Fall Walleye Index Netting at Peerless Lake, Alberta, 2012

Fisheries Management
Lesser Slave Area

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Abstract

Peerless Lake was surveyed in September, 2012 utilizing the modified Fall Walleye Index Netting (FWIN) protocol using half FIWN nets to assess the stock status, relative abundance, structure, and reproduction (recruitment) of primarily the Walleye *(Sander vitreus)* population as well as Northern Pike (*Esox lucius*), Yellow Perch (*Perca flavescens*) and Lake Whitefish (*Coregonus clupeaformis*). This information was used to evaluate the status of the current Sport Fishing Regulations for Peerless Lake to ensure they are in alignment with the stock status of the fish populations. In total 545 fish were captured in 18 half nets comprised of 92 Walleye, 6 Lake Trout, 45 Northern Pike, 146 Lake Whitefish, 39 Yellow Perch, 170 Cisco (*Coregonus artedi*), 21 Spottail Shinners (*Notropis hudsonius*), 25 White Suckers (*Catostomus commersoni*) and 1 Longnose Suckers (*Catostomus catostomus*).

The Walleye catch per unit effort (maximum likelihood estimate) was 9.4 fish/100m^2/24hr (95% C.I. 6.4 - 12.9) and the mean catch per unit effort estimated at 9.5 fish/100m^2/24hr. This catch rate is considered low and indicates a stock status of 'vulnerable' (Sullivan 2003). Female Walleye (n=39) ranged in age from 1 to 21 years-old (several full year class failures evident) reaching sexual maturity at approximately age 9 and ranged in size from 200mm – 754mm total length. Male Walleye (n= 45) ranged in age from 0 to 22 years-old (several full year class failures evident) reaching sexual maturity sometime after age 5 and ranged in size from 127mm – 687mm total length. Walleye had moderate growth rates reaching 500mm TL 7 years with females (K= 0.124) growing slightly slower than males (K= 0.153) with females reaching slightly larger L∞ (780.0mm TL) than males (697.5 mm TL). Walleye population in Peerless Lake has historically been categorized as a stable to vulnerable population. The remaining biological indicators from the 2012 FWIN signify that this population continues to exhibit many characteristics of a stable to vulnerable Walleye population. However low densities, unbalanced catch curve, low levels of natural recruitment and multiple full year class failures indicate and may result in this status shifting to vulnerable in future assessments.

The Northern Pike catch per unit effort (maximum likelihood estimate) was 4.5fish/100m^2/24hr (95% C.I. 3.3 -6.1) and the mean catch per unit effort was estimated at 4.7 fish/100m^2/24hr. Female pike (n=37) ranged in age from one to 16 years-old (several full year class failures), due to the low sample size no maturation schedule could be derived as nearly all (n=37) were mature and ranged in size from 383mm – 1038mm total length. Male pike (n=11) ranged in age from 5 to 8 years-old (several full year class failures), due to the low sample size no maturation schedule could be derived as all male pike were mature and ranged in size from 582 – 710mm total length. The catch rate and biological indicators from the 2012 FWIN are indicative of a vulnerable to collapsed northern pike population.

The lake whitefish catch per unit effort (maximum likelihood estimate) was 14.2 fish/100m^2/24hr (95% C.I. 8.6 -21.0) and the mean catch per unit effort was estimated at 14.9 fish/100m^2/24hr. Female lake whitefish (n=57) ranged in age from 0 to 28 years-old (several full year class failures), ranged in size from 129mm – 574mm total length. Female lake whitefish were mature at 9 years of age and older. Male lake whitefish (n=57) ranged in age from 2 to 24 years-old (several full year class failures) and ranged in size from 188mm – 660mm total length with maturity reached at 9 years of age. Females had a faster growth rate than male lake whitefish (f= 0.164, m=0.160), however males were able to reach a greater overall total length than females (F= 516.91mm TL, M= 528.23mm TL).

Introduction

Alberta Environment and Sustainable Resource Development implements strategies to manage sport fisheries for long-term sustainable harvest. Monitoring is required to evaluate the effectiveness of these strategies and to recommend alternate strategies where evidence supports change. The objective of Fall Walleye Index Netting is to estimate relative abundance, population structure and growth of Walleye, but we also collect data for Northern Pike, Yellow Perch and Lake Whitefish. These data are essential to provide sustainable harvest allocations for sport fish.

Peerless Lake is an 8259 ha lake located approximately 50 km east-northeast of Red Earth Creek, Alberta. Access to Peerless Lake is possible through one of three publically accessible boat launches at two public campgrounds. Peerless Lake provides domestic and recreational fishing opportunities at various times of the year. The majority of use and harvest takes place during the open water months with Domestic gill net fisheries and recreational angling exerting harvest pressure on fish populations. Domestic pressure on Peerless Lake has not been quantified but presumed to be moderate to high based on the proximity to the Trout Peerless First Nation. Peerless Lake supports one of few 'drive to' fisheries in Alberta where it is possible to harvest lake trout, making the lake a popular destination for fisherman throughout the province. Extensive work has been completed on the population of lake trout in Peerless Lake between the mid 1980's and most recently by Fish and Wildlife staff in 2011 and 2012. Recent anecdotal evidence and enforcement reports indicate that over the last several years Peerless Lake has grown in popularity for sport fishing amongst local and visiting anglers. A creel survey was conducted from May to October of 2012 at Peerless Lake to provide a current estimate of angler pressure and harvest; results are pending following completion of data analysis. Winter angling pressure on Peerless Lake is unknown but presumed to be less than open water sportfishing. Peerless Lake had not been assessed using the FWIN protocol prior to 2012, due to the presence of lake trout and the sensitivity of the population. The last sportfish population assessment was conducted by the ESRD in 2012 and was designed to assess lake trout populations in Peerless Lake. Results of the summer profundal index netting (SPIN) completed by ESRD in 2011 and 2012 are pending following completion of data analysis and write up. Historically there has been commercial fishing that took place on Peerless Lake. The commercial fishery was regularly closed for meeting or exceeding the lake trout tolerance limit and following the decline of the lake whitefish population the fishery was suspended. There has not been a commercial fishery on Peerless Lake since 1999 and currently the commercial rationale for Peerless Lake indicates that the lake may not be able to support such a fishery at this time.

