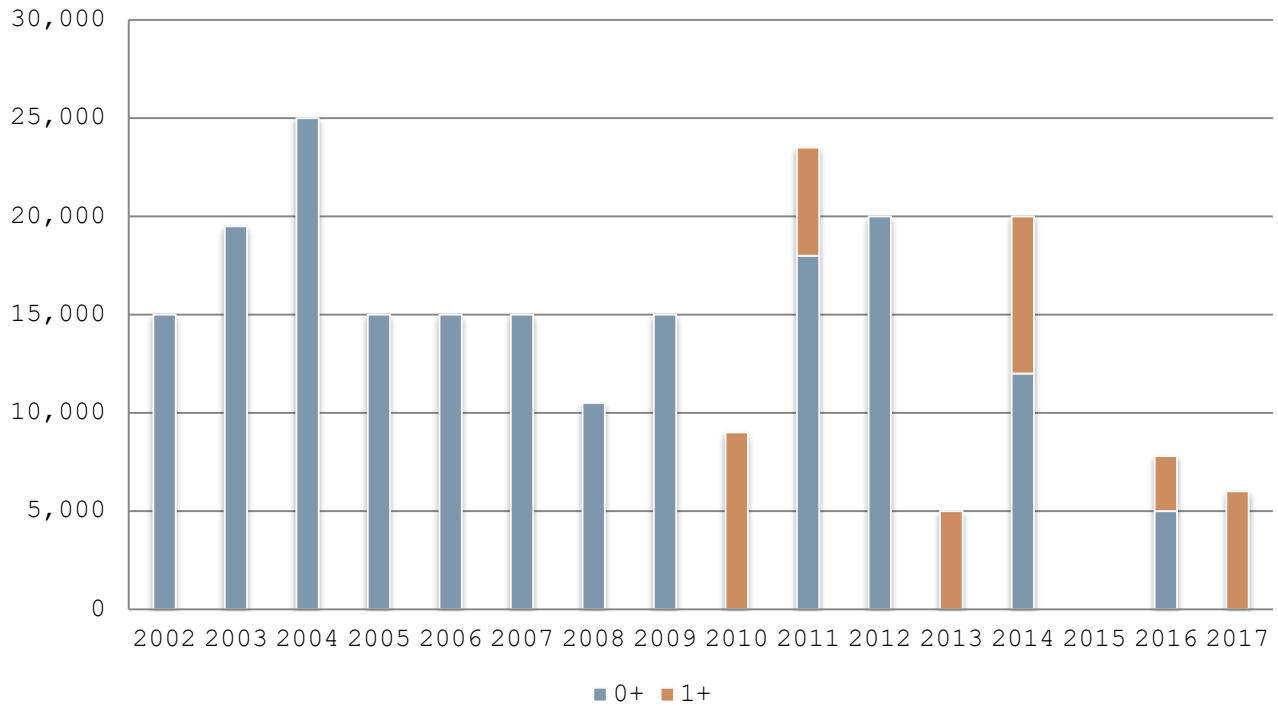


1.0 Historical Data

Table 2: Gull Lake Stocking Records (2002-2017)

Year	BRTR			RNTR			SPLA			BNTR	
	0+	1+	fish/ha	0+	1+	fish/ha	0+	1+	fish/ha	0+	fish/ha
2002	8,800		75.5	15,000		128.6	5,000		42.9		-
2003	5,000		42.9	19,500		167.2	5,000		42.9		-
2004			-	25,000		214.4			-	5,000	42.9
2005			-	15,000		128.6	10,000		85.8		-
2006			-	15,000		128.6			-		-
2007	5,000		42.9	15,000		128.6			-		-
2008	5,000		42.9	10,500		90.1	5,000		42.9		-
2009		6,200	53.2	15,000		128.6			-		-
2010	5,000		42.9		9,000	77.2		6,000	51.5		-
2011			-	18,000	5,500	201.5			-		-
2012			-	20,000		171.5			-		-
2013		5,300	45.5		5,000	42.9			-		-
2014	5,000	5,000	85.8	12,000	8,000	171.5			-		-
2015	15,000		128.6			-			-		-
2016	3,500	5,000	72.9	5,000	2,805	66.9			-		-
2017	8,000	5,000	111.5		6,000	51.5			-		-

Figure 5: Rainbow Trout Stocking (2002-2017)



1.0 Historical Data

Figure 6: Brook Trout Stocking (2002-2017)

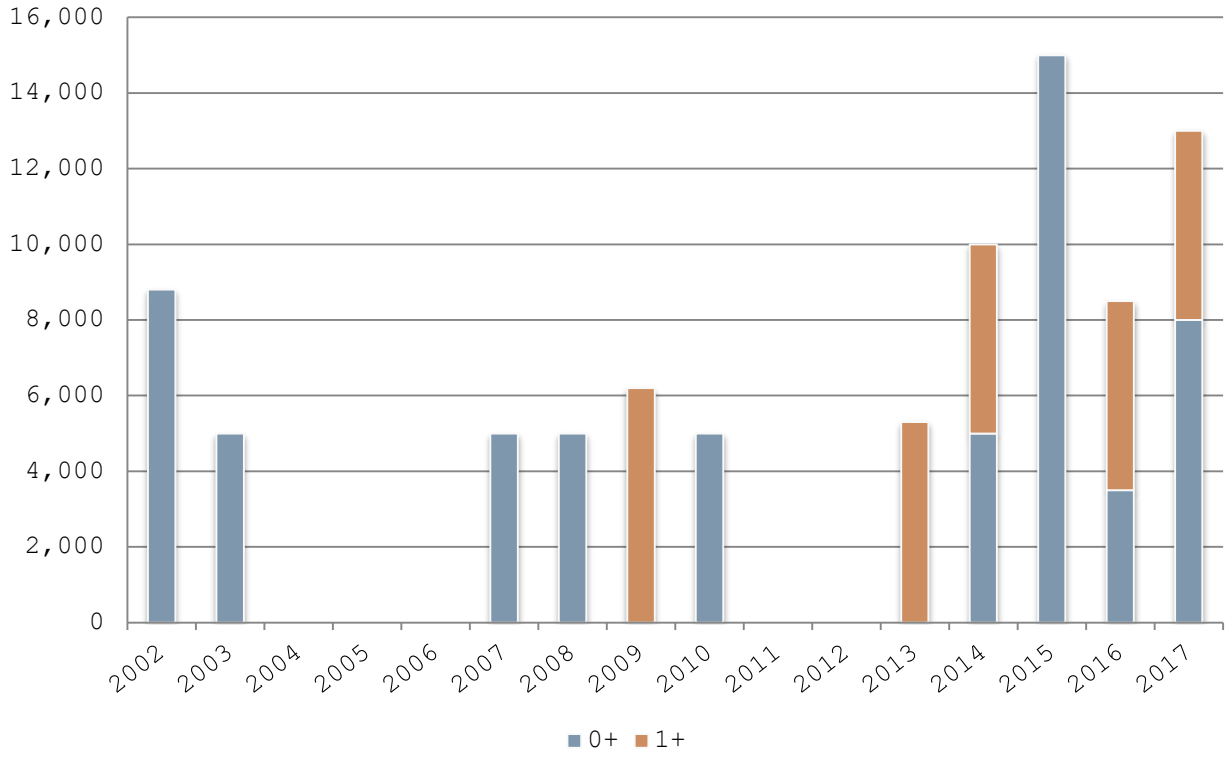
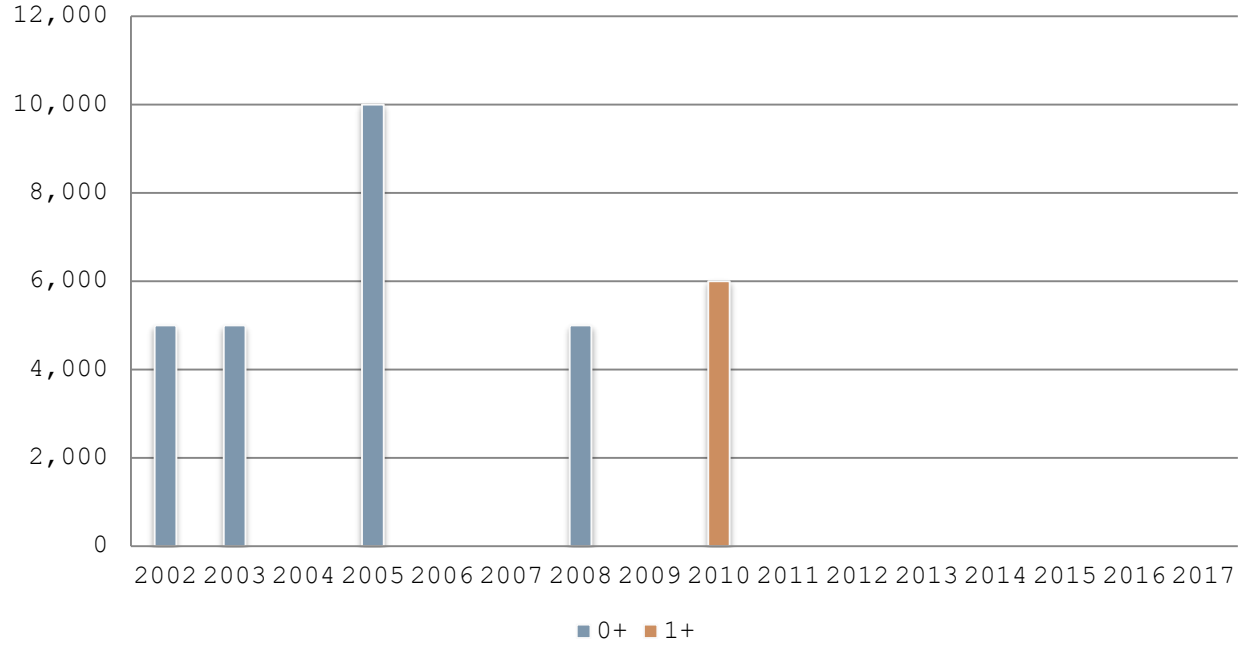
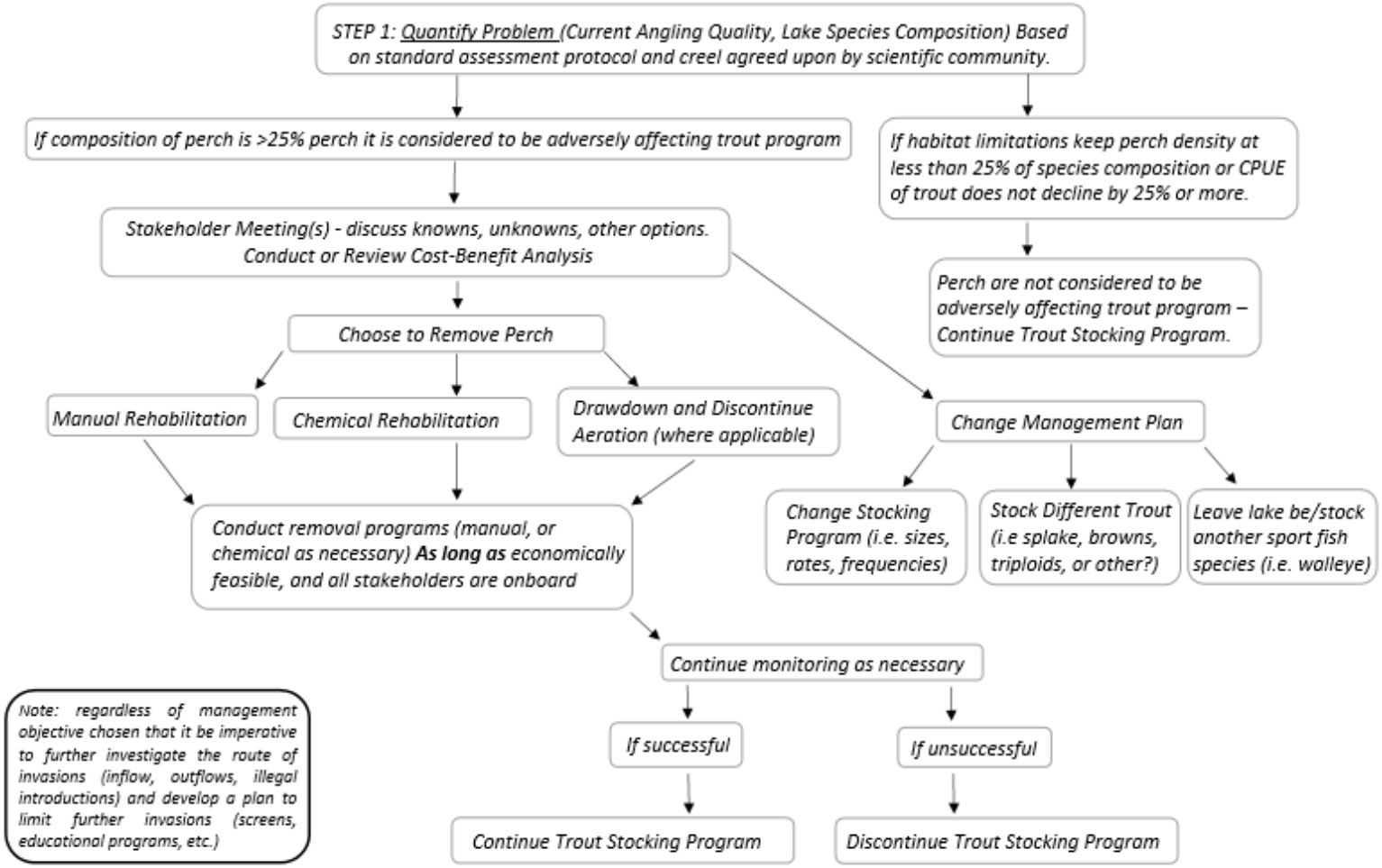


