Fall Walleye Index Netting at Vandersteene Lake, Alberta, 2012

Fisheries Management
Lesser Slave Area

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Disclaimer
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Abstract

Vandersteene Lake was surveyed in September, 2012 utilizing the modified Fall Walleye Index Netting (FWIN) protocol using half FWN 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 Vandersteene Lake to ensure they are in alignment with the stock status of the fish populations. In total 173 fish were captured in 12 half nets comprised of 75 Walleye, 22 Northern Pike, 40 Lake Whitefish, 1 Yellow Perch, 18 Cisco (*Coregonus artedi*), 3 Spottail Shinners (*Notropis hudsonius*), 12 White Suckers (*Catostomus commersoni*) and 2 Longnose Suckers (*Catostomus catostomus*).

The Walleye catch per unit effort (maximum likelihood estimate) was 13.5 fish/100m^2/24hr (95% C.I. 9.0 -18.1) and the mean catch per unit effort estimated at 12.0 fish/100m^2/24hr (95% C.I. 3.4 -19.9). This catch rate is considered low and indicates a stock status of 'vulnerable' (Sullivan 2003). Female Walleye (n=45) ranged in age from 8 to 22 years-old (several full year class failures evident) reaching sexual maturity at approximately age 10 and ranged in size from 430mm – 746mm total length. Male Walleye ranged in age from 3 to 23 years-old (several full year class failures evident) reaching sexual maturity sometime after age 3 and ranged in size from 289mm – 670mm total length. Walleye had slow growth rates reaching 500mm TL 10 to 12 years with females (K= 0.085) growing slightly faster than males (K= 0.054) with males reaching slightly larger L∞ (812.4mm TL) than females (777.7 mm TL). Walleye population in Vandersteene Lake has historically been categorized as a trophy (old growth) population. The remaining biological indicators from the 2012 FWIN signify that this population continues to exhibit many characteristics of a trophy (old growth) 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 3.1fish/100m^2/24hr (95% C.I. 0.6 -6.7) and the mean catch per unit effort was estimated at 3.5 fish/100m^2/24hr (95% C.I. 0 - 7). Female pike (n=13) ranged in age from 1 to 12 years-old (several full year class failures), due to the low sample size no maturation schedule could be derived as nearly all (n=12) were mature and ranged in size from 369mm – 974mm total length. Male pike (n=9) ranged in age from 1 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 418mm – 735mm 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 5.1 fish/100m^2/24hr (95% C.I. 2.5 -8.0) and the mean catch per unit effort was estimated at 6.4 fish/100m^2/24hr (95% C.I. 2 – 10.5). Female lake whitefish (n=21) ranged in age from 2 to 25 years-old (several full year class failures), ranged in size from 369mm – 974mm total length. Due to the low sample size no accurate maturation schedule could be derived, all females were mature at 8 years of age and older. Male lake whitefish (n=19) ranged in age from 2 to 24 years-old (several full year class failures) and ranged in size from 418mm – 735mm total length.. Due to the low sample size no maturation schedule could be derived as all male lake whitefish were mature after 2 years of age. Females had a faster growth rate than male lake whitefish (f= 0.142, m=0.072), however males were able to reach a greater overall total length than females (F= 535.92mm TL, M= 656.44).

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.

Vandersteene Lake is a 2073 ha lake located 50 km east-northeast of Red Earth Creek, Alberta. Access to Vandersteene Lake is limited and requires the use of either all terrain vehicles or snow machines and there are no developed boat launches at the lake limiting use to smaller crafts (car toppers, kayak, canoes, etc). Vandersteene 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 Vandersteene Lake is relatively unknown but presumed to be minimal based on the low numbers of domestic licenses issued, however members of the Trout Peerless First Nation have indicated this lake is an important food source to members of the community (Myles Brown, personal comm). The sport fishery was assessed in 2004 by the ACA (Fortier and Tchir 2005); angler pressure was estimated to be 0.632 angler-hr/ha (95% CI = 0.270 – 1.298) with an overall catch rate for Walleye of 1.04fish/hr and a harvest rate at that time for Walleye of 0.0097 kg/ha (95% CI = 0.036 – 0.995 kg/ha). The results of Fortier and Tchir (2005) assessment indicated that the Walleye population was vulnerable and at a low density and sportfishing pressure was low however it was recognized in that report that with continued industrial growth and expansion this fishery is likely to grow in popularity. The Walleye sportfishing regulation was changed in 2007 to a zero bag limit for conservation reasons to facilitate growth and recovery of the Walleye population. Recent anecdotal evidence and enforcement reports indicate that over the last several years Vandersteene Lake has grown in popularity for sport fishing amongst local and visiting anglers. Winter angling pressure on Vandersteene is unknown but presumed to be less than open water sportfishing. Vandersteene Lake had not been assessed using the FWIN protocol prior to 2012. The last sportfish population assessment was conducted by the Alberta Conservation Association (ACA) in 2004 (Fortier and Tchir 2005). The ACA assessment was conducted in the mid summer months utilizing the Lake Monitoring Program (LMP) methodology and is not directly comparable to the information collected by ESRD in 2012 using the FWIN protocol. Additionally, Fish and Wildlife records indicate that Vandersteene Lake was commercially fished sporadically from 1983 to 2000 and targeted lake whitefish. There has not been a commercial fishery on Vandersteene Lake for thirteen years and currently the commercial rationale for Vandersteene Lake indicates an allocation meeting with all stakeholders, recent biological assessment of the fish community and a commercial test-fishery are required before a scheduled commercial fishery can take place.

The current sportfishing regulations on Vandersteene Lake & tributaries & outlet* are: Open all year (lake only) – Pike limit 0 from Mar. 2 to May 31; Pike limit 3 over 63 cm from June 1 to Mar. 1; perch limit 15; lake whitefish limit 10; burbot limit 10; Walleye limit 0.* Tributaries and outlet – CLOSED – Nov. 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 Vandersteene 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 12 nets were set, three nets were set in shallow depth stratum < 5m water, four nets were set in 5 – 15 meter medium depth stratum, and five nets were set in the > 15 m depth stratum, unique to lakes in this geographic area of Alberta. 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 kept 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 15th –17th, 2012. Water temperature varied from 12.8-13.2^{o}C at all 12 sampling sites. Nets were set for a mean time of 23 hours and 5 minutes, with soak times varying between 21 hours– 24 hours and 34 minutes from site to site. A total of 173 fish representing eight species were caught during the survey: 75 Walleye, 22 northern pike, 40 lake whitefish, 1 yellow perch, 18 cisco, 3 spottail shinners, 12 white and 2 longnose suckers.