The current sportfishing regulations on Peerless Lake & tributaries & outlet* are: Open all year (lake only) – lake trout limit 3; Walleye and pike limit 0 from March 2 to May 31; Walleye limit 1 over 50cm and pike limit 3 over 63from June 1 to March 1; perch limit 15; lake whitefish limit 10; burbot limit 10. *Tributaries and outlet CLOSED November 1 to May 31.

Methods

A comprehensive description of equipment and methodology may be found in the Manual of Instructions Fall Walleye Index Netting (FWIN) (Morgan 2002). The FWIN protocol used at Peerless Lake was modified in accordance with the Standards for Index Netting of Walleye in Alberta concerning the use of half FWIN nets. Sites were selected randomly and were weighted by depth stratum. The number of nets set was by conducting power analyses of net catches to achieve a predetermined level of precision measured by a coefficient of variation of less than 0.2 (Haddon 2001, Morgan 2002). In total 18 nets were set, six nets were set in shallow depth stratum < 5m water, 12 nets were set in 5 – 15 meter medium depth stratum. The FWIN nets consisted of eight panels, 1.83 m deep x 3.81 m in length with stretched mesh sizes of 25, 38, 51, 64, 76, 102, 127, and 152 mm.

Nets were set for approximately 24 hrs before being cleared of fish and reset at a new location. The date and time the nets were set and pulled were recorded. Nets were set perpendicular to depth contours, and minimum and maximum depths were recorded. The net location was recorded in Universal Transverse Mercator (UTM) projection coordinates using the North American Datum 1983 (NAD 83) using handheld GPS units. Surface water temperature was also recorded for most net locations. The FWIN protocol requires that sampling occur at surface temperatures of 10 to 15 C.

All fish species were retained for biological sampling. Catch was recorded by net location and mesh size. A net ID, date, mesh size, and count of each species of fish caught were recorded for each panel for catch-per-unit-effort (CPUE) calculations. All fish were measured for fork length (FL), and total length (TL) to the nearest millimetre, and weighed in grams, with individual data recorded on a sample envelope for each fish. Walleye, northern pike, yellow perch, and Lake Whitefish were also examined for gender and maturity, and a bony structure was removed for ageing.

Otoliths were collected and prepared following Watkins and Spencer (2009). Aging structures for the remaining species were collected and prepared following Mackay et al (1990). Walleye and northern pike ages were determined and verified by a second technician. Gonad weight was also collected for mature female walleye.

Walleye catch rates were calculated as walleye·100m-2·24hrs-1 and empirical confidence intervals to 95% were determined by bootstrapping net catches to 50,000 replications (Haddon, 2001). Size and age distributions, von Bertanlanffy growth curves, and maturity rates were calculated to assess the stock status according to modified guidelines of the Walleye Management and Recovery Plan (Berry 1995). Von Bertalanffy parameters were calculated using FAST 2.1 software (Slipke and Maceina, 2002). The raw data can be found in Fish and Wildlife Management Information System (FWMIS).

Walleye densities were estimated from the FWIN catch rate based on the regression $y = 1.8359x + 0.1235$ (where y = density (#/ha) and x = FWIN CUE) from unpublished Alberta Conservation Association and Fish and Wildlife data.

Although not designed specifically for managing northern pike or other species captured, FWIN surveys may also be useful as a tool for assessing those populations as well. Fisheries Management Branch (FMB) is currently calibrating FWIN catch rates and structures of northern pike populations to other sampling methods currently used for this species. Biological data for northern pike and lake whitefish can be found in the Appendices.

Results

Index netting was conducted from September $10-14^{h}$, 2012. Water temperature varied from 13.6-15.0^{o}C at all 18 sampling sites. Nets were set for a mean time of 23 hours and 13minutes, with soak times varying between 23 hours and 30 minutes– 24hours and 11minutes from site to site. A total of 545 fish representing nine species were caught during the survey: 92 Walleye, 9 lake trout, 45 northern pike, 146 lake whitefish, 39 yellow perch, 170 cisco, 21 spottail shiners, 25 white suckers and 1 longnose sucker.

Walleye

The Walleye catch per unit effort (maximum likelihood estimate) was 9.4 fish/100m^2/24hr (95% C.I. 6.4 -12.9) (table 1) and the mean catch per unit effort estimated at 9.5 fish/100m^2/24hr. This catch rate is considered low and indicates a stock status of 'vulnerable' (Sullivan 2003). Female Walleye (n=39) ranged in age from 1 to 21 years-old (several full year class failures evident) reaching sexual maturity at approximately age 9 and ranged in size from 200mm – 754mm total length. Male Walleye ranged in age from 0 to 22 years-old (several full year class failures evident) reaching sexual maturity sometime after age 5 and ranged in size from 127mm – 687mm total length. Walleye had moderate growth rates reaching 500mm TL 7 years with females (K= 0.124) growing slightly slower than males (K= 0.153) with females reaching slightly larger $L\infty$ (780.0mm TL) than males (697.5 mm TL). A Gonadosomatic Index (GSI) is a ratio of gonad weight over whole body weight and is used to indicate the potential for an adult female to successfully spawn the following spring or the maturity of the gonads at the relative whole body weight of the fish. Of the female walleye sampled 12 of 19 fish (63%) possessed a GSI of above 2.0% suggesting that all of these individuals would potentially spawn the following spring. The remaining biological indicators from the 2012 FWIN signify that this population continues to exhibit many characteristics of a trophy (old growth) Walleye population (Berry 1995, Sullivan 2003), however low densities, unbalanced catch curve, low levels of natural recruitment and some full year class failures are also indicative of a vulnerable Walleye population.

Northern Pike

The Northern Pike catch per unit effort (maximum likelihood estimate) was 4.5fish/100m^2/24hr (95% C.I. 3.3 - 6.1) (table 1) and the mean catch per unit effort was estimated at 4.7 fish/100m^2/24hr. Female northern pike (n=34) ranged in age from 1 to 16 years-old (figure 4) with several full year class failures present. Due to the low sample size no maturation schedule could be derived as nearly all (n=34) were mature (table 4). Female northern pike ranged in size from 383mm – 1038mm total length (figure 5, table 5). Male pike (n=11) ranged in age from 5 to 8 years-old with several full year class failures (figure 4). Due to the low sample size no maturation schedule could be derived as all male pike were mature (table 4). Male northern pike ranged in size from 582mm – 710 mm total length (figure 5, table 5). The catch rate and biological indicators from the 2012 FWIN are indicative of a vulnerable to collapsed Northern Pike population.