Figure 7: Splake Stocking (2002-2017)



1.0 Historical Data

Figure 8: SVSFE Management Options for Unwanted Perch into Stocked Trout Lakes



Literature Cited: Fisheries Management Branch Response to Unwanted Occurrences of Perch in Stocked-Trout Lakes in Alberta, 2008

2.0 Study Rationale

In early spring of 2017, SVSFE representatives (Holly Urban, Brock Koutecky, and Megan Paterson), FLIPPR representatives (Ken Kansas and Ray Frey), and Regional Fisheries Staff (Ian Kitch, Bruno Bruderlin, and Jonathan Stephens) met in Russell, Manitoba to discuss the current status and future management of a handful of Parkland trout fisheries experiencing detrimental non-salmonid encroachments. Following the meeting, the attendees decided that a standard non-lethal trout assessment program be created. This replicable program would utilize both trap netting and/or electrofishing to assess stocked trout lakes in the Parkland area. Following the meeting, SVSFE drafted the assessment program which would later be entitled "Stillwater Stocked Trout Littoral Sampling (SSTLS)". This program, where efforts were based primarily on shoreline distance and lake surface size, would be utilized during the 2017 to assess a handful of stocked trout waterbodies. The methodology of SSTLS can be viewed in the protocol document; Swan Valley Sport Fishing Enhancement: Stillwater Stocked Trout Littoral Sampling – Version 2.0 (Draft), or a short summary of the protocol on page 16 of this report. The program was designed to monitor trout stocking success by estimating relative abundance of a specific fish community, as well as provide other biological measures to help managers quantify trout stocking success and monitor trend analysis over time. In 2017, the specific objectives for Gull Lake were as follows;

(1) Establish a current database/fish inventory of Gull Lake by creating and utilizing a replicable protocol which can be used for assessment measures in future years (SSTLS)

(2) Determine fish community compositions, CPUE over time, age and growth, and other biological measures to help managers quantify trout stocking success

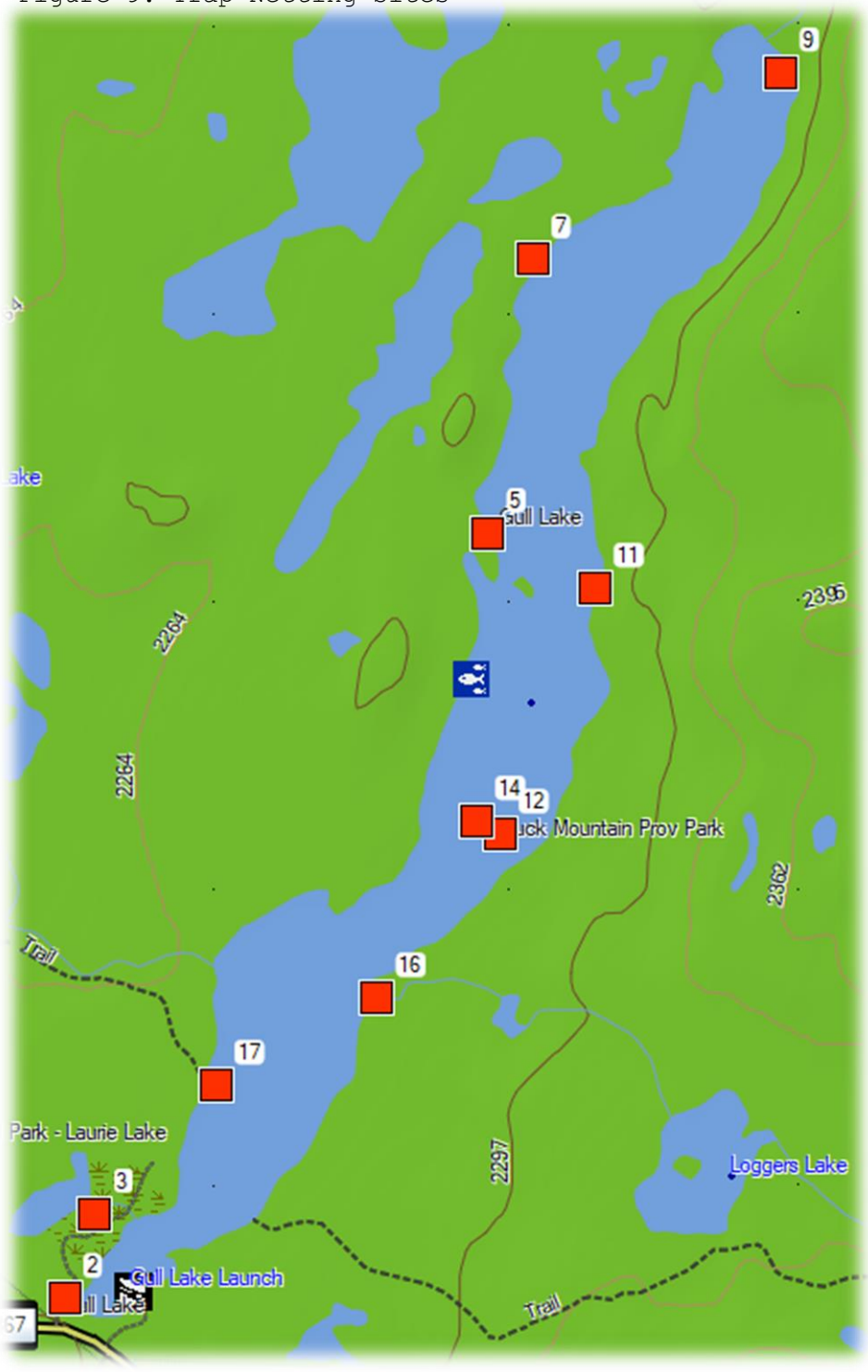
(3) Summarize methodology and seasonal variation of catch data for future research or manual removal programs

(4) Remove all non-salmonid catch from the lake while conducting assessments

(5) Develop recommendations that will assist in future management, use, and development of Gull Lake.

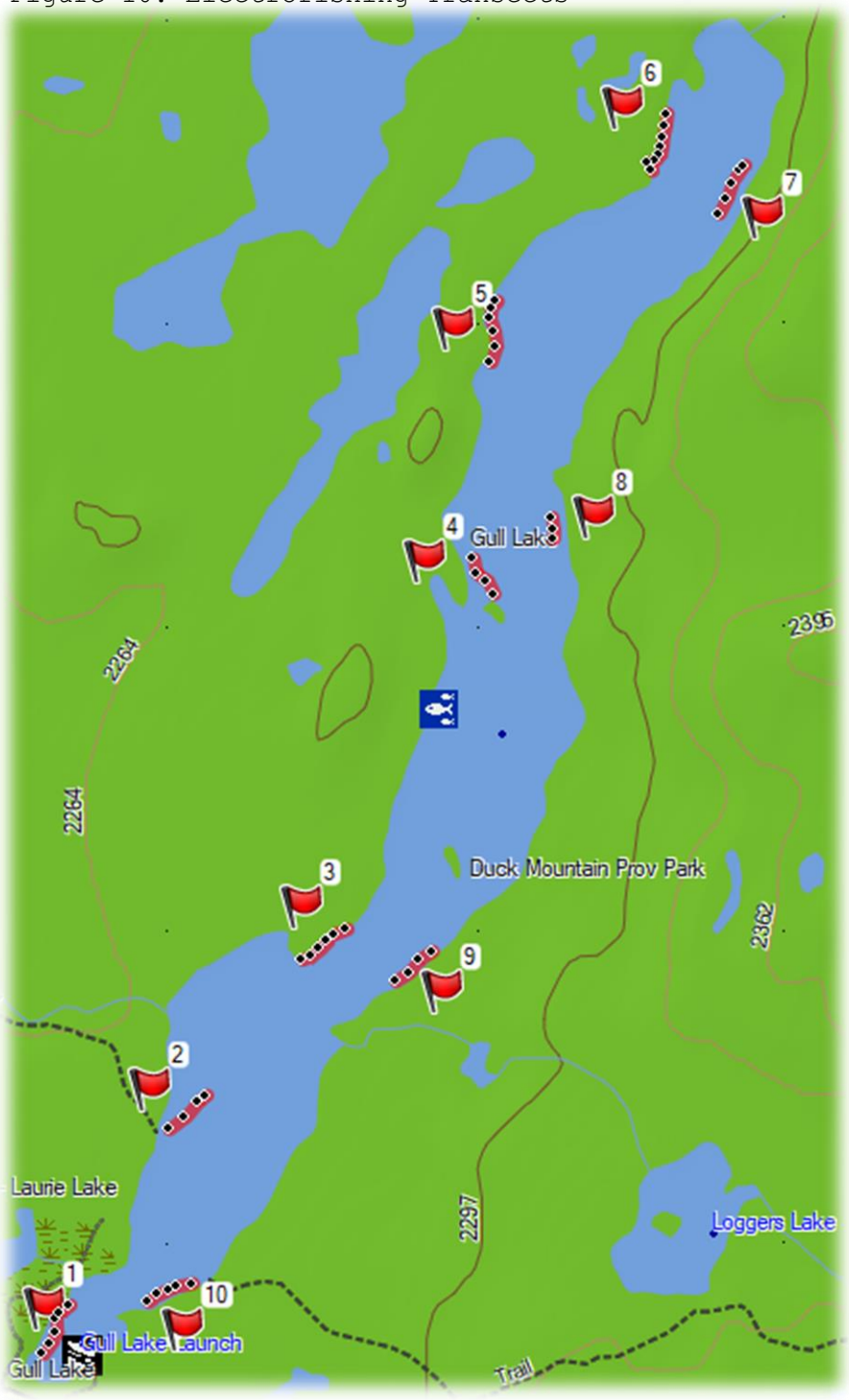
3.0 Effort Summary

Figure 9: Trap Netting Sites



3.0 Effort Summary

Figure 10: Electrofishing Transects



3.0 Effort Summary

Table 3:

2017 Gull Lake Trap Netting Summary								
Site #	UTM	Trap Type	Spring Pull Date	Water Temp (°C)	Effort (hrs)	Fall Pull Date	Water Temp (°C)	Effort (hrs)
2	14U 375153 5713990	Black	30-May-17	12.6	24.15	18-Sep-17	13.73	22.87
16	14U 358045 5714791	Green	30-May-17	11.8	25.23	18-Sep-17	14.55	24.20
7	14U 358534 5716805	Black	31-May-17	12.73	22.08	19-Sep-17	13.8	22.18
11	14U 358682 5715899	Green	31-May-17	12.73	22.03	19-Sep-17	13.9	22.35
17	14U 357590 5714564	Black	1-Jun-17	15.2	22.00	20-Sep-17	13.29	22.62
12	14U 358399 5716058	Green	1-Jun-17	15.2	23.03	20-Sep-17	13.33	23.35
9	14U 359237 5717299	Black	2-Jun-17	15	22.32	21-Sep-17	12.6	22.92
5	14U 358389 5716058	Green	2-Jun-17	15	22.58	21-Sep-17	13.19	23.93
14	14U 358335 5715269	Black	3-Jun-17	14.35	22.10	22-Sep-17	12.9	23.42
3	14U 357284 5714125	Green	3-Jun-17	13.54	21.92	22-Sep-17	12.6	22.50

Table 4:

2017 Gull Lake Electrofishing Summary						
Site #	Date (Day)	Water Temp (°C)	Effort (Seconds)	Date (Night)	Water Temp (°C)	Effort (Seconds)
1	25-Sep-17	11.4	400	27-Sep-17	10.8	400
2	25-Sep-17	11.4	400	27-Sep-17	10.8	400
3	25-Sep-17	11.4	400	27-Sep-17	10.8	400
4	25-Sep-17	11.4	400	27-Sep-17	10.8	400
5	25-Sep-17	11.4	400	27-Sep-17	10.8	400
6	25-Sep-17	11.4	400	27-Sep-17	10.8	400
7	25-Sep-17	11.4	400	27-Sep-17	10.8	400
8	25-Sep-17	11.4	400	27-Sep-17	10.8	400
9	25-Sep-17	11.4	400	27-Sep-17	10.8	400
10	25-Sep-17	11.4	400	27-Sep-17	10.8	400

4.0 Methodology

Stillwater Stocked Trout Littoral Sampling (SSTLS) was designed to efficiently assess a stocked trout water body in a workweek with a minimum of 3 technicians (maximum 5-6 including volunteers). The size of the waterbody (ha) and shoreline perimeter distance (m) are the two primary factors in determining effort requirements. The program was proposed to facilitate a sampling period when all targetable species are utilizing littoral habitats at some stage over the sampling variation.