Walleye

The Walleye catch per unit effort (maximum likelihood estimate) was 13.5 fish/100m^2/24hr (95% C.I. 9.0 -18.1) (table 1) and the mean catch per unit effort estimated at 12.0 fish/100m^2/24hr (95% C.I. 3.4 -19.9). This catch rate is considered low and indicates a stock status of 'vulnerable' (Sullivan 2003). Female Walleye (n=45) ranged in age from 8 to 22 years-old (several full year class failures evident) reaching sexual maturity at approximately age 10 and ranged in size from 430mm – 746mm total length. Male Walleye ranged in age from 3 to 23 years-old (several full year class failures evident) reaching sexual maturity sometime after age 3 and ranged in size from 289mm – 670mm total length. Walleye had slow growth rates reaching 500mm TL 10 to 12 years with females (K= 0.085) growing slightly faster than males (K= 0.054) with males reaching slightly larger $L\infty$ (812.4mm TL) than females (777.7 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 38 of 45 fish (84%) possessed a GSI of above 2.0% suggesting that all of these individuals would potentially spawn the following spring. Walleye population in Vandersteene Lake has historically been categorized as a trophy (old growth) population. 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 multiple 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 3.1fish/100m^2/24hr (95% C.I. 0.6 -6.7) (table 1) and the mean catch per unit effort was estimated at 3.5 fish/100m^2/24hr (95% C.I. 0 - 7). Female northern pike (n=13) ranged in age from 1 to 12 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=12) were mature (table 4). Female northern pike ranged in size from 369mm – 974mm total length (figure 5, table 5). Male pike (n=9) ranged in age from 1 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 418mm – 735mm 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 5.1fish/100m^2/24hr (95% C.I. 2.5 - 8.0) (table 1) and the mean catch per unit effort was estimated at 6.4 fish/100m^2/24hr (95% C.I. 2 – 10.5). Female lake whitefish (n=21) ranged in age from 2 to 25 years-old (several full year class failures), ranged in size from 369mm – 974mm total length. Due to the low sample size no accurate maturation schedule could be derived, all females were mature at 8 years of age and older. Male lake whitefish (n=19) ranged in age from 2 to 24 years-old (several full year class failures) and ranged in size from 418mm – 735mm total length.. Due to the low sample size no maturation schedule could be derived as all male lake whitefish were mature after 2 years of age. Females had a faster growth rate than male lake whitefish (f= 0.142, m=0.072), however males were able to reach a greater overall total length than females (F= 535.92mm TL, M= 656.44).

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.

Tables and Figures

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

Species	Year	CPUE	95% CI
WALL	2012	12	(3.4 - 19.9)
LKWH	2012	5.1	(2.5 - 8.0)
NRPK	2012	3.5	(0.6 - 6.7)

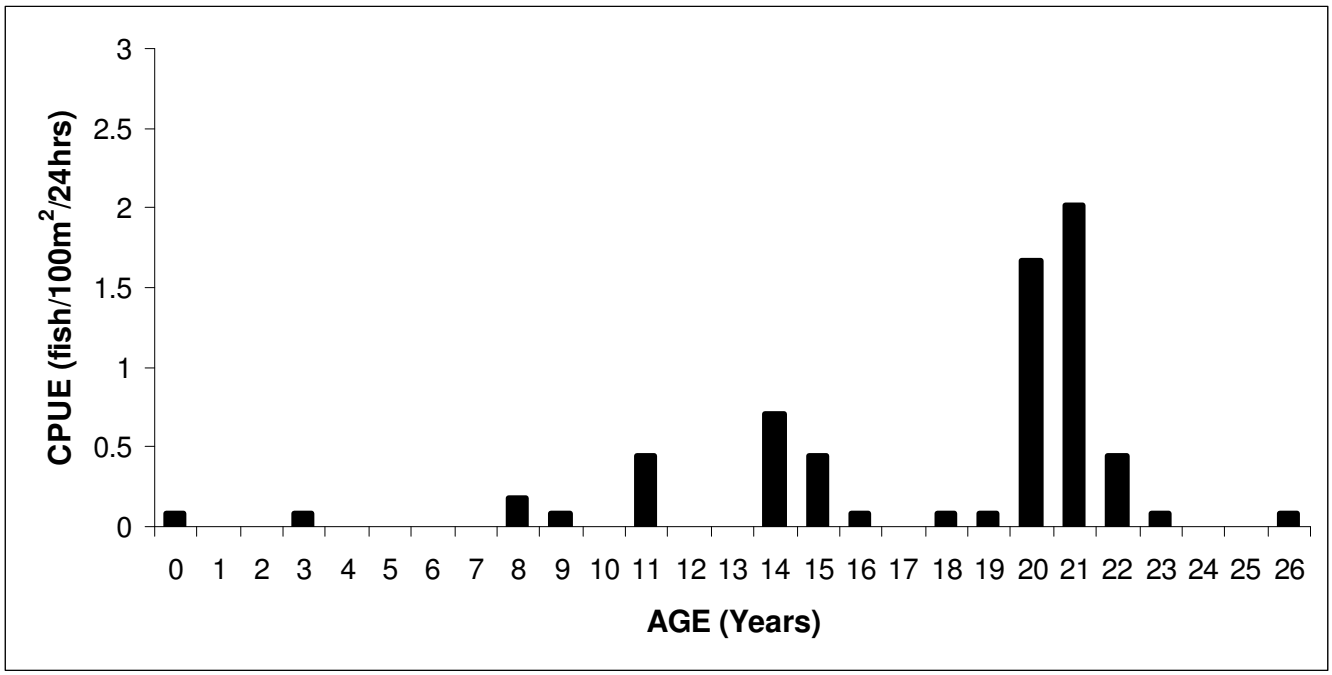

Figure 1. Age distribution of Walleye captured and sampled from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=75). Y-axis is catch per unit effort (fish/100m^2/24hrs), the X-axis is age of Walleye in years.

