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

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

Prepared by

Bill Patterson,
Fisheries Section,
Northeast Boreal Region,
Alberta Conservation Association

and

M. G. Sullivan,
Fisheries Section,
Natural Resources Service,
Alberta Environmental Protection

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 Vincent 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 Vincent Lake, a creel survey was conducted during May to August 1997. The approximate number of anglers was 3368. The approximate angler effort was 8.6 angler-hours. There was no angler harvest of walleye. The corrected release rate for walleye was 0.074 fish / hr.

Historical and anecdotal information indicates walleye are not native to Vincent Lake. Walleye were stocked into Vincent Lake in 1951, 1958, 1990, 1991 and 1992. A creel census in 1982 - 1983 and the 1997 survey suggest that the stocked walleye have naturalized.

Based on the criteria used to classify walleye stocks in Alberta the walleye in Vincent Lake should retain the classification of “stocked”. The regulation recommended in Alberta's walleye management strategy for a stocked walleye fishery is catch and release (0 daily bag limit) for walleye.

ACKNOWLEDGEMENTS

The creel survey attendants at Vincent Lake, Keith Tachuk and Leanne Boykiw, performed very well in conducting this study. The luxurious amenities of the Westcove Recreation Area made up for the long walks between their campsite and the boat launch and day-use areas. Their endurance and their inconvenience are certainly appreciated.

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.

TABLE OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iv
LIST OF FIGURES	iv
LIST OF APPENDICES	iv
INTRODUCTION	1
METHODS	1
Study Site Description	1
Methods of Study	1
RESULTS	4
Angler Survey	4
Status of the Walleye Fishery	5
DISCUSSION	8
LITERATURE CITED	9
APPENDICES	10

LIST OF TABLES

Table — Page

1. Observed catch rates of anglers; Vincent Lake, 1997. 4
2. Angler survey summary; Vincent Lake, 1997. 5

LIST OF FIGURES

Figure — Page

1. Exaggeration rate of anglers from Northeast Boreal Region lakes, 1991 - 94, 1996 and 1997 6
2. Age-class histogram of test-caught walleye from Vincent Lake, 1997. 6
3. Fork length / age scattergram of test-caught walleye from Vincent Lake, 1997. 7

LIST OF APPENDICES

Appendix — Page

1. Angler survey data; Vincent Lake, 1997.
    - 1.1. Daily summary of angler survey data. 10
    - 1.2. Catch frequency distribution of released walleye. 11
    - 1.3 Methods of angling and catch statistics for walleye. 12
    - 1.4. Skill level of anglers and catch statistics for walleye. 12
    - 1.5. Target species of anglers and catch statistics for walleye. 12
    - 1.6. Angler use of electronic gear and catch statistics for walleye. 12
2. Biological data from test-caught walleye; Vincent Lake, 1997. 13
3. Biological data from sport-caught pike; Vincent Lake, 1997. 15
4. Biological data from sport-caught perch; Vincent Lake, 1997. 16
5. Creel survey form; Vincent Lake, 1997. 17

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 (or stocked), 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 Vincent Lake was assigned a stocked status. A zero (0) daily bag limit on walleye was therefore implemented at the fishery.

This report describes the creel survey conducted at Vincent 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

Vincent Lake (TWP 59, RNG 9, W4M) is approximately 12 km northwest of the town of St. Paul. Vincent Lake has a surface area of 728 hectares and a maximum depth of 9.1 metres. The Westcove Recreation Area is located on the west shoreline of Vincent Lake. Multiple cottage developments surround Vincent Lake. The trophic status of Vincent Lake is hypereutrophic. Vincent Lake has 2 inlets and is in the North Saskatchewan River Basin.