Season	Target (°C)	Acceptable (°C)
Spring	4°-10°	4°-20°
Fall	16°-10°	20°-4°

For medium sized stocked trout water bodies (16ha-200ha), electrofishing and trap-netting requirements are based on lake shoreline distance (including island shoreline). The minimum requirements for each water body will receive a trap-net and one - 400 second (or 100m) electrofishing transect for each 1000m of available shoreline. The target requirement for each trap net and 400 second, (or 100m) transect will require one of each for every 500m of available shoreline. The program guidelines were compiled and referred to a variety of electrofishing and trap netting protocols used throughout Canada and the United States. Gull Lake effort requirements below:

Lake Name	Lake Size (ha)	Shoreline (m)	Island Shoreline (m)	Total Shoreline (m)	Minimum # of Transects & Traps	Target # of Transect and Traps	# of Transects and Traps Conducted
Gull Lake	119.1ha	9,340m	396m	9,736m	10	20	10

Trap Netting: Netting efforts were initially conducted in the spring, and then replicated in the fall. A total of 10 nets sets were completed each season. With 5 nets using standard Lake Superior ESTN nets, and 5 sets using small-mesh custom Lake Superior type trap nets to facilitate the catch of small bodied fish. Net set specifics have been adapted from NSCIN, and also ESTN (Ontario). Type of net for each site was selected based on gap depth also was pre-determined prior to field activities. An overview of netting efforts can be viewed on page 17.

Electrofishing: The initial intention was to conduct electrofishing surveys in both spring and fall, however, due to unforeseen issues with the electro-fisher only fall sampling was conducted. A total of 10 non-random transects at 400 seconds were completed during daylight hours, the same transects were then replicated after sundown two days later. An overview of the electrofishing efforts can be viewed on page 17.

For more information on requirements, guidelines, and specifics; please refer to Swan Valley Sport Fishing Enhancement: Stillwater Stocked Trout Littoral Sampling – Version 2.0 (pages 2-11)

5.0 Results

Table 5: Catch Summary

METHOD	EFFORT	SITE/METHOD/CODE	Site #	RNTR	CPUE RNTR	BRTR	CPUE BRTR	SPLA	CPUE SPLA	LKWH	LKWH CPUE	WHSC	WHSC CPUE	YLPR	CPUE YLPR	NRPK	NRPK CPUE	TOTAL FISH
TN - SPRING	24.15	GU-TM-17-001	2	16	0.66	3	0.12	12	0.50	4	0.17	199	8.24	0	0.00	0	0	234
TN - SPRING	25.23	GU-TM-17-002	16	6	0.24	0	0.00	0	0.00	0	0.00	304	12.05	3	0.12	0	0	313
TN - SPRING	22.08	GU-TM-17-003	7	14	0.63	3	0.14	1	0.05	0	0.00	25	1.13	12	0.54	1	0.05	56
TN - SPRING	22.03	GU-TM-17-004	11	13	0.59	3	0.14	1	0.05	0	0.00	87	3.95	9	0.41	0	0	113
TN - SPRING	22.00	GU-TM-17-005	17	21	0.95	1	0.05	4	0.18	0	0.00	94	4.27	8	0.36	0	0	128
TN - SPRING	23.03	GU-TM-17-006	12	3	0.13	1	0.04	0	0.00	1	0.04	110	4.78	110	4.78	0	0	225
TN - SPRING	22.32	GU-TM-17-007	9	20	0.90	6	0.27	1	0.04	0	0.00	120	5.38	24	1.08	0	0	171
TN - SPRING	22.58	GU-TM-17-008	5	10	0.44	4	0.18	0	0.00	0	0.00	52	2.30	477	21.12	0	0	543
TN - SPRING	22.10	GU-TM-17-009	14	4	0.18	2	0.09	0	0.00	0	0.00	59	2.67	40	1.81	0	0	105
TN - SPRING	21.92	GU-TM-17-010	3	4	0.18	0	0.00	0	0.00	0	0.00	59	2.69	136	6.20	0	0	199
TN - SPRING	24.00	GU-TM-17-011	8	4	0.17	5	0.21	0	0.00	0	0.00	36	1.50	63	2.63	0	0	108
TN - SPRING	23.42	GU-TM-17-012	10	10	0.43	1	0.04	0	0.00	0	0.00	42	1.79	55	2.35	0	0	108
TN - FALL	22.87	GU-TM-17-013	2	1	0.04	4	0.17	10	0.44	2	0.09	16	0.70	3	0.13	0	0	36
TN - FALL	24.20	GU-TM-17-014	16	1	0.04	1	0.04	0	0.00	0	0.00	20	0.83	73	3.02	0	0	95
TN - FALL	22.18	GU-TM-17-015	7	15	0.68	0	0.00	1	0.05	7	0.32	43	1.94	14	0.63	0	0	80
TN - FALL	22.35	GU-TM-17-016	11	15	0.67	0	0.00	0	0.00	0	0.00	11	0.49	36	1.61	0	0	62
TN - FALL	22.62	GU-TM-17-017	17	4	0.18	2	0.09	7	0.31	6	0.27	35	1.55	48	2.12	0	0	102
TN - FALL	23.35	GU-TM-17-018	12	8	0.34	0	0.00	0	0.00	1	0.04	1	0.04	17	0.73	0	0	27
TN - FALL	22.92	GU-TM-17-019	9	8	0.35	1	0.04	4	0.17	3	0.13	50	2.18	23	1.00	0	0	89
TN - FALL	23.93	GU-TM-17-020	5	10	0.42	1	0.04	0	0.00	1	0.04	26	1.09	906	37.86	0	0	944
TN - FALL	23.42	GU-TM-17-021	14	1	0.04	0	0.00	0	0.00	4	0.17	12	0.51	32	1.37	0	0	49
TN - FALL	22.50	GU-TM-17-022	3	1	0.04	6	0.27	0	0.00	0	0.00	0	0.00	78	3.47	0	0	85
N-EFISHING	0.11	GU-TM-17-023	1	0	0.00	0	0.00	0	0.00	0	0.00	2	18.00	63	567.00	0	0	65
N-EFISHING	0.11	GU-TM-17-024	2	2	18.00	0	0.00	0	0.00	1	9.00	10	90.00	52	468.00	0	0	65
N-EFISHING	0.11	GU-TM-17-025	3	3	27.00	0	0.00	0	0.00	0	0.00	12	108.00	16	144.00	0	0	31
N-EFISHING	0.11	GU-TM-17-026	4	2	18.00	0	0.00	0	0.00	0	0.00	3	27.00	121	1089.00	0	0	126
N-EFISHING	0.11	GU-TM-17-027	5	1	9.00	0	0.00	0	0.00	0	0.00	13	117.00	70	630.00	0	0	84
N-EFISHING	0.11	GU-TM-17-028	6	3	27.00	0	0.00	0	0.00	0	0.00	11	99.00	42	378.00	0	0	56
N-EFISHING	0.11	GU-TM-17-029	7	4	36.00	1	9.00	0	0.00	1	9.00	7	63.00	20	180.00	0	0	33
N-EFISHING	0.11	GU-TM-17-030	8	2	18.00	1	9.00	0	0.00	0	0.00	6	54.00	24	216.00	0	0	33
N-EFISHING	0.11	GU-TM-17-031	9	9	81.00	3	27.00	0	0.00	0	0.00	1	9.00	39	351.00	0	0	52
N-EFISHING	0.11	GU-TM-17-032	10	3	27.00	0	0.00	0	0.00	1	9.00	2	18.00	71	639.00	0	0	77
D-EFISHING	0.11	GU-TM-17-033	1	0	0.00	0	0.00	0	0.00	0	0.00	1	9.00	13	117.00	0	0	14
D-EFISHING	0.11	GU-TM-17-034	2	0	0.00	0	0.00	0	0.00	0	0.00	10	90.00	8	72.00	0	0	18
D-EFISHING	0.11	GU-TM-17-035	3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	54.00	0	0	6
D-EFISHING	0.11	GU-TM-17-036	4	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	20	180.00	0	0	20
D-EFISHING	0.11	GU-TM-17-037	5	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	12	108.00	0	0	12
D-EFISHING	0.11	GU-TM-17-038	6	1	9.00	0	0.00	0	0.00	0	0.00	3	27.00	14	126.00	0	0	18
D-EFISHING	0.11	GU-TM-17-039	7	0	0.00	3	27.00	0	0.00	0	0.00	1	9.00	1	9.00	0	0	5
D-EFISHING	0.11	GU-TM-17-040	8	1	9.00	1	9.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	2
D-EFISHING	0.11	GU-TM-17-041	9	1	9.00	1	9.00	0	0.00	0	0.00	3	27.00	0	0.00	0	0	5
D-EFISHING	0.11	GU-TM-17-042	10	1	9.00	1	9.00	0	0.00	0	0.00	1	9.00	0	0.00	0	0	3
TOTALS:				222		55		41		32		1487		2759		1		

Note: GU-TM-17-021, and GU-TM-17-022 trap netting were conducted in the spring but were not replicated in the fall. These two sites were omitted from the sample as the set specifics did not meet the requirements of SSTLS (too shallow). Catch data from these nets are not included for species compositions and CPUEs. However, fish data collected from these sites were used in length, age, and abundance analysis.

5.0 Results

Figure 11: Spring Trap Netting Composition

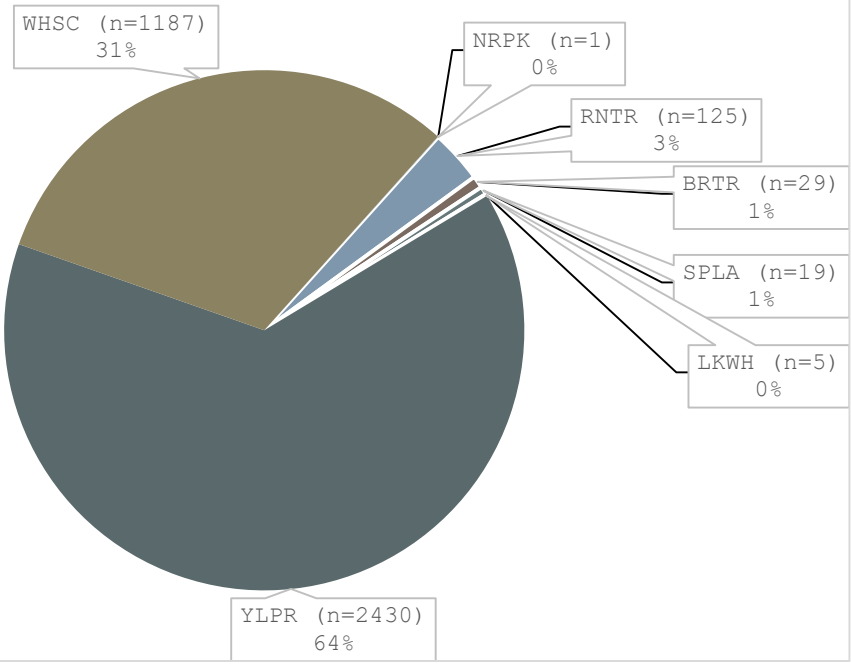
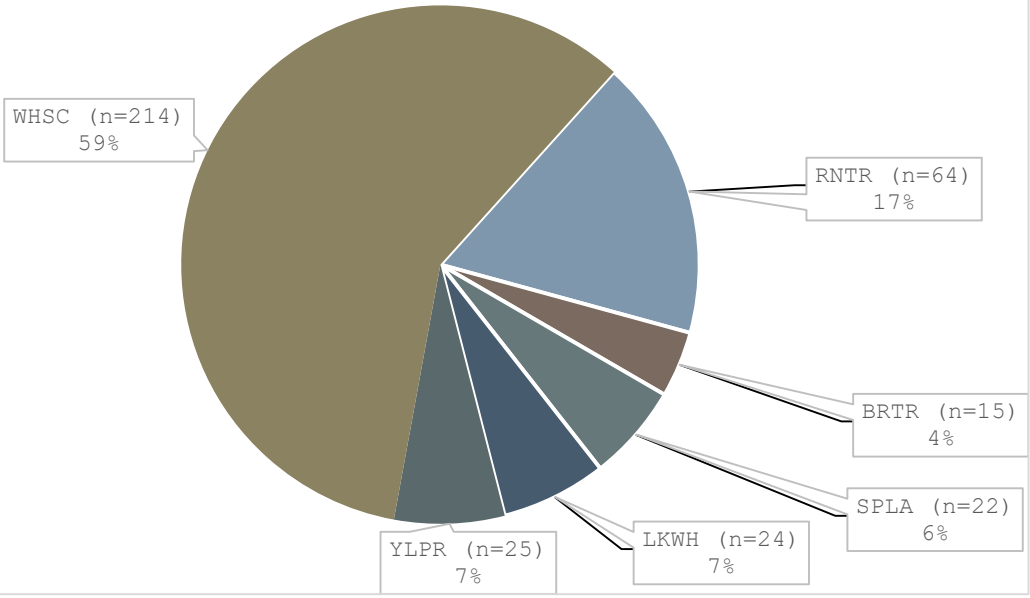


