

Buck Lake Fall Walleye (*Sander vitreus*) Index Netting Survey, 2007

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ABSTRACT

The 2007 Fall Walleye Index Netting (FWIN) Survey of Buck Lake was conducted from September 19, 2007 to September 21, 2007. Survey objectives included estimating catch per unit effort, as well as various population demographics (age, growth rate, reproductive status) in order to monitor the effectiveness of Walleye management and to ensure the stability and sustainability of Walleye populations at this location. In total 368 Walleye were caught at Buck Lake in 2007, with a mean catch per unit effort of 42.4 Walleye/100m²/24h¹. The mean fork length of the Walleye caught was 385 mm (range 118 - 510 mm). Walleye sampled from Buck Lake in 2007 had reached 500 mm in length by ten years of age. Mean age for this species was 7.3 years in 2007, with a wide range of ages represented in the sample (ranging from 0 to 19 years). Male Walleye were completely mature by five years of age, while females were all mature at age ten. A gonadosomatic index of greater than 1% separated mature spawning females from immature individuals. Growth rates for Walleye sampled at Buck Lake in 2007 were similar to those recorded for previous years. Based on population parameters characterized in *Alberta's Walleye Management and Recovery Plan (Berry, 2005)*, the status of the Buck Lake Walleye population in 2007 remains stable.

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1.0 INTRODUCTION

Walleye (*Sander vitreus*) are a popular sport fish species in Alberta, and have consequently been subjected to high levels of angling pressure for a number of years. Historical province-wide management practices were ineffective in preventing the decline or collapse of Walleye populations at locations with high levels of angling pressure. In response, Alberta Sustainable Resource Development established *Alberta's Walleye Management and Recovery Plan* (WRMP) (Berry, 1995) to restore diminished populations and prevent further declines. Under this plan individual populations are classified as stable, vulnerable, or collapsed, and are managed according to their status and exploitation level.

Buck Lake is situated in close proximity to two major population centers (exceeding one million people each) and receives high levels of angling pressure. Harvest levels for sport species must therefore be carefully managed to prevent overharvest and subsequent population decline. As a result, sport angling for Walleye has been limited to the possession of one Walleye over 43 cm Total Length (TL).

The 2007, a Fall Walleye Index Netting (FWIN) study at Buck Lake was conducted to monitor the overall population status and determine natural recruitment levels, following similar assessments conducted in 2005 and 2006. The management status of Buck Lake was classified as stable during 2005 and 2006 based on the five biological characteristics of a Walleye population outlined in *Alberta's Walleye Management and Recovery Plan* (Berry, 2005).

2.0 METHODS

2.1 STUDY AREA

Buck Lake is located approximately 309 km northwest of Calgary, and 105 km southwest of Edmonton in Alberta (Figure 1). Public access via vehicle is possible from a variety of secondary roads branching from Highway 12 and Highway 22. Buck Lake is eutrophic, with a surface area of 2,540 ha (Mitchell and Prepas 1990). While the primary inlet (Buck Creek) flows into the lake from the southeast, drainage is located at the north end, where Buck Creek eventually merges with the North Saskatchewan River. There is extensive development around the lake, including several cottage developments, camp grounds, and the Village of Buck Lake.

Ten fish species occur in Buck Lake. These include: Walleye (*Sander vitreus*), Northern Pike (*Esox lucius*), Yellow Perch (*Perca flavescens*), Burbot (*Lota lota*), Lake Whitefish (*Coregonus clupeaformis*), White Sucker (*Catostomus commersoni*), Spottail Shiner (*Notropis hudsonius*), Brook Stickleback (*Culaea inconstans*), Trout-perch (*Percopsis omiscomaycus*) and Iowa Darter (*Etheostoma exile*) (Mitchell and Prepas 1990).

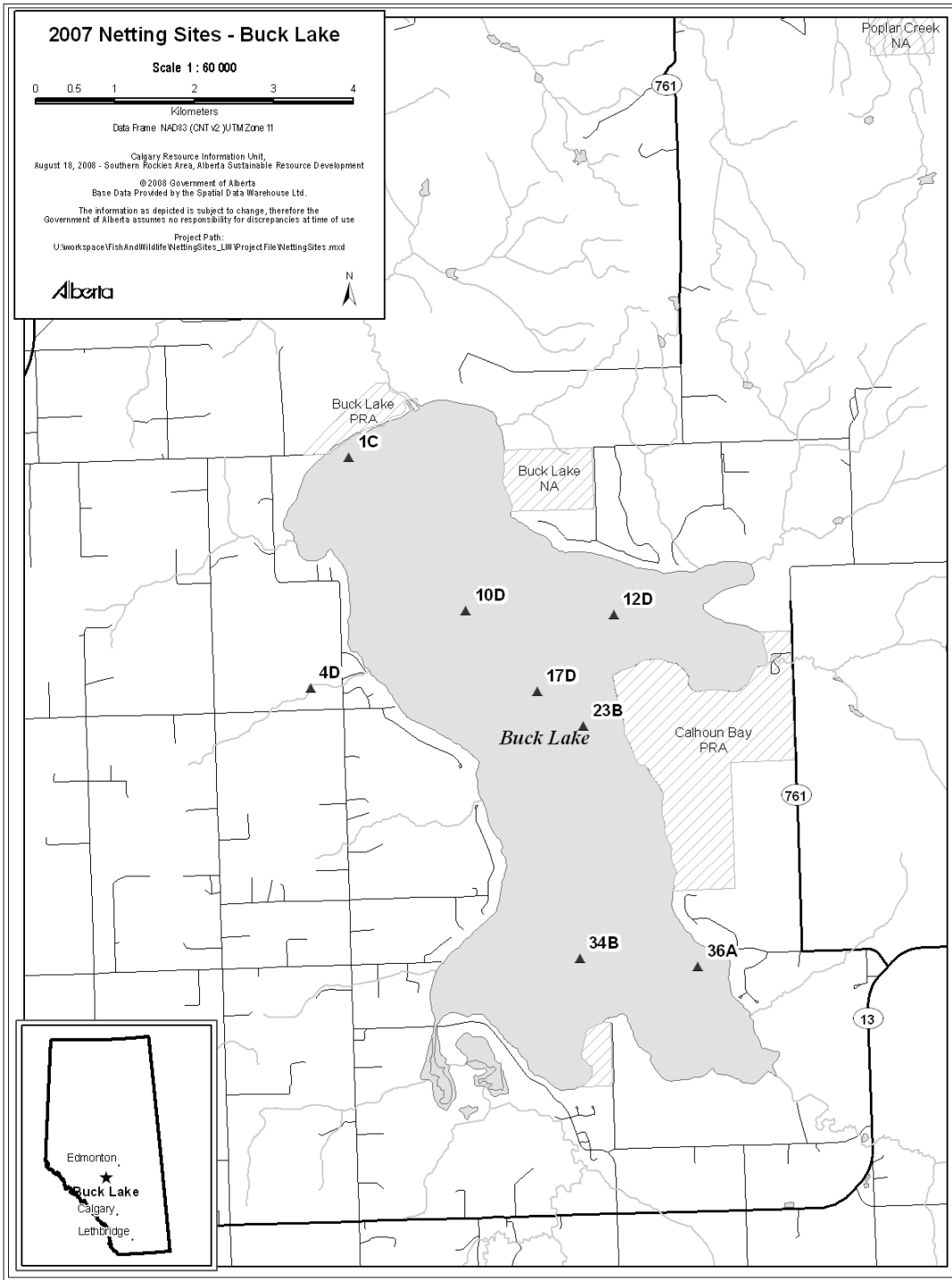


Figure 1. Map of Buck Lake, including 2007 netting locations and location in southern Alberta

2.2 SURVEY METHODS

The Fall Walleye Index Netting (FWIN) protocol developed by the Ontario Ministry of Natural Resources in 2000 was employed to survey Buck Lake in 2007 (Morgan 2000). According to this method, nets are composed of eight ascending panels of different mesh sizes (25 mm, 38 mm, 51mm, 64mm, 76mm, 102mm, 127mm, and 152mm, respectively) without spacers. As a result, the standard FWIN net measures 61.0 m long by 1.8 m deep, spanning an area of 109.8m².

