Status of Walleye and Northern Pike Sport Fisheries at Lesser Slave Lake, Alberta, 2005

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EXECUTIVE SUMMARY

The purpose of this survey was to describe the current level of angler use and provide data to fisheries managers to evaluate the status of the walleye (*Sander vitreus*) and northern pike (*Esox lucius*) sport fisheries on Lesser Slave Lake. This report describes the results of the summer angler survey on Lesser Slave Lake and is presented alongside results of the previous creel survey conducted in 1999.

An access point angler survey to quantify angling effort, catch and harvest rates of walleye and northern pike was completed at Lesser Slave Lake from 20 May to 28 August in 2005. The estimated number of anglers that fished the lake in 2005 was 115,000 (95% CL: 92,000 – 141,000 anglers), while the estimate of angling pressure exerted on Lesser Slave Lake was 281,000 angler-h (95% CI: 230,000 – 351,000 angler-h), or 2.37 angler-h/ha (95% CL: 1.94 – 2.96 angler-h/ha).

Total observed catch rate (TCUE) reported for walleye by anglers was 3.025 fish/h in 2005 and 2.045 fish/h in 1999. Total observed harvest rate (THUE) was 0.291 fish/h in 2005 and 0.187 fish/h in 1999. TCUE for the test angling was 2.528 fish/h in 2005.

In 2005, anglers reported catching 76,716 walleye during the survey period, of which 7,374 were harvested. The estimated total angler catch of walleye was 870,000 fish (95% CI = 694,000 – 1,094,000 fish) and the estimated total angler harvest was 82,000 fish (95% CI = 65,750 – 101,750 fish). The mean weight of harvested walleye was 0.92kg/fish resulting in an estimated total harvest of 75,440 kg (95% CI = 60,490 – 93,610 kg) or 0.636 kg/ha (95% CI = 0.512 – 0.792 kg/ha).

The mean length (± SD) of walleye harvested by anglers was 490 ± 45 mm TL (n = 412), whereas those captured through test angling was 434 mm TL (n = 220). The mean age of angler-harvested walleye was 8.7 ± 1.4 y (n = 415)

TCUE reported for northern pike by sport anglers was 0.091 fish/h, whereas TCUE for test anglers was 0.056 fish/h. Observed THUE of northern pike was 0.004 fish/h.

In 2005, anglers reported catching 2,312 northern pike during the survey, of which 103 were harvested. The estimated total angler catch of northern pike was 25,700 fish (95% CI = 21,000 – 32,500 fish) and the estimated total angler harvest was 1,060 fish (95% CI = 855 – 1,340 fish). The mean weight of harvested northern pike was 2.47 kg/fish resulting in an estimated total harvest of 2,618 kg (95% CI = 2,114 – 3,313 kg) or 0.022 kg/ha (95% CI = 0.018 – 0.028 kg/ha). The mean length of northern pike harvested by anglers in 2005 was 737 ± 147 mm TL (n = 28) and the mean age was 6.7 ± 2.2 y (n = 28).

Data collected as part of this survey were used by fisheries managers in formulating management regulations for the walleye and northern pike sport fisheries at Lesser Slave Lake.

Key words: walleye, northern pike, angler survey, catch-per-unit-effort, Lesser Slave Lake.

ACKNOWLEDGEMENTS

This work was funded by the Alberta Conservation Association (ACA). Thanks to Human Resources and Skills Development Canada (HRSDC) for financial contributions through their Summer Career Placements program. In addition, the ACA received in-kind support from Alberta Sustainable Resource Development (ASRD), Fisheries Management Division, in Peace River.

Essential to this project were the creel clerks who interviewed Lesser Slave Lake anglers. Thanks to all the volunteer test anglers for donating their time and personal expense to this project. Thanks also to several reviewers who edited earlier drafts of this report.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

Changes in angler pressure, especially related to the growth and development of Alberta, have raised concerns about the potential impacts on walleye and northern pike populations that may result from increased angling effort.

Strategies implemented by Alberta Sustainable Resource Development (ASRD) to maintain or recover walleye (*Sander vitreus*) and northern pike (*Esox lucius*) include implementation of angling regulations that are designed to reduce fish mortality and increase recruitment (Berry 1995, 1999). Regular evaluations of the abundance and structure of sport fish populations are necessary to evaluate the effectiveness of management strategies.

Lesser Slave Lake, one of the premier walleye lakes in Alberta, has experienced increases in angling pressure since 1985 (Buchwald 1985; Hildebrand and Ash 1986; Potter and Rhodes 1997; Lucko 1999). Current sport fishing regulations for Lesser Slave Lake (ASRD 2005) permit anglers to keep one walleye ≥ 43 cm total length (TL) per day between 20 May and 15 June, and two walleye from 16 June to 31 March. Anglers may keep three northern pike ≥ 55 cm TL from 20 May to 31 March. A closure to angling is in effect for the whole lake from 1 April to 19 May. In addition, the section of the lake that lies west of a line drawn from Shaw Point to Little Grassy Point (located in 26-74-14-W5) is closed from 1 March to 15 June. As a result of its popularity, frequent evaluations of sport fishery parameters are required to assess current management strategies and sustainability of the sport fishery at Lesser Slave Lake.

1.1 Study objectives

To assess impacts of changing angling pressure on Lesser Slave Lake, the Alberta Conservation Association (ACA) conducted a creel survey on the lake from 20 May to 28 August 2005. Results of this survey are presented together with results from a survey conducted in 1999. Specifically, our objectives were to:

1. Estimate the total number of anglers and angler effort during the summer (20 May – 31 August);

2. Estimate angler catch and harvest (yield) of sport fish, as well as, catch and harvest rates of sport fish;
3. Describe angler demographics; and
4. Describe the biological parameters of the sport fish harvest.

2.0 STUDY AREA

Lesser Slave Lake is located approximately 250 km northwest of Edmonton (Figure 1). It is a eutrophic lake with a total surface area of 118,659 ha and an average depth of 11.4 m (Mitchell and Prepas 1990). It is comprised of two basins with an east-west orientation. Many creeks and rivers flow into the lake, with much of the inflowing water entering from the west end via the South Heart River/Buffalo Bay system. The three largest inflows on the south shores of Lesser Slave Lake are the Driftpile, Swan and Assineau rivers. The single outflow is the Lesser Slave River, which is located at the eastern end of the lake in the town of Slave Lake. A more detailed description of the physical, chemical and biological characteristics may be found in Mitchell and Prepas (1990).

The south shoreline has the most development with four hamlets, one village and one town on or near Lesser Slave Lake. There are two provincial parks situated on the lake, Hilliard's Bay Provincial Park is located on the northwest shore and Lesser Slave Lake Provincial Park is located on the northeast shore (Figure 1).