Figure 12: Fall Trap Netting Composition



5.0 Results

Figure 13: Day Electrofishing (Fall) Composition

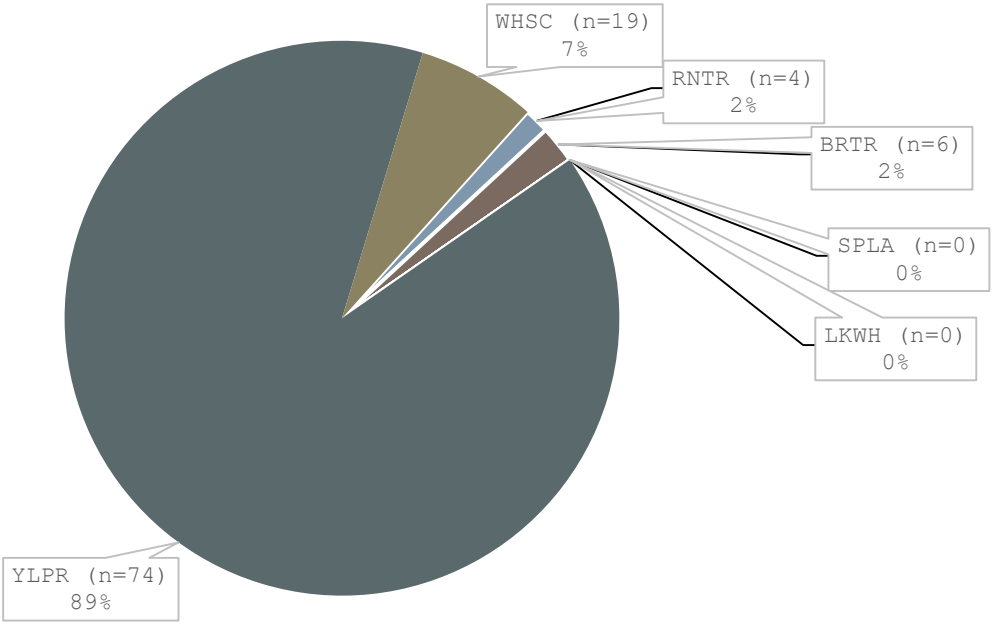
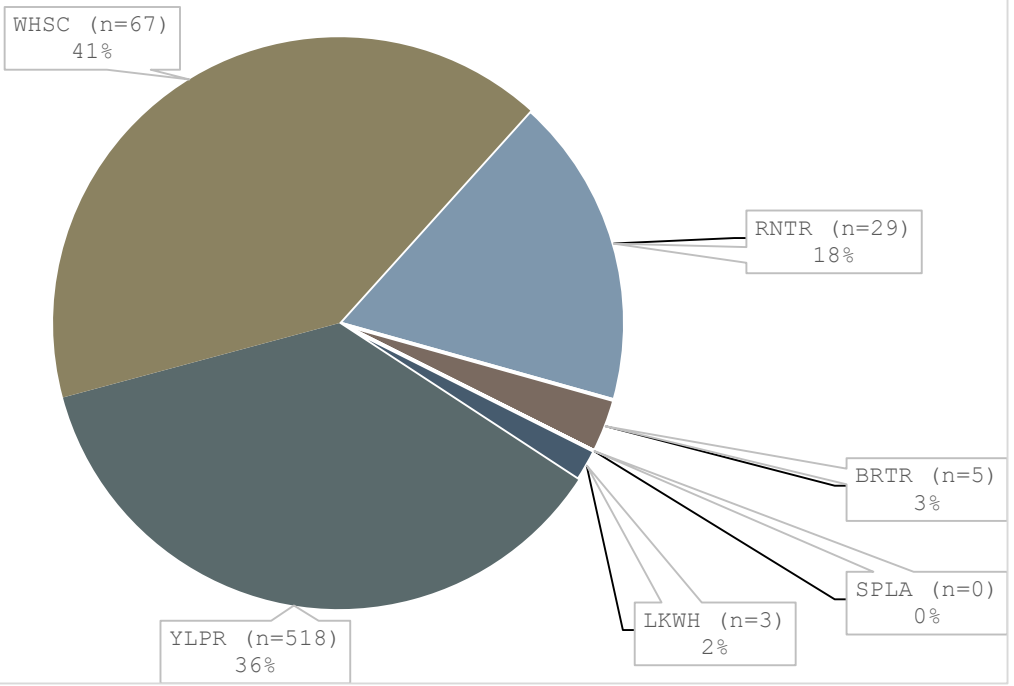


Figure 14: Night Electrofishing (Fall) Composition



5.0 Results

Figure 15: Spring Trap Netting CPUE

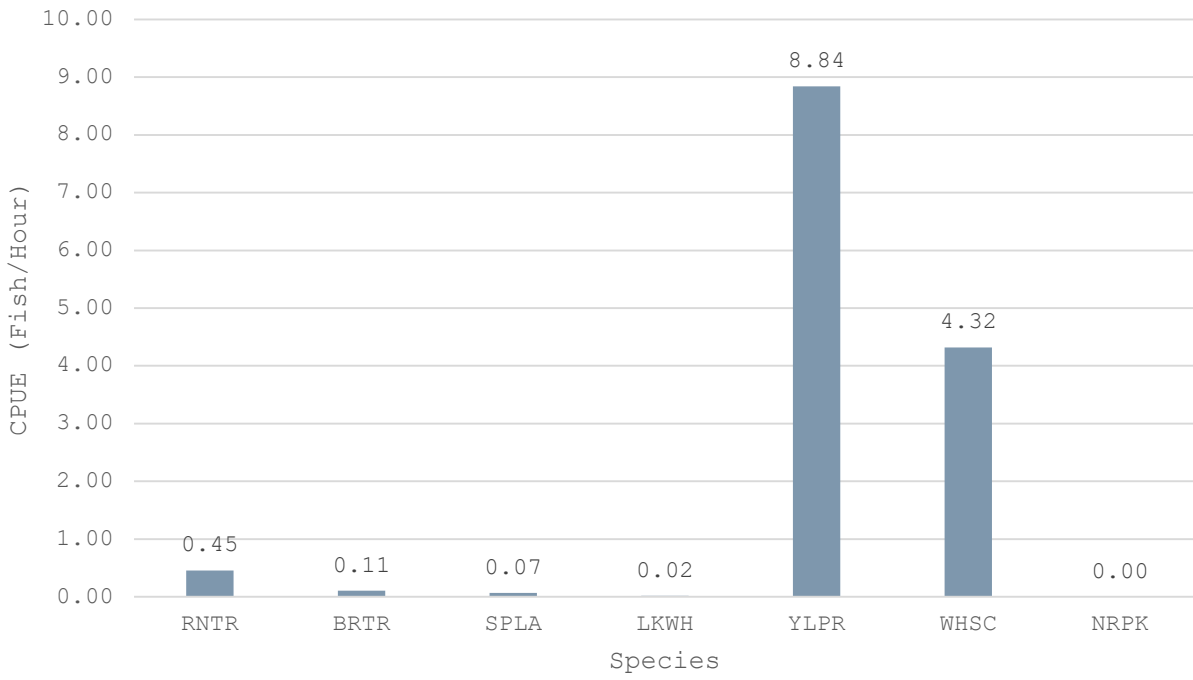
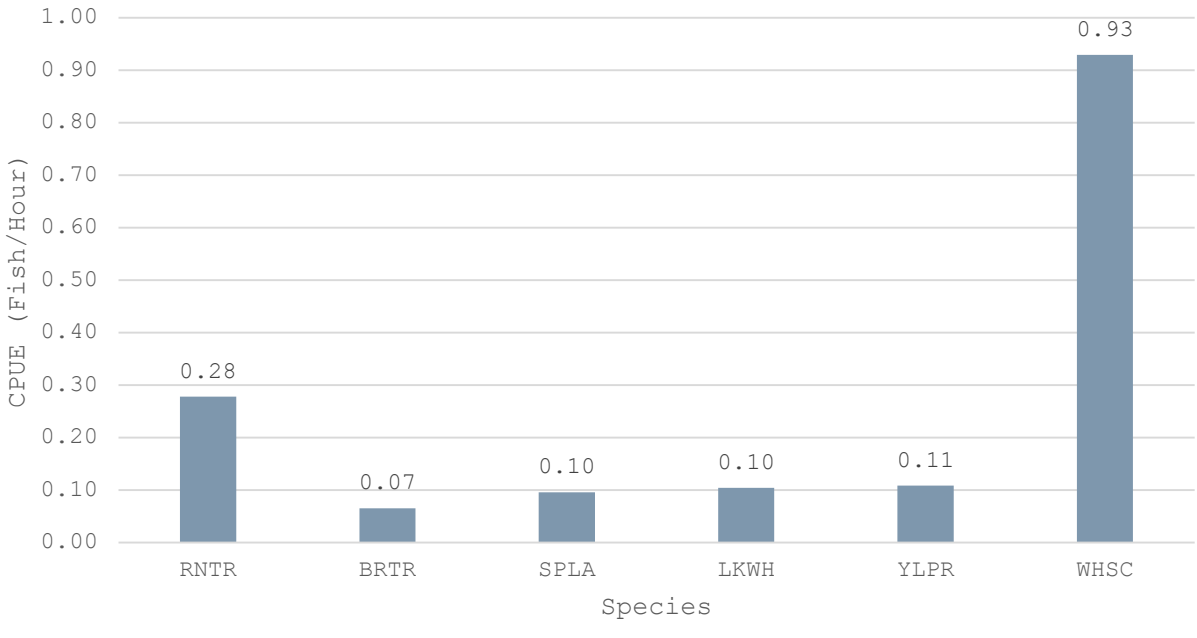