Lake Whitefish

The lake whitefish catch per unit effort (maximum likelihood estimate) was 14.2 fish/100m^2/24hr (95% C.I. 8.6 - 21.0) (table 1) and the mean catch per unit effort was estimated at 14.9 fish/100m^2/24hr. Female lake whitefish (n=57) ranged in age from 0 to 28 years-old (several full year class failures), ranged in size from 129mm – 574mm total length. Due to the low sample size no accurate maturation schedule could be derived, all females were mature at 12 years of age and older. Male lake whitefish (n=57) ranged in age from 1 to 26 years-old (several full year class failures) and ranged in size from 188mm – 660mm total length.. Due to the low sample size no maturation schedule could be derived as all male lake whitefish were mature after 8 years of age. Females had a faster growth rate than male lake whitefish (f= 0.164, m=0.160), however males were able to reach a greater overall total length than females (F= 516.91mm TL, M= 528.23mm TL).

Once sampling was completed any fish fit for human consumption were distributed to local members of the Trout Peerless First Nation through local aboriginal liaisons and fisheries management staff. Fish that were not fit for human consumption were either saved for future projects, donated as bate or feed for injured wildlife or disposed of at the local landfill facility. Preference was to have as much fish as possible used by local first nations.

Yellow Perch

The yellow perch catch per unit effort (maximum likelihood estimate) was 3.6 fish/100m^2/24hr (95% C.I. 1.5 – 7.4) (table 1) and the mean catch per unity effort was estimated at 4.0 fish/100m^2/24hr. Female yellow perch (n=26) ranged in age from 1 – 8 years-old, and ranged in size from 101mm - 234mm total length. Make yellow perch (n=13) ranged in age from 1 – 4 years and ranged in size from 103 – 160 mm total length. Due the low sample size and gear recruitment, no maturation schedule could be derived as all male and nearly all female yellow perch sampled were mature. Growth rates for yellow perch could not be calculated due to low sample size.

Tables and Figures

Table 1. Species catch rates from 2012 Peerless Lake FWIN survey. Additional species observed not included in data analysis include: lake trout, spottail shiner, white sucker, longnose sucker and cisco.

Species	Year	CPUE	95% CI
WALL	2012	9.5	(6.4 - 12.9)
NRPK	2012	4.7	(3.3 - 6.1)
LKWH	2012	14.3	(8.6 - 21.0)

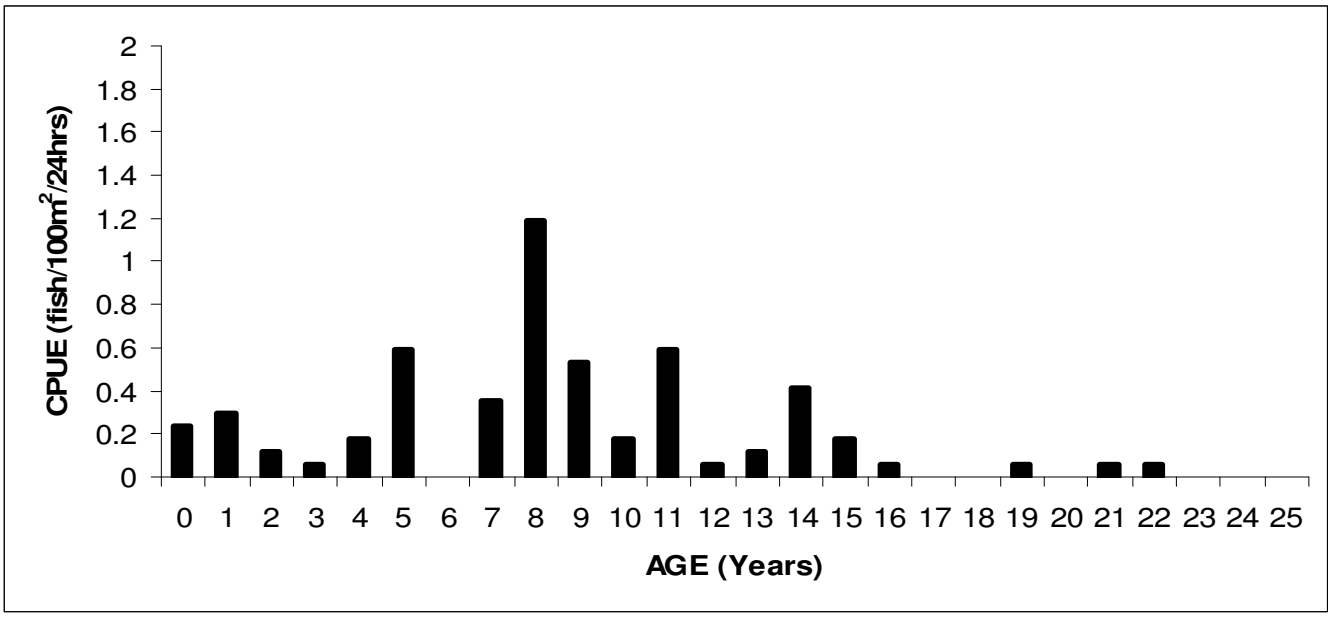

Figure 1. Age distribution of Walleye captured and sampled from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=92). Y-axis is catch per unit effort (fish/100m^2/24hrs); the X-axis is age of Walleye in years.