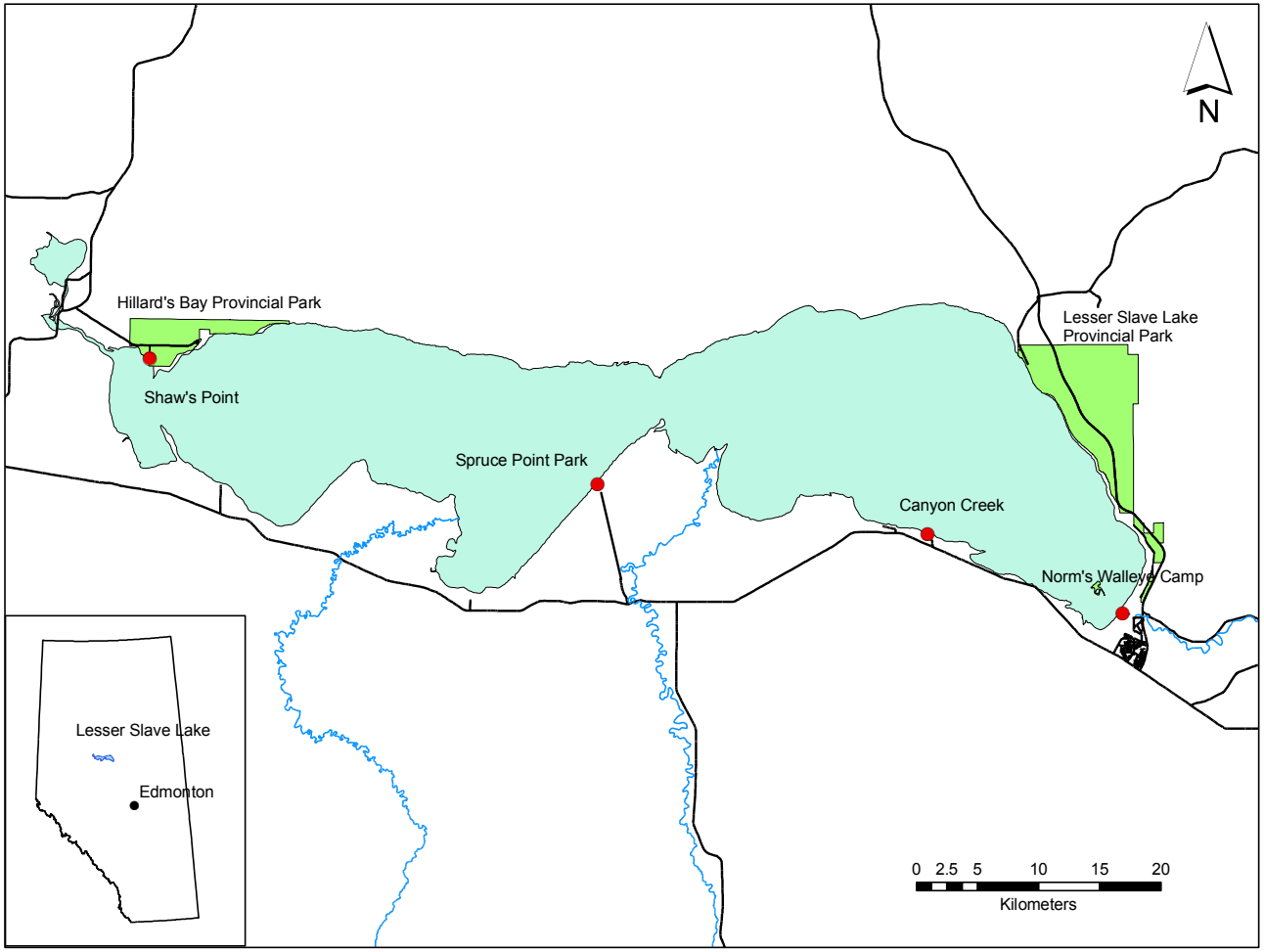

Figure 1. Location of creel survey sites on Lesser Slave Lake, Alberta. Inset is a map of Alberta indicating the location of the lake in the province.

3.0 MATERIALS AND METHODS

3.1 Survey design

A reduced effort creel survey (Pollock et al. 1994) was conducted from four access points (Figure 1) at Lesser Slave Lake from 20 May to 28 August 2005 to collect angler effort and sport fishery data. Access points included Shaw's Point Lakeside Resort and Spruce Point Park in the west basin. In the east basin, Canyon Creek and Lesser Slave River (Norm's Walleye Camp) were surveyed. Three of the four sites were chosen because they were previously surveyed in 1999 (Lucko 1999). Canyon Creek was selected to replace Joussard, which was surveyed in 1999, as we felt this access site would provide better overall representation of the sport fishery.

Two crews of two creel clerks interviewed anglers as they returned from completed trips between 08:00 and 23:00 on days surveyed. Sampling occurred on a schedule of 10 days on, four days off, surveying every weekend. The crews each surveyed two access points during the course of a 10-day shift. Survey effort was split such that five days of each shift were spent at each access point. Two access points were surveyed concurrently during each five day split (i.e., one crew surveyed at Canyon Creek while the other crew surveyed at Spruce Point Park). The survey sites visited first were switched each shift so that all sites were sampled equally.

Aerial boat counts were used in conjunction with the access point surveys in order to generate whole-lake estimates of angler parameters. Stratified random sampling was used to select 36 days for boat counts. The stratification was based on the day type (i.e., weekend (WE) or weekday (WD)) to ensure equal representation of weekend and weekdays surveyed, as well as equal representation for all launches surveyed. Of the 36 aerial survey days, six were either cancelled or excluded from analyses due to poor weather or very low numbers of counted boats.

3.2 Biological fish data

When permitted, creel clerks collected biological data from fish that were harvested by anglers. Data collected included fork length (FL), weight (± 10 g), ageing structures, sex, and state of maturity. Fish were dissected to determine sex and maturity through

inspection of the gonads. Fish were aged according to Mackay et al. (1990) using the left cleithrum for northern pike and the first three rays of the left pelvic fin for walleye.

3.3 Test angling

To collect data on the size of fish that could not be legally harvested, test angling was conducted throughout the survey period. Test anglers were comprised of creel clerks, fisheries staff, and volunteers, of varying skill level, attempting to catch walleye and northern pike using techniques that anglers would normally use. Test anglers recorded the number of hours fished and the fork and total length (TL), ± 1 mm, of all fish caught. The percentage of the total catch composed of legal-length fish was compared to the corresponding percentage from the sport fishery in order to assess the rate of angler exaggeration (Sullivan 2003).

3.4 Data management and analysis

To ensure accuracy, all data were verified and outliers identified. Quality control measures included reviewing frequency distributions and plots of each angler survey parameter. Outliers were identified as being outside of the general distribution, and then were compared to original datasheets to determine whether they resulted from errors in data entry. If a measurement or recording error was suspected, the outlier was omitted from analysis. All data on sport fish, as well as non-sport fish species (number caught, FL, sex, maturity and weight) were entered into the Provincial Government Fisheries Management Information System (FMIS), Project Location ID 6934. Data obtained from gill netting surveys on the lake in September 2005 were used to supplement length and age distributions (FMIS Project Location ID 6934).

Boat counts were used to determine a ratio-of-use (ROU) for each pair of concurrently surveyed access sites. Shaw's Point and Lesser Slave River were surveyed concurrently, as were Spruce Point and Canyon Creek. The ROU was used to extrapolate the information collected from anglers at the access sites to all the anglers on the lake. The ROUs were then bootstrapped in the same fashion as other parameters collected (see below). ROU was calculated as:

$$\text{Ratio of use} = \frac{\#\text{ boats from boat count}}{\#\text{ boats using surveyed sites}}$$

Bootstrap methods (Haddon 2001) were used to calculate the maximum likelihood estimates for the following parameters: number of angler interviews, angling effort, catch and harvest of walleye and northern pike, and ratio of use. Samples were stratified by day type into weekdays (Monday - Thursday) and weekend days (Friday - Sunday, including statutory holidays). Daily totals of each parameter were bootstrapped for each day type, generating a distribution of ten thousand bootstrap samples. The distributions from bootstrapping were used to extrapolate to days that were not surveyed. A flow chart describing the steps is presented in Figure 2.

Total catch-per-unit-effort (TCUE) was calculated by dividing the total number of fish caught by recreational anglers (both kept and released) by the total number of hours spent angling (angler-hours, i.e., total amount of effort applied by surveyed anglers). Total harvest-per-unit-effort (THUE) was calculated by dividing the total number of fish kept by anglers by the total number of angler-hours. Daily totals for catch-per-unit-effort (CPUE) and harvest-per-unit-effort (HPUE) were bootstrapped to estimate monthly means and 95% confidence limits. Means and 95% confidence intervals of monthly CPUE and HPUE are presented for 1999 and 2005.

Estimated total harvest per hectare (kg/ha) was calculated by multiplying estimated harvest by the mean weight (kg) of observed harvest, and dividing by the area of the lake (ha).