Figure 16: Fall Trap Netting CPUE



5.0 Results

Figure 17: Day Time Electrofishing CPUE

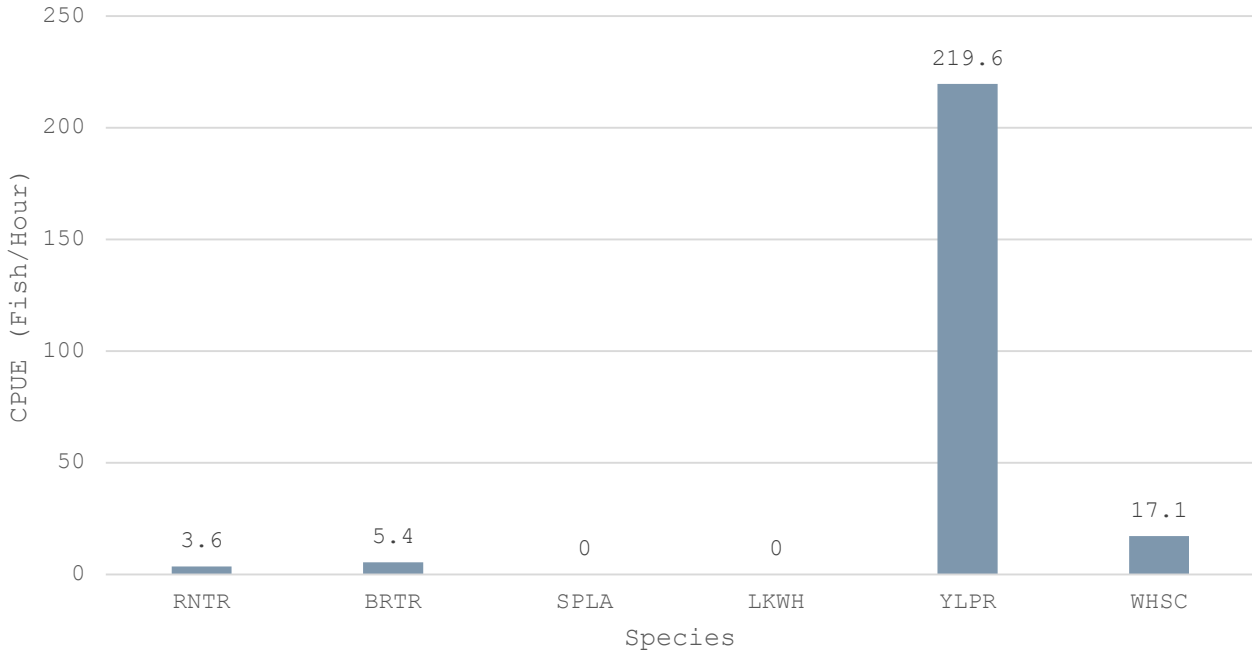
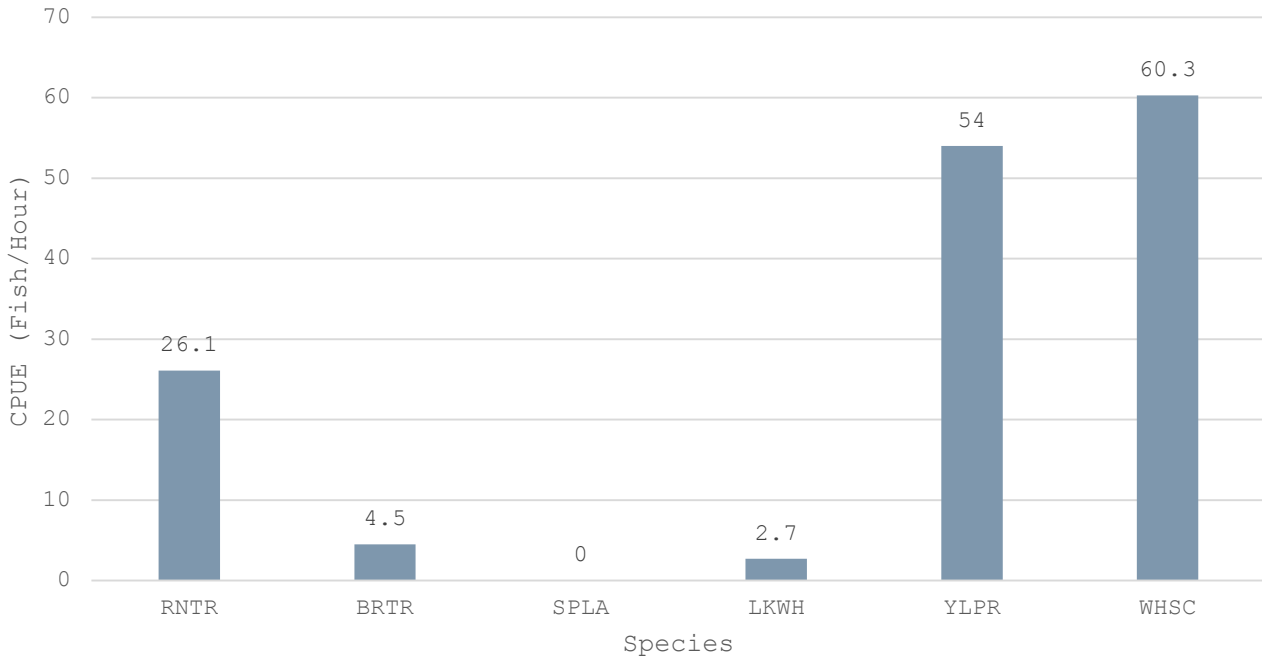


Figure 18: Night Time Electrofishing CPUE



5.0 Results

Gull Lake Total Species Composition

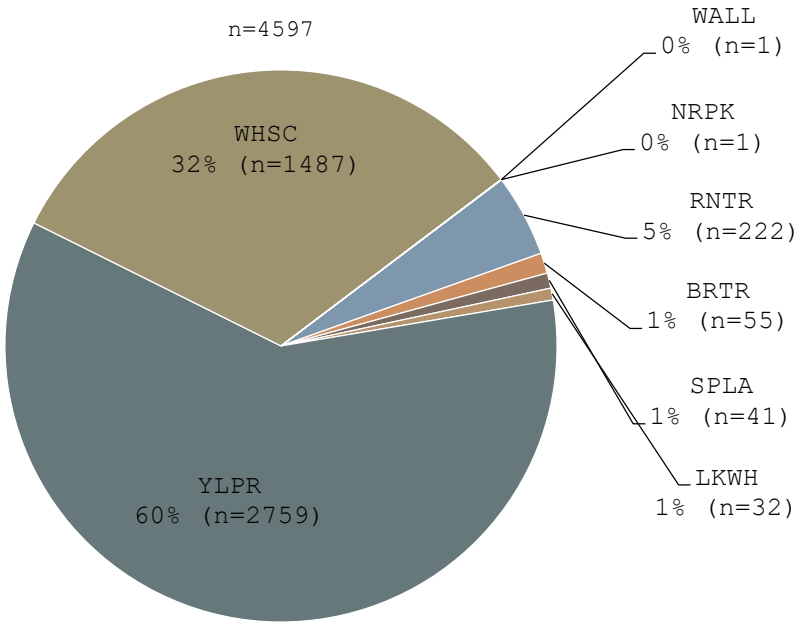
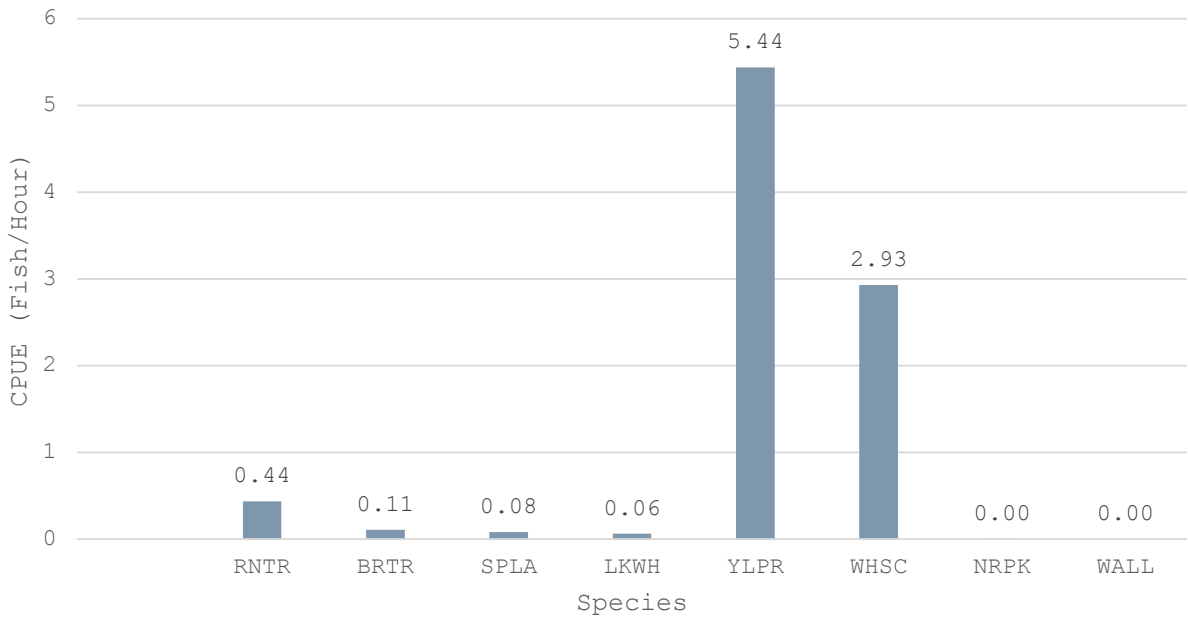


Figure 20: Gull Lake Total Species CPUE



5.0 Results

Figure 21: 2017 Gull Mile Lake - Rainbow Trout
Length Frequencies
n=219

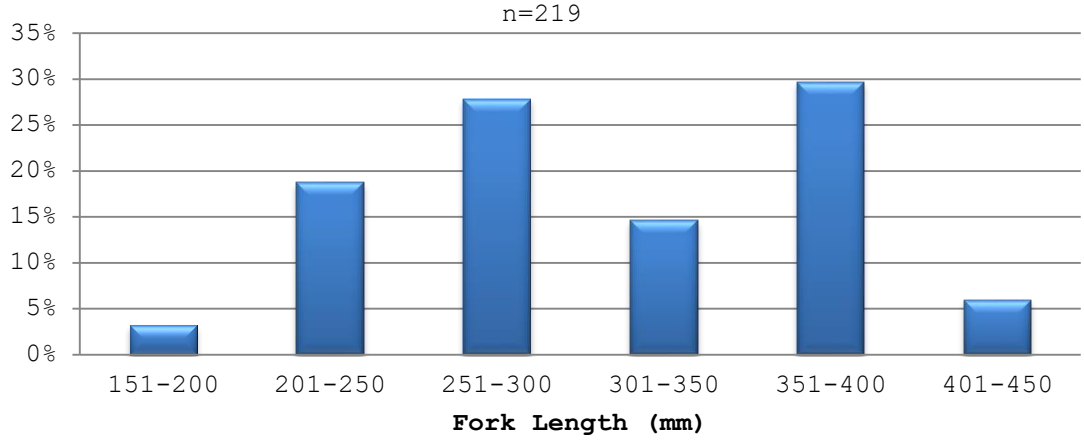
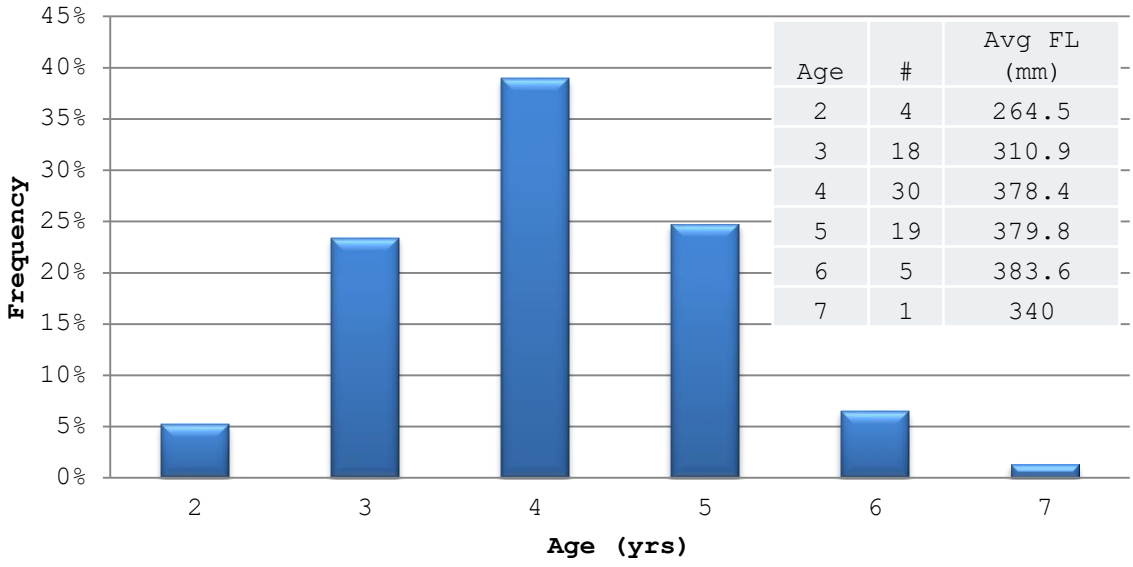


Figure 22: Rainbow Trout Age Frequencies



Age	#	Avg FL (mm)
2	4	264.5
3	18	310.9
4	30	378.4
5	19	379.8
6	5	383.6
7	1	340

Table 6: Gull Lake Rainbow Trout Stocking Records (2008-2016)

Year	2010		2011			2012	2013	2014				2015	2016	
Date	11-May	3-Jun	2-Jun	14-Jun	29-Sep	20-Sep	19-Jun	5-Jun	23-Jun	22-Sep	9-Oct		20-Jun	19-Sep
Rate	7,000	2,000	3,000	2,500	18,000	20,000	5,000	4,000	4,000	5,000	7,000	no stocking	2,805	5,000
Age	1+	1+	1+	1+	0+	0+	1+	1+	1+	0+	0+		1+	0+
2017 Age	8+	8+	7+	7+	6+	5+	5+	4+	4+	3+	3+		2+	1+

