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Assessment of the 2002 Summer Sport Fishery for Walleye and Northern Pike in Calling Lake, Alberta

Alberta Conservation Association

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EXECUTIVE SUMMARY

In an effort to maintain, and in some cases, recover Alberta's walleye (Sander vitreus) and northern pike (Esox lucius) fisheries, Alberta Natural Resources Service implemented new management strategies in 1998 and 1999, respectively. In 1996, the walleye fishery at Calling Lake was classified as vulnerable and a 50 cm total length (TL) and three fish daily bag limit was implemented. After a 1996 creel survey, the walleye fishery was re-classified as collapsed, and in April 1998 a catch and release regulation (zero daily bag limit) was implemented. The pike fishery was classified as vulnerable in 1999 and a minimum size limit of 63 cm TL, with a daily possession limit of three fish was implemented. In April of 2002, Alberta Sustainable Resource Development closed the north portion of Calling Lake to angling and the commercial fishery. During the open season (May 17, 2002 – March 14, 2003) anglers were allowed to harvest two pike and one walleye of any size from the south portion of the lake.

Assessments of the walleye and northern pike sport fisheries were undertaken with a reduced-effort creel survey from May to September, 2002. Data from this survey showed that an estimated 7,167 anglers fished the lake. Angling pressure measured in 2002 exceeded that in 1996, though it was not substantially higher than historical levels. In contrast, there was a considerable increase in the walleye, but not the pike harvest since 1996. The yield of walleye and pike, including incidental mortality, was estimated at 0.87 and 0.19 kilograms/hectare, respectively.

ACKNOWLEDGMENTS

I am grateful to the seasonal crew of Owen Watkins, Deanne Miskew and Ryan Popowich, who worked at Calling Lake. The crew and I would like to thank: Alberta Community Development for the use of the Calling Lake Provincial Park seasonal residence; staff at Alberta Fish and Wildlife for the use of 2 boats during the survey as well as collaboration throughout the project; Human Resources and Development Canada for providing seasonal staff funding; and The Fish'n' Hole for providing discounts on equipment purchases.

Also, I would like to acknowledge Chris Davis (Alberta Fish and Wildlife), Dave Park (ACA) and Dr. Garry Scrimgeour (ACA) and for reviewing and providing essential improvements to this report.

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1.0 INTRODUCTION

Alberta populations of walleye (Sander vitreus) and northern pike (Esox lucius) have been subjected to heavy fishing pressure for many years. Many populations show signs of over-harvest; some of them have experienced significant declines. Management strategies prior to 1995 focused on province-wide regulations designed for mid-intensity harvests; as a result, many fisheries with heavier-than-average exploitation have declined or collapsed (Sullivan 1994). New management strategies were implemented to aid the recovery of walleye fisheries in 1996 (Berry 1996) and pike in 1999 (Berry 1999). These strategies require a population evaluation to assess the degree of exploitation, and subsequently, a classification as: i) collapsed, ii) vulnerable, or iii) stable. Sport fishery regulations are then based on this classification status (Sullivan 1994).

1.2. History of the Calling Lake fishery

A historical survey of data collected between 1920 and 1975 by Valastin and Sullivan (1997) described Calling Lake as an excellent walleye and pike fishery before the collapse in the late 1940's. Miller (1949) documented the 1940's collapse of the walleye fishery and recommended monitoring combined with a reduced catch. The decline in both the walleye and whitefish fishery in the 1940's was also documented by Scott (1976). Since the collapse, fishing was reported to be sporadic with pike notably decreasing in size, although large walleye were still caught occasionally (Valastin and Sullivan 1997).

After a 1996 summer creel survey, the Calling Lake walleye fishery was classified as collapsed, and in April 1998 a catch and release regulation was implemented. The pike fishery was classified as vulnerable in 1999 and a minimum size limit of 63 cm TL with a daily possession of three fish was applied. In April of 2002, Alberta Sustainable Resource Development closed the north portion of Calling Lake to angling and the commercial fishery. During the open season (May 17, 2002 – March 14, 2003) anglers were allowed to harvest two pike and one walleye of any size from the south portion of Calling Lake.

In the present study, I report the results of a reduced-effort creel survey of Calling Lake completed between May and September, 2002. I used these data to quantify: i) total angler effort and ii) harvest and reported release rates of both walleye and pike in Calling Lake. These data were then compared to data collected in 1996 to determine temporal trends in angler effort and catch rates.

2.0 STUDY AREA

Calling Lake (TWP 71-73, R 21-23 W4) is located approximately 55 km north of the Town of Athabasca (Figure 1). The hamlet of Calling Lake is located on the lake's south eastern shore and members of the Bigstone Cree Indian Band live along the east shore of Calling Lake. These are the only residential areas located in the lake's basin. Calling Lake Provincial Park and day-use area are located along the south shore. The lake has a surface area of 13,400 hectares, a maximum depth of 18 metres and its drainage basin covers an area of 1090 square kilometres (Mitchell and Prepas 1990). Rock Island River is the main inflow and is located at Calling Lake's northwest end. The main outlet, Calling River, flows into the Athabasca River approximately 25 km downstream. Several intermittent streams also flow into Calling Lake along the west and east sides (Mitchell and Prepas 1990).

Calling Lake supports a fish community that includes walleye, northern pike, yellow perch (Perca flavescens), lake whitefish (Coregonus clupeaformis), cisco (Coregonus artedii), burbot (Lota lota), white sucker (Catostomus commersoni), longnose sucker (Catostomus catostomus), spottail shiner (Notropis hudsonius) and Iowa darter (Etheostoma exile) (Mitchell and Prepas 1990).

3.0 MATERIALS AND METHODS

3.1 Creel surveys

An access point (on-site, intercept design) creel survey (Pollock et al. 1994) was conducted from 18 May to 1 September, 2002 to collect sport fishery data at Calling Lake. The survey schedule included ten survey days followed by four days of non surveys. This pattern was repeated eight times during the study period. The creel survey was designed to include both weekdays (Monday to Friday) and weekends

(Saturday and Sunday, including statutory holidays) as well as two shifts during each survey day beginning in the morning (0800-1530) and evening (1530-2300). During the survey period, 43% of weekends and 37% of the weekdays were surveyed. Whole-day surveys were conducted on weekends (24 hour survey) and sixteen weekday morning shifts and eleven weekday evening shifts were completed.

Immediately following angling trips, anglers were interviewed to provide information on the following: i) time spent angling, ii) angling party size, iii) numbers of each species kept and released, iv) target species, v) angling method, vi) use of technology (e.g., fish finder), vii) type of hook (barbed or barbless) and, viii) place of residence. A subjective evaluation of each angler's skill level was also made by the creel survey crew. Children and anglers with little equipment, knowledge or interest were considered to be novices. Anglers that demonstrated superior knowledge and equipment were designated as highly skilled, and all other anglers were classified as having a moderate skill level. The creel survey crew also conducted telemetry surveys and digitized creel and biological data.

3.2 Telemetry surveys

Anglers could access Calling Lake from private residences or other boat launches as well as the creel survey site. Therefore, anglers that were encountered during telemetry surveys were asked the same questions as in the creel survey, including landing location. Landing is defined as the point-of-land an angler's boat touches at the conclusion of a fishing trip (e.g., private cabin, Moosehorn boat launch). An estimate of the total effort, harvest and yield was extrapolated using exact confidence intervals for the binomial distribution of boat count information: a count of anglers whose landing was the creel survey site to the total number of anglers on the lake during the survey period.

When possible, sport fish retained by anglers were also sampled for biological information. Fork length (FL), maximum total length (TL), and weight (± 10 gm) of each fish was recorded, and one or more skeletal structures were removed for age assessment. The left pelvic fin and cleithrum of pike, and the left pelvic fin and operculum of walleye were used for this purpose (Mackay et al. 1990). Sex and

maturity of each fish was determined following Olynyk (1980). These data are utilized according to ASRD management strategies for walleye and northern pike sport fishery assessment and management (Berry 1996 and 1999).

3.3 Test angling

Test-angling for walleye and pike took place at Calling Lake on a number of days during the same period as the creel survey. To estimate a catch rate for pike <63 cm TL, the ratio of pike <63 cm TL: pike ≥63 cm TL caught in the test fishery was assumed to be equal to the corresponding ratio from the sport fishery (modified from Sullivan 2003). Sullivan (2003) concluded that anglers exaggerate more as fishing success declines. Therefore, if test angling reveals high fishing success then the reported catch rate is likely not exaggerated, and may reflect a high-density of walleye.

Test anglers were instructed to catch walleye and pike using lures and techniques that they would normally utilize. Fork lengths of all test-angled walleye and pike were measured (±1 mm), and then a pelvic fin section was removed for aging purposes. All test-angled fish were released.

Catch rates (catch per unit effort, CPUE) were calculated as the total ratio estimator (Malvestuto 1983). Catch referred to both the number of fish harvested and the number of fish reported to have been released. Total estimated catch rate is an estimate of the catch rate of fish in the protected fork length category compared to the sport fishery reported catch rate of protected fish and harvested length distribution (Sullivan 2003). Harvest rate and reported release rate are calculated from the catch and number of fishing hours reported by anglers (Sullivan 2003).

Field data forms were transcribed into computer files and accompanied with a double entry verification process. Prior to analysis, all data were again verified by calculating frequency distributions of all creel survey parameters (e.g., month, date, method, skill level) and using field diaries and notes to verify outlying values. Fish data were verified by plotting weight measurements against the variable of length, and length measurements against the variable of age. Outlying values were investigated and eliminated if measurement error was determined to be the likely cause of the outlier.

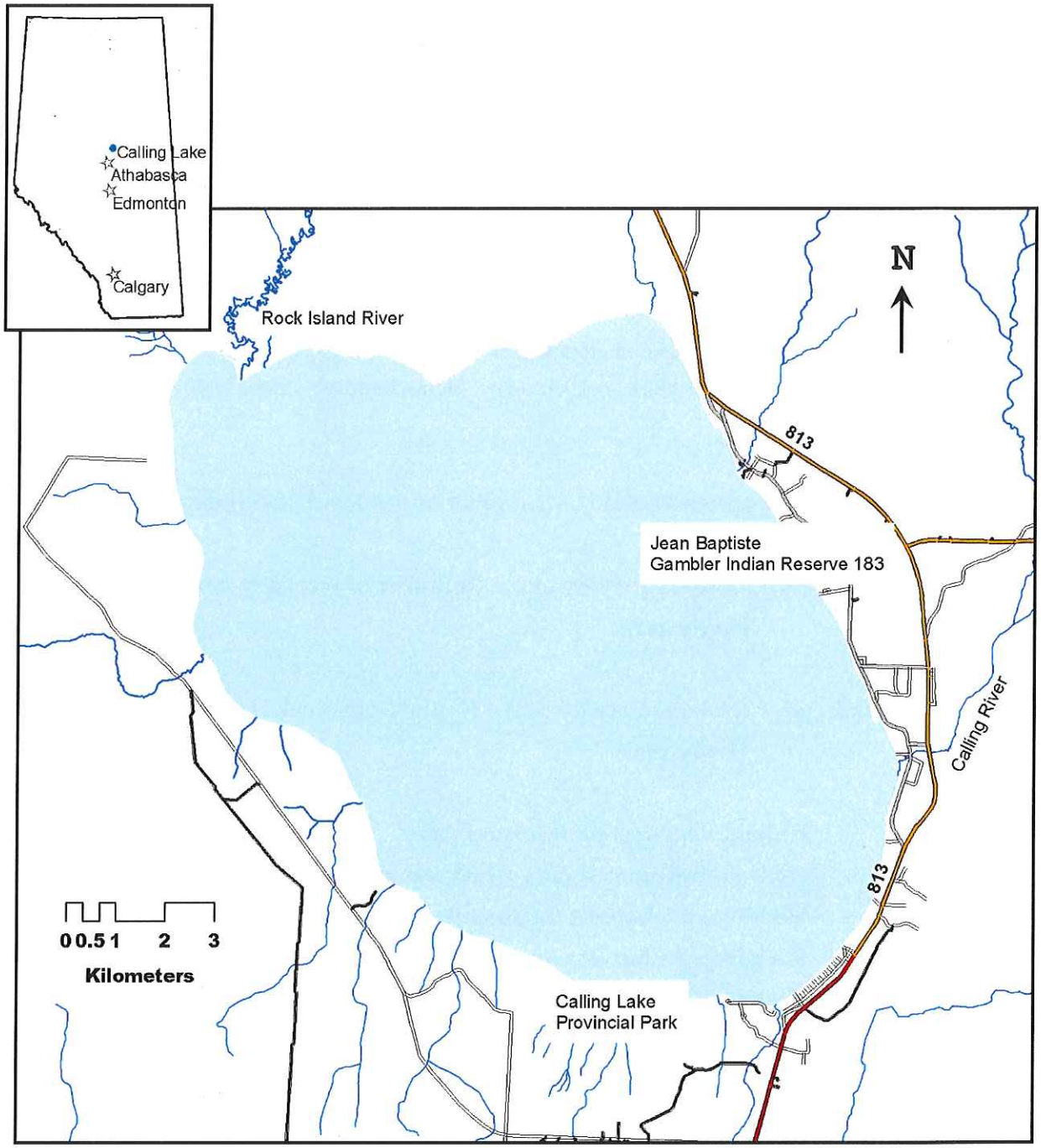

Figure 1. Location of Calling Lake including the area open to angling, the Provincial Park, and the residential area along the east shore.