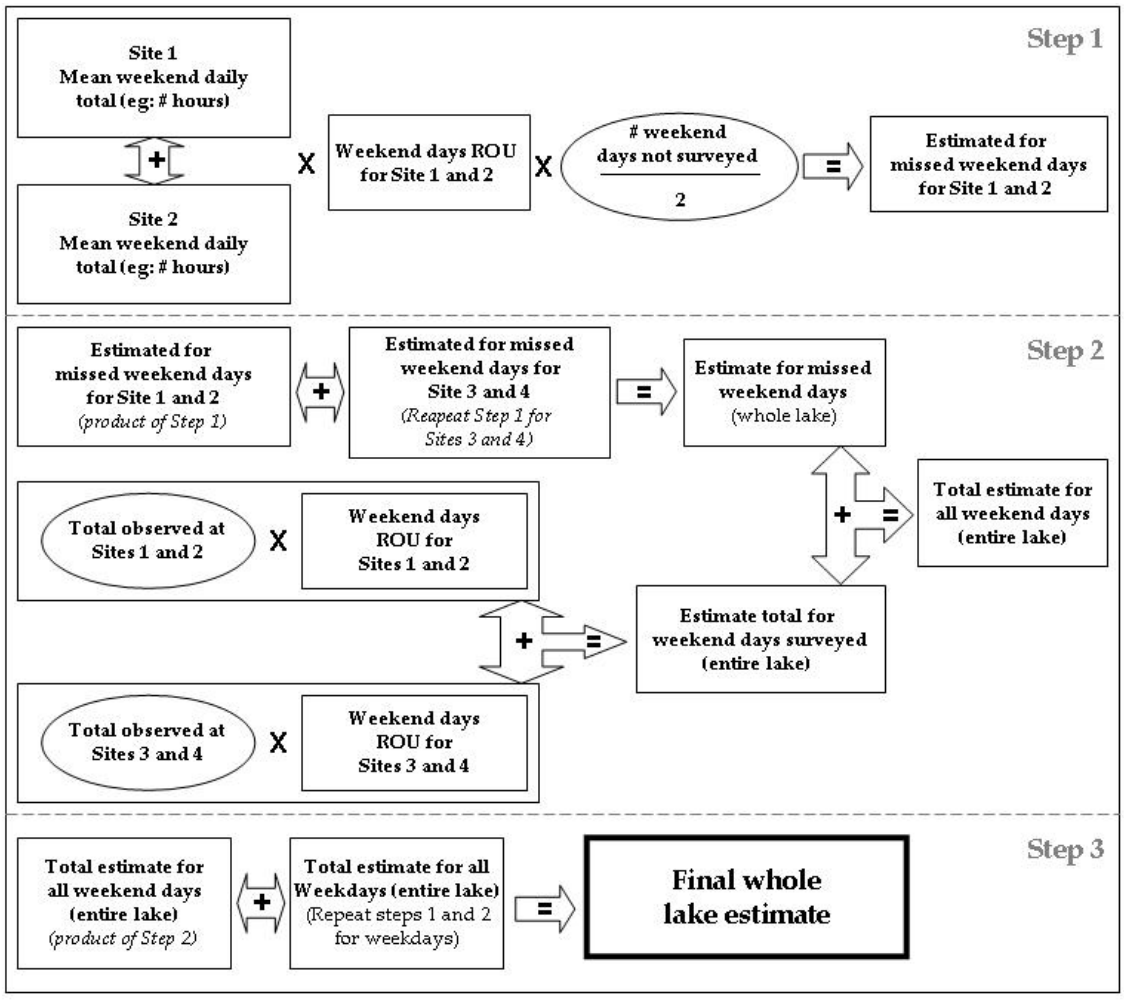

Figure 2. Flow chart outlining the process used for estimating whole lake parameters from the angler survey at Lesser Slave Lake, 2005. Circles represent values with no variance and rectangles represent probability distributions of ten thousand replicates from bootstrapping. Bold outline represents derived parameters used in the assessment of the sport fishery (e.g., total effort, total walleye harvest). Site 1 and 2 represent Shaw's Point and Lesser Slave River survey sites in both 1999 and 2005. Sites 3 and 4 represent Spruce Point and Joussard in 1999, and Canyon Creek in place of Joussard in 2005. The ratio-of-use (ROU) is the number of boats from aerial boat counts divided by the number of boats in the angler survey.

Length-frequency distributions were used to examine population structure of fish captured by anglers, test angling, and gillnetting. Because TL was not measured for all fish, we estimated it using the following linear regression relationships established

from fork and total lengths collected during 2005 index netting at Lesser Slave Lake (Fortier et al. 2006):

Walleye (mm):	TL = 1.048 * FL + 7.267; R^2 = 0.998, n = 465
Northern pike (mm):	TL = 1.039 * FL + 11.497; R^2 = 0.999, n = 74

Age and length (TL) data from gillnetting and sport and test angling were combined to assess growth rate using the von Bertalanffy growth function (von Bertalanffy 1938):

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

where,

L_t = length at age t;

L_∞ = the asymptote or final maximum size;

K = the rate at which the growth curve approaches the asymptote;

t = age; and

t_0 = a time scaler, the hypothetical time when the fish was size zero.

The von Bertalanffy growth function is a non-linear equation that explains growth using three parameters. The parameter used to estimate growth is K, i.e., the rate at which the fish approaches maximum size (L_∞). Higher values of K represent faster growth and are usually associated with a lower L_∞. Due to small sample sizes of small fish t_0 was fixed at zero to reduce bias in the growth function. As with L_∞, t_0 can be highly variable due to small sample sizes of small fish. Growth curve parameters were estimated through iteration using Sigma Plot 8.0. The estimates for L_∞ and K were then used to calculate an estimate for the time for a fish to reach a harvestable length.

4.0 RESULTS

4.1 Angler survey

Between 20 May and 28 August 2005, 9,976 anglers were interviewed at Lesser Slave Lake. Whole lake estimates generated from all four survey sites in 1999 and 2005 are presented in Table 1.

Table 1. Summary of observed and estimated angler parameters, with 95% confidence intervals (CI), from summer surveys conducted at Lesser Slave Lake in 1999 and 2005.

	Year	
	1999	**2005**
Number of anglers		
Observed	15,880	9,976
Estimated	118,000	115,000
95% CI	94,000 - 141,000	92,000 - 141,000
Angler-hours		
Observed	47,068	25,364
Estimated	351,000	281,000
95% CI	280,500 - 439,500	230,000 - 351,000
Effort (h/ha)		
Observed	0.40	0.21
Estimated	2.96	2.37
95% CI	2.36 - 3.70	1.94 - 2.96

Anglers that visited Lesser Slave Lake were primarily from Edmonton and the surrounding area (29.7% in 1999 and 38.2% in 2005). A complete distribution of angler residence is presented in Figure 3.

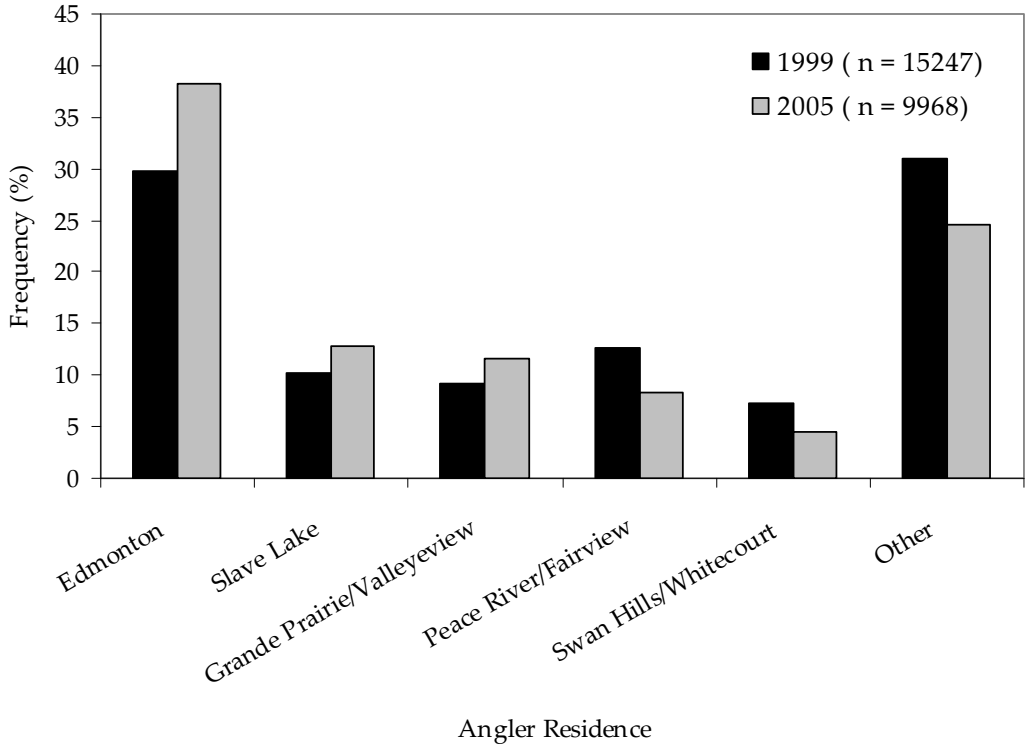

Figure 3. Residence of anglers interviewed during angler surveys at Lesser Slave Lake, Alberta in 1999 and 2005 (1999: n = 15,247; 2005: n = 9,968).

4.2 Walleye catch and harvest

Anglers interviewed in 2005 reported catching 76,716 walleye, of which 7,374 were harvested. In 1999, anglers reported catching 96,237 walleye, of which 8,803 were harvested. The mean weight of walleye sampled in 1999 was 1.11 kg compared to 0.92 kg in 2005. Whole-lake estimates of walleye catch and harvest data for 1999 and 2005 are shown in Table 2.

Table 2. Summary of whole lake estimates of walleye catch and harvest, with 95% confidence intervals (CI), from summer surveys conducted at Lesser Slave Lake in 1999 and 2005.

	Year	
	1999	**2005**
Walleye caught		
Observed	96,237	76,716
Estimated	733,000	870,000
95% CI	565,000 - 916,000	694,000 - 1,094,000
Walleye kept		
Observed	8,803	7,374
Estimated	70,900	82,000
95% CI	54,100 - 86,800	65,750 - 101,750
Walleye harvest (kg)		
Observed	9,771	6,784
Estimated	78,415	75,440
95% CI	59,835 - 96,001	60,490 - 93,610
Walleye harvest (kg/ha)		
Observed	-	-
Estimated	0.661	0.636
95% CI	0.504 - 0.809	0.512 - 0.792

The total catch rate (TCUE) of walleye reported by sport anglers was 3.025 fish/angler-h in 2005 and 2.045 fish/angler-h in 1999. The total harvest rate (THUE) of walleye (≥ 43 cm FL) was 0.291 fish/angler-h in 2005 and 0.187 fish/angler-h in 1999. The highest mean monthly CPUE and HPUE were recorded in June in both 1999 and 2005. Both July and August showed increases in HPUE for 2005 over 1999; July showed an increase of 102% whereas August showed an increase of 109.8%. Overall mean CPUE and HPUE were higher in 2005 compared to 1999. Mean monthly and combined CPUE and HPUE values and 95% confidence limits are shown in Table 3.

Table 3. Mean monthly and whole season catch-per-unit-effort (CPUE) of walleye from daily totals for sites surveyed at Lesser Slave Lake, Alberta in 1999 and 2005.