5.0 Results

Figure 23: 2017 Gull Mile Lake - Brook Trout Length Frequencies

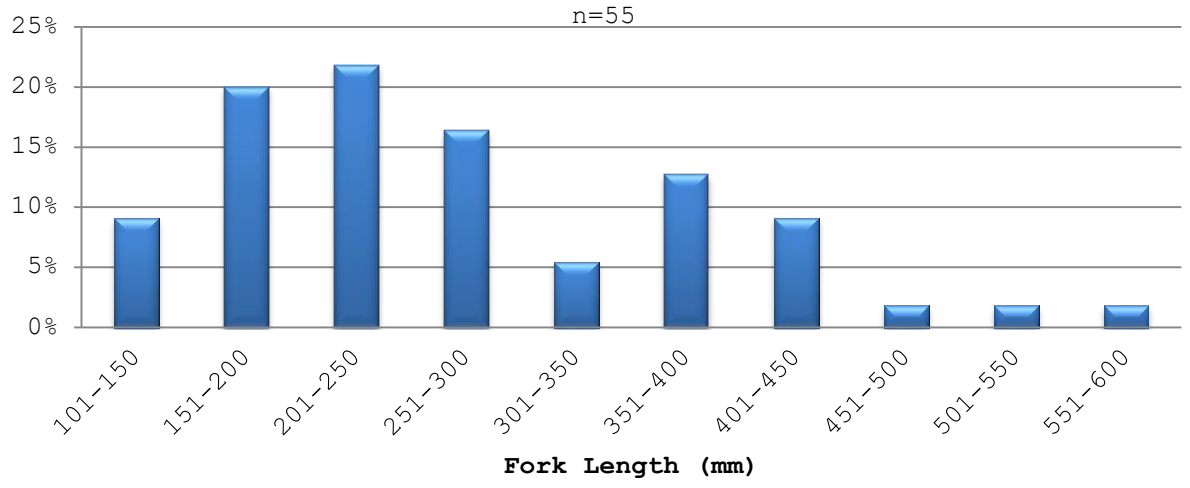
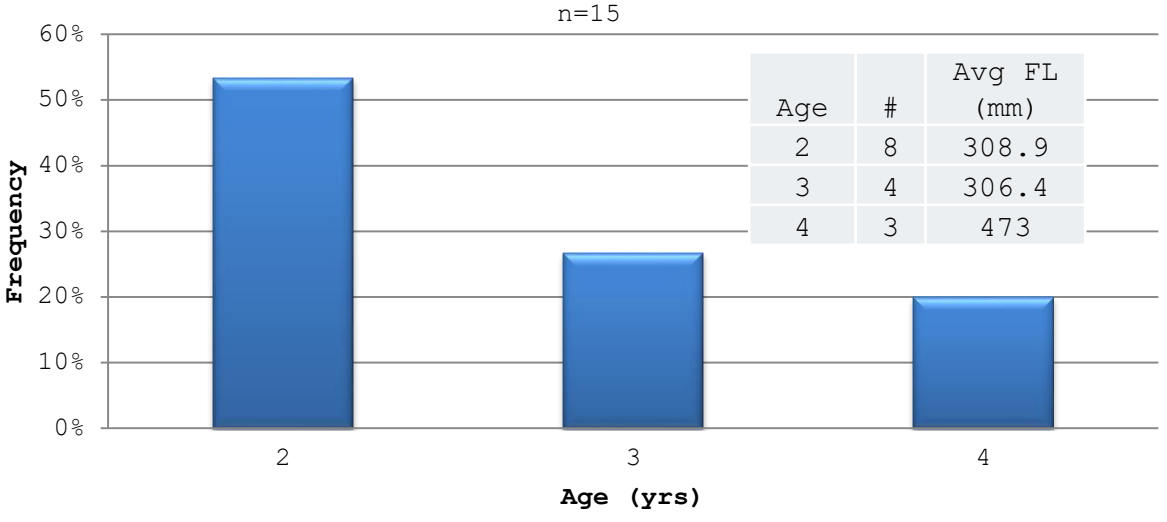


Figure 24: Brook Trout Age Frequencies



Age	#	Avg FL (mm)
2	8	308.9
3	4	306.4
4	3	473

Table 7: Gull Lake Brook Trout Stocking Records (2008-2016)

Year	2010	2011	2012	2013	2014		2015		2016	
Date	27-Sep	no stocking	no stocking	12-Jun	20-May	4-Sep	10-Sep	15-Oct	19-May	19-Sep
Rate	5,000			5,300	5,000	5,000	12,500	2,500	5,000	3,500
Age	0+			1+	1+	0+	0+	0+	1+	0+
2017 Age	7+			5+	4+	3+	2+	2+	2+	1+

5.0 Results

Figure 25: 2017 Gull Mile Lake - Splake Length Frequencies

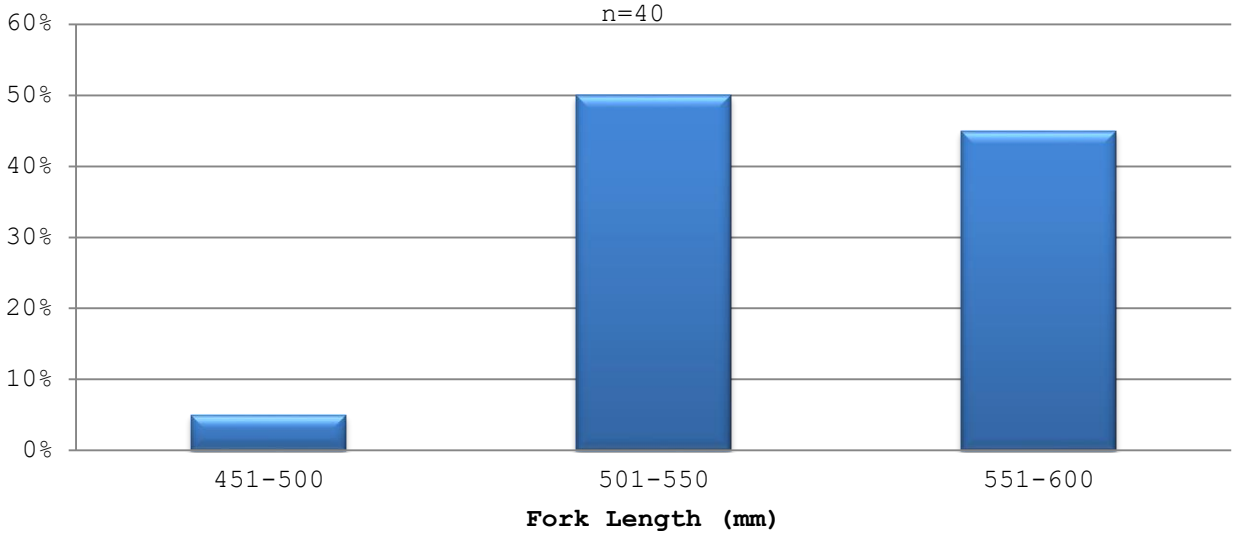


Figure 26: Splake Age Frequencies

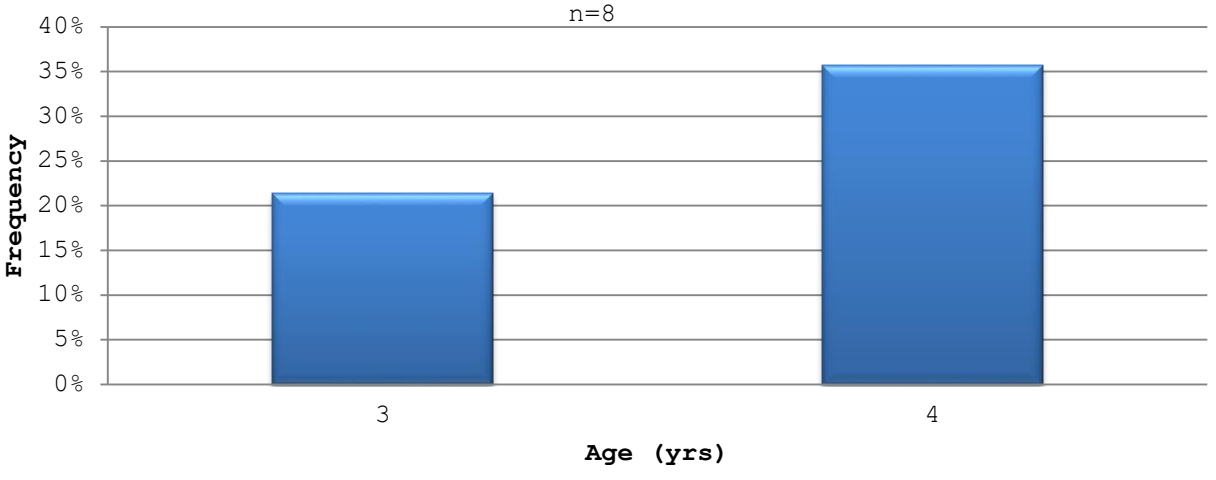


Table 8: Gull Lake Splake Stocking Records 2008-Present		
Year	2008	2010
Date	9-Sep	27-Sep
Rate	5,000	6,000
Age	0+	1+
2017 Age	9+	8+

Age	#	Avg FL (mm)
3	3	531.7
4	5	543.6

5.0 Results

Figure 27: Lake Whitefish Length Frequencies

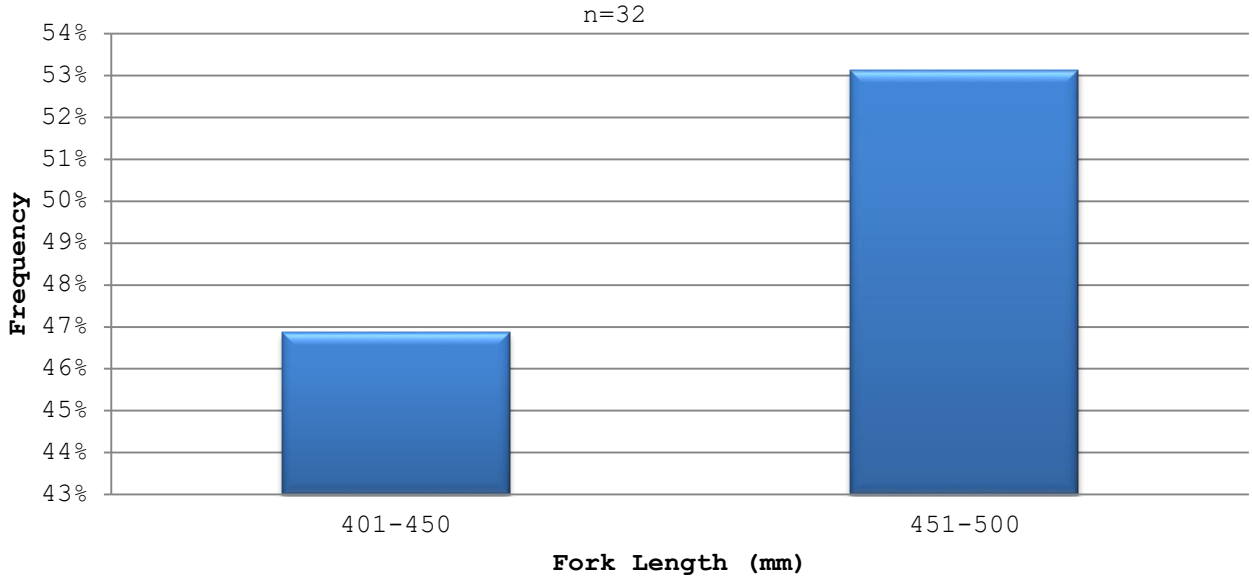
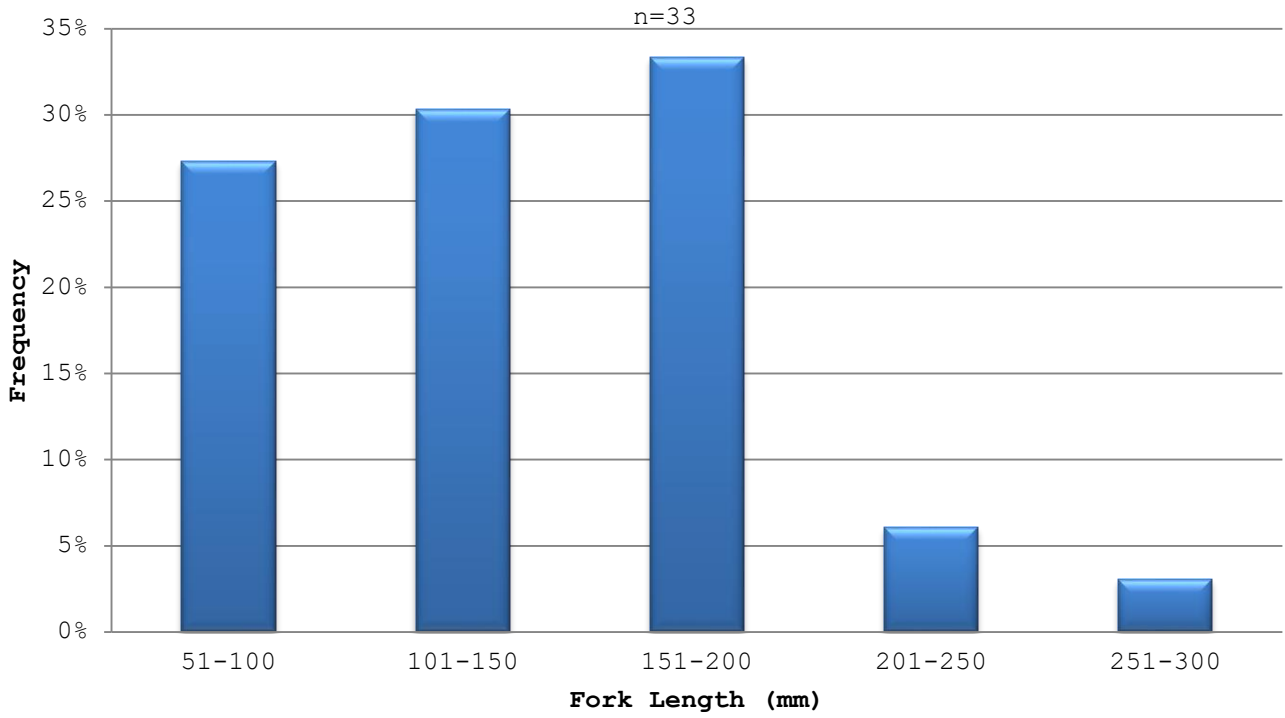


