

**Assessment of the Status
of the Sport Fishery for Walleye
at Skeleton Lake, 1997.**

Conducted as part of the
Walleye Monitoring Program
(Project No. H96010)

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March, 1998.

ABSTRACT

To recover or maintain Alberta's walleye fisheries, a new walleye management strategy was implemented in 1996. In 1996, the walleye fishery at Skeleton Lake was classified as a stocked walleye fishery and a zero (0) daily bag limit was implemented. In order to monitor the status of the walleye fishery at Skeleton Lake, a creel survey was conducted during May to August 1997. Since the last creel survey conducted in 1985, the estimated number of anglers had declined 93% from 5349 to 387 anglers. Angler effort declined, by 93% from 14.5 angler-hours / ha to 0.95 angler-hours / ha. No walleye were reported caught in 145 hours of angling.

Only 3 age-classes of walleye were sampled by the test fishery. The age 3 walleye are possibly recruits from the most recent stocking in 1991. The density of age 3 walleye is less than the density of mature fish.

Skeleton Lake is a stocked walleye fishery. Historically, Skeleton Lake supported only a moderate walleye fishery. The potential for this fishery to recover to historical levels is very low.

Based on the criteria used to classify walleye stocks in Alberta, the absence of walleye in the sport-fishery sample and the historical information the walleye population in Skeleton Lake should retain the classification of "collapsed".

ACKNOWLEDGEMENTS

The creel survey attendants at Skeleton Lake, Jason Cooper and Chad Tourand, deserve full credit for the success of this study, and for their commitment to the gathering of test fishery data. The antagonistic and moody caretakers of the Shoreline Camping and Fishing Resort made Jason's and Chad's summer somewhat memorable. The survey would have suffered if it were not for their good nature and patience.

The Alberta Conservation Association (ACA) would like to acknowledge the co-operation from Alberta Environmental Protection, Natural Resources Service (NRS), Northeast Boreal Region, Fisheries Management Section staff that was received throughout the course of the survey. The assistance from NRS staff and the use of NRS equipment is greatly appreciated.

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INTRODUCTION

Walleye (*Stizostedion vitreum*) populations in Alberta have been subjected to heavy fishing pressure for many years. Most populations show signs of over-harvest, with some experiencing significant declines. Previous management strategies have focused on province-wide regulations designed to manage the walleye harvest at an average fishery. Fisheries receiving heavier than average exploitation have not been adequately protected with these regulations and consequently many have declined or collapsed. To recover these fisheries and to maintain the stable fisheries, a new walleye management strategy was implemented in 1996 (Berry 1995). This strategy requires that each walleye population is evaluated as to its degree of exploitation and is then placed in one of these categories: collapsed, vulnerable, or stable. The fishery is assigned a standard sport fishing regulation based on this status (Sullivan 1994). In early 1996, the walleye fishery at Skeleton Lake was assigned a collapsed status. A zero (0) daily bag limit on walleye was therefore implemented at the fishery.

This report describes the creel survey conducted at Skeleton Lake during the summer of 1997. The purpose of the survey was to monitor the walleye sport fishery and verify the status of the population and fishery

METHODS

Study Site Description

Skeleton Lake (TWP 63, RNG 18, W4M) is approximately 10 km east of the town of Boyle. Skeleton Lake has a surface area of 766 hectares and a maximum depth of 17 metres. The shoreline is heavily developed with numerous cottage sub-divisions. The trophic status of Skeleton Lake is hypereutrophic. Skeleton Lake is in the Athabasca River Basin. A more complete description of the physical, chemical and biological characteristics may be found in Mitchell and Prepas (1990).

Methods of Study

One creel survey crew (two technicians) collected information from both Skeleton Lake and Baptiste Lake between 17 May - 17 August 1997. At Skeleton Lake, the crew was stationed at the Shoreline Camping and Fishing Resort. A schedule of 5 survey days at Skeleton Lake

(Wednesdays through Sundays) was preceded by 5 survey days (Fridays through Tuesdays) at the alternate site (Baptiste Lake). This cycle was repeated 7 times during the study.

The survey technicians interviewed each angler returning to the survey site during all survey days (24 h survey). Anglers were approached and asked a series of questions concerning their time spent angling, the numbers of each species caught or released, species sought, their gear types, and their use of electronic equipment. A subjective evaluation of their skill level was also made. Children and anglers with little equipment, knowledge or seriousness were considered to be novice anglers. Professional anglers demonstrated clear superiority in equipment and knowledge (and usually had their sponsors emblazoned on their hats, coats and boats). All other anglers were classified as having a moderate skill.