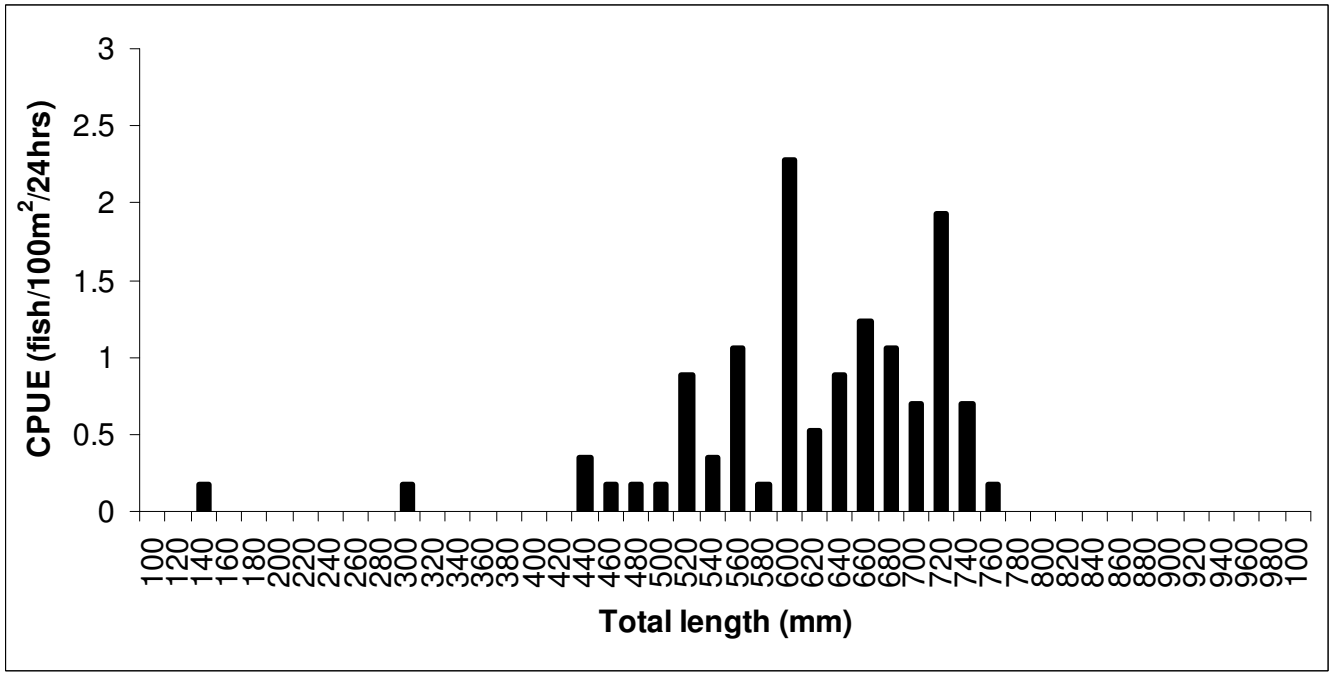

Figure 2. Total length distributions of Walleye from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=75). Y-axis is catch per unit effort (fish/100m^2/24hrs), X-axis is total length of Walleye in millimetres.

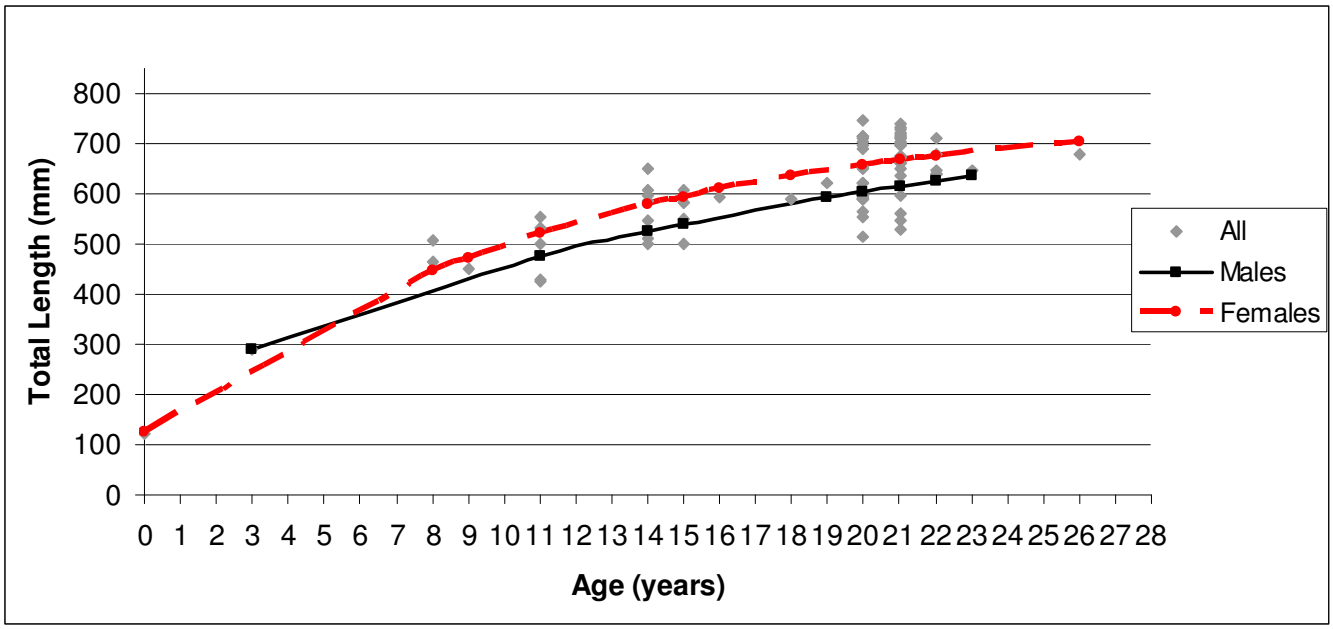

Figure 3. Length-at-Age scatter plot with von Bertalanffy growth equations for all Walleye sampled 2012; (n=75; K=0.092, L∞=734.188mm TL, t0= -2.146), females (n=45; K=0.085, L∞=777.6781mm TL, t0= -2.05), and males (n=29, K=0.054, L∞=812.368 mm TL, t0= -5.199) *one individual unknown sex was added into the female distribution in order for FAMS 1.0 to calculate a viable growth solution.