Figure 28: Yellow Perch Length Frequencies



6.0 Discussion

Catch & Method Comparison:

Rainbow Trout: In terms of trap netting, rainbow catch was higher in the spring (0.45 fish/hour) when comparing to the fall (0.28 fish/hour). As rainbows occupy shallow habitats in the spring, it is no surprise that catch was higher in the spring. When referring to electrofishing; rainbow catch was increased sevenfold (26.1 fish/hour) at night when compared to the day (3.6 fish/hour). Unfortunately, electrofishing during the spring was not conducted due to unforeseen issues with the electro-fisher.

Brook Trout: Trap netting CPUE of brook trout was very similar in the spring (0.11 fish/hour), when compared to the fall (0.07 fish/hour). Similarly, electrofishing yielded 5.4 fish/hour during the day and 4.5 fish/hour while electrofishing at night.

Splake: Trap netting splake yielded similar results in spring and fall with 0.07 fish/hour and 0.10 fish/hour, respectively. No splake were caught during electrofishing efforts (day or night).

Lake Whitefish: As expected, Lake Whitefish trap-catch was higher in the fall (0.10 fish/hour), when compared to the spring (0.02 fish/hour). While electrofishing; CPUE was higher at night (2.7 fish/hour), when compared to the day (0 fish/hour).

Yellow Perch: Spring trap netting was the most effective method of catching yellow perch. The spring yielded a catch of 8.84 fish/hour while the fall resulted in 0.11 fish/hour. Most yellow perch were found in areas with thick vegetation and high fish cover. Surprisingly, day electrofishing catch was significantly higher (219.6 fish/hour) when compared to the night (54 fish per/hour).

White Sucker: As expected, trap netting was much more effective in the spring (4.32 fish/hour) when compared to the fall (0.93 fish/hour). The nets with the highest sucker catches were near inflowing and outflowing tributaries (site 3, 9, 16). Electrofishing was significantly more effective during the night (60.3 fish/hour), when compared to the day (17.1 fish/hour).

Walleye and Northern Pike: There was evidence of both northern pike and walleye found during spring trap netting; the fish were located in trap(s) number 3, and 11 respectively. No conclusions can be made regarding these catch rates aside from presence within the system.

6.0 Discussion

Summary: With the understanding of general fish behavior there were no surprises in catch results aside from yellow perch catch being higher during day electrofishing when comparing to night electrofishing. The reason for discussing these catch results are for potential maintenance and monitoring purposes. Regarding yellow perch, it is suggested that if a comprehensive removal program ever be initiated; that spring trap netting (fine mesh) would be the most effective. Arguably, spring electrofishing would produce significant results as well. This can also be verified from 2016 MCWS spring electrofishing results. The fine mesh trap nets were most effective in the spring, specifically site 6. White sucker catch was also significantly higher in the spring and likely do to distance from spawning tributaries; site 16 for example. For assessing trout stocking success; trap netting and night electrofishing appear to be the best methods.

Stock Analysis: Two Mile Lake has been managed as a rainbow and brook trout fishery since the early 2000's, with the stocking of splake ceasing in 2010. At this point in time rainbow and brook trout are the two species stocked on an annual/biennial basis. From this point on we will focus on a rainbow and brook trout stocking strategy for Gull Lake.

Again, the objective of this assessment was to gather a greater understanding of the state of Gull Lake, with focus on correlating strong age classes of trout to stocking records. Therefore the intention was to pattern these correlations and suggest future stocking recommendations based on findings. Due to discrepancies with trout ages, the only members of the dataset used were the structures that achieved full confidence from our aging consultant.

Rainbow Trout: In terms of rainbows, we first notice that growth is similar when comparing to 2010 BTIN rainbow trout ages. In terms of stocking success, there is evidence of recruitment from each individual planting to the population. As expected, there is notable evidence in initial loss of stock as a result of the complex fish community (predation and competition). In 2017, it was noted that a vast majority of rainbows were skinny and in poor condition.

Table 9: Rainbow Trout Growth Comparison (FL-mm)

Age	2	3	4	5	6
Avg FL (mm) 2010	260.6	n/a	377	n/a	n/a
Avg FL (mm) 2017	273.5	309	378.47	378.35	396

6.0 Discussion

In terms of strong age class correlation, we noticed following age analysis that the greatest abundance of rainbows were 4+ years, which directly correlated with yearling spring stocking in 2014 (8,000 18+). The second strongest age class also correlated with spring stocking (5,000 18+cm in 2013). There was also evidence of stocking success of fall fingerlings (7,000 12-15cm in the fall of 2014). Spring yearling stocking appears to result in greater stocking success than fall fingerling stocking. Also, rates have been relatively low with regards to stocking rates from other jurisdictions (below). 2012 equated to 165 fall fingerlings/ha, 2013 equates to 41.4 spring yearling/ha, and 2014 equates to 66.2 spring yearling/ha and 99.3 fall fingerlings/ha.

The Following is a list of recommended rainbow trout stocking rates from different jurisdictions:

1) Minnesota DNR – In North-Central soft-water Lakes (similar in nature to Gull Lake) – the states stocks medium fingerlings at 175 fish/acre and yearling rainbows at 85 fish/acre for moderate angling pressure lakes annually (Johnson, 1978). This rate would equate to 51,887 (12-15cm) or 25,202 (18+) annually for Gull Lake.

2) In Manitoba, when referencing the creel census of Gull Lake in 1983 by Hugh Valiant; he states that stocking of fingerling rainbows is a waste of money; however, fall stocking should be investigated as a means of reducing bird predation (Valient, 1983). Rainbow trout are more suseptable to bird predation than splake or brook trout (Matkowski, 1982). He suggests that in order to provide reasonable angling quality at a reasonable cost, the lake should be stocked with either 0+ splake or 0+ brook trout in combination with a low levels of 2+ rainbow stocking. Of course, this was recommended prior to the yellow perch and white sucker populations present the lake today. He then goes on to state that in order to achieve a high angling quality 0.3 fish per hour this could be achieved by stocking 650 0+ splake, or 350 1+ brook trout, or 225 2+ rainbows per hectare. This equates to 78,520 0+ splake, or 42,280 1+ brook trout, or 27,180 2+ rainbows annually for Gull Lake.

3) Bidgood, 1975 had a recommended rainbow stocking rates for Alberta potholes. His recommendation was 500 (0+) per acre. This equates to 148,250 fingerling annually for Gull Lake.

4) Hopelain, 2000 had created stocking rates for California stocked trout lakes. For small fingerling rainbows (>75 per lb) the suggestion was for 50-100 fish per acre. This equates to 14,825 – 29,650 fingerling rainbow trout annually for Gull Lake.

6.0 Discussion

5) The Ohio Department of Natural Resources used 25 fish per hectare in lakes >33ha (Ohio DNR, undated). In Gull Lake, this equates to 3,020 fish per year. They do not reference stocking size. One can assume that at this stocking rate they are referring to either 1+ or 2+ fish.

6) The province of Quebec uses 200 fingerlings per hectare in lakes with moderate levels of competition (Quebec, 1988). This equates 24,160 fingerlings annually for Gull Lake.

7) Wyoming Department of Fish and Game use 150-300 "catchable" trout per surface acre (Eiserman, 1966). In Two Mile Lake this equates to 44,475 - 88,950 rainbow trout annually.

8) The province of Saskatchewan is experimenting with stocking larger trout in lakes experiencing perch problems. "In a couple lakes with perch we are planning on stocking larger trout (8-10 inches compared to 2-3 inches) at a reduced stocking rate (1/2 to 2/3 the regular rate) with the hope that the larger stocked trout will better compete with the perch" (Prestie, 2016). This was the first year this was tried and only in one lake so far, so we do not have any results yet (Prestie, 2016).

At the Whiteshell Hatchery; the facilities' logistics are as follows: Rainbow trout eggs are received in early March. The following fall rainbows are stocked as fingerlings, which are usually 12-15cm by that time. A portion of stock is also kept over winter and stocked the following spring as yearlings (which are usually 18+cm).

As we can see, rates vary significantly from jurisdiction to jurisdiction. In Gull Lake, the stocking rate ranges vary each year; however it appears that stocking densities are much lower than the above stated literature, including the recommended rates recommended by Valient for Gull lake in 1983. Most of the stocking rates above do not consider levels of competition and lake complexity. Generally, with increasing levels of competition requires stocking densities of rainbow trout at lower rates.

Table 10: Gull Lake Rainbow Trout Stocking Densities (2008-2016)

Year	2010		2011			2012	2013	2014				2015	2016	
Date	11-May	3-Jun	2-Jun	14-Jun	29-Sep	20-Sep	19-Jun	5-Jun	23-Jun	22-Sep	9-Oct		20-Jun	19-Sep
Rate	7,000	2,000	3,000	2,500	18,000	20,000	5,000	4,000	4,000	5,000	7,000	no stocking	2,805	5,000
Age	1+	1+	1+	1+	0+	0+	1+	1+	1+	0+	0+		1+	0+
2017 Age	8+	8+	7+	7+	6+	5+	5+	4+	4+	3+	3+		2+	1+
Rate (Fish/Ha)	57.9	16.5	24.8	20.7	149	165.6	41.4	33.1	33.1	41.4	57.9		23.22	41.4

6.0 Discussion

Brook Trout: In terms of brook trout growth is similar, if not slightly better when comparing to 2010 BTIN brook trout age and growth. Brook trout were found in relatively low numbers in 2017 (n=55); which is approximately 25% the catch rate of rainbows. Brook Trout have been stocked at approximately half the rate of rainbows since 2010. Also, during 2017 assessments it was noted that a brook trout were fat and in good condition, especially when comparing to rainbow trout.

Table 11: Brook Trout Growth Comparison (FL)

Age	2	3	4
Avg. FL (mm) 2010	293.8	321	345
Avg. FL (mm) 2017	308.9	306.4	473

In terms of strong age class correlation, we simply cannot draw too many conclusions. Age class strength simply represents harvest rates, with lots of little fish and fewer large fish. However, we can still note fair survival rates from both fall fingerling and spring yearling plantings. In summary, spring yearling stocking appears similar to fall fingerling stocking in terms of success, but a greater sample size of ages would without a doubt result in a greater understanding of stocking success.

The Following is a list of recommended brook trout stocking rates from different jurisdictions:

1) The Province of Alberta stocks brook trout at 75-100 fingerlings per hectare (Alberta Ministry of the Environment, 1994). For Gull Lake, this equates to 9,060 - 12,080 fingerings.

2) The Michigan Department of Natural Resources (1987) stocked brook trout at 25 (5-7”) yearlings in multi-species two-story lakes. This equates to 7,412 yearlings for Gull Lake.

3) The state of Minnesota stocks brook trout at 150-200 fingerlings per acre or 100-250 yearlings per acre (Johnson, 1978). Applying this rate to Gull Lake would suggest 44,475 - 53,900 fingerlings or 29,650 – 74,125 yearlings.