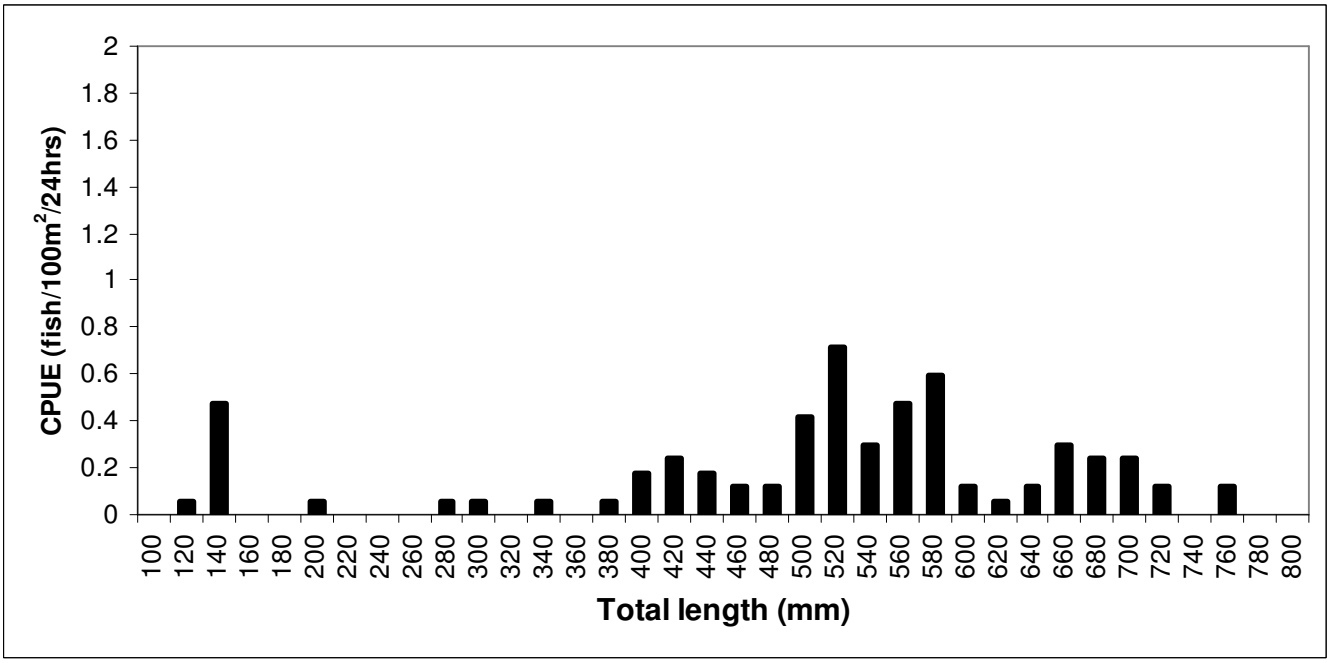

Figure 2. Total length distributions of Walleye from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=92). Y-axis is catch per unit effort (fish/100m^2/24hrs); X-axis is total length of Walleye in millimetres.

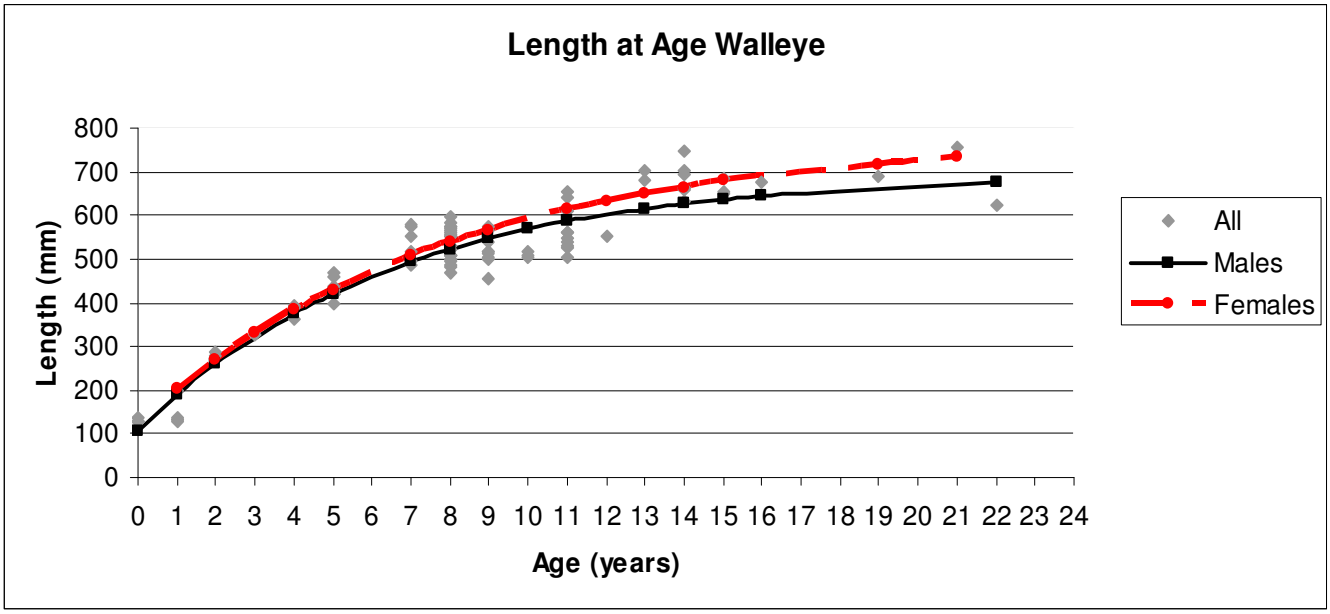

Figure 3. Length-at-age scatter plot with von Bertalanffy growth equations for all Walleye sampled 2012; (n=92; K=0.136, L∞=732.117mm TL, t0= -1.248), females (n=39; K=0.124, L∞=780.0021mm TL, t0= -1.446), and males (n=45, K=0.153, L∞=697.575 mm TL, t0= -1.058) * Eight individuals, sex unknown, excluded from calculations.

Table 2. Walleye length composition (sample number, percent) of sexes combined, for males and female; number and maturing (%) for Peerless Lake 2012 FWIN survey. Eight individuals were excluded from maturity ranking for male and female comparison because of unknown gender; however their maturity TL was identified with the majority sample.