Nets were placed in a spatial distribution determined by assigning random locations within depth and distance strata according to the methodology described in Morgan (2000). While this methodology allows for the selection of an alternate location if an inappropriate spot is initially chosen (too shallow, heavily vegetated, or a very steep bottom gradient), all of the randomly generated locations were used in 2007. Three nets were set in the shallow stratum, and five in the deep stratum, for a total of eight nets set for 2007 (Figure 1). In accordance with protocol, nets were set perpendicular to shore for approximately 24 hours.

The catches for individual panels were collected separately and identified with grid location numbers and mesh sizes. Six species were caught in 2007, including Walleye, Northern Pike, Lake Whitefish, Yellow Perch, White Sucker, and Spottail Shiner. Sport fish species were visually examined to catalogue hooking injuries and illnesses and subjectively assess their general physical condition (normal weight versus exceptionally fat or thin individuals). Fork length (FL) (mm), total length (TL) (mm), and weight (mm) were measured, and species specific aging structures were collected (otoliths for Walleye, Lake Whitefish and Yellow Perch, and cleithra for Northern Pike). Gender and sexual maturity for were determined by examination of the gonads, (which for Walleye included weighing the female gonads to the nearest grams). If the gonads were considered to be sufficiently developed for spawning during the following spring fish were classified as mature. Non spawning females were identified by the absence of developing eggs despite the presence of mature gonadal development.

For some of the analysis and comparisons in this report a weighted CUE (catch per unit effort) was used. The weighted CUE is the number of fish caught per net per twenty-four hours. The weighted CUE is calculated using the formula:

$$\text{Weighted_CUE} = \left(\frac{\left(\frac{\text{Number_of_fish} \times 24\text{h}}{\text{Number_of_hours_net_was_set}} \right) \times 100\text{m}^2}{109.8\text{m}^2} \right)$$

Walleye ages were assigned by a modified methodology from that described in MacKay et al. (1990). The first annulus tightly surrounding the focus (indicating one year of age) was identified using the following formula:

$$1^{\text{st}} \text{ annulus} = \frac{rL (\text{age-0 } L)}{L}$$

where:

rL = radius length (distance from the center of the focus to the furthest edge)

Age-0 L = hypothesized length of age-0 Walleye at time sampled

L = length of the sampled Walleye

The von Bertalanffy growth equation was used to calculate growth parameters. The following equation was used:

$$L_t = L_{\infty}(1 - e^{-k(t-t_0)})$$

where:

L_{∞} = maximum theoretical length (fork length infinity) that can be obtained;

k = growth coefficient;

t = time of age in years;

t_0 = is the time in years when length would theoretically be equal to zero and;

e = exponent for natural logarithms.

L_{∞} , t_0 , and k were calculated using the Fishery Analysis and Simulation Tools ver. 2.1 (Slipke and Maceina 2001). The length-at-age data were fitted to the growth model by applying the equation independently to each sample.

All data were analysed and reported on using Microsoft Office 2000 Professional (9.0.7616 SP-3) (MSAccess, MSExcel, MSWord). The data set for this study is stored in the Alberta Sustainable Resource Development *Fisheries and Wildlife Management Information System* database (FWMIS) under project number 12744.

3.0 RESULTS AND DISCUSSION

3.1 Water Temperatures and Netting Effort

In 2007 the FWIN was conducted between September 19 and September 21 at Buck Lake. Water temperatures ranged from 12 to 13 degrees C, while the mean soak time was 23.8 hours (95% CI: 22.9 - 24.8h; n=8) (Appendix 1).

3.2 Catch Results

The FWIN catch during 2007 totalled 448 fish representing six species, with a mean catch of 56.0 fish/net (95% CI = 51.0 - 60.4) (Appendix 1). The five deep sets caught 277 fish (55.4 fish/net, 95% CI = 48.0 - 62.4) while the three shallow sets caught 171 fish (Mean: 57.0 fish/net; 95% CI = 55.0 - 61.0). Walleye were the most frequently caught species (n=368, 82.1%), followed by Northern Pike (n=49, 10.9%), Yellow Perch (n=22, 4.9%), Lake Whitefish (n=6, 1.3%), Spottail Shiner (n=2, 0.4%) and White Sucker (n=1, 0.2%).

3.3 Walleye Catch Per Unit Effort

During the 2007 FWIN Walleye were caught in all mesh sizes except the 127mm panel. The 64 mm panel had the highest catch, at 10.3 Walleye/100m²/24h¹ (95% CI = 8.4 – 12.3). Shallow sets caught a mean of 43.5 Walleye/net (95% CI = 37.3 – 49.0) while the deep sets caught a mean of 41.7 Walleye/net (95% CI = 33.1 - 49.6). The weighted catch per unit effort was 42.4 Walleye/100m²/24h¹ (95% CI = 36.4 - 47.6) for Buck Lake in 2007, and was normally distributed (Figure 2).

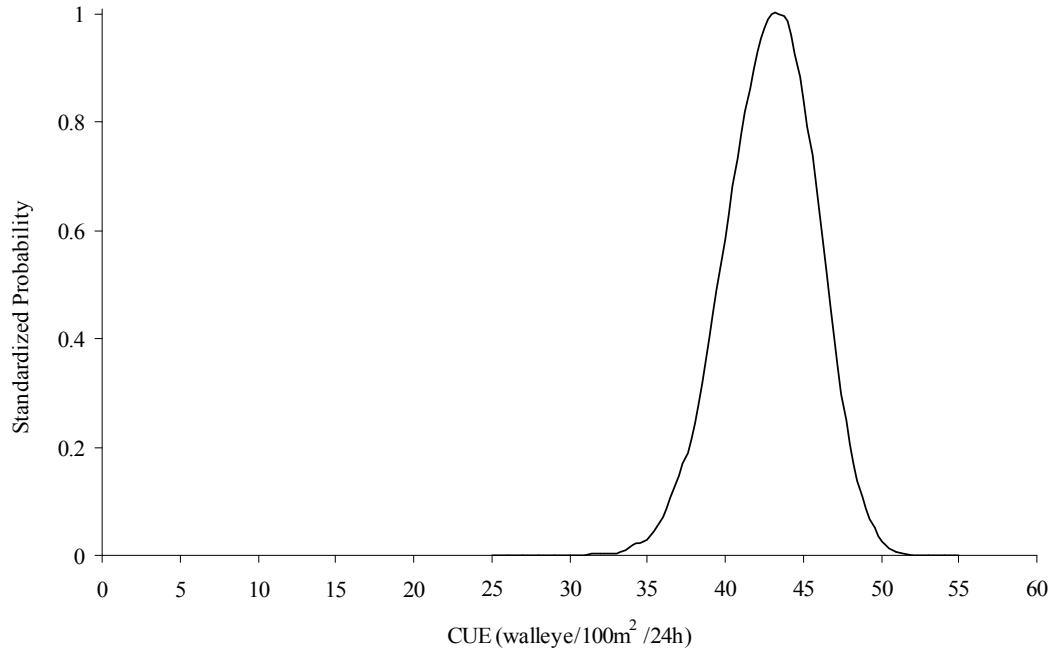


Figure 2. Walleye FWIN catch frequency distribution, Buck Lake 2007.

As was the case in previous years the catch rate for Walleye in this location is very high in comparison to catch rates elsewhere in Alberta (Figure 3). The weighted CUE for Walleye in 2007 at Buck Lake (42.3 Walleye/net) was 23% higher than the catch rate for 2006 (32.7 Walleye/net), 16% higher than the catch rate for 2005 (35.3 Walleye/net) and 4% lower than the 2004 catch rate (44.3 Walleye/net) (Watkins 2007, 2005).