As time permitted during the survey period, sport fish retained by anglers were sampled for biological information. The fork length of each fish was recorded to the nearest millimetre; the weight was recorded to the nearest ten grams; and one or more skeletal structures were removed to determine the age of the fish. For this purpose, the left pelvic fin and operculum of walleye, the left cleithrum of northern pike (*Esox lucius*), and the operculum and or anal fin of yellow perch (*Perca flavescens*) were collected. Ages were determined following Mackay *et al.* (1990). Sex and state of maturity of each fish was determined following Olynyk (1980). Stomach contents were removed and classified as to number and species of vertebrates, and approximate number and order of invertebrates. The complete biological data set for walleye is reported in this study. The biological data sets for other species are partially reported in the Appendices, with the full data set stored in the Alberta Conservation Association (ACA) Fisheries Section and the Alberta Natural Resources Service (NRS), Fisheries Management Branch files, Edmonton Metropolitan office.

An angling test-fishery was used to collect additional information regarding the size frequency distribution of walleye in the population. Data from sport-harvested walleye could not provide this information, due to the zero (0) daily bag limit for walleye at this lake. Creel survey technicians, volunteer anglers, and fisheries staff participated in the collection of this data. Test fisheries occurred during creel survey days from 17 May to 17 August 1997. The test fishery catch rate (CUE) was not used in the calculation of angler effort and the CUEs for both fisheries are in no way related.

All field data were recorded in pencil on field data forms (Appendix 6). Data were transcribed into computer files (Lotus 1-2-3 format) by commercial keypunch services using double entry verification. Prior to analysis, all data were again subjected to verification procedures. These involved calculating frequency distributions of all creel survey parameters

and using field diaries and notes to verify outlying values. Biological samples were verified by plotting weight measurements against the dependent variable of length, and length measurements against the dependent variable of age. Outlying values were investigated and eliminated if measurement error was suspected.

To determine sport fishery parameters specific to the creel survey site, the following procedure was used:

- creel data categories (i.e. # anglers, # hours fishing, # walleye harvested) were separated into daily weekday totals. Weekdays included Monday (day 1) through Thursday (day 4). Weekends included Friday (day 5) through Sunday (day 7) and long weekends (day 8) either on a Monday or a Friday.
- totals, means and standard deviations of # anglers / weekdays, # hours / weekdays and # walleye harvested / weekdays were calculated using Lotus 123 @functions: total (@SUM), mean (@AVG), and standard deviation (@STD). Standard error (SE) for each category was calculated by ($\text{@STD of each category} / (\text{@SQRT (n days surveyed)})$).
- to estimate parameters for days NOT surveyed, the above means and SE of those categories were multiplied by the # weekdays not surveyed and added to the observed parameters.
- the same procedure was used for weekend days.
- estimated # anglers, # hours fishing and # walleye harvested for weekdays and weekend days were added for total estimates.
- variances of these estimates were combined following Pollock et al. (1994) for stratified sampling, by adding the separate estimates of variances.
- 95% confidence intervals for estimated # anglers, # angling hours and # walleye harvested were calculated using $t_{0.05(df)} \times \text{SE}$.

At many surveyed lakes, anglers could access the lake from sites other than the creel survey site. In these instances, an estimate of the total use of the fishery was extrapolated from the proportion of angler numbers using the creel survey site compared to those observed during entire-lake surveys. These entire-lake surveys were conducted on several occasions and consisted of driving a boat over the entire lake and interviewing all anglers encountered. Angler use estimates for this survey were based on entire-lake surveys conducted in 1985. Total use estimators of the fishery were then calculated by simple extrapolation. Variances of these combined estimates were calculated following Pollock et al. (1994).

All statistical analyses and graphics were done on an IBM - type personal computer (Intel Pentium, 133 MHz) using Lotus 1-2-3 Release 5 and Microsoft Office '97. All frequency

analysis was conducted using Microsoft Office '97 (Excel spreadsheet). All data and analyses are stored in spreadsheet format on the ACA / NRS Edmonton Metropolitan office Fisheries computers and on Iomega Zip 100 MB disk cartridges.

RESULTS

Angler Survey

During 17 May - 17 August 1997, 75 anglers were interviewed (Table 1 and Appendix 1). (Appendix 1). Based on the entire-lake surveys (Appendix 1.6), the creel survey site received 41% of the total angler effort. The total number of anglers was estimated at 387, with an estimated effort of 0.95 angler-hours / ha (Table 2). No walleye were reported released in 145 hours of angling, suggesting a release rate of <0.007 fish / h. The test fishery sampled 14 walleye in 150.5 hours of angling (Table 3 and Figure 1). Biological samples were collected from 8 pike (Appendix 2), and 21 perch (Appendix 3).