			Males		Females	
TL (mm)	Number (No.) (N)	Comp. (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0	0	~	0	~
50	0	0	0	~	0	~
100	0	0	0	~	0	~
150	2	2.3809524	2	0	0	~
200	1	1.1904762	0	0	1	0
250	2	2.3809524	1	0	1	0
300	1	1.1904762	0	0	1	0
350	1	1.1904762	2	0	2	0
400	7	8.3333333	2	50	5	0
450	11	13.095238	7	100	4	0
500	19	22.619048	14	100	5	50
550	20	23.809524	7	100	11	82
600	5	5.952381	4	100	1	100
650	10	11.904762	6	100	4	100
700	4	4.7619048	0	0	3	100
750	1	1.1904762	0	0	1	100
800	0	0	0	0	0	~
SUM	**84**	**100**	**45**	~	**39**	~

Table 3. Walleye age composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Peerless Lake 2012 FWIN survey.

	All	Males		Females	
Age	Number (N)	No. (N)	Mature %	No. (N)	Mature %
0	1	1	~	0	~
1	2	1	0	1	0
2	2	1	0	1	0
3	1	0	~	1	0
4	3	1	0	2	0
5	10	4	50	6	0
6	0	0	~	0	~
7	6	1	100	5	60
8	20	12	100	8	60
9	9	5	100	4	100
10	3	3	100	0	0
11	10	7	100	3	66
12	1	0	0	1	100
13	2	1	100	1	100
14	7	4	100	3	100
15	3	2	100	1	100
16	1	1	100	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	1	0	0	1	100
20	0	0	0	0	0
21	1	0	0	1	100
22	1	1	100	0	0
SUM	**84**	**45**	~	**39**	~

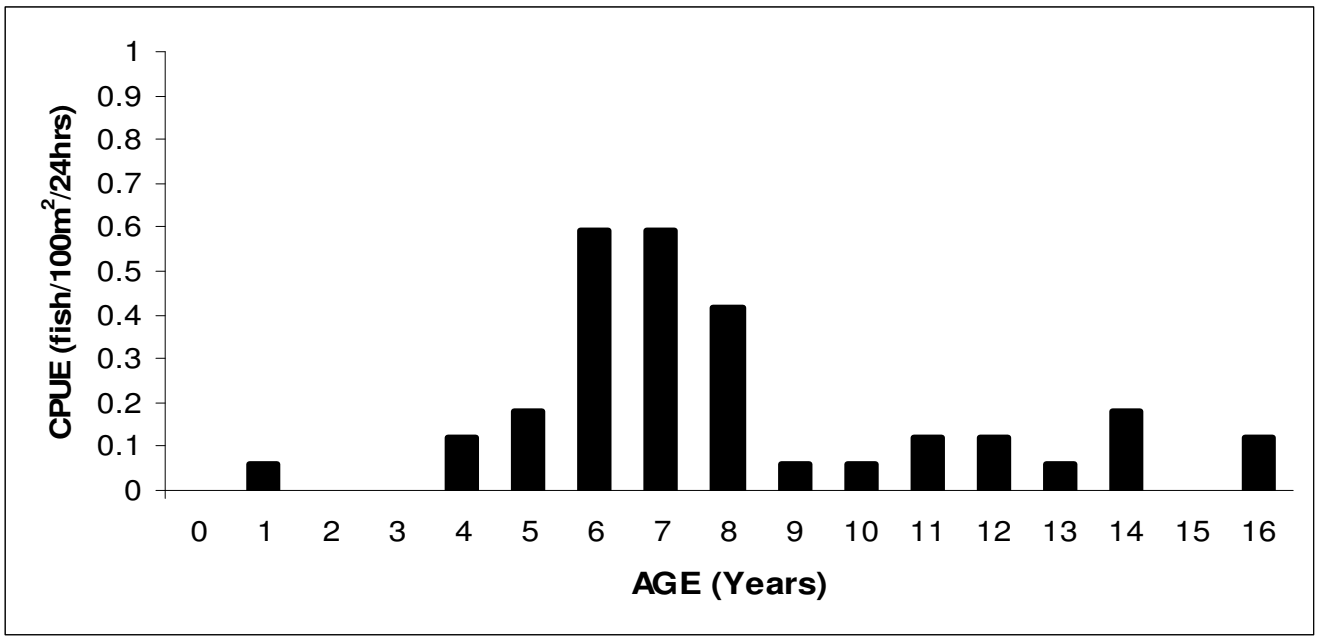

Figure 4. Age distribution of northern pike captured and sampled from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=45). Y-axis is catch per unit effort (fish/100m^2/24hrs); the X-axis is age of pike in years.