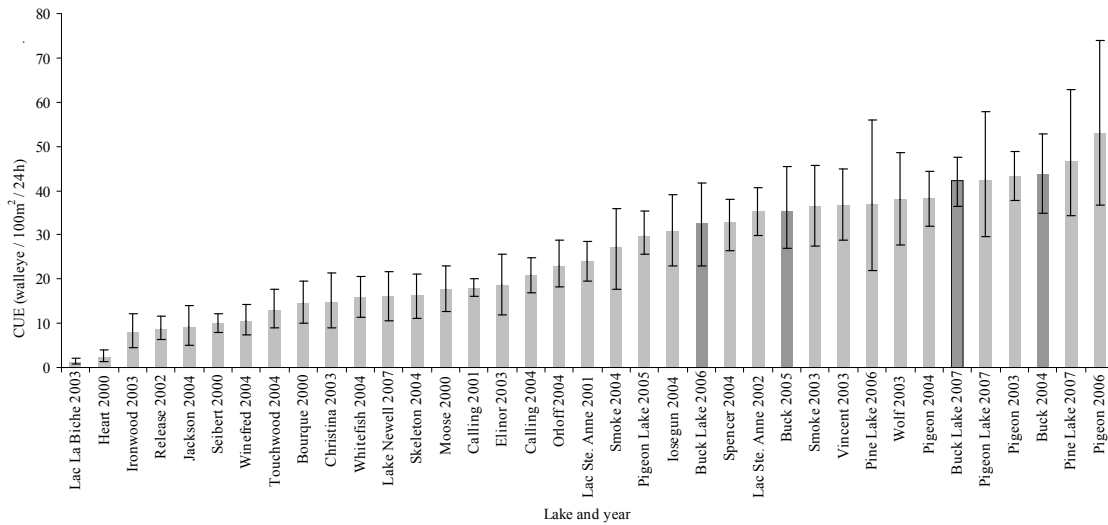


Figure 3. FWIN catches of Walleye from 43 Alberta lakes from 2000-2007. Error bars depict 95% confidence intervals.

3.4 Walleye Fork Length Frequency Distribution

In 2007 the Walleye FL distribution ranged from 118mm to 510 mm (n=368; mean = 385mm) with fish from 350-450 mm FL predominating (Figure 4). Cumulatively, this size range had a CUE of 33.5 Walleye/net, comprising 79% of the total CUE.

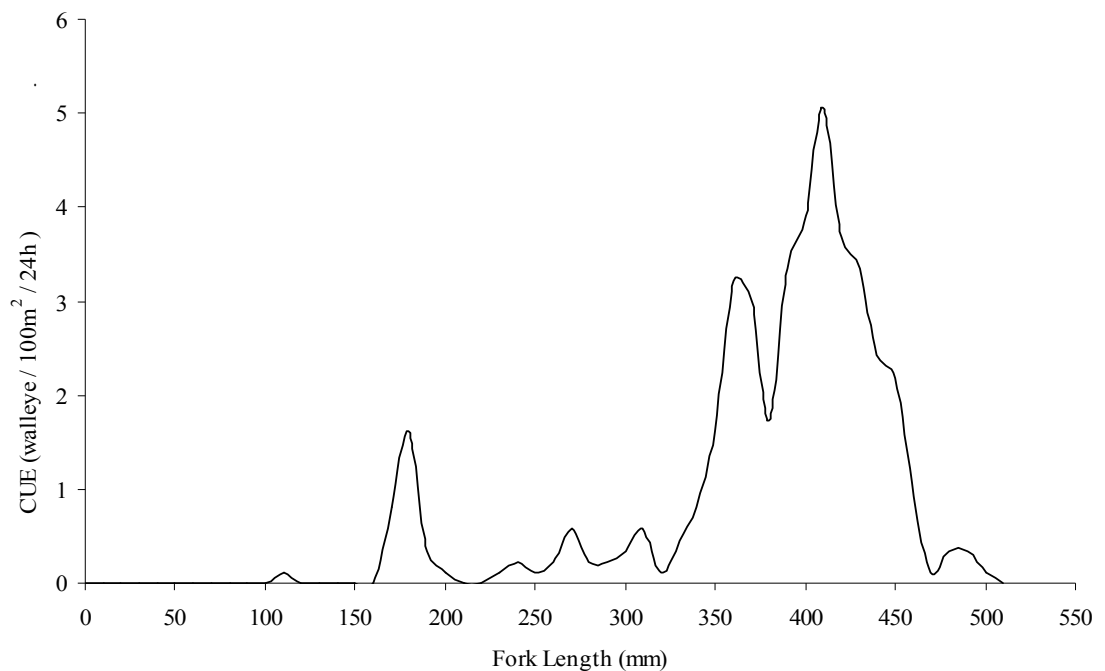


Figure 4. Walleye fork length frequency distribution, Buck Lake 2007.

3.5 Walleye Age Class Frequency Distribution

Walleye ranged from 0 to 19 years of age in 2007 (Figure 5). The 2003, 1998, and 1997 year classes (aged 4, 9, and 10 years) dominated the sample with a combined CUE of 25.4 Walleye/net. These age groups correspond to 60.2% of the total sample.

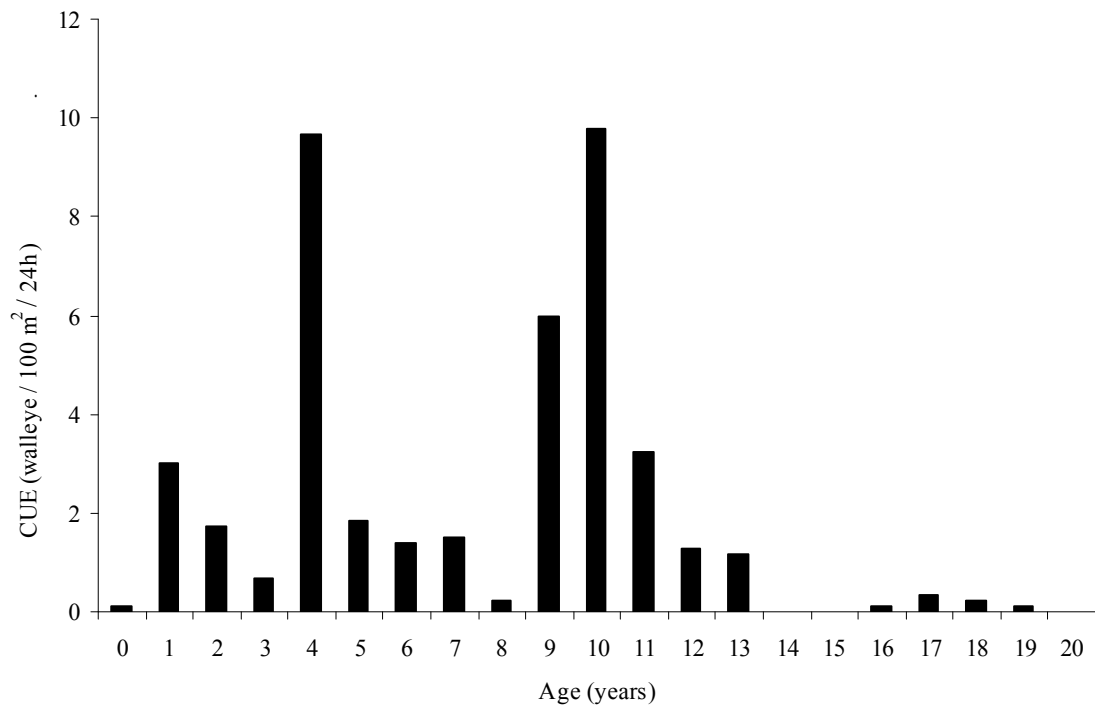


Figure 5. Walleye age-class frequency distribution, Buck Lake 2007.

The 1996 year class (11 years old) was the next most prominent age class, with a CUE of 3.2 Walleye/net representing 7.6% of the sample. The population is primarily supported by three age classes, and has a mean age of 7.3 years. These characteristics are indicators of a stable population (Table 1). The results obtained for Buck Lake in 2007 are similar with the status designation from previous years, since the fishery was also classified as stable in 2006 and 2005 (mean age: 6.2 years (2006), 6.1 years (2005), three age classes supporting the fishery in both years) (Watkins, 2007).

Table 1. Criteria for classifying status of Walleye fisheries, modified for FWIN analysis (from Sullivan, 2003).