Gini coefficients and associated Lorenz curves were calculated following the method described by Baccante (1995). All Proportional Stock Density (PSD %) and Relative Stock Density (RSD stock and quality categories) classifications were calculated using fork lengths and the size categories. The stock and quality categories include pike 35 to 52 cm and 53 to 70 cm in fork length, respectively (Gablehouse 1984). All data and analyses are stored in spreadsheet format in the provincial governments Fisheries Management Information System (FMIS). A summary of non-verified data is provided in appendices.

To determine sport fishery parameters specific to the creel survey site, the following equations were modified from Sullivan 1984:

The estimate of sport fishery parameters (e.g., number of walleye harvested during the survey period) including days and shifts not surveyed (non-scheduled strata, NSS) were calculated using extrapolation:

Hwknd = (observed Hwknd) + ((number of weekend NSS (mean Hwknd))

Hwkdy am = (observed Hwdy am) + ((number of weekday am NSS (mean Hwdy am))

Hwkdy pm = (observed Hwdy pm) + ((number of weekday pm NSS (mean Hwdy pm))

Hwknd = harvest on weekend days
$Hwknd_e$ = estimated harvest on weekend days
Hwkdy am = harvest for weekday am time period
Hwkdy pm = harvest for weekday pm time period
$Hwkdy_e$ = estimated harvest on weekdays

Therefore the primary site estimate was:

$Hp_e = Hwknd_e + Hwkdy_e$ am + $Hwkdy_e$ pm
Hp_e = estimated primary site harvest

Variance of the estimate was for NSS (e.g., weekend) was:

$$\text{wknd(var)} = (\text{observed STD(wknd NSS)})^2$$

STD = standard deviation

Therefore the variance for the total site estimate for each survey parameter was:

$$\text{Hp(var)} = \text{wknd(var)} + \text{wkdy am(var)} + \text{wkdy pm(var)}$$

Whole lake estimates (i.e., harvest defined as total number of walleye harvested during the survey period) were extrapolated from the proportion of anglers surveyed using the creel survey site compared to the total number of anglers on the lake during the survey period. Variances of these total site estimates were calculated following Pollock et al. (1994). For example, estimated total harvest was calculated using:

$$H_e = Hp_e \times 1/R$$

H_e = estimated total harvest
R = proportion of use

Standard error of the whole lake estimate (e.g harvest) was:

$$\text{Hse for whole lake estimate} = (\text{SQRT}((\text{site harvest estimate}^2) \times (\text{proportion se}^2)) + ((\text{site harvest estimate se}^2) \times (\text{proportion}^2)))$$

$H_e$se = standard error for estimated total harvest
Rse = standard error of proportion

4.0 RESULTS

4.1. Angler survey

During the survey period, a total of 3,050 anglers were interviewed (Table 1 and Appendix 1.0). Based on the proportion of anglers whose landing was the creel survey site, the creel site recorded 72% (447 anglers from creel site/619 anglers on lake during boat counts) of the total angling effort at Calling Lake. The total number of anglers was estimated at 7,167. The estimated effort was 22,305 hours, resulting in an estimated angling pressure of 1.66 angling-hours / ha. The estimated harvest of walleye was 4,438 fish, and the estimated number of walleye released was 20,329 fish (Table 2). The estimated harvest and release of pike were 827 and 1843 fish, respectively. Biological samples and measurements were collected from 332 sport-harvested walleye and 56 sport-harvested pike. The test fishery sampled and released a total of 897 walleye and 116 pike.

The yield of sport-harvested walleye (not released) was estimated at 9,391 kg or 0.70 kg/ha. In some cases total walleye mortality during live-release tournaments can be as high as 22.8% (Fielder and Johnson 1994). However, a standard release mortality of 10% was used to calculate yield, resulting in a mortality yield of 2,309 kg (20,329 walleye × 0.10 mortality × 1.136 kg mean weight) or 0.17 kg/ha. The total estimated sport yield of walleye during the 2002 survey period was therefore 0.87 kg / ha. The sport yield of walleye during the 1996 survey (including release mortality) was approximately 0.23 kg/ha.

The yield of sport-harvested pike was estimated at 2,179 kg or 0.16 kg/ha. Mortality yield of pike was estimated at 460 kg (4,119 pike × 0.05 mortality × 2.235 kg mean weight) or 0.034 kg/ha, utilizing a 5% release mortality (Chris Davis, Fisheries Biologist ASRD, pers. comm.). The total estimated sport yield of pike during the 2002 survey period was therefore 0.19 kg/ha. Using the same method, the sport yield of pike during the 1996 survey was approximately 0.10 kg/ha.

Table 1. Observed and reported catch rates of anglers during the Calling Lake creel surveys conducted in 1996 and 2002.

Creel data	1996	2002
Number of days surveyed	32	Refer to Methods section
Number of anglers interviewed	1,460	3,050
Number of angling hours	5,823	9,975
WALLEYE DATA		
Walleye kept/angling hour	*0.039	***0.171
Walleye released/angling hour	0.398	0.740
Total walleye/angling hour		0.911
NORTHERN PIKE DATA		
Pike kept/angling hour	**0.034	***0.035
Pike released/angling hour	0.190	0.074
Total pike/angling hour	0.224	0.109
Total estimated pike/angling		0.081

* Alberta Natural Resources Service introduced a 50 cm TL and a 3 fish daily bag limit for walleye in 1996.

** Alberta Natural Resources Service pike regulation was no size limit, 10 fish daily bag limit.

*** Alberta Sustainable Resource Development introduced a closed area for walleye and pike. Daily bag limit was 1 walleye (no size limit) and 2 pike (no size limit).

Table 2. Whole lake estimates of numbers of anglers, hours, fishing effort (hours per hectare) and numbers of fish harvested in Calling Lake, 2002. Numbers in brackets represent 95% confidence intervals.

	1996 whole lake estimate (95% CI)	2002 whole lake estimate (95% CI)
Number of anglers	4,597 (3760 – 5434)	7,167 (4207 – 10,127)
Number of hours	18,357 (14,594 – 22,120)	22,305 (12,848 – 31,762)
Angling hours/hectare	1.33 (1.06 – 1.60)	1.66 (0.97 – 2.36)
Number of walleye harvested	720 (505 - 935)	4,438 (2,383 – 6,493)
Number of Pike harvested	622 (No data)	827 (621 – 1,035)

Angling pressure (angling hours/hectare) was highest during mid-June to mid-July (Figure 2). Angling pressure did not differ appreciably in early June, late-July or early August. The increase in angling pressure during late August was due to the influx of anglers during a long-weekend.

Our estimate of release rates for walleye was approximately 5-times higher than the harvest rate from late June through to mid-July. During the other periods of the creel survey, the reported release rate for walleye was approximately 3-times higher than the harvest rate (Figure 3).

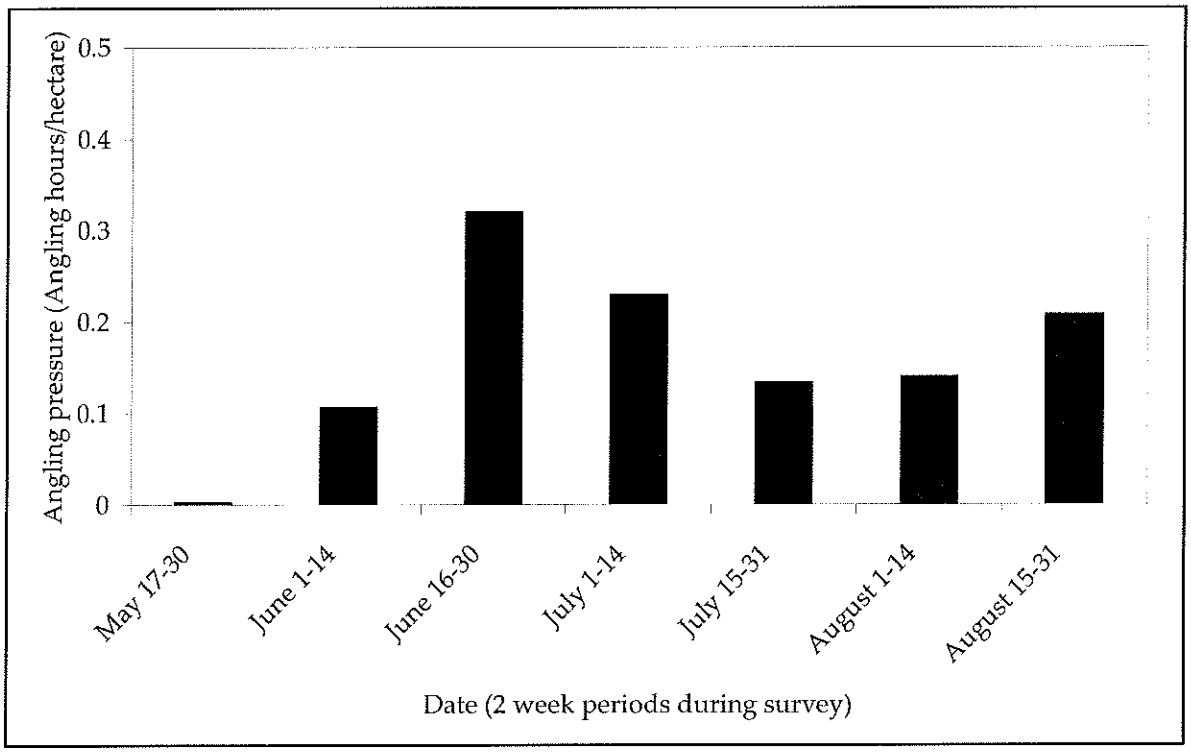

Figure 2. Total angling pressure observed during the Calling Lake creel survey period of May 17 – August 31, 2002. Angling pressure is defined as total estimated angling hours during the survey period divided by the area of the lake in hectares.