Methods of Study

One creel survey crew (two technicians) collected information from both Vincent Lake and Floatingstone Lake between 17 May - 17 August 1997. At Vincent Lake, the crew camped at the County of St. Paul's Westcove Recreation Area. A schedule of 5 survey days at Vincent Lake (Wednesdays through Sundays) was preceded by 5 survey days (Fridays through

Tuesdays) at the alternate site (Floatingstone 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. Biological data 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 these 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 5). All 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 (@STD of each category / (@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 ${}_{t}0.05_{(df)}$ x SE.

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, 352 anglers were interviewed (Table 1 and Appendix 1). Based on the personal comments of a Natural Resources Service, Fish and Wildlife Officer conducting frequent boat checks on Vincent Lake, the ratio of use of the creel site to other access points to be approximately 1 to 4 (Table 2). The total number of anglers was approximated at 3368 and the total effort was approximately 8.6 angler-hours / ha. One hundred and twenty walleye were reported released in 664.5 hours of sportfishing (0.181 walleye released / hr). The catch frequency distribution of released walleye is shown in Appendices 1.2. The test fishery sampled 52 walleye during the survey period (Appendix 2). Biological samples were collected from 33 pike (Appendix 3), and 71 perch (Appendix 4).

Table 1. Observed catch rates of anglers; Vincent Lake, 1997.

CREEL DATA	**1997**
# days surveyed	36
# anglers interviewed	352
# angling hours reported	664.5
# angling hours estimated	6242
WALLEYE DATA	
Walleye kept / angler-hour (HCUE)	N/A
Walleye rel. (<38 cm TL) / angler-hour	0.042
Walleye rel. (38 - 50 cm TL) / angler-hour	0.084
Walleye rel. (>50 cm TL) / angler-hour	0.054
Total walleye rel. / angler-hour	0.181
NORTHERN PIKE DATA	
Pike kept / angler-hour	0.066
Pike rel. (<50 cm TL) / angler-hour	0.017
Pike rel. (>50 cm TL) / angler-hour	0.029
Total pike rel. / angler-hour	0.045
YELLOW PERCH DATA	
Perch kept / angler-hour	0.226
Perch rel. (<20 cm TL) / angler-hour	0.250
Perch rel. (>20 cm TL) / angler-hour	0.006
Total perch rel. / angler-hour	0.256

Table 2. Angler survey summary; Vincent Lake, 1997.

PARAMETER	REPORTED (1997)	SURVEY SITE ESTIMATE (95% CI)	APPROXIMATE USE (observed ratio of use 1:4)
# Anglers	352	842 (+-29.1%)	3368
# Hours	664.5	1560.6 (+-30.7%)	6242
Hours / hectare	0.91	2.1 (+-30.6%)	8.6
# walleye harvested	N/A	N/A	N/A

Status of the Walleye Fishery

The reported release rate for walleye was 0.181 fish / hr. This was possibly false information. Comparative test fisheries completed during walleye stock monitoring surveys at other fisheries indicate reported release rates were exaggerated (Sullivan 1997). Using the mean rate of exaggeration (Figure 1), a corrected release rate for walleye was calculated (0.181 / 2.5 = 0.074 fish / hr). The corrected release rate of 0.074 walleye / hr is very low and indicates that the walleye fishery at Vincent Lake is in a collapsed status.

Several age-classes of walleye are present in Vincent Lake (Figure 2). The walleye stocked in 1990, 1991 and 1992 are ages 7, 6 and 5, respectively. Ages 4, 8 and 9 were therefore recruited walleye. The density of each age-class is very weak, less than 0.03 walleye released / hr. The index of growth (Figure 3) was very fast (50 cm FL in 6 years of age). The age 4 walleye may be recruits of the age 7 walleye, which were stocked in 1990. In this case, the age of maturity would be 3 years of age, which is extremely young. If ages 8 or 9 walleye produced the age 4 walleye, the age of maturity would be 4 or 5 years old, respectively. This age of maturity is very young.

The walleye fishery in Vincent has been established through stocking efforts in the 1950's. The survey results indicate that the walleye stocked into Vincent Lake have naturalized and are in a collapsed state. Present angling pressure and a catch and release regulation (0 daily bag limit) will maintain a minimal fishery.