STATUS OF STOCK	TROPHY	STABLE	VULNERABLE	COLLAPSED
Age-class Distribution	Wide 8 or more age classes mean age >9	Wide 8 or more age classes mean age = 6-9	Narrow 1-3 age classes mean age = 4 - 6 few old (>10 years) fish	Wide or Narrow Mean age = 6 - 10
Buck Lake 2007		18 age-classes mean age 7.3		
Age-class Stability	Very Stable 1 - 2 age classes out of smooth catch curve	Relatively Stable 2 - 3 age classes out of smooth catch curve	Unstable 1 - 3 age classes support fishery	Stable or Unstable Recruitment failures
Buck Lake 2007		3 age-classes		
Age-At-Maturity	Females 10 - 20 Males 10 - 16	Females 8 - 10 Males 7 - 9	Females 7 - 8 Males 5 - 7	Females 4 - 7 Males 3 - 6 Ages will vary with age class distribution
Buck Lake 2007			Females 4-10 Males 3-5	
Length-at-age	Very slow 50 cm (FL) in 12 - 15 years	Slow 50 cm (FL) in 9 - 12 years	Moderate 50 cm (FL) in 7 - 9 years	Fast 50 cm (FL) in 4 - 7 years
Buck Lake 2007		50 cm FL in 10 years		
Catch Rate FWIN		High >30 Walleye / net 42.4 Walleye/net	Moderate 5 - 25 Walleye / net	Low <5 Walleye / net
Buck Lake 2007				

3.6 Walleye Age-Class Stability

The Buck Lake Walleye population exhibited a wide distribution of age classes (age 0 to age 19 years) in 2007, with a mean age of 7.3 years. While no 14 and 15 year old fish were captured during the FWIN the preceding year classes are sufficiently strong to indicate a continuance of the population (Figure 5). Recruitment of young Walleye is also high at this location, with 35% of the fish sampled less than five years of age. This broad range of ages is also an indicator of population stability under the *Alberta's Walleye Management and Recovery Plan* (Berry 1995) (Table 1).

3.7 Walleye Age-at-Maturity

The gender ratio for Walleye in 2007 was 1 female: 1.42 males. While the female population were completely sexually mature by age ten, the earliest recorded maturity occurred at age four (Figure 6). Males matured earlier than females, as young as three years, and were completely mature by age five (Figure 7). The timing of maturation from the 2007 Buck Lake FWIN is indicative of a vulnerable Walleye population (Table 1).

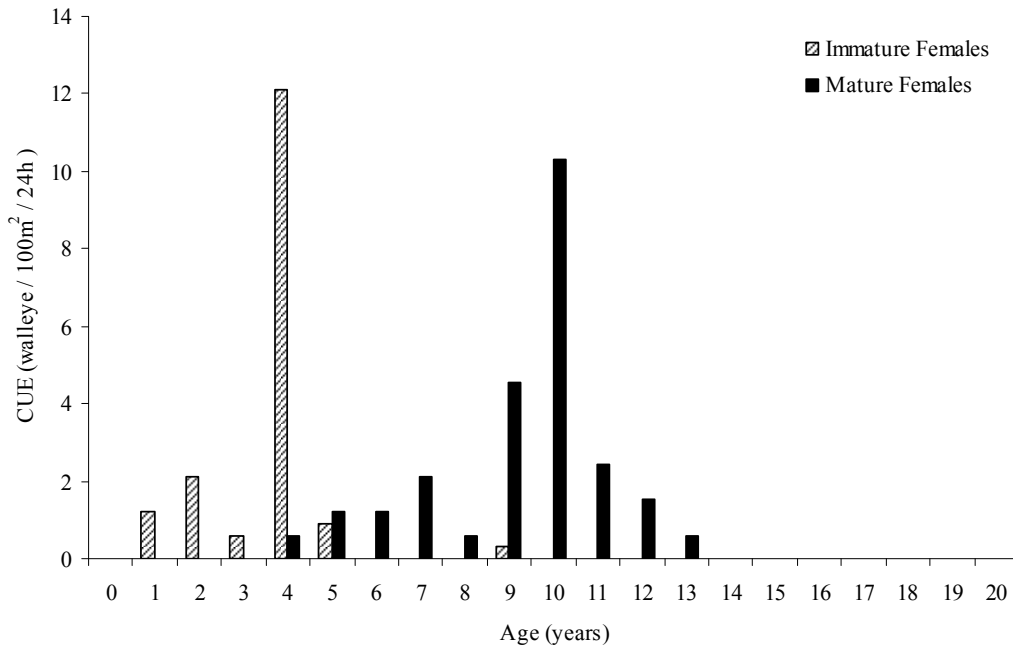


Figure 6. Age-at-maturity of female Walleye, Buck Lake 2007.

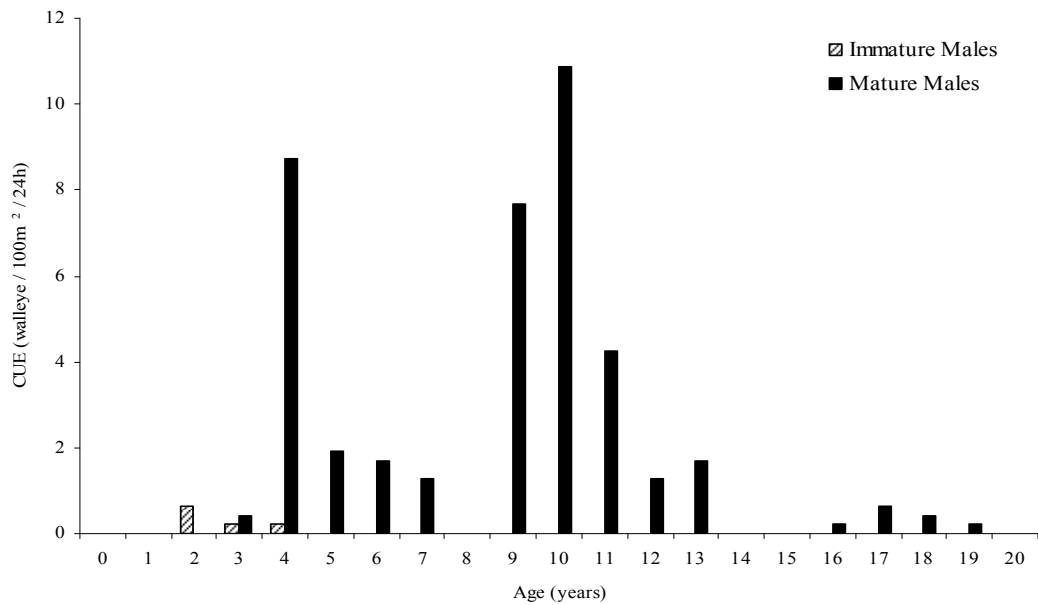


Figure 7. Age-at-maturity of male Walleye, Buck Lake 2007.

3.8 Walleye Length-at-Age

There were eight Walleye caught in 2007 which were 500 mm TL or larger (Figure 8). The population in Buck Lake reached this size starting at ten years of age, an indicator of slow growth (and therefore a stable population) according to the WMRP (Table 1).

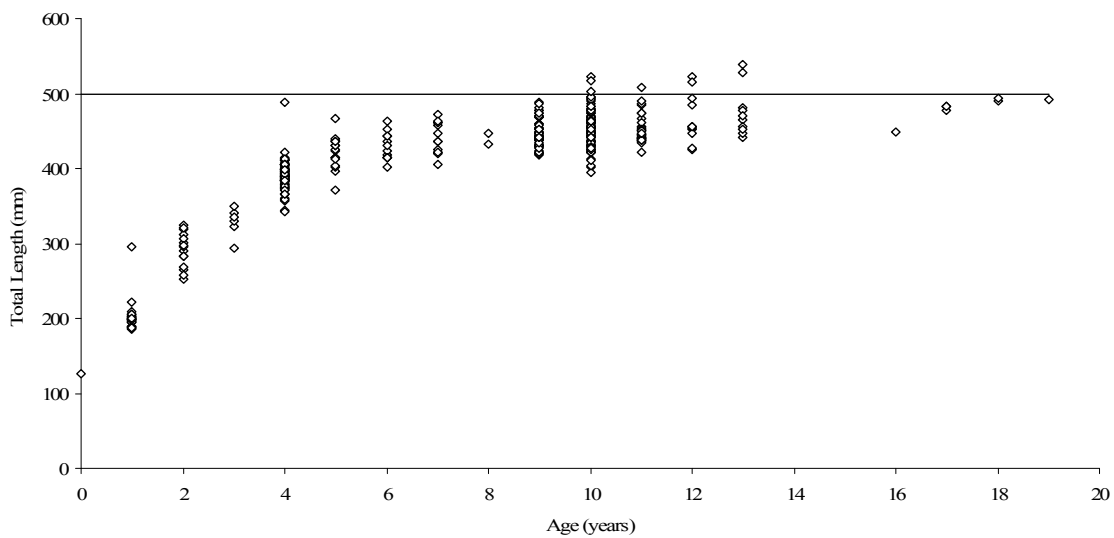


Figure 8. Total length-at-age for Buck Lake, 2007.