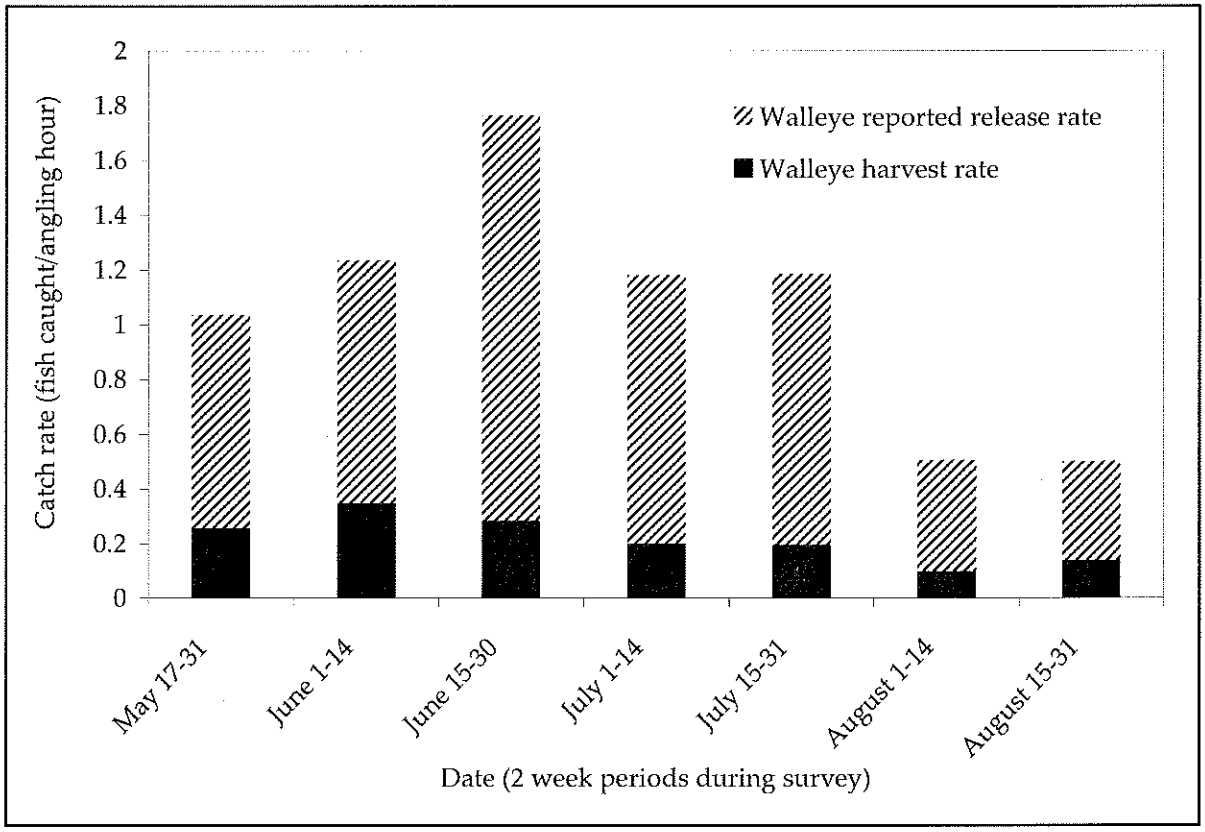

Figure 3. Walleye harvest and reported release rates in Calling Lake during the creel period of May 17 – August 31, 2002.

4.2 Assessment of the walleye sport fishery

In Table 3, characteristics of the walleye sport fishery at Calling Lake are compared to the parameters listed in Alberta's Walleye Management and Recovery Plan (AWMRP) (Berry 1996). Descriptions of the management categories (e.g., stable, vulnerable, collapsed) come from Berry (1996) and are based upon a classification system for walleye fisheries that is derived from a stock-recruitment curve (Sullivan 1994).

Table 3. Criteria used to assess the status of walleye sport fisheries in Calling Lake, 2002. The descriptions of the management categories (e.g., stable, vulnerable) come from Sullivan (1994). Each metric (e.g., Age-class Distribution) is described by data collected from creel surveys that includes population and density information. Highlighted management categories represent the best fit of each fishery metric for Calling Lake in 2002.

	Trophy	Stable	Vulnerable	Collapsed
Age-class Distribution	Wide 8 or more age-classes, mean age > 9 yrs	Wide 8 or more age-classes, mean age = 6 – 9 yrs	Narrow 1 - 3 age-classes, mean age = 4 – 6 and few old (> 10 yrs) fish	Narrow or wide. Mean age = 6 – 10 yrs
Calling Lake, 2002				Mean age: sport fishery = 11 test fishery = 8 yrs
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
Calling Lake, 2002			Bimodal distribution. Ages 5 and 11 support sport fishery.	
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
Calling Lake, 2002			50 cm in 8 - 9 years	
Catch Rate	Total = > 2/h >50 cm TL max = >1/h	Total = >1/h >50 cm TL max = >0.3/h	Total = 0.5 – 1/h >50 cm TL max = <0.3	Total = < 0.1 >50 cm TL max = <0.02
Calling Lake, 2002		Reported release = 0.740/h	Total CPUE = 0.911/h	
Age-at-maturity (yrs)	Females 10 - 20 Males 10 - 16	Females 8 – 10 Males 7 – 9	Females 7 - 8 Males 5 - 7	Females 4 – 7 Males 3 - 6
Calling Lake, 2002				Females at 6 Males at 6

4.2.1 Age-class distribution

The age-class distribution of walleye harvested by anglers is shown in Figure 4. Although this distribution is relatively wide (4 to18 years) there is poor representation of age-classes less than 10 years or greater than 12 years of age. Seventy percent of the 2002 walleye sport harvest was fish in the 10 -12 year age range. The 2002 test fishery data showed strong densities of smaller fish when compared to sport harvest data (Figure 5). The 2001 Fall Walleye Index Netting (FWIN) data from Calling Lake indicates a strong 1997 year-class (Table 4). The modal age of walleye in the 2002 sport harvest was 11 years (n = 298). Using the length-at-age regression from the sport fishery, the mean age from the test fishery was approximately 8 years (Figure 6).

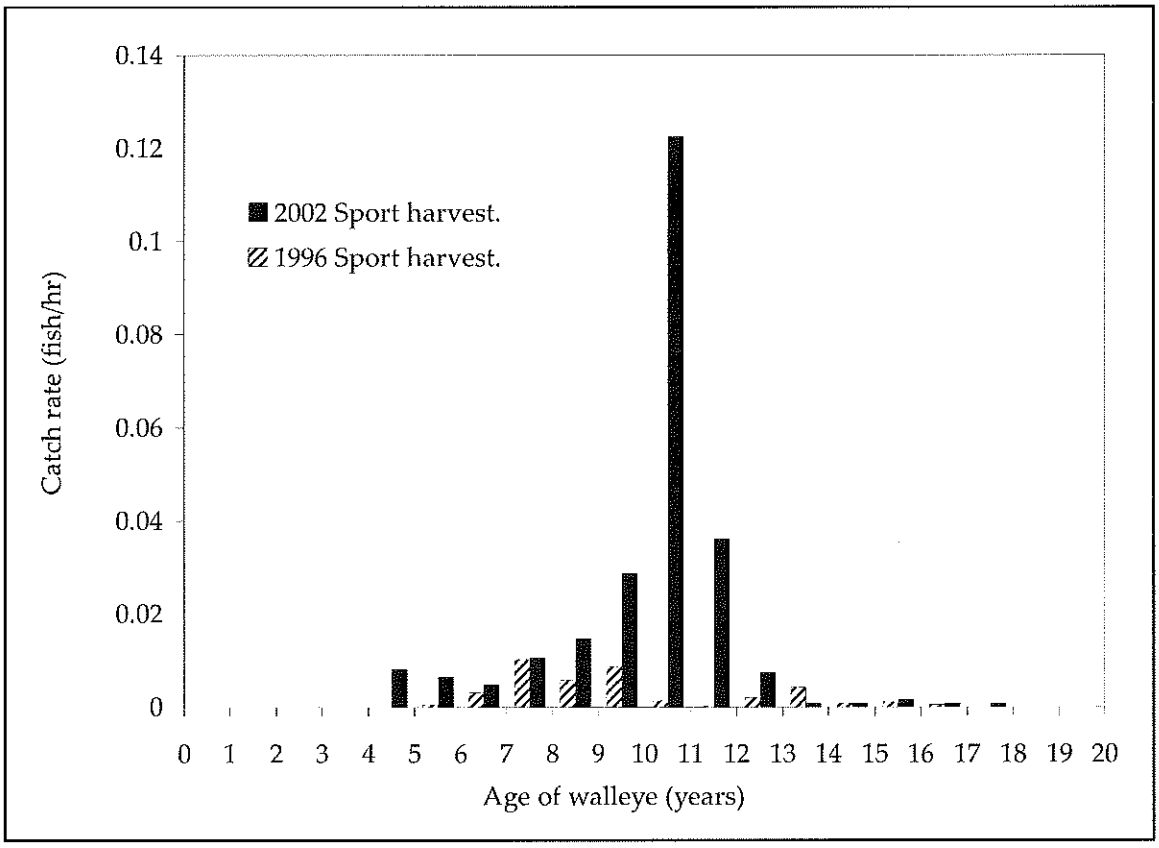

Figure 4. Comparison of age-class distribution of walleye harvested by anglers from Calling Lake in 1996 and 2002. Sport harvest rates during the 1996 and 2002 creel survey were 0.039 fish/hr and 0.171 fish/hour, respectively.

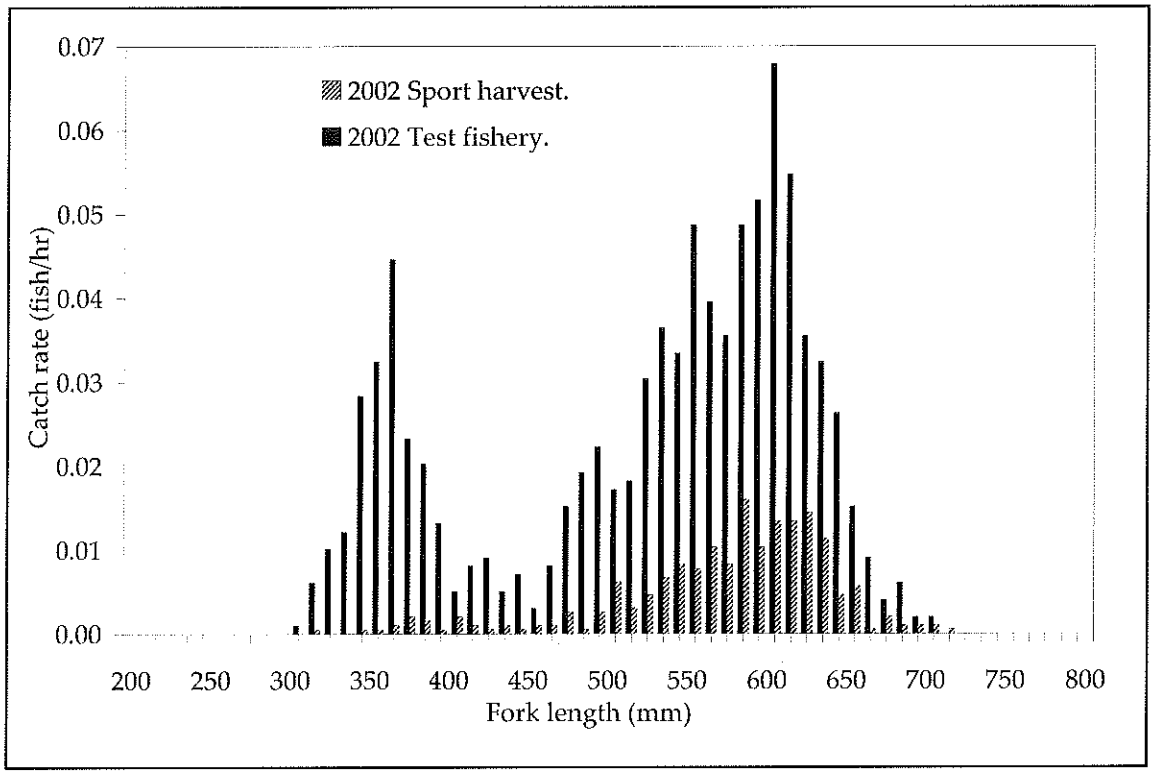

Figure 5. Fork-length distribution of walleye harvested by anglers from Calling Lake, 2002. Sport harvest rate from the 2002 creel survey was 0.171 fish/hour. Since high catch rates reported by anglers are not exaggerated (Sullivan 2003), the length distribution collected by the test fishery used the total catch rate reported by the sport fishery (0.91 fish/hour).