Table 1. Observed catch rates of anglers; Skeleton Lake, 1985 and 1997.

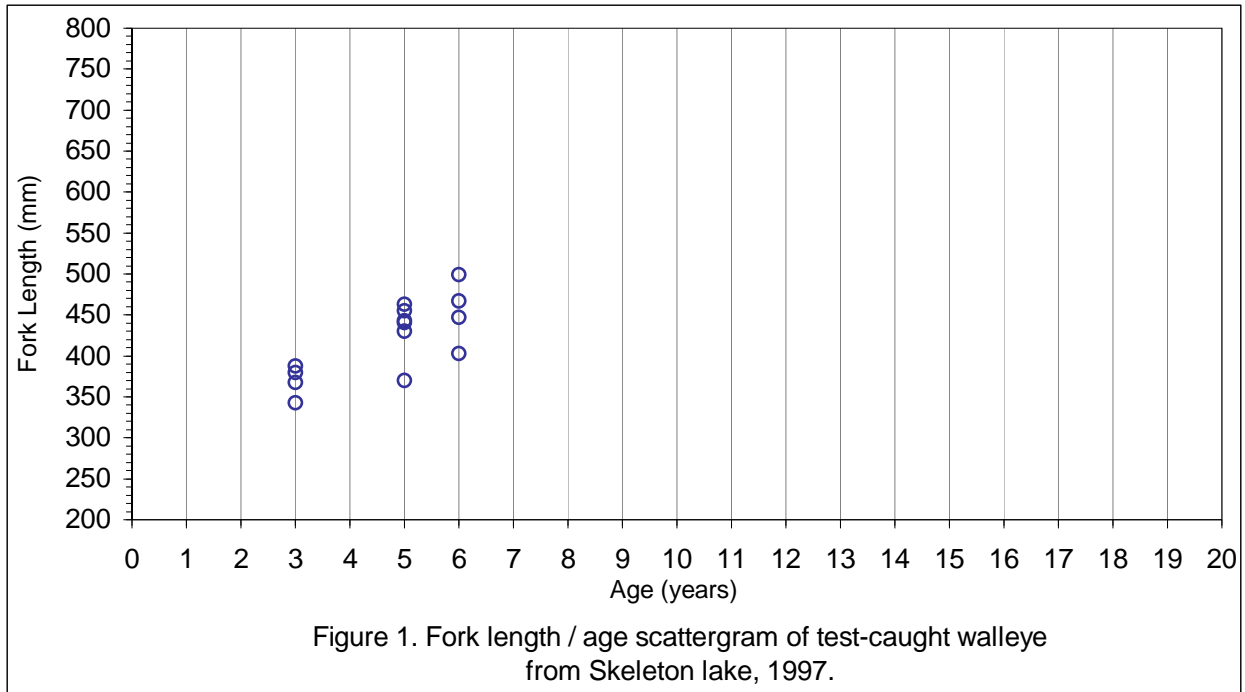
CREEL DATA	1985	1997
# days surveyed	71	37
# anglers interviewed	1886	75
# angling hours reported	3925	145
# angling hours estimated	11 131	727.2
WALLEYE DATA		
Walleye kept / angler-hour (HCUE)	0.0005	N/A
Walleye rel. (<38 cm TL) / angler-hour	N/A	0.0
Walleye rel. (>38 cm TL) / angler-hour	N/A	N/A
Walleye rel. (38 - 50 cm TL) / angler-hour	N/A	0.0
Walleye rel. (>50 cm TL) / angler-hour	N/A	0.0
Total walleye rel. / angler-hour	0.0008	<0.007
NORTHERN PIKE DATA		
Pike kept / angler-hour	0.157	0.131
Pike rel. (<50 cm TL) / angler-hour	N/A	0.11
Pike rel. (>50 cm TL) / angler-hour	N/A	0.028
Total pike rel. / angler-hour	0.099	0.138
YELLOW PERCH DATA		
Perch kept / angler-hour	0.535	0.145
Perch rel. (<20 cm TL) / angler-hour	N/A	0.61
Perch rel. (>20 cm TL) / angler-hour	N/A	0.0
Total perch rel. / angler-hour	0.508	0.61

Table 2. Angler survey summary; Skeleton Lake, 1985 and 1997.

PARAMETER	1985 EST.	REPORTED (1997)	ESTIMATED (1997)
# Anglers	5 349	75	387 (+-42.6%)
# Hours	11 131	145	727.2 (+-45.9%)
Hours / hectare	14.5	0.19	0.95 (+-45.9%)
# walleye harvested	Approx. 10	N/A	N/A

Table 3. Biological data from test-caught walleye; Skeleton Lake, 1997.