3.9 Von Bertalanffy Growth Equation

Growth parameters for Walleye in 2007 strongly resembled those for previous years at Buck Lake (Figure 9). The growth rate (k) was 0.316, comparable to 0.443 in 2006 and 0.330 in 2005 (Watkins, 2007). The asymptotic fork length (L_{∞}) was 449 mm in 2007 (2006: 440 mm; 2005: 445mm (Watkins, 2007)). As a result, the Walleye population in 2007 can be concluded to be growing at a similar rate to previous years.

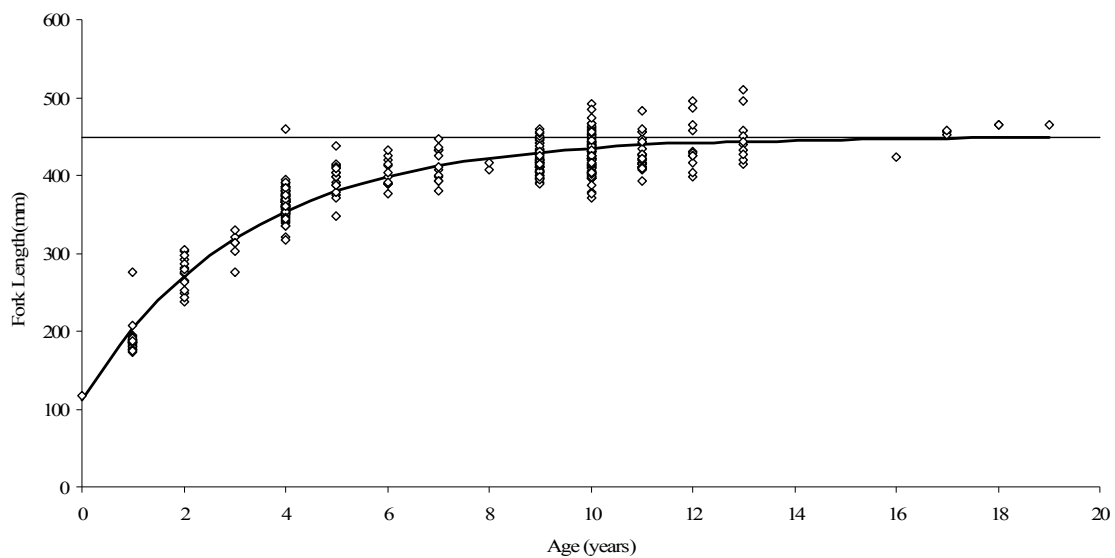


Figure 9. Von Bertalanffy growth curve for 2007 ($L_{\infty} = 449$ mm FL, $k = 0.316$, $t_0 = -0.902$).

3.10 Walleye Length-at-Weight

The length to weight relationship for Walleye in 2007 strongly resembled those for previous years (Figure 10) (Watkins, 2007). The mean weight was 693g, ranging from a minimum of 49 g and a maximum of 1436g (n=365) (mean weight: 659 g (2006), 618 g (2005) (Watkins, 2007)).

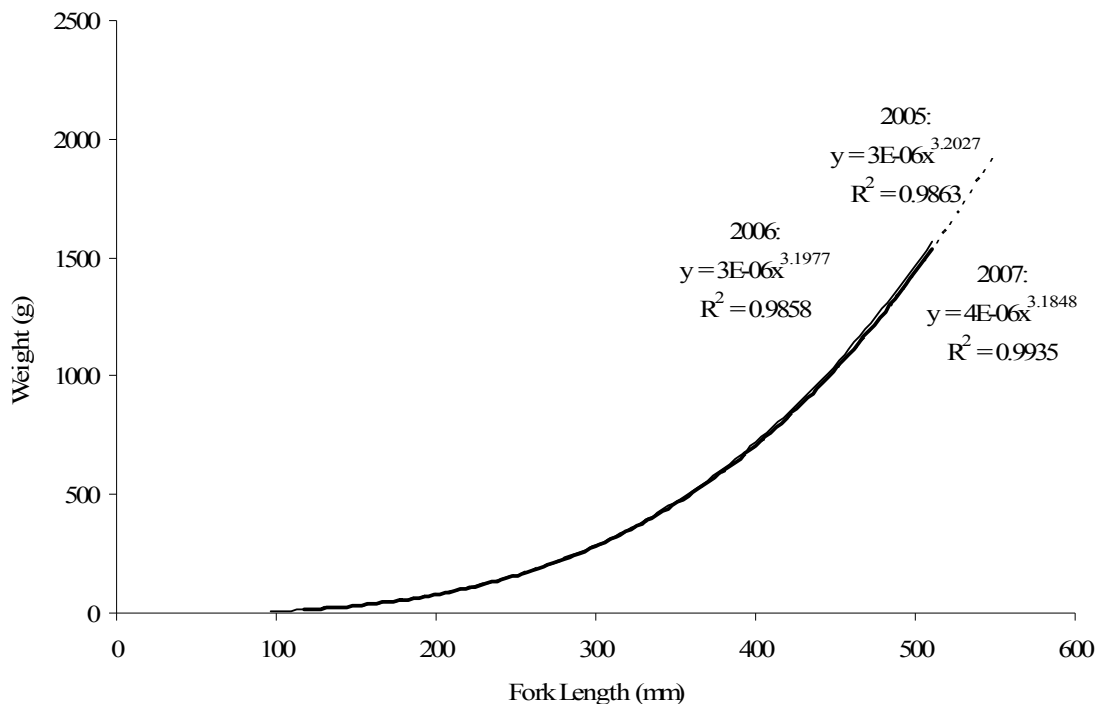


Figure 10. Walleye length-at-weight for Buck Lake, 2005-2007 (Watkins, 2007).

3.11 Walleye Gonadosomatic Index (GSI)

The Gonadosomatic Index (which is the ratio of the weight of the gonads relative to the whole body weight) was calculated to distinguish between females who will or will not spawn during the following year. No mature non-spawning females were captured during the 2007 FWIN. All females with a GSI greater than 1% were mature fish, with developed eggs present in the ovary (indicative of spawning status) (Figure 11).

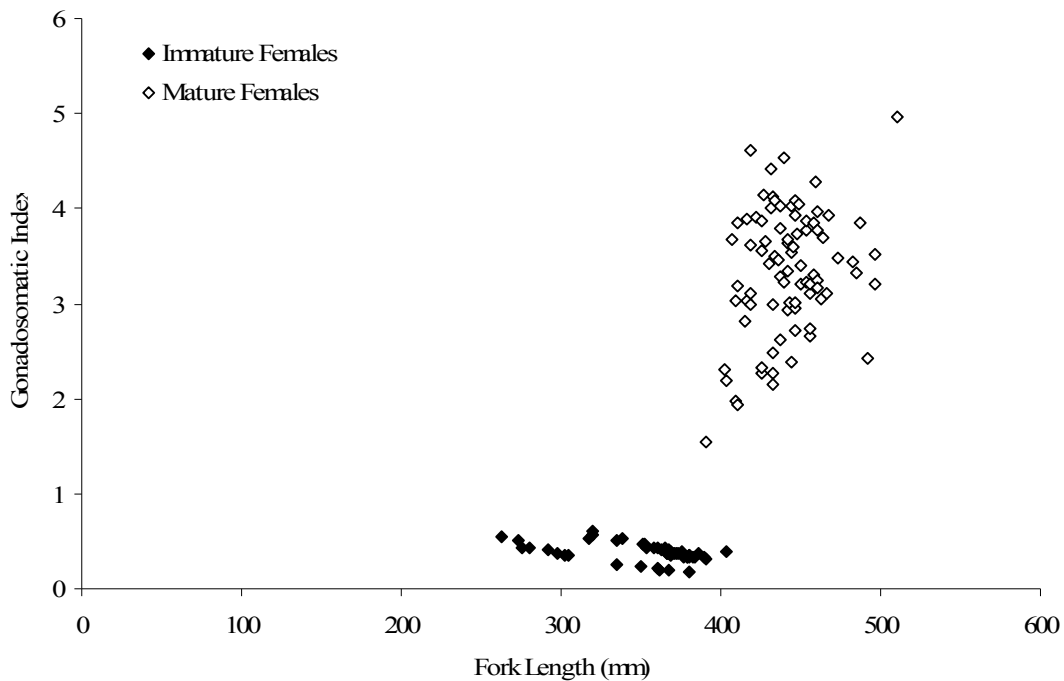


Figure 11. Walleye Gonadosomatic Index, Buck Lake, 2007.