Table 4. Age-class distribution of walleye sampled by the 2001 Fall Walleye Index Netting (FWIN) in Calling Lake.

Age (yrs), fall 2001	Year-class	Frequency	Percent
1	2000	0	0
2	1999	0	<1
3	1998	1	<1
4	1997	369	54
5	1996	6	<1
6	1995	2	<1
7	1994	21	3
8	1993	30	4
9	1992	21	3
10	1991	194	28
11	1990	23	3
12	1989	7	1
13	1988	3	<1
14	1987	3	<1
15	1986	1	<1
16	1985	0	0
17	1984	0	0
18	1983	0	0
19	1982	0	0
20	1981	0	0
	Total	682	100

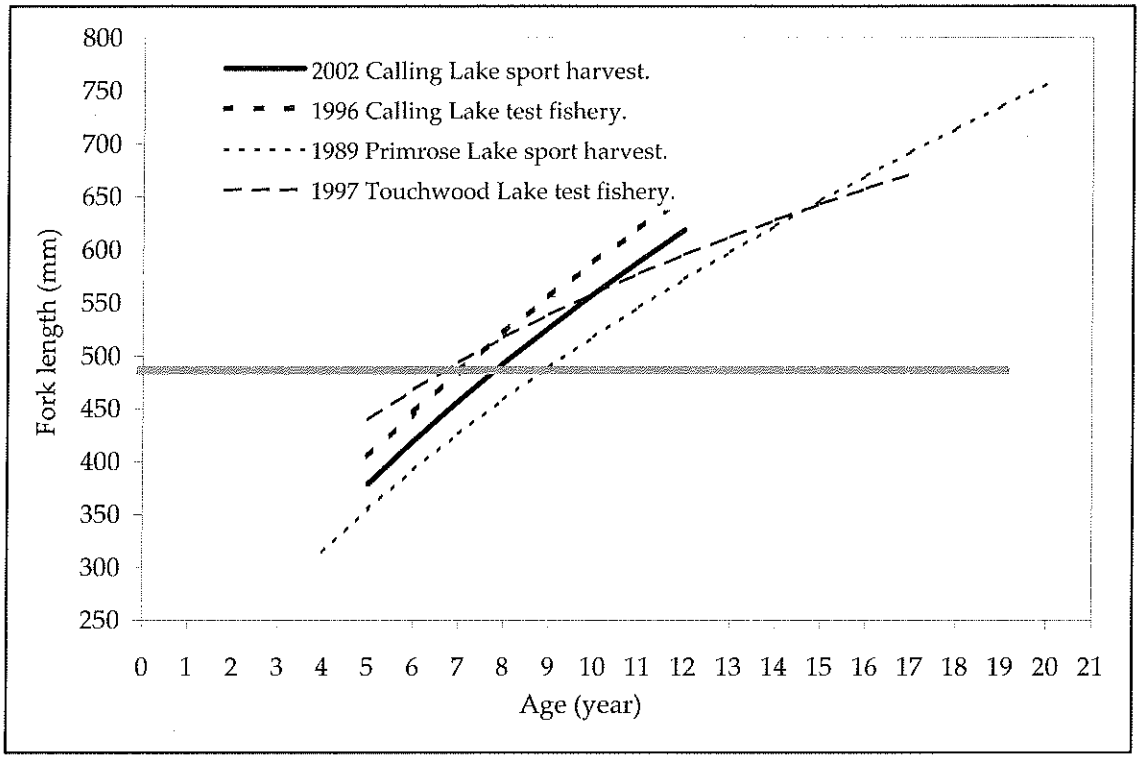

Figure 6. Length-at-age of sport harvested walleye from Calling Lake, 2002. Each line is a curve fitted to the mean length-at-age of walleye sampled. The coefficient of determination (R^2) for the Calling Lake 2002 sport fishery sample was 0.78 (n = 298). The coefficient of determination calculated in 1996 Calling Lake test fishery was $R^2 = 0.84$ (n = 135) (from Patterson and Sullivan 1997). Primrose Lake is located in the Primrose Air Weapons Range and is closed to sport angling ($R^2 = 0.75$, n = 101; from AB SRD district data files). Touchwood Lake is considered a collapsed walleye fishery and has a 0 daily bag limit for walleye ($R^2 = 0.72$, n = 393; from Patterson and Sullivan (1998)).

4.2.2 Age-class stability

Eleven year old walleye dominated the sport fishery age-class distribution during the survey and was likely biased due to the large numbers and desire of anglers to retain large walleye. The sport fishery incidental mortality from catching and releasing walleye, as described by Fielder and Johnson (1994), on all sizes of walleye may prevent this 11 year old age-class from fully recruiting to the sport fishery. The reproductive contribution of the 1997 walleye year-class to younger age class recruitment is

considered to be vital to the sustainability of this sport fishery. The decline in older walleye (> 12 years) and the potential decline in younger walleye due to sport fishery yield (including release mortality) results in an unstable age-class distribution.

4.2.3 *Index-of-growth*

The length-at-age of walleye collected during the Calling Lake 2002 sport fishery survey suggests a moderately fast growth rate when compared to collapsed and stable walleye populations (Figure 6). Relatively, the index-of-growth has declined since the 1996 fishery survey. According to the 2002 sport fishery information, the approximate age of walleye with 50 cm FL in Calling Lake was 8 to 9 years old (Figure 6).

4.2.4 *Walleye catch rate*

The total walleye sport catch rate observed during the 2002 creel survey of Calling Lake was 0.911 fish/h (Table 1). The observed sport harvest was moderately low (0.171 walleye/h). Therefore the reported release rate was 0.740 walleye/h. Anglers tend to exaggerate their catch more as fishing success declines (Sullivan 2003). For this reason, the total catch rate reported by the sport fishery suggests a moderate density of walleye in Calling Lake.

4.2.5 *Age-at-maturity*

Male and female walleye sampled in the sport harvest began to reach maturity at 6 years (Figure 7), though 6% percent of the total harvested walleye were immature (all between the ages of 5-7 years). Mature females and males made up 75% and 19% of the harvested walleye, respectively; suggesting that female walleye are more vulnerable to angling than mature male walleye. Data from a Fall Walleye Index Netting (FWIN) survey shows that these mature fish make up more than 28% of the lake population (Table 4).

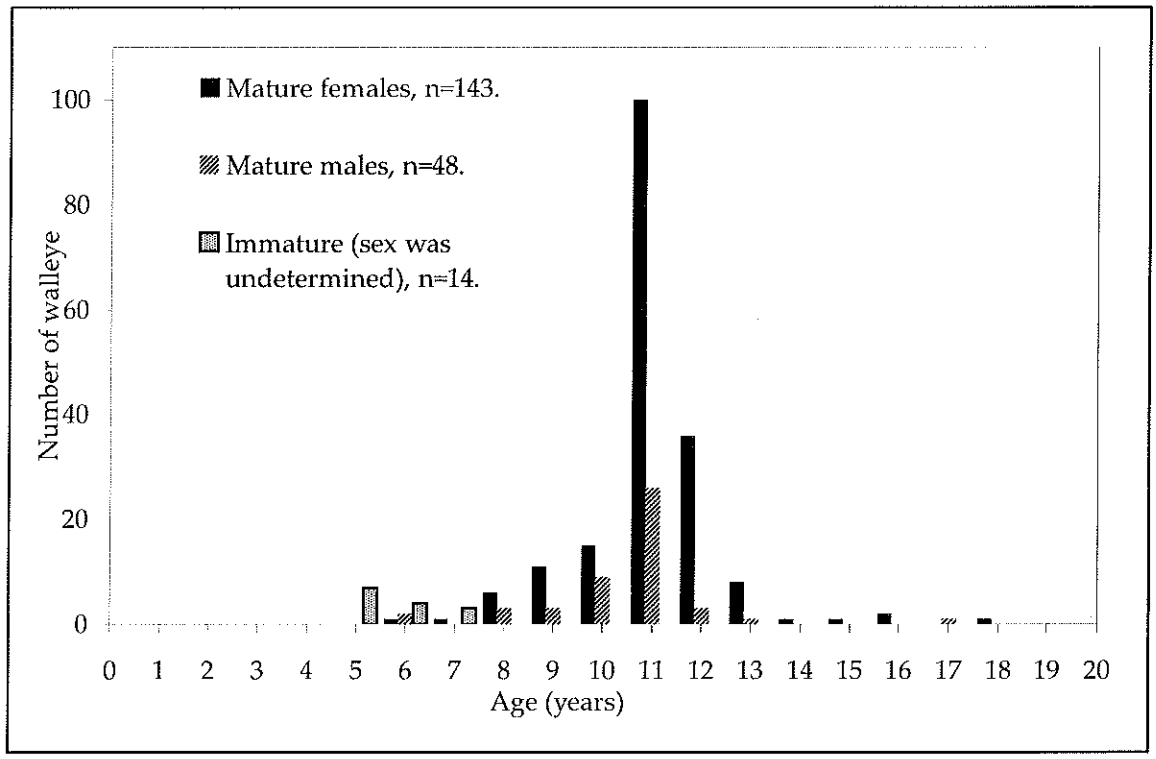

Figure 7. Age-at-maturity of walleye harvested from Calling Lake Summer Sport Fishery, 2002. Males were mature by age 6 (n = 48) and mature females were first harvested at age 6 (n = 183). Fourteen immature (undetermined sex) walleye were also harvested by anglers.

4.3 Assessment of the pike sport fishery

4.3.1 Biological metrics

The metrics for assessing pike fisheries in Alberta are shown in Table 5. Characteristics of the pike sport fishery at Calling Lake are compared to the parameters listed in Alberta's Northern Pike Management and Recovery Plan (ANPMRP) (Berry 1999). These management categories are based on categories used in the Alberta Walleye Management and Recovery Plan.

During 1996 and 2002, there was no sport fishery size restrictions for pike. The observed sport harvest rate was 0.035 pike kept/h (Table 1) during the 2002 Calling

Lake creel survey. In 1996, the sport harvest rate was 0.034 pike/h during the Calling Lake creel survey. For comparison to the ANPMRP, the catch rate for pike ≥63 cm TL was calculated using the percentage of pike in the harvest that had ≥63 cm TL. Based on their data, the harvest rate on pike ≥63 cm TL during the 1996 and 2002 creel surveys were 0.016 fish/h and 0.028 fish/h, respectively.

The reported release rates for pike during the 1996 and 2002 creel surveys were 0.074 fish released/hour and 0.190 fish released/hour, respectively. The total reported catch rates for pike during these two creel surveys were 0.108/h in 1996 and 0.225/hr in 2002.

Anglers harvested more large pike during the 2002 survey than that in 1996. However, they reported releasing more pike during the 1996 creel survey. Although not statistically significant, the estimate of pike harvest (Table 2) increased 33% since 1996 and coincides with a 25% increase in angling pressure between the 1996 and 2002 creel surveys.

Table 5 contains two categories of data: biological data that describes the pike sport fishery (e.g., catch rate, growth, and mean weight) and sport fishery data that describes angler success (e.g., % success, Gini coefficient).

The age-class distributions of pike sampled in the 1996 and 2002 creel surveys are very similar; both exhibiting a wide, unstable age distribution (Figure 8). Very few large pike (>75 cm FL) were sampled by the sport and test fishery during the 2002 field season (Figure 9). However, the test fishery in 2002 sampled slightly more moderate sized pike (50 – 75 cm FL). Only 38% of the pike sampled by the 2002 test fishery were ≥63 cm TL. Cushing (1981) describes recruitment overfishing as the reduction of adult spawning stock through intense harvesting, thus decreasing the number of their progeny. There is no appreciable recruitment of young pike into the fishery evident from the creel survey and test fishery in 2002. With a higher pike catch rate and a greater range of age- and size-classes, particularly young and small pike, Wolf Lake (as sampled during the creel survey in 1990) represents a recruitment overfished, and therefore, vulnerable pike fishery.