Table 2. Walleye length composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Vandersteene Lake 2012 FWIN survey.

			Males		Females	
TL (mm)	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0.00	0	--	0	--
50	0	0.00	0	--	0	--
100	0	0.00	0	--	0	--
150	1	1.33	0	--	0	--
200	0	0.00	0	--	0	--
250	0	0.00	0	--	0	--
300	1	1.33	1	0	0	--
350	0	0.00	0	--	0	--
400	0	0.00	0	--	0	--
450	2	2.67	1	100	1	0
500	3	4.00	1	100	2	50
550	10	13.33	8	100	2	100
600	17	22.67	10	100	7	100
650	12	16.00	6	100	6	100
700	13	17.33	2	100	11	100
750	16	21.33	0	--	16	100
800	0	0.00	0	--	0	--
SUM	**75**		**29**		**45**	

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

			Males		Females	
Age	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	1	1.33	0	--	0	--
1	0	0.00	0	--	0	--
2	0	0.00	0	--	0	--
3	1	1.33	1	0	0	--
4	0	0.00	0	--	0	--
5	0	0.00	0	--	0	--
6	0	0.00	0	--	0	--
7	0	0.00	0	--	0	--
8	2	2.67	0	--	2	0
9	1	1.33	0	--	1	0
10	0	0.00	0	--	0	--
11	5	6.67	3	100	2	100
12	0	0.00	0	--	0	0
13	0	0.00	0	--	0	0
14	8	10.67	2	100	6	100
15	5	6.67	3	100	2	100
16	1	1.33	0	--	1	100
17	0	0.00	0	--	0	--
18	1	1.33	0	--	1	100
19	1	1.33	1	100	0	--
20	19	25.33	10	100	9	100
21	23	30.67	5	100	18	100
22	5	6.67	3	100	2	100
23	1	1.33	1	100	0	--
24	0	0.00	0	--	0	--
25	0	0.00	0	--	0	--
26	1	1.33	0	--	1	100
27	0	0.00	0	--	0	--
28	0	0.00	0	--	0	--
29	0	0.00	0	--	0	--
30	0	0.00	0	--	0	--
SUM	**75**		**29**		**45**	

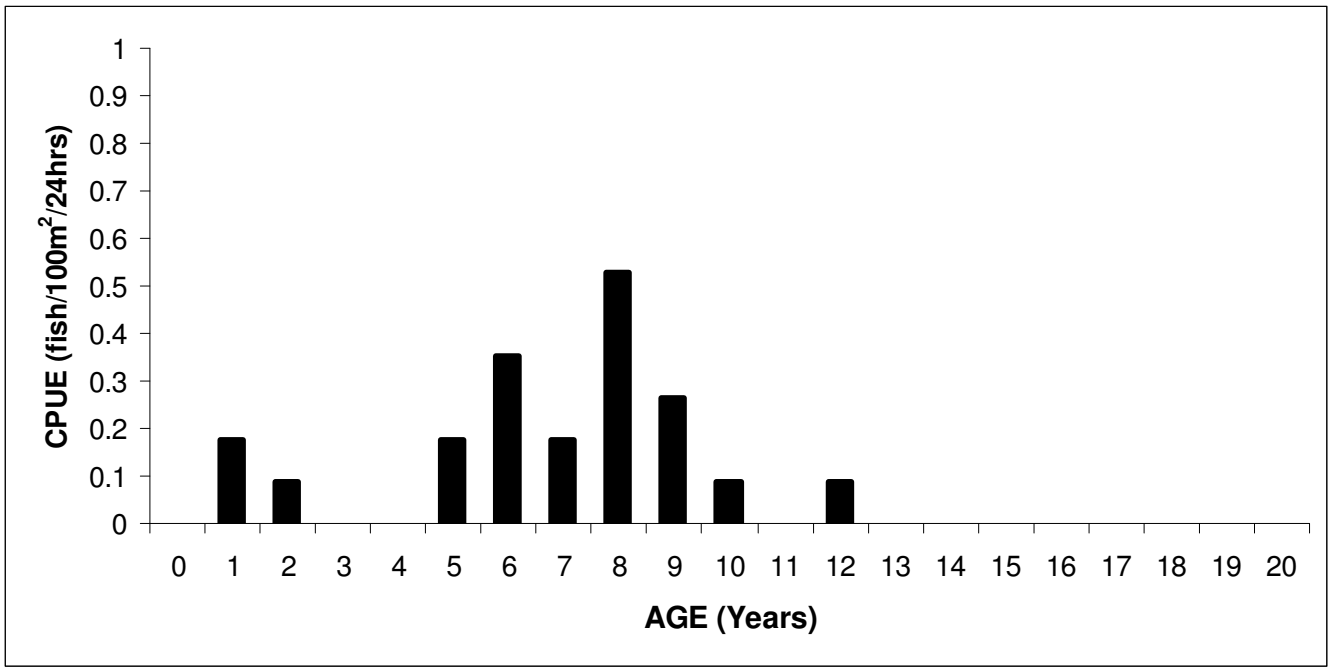

Figure 4. Age distribution of northern pike captured and sampled from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=22). Y-axis is catch per unit effort (fish/100m^2/24hrs); the X-axis is age of pike in years.