3.12 Northern Pike Catch Rate

The catch rate for Northern Pike was 5.57 fish/100m²/24h¹ (95% CI = 3.82 - 7.53, n=8) in 2007 (Figure 12). This was 8% lower than the CUE in 2006 (6.03 Northern Pike/net; 95%CI=2.14 - 11.5) but still 33% higher than the catch for this species in 2005 (3.69 Northern Pike/net; 95%CI=1.71 - 6.48) (Watkins, 2007).

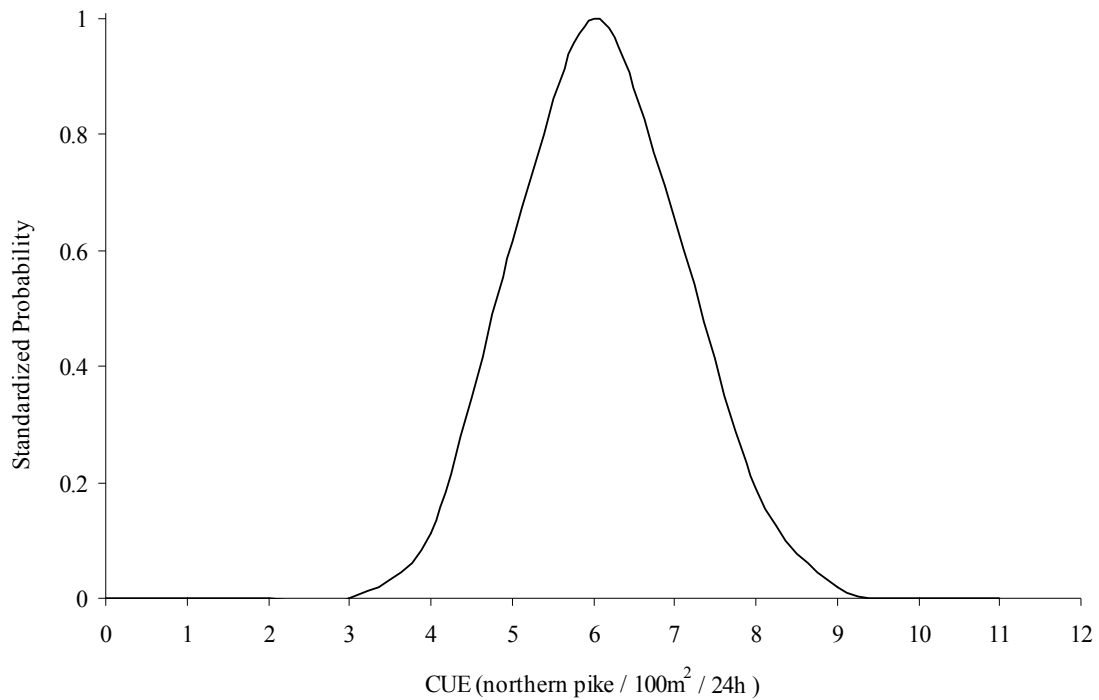


Figure 12. Catch per unit effort for Northern Pike, Buck Lake, 2007.

3.13 Northern Pike Fork Length Frequency Distribution

In 2007 the fork length distribution for Northern Pike ranged from 406 - 669 mm (n=49). Fish between 590 mm and 640 mm FL dominated the sample, comprising 44.9% of the CUE (Figure 13). The most common size classes for Northern Pike were 620-629mm and 630-639 mm FL fish, with CUEs of 0.80 fish/net and 0.68 fish/net. The size distribution for 2007 closely resembles that of previous years. Northern pike ranging from 490 mm to 650 mm in fork length predominated in both 2006 (84% of the sample) and 2005 (80% of the sample) (Watkins, 2007).

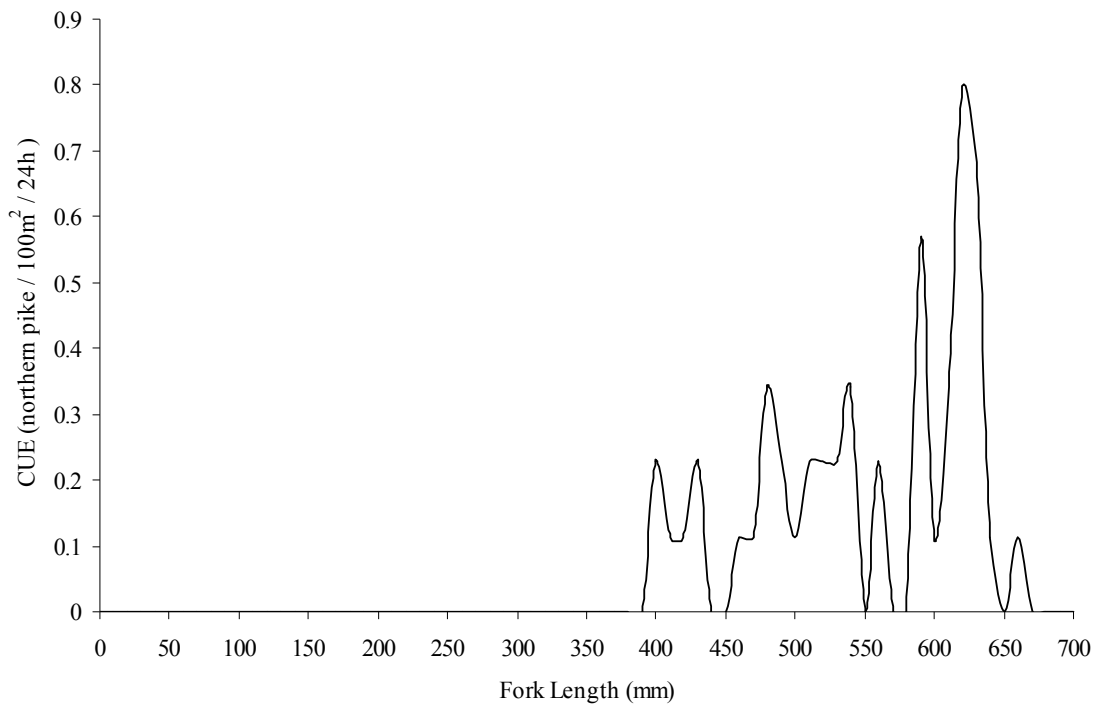


Figure 13. Northern Pike fork length frequency distribution, Buck Lake, 2007.

3.14 Northern Pike Length at Weight

In 2007 pike weighed a similar amount for a given length compared to previous years. The heaviest fish caught weighed 2,124 grams, while the lightest was 529g. Mean weight in 2007 was 1,348g (95%CI= 1,213 - 1,479g, n=49), which is comparable to 2006 (Mean weight = 1,375g, 95%CI = 1,257 - 1,490, n=49) and heavier than 2005 (Mean weight = 1,106g, 95%CI = 1,014 - 1,200, n=46) (Figure 14).