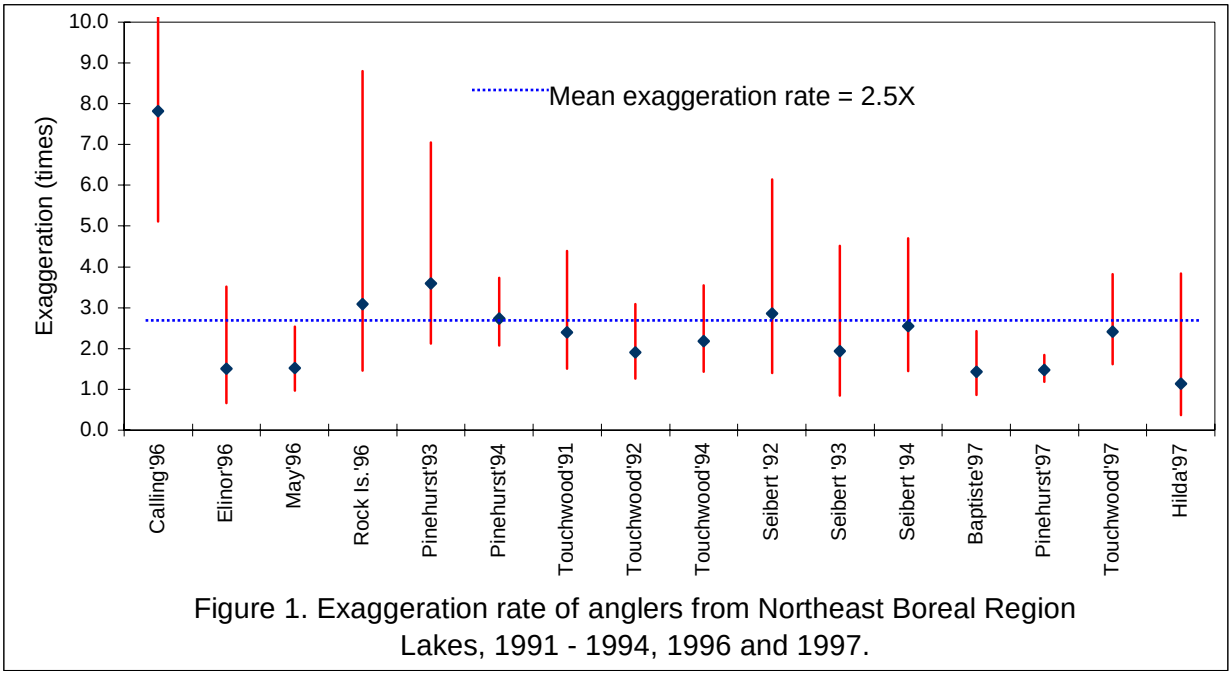

Figure 1. Exaggeration rate of anglers from Northeast Boreal Region Lakes, 1991 - 1994, 1996 and 1997.