Table 5. Criteria used to assess the status of the pike sport fishery in Calling Lake, 2002. Each metric is described by data collected from creel surveys and test fishery data that includes population and density information. Highlighted management categories represent the best fit of each fishery metric for Calling Lake in 2002.

Metric	Stable	Vulnerable (no risk)	Vulnerable (low risk)	Collapsed
CPUE kept/hour (>63 cm TL maximum)	> 0.1	> 0.02	> 0.01	< 0.01
Calling Lake, 2002		0.028		
CPUE estimated total (Observed >63 cm TL catch rate + estimated release catch rate)	1 – 2	0.5 - 1	0.2 - 0.5	< 0.2
Calling Lake, 2002				0.081
Number of measurable age-classes (Age-classes > 0.02 pike/hour)	7 – 12	3 – 7	1 – 2	Almost none
Calling Lake, 2002				Nearly 1
Growth rate	Slow	Increasing	Increasing	Fast
Calling Lake, 2002			Provincial regulation size at age 5-6	
Mean Weight (in kg, of pike >63 cm TL)	1 – 2	< 1	0.5 – 1.5	0.5 – 3.5
Calling Lake, 2002				2.8 kg
Proportional Stock Density (% pike >53 cm TL max)	> 40	< 40	Variable (> 0.1 pike/h)	Variable (< 0.1 pike/h)
Calling Lake, 2002				94.7
Relative Stock Density (% pike 35 – 52 cm TL max, stock – quality size)	< 50	> 50	Variable (> 0. /h)	Variable (> 0.1/h)
Calling Lake, 2002				5.3
Gini (Catch inequality)	0.3	0.5 – 0.7	0.7 – 0.9	> 0.9
Calling Lake, 2002			0.71	

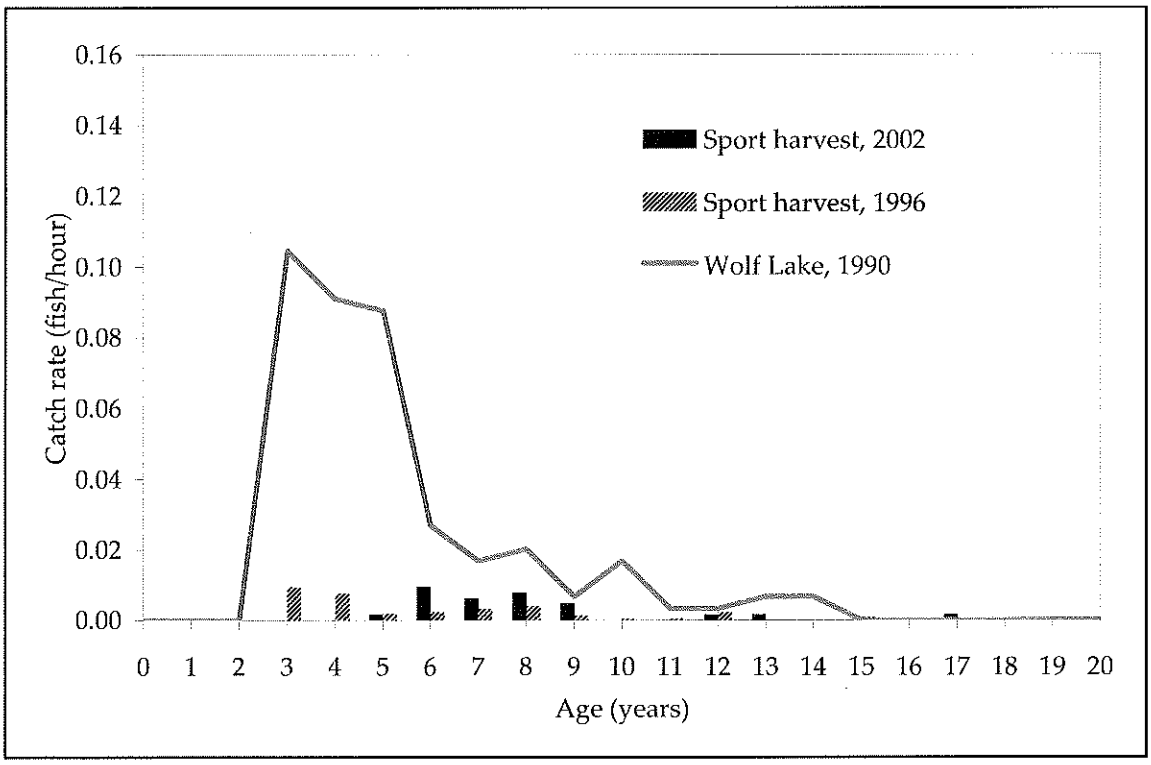

Figure 8. Age-class distribution of sport harvested pike from Calling Lake during the 1996 and 2002 creel surveys. Sport harvest rates during the 1996 and 2002 creel survey were 0.034 fish/hr and 0.035 fish/hour, respectively. Wolf Lake had a harvest catch rate of 0.391 pike/hour during a creel survey in 1990.

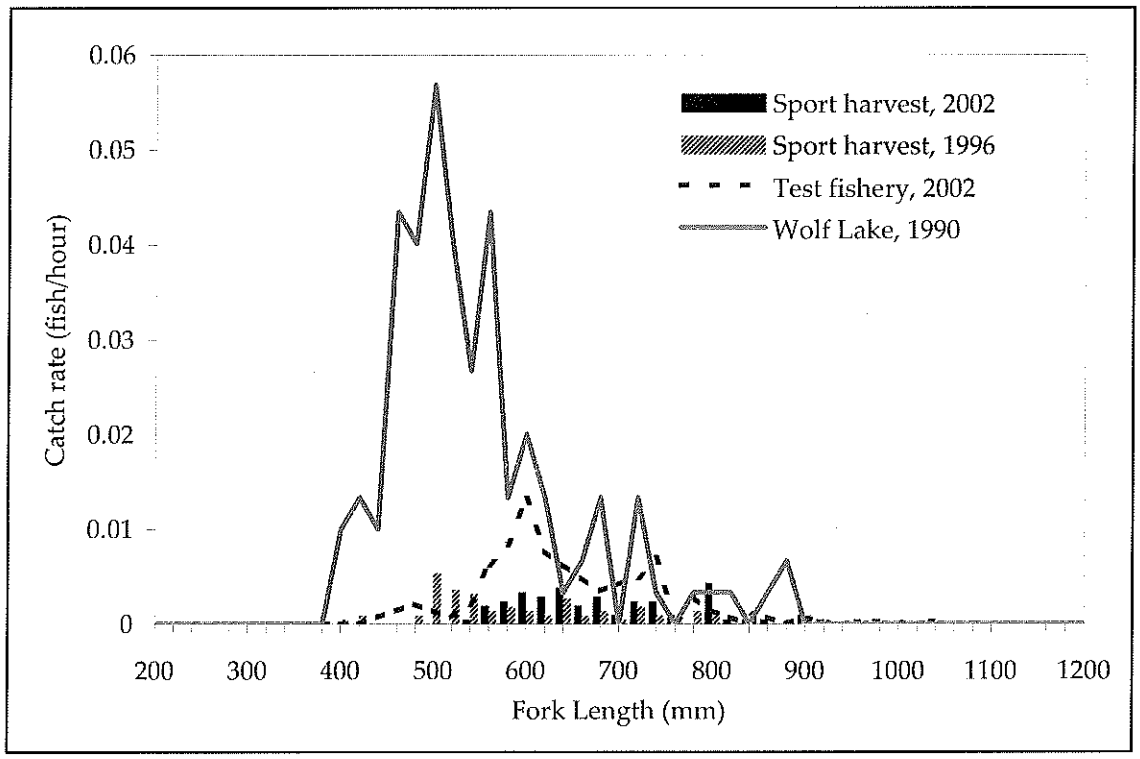

Figure 9. Fork length distribution of sport harvested pike in Calling Lake in 1996 and 2002. Sport harvest rates in 1996 and 2002 were 0.034 fish/hr and 0.035 fish/hour, respectively. Wolf Lake had a harvest CPUE of 0.391 pike/hour in 1990. The ratio of pike <63 cm TL:>63 cm TL in the test fishery was assumed to be equal to the corresponding ratio from the sport fishery. This ratio was used to calculate the total estimated catch rate from the protected-length catch rate following Sullivan (2003).

The length-at-age of young pike has increased slightly since the 1996 survey (Figure 10). During the 2002 test and sport fishery surveys, pike were reaching the provincial size limit (63 cm TL max) by ages 5 and 6. Pike from Wolf Lake sampled during the 1990 creel survey had slower growth than pike sampled during the 1996 and 2002 Calling Lake surveys. The increase in growth of pike from Calling Lake is likely related to lower densities of young pike and the reduced competition for resources. The slower growth of the older fish harvested may indicate higher densities. The mean weight of a pike >63 cm TL was 2.8 kg.

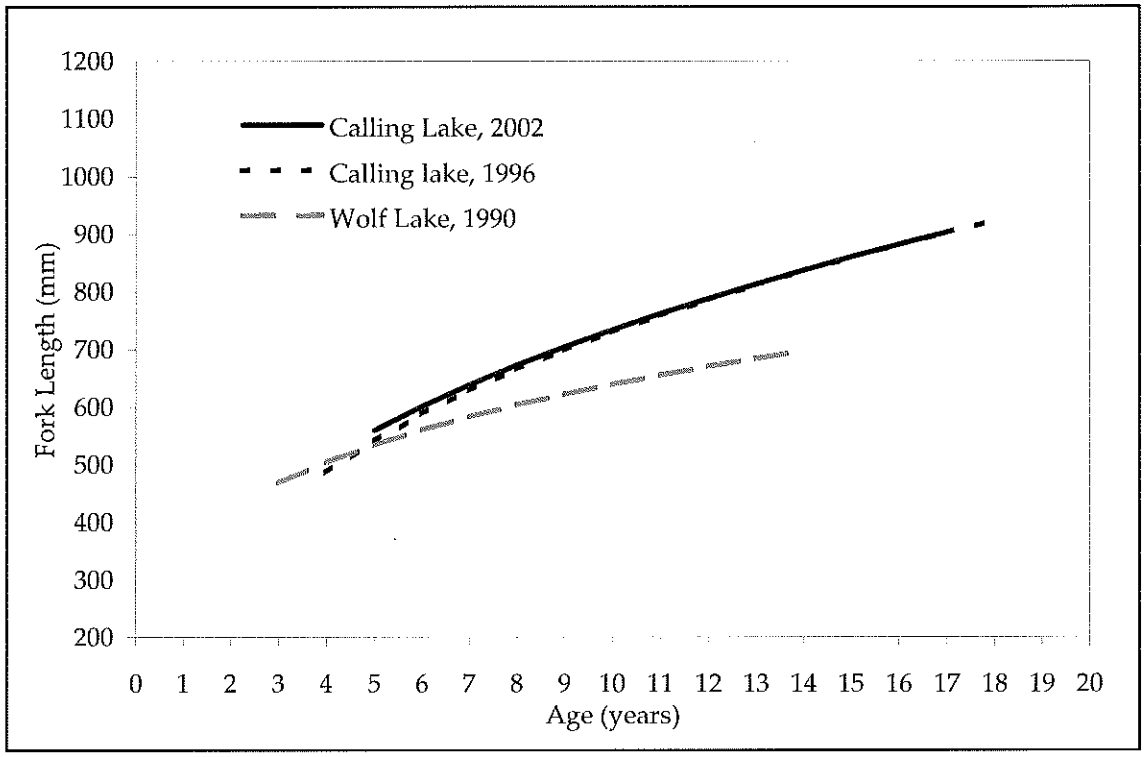

Figure. 10. Length-at-age graph of sport harvested pike in Calling Lake in 1996 and 2002. Regression analyses indicated that power analyses explained moderately high amounts of variation in length-at-age of sport harvested pike in Calling Lake in 1996 (R^2=0.78, n=76), 2002 (R^2=0.76, n=22,), and in Wolf Lake in 1990 (R^2=0.54, n=112).