	Catch rate (fish/angler-h)					
	1999			2005		
Period	Mean	95% CI	n	Mean	95% CI	n
CPUE						
May	1.149	0.584 - 1.711	16	1.468	0.766 - 2.169	16
June	2.611	2.219 - 3.003	33	4.216	3.777 - 4.654	41
July	2.248	1.905 - 2.592	43	2.689	2.261 - 3.117	43
August	1.358	0.877 - 1.838	22	1.417	0.962 - 1.872	38
Season	2.207	1.794 - 2.259	114	2.651	2.345 - 2.956	138
HPUE						
May	0.1933	0.1465 - 0.2401	16	0.1902	0.1233 - 0.2570	16
June	0.2693	0.2367 - 0.3019	33	0.3131	0.2713 - 0.3549	41
July	0.1536	0.1251 - 0.1822	43	0.3103	0.2695 - 0.3511	43
August	0.1503	0.0906 - 0.1704	22	0.2738	0.2304 - 0.3172	38
Season	0.1882	0.1681 - 0.2083	114	0.2872	0.2637 - 0.3106	138

In 1999, test anglers reported that 17.4% of walleye were ≥ 43 cm TL, whereas sport anglers reported 16.8% of walleye were ≥ 43 cm TL. In 2005, 32.9% and 35.4% of the catch by test anglers and sport anglers, respectively, were fish ≥ 43 cm. The similarity in catch rates reported by test and sport anglers suggest that sport anglers did not exaggerate their catches of either legal or sub-legal walleye. From June through August 2005, legal-length walleye comprised a larger percentage of angler catches than in 1999. This difference was also seen when all months were combined. Catch rates of walleye above and below the size limit are presented in Table 4.

Table 4. Mean monthly and whole season catch-per-unit-effort (CPUE) of walleye above and below the legal harvestable length (≥ 43 cm TL) from daily totals for sites surveyed at Lesser Slave Lake, Alberta in 1999 and 2005.

	Catch rate (fish/angler-h)					
	1999			2005		
Size Range	Mean	95% CI	n	Mean	95% CI	n
> 43 cm TL						
May	0.255	0.146 - 0.364	16	0.529	0.187 - 0.871	16
June	0.483	0.404 - 0.559	33	1.534	1.321 - 1.748	41
July	0.266	0.200 - 0.333	43	0.860	0.652 - 1.069	43
August	0.174	0.081 - 0.267	22	0.579	0.357 - 0.801	38
Season	0.310	0.264 - 0.356	114	0.945	0.811 - 1.079	138
< 43 cm TL						
May	0.892	0.359 - 1.425	16	0.937	0.460 - 1.415	16
June	2.128	1.757 - 2.499	33	2.682	2.383 - 2.980	41
July	1.982	1.657 - 2.307	43	1.829	1.538 - 2.120	43
August	1.183	0.729 - 1.637	22	0.837	0.527 - 1.147	38
Season	1.717	1.502 - 1.933	114	1.706	1.501 - 1.911	138

4.3 Walleye population structure and growth

In 1999, harvested walleye ranged in size from 414 to 802 mm TL with a mean TL (± SD) of 506 ± 51 mm (n = 1,059; Figure 4). In 2005, walleye ranged in TL from 424 to 720 mm with a mean TL of 490 ± 45 mm (n = 412; Figure 4). In 1999, fish captured during test angling ranged in TL from 205 to 694 mm with a mean TL of 391 mm (n = 1,082; Figure 5). In 2005, test-angled walleye ranged in TL from 324 to 589 mm with a mean TL of 434 mm (n = 220; Figure 5).

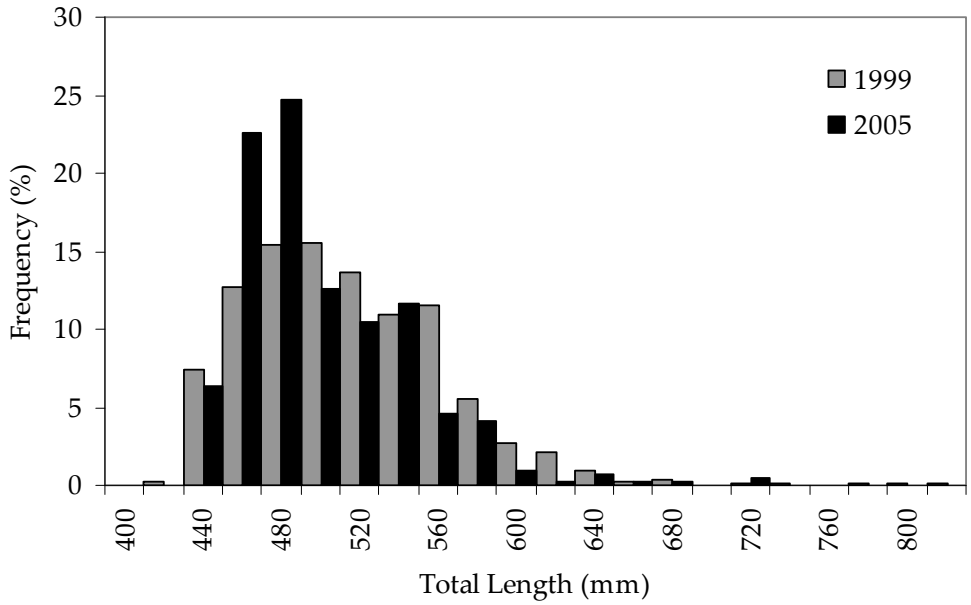

Figure 4. Length-class distributions of walleye captured during angler surveys at Lesser Slave Lake in 1999 and 2005 (1999: mean length = 506 mm, n = 1,059; 2005: mean length = 490 mm, n = 412).

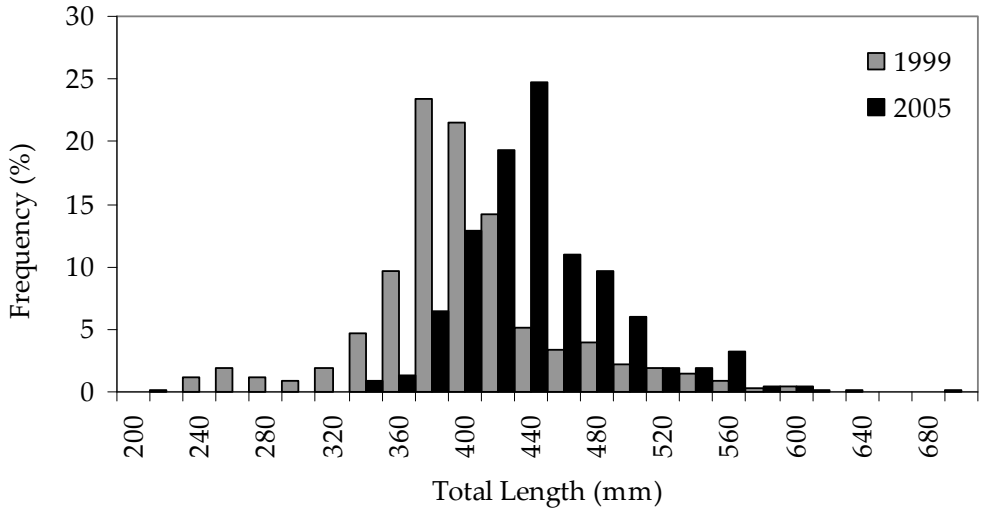

Figure 5. Length-class distributions of walleye captured during test angling at Lesser Slave Lake in 1999 and 2005 (1999: mean length = 391 mm, n = 1,082; 2005: mean length = 434 mm, n = 220).

In 1999, harvested walleye ranged in age from 4 to 21 y with a mean age (± SD) of 8.5 ± 2.2 y (n = 1,058; Figure 6). In 2005, harvested walleye ranged in age from 7 to 16 y with a mean age of 8.7 ± 1.4 y (n = 415; Figure 5).

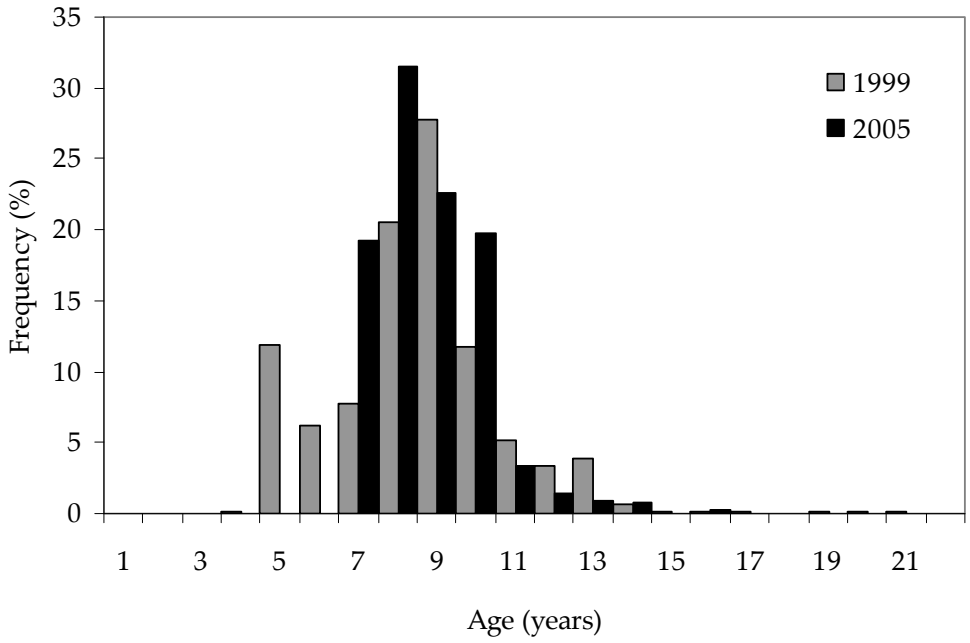

Figure 6. Age-class distributions of walleye observed during angler surveys at Lesser Slave Lake in 1999 and 2005 (1999: mean age = 8.5 y, n = 1058; 2005: mean age = 8.7 y, n = 415).