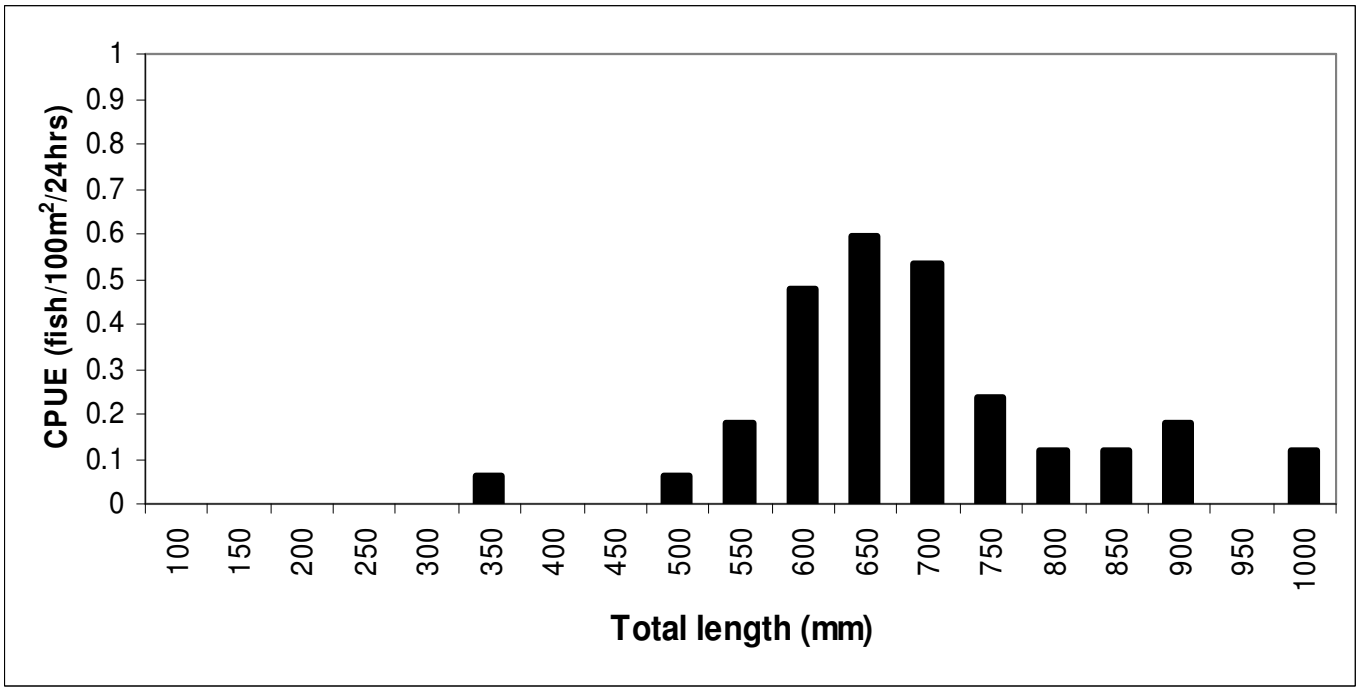

Figure 5. Total length distributions of northern pike from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=45). Y-axis is catch per unit effort (fish/100m^2/24hrs); X-axis is total length of pike in millimetres.

Table 4. Northern pike age composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Peerless Lake 2012 FWIN survey.

			Males		Females	
Age	No. (N)	Comp. (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0	0	~	0	~
1	1	2.222222	0	~	1	0
2	0	0	0	~	0	~
3	0	0	0	~	0	~
4	2	4.444444	0	~	2	100
5	3	6.666667	2	100	1	100
6	10	22.22222	5	100	5	100
7	10	22.22222	3	100	7	100
8	7	15.55556	1	100	6	100
9	1	2.222222	0	~	1	100
10	1	2.222222	0	~	1	100
11	2	4.444444	0	~	2	100
12	2	4.444444	0	~	2	100
13	1	2.222222	0	~	1	100
14	3	6.666667	0	~	3	100
15	0	0	0	~	0	~
16	2	4.444444	0	~	2	100
SUM	45	100	11		34	

Table 5. Northern pike length composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Peerless Lake 2012 FWIN survey.

		Males		Female	
TL (mm)	**Number (N)**	**No. (N)**	**Mature (%)**	**No. (N)**	**Mature (%)**
0	0	0	~	0	~
50	0	0	~	0	~
100	0	0	~	0	~
150	0	0	~	0	~
200	0	0	~	0	~
250	0	0	~	0	~
300	0	0	~	0	~
350	1	0	~	1	0
400	0	0	~	0	~
450	0	0	~	0	~
500	0	0	~	0	~
550	4	2	100	2	100
600	8	4	100	4	100
650	10	4	100	6	100
700	9	1	100	8	100
750	4	0	0	4	100
800	2	0	0	2	100
850	4	0	0	2	100
900	3	0	0	3	100
950	0	0	0	0	0
1000	2	0	0	2	100
SUM	47	11	~	34	~

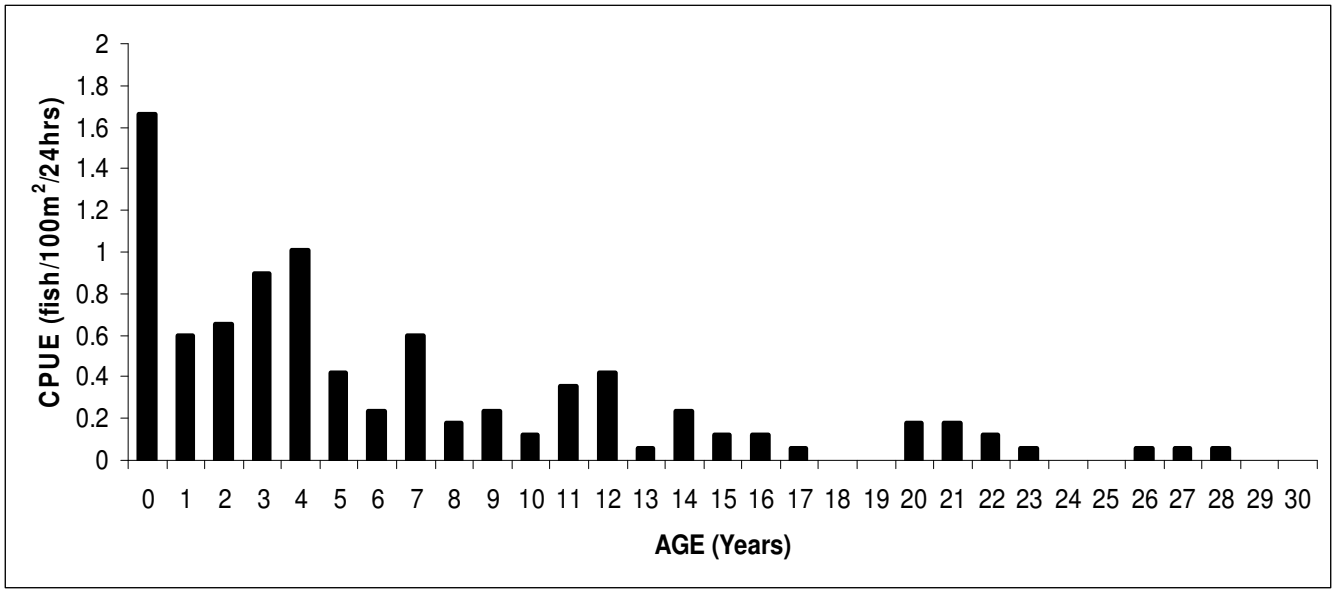

Figure 6. Age distribution of lake whitefish captured and sampled from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=146). Y-axis is catch per unit effort (fish/100m^2/24hrs); the X-axis is age of lake whitefish in years.