4.3.2 Social metrics

During the 2002 Calling Lake creel survey, there were no minimum size limits for pike, therefore anglers were not asked about released pike, and the % *success* metric is not applicable in this assessment. It is not possible to calculate of the true number of released fish during on site surveys, as anglers may exaggerate their reported catches (Huntsman et al. 1978). The accuracy of angler reports is an important factor in assessing the usefulness of catch information when fisheries have regulations requiring a major portion of the catch to be released (e.g., fisheries with size-limit or total catch-and-release regulations) (Sullivan 2003). There was considerable catch inequality for pike, with a Gini coefficient of 0.709 (Baccante 1995). A Gini coefficient of 0 indicates all anglers caught equal numbers of fish, and a coefficient of 1 indicates that a single angler caught the entire catch. It is possible that the Gini coefficient is inflated due to

exaggeration of catch rates of pike, particularly the reported release rate. However, with no minimum size limit the extent that catch rates were exaggerated was not calculated.

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6.0 APPENDICES

6.1 Appendix 1. Daily summary of angler survey data collected during 17 May – 1 September 2002 at Calling Lake. WALL = walleye, NRPK = northern pike, YLPR = yellow perch, Rel. = released.

Month	Date	Number fishers	Number hours	Number WALL kept	Number WALL rel.	Number NRPK kept	Number NRPK rel.	Number YLPR kept	Number YLPR rel.
5	17	4	4.00	4	1	0	0	0	0
5	18	4	12.00	1	4	0	0	0	0
5	19	0	0.00	0	0	0	0	0	0
5	20	0	0.00	0	0	0	0	0	0
5	21	0	0.00	0	0	0	0	0	0
5	22	0	0.00	0	0	0	0	0	0
5	23	0	0.00	0	0	0	0	0	0
5	24	0	0.00	0	0	0	0	0	0
5	25	3	11.00	2	20	0	3	0	0
5	26	0	0.00	0	0	0	0	0	0
6	1	65	207.50	57	213	6	12	0	0
6	2	72	210.00	57	158	9	35	0	0
6	3	18	47.00	13	16	1	6	0	0
6	4	0	0.00	0	0	0	0	0	0
6	5	0	0.00	0	0	0	0	0	0
6	6	5	11.50	3	45	0	5	0	0
6	7	5	21.25	4	22	1	4	0	0
6	8	79	212.00	44	127	7	29	0	0
6	9	20	67.00	16	52	2	19	0	0
6	14	56	160.00	45	168	22	25	0	0
6	15	124	602.00	71	506	30	88	0	0
6	16	130	346.50	100	255	33	50	0	0
6	17	7	13.50	3	37	0	8	0	0
6	18	46	104.50	27	154	4	20	0	0
6	19	34	73.50	22	80	4	7	0	0
6	20	21	68.50	18	48	0	2	0	0
6	21	28	78.50	22	98	7	9	0	0
6	22	166	566.50	120	767	26	73	0	0
6	23	118	386.25	96	538	15	57	0	0
6	28	36	81.75	26	93	3	1	0	0
6	29	156	470.75	98	754	31	38	3	0
6	30	0	0.00	0	0	0	0	0	0
7	1	0	0.00	0	0	0	0	0	0
7	2	2	4.00	0	0	0	0	0	0
7	3	63	156.50	43	55	4	7	0	0
7	4	39	130.50	31	76	6	5	1	0
7	5	29	67.00	11	50	5	5	0	0

6.1 Appendix 1. Continued.

Month	Date	Number fishers	Number hours	Number WALL kept	Number WALL rel.	Number NRPK kept	Number NRPK rel.	Number YLPR kept	Number YLPR rel.
7	6	114	456.50	54	276	6	9	0	0
7	7	62	195.50	36	113	10	13	0	0
7	8	26	69.50	20	80	2	4	0	0
7	12	91	238.00	56	262	5	6	0	1
7	13	138	508.00	66	491	14	47	34	2
7	14	62	181.00	21	117	1	3	0	1
7	15	15	32.50	10	48	0	3	0	0
7	16	35	110.50	20	118	2	5	3	1
7	17	57	173.50	31	67	3	4	0	1
7	18	23	66.00	14	53	0	5	0	0
7	19	41	106.50	20	99	0	2	0	0
7	20	16	51.00	7	98	1	4	0	1
7	21	93	280.50	39	96	3	4	0	0
7	27	42	125.50	29	103	3	10	2	1
7	28	63	180.00	23	177	4	15	0	1
7	29	6	45.00	6	15	0	3	0	0
7	30	0	0.00	0	0	0	0	0	0
7	31	0	0.00	0	0	0	0	0	0
8	1	2	4.00	0	0	0	0	0	0
8	2	10	31.00	3	3	1	2	0	0
8	3	0	0.00	0	0	0	0	0	0
8	4	91	409.50	16	49	17	13	0	0
8	5	15	61.50	0	0	3	2	0	0
8	10	82	302.50	34	131	9	7	0	0
8	11	99	380.50	42	174	9	24	1	0
8	12	5	31.00	3	19	0	0	0	0
8	13	3	5.50	1	8	0	2	0	0
8	14	0	0.00	0	0	0	0	0	0
8	15	0	0.00	0	0	0	0	0	0
8	16	0	0.00	0	0	0	0	0	0
8	17	49	181.50	6	6	4	9	0	0
8	18	92	365.50	23	26	9	6	0	0
8	24	102	389.00	47	95	15	12	22	7
8	25	80	263.50	29	65	6	2	4	4
8	26	0	0.00	0	0	0	0	0	0
8	27	0	0.00	0	0	0	0	0	0
8	28	0	0.00	0	0	0	0	0	0
8	29	0	0.00	0	0	0	0	0	0
8	30	5	8.25	3	3	0	1	0	0
8	31	149	521.00	95	223	10	10	22	6
9	1	36	88.00	13	31	1	1	1	0
Total		3050	9975.25	1701	7383	354	736	93	26

6.2 **Appendix 2. Catch frequency distribution of walleye harvested by the sport fishery during the creel survey period 17 May – 1 September, 2002 from Calling Lake.** WALL = walleye.

Number WALL kept	Number anglers	% anglers	Harvest	% WALL harvested	Cumulative % WALL harvested
0	1356	44.5	0	0.0	0.0
1	1687	55.3	1687	99.2	99.2
2	7	0.2	14	0.8	100.0
3	0	0.0	0	0.0	
4	0	0.0	0	0.0	
5	0	0.0	0	0.0	
>5	0	0.0	0	0.0	
Total	3050	100.0	1701	100.0	

6.3 **Appendix 3. Catch frequency distribution of walleye released by the sport fishery during the creel survey period, 17 May – 1 September, 2002 from Calling Lake.** WALL = walleye.

Number WALL released	Number anglers	% anglers	Number WALL released	% WALL released
0	1226	40.2	0	0.0
1	603	19.8	603	8.2
2	391	12.8	782	10.6
3	200	6.6	600	8.1
4	138	4.5	552	7.5
5	134	4.4	670	9.1
6	58	1.9	348	4.7
7	31	1.0	217	2.9
8	46	1.5	368	5.0
9	19	0.6	171	2.3
10	93	3.0	930	12.6
11 - 20	80	2.6	1249	16.9
21 - 30	23	0.8	567	7.7
31 - 40	7	0.2	246	3.3
41 - 50	0	0.0	0	0.0
>51	1	0.0	80	1.1
Total	3050	100.0	7383	100.0

6.4 Appendix 4. Catch frequency distribution of walleye caught (harvest + released) by the sport fishery during the creel survey period 17 May – 1 September 2002 from Calling Lake. WALL = walleye.

Number WALL caught	Number anglers	% anglers	Number WALL caught	% WALL caught
0	815	26.7	0	0.0
1	620	20.3	620	6.8
2	505	16.6	1010	11.1
3	332	10.9	996	11.0
4	191	6.3	764	8.4
5	118	3.9	590	6.5
6	132	4.3	792	8.7
7	43	1.4	301	3.3
8	40	1.3	320	3.5
9	32	1.0	288	3.2
10	36	1.2	360	4.0
11 - 20	142	4.7	1858	20.5
21 - 30	35	1.1	827	9.1
31 - 40	8	0.3	278	3.1
41 - 50	0	0.0	0	0.0
>51	1	0.0	80	0.9
Total	3050	100.0	9084	100.0

6.5 **Appendix 5. Catch frequency distribution of pike harvested by the sport fishery during the creel survey period 17 May – 1 September 2002 from Calling Lake.** NRPK = northern pike.

Number NRPK kept	Number anglers	% anglers	Harvest	% NRPK harvested	Cumulative % NRPK harvested
0	2730	89.5	0	0.0	0.0
1	286	9.4	286	80.8	80.8
2	34	1.1	68	19.2	100.0
3	0	0.0	0	0.0	
4	0	0.0	0	0.0	
5	0	0.0	0	0.0	
>5	0	0.0	0	0.0	
Total	3050	100.0	354	100.0	

6.6 **Appendix 6. Catch frequency distribution of pike released by the sport fishery during the creel survey period, 17 May – 1 September 2002 from Calling Lake.** NRPK = northern pike.

Number NRPK released	Number anglers	% anglers	Number NRPK released	% NRPK released
0	2541	83.3	0	0.0
1	364	11.9	364	49.5
2	98	3.2	196	26.6
3	28	0.9	84	11.4
4	5	0.2	20	2.7
5	11	0.4	51	6.9
6	1	0.0	6	0.8
7	1	0.0	7	1.0
8	1	0.0	8	1.1
9	0	0.0	0	0.0
10	0	0.0	0	0.0
11 - 20	0	0.0	0	0.0
21 - 30	0	0.0	0	0.0
31 - 40	0	0.0	0	0.0
41 - 50	0	0.0	0	0.0
>51	0	0.0	0	0.0
Total	3050	100.0	736	100.0

6.7 **Appendix 7. Catch frequency distribution of pike caught (harvest + released) by the sport fishery during the creel survey period 17 May – 1 September 2002 from Calling Lake.** NRPK = northern pike.

Number NRPK caught	Number anglers	% anglers	Number NRPK caught	% NRPK caught
0	2328	76.3	0	0.0
1	491	16.1	491	45.0
2	150	4.9	300	27.5
3	55	1.8	165	15.1
4	10	0.3	40	3.7
5	8	0.3	40	3.7
6	3	0.1	18	1.7
7	4	0.1	28	2.6
8	1	0.0	8	0.7
9	0	0.0	0	0.0
10	0	0.0	0	0.0
11 - 20	0	0.0	0	0.0
21 - 30	0	0.0	0	0.0
31 - 40	0	0.0	0	0.0
41 - 50	0	0.0	0	0.0
>51	0	0.0	0	0.0
Total	3050	100.0	1090	100.0

6.8 Appendix 8. Biological data collected from the sport-harvested walleye during 17 May – 1 September 2002 from Calling Lake.