4) Ohio (undated), stocks brook trout at 100 fish per hectare for lakes showing moderate growth. In Gull Lake, this would equate to 12,080 fish at an unknown size.

5) The Pennsylvania Fish and Boat Commission (1997), suggests stocking brook trout at 75-625 fish per acre in lakes. In Gull Lake this rate would equate to 22,238 – 185,312 fish at unknown sizes.

6.0 Discussion

6) In Quebec waters (1988) with moderate competition, brook trout stocking in oligotrophic lakes is 60 fish per hectare, and 125 fish per hectare in mesotrophic lakes. Gull Lake arguably stands somewhere between oligotrophic and mesotrophic. This equates to 7,248, and 15,000 for Gull Lake, respectively.

7) In Saskatchewan (1999), brook trout are stocked at 100 fish per hectare. For Gull Lake this equates to 12,080 brook trout for a lake this size. Also, as noted earlier, Saskatchewan is experimenting with stocking larger trout at 1/2 to 1/3 regular rate in lakes experiencing perch problems. This experiment is still in it's early stages (Prestie, 2016).

8) Valient, 1983 recommends stocking Gull Lake with brook trout at a rate of 350 yearlings per hectare in Gull Lake. This equates to 42,280 yearlings on an annual basis.

The Whiteshell Hatchery, generally stocks brook trout as fingerlings in the fall, which are usually 12-15cm by that time. A portion of stock is also kept over winter and stocked the following spring as yearlings; which are usually 18+cm.

Splake: Splake were also found in low numbers (n=41) which is directly associated to low stocking densities over the past 10 years. The most recent stocking occurred in September of 2010 with 6,000 18+cm splake. The species were found in very good condition and relatively large sizes. Surprisingly, in terms of age and growth analysis multiple age classes were found. The three potential reasons for this occurrence (1) inaccurate age analysis, (2) undocumented stockings in the past few years (unlikely), or (3) the hybrid has shown successful natural recruitment. First generation (F1) are known to have established a self-sustaining population in Agnes Lake, Alberta (Spangler, 1978). Regardless of these findings, it is nice to see a remnant population of splake in Gull Lake. Splake stocking was considered very successful a decade or so ago, and a request is submitted annually to Jeff Long for splake destined for the Duck Mountains. It is unknown how long it will be until splake will be available at this time. Splake have actually been used as a predator to reduce to abundance of stunted perch populations (Rumsey and Lamarre 1994). However, there have also been multiple instances where splake stocking on top of perch populations was unsuccessfully do to high mortalities associated with interspecific competition. Regardless, the fact the stocking splake in Gull Lake in the past showed reasonable levels of success should not be overlooked.

6.0 Discussion

In general, and multiple authors state that stocking of trout in the fall survive poorly. This is based on the fact that they do not disperse as readily, and that overwinter mortality is extensive (Needham, 1959). On the other hand, Matkowski (1982) stated that predation by birds and fish appear to be the two major sources of loss of stocked trout in study lakes (Matkowski, 1982). Matkowski, found that an adult loon in a particular Duck Mountain trout takes will eat three stocked trout per day. An interesting pilot study conducted in Perch Lake by Matkowski in 1982 is as follows. In early May, the lake was stocked with 321 brook trout, 321 splake, and 330 rainbow trout. Matkowski observed predatory birds over the course of the summer, noting significant loss of stock from loons in particular. In the fall, the lake was pulse netted as an effort to quantify survival rates and loss of stock over the summer. Catch yielded 135 brook trout, 171 splake, and and 29 rainbows. This equated to a survival rate of 42%, 53%, and 8% respectively. Significantly fewer yearling rainbows survived the summer compared to the other two species and it seems likely that because the rainbows occupy shallower, warmer water than the splake or brook trout do, they are more susceptible to bird predation (Valient, 1983).

Fingerling stocked trout in the fall are subject to only a short period of predation before freeze up and fish surviving to the following spring are apparently not as seriously reduced by avian or mammal predators (Johnson, 1978). In 2017, predatory birds were often documented on Gull Lake.

In a lake environment, the basic release techniques involve planting fish in shallow near-shore area or in deeper, open water. Walden (1956) recommended that brook trout be planted in littoral areas of lakes where protective cover can readily be sought. Kerr (2000) recommends that rainbow and brook trout be released over deep water if littoral predators are present.

Mueller and Rockett (1961) suggested that planted rainbow trout needed to be at least four inches long (e.g. 40/lb) to escape predation from yellow perch. Rainbow trout predation form yellow perch was found to be significantly less when released over deep (12-18m) water sites ((Mueller & Rocket 1961).

Rainbow and brook trout stocking has occurred throughout the year but there is considerable evidence to suggest that plantings in the spring and summer are most successful (Kerr, 2000). When it comes to rainbow trout stocking where levels of competition are present; stocking larger is better. Stringer (1980) generalized survival rates for stocked rainbow trout as follows: yearlings (40-60%), fall fingerlings (10-30%), and fry (2-6%).

6.0 Discussion

Hartleb and Mooring (1994) concluded that stocking rainbow and brook trout into waters containing other dietary competitors, such as yellow perch limit survival and growth. Multiple researchers have found that planted rainbow and brook trout do not compete successfully with yellow perch for food (Kerr, 2000).

Several studies have demonstrated a negative relationship between white suckers and rainbow trout (Kerr, 2000). Alexander (1975) found that survival of stocked rainbow trout was reduced with the introduction of white sucker in Paine Lake, Alberta. This was attributed to a reduction in the benthos population. In Paine Lake, Barton noted that trout catch rate increased from 0.11 to 0.94 fish/hour when stocking rates increased from 1028-2475 fish/ha. On the other hand, a handful of studies were unable to demonstrate a relationship between white sucker abundance and growth and survival of stocked brook trout; noting a niche shift when living amongst suckers (Kerr, 2000).

As seen above, stocking rates vary considerably among different jurisdictions according to the stocking objective, age/size of fish, and amount the fishing pressure of the waterbody. There are a number of studies that suggest slow growth and reduced condition can be attributed to over-stocking. Overall, it is better to understock than to overstock (Brown and Thorenson, 1958).

In terms of stocking frequency, the best approach depends on the stocking objective. For projects designed to provide an immediate (i.e. put and take) angling opportunities, it may be prudent to stock catchable sized fish several times during the season (Kerr, 2000). In situations where establishing a longer-term (i.e. put-and-delayed-take fishery) it the goal, annual or alternate year stocking is probably more appropriate (Kerr, 2000). Gull Lake is a put-grow-delayed-take fishery. Raising rainbows to catchable sizes is not occurring in Manitoba at this time.

At this point in time, we can confidently state that Gull Lake is a complicated system in the fact that the lake hosts multiple trout species, a prevalent yellow perch and sucker population, evidence of small pike and walleye populations, and a variety of fish eating avian species that further complicate trout stocking success. A chemical reclamation of the lake would without a doubt increase stocking success, however this is not an option at this time. Manual perch removals are worth consideration but a few things should be considered including long term commitments.

6.0 Discussion

Manual removal efforts are extremely unlikely to remove all individuals, and are only temporary because the juveniles that remain will display compensatory increases in recruitment, survival and growth. Therefore, mechanical removal programs should be comprehensive and long-term (Jolley et el, 2008).

There are multiple options for stocking trout to consider. This refers to size, frequency, rate, and method. Regarding stocking size and frequency, of course stocking fish at a harvestable size would result in increased return to the anglers. In Manitoba, we currently have access to 0+ (12-15cm) for fall stocking and 1+ (18+cm) available for spring stocking. Based on Mueller and Rocket's findings, we should avoid stocking rainbows <4" (10cm) in length at all costs in lakes with yellow perch. Stocking rates are perhaps the most difficult to recommend. As we know, this complicated system has an abundance of competition and predators. Therefore, determining a balanced approach should consider; initial loss of stock to avian and fish predation, and mortalities associated with interspecific & intraspecific competition (including over stocking). Due to the complexity of these relationships, we can simply suggest rates, sizes, and frequencies that are based on success rates from past years. Based on available information, stocking program success varies significantly and are largely customized based on lake type, ecological complexity, and angling pressure. In terms of stocking method, there are two possible methods. Spot stocking by truck, or scatter stocking by boat. For reasoning stated above, we recommend scatter stocking over deep water(brook and rainbow trout), or in littoral areas with high fish cover (brook trout).

Lake Whitefish: Whitefish were found in very low numbers (n=32), which is expected regarding the littoral fish sampling methods used. Whitefish are a pelagic species, therefore using trap netting and electrofishing in order to quantify abundance would not be representative. Whitefish were found to be very skinny and in very poor condition, especially when compared to 2010/2011 BTIN. Poor condition is likely a result of a complex fish community with limited forage; however this cannot be verified based on the available information at this time.

6.0 Discussion

Yellow Perch: Yellow perch still exist in very high numbers and it is without a doubt that they are having a detrimental effort on stocked trout success. Over the years, the size of perch has been reduced. Age analysis from 2017 suggest that the population has stunted. In the first few years after the introduction to a waterbody perch sometimes produce attractive sized fish. As the perch population expands rapidly they compete with trout and each other for food, negatively affecting the growth of both species (FMB AB, 2008). Once over-populated, they remain in this ecological stage; i.e. abundant and very small sized fish (FMB AB, 2008). This occurrence, appears to be occurring in Two Mile Lake at this present time. Also, the perch still have high infestation rates of the black spot and yellow grub parasite(s). During 2017 assessments a total of 2,759 individuals were removed with an estimated biomass of 166.15kg.

White Sucker: At this time it is believed that the first confirmed presence of white sucker was in 2010. It becomes apparent that the species has made it's way back into the lake since reclamation (around 1958). It is unknown which tributary the suckers entered from, but it is believed that the fish entered from Child's Lake. As we know, white suckers are extremely aggressive and opportunistic; therefore we can confidently say that over time the population will grow and further complicate stocking success. In 2017, a total of 1,487 individuals were removed with an estimated biomass of 667.6kg.

Walleye and Northern Pike: One walleye and one pike were captured during spring trap netting efforts. These fish may have found its way to the lake through natural means, or may have been introduced illegally. Regardless, the presence of these predators in high populations would without a doubt further complicate trout stocking success, and therefore should continue to be monitored.

7.0 Recommendations

Rainbow trout should be stocked twice annually; once in the spring and once in the fall. Spring stocking of yearling trout (18+) should be stocked with 6,000 fish annually. This equates to 50 yearling/hectare. Fall stocking of fingerling rainbow trout should be stocked at 12,000 – 18,000 fish annually. This equates to 100 - 150 fingerling/hectare.

Brook trout should also be stocked with both yearlings and fingerlings annually. Spring stocking of yearling trout (18+) should be stocked with 4,800 fish annually. This equates to 40 yearling/hectare. Fall stocking of fingerling brook trout should be stocked at 6,000 – 12,000 fish annually. This equates to 50 – 100 fingerlings per hectare.

Stocking success of splake has been verified from SVSFE 2010-2011 BTIN results along with master anger submissions following perch and sucker encroachments (specifically 2015). Both Fraser (1988), and Liskauskas & Quinn (1991) recommend that splake should not be stocked annually, and that stocking should occur every 2-3 years at relatively low rates. Stocking frequency should occur once biennially, at a rate of 60-130 fish/hectare. This equates to 3,000-6,000 fish biennially, spring or fall, whichever is available. This stocking rate simply mirrors what has been successful in the past, and is the best recommendation based on available information at this time.

Also, in terms of stocking method it is highly recommended that scatter stocking in both spring and fall over deep water be priority. These high rates are meant to incorporate loss of stock of yearling trout to bird predation over the summer months, and also loss of stock of fingerling trout to starvation over the winter months. Of course, there in no guarantee that stocking at these suggested rates are going to "turn the lake around", however based on literature review it is believed that this program will result in increased angling success of both rainbow and brook trout.

Historically, Gull Lake was a pike and sucker lake that had been reclaimed at some point in the lake 1950's. Since this time, a variety of non-salmonid species have began re-appearing in the lake including, yellow perch, white sucker, and more recently; northern pike and walleye. Based on available evidence it is believed that these species have found their way to Gull Lake through connectivity with Child's Lake. For this reason it is recommended that these connective tributaries be evaluated, and that control structures be installed if necessary to prohibit further encroachment of pike and walleye to Gull Lake.

Furthermore, follow up assessments (SSTLS) should be conducted in 4-6 years to monitor the success of adapted stocking rates along with the status of non-trout encroachment.

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Goals are only achievable by working with individuals who are passionate about fishing and who have the drive to do meaningful work. These partnerships are truly the key to success. We, as SVSFE technicians are extremely grateful for the encouragement received from the organization and look forward to building this partnership in the years to come.

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