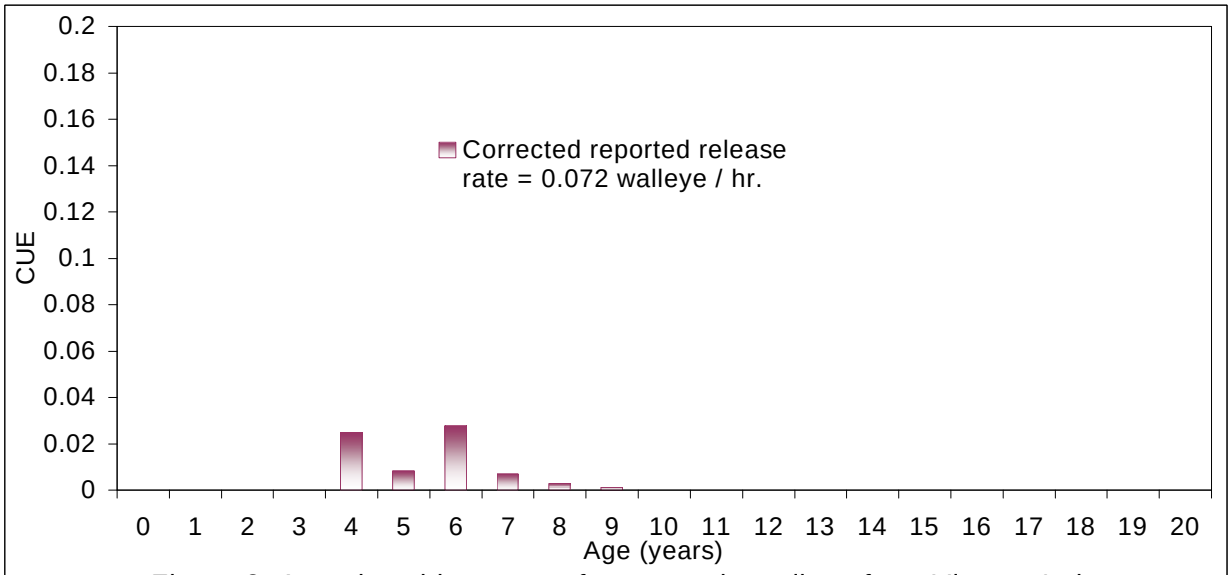

Figure 2. Age-class histogram of test-caught walleye from Vincent Lake, 1997.

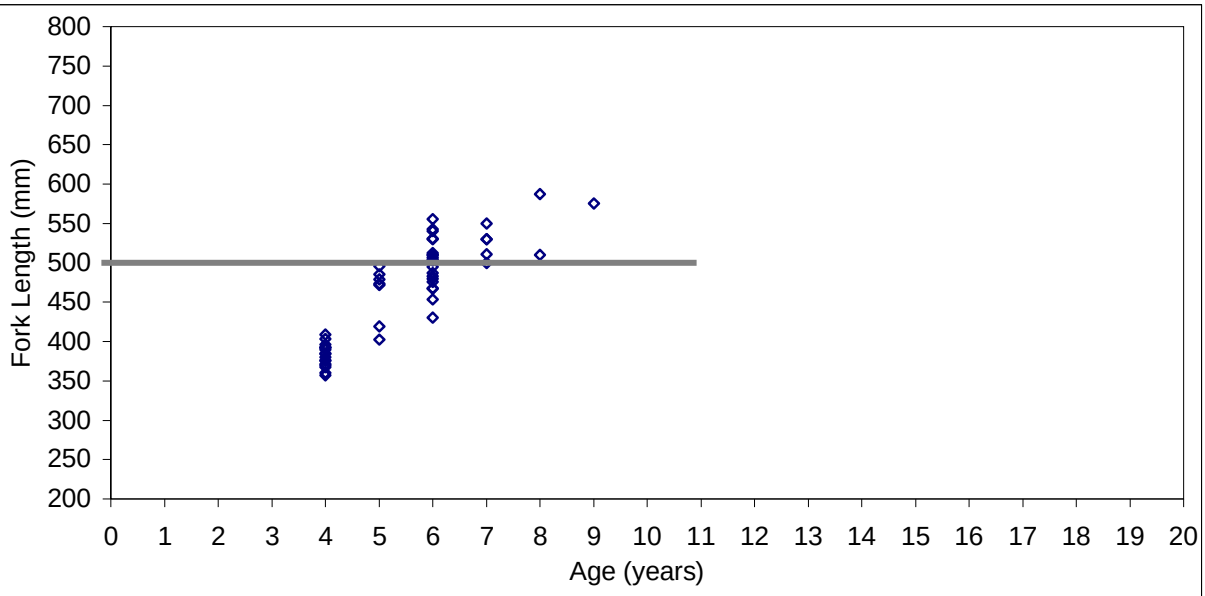

Figure 3. Fork length / age scattergram of test-caught walleye from Vincent Lake, 1997.