MM/DD/YY = month/date/year, g = grams, mm = millimetres, F = mature female, M = mature male, Imm = immature, Unk = unknown, yr = years.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yr)
1	6/1/2002	2900	693		F	16
2	6/1/2002	2500	607	643	F	12
3	6/1/2002	2350	625	663	F	12
4	6/1/2002	2360	620	652	F	11
5	6/1/2002	2000	577	610	F	11
6	6/1/2002	2300	604	642	F	11
7	6/1/2002	2200	611	648	F	11
8	6/1/2002	2200	587		F	11
9	6/1/2002	1500	524	557	F	8
10	6/1/2002	1900	586	620	F	11
11	6/1/2002	2450	618		F	11
12	6/1/2002	2600	656	690	F	12
13	6/1/2002	2350	594		F	11
14	6/1/2002	2000	615	645	F	10
15	6/1/2002	1900	568	604	F	11
16	6/1/2002	2500	615	643	F	11
17	6/1/2002	1700	560	592	M	11
18	6/1/2002	1500	505	535	M	9
19	6/1/2002	1950	557	592	F	11
20	6/1/2002	3300	679		F	12
21	6/1/2002	3450			F	11
22	6/1/2002	2500	636	671	F	12
23	6/1/2002	2100	605	643	F	11
24	6/1/2002	2400	617	651	F	11
25	6/1/2002	2300	622	656	F	11
26	6/1/2002	2300	597	626	F	11
27	6/1/2002	2100	574	625	F	11
28	6/1/2002	2150	586	622	F	11
29	6/2/2002	2650	612	647	F	11
30	6/2/2002	1400	493	524	M	10
31	6/2/2002	2300	601	633	F	11
32	6/2/2002	875	441	469	M	6
33	6/2/2002	2200	622	650	F	12
34	6/2/2002	1400	504	536	M	10
35	6/2/2002	1900	556	585	M	11
36	6/2/2002	1700	561	587	M	11
37	6/2/2002	1800	578	598	M	11
38	6/2/2002	1650	503	534	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
39	6/2/2002	2350	617	646	F	11
40	6/2/2002	3150	656		F	11
41	6/2/2002	2300	598	628	F	11
42	6/2/2002	2200	594	630	F	11
43	6/2/2002	2400	600	632	F	11
44	6/2/2002	1900	575	602	M	11
45	6/2/2002	3500	714	745	F	15
46	6/2/2002	3400	652	692	F	14
47	6/2/2002		571	598	F	11
48	6/2/2002	2300	584	625	F	11
49	6/3/2002	4000	710	748	F	16
50	6/3/2002	1600	541	571	M	11
51	6/3/2002	1600	627	657	F	11
52	6/3/2002	2200	587	616	F	11
53	6/14/2002	2300	614	645	F	11
54	6/14/2002	2700	623	656	F	11
55	6/14/2002	2400	610	647	F	11
56	6/14/2002	2900	657	694	F	11
57	6/14/2002	2050	590	621	F	11
58	6/14/2002	2000	578	604	M	11
59	6/14/2002	3500	698	722	F	13
60	6/14/2002	2600	615	645	F	11
61	6/14/2002	1900	577	604	M	11
62	6/14/2002	2000	590	625	M	12
63	6/14/2002	2000	578	609	F	11
64	6/14/2002	2000	562	592	F	11
65	6/14/2002	1900	592	624	F	11
66	6/14/2002	2600	626	657	F	11
67	6/14/2002	1900	592	622	F	11
68	6/14/2002		540	575	F	9
69	6/14/2002	1650	534	560	M	11
70	6/19/2002	1900	590	615	Unk	
71	6/19/2002	2200	581	607	Unk	
72	6/19/2002	2200	584	617	M	11
73	6/19/2002	2500	614	644	F	11
74	6/19/2002	2400	615	648	F	11
75	6/19/2002	2700	632	666	F	13
76	6/16/2002	2500	619	656	F	11
77	6/16/2002	1500	528	561	M	11
78	6/21/2002	2600	634	667	F	11
79	6/21/2002	2400	591	622	F	11
80	6/21/2002	2250	569	601	F	12
81	6/21/2002	2400	621	654	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
82	6/21/2002	2700	628	660	F	11
83	6/21/2002	1550	525	556	F	7
84	6/22/2002	2250	572	607	F	11
85	6/22/2002	1850	543	572	M	11
86	6/22/2002	2050	570	609	F	11
87	6/22/2002	1950	567	602	F	9
88	6/28/2002		551	580		11
89	6/28/2002		546	580		11
90	6/28/2002		541	569		11
91	6/28/2002		599	634		10
92	6/28/2002		624	653		11
93	6/28/2002		628	663		11
94	6/28/2002		620	652		10
95	6/28/2002		534	564		11
96	6/28/2002		630	661		10
97	6/28/2002		508	542		10
98	6/28/2002		569	603		11
99	6/28/2002		631	664		10
100	6/28/2002		534	568		10
101	6/28/2002		645	677		11
102	6/28/2002		678	712		12
103	6/28/2002		539	582		8
104	6/28/2002		634	667		11
105	6/28/2002		548	587		9
106	6/29/2002		637	665		9
107	6/29/2002		645	670		11
108	6/29/2002		616	644		10
109	6/29/2002		575	610		10
110	6/29/2002		520	551		10
111	6/29/2002		569	600		9
112	6/29/2002		605	640		11
113	6/29/2002		613	645	F	11
114	6/29/2002		586	620	F	9
115	6/29/2002		560	586	F	10
116	6/29/2002		630	660	F	9
117	6/29/2002		613	655	F	11
118	6/29/2002		629	664	F	10
119	6/29/2002	2200	602	639	F	11
120	6/29/2002	1700	567	592	M	11
121	6/29/2002	1550	523	556	F	9
122	6/29/2002	1800	585	616	F	10
123	6/29/2002		660	697	F	11
124	6/29/2002		590	624	F	9

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
125	6/29/2002		506	541		8
126	6/29/2002		532	561		11
127	5/18/2002		575		F	
128	5/18/2002		505		F	
129	5/18/2002		612		M	11
130	5/18/2002		545		F	
131	5/18/2002		583		F	
132	5/18/2002		623	660	F	11
133	5/18/2002		638	674	F	11
134	5/18/2002		640		F	12
135	5/18/2002		581		F	11
136	7/2/2002		640	671		
137	7/2/2002	3000	650	680		11
138	7/2/2002	3700	710	751	F	18
139	7/2/2002	1650	560	591	F	11
140	7/2/2002	2500	611	644	F	11
141	7/2/2002	2050	592	620	F	11
142	7/2/2002	2100	612	641	F	11
143	7/3/2002		582	612		11
144	7/3/2002		477	499		9
145	7/3/2002		602	633		11
146	7/3/2002		592	623		11
147	7/3/2002	1850	562	608	F	10
148	7/3/2002	2000	587	617	F	10
149	7/3/2002	3000	675	706	F	
150	7/3/2002	1600	555	583	F	
151	7/3/2002		645	676		
152	7/3/2002		651	688		
153	7/3/2002		503	538		
154	7/3/2002		460	495		
155	7/3/2002		609	635		
156	7/3/2002		612	642		
157	7/3/2002	2000	568	598	M	
158	7/3/2002		589	627		
159	7/3/2002		495	522		
160	7/3/2002		541	578		
161	7/3/2002		540	571		
162	7/3/2002	1700	570	600	F	10
163	7/3/2002	2100	584	629	F	10
164	7/3/2002	1600	541	573	F	11
165	7/3/2002	2500	622	653	F	
166	7/3/2002	2200	569	598	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
167	7/3/2002	2300	583	621	F	
168	7/4/2002	550	377	390	Imm	
169	7/4/2002		475	508	M	
170	7/4/2002	2500	602	637	F	
171	7/4/2002	2475	636	669	F	
172	7/4/2002	2350	610	644	F	
173	7/4/2002	2450	630	665	F	
174	7/6/2002	2500	612	644	F	
175	7/6/2002	1900	571	604	F	
176	7/6/2002	1300	499	538	F	11
177	7/6/2002	1100	474	506	F	8
178	7/6/2002	2850	644	683	F	11
179	7/6/2002	2175	629	658		
180	7/6/2002	3000	681	718	M	
181	7/6/2002	2100	584	615	F	11
182	7/6/2002	1700	633	667	F	11
183	7/6/2002	2400	625	660	F	12
184	7/6/2002	2100	585	620	F	11
185	7/6/2002	2850	645	678	F	13
186	7/6/2002	1700	552	582	M	11
187	7/6/2002	1700	522	560	F	10
188	7/6/2002	2000	585	620	F	12
189	7/6/2002	2250	599	624	F	12
190	7/7/2002	1400	514	546		11
191	7/7/2002	2450	626	659		12
192	7/7/2002	2100	584	617		11
193	7/7/2002	1950	584	618		11
194	7/7/2002	2150	593	624		11
195	7/7/2002	1600	533	566		8
196	7/7/2002	2250	607	641		11
197	7/7/2002		503	537		8
198	7/7/2002	1200	500	530		10
199	7/7/2002	1950	601	631		11
200	7/13/2002	1400	507	540	F	8
201	7/13/2002	2700		650	F	11
202	7/13/2002	1100	461	495	F	8
203	7/13/2002	2100	625	657	F	11
204	7/13/2002	2200	591	620	F	11
205	7/13/2002	1600	534	570	F	9
206	7/13/2002	2600	619	653	F	11
207	7/13/2002	2000	582	614	M	11
208	7/13/2002	2000	566	597	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
209	7/13/2002	1600	536	565	F	11
210	7/13/2002		409	433	Imm	5
211	7/13/2002	1700	554	587	M	11
212	7/13/2002	1900	572	607	M	11
213	7/13/2002	1700	559	590	M	10
214	7/13/2002	700	416	441	Imm	5
215	7/13/2002	1700	555	588	M	11
216	7/16/2002	1850	545	577	F	11
217	7/17/2002	2800	650	686	F	12
218	7/17/2002	3250	683	717	M	17
219	7/17/2002	1400	497	529	F	9
220	7/17/2002	2200	587	624	F	12
221	7/17/2002	2000	587	619	M	11
222	7/17/2002	700	409	437	Imm	7
223	7/17/2002	550	366	390	Imm	6
224	7/17/2002	1800	546	583	F	10
225	7/17/2002	1700	418	443	Imm F	7
226	7/17/2002	2150	602	630	F	12
227	7/17/2002	1350	508	538	M	11
228	7/17/2002	625	379	405	Imm	6
229	7/17/2002	875	438	461	Imm F	7
230	7/17/2002	1850	562	596	M	12
231	7/17/2002	285	658	686	F	12
232	7/17/2002	2650	610	648	F	12
233	7/17/2002	1200	476	510	M	8
234	7/17/2002	2400	601	640	F	11
235	7/18/2002	2250	602	635	F	11
236	7/18/2002	2450	622	657	F	12
237	7/18/2002	1800	544	580	F	10
238	7/18/2002	1200	478	506	M	10
239	7/18/2002	2100	549	580	M	11
240	7/18/2002	1500	518	543	M	12
241	7/18/2002	2200	580	613	F	11
242	7/19/2002	2400	624	662	F	12
243	7/19/2002	2700	605	640	F	12
244	7/19/2002	2650	627	661	F	12
245	7/21/2002		440	466	F	6
246	7/21/2002		484	513	M	9
247	7/21/2002	1700	529	565	F	8
248	7/21/2002	1700	520	548	M	8
249	7/27/2002	2500	595	630	F	11
250	7/27/2002	2150	575	610	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
251	7/27/2002	2200	600	632	F	12
252	7/27/2002	2550	609	945	F	12
253	7/28/2002	2650	629	659	F	12
254	7/28/2002	2700	630	660	F	11
255	7/28/2002	450	318	340	Imm	5
256	7/28/2002	600	356	380	Imm	5
257	7/28/2002	3150	645	678	F	12
258	7/28/2002	2000	535	570	F	11
259	8/4/2002		530	562	F	9
260	8/4/2002		423	456		7
261	8/4/2002	1950	572	606	F	11
262	8/4/2002	1750	520	558	M	10
263	8/4/2002	650	375	398	Imm F	5
264	8/11/2002	1950	554	584	F	11
265	8/11/2002	1650	508	534	F	9
266	8/11/2002	2000	561	595	F	11
267	8/11/2002	2600	634	667	F	13
268	8/11/2002	3000	628	658	M	13
269	8/11/2002	2600	591	622	M	11
270	8/11/2002	3000	632	670	F	11
271	8/11/2002	2950	634	662	F	12
272	8/11/2002	3200	678	716	F	13
273	8/11/2002	2500	596	630	F	11
274	8/11/2002	3000	638	678	F	
275	8/12/2002	1600	532	562	M	10
276	8/12/2002	2100	559	592	F	11
277	8/12/2002	2200	554	582	F	10
278	8/18/2002	2850	652	686	F	13
279	8/18/2002	2300	597	626	F	11
280	8/18/2002	750	379	404	Imm F	6
281	8/18/2002	750	382	407	Imm M	
282	8/18/2002	1200	458	481	M	6
283	8/18/2002	2000	565	600		10
284	8/18/2002	1800	542	575		7
285	8/18/2002	3000	635	670		12
286	8/24/2002	2850	632	661	F	12
287	8/24/2002	3000	638	670	F	12
288	8/24/2002	2500	620	658	F	13
289	8/24/2002	800	401	432		6
290	8/24/2002	3000	630	661		12
291	8/24/2002	2250	610	646	F	11
292	8/24/2002	2700	588	620	F	11