4.4 Northern pike catch and harvest

In 2005, interviewed anglers reported catching 2,312 northern pike, of which 103 were harvested. In 1999, anglers reported catching a total of 15,764 northern pike, of which 605 were harvested. The mean weight of northern pike sampled in 1999 was 2.20 kg, compared to 2.47 kg in 2005. Whole-lake estimates of northern pike catch and harvest data for 1999 and 2005 are shown in Table 5.

Table 5. Summary of whole lake estimates of northern pike catch and harvest, with 95% confidence intervals (CI), from summer surveys conducted at Lesser Slave Lake in 1999 and 2005.

	Year	
	1999	**2005**
Northern pike caught		
Observed	15,764	2,312
Estimated	109,500	25,700
95% CI	88,000 - 138,500	21,000 - 32,500
Northern pike kept		
Observed	605	103
Estimated	4,500	1,060
95% CI	3,540 - 5,840	855 - 1,340
Northern pike harvested (kg)		
Observed	1,331	254
Estimated	4,820	2,618
95% CI	3,791 - 6,255	2,114 - 3,313
Northern pike harvested (kg/ha)		
Observed	-	-
Estimated	0.041	0.022
95% CI	0.032 - 0.053	0.018 - 0.028

Total catch rates (TCUE) of northern pike reported by sport anglers was 0.09 fish/angler-h in 2005 and 0.335 fish/angler-h in 1999. TCUE for northern pike from the test fishery was 0.056 fish/h in 2005. The total harvest rate (THUE) of northern pike (≥ 55 cm TL) was 0.004 fish/angler-h in 2005 and 0.013 fish/angler-h in 1999. June had the highest mean monthly CPUE in both 1999 and 2005. June also had the greatest HPUE in both years. Both July and August showed increases in HPUE for 2005 over 1999. Overall mean CPUE and HPUE was higher in 2005 compared to 1999. Mean monthly and combined CPUE and HPUE values and 95% confidence limits are shown in Table 6.

Table 6. Mean monthly and whole season catch-per-unit-effort (CPUE) of northern pike from daily totals for sites surveyed at Lesser Slave Lake, Alberta in 1999 and 2005.

	Catch rate (fish/angler-h)					
	1999			2005		
Period	Mean	95% CI	n	Mean	95% CI	n
CPUE						
May	0.507	0.395 - 0.619	16	0.112	0.076 - 0.148	16
June	0.309	0.231 - 0.387	33	0.108	0.085 - 0.130	41
July	0.385	0.316 - 0.453	43	0.078	0.056 - 0.101	53
August	0.417	0.321 - 0.512	22	0.080	0.057 - 0.104	38
Season	0.386	0.343 - 0.429	114	0.092	0.079 - 0.104	138
HPUE						
May	0.016	0.010 - 0.023	16	0.009	0.004 - 0.015	16
June	0.012	0.008 - 0.017	33	0.008	0.005 - 0.016	41
July	0.013	0.009 - 0.017	43	0.002	0 - 0.006	53
August	0.015	0.010 - 0.021	22	0.003	0 - 0.007	38
Season	0.014	0.011 - 0.016	114	0.005	0.003 - 0.007	138

4.5 Northern pike sport fishery assessment

In 1999, harvested northern pike ranged in TL from 510 to 1,002 mm with a mean TL of 714 ± 88 mm (n = 135; Figure 7). In 2005, northern pike ranged in TL from 553 to 994 mm with a mean TL of 737 ± 147 mm TL (n = 28; Figure 7).

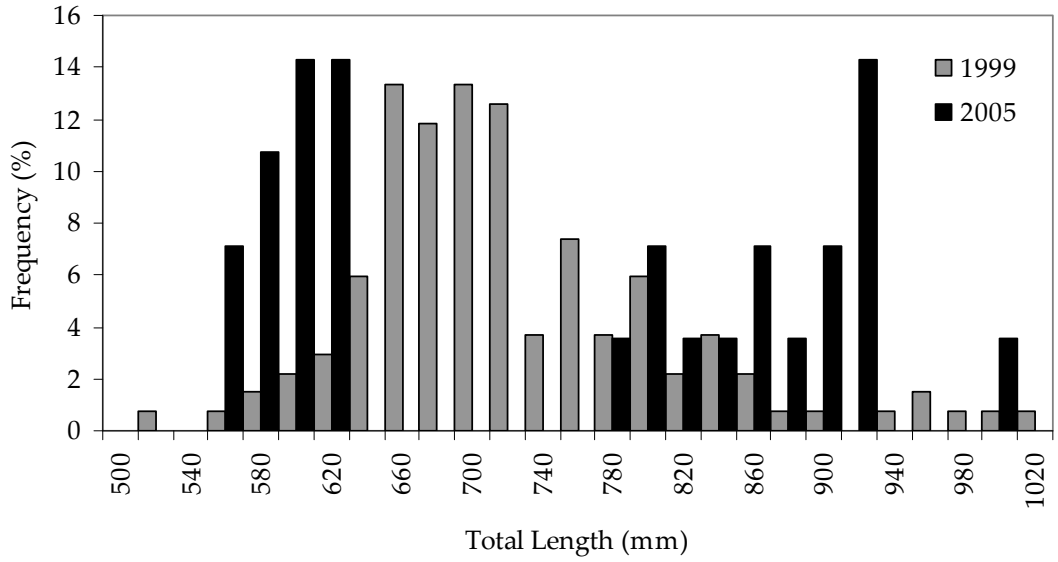

Figure 7. Length-class distributions of northern pike captured during the angler survey at Lesser Slave Lake in 1999 and 2005 (1999: mean length = 714 mm, n = 135; 2005: mean length = 737 mm, n = 28).

In 1999, harvested northern pike ranged in age from 3 to 12 y with a mean age of 6.2 ± 1.8 y (n = 136; Figure 8). In 2005, harvested northern pike ranged in age from 4 to 11 y with a mean age of 6.7 ± 2.2 y (n = 28, Figure 8).

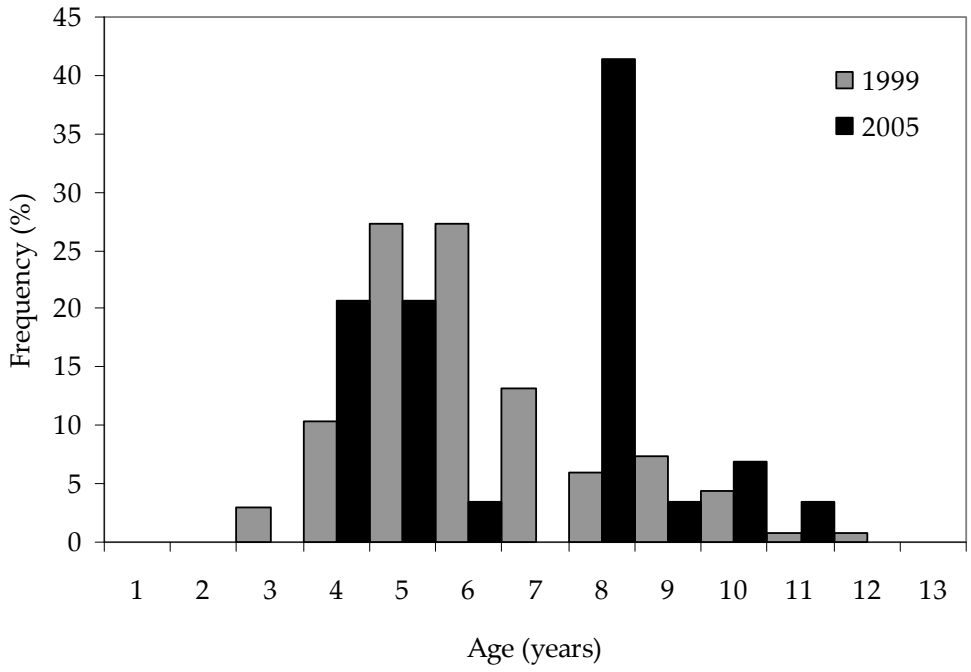

Figure 8. Age-class distributions of northern pike observed during the angler survey at Lesser Slave Lake in 1999 and 2005 (1999: mean age = 6.2, n = 136; 2005: mean age = 6.8, n = 29).