DISCUSSION

Based on the criteria used to classify walleye stocks in Alberta the walleye population in Vincent Lake is collapsed. The reported release rate of 0.181 walleye / hr was probably false information. According to Sullivan (1996), anglers exaggerate the reported numbers of released walleye. The corrected release rate of 0.074 walleye released / hr was very low. The age-class distribution of walleye at Vincent Lake was very narrow and all age-classes were extremely weak. The index of growth was very fast and the age of maturity extremely young.

Anecdotal and historical information indicate that the walleye in Vincent Lake are not native and have been established through stocking. Recruitment, though extremely poor, is evident. The walleye in Vincent Lake are naturalized. The regulation recommended in Alberta's walleye management strategy (Berry 1995) for a walleye fishery that has been stocked is a zero (0) daily bag limit (catch and release for walleye).

LITERATURE CITED

Berry, D.K. 1995. Alberta's walleye management and recovery plan. Alta. Environ. Prot., Nat. Res. Ser. No. T/310. 32 p.

Herdman, M. 1984. Vincent Lake creel census, December 1982 – April 1983. Alta. Fish and Wildlife Div. unpubl. MH. 18 p.

Mackay, W.C., G.R. Ash, and H.J. Norris (eds.).1990. Fish ageing methods for Alberta. R.L.&L. Environmental Services Ltd. in assoc. with Alberta Fish and Wildl. Div. and Univ. of Alberta, Edmonton. 113 p.

Olynyk, J.P.R. 1980. An analysis of sauger maturity regimes in southern Lake Winnipeg. Manitoba D.N.R. Report No. 80-36. 52 p.

Sullivan, M.G. 1998. Exaggeration of anglers from 13 lakes in the northeast boreal region of Alberta. Unpubl. Ms. In prep.

Pollock, K.H. and C.M. Jones, and T.L. Brown. 1994. Angler survey methods and their applications in fisheries management. Am. Fish. Soc. Spec. Pub. 25. 371 p.

Sullivan, M.G. 1994. A classification system for walleye fisheries based on a stock-recruitment curve. Alta. Fish & Wildl. Div. unpubl. MS. 11 p.

Sullivan, M.G. 1996. Test angling fisheries and reporting bias in creel surveys. Alberta Fisheries Workshop, 24 Oct. 1996. Edmonton, Ab.

APPENDICES

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

DATE **36** **Totals**	# Anglers **352**	# Hours **664.5**	# WALL Released < 38 cm **28**	# WALL Released 38 - 50 cm **56**	# WALL Released > 50 cm **36**	# NRPK Kept **44**	# NRPK Released < 50 cm **11**	# NRPK Released > 50 cm **19**	# YLPR Kept **150**	# YLPR Released < 20 cm **166**	# YLPR Released > 20 cm **4**
21-May-97	0	0	0	0	0	0	0	0	0	0	0
22-May-97	0	0	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	3	3	0	0	0	1	0	0	0	0	0
25-May-97	7	11	3	4	0	2	5	0	0	0	0
4-Jun-97	3	3	0	0	0	0	0	0	0	0	0
5-Jun-97	5	10.5	0	0	0	2	0	0	0	0	0
6-Jun-97	7	10	0	1	3	1	0	1	0	0	0
7-Jun-97	15	34	0	0	1	1	2	0	4	4	0
8-Jun-97	4	4.5	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	1	2	0	0	2	0	0	0	0	0	0
21-Jun-97	23	40.5	0	1	5	13	0	6	0	0	0
22-Jun-97	5	12	0	1	0	1	0	2	0	0	0
2-Jul-97	7	10	0	0	0	0	0	0	0	0	0
3-Jul-97	2	6	0	0	1	0	0	1	0	0	0
4-Jul-97	24	85.5	18	31	12	4	0	4	0	3	4
5-Jul-97	20	33	4	1	2	6	0	0	0	0	0
6-Jul-97	10	18	0	0	1	1	0	3	0	0	0
16-Jul-97	22	36	1	1	2	3	0	0	0	0	0
17-Jul-97	25	45	0	11	2	2	0	1	10	29	0
18-Jul-97	15	32	1	3	2	1	1	1	20	15	0
19-Jul-97	27	47	1	1	0	0	0	0	6	31	0
20-Jul-97	7	13	0	0	0	0	0	0	18	41	0
30-Jul-97	8	10.5	0	0	0	0	0	0	0	0	0
31-Jul-97	6	4	0	0	0	0	0	0	0	0	0
1-Aug-97	17	38.5	0	0	2	2	0	0	3	0	0
2-Aug-97	31	48.5	0	1	1	1	1	0	36	25	0
3-Aug-97	34	66.5	0	0	0	3	0	0	51	18	0
4-Aug-97	12	19.5	0	0	0	0	0	0	2	0	0
13-Aug-97	2	10	0	0	0	0	1	0	0	0	0
14-Aug-97	2	1	0	0	0	0	1	0	0	0	0
15-Aug-97	0	0	0	0	0	0	0	0	0	0	0
16-Aug-97	4	5	0	0	0	0	0	0	0	0	0
17-Aug-97	4	5	0	0	0	0	0	0	0	0	0