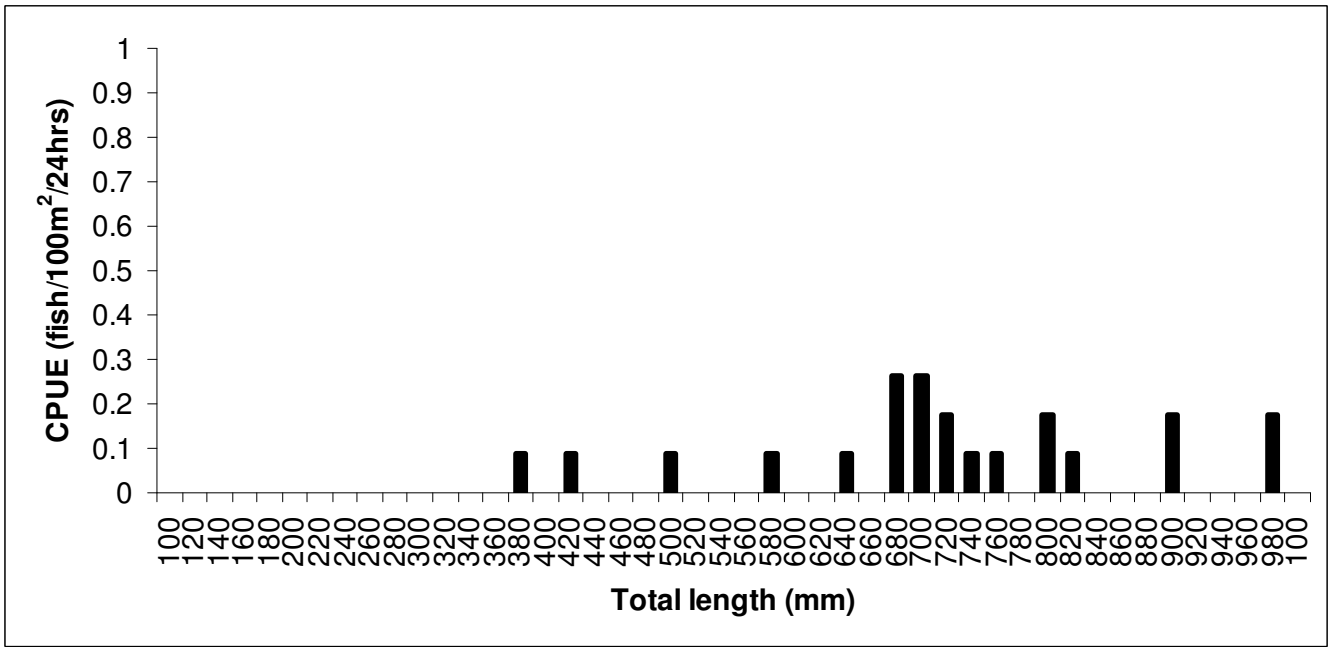

Figure 5. Total length distributions of northern pike from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=22). Y-axis is catch per unit effort (fish/100m^2/24hrs); X-axis is total length of pike in millimetres.

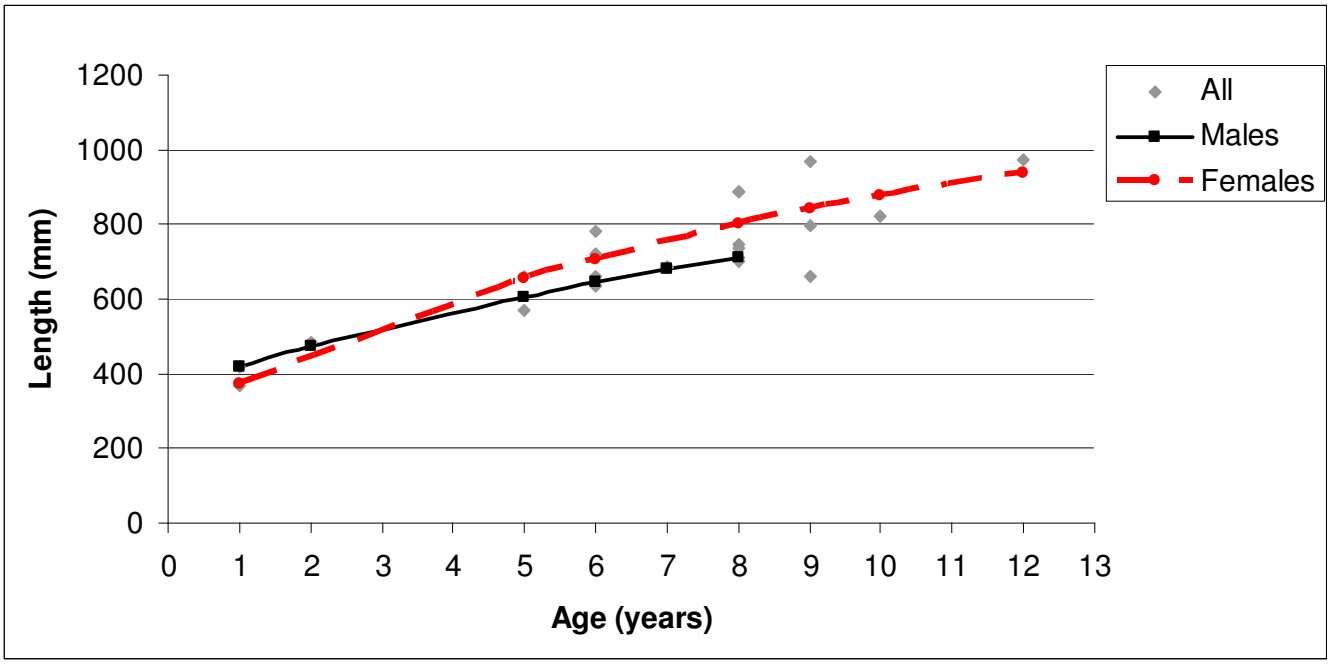

Figure 6. Length-at-Age scatter plot with von Bertalanffy growth equations for all northern pike sampled 2012; all northern pike (n=22; K=0.04, L∞=734.188mm TL, t0= -2.146), females (n=13; K=0.085, L∞=777.6781mm TL, t0= -2.05), and males (n=9, K=0.054, L∞=812.368 mm TL, t0= -5.199). Due to the low sample size the values reported from FAMS 1.0 can not be considered definitive.