4.6 Conclusion

The estimated total angler catch of walleye was 870,000 fish (95% CI = 694,000 – 1,094,000 fish), while estimated total angler harvest was 82,000 fish (95% CI = 65,750 – 101,750 fish) or 75,440 kg (95% CI = 60,490 – 93,610 kg). In 2005, TCUE reported by anglers was 3.025 fish/h, while THUE was 0.291 fish/h. In contrast, the estimated total angler catch of northern pike was 25,700 fish (95% CI = 21,000 – 32,500 fish), while estimated total angler harvest was 1,060 fish (95% CI = 855 – 1,340 fish) or 2,618 kg (95% CI = 2,114 – 3,313 kg). TCUE reported for northern pike by sport anglers was 0.091 fish/h, while THUE was 0.004 fish/h.

Data collected as part of this survey will be used by fisheries managers to revise management regulations for the walleye and northern pike sport fisheries at Lesser Slave Lake.

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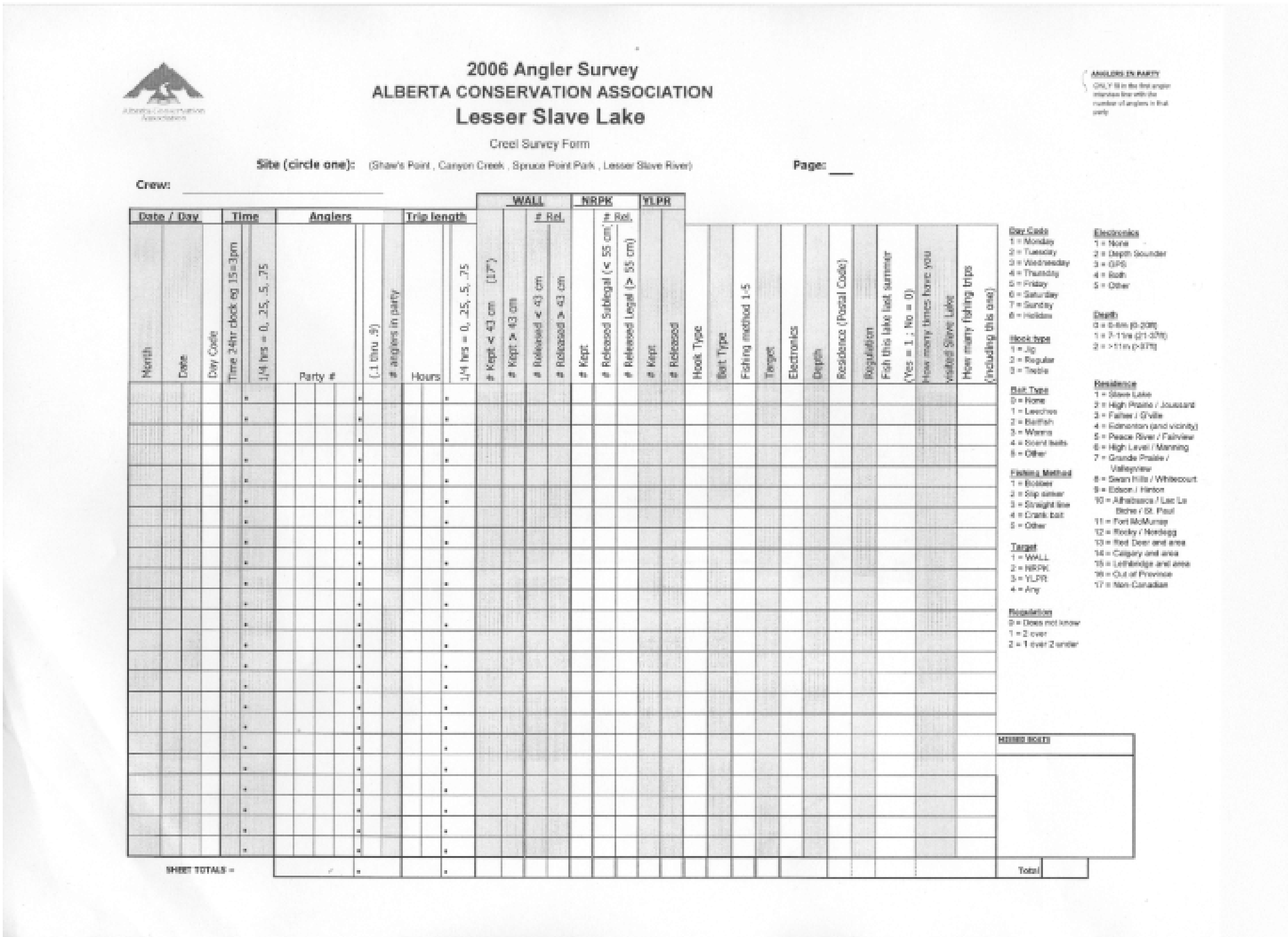
6.0 APPENDICES

Appendix 1. Example of a creel survey data form.



2006 Angler Survey
ALBERTA CONSERVATION ASSOCIATION
Lesser Slave Lake

Creel Survey Form

Site (circle one): (Shaw's Point , Canyon Creek , Spruce Point Park , Lesser Slave River)

Page: ___

Crew: ______

ANGLERS IN PARTY
ONLY fill in the first angler interview line with the number of anglers in that party

Date / Day			Time		Anglers			Trip length		WALL		# Rel.		NRPK	# Rel.		YLPR													
Month	Date	Day Code	Time 24hr clock eg 15=3pm	1/4 hrs = 0, .25, .5, .75	Party #	(.1 thru .9)	# anglers in party	Hours	1/4 hrs = 0, .25, .5, .75	# Kept < 43 cm (17")	# Kept > 43 cm	# Released < 43 cm	# Released > 43 cm	# Kept	# Released Sublegal (< 55 cm)	# Released Legal (> 55 cm)	# Kept	# Released	Hook Type	Bait Type	Fishing method 1-5	Target	Electronics	Depth	Residence (Postal Code)	Regulation	Fish this lake last summer (Yes = 1 ; No = 0)	How many times have you visited Slave Lake	How many fishing trips (including this one)

SHEET TOTALS =

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

Hook type
1 = Jig
2 = Regular
3 = Treble

Bait Type
0 = None
1 = Leeches
2 = Baitfish
3 = Worms
4 = Scent baits
5 = Other

Fishing Method
1 = Bobber
2 = Slip sinker
3 = Straight line
4 = Crank bait
5 = Other

Target
1 = WALL
2 = NRPK
3 = YLPR
4 = Any

Regulation
0 = Does not know
1 = 2 over
2 = 1 over 2 under

Electronics
1 = None
2 = Depth Sounder
3 = GPS
4 = Both
5 = Other

Depth
0 = 0-6m (0-20ft)
1 = 7-11m (21-37ft)
2 = >11m (>37ft)

Residence
1 = Slave Lake
2 = High Prairie / Joussard
3 = Falher / G'ville
4 = Edmonton (and vicinity)
5 = Peace River / Fairview
6 = High Level / Manning
7 = Grande Prairie / Valleyview
8 = Swan Hills / Whitecourt
9 = Edson / Hinton
10 = Athabasca / Lac La Biche / St. Paul
11 = Fort McMurray
12 = Rocky / Nordegg
13 = Red Deer and area
14 = Calgary and area
15 = Lethbridge and area
16 = Out of Province
17 = Non-Canadian

MISSED BOATS

Total

Appendix 2. Daily summaries of observed walleye and northern pike sport fishery parameters from Canyon Creek, Lesser Slave Lake, 2005.

Launch	Anglers/Effort					WALL						NRPK					
	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	#Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**490**	**55**	**1259**	**3471**	**13548**	**1467**	**7047**	**5034**	**-**	**-**	**281**	**10**	**192**	**79**	**-**	**-**
Canyon Creek	27-May	4	0	10	26	24	2	20	2	0.077	0.923	1	0	0	0	0.000	0.038
	28-May	6	1	16	51	33	6	12	15	0.118	0.647	1	1	0	0	0.020	0.020
	29-May	3	0	10	18	0	0	0	0	0.000	0.000	2	1	2	0	0.056	0.111
	30-May	2	0	7	17.5	24	4	5	15	0.229	1.371	1	0	1	0	0.000	0.057
	31-May	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	15-Jun	2	0	5	13.5	20	5	9	6	0.370	1.481	0	0	0	0	0.000	0.000
	16-Jun	4	1	12	34	117	22	58	37	0.647	3.441	4	0	2	2	0.000	0.118
	17-Jun	10	1	27	70.5	188	37	103	48	0.525	2.667	3	0	3	0	0.000	0.043
	18-Jun	12	2	36	108	369	44	186	139	0.407	3.417	9	3	3	3	0.028	0.083
	19-Jun	10	0	32	86.5	256	31	106	119	0.358	2.960	7	2	2	3	0.023	0.081
	24-Jun	14	4	26	76.75	408	26	232	150	0.339	5.316	2	0	2	0	0.000	0.026
	25-Jun	24	3	56	168.25	890	74	479	337	0.440	5.290	4	0	3	1	0.000	0.024
	26-Jun	40	9	100	267	1447	125	762	560	0.468	5.419	47	0	29	18	0.000	0.176
	27-Jun	22	3	48	174	1525	59	546	920	0.339	8.764	23	0	16	7	0.000	0.132
	28-Jun	22	2	44	182.5	1135	46	498	591	0.252	6.219	23	0	21	2	0.000	0.126
	8-Jul	13	2	30	55.5	282	34	220	28	0.613	5.081	4	0	4	0	0.000	0.072
	9-Jul	28	1	84	183	681	88	294	299	0.481	3.721	4	0	2	2	0.000	0.022
	10-Jul	41	0	111	276.25	1151	128	637	386	0.463	4.167	17	1	10	6	0.004	0.062
	11-Jul	0	1	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	12-Jul	0	1	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	27-Jul	10	1	22	72	231	23	133	75	0.319	3.208	11	0	8	3	0.000	0.153
	28-Jul	12	1	31	114	555	54	302	199	0.474	4.868	12	0	8	4	0.000	0.105

Appendix 2. Continued.