Appendix 1.2. Catch frequency distribution of released walleye. [Vincent Lake, 1997]

# WALL Released	# Anglers	% Anglers	# WALL Released	% WALL Released
0	298	84.7	0	0.0
1	36	10.2	36	30.0
2	6	1.7	12	10.0
3	1	0.3	3	2.5
4	2	0.6	8	6.7
5	2	0.6	10	8.3
6	2	0.6	12	10.0
7	3	0.9	21	17.5
8	1	0.3	8	6.7
9	0	0.0	0	0.0
10	1	0.3	10	8.3
>10	0	0.0	0	0.0
Totals	352	100	120	100

Appendix 1.3. Methods of anglers and catch statistics for walleye. [Vincent Lake, 1997]

METHOD	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Artificial	220	62.5	375.5	41	0.109
Commercial Baitfish	21	6.0	47.5	19	0.400
Seined Baitfish	0	0.0	0		
Leeches	24	6.8	61.5	49	0.797
Dewworms	19	5.4	47	7	0.149
Scent baits	3	0.9	3	0	0.000
Miscellaneous	65	18.5	130	4	0.031
TOTALS	352	100.0	664.5	120	

Appendix 1.4. Skill level of anglers and catch statistics for walleye. [Vincent Lake, 1997]

SKILL	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Novice	51	14.5	93.5	9	0.096
Average	294	83.5	547.5	79	0.144
Professional	7	2.0	23.5	32	1.362
TOTALS	352	100	664.5	120	

Appendix 1.5. Target species of anglers and catch statistics for walleye. [Vincent Lake, 1997]

TARGET	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
Walleye	15	4.3	51.5	58	1.126
Northern Pike	32	9.1	62.5	5	0.080
Yellow Perch	50	14.2	95.5	3	0.031
Any species	255	72.4	455	54	0.119
TOTALS	352	100	664.5	120	

Appendix 1.6. Angler use of electronic gear and catch statistics for walleye. [Vincent Lake, 1997]

ELECTRONICS	# Anglers	% Anglers	# Hours	WALL Released	Released CUE
None	278	79.0	495.5	87	0.176
Depth Sounder	74	21.0	169	33	0.195
G.P.S.	0	0.0	0		
Depth Sounder + G.P.S.	0	0.0	0		
Other	0	0.0	0		
TOTALS	352	100	664.5	120	