Sample #	Fork Length (mm)	Age (years)	Month	Day
1	441	5	June	5
2	370	5	June	6
3	447	6	June	7
4	443	5	June	7
5	455	5	June	7
6	343	3	June	7
7	499	6	June	21
8	403	6	June	21
9	368	3	June	21
10	388	3	June	21
11	463	5	June	21
12	380	3	June	21
13	430	5	July	3
14	467	6	July	3



Status of the Walleye Fishery

No walleye were reported caught by the sport-fishery in over 145 hours of angling. Only 14 walleye were sampled by the test-fishery in 150.5 hours of angling. The observed sport-catch rates on walleye are indicative of a walleye stock with a collapsed status.

The age 6 walleye are possibly from the stocking of walleye fry in 1991. The age 3 walleye may have been produced by these age 6 walleye. In this case, the age-at-maturity would be 3 years, which is extremely young. If the earlier stocking of walleye fry in 1988 produced these age 3 walleye, the age-at-maturity would be 6 years, which is still very young. The index of growth of stocked walleye was exceptionally fast (40 cm fork length in 3 years).

Historical information indicates that Skeleton Lake once supported a moderate walleye population (Valastin and Sullivan 1996). The survey results and historical information indicate that the walleye population in Skeleton Lake is collapsed, and possibly near extirpation.

DISCUSSION

Based on the criteria used to classify walleye stocks in Alberta the walleye population in Skeleton Lake is collapsed. No walleye were reported caught in 145 hours of sport-fishing. Age at maturity is possibly very young and the index of growth is severely accelerated.

The angling effort between 1985 and 1997 declined dramatically. Historical survey reports that Skeleton Lake once supported a native population of walleye and that this sporadic fishery declined during the early years of fishing pressure. By 1985, The sport fishery for walleye had completely collapsed (Sullivan 1987).

In 1989, a province-wide regulation modification reduced bag limits from 5 to 3 walleye per day and a 38 cm TL size limit was imposed. These regulations have been ineffective in preventing the continued collapse and possibly the extirpation of walleye at Skeleton Lake. Skeleton Lake's regulation category should be updated to reflect it's status; Skeleton Lake should be categorized as a collapsed walleye fishery rather than a stocked walleye fishery. The existing regulation of a zero (0) daily bag limit will not change. The potential for this fishery to recover to historical levels is very low.

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APPENDICES

Appendix 1.1. Daily summary of angler survey data. [Skeleton Lake, 1997]

DATE	# Anglers	# Hours	# WALL Released <38 cm TL	# WALL Released 38 - 50 cm TL	# WALL Released >50 cm TL	# NRPK Kept	# NRPK Released < 50 cm TL	# NRPK Released > 50 cm TL	# YLPR Kept	# YLPR Released < 20 cm TL	# YLPR Released > 20 cm TL
Totals 36	75	145	0	0	0	19	16	4	21	88	0
21-May-97	0	0	0	0	0	0	0	0	0	0	0
22-May-97	2	2	0	0	0	0	0	0	0	0	0
23-May-97	0	0	0	0	0	0	0	0	0	0	0
24-May-97	2	2	0	0	0	0	0	1	0	0	0
25-May-97	0	0	0	0	0	0	0	0	0	0	0
4-Jun-97	0	0	0	0	0	0	0	0	0	0	0
5-Jun-97	2	2	0	0	0	0	0	0	0	0	0
6-Jun-97	0	0	0	0	0	0	0	0	0	0	0
7-Jun-97	6	7.5	0	0	0	2	2	0	0	0	0
8-Jun-97	0	0	0	0	0	0	0	0	0	0	0
18-Jun-97	0	0	0	0	0	0	0	0	0	0	0
19-Jun-97	0	0	0	0	0	0	0	0	0	0	0
20-Jun-97	0	0	0	0	0	0	0	0	0	0	0
21-Jun-97	0	0	0	0	0	0	0	0	0	0	0
22-Jun-97	0	0	0	0	0	0	0	0	0	0	0
2-Jul-97	0	0	0	0	0	0	0	0	0	0	0
3-Jul-97	0	0	0	0	0	0	0	0	0	0	0
4-Jul-97	3	3	0	0	0	0	0	0	0	0	0
5-Jul-97	14	37.5	0	0	0	7	4	3	0	0	0
6-Jul-97	0	0	0	0	0	0	0	0	0	0	0
16-Jul-97	0	0	0	0	0	0	0	0	0	0	0
17-Jul-97	0	0	0	0	0	0	0	0	0	0	0
18-Jul-97	0	0	0	0	0	0	0	0	0	0	0
19-Jul-97	13	30	0	0	0	4	4	0	0	0	0
20-Jul-97	0	0	0	0	0	0	0	0	0	0	0
30-Jul-97	0	0	0	0	0	0	0	0	0	0	0
31-Jul-97	3	3	0	0	0	0	0	0	0	0	0
1-Aug-97	6	11	0	0	0	0	0	0	21	60	0
2-Aug-97	14	35	0	0	0	6	6	0	0	28	0
3-Aug-97	8	10	0	0	0	0	0	0	0	0	0
4-Aug-97	2	2	0	0	0	0	0	0	0	0	0
13-Aug-97	0	0	0	0	0	0	0	0	0	0	0
14-Aug-97	0	0	0	0	0	0	0	0	0	0	0
15-Aug-97	0	0	0	0	0	0	0	0	0	0	0
16-Aug-97	0	0	0	0	0	0	0	0	0	0	0
17-Aug-97	0	0	0	0	0	0	0	0	0	0	0