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

			Males		Females	
Age	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0.00	0	--	0	--
1	2	9.09	1	0	1	100
2	1	4.55	1	0	0	100
3	0	0.00	0	--	0	--
4	0	0.00	0	--	0	--
5	2	9.09	1	100	1	100
6	4	18.18	1	100	3	100
7	2	9.09	2	0	0	100
8	6	27.27	3	100	3	100
9	3	13.64	0	100	3	0
10	1	4.55	0	100	1	0
11	0	0.00	0	--	0	--
12	1	4.55	0	100	1	0
13	0	0.00	0	--	0	--
14	0	0.00	0	--	0	--
15	0	0.00	0	--	0	--
16	0	0.00	0	--	0	--
SUM	**22**		**9**		**13**	

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

			Males		Females	
TL (mm)	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0.00	0	--	0	--
50	0	0.00	0	--	0	--
100	0	0.00	0	--	0	--
150	0	0.00	0	--	0	--
200	0	0.00	0	--	0	--
250	0	0.00	0	--	0	--
300	0	0.00	0	--	0	--
350	0	0.00	0	--	0	--
400	1	4.55	0	--	1	100
450	1	4.55	1	100	0	--
500	1	4.55	1	100	0	--
550	0	0.00	0	--	0	--
600	1	4.55	1	100	0	--
650	1	4.55	0	--	1	100
700	6	27.27	4	100	2	100
750	4	18.18	2	100	2	100
800	2	9.09	0	--	2	100
850	1	4.55	0	--	1	100
900	2	9.09	0	--	2	100
950	0	0.00	0	--	0	--
1000	2	9.09	0	--	2	100
SUM	**22**		**9**		**13**	

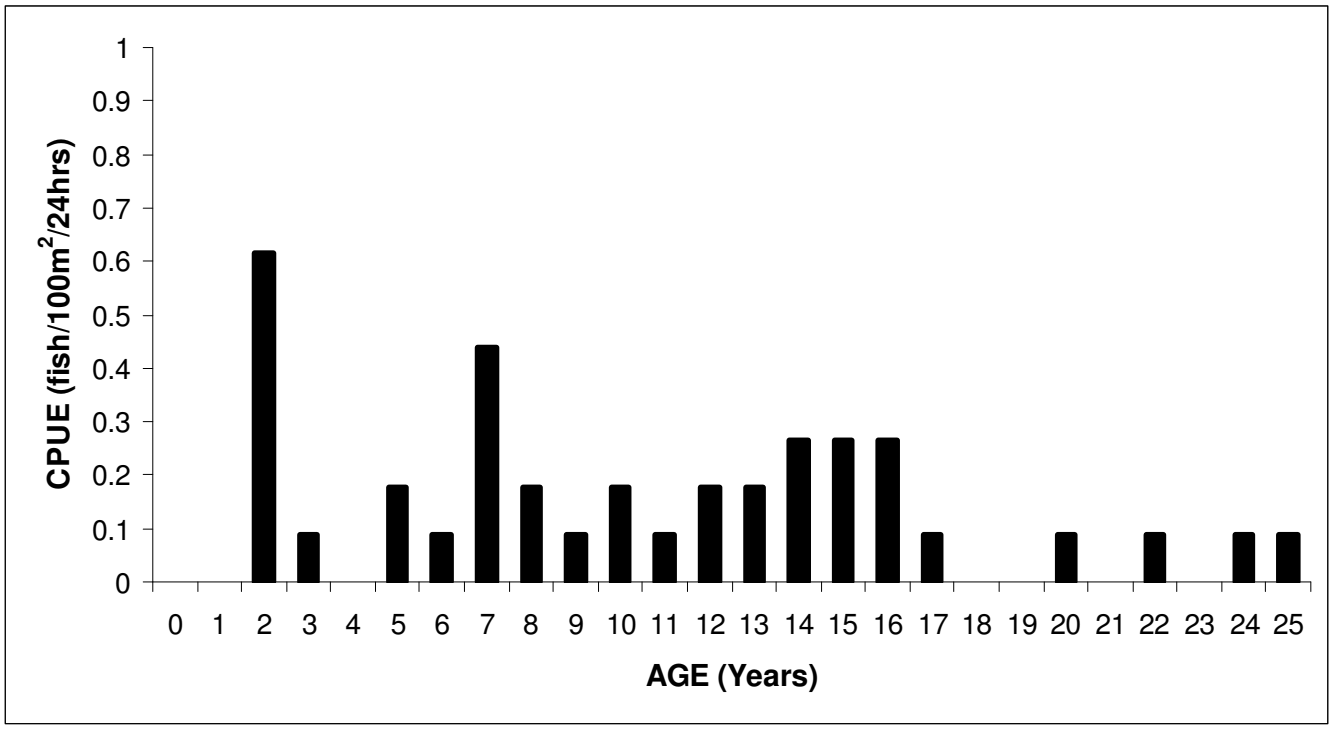

Figure 7. Age distribution of lake whitefish captured and sampled from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=40). Y-axis is catch per unit effort (fish/100m^2/24hrs); the X-axis is age of lake whitefish in years.