Appendix 2. Biological data from test-caught walleye. [Vincent Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (years)	Month	Day
mean =	461.6	1337.5	5.4		
1	530		7	6	4
2	510		6	6	5
3	530		6	6	5
4	575		9	6	6
5	540	1600	6	7	4
6	473	1300	5	7	4
7	504	1550	6	7	5
8	392		4	7	5
9	419	900	5	7	5
10	357		4	7	17
11	396		4	7	18
12	472		5	7	1
13	483		6	7	1
14	530		7	7	1
15	507		6	7	1
16	543		6	7	1
17	503		6	7	1
18	550		7	7	1
19	511		7	7	1
20	510		6	7	1
21	587		8	7	1
22	476		6	7	1
23	367		4	7	1
24	380		4	7	1
25	392		4	7	1
26	371		4	7	1
27	453		6	7	1
28	402		5	7	1
29	430		6	7	1
30	467		6	7	1
31	375		4	7	1
32	360		4	7	1
33	403		4	7	1
34	468		6	7	1
35	376		4	6	27
36	385		4	6	27
37	487		6	7	3
38	510		8	7	3
39	390		4	7	3
40	384		4	7	12
41	496		5	7	13
42	500		7	7	13
43	531		6	7	13
44	370		4	7	13

Appendix 2. Biological data from test-caught walleye, con't. [Vincent Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (years)	Month	Day
45	480		6	7	19
46	485		5	7	19
47	479		5	7	19
48	512		6	7	19
49	495		6	7	22
50	393		4	7	22
51	555		6	7	27
52	409		4	8	10

Appendix 3. Biological data from sport-caught pike. [Vincent Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (years)	Sex 1 = immature 3 = mature female 8 = mature male	Month	Day
mean =	580.8	1561.7	5.4			
1	568		7		5	18
2	626	1615	6		5	18
3	488		3		5	18
4	550		4		5	24
5	630	1600	7		5	25
6	661		7		6	5
7	625	1750	7		6	5
8	580	1550	3		6	7
9	656	2300	6		6	14
10	635	1850	8	3	6	21
11	585	1400	7	3	6	21
12	534	1250	3	8	6	21
13	562	1500	5	3	6	21
14	450	700	3		6	21
15	558	1500	4		6	21
16	544	1400	5		6	21
17	605	1700	7		6	21
18	548	1350	4		7	4
19	565	1600	4		7	4
20	618	1800	4		7	4
21	585	1650	4		7	4
22	520	1300	3		7	5
23	627	2000	7		7	5
24	605	1500	6		7	6
25	545	1400	6	8	7	16
26	537		6	8	7	16
27	575	1600	6	3	7	16
28	646	2200	4		7	18
29	560	1400	6		8	1
30	546	1350	7		8	1
31	675		6		8	2
32	568	1500	4		8	3
33	590	1400	9		8	3

Appendix 4. Biological data from sport-caught perch. [Vincent Lake, 1997]

Sample #	Fork Length (mm)	Weight (g)	Age (years)	Sex 1 = immature 3 = mature females 8 = mature males	Month	Date
mean =	202.9	303.4	3.9			
1	200	300	4		7	17
2	204	300	4	3	7	17
3	210	300	4		7	17
4	215	350	4		7	17
5	193	350	4		7	17
6	195	250	4		7	17
7	193	300	4		7	18
8	203	300	4		7	18
9	269	500	5		7	18
10	200	300	4		7	18
11	202	350	4		7	18
12	189	300	4		7	18
13	204	350	4		7	18
14	202	200	4		7	19
15	207	300	3		7	19
16	192	200	3		7	19
17	205	200	4		7	19
18	196	200	4		7	19
19	179	150	3		7	19
20	215	350	4		7	20
21	195	300	4		7	20
22	200	300	4		7	20
23	205	300	4		7	20
24	215	400	4		7	20
25	193	350	4		7	20
26	195	300	3		7	20
27	210	400	4		7	20
28	206	300	4		7	20
29	193	300	4		7	20

Appendix 5. Creel survey form. [Vincent Lake, 1997]