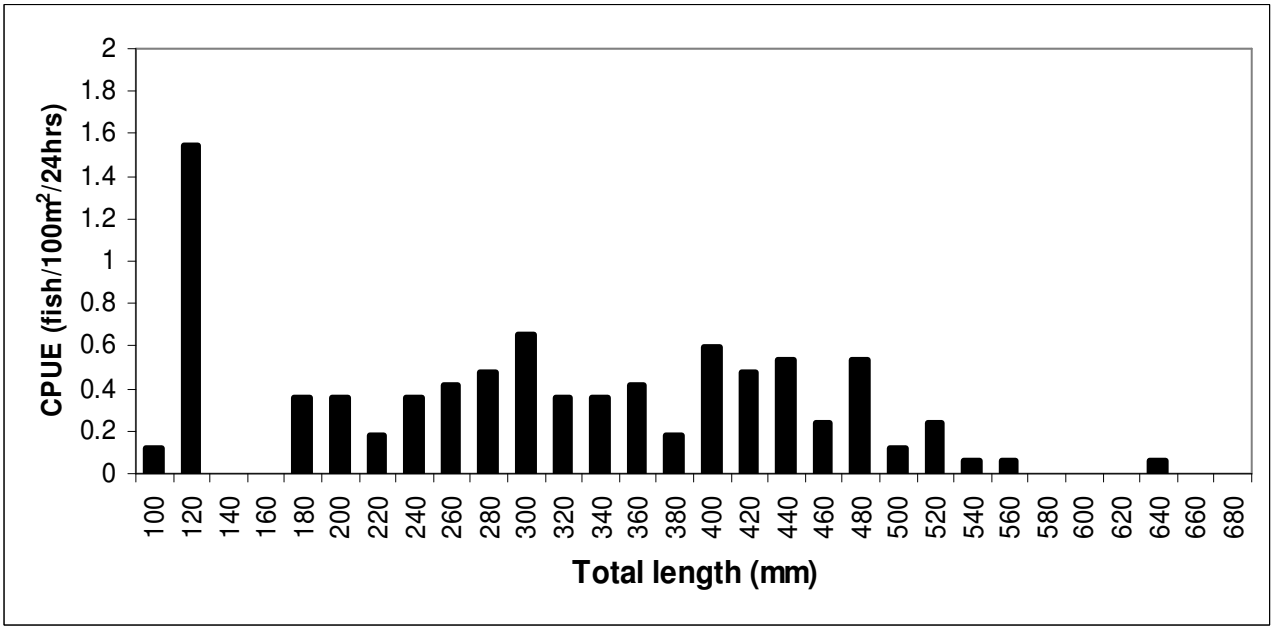

Figure 7. Total length distributions of lake whitefish from Fall Walleye Index netting at Peerless Lake, Alberta, 2012 (n=146). Y-axis is catch per unit effort (fish/100m^2/24hrs); X-axis is total length of lake whitefish in millimetres.

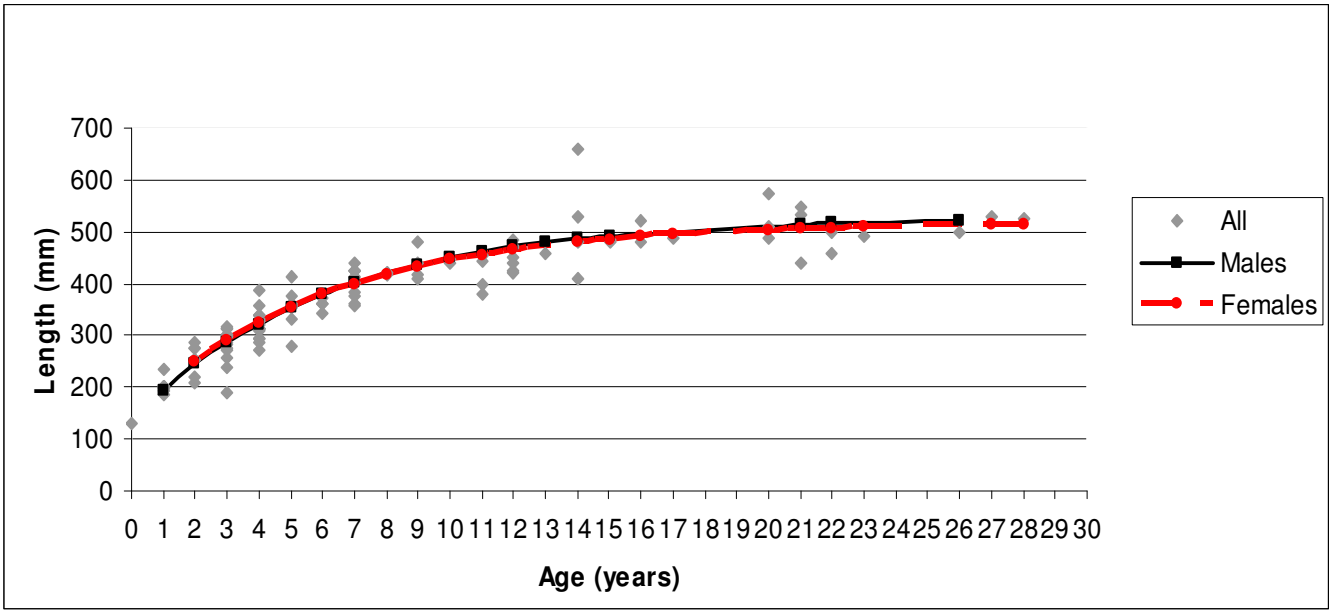

Figure 8. Length-at-age scatter plot with von Bertalanffy growth equations for all lake whitefish sampled at Peerless Lake 2012; No feasible solution for all lake whitefish could be found, females (n=57; K=0.164, L∞=516.91mm TL, t0= -2.006), and males (n=57, K=0.16, L∞=528.234 mm TL, t0= -1.869). Due to the low sample size the values reported from FAMS 1.0 can not be considered definitive.

Table 6. Lake whitefish length composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Peerless Lake 2012 FWIN survey. Unknown sex (n=32) were omitted.