6.8 Appendix 8. Continued.

Sample number	MM/DD/YY	Weight (g)	Fork length (mm)	Total length (mm)	Maturity	Age (yrs)
293	8/24/2002	1750	528	562	F	8
294	8/24/2002	2500	607	644	F	12
295	8/24/2002	2400	602	634	F	12
296	8/24/2002	3000	590	623	F	11
297	8/24/2002	2850	657	690	F	12
298	8/24/2002	3350	669	707		12
299	8/24/2002	3100	656	698	F	13
300	8/25/2002	700	389	415	Imm M	5
301	8/25/2002	2100	546	582	F	10
302	8/25/2002	1500	519	550	M	9
303	8/25/2002	1650	530	565	F	10
304	8/25/2002	2550	607	635	F	11
305	8/25/2002	2700	604	631	F	12
306	8/25/2002	2900	635	665	F	11
307	8/25/2002	2200	565	591	M	11
308	8/25/2002	2700	622	658	F	12
309	8/25/2002	1800	391	413	Imm	5
310	8/25/2002	3300	639	670	F	12
311	8/25/2002	2300	586	622	F	11
312	8/31/2002	2950	638	671	F	12
313	8/31/2002	600	361	386	Imm	5
314	8/31/2002	750	402	428	Imm	6
315	8/31/2002	700	383	406	Imm	5
316	8/31/2002	2000	539	573	F	9
317	8/31/2002	2200	560	598	F	10
318	8/31/2002	2650	601	636	F	11
319	8/31/2002	2700	612	646	F	11
320	8/31/2002	3000	655	691	F	11
321	8/31/2002	1950	570	600		11
322	8/31/2002	2950	645	682	F	12
323	8/31/2002	1325	469	496	M	8
324	8/31/2002	2450	598	631	F	12
195A	7/7/2002		347	367	Imm	5
199A	7/12/2002	2500	633	664	F	11
199B	7/12/2002	2200	604	640	F	11
199C	7/12/2002	1700	569	597	M	10
199D	7/12/2002	1300	510	532	M	10
199E	7/12/2002	1700	550	580	M	10
199F	7/12/2002	2300	612	643	M	11
199G	7/12/2002	1600	543	573	M	11
	n	2116.0	573.4	605.3		
	Mean	263	330	318		

6.9 Appendix 9. Biological data from test fishery caught walleye, 17 May – 1 Sept. 2002, Calling Lake. FL mm: mean = 627.7, n = 116; TL mm: mean = 666.9, n = 11.

Sample number	FL (mm)	TL (mm)	Sample number	FL (mm)	TL (mm)	Sample number	FL (mm)	TL (mm)
1	623		40	603		79	690	
2	571		41	681		80	675	
3	734		42	610		81	500	
4	540		43	577		82	687	
5	772		44	805		83	784	
6	719		45	737		84	560	
7	725	770	46	611		85	578	
8	582		47	730		86	715	
9	620		48	612		87	638	
10	554		49	470	775	88	634	
11	578	617	50	597		89	598	
12	611		51	668		90	552	
13	650		52	544		91	586	
14	590		53	464		92	890	
15	513	547	54	853		93	688	
16	548		55	577		94	586	615
17	740	782	56	655		95	660	
18	604		57	702		96	555	
19	576		58	586		97	682	
20	716		59	457		98	475	
21	590		60	762		99	591	
22	550		61	555		100	722	
23	534		62	593		101	738	
24	587	630	63	602		102	721	
25	736		64	714		103	542	
26	610		65	591	635	104	570	
27	626	663	66	458		105	708	
28	590		67	596		106	653	
29	576		68	489		107	785	
30	586		69	594		108	422	
31	644		70	624		109	578	
32	635	673	71	645		110	572	
33	595		72	666		111	678	
34	641		73	765		112	595	
35	703		74	567		113	638	
36	638		75	523		114	614	
37	670		76	571		115	628	
38	597	629	77	723		116	775	
39	687		78	608				

6.10 **Appendix 10. Biological data from sport harvested pike during 17 May – 1 September 2002 from Calling Lake.** DD/MM/YY = date/month/year, g = grams, mm = millimetres, F = mature female, M = mature male, Imm = immature/sex undeterminable, yr = years.

Sample number	DD/MM/YY	Weight (g)	FL (mm)	TL (mm)	Sex	Age (yrs)
1	1/6/2002	1400	555	591	M	6
2	1/6/2002	1900	647	686	M	8
3	1/6/2002	1100	560	592	M	5
4	1/6/2002		630	670	F	7
5	1/6/2002	2100	701		F	8
6	1/6/2002	2100	676		F	7
7	2/6/2002	3400	795		F	13
8	2/6/2002	2750	742	751	F	12
9	2/6/2002	1425	570	605	M	6
10	2/6/2002	2200	660		M	9
11	14/6/02	2800	730	768	F	9
12	14/6/02	1200	562	591	Imm	6
13	19/6/02	5100	898	937	M	17
14	19/6/02	2300	668	708	F	
15	21/06/02	3200	795	804	F	
16	21/06/02	2100	665	703	F	
17	21/06/02	1650	622	660	F	
18	21/06/02	4300	849	871	F	
19	21/06/02	1400	592	532	F	6
20	28/06/02	740	784			
21	28/06/02		1040			
22	29/06/02		619	656		
23	29/06/02		706	746	F	
24	29/06/02		744	781	F	
25	29/06/02		707	745	F	
26	29/06/02	6600	944	999	F	
27	2/7/2002		592	622	F	
28	2/7/2002		628	663	F	6
29	3/7/2002		726	771		7
30	3/7/2002		563	598		
31	7/4/2002		711	752	F	
32	13/7/02	3700	810	851	F	
33	16/7/02	1500	596	630	M	
34	17/7/02	2250	603	639	M	8
35	17/7/02	1700	617	652	M	7
36	17/7/02	2550	725	771	M	
37	17/7/02	3200	724	767	F	8

6.10 Appendix 10. Continued.

Sample number	DD/MM/YY	Weight (g)	FL (mm)	TL (mm)	Sex	Age (yrs)
38	28/7/02	2950	736	778	F	8
39	28/7/02	3150	781	830	F	9
40	4/8/2002	1850	602	642	M	6
41	11/8/2002	2450	681	718	F	
42	11/8/2002	1450	581	616	F	
43	11/8/2002	6400	918	964	F	
44	11/8/2002	3350	788		F	
45	11/8/2002	6800	961	1112	F	
46	11/8/2002	3800	828	872	F	
47	18/8/02	2300	661	702	F	
48	18/8/02	2000	638	675	F	
49	18/8/02	3500	796	842	F	
50	18/8/02	2600	671	711	F	
51	24/8/02	1700	583	618	M	
52	24/8/02	1750	598	625	M	
53	24/8/02	1900	620	657	M	
54	24/8/02	2600	704	750	F	
55	24/8/02	1500	573	611	M	
56	25/8/02	1800	628	664	F	
	n	2663.7	698.3	724.5		
	Mean	45	56	49		

6.11 Appendix 11. Biological data from test fishery caught pike during 17 May – 1 September 2002 from Calling Lake.

Sample number	FL (mm)	TL (mm)	Sample number	FL (mm)	TL (mm)	Sample number	FL (mm)	TL (mm)
1	623		40	603		79	690	
2	571		41	681		80	675	
3	734		42	610		81	500	
4	540		43	577		82	687	
5	772		44	805		83	784	
6	719		45	737		84	560	
7	725	770	46	611		85	578	
8	582		47	730	775	86	715	
9	620		48	612		87	638	
10	554		49	470		88	634	
11	578	617	50	597		89	598	
12	611		51	668		90	552	
13	650		52	544		91	586	
14	590		53	464		92	890	615
15	513	547	54	853		93	688	
16	548		55	577		94	586	
17	740	782	56	655		95	660	
18	604		57	702		96	555	
19	576		58	586		97	682	
20	716		59	457		98	475	
21	590		60	762		99	591	
22	550		61	555		100	722	
23	534		62	593		101	738	
24	587	630	63	602	635	102	721	
25	736		64	714		103	542	
26	610		65	591		104	570	
27	626	663	66	458		105	708	
28	590		67	596		106	653	
29	576		68	489		107	785	
30	586		69	594		108	422	
31	644		70	624		109	578	
32	635	673	71	645		110	572	
33	595		72	666		111	678	
34	641		73	765		112	595	
35	703		74	567		113	638	
36	638		75	523		114	614	
37	670		76	571		115	628	
38	597	629	77	723		116	775	
39	687		78	608				
						n	116	11
						Mean	627.7	666.9

6.12 Appendix 12. Creel survey field data form.

Page # ______

2002 SPORT FISHERIES MONITORING PROGRAM

Calling Lake Creel Survey Data Sheet (roving and complete trip data)

Date (mm/dd/yy) ______ **(put into spreadsheet 'Date' column)** NRPK = 2 fish any size daily possession LKWH = 10 any size

Shift = **am or pm (circle one)** WALL = 1 fish any size daily possession BRBT = 10 any size

Crew = ______ YLPR = 15 any size

Alberta Conservation Association

Day / Time				Interview UTM (NAD 83)		Anglers										Appendices								Species Caught					
Day Code	Time (10s)	Time (1s)	1/4 hrs = 0, 25, 5, 75	UTM Easting	UTM Northing	100s	10s Party # e.g. 017	1s	Angler # 1 thru 9	# Anglers in party	Boat Registration #	Landing?	Time fishing (10s)	Time fishing (1s)	1/4 hrs = 0, 25, 5, 75	Target	Method	Bait 1 = Yes, 2 = No	Electronics	Skill	Residence	Barbed hooks? 1 = Yes, 2 = No	1 = incomplete or 2 = complete trip survey	# WALL KEPT	# WALL RELEASED	# NRPK KEPT	# NRPK RELEASED	# YLPR KEPT	# YLPR RELEASED
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20 interviews/page				Sheet totals											.														

SHEET RULES
- NO blank spaces
- Horizontal lines = 0s
- Vertical lines = as above or as between
- Anglers 1 thru 9 – # anglers in each party 1, 2, 3...
- # Anglers in Party - Put # of party members only in first interview row and 0 in remaining party rows

DAY CODE
1 = Monday
2 = Tuesday
3 = Wednesday
4 = Thursday
5 = Friday
6 = Saturday
7 = Sunday
8 = Holiday

LANDING
1 = PP
2 = Cabin
3 = Aboriginal angler
4 = Other

METHOD
1 = Artificial
2 = Commercial Baitfish
3 = Seined Baitfish
4 = Leeches
5 = Dewworms
6 = Scentbaits
7 = Miscellaneous

SKILL
1 = Novice
2 = Average
3 = Pro
4 = Test angling

TARGET
1 = WALL
2 = NRPK
3 = YLPR
4 = LKWH
5 = BRBT
6 = Anything

ELECTRONICS
1 = None
2 = Depth Sounder
3 = G.P.S.
4 = Depth Sounder & GPS
5 = Other

RESIDENCE
1 = < 50 km
2 = Athabasca
3 = Edmonton
4 = Ft. McMurray
5 = Lac La Biche
6 = Peace River / Lesser Slave
7 = St. Paul / Bonnyville
8 = Edson / Hinton
8 = Vegreville / Lloydminster
9 = Red Deer and east
10 = Rocky / Nordegg
11 = South east slopes
12 = Calgary and east
13 =Southern AB
14 = SASK
15 = BC
16 = Other province

The Alberta Conservation Association acknowledges the following partner for their generous support of this project

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Alberta Conservation Association