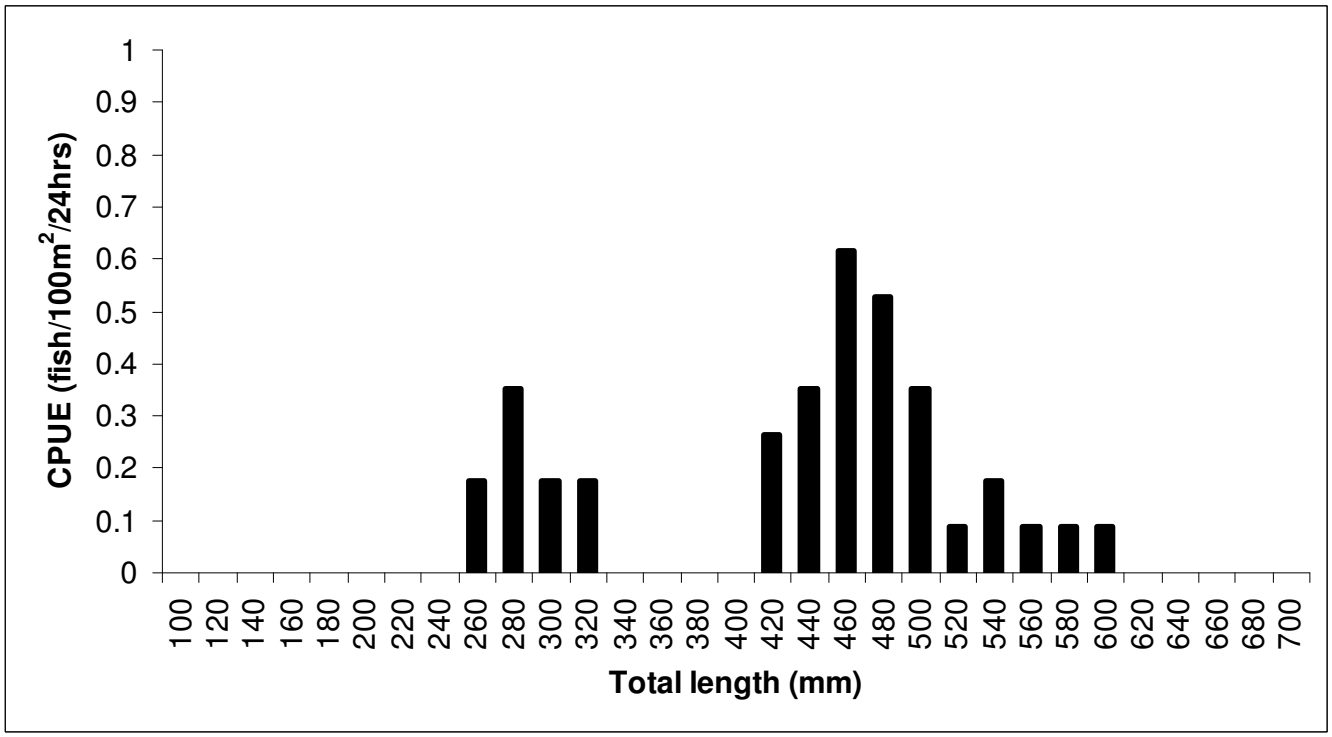

Figure 8. Total length distributions of lake whitefish from Fall Walleye Index netting at Vandersteene Lake, Alberta, 2012 (n=40). Y-axis is catch per unit effort (fish/100m^2/24hrs); X-axis is total length of lake whitefish in millimetres.

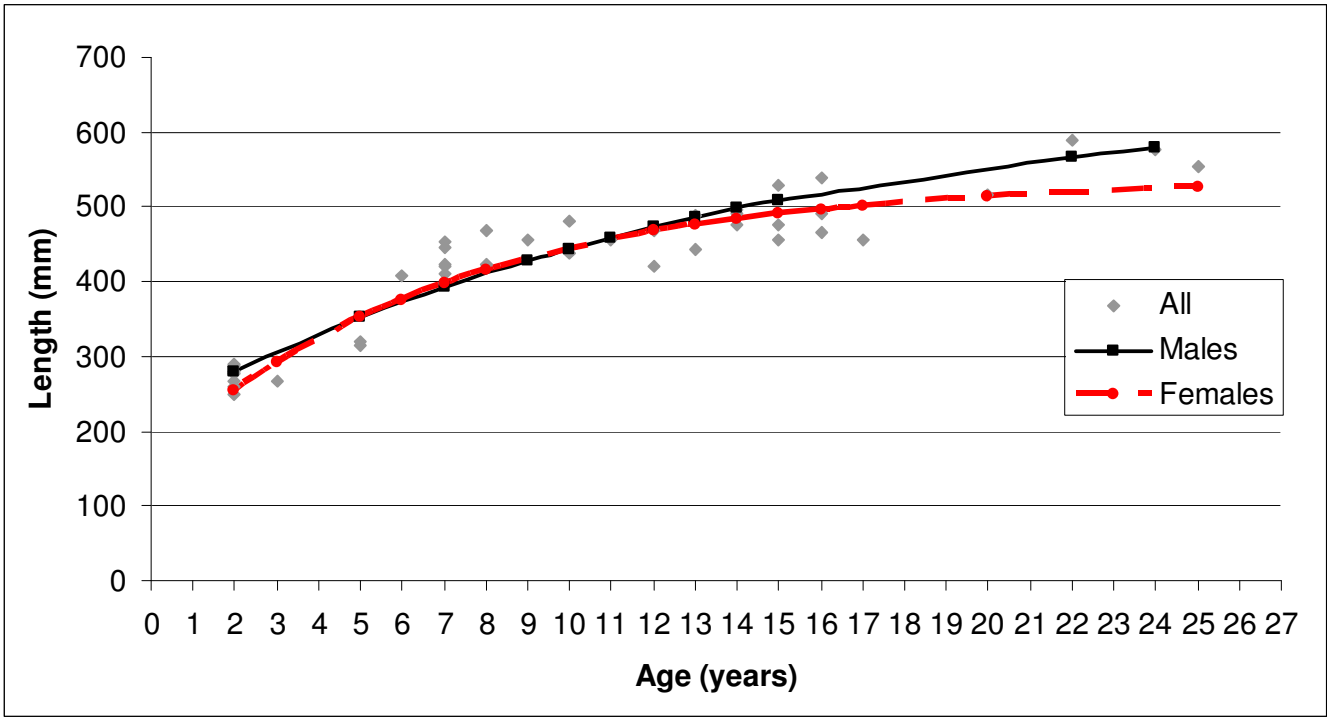

Figure 9. Length-at-Age scatter plot with von Bertalanffy growth equations for all lake whitefish sampled 2012; No feasible solution for all lake whitefish could be found, females (n=21; K=0.142, L∞=535.92mm TL, t0= -2.542), and males (n=19, K=0.072, L∞=656.44 mm TL, t0= -5.683). Due to the low sample 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 Vandersteene Lake 2012 FWIN survey.

			Males		Females	
TL (mm)	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0	0	--	0	--
50	0	0	0	--	0	--
100	0	0	0	--	0	--
150	0	0	0	--	0	--
200	0	0	0	--	0	--
250	1	2.5	0	--	1	0
300	7	17.5	4	0	3	33.3
350	2	5	1	100	1	0
400	0	0	0	--	0	--
450	9	22.5	3	100	6	83.3
500	15	37.5	9	100	6	100
550	3	7.5	0	--	3	100
600	3	7.5	2	100	1	100
650	0	0	0	--	0	--
700	0	0	0	--	0	--
750	0	0	0	--	0	--
800	0	0	0	--	0	--
SUM	**40**		**19**		**21**	

Table 7. Lake whitefish age composition (sample number, percent) of sexes combined, for males and female; number and maturing (percent) for Vandersteene Lake 2012 FWIN survey.