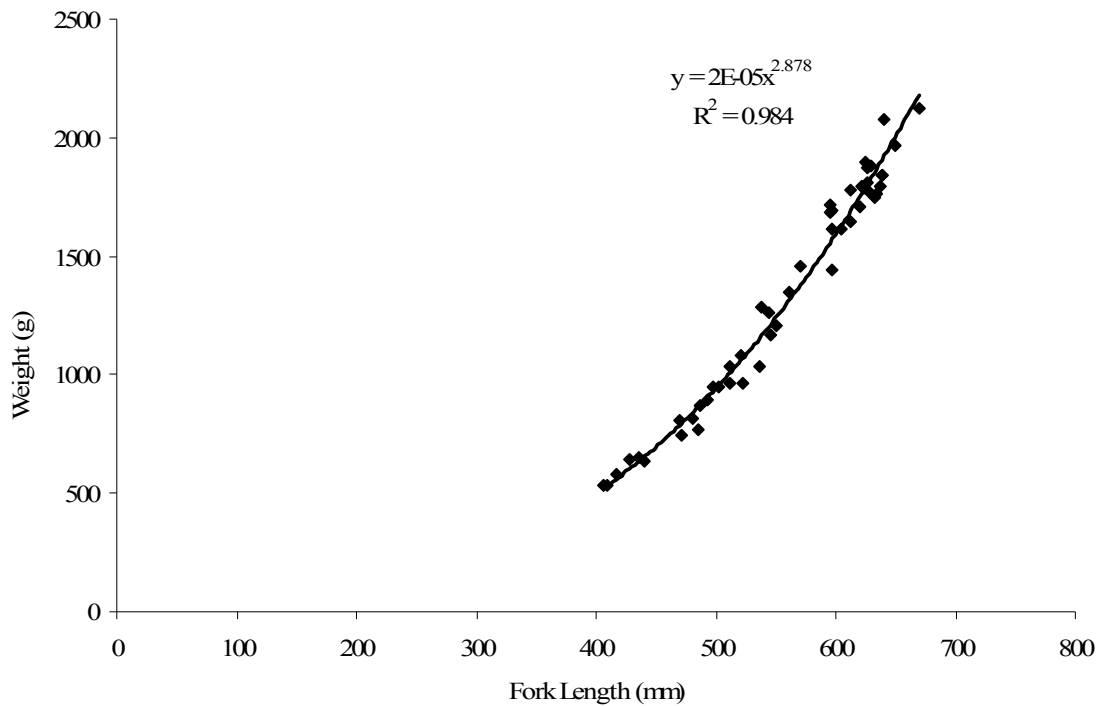


Figure 14. Northern Pike length-at-weight, Buck Lake 2007.

3.15 Yellow Perch Catch Rate

The catch rate for Yellow Perch in 2007 was 2.59 fish/100m²/24h¹ (95% CI=1.06 – 4.14, n=22), and normally distributed (Figure 15). This represents a 24% increase in the CUE for Yellow Perch from 2006 (CUE=1.97 fish/net; 95%CI=0.65 - 3.34) and an 80% increase from 2005 (CUE=0.526 fish/net; 95%CI=0.23 - 0.86) (Watkins, 2007).

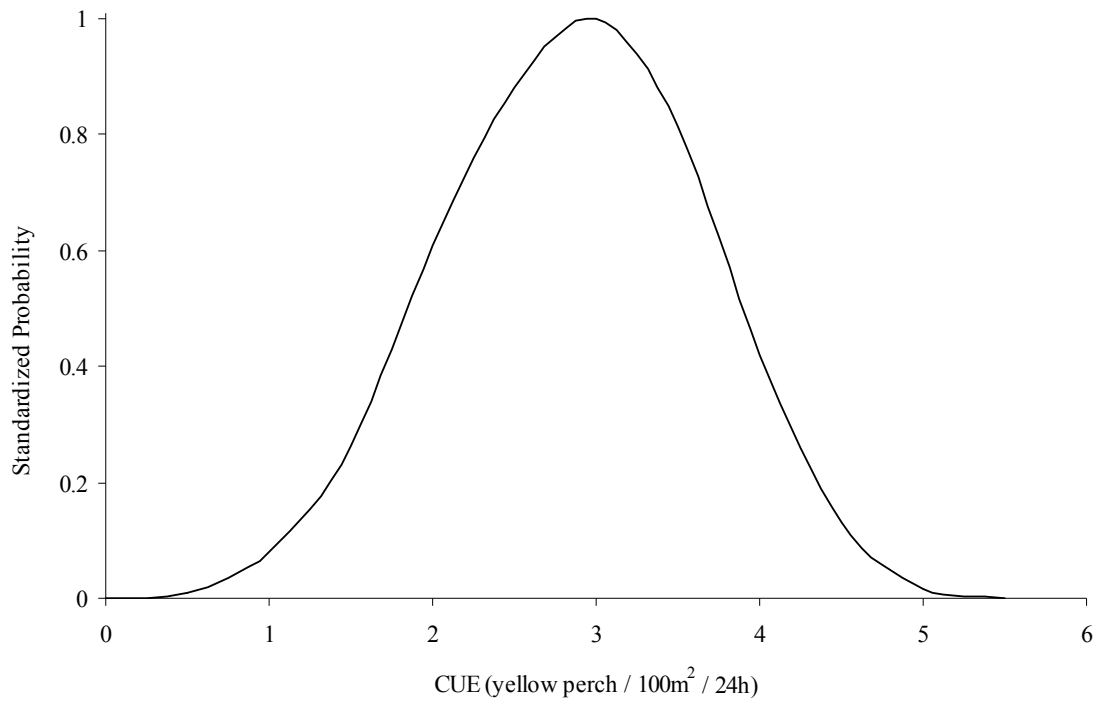


Figure 15. Yellow Perch catch per unit effort for Buck Lake, 2007.

4.0 SUMMARY

Based on the five biological characteristics identified in *Alberta's Walleye Management and Recovery Plan* (Berry 1995) the status of the Buck Lake Walleye fishery can be classified as stable in 2007, which is unchanged from 2006 and 2005.

Recruitment is strong at this location in spite of limited numbers of old Walleye. Fish aged 9 - 11 are highly represented in the sample, as are those aged four years. Some younger Walleye were also captured in 2007, including young of the year. No year class failures were observed, and some older fish (aged 16 – 19 years) were also present. This broad span of ages, coupled with the presence of prominent numbers of young fish is characteristic of a stable population.

Walleye surveyed in 2007 grew at a rate similar to previous years, both in regards to length and weight. The relatively slow growth observed for this population (reaching 50 cm TL in ten years) is an indicator of a stable population.

Northern Pike were caught at a high rate (5.57 fish/net) in 2007, which is similar to the 2006 FWIN catch rate. The size distribution (for both length and weight) also resembled results for previous years. In contrast, the catch for Yellow Perch is increasing at Buck Lake, up to 2.59 fish/net in 2007 from 1.97 fish/net in 2005.

In addition to its' stability, the 2007 Walleye population in Buck Lake has a relatively high catch rate, falling within the top third of results for Alberta. The catch rate and growth parameters for Walleye and Northern Pike for this location are indicators of successful management for self sustaining populations of these sport species at this location.

5.0 LITERATURE CITED

- Berry D.K. 1995. Alberta's Walleye Management and Recovery Plan. Alberta Environment Protection, Natural Resources Service. Number T/310. 32 pp.
- Campana S.E. 2001. Accuracy, precision and quality control in age determination, including review of the use and abuse of age validation methods. *Journal of Fish Biology* 59, 197-242.
- Casselmann J. M. 1995. Otolith techniques for identifying and discriminating between pond-cultured and indigenous Walleye *Stizostedion vitreum* from the natural environment. Ontario Ministry of Natural Resources, Glenora Fisheries Station, Glenora.
- Mackay, W.C., G.R. Ash, and H.J. Norris (eds.). 1990. Fish ageing methods for Alberta. R.L. & L. Environmental Services Ltd. In assoc. with Alberta Fish and Wildl. Div. and Univ. of Alberta, Edmonton. 113 pp.
- Mitchell, P. and E. Prepas. 1990. Atlas of Alberta Lakes. University of Alberta Press, Edmonton. 675 pp.
- Morgan G.E. 2000. Manual of Instructions, Fall Walleye Index Netting (FWIN). Ontario Ministry of Natural Resources. Fish and Wildlife Branch. 37 pp.
- Patterson B. 2004. Assessment of the summer sport fishery for Walleye and Northern Pike at Pigeon Lake, 2003. Produced by Alberta Conservation Association Edmonton, Alberta, Canada. 55p
- Slipke, J. and M. Maceina. 2001. Fishery analyses and simulations tools (FAST), version 2.1. Auburn University, Department of Fisheries and Allied Aquacultures, Auburn, Alabama, USA. 156pp.
- Sullivan M.G. 2003. Active management of Walleye fisheries in Alberta: dilemmas of managing recovering fisheries. *North America Journal of Fisheries Management* 23(4): in press.
- Watkins O. 2005. Pigeon Lake Fall Walleye, *Sander vitreus*, Index Netting Survey, 2004. Alberta Sustainable Resource Development, Fish and Wildlife Division. Data Report. pp. 46

Watkins O. 2007. Buck Lake Fall Walleye, *Sander vitreus*, Index Netting Survey, 2005 -- 2006. Alberta Sustainable Resource Development, Fish and Wildlife Division. Data Report. pp. 39