Launch	Anglers/Effort					WALL						NRPK					
	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	#Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**490**	**55**	**1259**	**3471**	**13548**	**1467**	**7047**	**5034**	**-**	**-**	**281**	**10**	**192**	**79**	**-**	**-**
Canyon Creek	29-Jul	21	1	47	105.5	418	46	264	108	0.436	3.962	5	0	5	0	0.000	0.047
	30-Jul	41	5	113	294	784	122	503	159	0.415	2.667	11	0	10	1	0.000	0.037
	31-Jul	30	5	84	259	1070	139	577	354	0.537	4.131	28	2	17	9	0.008	0.108
	1-Aug	3	1	8	12	65	6	33	26	0.500	5.417	0	0	0	0	0.000	0.000
	5-Aug	5	1	8	14	24	10	12	2	0.714	1.714	0	0	0	0	0.000	0.000
	6-Aug	17	2	44	134	254	52	183	19	0.388	1.896	6	0	5	1	0.000	0.045
	7-Aug	11	1	28	54.75	119	35	75	9	0.639	2.174	8	0	7	1	0.000	0.146
	8-Aug	11	0	33	65.5	108	32	61	15	0.489	1.649	5	0	2	3	0.000	0.076
	9-Aug	8	0	22	42	137	12	69	56	0.286	3.262	4	0	2	2	0.000	0.095
	24-Aug	7	1	19	58.5	123	31	86	6	0.530	2.103	2	0	2	0	0.000	0.034
	25-Aug	19	1	49	155.5	364	52	197	115	0.334	2.341	10	0	8	2	0.000	0.064
	26-Aug	16	2	38	116	307	38	157	112	0.328	2.647	3	0	0	3	0.000	0.026
	27-Aug	22	2	59	166	439	84	228	127	0.506	2.645	24	0	18	6	0.000	0.145

Appendix 3. Daily summaries of observed walleye and northern pike sport fishery parameters from Lesser Slave River (Norm's Walleye Camp), Lesser Slave Lake, 2005.

		Anglers/Effort				WALL						NRPK					
Launch	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**694**	**74**	**1688**	**5515**	**18693**	**1286**	**10903**	**6504**	**-**	**-**	**655**	**32**	**425**	**198**	**-**	**-**
LSR	20-May	7	0	12	18.75	2	1	0	1	0.053	0.107	4	1	2	1	0.053	0.213
	21-May	13	2	35	52	61	7	49	5	0.135	1.173	5	3	1	1	0.058	0.096
	22-May	24	1	62	162	81	11	51	19	0.068	0.500	11	2	7	2	0.012	0.068
	23-May	3	0	7	27	26	1	25	0	0.037	0.963	0	0	0	0	0.000	0.000
	1-Jun	10	0	20	49.5	98	14	46	38	0.283	1.980	20	1	6	13	0.020	0.404
	2-Jun	7	0	12	32.5	45	9	29	7	0.277	1.385	2	0	0	2	0.000	0.062
	3-Jun	13	1	37	97.5	271	23	143	105	0.236	2.779	10	2	5	3	0.021	0.103
	4-Jun	18	1	43	142	270	25	142	103	0.176	1.901	68	9	47	12	0.063	0.479
	5-Jun	26	6	63	167	227	34	115	78	0.204	1.359	20	0	16	4	0.000	0.120
	10-Jun	26	2	68	157.25	695	53	495	147	0.337	4.420	12	3	7	2	0.019	0.076
	11-Jun	18	1	49	129	643	42	413	188	0.326	4.984	21	2	15	4	0.016	0.163
	12-Jun	9	1	18	40	163	12	119	32	0.300	4.075	0	0	0	0	0.000	0.000
	13-Jun	7	1	16	52.5	383	12	315	56	0.229	7.295	2	0	1	1	0.000	0.038
	14-Jun	16	5	40	98.5	531	22	353	156	0.223	5.391	7	0	5	2	0.000	0.071
	29-Jun	69	10	173	698.5	3135	182	1477	1476	0.261	4.440	81	1	39	41	0.001	0.116
	30-Jun	41	7	87	359.5	1825	91	1009	725	0.253	5.076	30	0	17	13	0.000	0.083
	1-Jul	68	1	164	944.5	4921	99	2496	2326	0.105	5.151	101	0	59	42	0.000	0.107
	2-Jul	17	3	39	221	1124	18	702	404	0.081	5.086	21	0	15	6	0.000	0.095
	3-Jul	13	5	43	123	253	42	168	43	3.907	2.057	6	1	5	0	1.976	0.506
	13-Jul	13	3	57	160.5	441	75	306	60	0.467	2.748	16	2	11	3	0.012	0.100
	14-Jul	23	0	24	29	69	11	54	4	0.379	2.379	1	0	1	0	0.000	0.034
	15-Jul	8	2	59	139	550	71	347	132	0.511	3.957	9	1	7	1	0.007	0.065

Appendix 3. Continued.

Launch	Date	Anglers/Effort				WALL						NRPK					
		Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**694**	**74**	**1688**	**5515**	**18693**	**1286**	**10903**	**6504**	**-**	**-**	**655**	**32**	**425**	**198**	**-**	**-**
LSR	16-Jul	26	0	51	144.25	651	57	507	87	0.395	4.513	17	0	16	1	0.000	0.118
	17-Jul	21	4	80	279.5	832	97	609	126	0.347	2.977	35	0	25	10	0.000	0.125
	22-Jul	30	4	46	124	252	43	169	40	0.347	2.032	19	0	9	10	0.000	0.153
	23-Jul	18	0	12	26.5	22	2	19	1	0.075	0.830	3	0	3	0	0.000	0.113
	24-Jul	6	0	20	65.75	55	16	34	5	0.243	0.837	18	0	13	5	0.000	0.274
	25-Jul	10	2	64	159.75	151	31	100	20	0.194	0.945	18	0	12	6	0.000	0.113
	26-Jul	24	2	81	249.75	460	60	328	72	0.240	1.842	46	0	39	7	0.000	0.184
	10-Aug	33	0	29	95	126	25	95	6	0.263	1.326	13	0	12	1	0.000	0.137
	11-Aug	12	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	12-Aug	10	1	29	104	70	18	48	4	0.173	0.673	6	1	5	0	0.010	0.058
	13-Aug	5	1	11	28	18	2	16	0	0.071	0.643	0	0	0	0	0.000	0.000
	14-Aug	1	1	3	12	11	4	6	1	0.333	0.917	1	0	1	0	0.000	0.083
	19-Aug	15	1	40	105.5	94	23	52	19	0.218	0.891	13	3	9	1	0.028	0.123
	20-Aug	10	0	23	49	47	18	24	5	0.367	0.959	8	0	7	1	0.000	0.163
	21-Aug	16	5	41	110.5	81	30	41	10	0.271	0.733	10	0	7	3	0.000	0.090
	22-Aug	7	0	25	51	9	5	1	3	0.098	0.176	1	0	1	0	0.000	0.020
	23-Aug	1	1	5	10	0	0	0	0	0.000	0.000	0	0	0	0	0.000	0.000

Appendix 4. Daily summaries of observed walleye and northern pike sport fishery parameters from Shaw's Point, Lesser Slave Lake, 2005.