Appendix 1.2. Methods of anglers and catch statistics for walleye.
[Skeleton Lake, 1997]

METHOD	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Artificial	55	80.9	103	0	0.000
Commercial Baitfish	0	0.0	0	0	
Seined Baitfish	0	0.0	0	0	
Leeches	9	13.2	22	0	0.000
Dewworms	0	0.0	0	0	
Scent baits	0	0.0	0	0	
Miscellaneous	4	5.9	8	0	0.000
TOTALS	68	100.0	133	0	

Appendix 1.3. Skill level of anglers and catch statistics for walleye. [Skeleton Lake, 1997]

SKILL	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Novice	38	53.5	68.5	0	0.000
Average	33	46.5	69.5	0	0.000
Professional	0	0.0	0	0	
TOTALS	71	100	138	0	

Appendix 1.4. Target species of anglers and catch statistics for walleye. [Skeleton Lake, 1997]

TARGET	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Walleye	0	0.0	0	0	
Northern Pike	11	15.9	27.5	0	0.000
Yellow Perch	4	5.8	8	0	0.000
Any species	54	78.3	96.5	0	0.000
TOTALS	69	100	132	0	

Appendix 1.5. Angler use of electronic gear and catch statistics for walleye. [Skeleton Lake, 1997]

ELECTRONICS	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
None	45	63.4	89.5	0	0.000
Depth Sounder	26	36.6	50.5	0	0.000
G.P.S.	0	0.0	0	0	
Depth Sounder + G.P.S.	0	0.0	0	0	
Other	0	0.0	0	0	
TOTALS	71	100	140	0	

Appendix 1.6. Summary of entire lake surveys; Skeleton Lake, 1985.

Date	# Anglers Surveyed	# Anglers Using Survey Site	Ratio of use
June 29	60	31	1.94
	42	17	2.47
	32	14	2.29
	85	31	2.74
July 6	21	6	3.5
	27	12	2.25
	47	23	2.04
July 14	48	12	4.0
July 27	78	49	1.59
	57	30	1.9
August 18	31	16	1.94
	Mean Ratio = 2.42	SE = 0.221	n = 11

Appendix 2. Biological data from sport-caught pike. [Skeleton Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (yrs)	Sex 1 = immature 3 = mature female 8 = mature male	Month	Day
mean =	512.0	1010.0	5.1			
1	428	550	2	1	6	7
2	571	1200	6	3	6	7
3	575		6	3	7	5
4	544		6	8	7	5
5	445		5	8	7	5
6	435	650	2	3	7	19
7	458	700	4	3	7	19
8	640	1950	10	3	7	19

Appendix 3. Biological data from sport-caught perch. [Skeleton Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (yrs)	Sex 1 = immature 3 = mature female 8 = mature male	Month	Day
mean =	181.7		3.0			
1	178		3		8	1
2	190		3		8	1
3	176		3	1	8	1
4	190		3		8	1
5	183		3		8	1
6	175		3	1	8	1
7	194		3		8	1
8	170		3	3	8	1
9	173		3	1	8	1
10	181		3	1	8	1
11	197		3		8	1
12	188		3		8	1
13	181		3	1	8	1
14	186		3	1	8	1
15	184		3	1	8	1
16	187		3	1	8	1
17	190		3	1	8	1
18	179		3		8	1
19	166		3		8	1
20	170		3		8	1
21	177		3		8	1

Appendix 4. Creel survey form. [Skeleton Lake, 1997]