6.0 APPENDICES

6.1 Catch Composition from FWIN Nets, Buck Lake 2007

Set #	Depth (m) min/max	Soak Time (h)	Species						Total
			WALL	NRPK	LKWH	YLPR	WHSC	SPSH	
1	(30.6 - 28.2)	25.5	43	8	1	5	0	1	58
2	(31.2 - 30.8)	22.5	54	3	0	5	0	0	62
3	(18.5 - 18)	22.5	44	3	1	1	0	0	49
4	(36.7 - 36)	25	30	12	0	1	0	0	43
5	(17.4 - 17)	25.75	59	6	0	0	0	0	65
6	(11 - 10.1)	22.25	38	9	2	5	0	1	55
7	(12.7 - 9.4)	22.75	51	5	0	5	0	0	61
8	(11.9 - 10.6)	24.25	49	3	2	0	1	0	55
Total			368	49	6	22	1	2	448
Mean		23.81							56

6.1.1 Catch composition from deep sets, Buck Lake FWIN 2007.

Set #	Stratum	Soak Time (h)	Species						Total
			WALL	NRPK	LKWH	YLPR	WHSC	SPSH	
1	deep	25.5	43	8	1	5	0	1	58
2	deep	22.5	54	3	0	5	0	0	62
3	deep	22.5	44	3	1	1	0	0	49
4	deep	25	30	12	0	1	0	0	43
5	deep	25.75	59	6	0	0	0	0	65
Total			230	32	2	12	0	1	277
Mean		24.25							55.4

6.1.2 Catch composition from shallow sets, Buck Lake FWIN 2007.

Set #	Stratum	Soak Time (h)	Species						Total
			WALL	NRPK	LKWH	YLPR	WHSC	SPSH	
6	shallow	22.25	38	9	2	5	0	1	55
7	shallow	22.75	51	5	0	5	0	0	61
8	shallow	24.25	49	3	2	0	1	0	55
Total			138	17	4	10	1	1	171
Mean		23.08							57

6.2 Walleye, Northern Pike, and Lake Whitefish and Yellow Perch catches by mesh size, Buck Lake 2007.

Walleye

Set #	Soak Time (h)	UTM		Mesh Size								Total
		Easting	Northing	25	38	51	64	76	102	127	152	
1	25.5	650765	5873134	2	8	6	12	8	7	0	0	43
2	22.5	650177	5873576	2	10	12	11	11	8	0	0	54
3	22.5	651144	5874539	0	8	10	7	11	8	0	0	44
4	25	649280	5874590	0	4	7	7	5	7	0	0	30
5	25.75	650720	5870194	3	9	14	17	9	6	0	1	59
6	22.25	652209	5870098	1	6	9	10	9	3	0	0	38
7	22.75	647808	5876514	1	0	12	15	12	11	0	0	51
8	24.25	647324	5873614	0	4	11	11	14	9	0	0	49
Total				34	87	132	154	155	161	127	153	368

Northern Pike

Set #	Soak Time (h)	UTM		Mesh Size								Total
		Easting	Northing	25	38	51	64	76	102	127	152	
1	25.5	650765	5873134	0	2	2	1	3	0	0	0	8
2	22.5	650177	5873576	0	0	0	2	1	0	0	0	3
3	22.5	651144	5874539	0	0	0	2	1	0	0	0	3
4	25	649280	5874590	0	4	2	3	1	1	1	0	12
5	25.75	650720	5870194	0	1	0	1	4	0	0	0	6
6	22.25	652209	5870098	0	2	2	1	2	2	0	0	9
7	22.75	647808	5876514	0	0	0	4	1	0	0	0	5
8	24.25	647324	5873614	0	0	0	2	1	0	0	0	3
Total				25	47	57	80	90	105	128	152	49

Lake Whitefish

Set #	Soak Time (h)	UTM		Mesh Size								Total
		Easting	Northing	25	38	51	64	76	102	127	152	
1	25.5	650765	5873134	0	0	0	0	0	1	0	0	1
2	22.5	650177	5873576	0	0	0	0	0	0	0	0	0
3	22.5	651144	5874539	0	0	0	0	0	1	0	0	1
4	25	649280	5874590	0	0	0	0	0	0	0	0	0
5	25.75	650720	5870194	0	0	0	0	0	0	0	0	0
6	22.25	652209	5870098	0	0	0	0	0	1	0	1	2
7	22.75	647808	5876514	0	0	0	0	0	0	0	0	0
8	24.25	647324	5873614	0	0	0	0	0	1	0	1	2
Total				25	38	51	64	76	106	127	154	6

Yellow Perch

Set #	Soak Time (h)	UTM		Mesh Size								
		Easting	Northing	25	38	51	64	76	102	127	152	Total
1	25.5	650765	5873134	0	3	2	0	0	0	0	0	5
2	22.5	650177	5873576	0	3	2	0	0	0	0	0	5
3	22.5	651144	5874539	0	0	0	1	0	0	0	0	1
4	25	649280	5874590	0	0	1	0	0	0	0	0	1
5	25.75	650720	5870194	0	0	0	0	0	0	0	0	0
6	22.25	652209	5870098	0	4	0	1	0	0	0	0	5
7	22.75	647808	5876514	0	0	3	1	1	0	0	0	5
8	24.25	647324	5873614	0	0	0	0	0	0	0	0	0
Total				25	48	59	67	77	102	127	152	22

Spottail Shiner

Set #	Soak Time (h)	UTM		Mesh Size								
		Easting	Northing	25	38	51	64	76	102	127	152	Total
1	25.5	650765	5873134	1	0	0	0	0	0	0	0	1
2	22.5	650177	5873576	0	0	0	0	0	0	0	0	0
3	22.5	651144	5874539	0	0	0	0	0	0	0	0	0
4	25	649280	5874590	0	0	0	0	0	0	0	0	0
5	25.75	650720	5870194	0	0	0	0	0	0	0	0	0
6	22.25	652209	5870098	1	0	0	0	0	0	0	0	1
7	22.75	647808	5876514	0	0	0	0	0	0	0	0	0
8	24.25	647324	5873614	0	0	0	0	0	0	0	0	0
Total				27	38	51	64	76	102	127	152	2

White Sucker

Set #	Soak Time (h)	UTM		Mesh Size								
		Easting	Northing	25	38	51	64	76	102	127	152	Total
1	25.5	650765	5873134	0	0	0	0	0	0	0	0	0
2	22.5	650177	5873576	0	0	0	0	0	0	0	0	0
3	22.5	651144	5874539	0	0	0	0	0	0	0	0	0
4	25	649280	5874590	0	0	0	0	0	0	0	0	0
5	25.75	650720	5870194	0	0	0	0	0	0	0	0	0
6	22.25	652209	5870098	0	0	0	0	0	0	0	0	0
7	22.75	647808	5876514	0	0	0	0	0	0	0	0	0
8	24.25	647324	5873614	0	0	0	0	0	1	0	0	1
Total				25	38	51	64	76	103	127	152	1

6.3 Statistics of the catch distribution for game fish catches, Buck Lake, 2007.
 This data is for presentation of the statistical nature of the catch distribution
 and are based on the geometric mean values (unweighted)

	Walleye	Northern Pike	Lake Whitefish	Yellow Perch	White Sucker	Spottail Shiner
Mean	46.0	6.1	0.8	2.8	0.1	0.3
Relative Standard Error (%)	7.1	19.1	41.8	31.3	100.0	65.5
Standard Error	3.3	1.2	0.3	0.9	0.1	0.2
Median	46.5	5.5	0.5	3.0	0.0	0.0
Mode		3.0	0.0	5.0	0.0	0.0
Standard Deviation	9.3	3.3	0.9	2.4	0.4	0.5
Sample Variance	85.7	11.0	0.8	5.9	0.1	0.2
Kurtosis	-0.1	-0.5	-1.5	-2.6	8.0	0.0
Skewness	-0.4	0.7	0.6	-0.1	2.8	1.4
Range	31	11	4	7	3	3
Minimum	30	3	0	0	0	0
Maximum	59	12	2	5	1	1
Sum	368	49	6	22	1	2
Count	8	8	8	8	8	9
Confidence Level (95%)	6.4	2.3	0.6	1.7	0.2	0.3