	Anglers/Effort					WALL						NRPK					
Launch	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**1204**	**449**	**3927**	**8610**	**23403**	**2128**	**16657**	**4618**	**-**	**-**	**863**	**42**	**657**	**164**	**-**	**-**
Shaw's	20-May	43	4	120	240.5	617	54	416	147	0.225	2.565	76	1	70	5	0.004	0.316
	21-May	66	41	229	373.5	785	116	530	139	0.311	2.102	61	0	59	2	0.000	0.163
	22-May	91	32	315	521	1900	177	1343	380	0.340	3.647	66	1	61	4	0.002	0.127
	23-May	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	1-Jun	21	1	65	181.75	876	43	541	292	0.237	4.820	31	4	16	11	0.022	0.171
	2-Jun	27	8	71	144.5	965	33	668	264	0.228	6.678	19	4	12	3	0.028	0.131
	3-Jun	34	15	92	204.75	1236	45	922	269	0.220	6.037	29	2	13	14	0.010	0.142
	4-Jun	49	15	151	321.75	1043	83	617	343	0.258	3.242	29	1	17	11	0.003	0.090
	5-Jun	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	10-Jun	36	12	117	286	991	50	769	172	0.175	3.465	27	2	18	7	0.007	0.094
	11-Jun	54	17	185	460	1919	97	1390	432	0.211	4.172	29	0	25	4	0.000	0.063
	12-Jun	26	3	73	144.5	1196	50	852	294	0.346	8.277	23	2	13	8	0.014	0.159
	13-Jun	37	8	88	213.25	1463	40	1068	355	0.188	6.860	30	2	13	15	0.009	0.141
	14-Jun	40	15	114	315.75	2090	57	1598	435	0.181	6.619	57	2	35	20	0.006	0.181
	29-Jun	27	11	90	210.25	533	47	436	50	0.224	2.535	28	1	21	6	0.005	0.133
	30-Jun	57	19	185	361	1118	131	862	125	0.363	3.097	13	0	11	2	0.000	0.036
	1-Jul	95	54	376	811.25	1104	166	855	83	0.205	1.361	37	1	30	6	0.001	0.046
	2-Jul	62	43	234	465.25	675	107	531	37	0.230	1.451	19	1	16	2	0.002	0.041
	3-Jul	14	5	47	78	199	19	176	4	0.244	2.551	5	0	5	0	0.000	0.064
	13-Jul	8	4	30	83.5	151	17	122	12	0.204	1.808	3	0	3	0	0.000	0.036

Appendix 4. Continued.

		Anglers/Effort				WALL						NRPK					
Launch	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**1204**	**449**	**3927**	**8610**	**23403**	**2128**	**16657**	**4618**	**-**	**-**	**863**	**42**	**657**	**164**	**-**	**-**
Shaw's	14-Jul	16	3	65	118.25	276	37	205	34	0.313	2.334	1	0	1	0	0.000	0.008
	15-Jul	22	22	71	215	488	70	265	153	0.326	2.270	21	1	18	2	0.005	0.098
	16-Jul	45	40	172	393.5	748	112	525	111	0.285	1.901	18	1	12	5	0.003	0.046
	17-Jul	24	12	77	180.5	491	45	255	191	0.249	2.720	11	1	7	3	0.006	0.061
	22-Jul	29	0	27	32.25	18	2	16	0	0.062	0.558	1	0	1	0	0.000	0.031
	23-Jul	26	2	92	183.5	124	29	93	2	0.158	0.676	11	1	9	1	0.005	0.060
	24-Jul	26	3	102	249.75	384	65	272	47	0.260	1.538	25	1	21	3	0.004	0.100
	25-Jul	22	5	67	185.75	340	44	247	49	0.237	1.830	21	2	15	4	0.011	0.113
	26-Jul	17	5	60	154.25	224	40	163	21	0.259	1.452	7	0	0	7	0.000	0.045
	10-Aug	7	0	20	62.5	153	14	96	43	0.224	2.448	10	0	4	6	0.000	0.160
	11-Aug	13	2	45	87.75	34	15	18	1	0.171	0.387	6	0	5	1	0.000	0.068
	12-Aug	36	2	118	255.75	389	83	246	60	0.325	1.521	42	1	37	4	0.004	0.164
	13-Aug	18	11	58	130	103	32	63	8	0.246	0.792	7	0	7	0	0.000	0.054
	14-Aug	28	7	86	189.5	243	62	170	11	0.327	1.282	26	5	21	0	0.026	0.137
	19-Aug	2	0	6	7	4	0	4	0	0.000	0.571	0	0	0	0	0.000	0.000
	20-Aug	46	8	151	359.25	278	89	168	21	0.248	0.774	40	2	35	3	0.006	0.111
	21-Aug	25	17	78	222	68	22	44	2	0.099	0.306	12	1	11	0	0.005	0.054
	22-Aug	8	2	22	58	116	10	75	31	0.172	2.000	18	2	13	3	0.034	0.310
	23-Aug	7	1	28	109	61	25	36	0	0.229	0.560	4	0	2	2	0.000	0.037

Appendix 5. Daily summaries of observed walleye and northern pike sport fishery parameters from Spruce Point Park, Lesser Slave Lake, 2005.

		Anglers/Effort				WALL						NRPK					
Launch	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**978**	**416**	**3102**	**7768**	**21072**	**2493**	**14933**	**3646**	**-**	**-**	**513**	**19**	**388**	**106**	**-**	**-**
SPP	30-May	5	0	10	28.5	26	9	11	6	0.316	0.912	1	0	1	0	0.000	0.035
	31-May	6	0	11	26	69	6	54	9	0.231	2.654	7	0	6	1	0.000	0.269
	15-Jun	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	16-Jun	35	19	103	341	919	108	645	166	0.317	2.695	22	0	21	1	0.000	0.065
	28-Jun	27	6	82	187	630	70	508	52	0.374	3.369	12	0	12	0	0.000	0.064
	11-Jul	45	20	146	351.5	1412	101	1136	175	0.287	4.017	17	0	13	4	0.000	0.048
	12-Jul	36	23	117	237.25	786	86	574	126	0.362	3.313	10	1	8	1	0.004	0.042
	27-Jul	15	8	53	154	343	53	237	53	0.344	2.227	12	1	3	8	0.006	0.078
	28-Jul	31	8	93	244	531	69	363	99	0.283	2.176	15	1	7	7	0.004	0.061
	8-Aug	18	1	56	123.5	110	28	72	10	0.227	0.891	7	0	4	3	0.000	0.057
	9-Aug	12	6	54	152.5	20	1	18	1	0.007	0.131	2	0	0	2	0.000	0.013
	24-Aug	8	0	25	61	57	6	41	10	0.098	0.934	4	0	3	1	0.000	0.066
	25-Aug	9	2	27	84	99	26	62	11	0.310	1.179	19	1	14	4	0.012	0.226
	27-May	18	0	51	114	184	36	80	68	0.316	1.614	1	0	0	1	0.000	0.009
	28-May	41	0	115	265.25	585	75	330	180	0.283	2.205	26	0	18	8	0.000	0.098
	29-May	26	2	74	182.5	383	56	258	69	0.307	2.099	24	0	23	1	0.000	0.132
	17-Jun	57	29	175	387.5	2030	200	1405	425	0.516	5.239	13	3	9	1	0.008	0.034
	18-Jun	65	74	234	689	1708	232	1009	467	0.337	2.479	41	2	33	6	0.003	0.060
	19-Jun	12	27	40	71	176	30	114	32	0.423	2.479	9	2	7	0	0.028	0.127
	24-Jun	43	12	125	354	1188	109	968	111	0.308	3.356	27	0	26	1	0.000	0.076
	25-Jun	68	28	214	513	2286	173	1837	276	0.337	4.456	38	0	29	9	0.000	0.074
	26-Jun	65	19	198	472.5	1373	164	939	270	0.347	2.906	25	1	19	5	0.002	0.053

Appendix 5. Continued.

Launch	Anglers/Effort					WALL						NRPK					
	Date	Groups	Groups Missed	# Anglers	Effort (hours)	Total Caught	Total Kept	# Rel <43	#Rel >43	Daily HPUE	Daily CPUE	Total Caught	Total Kept	#Rel <55	#Rel >55	Daily HPUE	Daily CPUE
	TOTALS	**978**	**416**	**3102**	**7768**	**21072**	**2493**	**14933**	**3646**	**-**	**-**	**513**	**19**	**388**	**106**	**-**	**-**
SPP	8-Jul	30	15	99	204	645	71	508	66	0.348	3.162	6	0	5	1	0.000	0.029
	9-Jul	21	8	78	123.5	382	45	314	23	0.364	3.093	5	0	1	4	0.000	0.040
	10-Jul	33	12	99	233	1083	106	876	101	0.455	4.648	11	3	4	4	0.013	0.047
	29-Jul	20	5	63	119	251	26	196	29	0.218	2.109	5	0	4	1	0.000	0.042
	30-Jul	68	17	230	677.25	1027	162	700	165	0.239	1.516	39	0	31	8	0.000	0.058
	31-Jul	61	21	202	569	1034	164	735	135	0.288	1.817	52	3	38	11	0.005	0.091
	5-Aug	9	1	29	38	9	0	9	0	0.000	0.237	0	0	0	0	0.000	0.000
	6-Aug	39	29	120	306.25	820	147	464	209	0.480	2.678	26	0	16	10	0.000	0.085
	7-Aug	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-
	26-Aug	28	10	85	230.5	540	76	266	198	0.330	2.343	24	0	21	3	0.000	0.104
	27-Aug	22	14	75	184.5	328	53	178	97	0.287	1.778	11	1	10	0	0.005	0.060
	28-Aug	5	0	19	44	38	5	26	7	0.114	0.864	2	0	2	0	0.000	0.045

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