			Males		Females	
Age	Number (N)	Comp (%)	No. (N)	Mature (%)	No. (N)	Mature (%)
0	0	0.00	0	--	0	--
1	0	0.00	0	--	0	--
2	7	17.50	4	0	3	0
3	1	2.50	0	--	1	100
4	0	0.00	0	--	0	--
5	2	5.00	1	100	1	0
6	1	2.50	0	--	1	100
7	5	12.50	2	100	3	66.6
8	2	5.00	0	--	2	100
9	1	2.50	1	100	0	--
10	2	5.00	2	100	0	--
11	1	2.50	1	100	0	--
12	2	5.00	1	100	1	100
13	2	5.00	1	100	1	100
14	3	7.50	2	100	1	100
15	3	7.50	2	100	1	100
16	3	7.50	0	--	3	100
17	1	2.50	0	--	1	100
18	0	0.00	0	--	0	--
19	0	0.00	0	--	0	--
20	1	2.50	0	--	1	100
21	0	0.00	0	--	0	--
22	1	2.50	1	100	0	--
23	0	0.00	0	--	0	--
24	1	2.50	1	100	0	--
25	1	2.50	0	--	1	100
26	0	0.00	0	--	0	--
27	0	0.00	0	--	0	--
28	0	0.00	0	--	0	--
29	0	0.00	0	--	0	--
30	0	0.00	0	--	0	--
SUM	**40**		**19**		**21**	

Interpretation

Prior to 2012 the fish community in Vandersteene Lake was last assessed by the Alberta Conservation Association (ACA) in 2004 using a previous sampling methodology, Lake Monitoring Program. Although this survey method utilized randomized stratum-weighted multi-mesh index netting, the differences in gear type, seasonality and Walleye behaviour between seasons does not allow for a direct comparison between the previous assessment and the FWIN conducted in the fall of 2012. However general trends observed during the 2004 LMP (Fortier and Tchir 2005) were also seen in the 2012 FWIN. The Walleye population in Vandersteene Lake currently displays characteristics of a trophy (old growth) and a vulnerable population (Sullivan 2003). The Walleye CPUE (maximum likelihood estimate) was 13.5 fish/100m^2/24hr (95% C.I. 9.0 -18.1) which is beneath the provincial FWIN average Walleye CPUE (18 fish/100m^2/24hr) and significantly lower than Graham Lake, the adjoining waterbody to the west of Vandersteene Lake, at 27.2 fish/100m2/24 hours (95% C.I. 21.7-32.4) (Wood and James 2010). Vandersteene Lake Walleye density can be classified as vulnerable according to Sullivan (2003).

Although, the low catch rate (density) can also be associated with a trophy stock status which is further supported by the wide age class structure comprised of 15 age classes ranging from 0 – 26 years of age of which 65% (n=49) of the Walleye sampled are over 20 years of age (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 two age-classes "supporting" the population (Sullivan 2003). Early age classes were poorly represented in the Vandersteene Lake Walleye with only a single young-of-the-year Walleye detected and low numbers of juvenile Walleye present in the sample (figure1, 2). Significant deficits in age cohorts (1,2,4-7,10,12,13,17,24 and 25 years of age) (figure 1), suggest that there have been multiple recruitment failures. Historical Vandersteene Lake Walleye assessments have shown recurring incidences of poor recruitment and recruitment failure attributed to spawning habitat limitations and low densities of mature spawning Walleye. In 1995 the ACA completed spawning site enhancements to Vandersteene Creek (88-3-W5M) in an attempt to bolster recruitment. Ongoing seasonal maintenance on Vandersteene Creek involving the removal of barriers (beaver dams, etc) has been conducted by the ACA as part of the enhancement program to allow spawning Walleye to utilize these enhancements. The habitat enhancements combined with the zero bag limit for Walleye in Vandersteene Lake provide maximum opportunity for the remaining mature Walleye to spawn and improve recruitment success.

Maturity for female walleye is reached at approximately ten years of age, based on a single year limited sample, and for male walleye at approximately ten to twelve years of age (table 2). The 2012 data for Vandersteene Lake would suggest that the population matures much later than the populations of Graham Lake (*F* age 7 – *M* age 5) (Wood and James 2010) and is indicative of a Trophy stock status. Additional sampling will need to be completed in order to accurately confirm age at 50% maturity for the Vandersteene Lake Walleye population (table 3). Vandersteene Lake Walleye are also slow growing with females growing faster than males with growth coefficients of 0.082 (F) and 0.032 (M) and the potential for males to reach a lager overall size (Female max size L∞ 782 vs. Male max size L∞ 979). Males reach approximately 500mm total length at 12 years-of-age and females reaching the same length at 10 years-of-age. Based on 2012 sampling, it appears that there is a sufficient population of mature adults with spawning potential however it is apparent within the age frequency distribution (figure 1) that there are significant deficits in the lower age class cohorts indicating continued poor recruitment survival. The reason for this remains unclear and additional spawning site surveys assessments are required to identify potential causes of this phenomenon.

Given the most significant deficit in age cohorts occurs between age zero (young-of- year) and age 10 (Figure 1) and that the majority of the Walleye population (56%, n=42) is tied up in two older year classes (21 and 22 year olds) with out improved recruitment success the Walleye population is facing imminent decline in the coming generations and will lead to a population collapse.

The northern pike population in Vandersteene Lake can be characterised as being vulnerable at low densities and at moderate risk of collapse. There is moderate age-class distribution with 9 age-classes present containing low densities of larger adult northern pike (figure 4 and 5) with no fish captured older than 12 years. 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 age class failures present. Concurrently, there is a

weak indication of recruitment with only one immature fish captured (young-of-year) all other northern pike (n=21) being mature (table 4 and 5). There is no evidence of truncation of northern pike at or below the current size restriction.

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