			Males		Females	
TL (mm)	**Number (N)**	**Comp (%)**	**No. (N)**	**Mature (%)**	**No. (N)**	**Mature (%)**
0	0	0	0	~	0	~
50	0	0	0	~	0	~
100	1	0.877193	0	~	1	0
150	4	3.508772	3	0	1	0
200	8	7.017544	7	0	1	0
250	19	16.66667	11	0	8	0
300	18	15.78947	8	0	10	0
350	15	13.15789	10	40	5	0
400	21	18.42105	8	100	13	53
450	17	14.91228	7	100	10	100
500	9	7.894737	2	100	7	100
550	1	0.877193	0	0	1	100
600	0	0	0	0	0	~
650	1	0.877193	1	100	0	~
700	0	0	0	~	0	~
750	0	0	0	~	0	~
800	0	0	0	~	0	~
SUM	114	100	57	~	57	~

Table 7. Lake whitefish age composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Peerless Lake 2012 FWIN survey. Unknown sex (n=32) were omitted.

			Males		Females	
Age	Number (N)	Comp. (%)	No. (N)	Mature (%)	No. (N)	Comp. (%)
0	1	0.88	0	~	1	0
1	8	7.02	8	0	0	~
2	9	7.89	4	0	5	0
3	14	12.28	9	0	5	0
4	17	14.91	8	0	9	0
5	7	6.14	4	25	3	0
6	4	3.51	1	100	3	0
7	10	8.77	6	50	4	50
8	3	2.63	0	~	3	33
9	4	3.51	3	100	1	100
10	2	1.75	1	100	1	100
11	6	5.26	4	100	2	
12	7	6.14	3	100	4	100
13	1	0.88	1	100	0	~
14	4	3.51	1	100	3	66
15	2	1.75	1	100	1	100
16	2	1.75	0	~	2	100
17	1	0.88	0	~	1	100
18	0	0.00	0	~	0	~
19	0	0.00	0	~	0	~
20	3	2.63	0	~	3	100
21	3	2.63	1	0	2	100
22	2	1.75	1	100	1	100
23	1	0.88	0	~	1	100
24	0	0.00	0	~	0	~
25	0	0.00	0	~	0	~
26	1	0.88	1	100	0	~
27	1	0.88	0	~	1	100
28	1	0.88	0	~	1	100
SUM	114	100	57		57	

Interpretation

Prior to 2012, Peerless Lake had never been assessed under FWIN protocol and was most recently surveyed in 2012 by ESRD when Summer Porfundal Index Netting (SPIN) was completed to assess the lake trout population. The Walleye population in Peerless Lake currently displays characteristics of a stable and a vulnerable population (Sullivan 2003). The Walleye CPUE (maximum likelihood estimate) was 9.4 fish/100m^2/24hr (95% C.I. 6.4 - 12.9) which is beneath the provincial FWIN average Walleye CPUE (18 fish/100m^2/24hr). Peerless Lake Walleye density can be classified as vulnerable according to Sullivan (2003).

Low catch rate (density) can be associated with a vulnerable to stable status (Sullivan 2003) which 67% (n=61) of the Walleye sampled were between the ages of 7 and 16 years of age showing stable age cohorts in the majority of the mid age population with moderate cohorts in the age 0 to 5 year-old classes (figure 1). However, the broad age-class structure is quantified as being unstable with no age cohorts that can be considered measurable ($\geq$3 fish/100m^2/24hr) and only one strong age class visible within the population (Sullivan 2003) and therefore suggesting that the population is more accurately classified as vulnerable. Early age classes were moderately represented in the Peerless Lake Walleye with fish 5 years-of-age being the strongest year class in this depiction (2012) (figure 1, 2). Age cohorts present at low densities include: 0,1,2,3,4,10,12,13, 20 years-of-age; there were no Walleye detected in the age six, 17 or 18 year old cohorts (figure 1). This suggests that there have been multiple recruitment failures.

Maturity for female walleye is reached 100 percent at approximately nine years of age, based on a single year limited sample, and for male walleye at approximately five years of age (table 2). The 2012 data for Peerless Lake would suggest that the population matures at a moderate growth rate and is indicative of a stable to vulnerable stock status (Sullivan 2003). Additional sampling will need to be completed in order to accurately confirm age at 50% maturity for the Peerless Lake Walleye population (table 3). Peerless Lake walleye are relatively fast growing with males growing slightly faster than females with growth coefficients of 0.125 (F) and 0.153 (M) and the potential for females to reach a lager overall size (F max size $L\infty$ 780 vs. M max size $L\infty$ 697). Males and females reach approximately 500mm total length at approximately seven years of age. Female gonadosomatic index (GSI) shows roughly 63% (n=12) of mature females have the potential to spawn in the following season after the 2012 sampling of Peerless Lake, however based on the data collected there appears to be slow recruitment into the population with only 15 Walleyes (16% of sample) detected in the 2012 FWIN that were 5 years-of-age and under. The reason for the low levels of recruitment in the Walleye population remains unclear and additional monitoring (FWIN) will be required in the future to identify and assess trends in Walleye abundance and structure. A potential reason for the low abundance of Walleye in Peerless Lake maybe associated with the presence of an additional top order predator not commonly observed in Walleye lakes in Alberta, lake trout. The dynamic between the Walleye and lake trout populations in Peerless Lake has not been examined to date. This was the first FWIN conducted on Peerless Lake and did not result in high incidental mortality of lake trout, however it is important to note that the sampling design adhered to the Morgan (2002) methodology and did not result in sampling of water deeper than 15m which represents a large portion of Peerless Lake (3769 ha). Future assessments of the Walleye population should take these factors into account when looking at experimental design, data analysis and interpretation.

The northern pike population in Peerless Lake can be characterised as being vulnerable at low densities and at moderate risk of collapse. There is moderate age-class distribution with 13 age-classes present containing low densities of larger adult northern pike (figure 4 and 5) with significant deficits in the lower age cohorts between one and three years of age. There is evidence of multiple year-classes contributing recruitment to the population however densities are low with catch rates < 1 fish/100m^2/24hrs for all mature age cohort and there are several full age-class failures present in cohorts less than four years of age in 2012. Of the adult pike sampled the three strongest year classes present in the sample, age six to eight in 2012 (n=27), suggest that there is increasing potential for contributing to recruitment in the maturing population (table 4 and 5) provided these age-classes can be retained in the population. Currently catches are not reflective of this as only one juvenile pike, 0.2% (n=1), was captured as part of 2012 sampling and there is no evidence of truncation of northern pike at or below the current size restriction.

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