FLATHEAD LAKE FISHERMAN CENSUS

By

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EXECUTIVE SUMMARY

A census of water-related recreation use was conducted on Flathead Lake from May 16, 1981 through May 14, 1982. Information from this census was analyzed to determine use and harvest of gamefish and characteristics of the fisherman population. Data on use was collected using car counters at state-owned boat access sites and through direct interviews. A total of 3,210 parties were interviewed accounting for 18,703 hours of use. The fisherman census was oriented primarily toward boat fishermen.

Anglers expended 605,160 hours in 168,792 trips equivalent to 1.34 days per surface acre (365 days/sq. km). Total harvest was 536,870 fish of which 92 percent were kokanee, four percent perch, two percent trophy-size lake and bull trout and one percent cutthroat trout. Boat fishermen accounted for 93 percent of the use by hours and 92 percent of the harvest. Average size of harvested fish was 12.3 inches for kokanee, 12.6 inches for cutthroat, 22.6 inches for bull trout and 31.3 inches for lake trout.

The fishery and fisherman population was characterized by specific seasonal fisheries in which the location, type of gear, success and origin of anglers varied considerably. For this reason, average values for the year or entire fishery are of limited value in comparison between years. Detailed information on these seasonal fisheries is presented.

ACKNOWLEDGEMENTS

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INTRODUCTION

The Flathead River Basin Environmental Impact Study was born out of concern over potential adverse environmental effects of coal mining in the Canadian portion of the North Fork Flathead River drainage. The study is unique in that it was designed to gather substantial amounts of baseline environmental and socio-economic information throughout the basin prior to the initiation of projected largescale exploitation of such resources as coal, gas, oil, timber and water.

Acquisition of baseline fisheries information for the study began in 1978 when the Montana Department of Fish, Wildlife and Parks initiated work on the North Fork of the Flathead River and its tributaries. Department work expanded to the Middle Fork drainage in 1979 and subsequently to Flathead Lake during July of 1980. Perspectives and objectives of these studies and other related Department projects have been detailed by Graham et al. (1980).

This study was part of a larger effort to quantify water-based recreation use on Flathead Lake, the upper Flathead River and its North Fork (Fredenberg and Graham 1982a, 1982b). These studies also produced the data used to calculate net economic value of fishing, boating, swimming and camping (Sutherland 1982).

Fishing use on Flathead Lake was last censused by direct interview in 1962-1963 (Robbins 1966). Statewide use surveys were also conducted in 1968-69 and 1975-76. The statewide surveys, however, did not estimate harvest characteristics of the fisherman population and provided only seasonal estimates of fisherman use.

This survey was primarily designed to census boat fishermen during the spring, summer and fall. Estimates were also made of shore fishermen and winter boat fishing. Numerous and dispersed access sites made accurate census of fishermen difficult and the large majority of winter users did not cross sites with car counters making estimates of use more difficult. Direct observation of anglers was used during the concentrated Skidoo Bay winter fishery.

DESCRIPTION OF STUDY AREA

Flathead Lake is one of the largest natural lakes in the United States west of the Mississippi and is located in northwestern Montana (Figure 1). Though it is not particularly deep in comparison to morphometrically similar large lakes (Potter 1978), Flathead has a mean depth of 32.5 meters and a maximum depth of 113 meters. As is illustrated in Figure 2, much of the lake exceeds 20 m in depth except for Polson Bay (maximum depth 10 m). Kerr Dam is located 6.4 km downstream from the lake on the Flathead River and has regulated the upper three meters of the lake since its completion in 1938. Morphometric information for the lake is summarized in Table 1.

Flathead Lake is noted for its high quality waters which have an average alkalinity of 84 mg/L as $CaCO_3$ and average conductivity of about 150 micronhos per cm^2 (Stanford et al. 1981). The mean annual primary productivity was 123 grams carbon/m^2/year which was somewhat greater than was expected. While the lake was formerly thought to be quite oligotrophic, Stanford et al. (1981) concluded that it was in fact oligo-mesotrophic. Historical trends in lake productivity have not been determined but the fact that as much as 20 percent of the phosphorous input may have come from domestic sewage has raised concern for the future.

The pristine nature of Flathead Lake is primarily due to the fact that most of the 18,379 km^2 drainage area is underlain by nutrient-poor Precambrian sedimentary rock which is frequently deficient in carbonates and nutrients. The largest tributary to the lake is the Flathead River which has an average flow of 9753 cfs at Columbia Falls (U.S. Geological Survey 1979). The three forks of the Flathead River (North, Middle and South) drain large tracts of undisturbed lands including all of Glacier National Park west of the Continental Divide (2266 km^2), all of the Great Bear Wilderness (1156 km^2) and a large portion of the 3842 km^2 Bob Marshall Wilderness. Other major tributaries to the lake include the Swan, Stillwater and Whitefish rivers which have average discharges of 1166, 336, and 192 cfs, respectively (U.S. Geological Survey 1979). The completion of Hungry Horse Dam on the South Fork of the Flathead River in 1952 has effectively isolated 23 percent of the Flathead Lake drainage from the remainder of the lake-river system.

On the 25 fish species listed for Flathead Lake by Gaufin et al. (1976), only ten are native. Four of the seven common gamefish species are native to the lake and include the westslope cutthroat trout (*Salmo clarkii lewisi*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni*), and pygmy whitefish (*Prosopium coulteri*). The other three species of common gamefish were introduced to the lake and include the kokanee salmon (*Oncorhynchus nerka*), lake trout (*Salvelinus namaycush*), and lake whitefish (*Coregonus clupeaformis*). Rainbow trout (*Salmo gairdneri*) and brook trout (*Salvelinus fontinalis*) are uncommon (Leathe and Graham 1982).

With the exception of the yellow perch (*Perca flavescens*), all the common nongame fish species are native. This group includes the northern squawfish (*Ptychocheilus oregonensis*), peamouth (*Mylocheilus caurinus*), longnose and largescale suckers (*Catostomus catostomus* and *C. macrocheilus*), redside shiner (*Richardsonius balteatus*) and slimy sculpin (*Cottus cognatus*).

Each fisherman on Flathead Lake was allowed to take all of the following limits during the 1981-1982 season:

1. Trout - tend pounds and one fish or ten fish, whichever is reached first. Two fish could always be taken, regardless of weight, and bull trout had to be at least 18 inches total length to be kept. Only one daily limit allowed in possession.

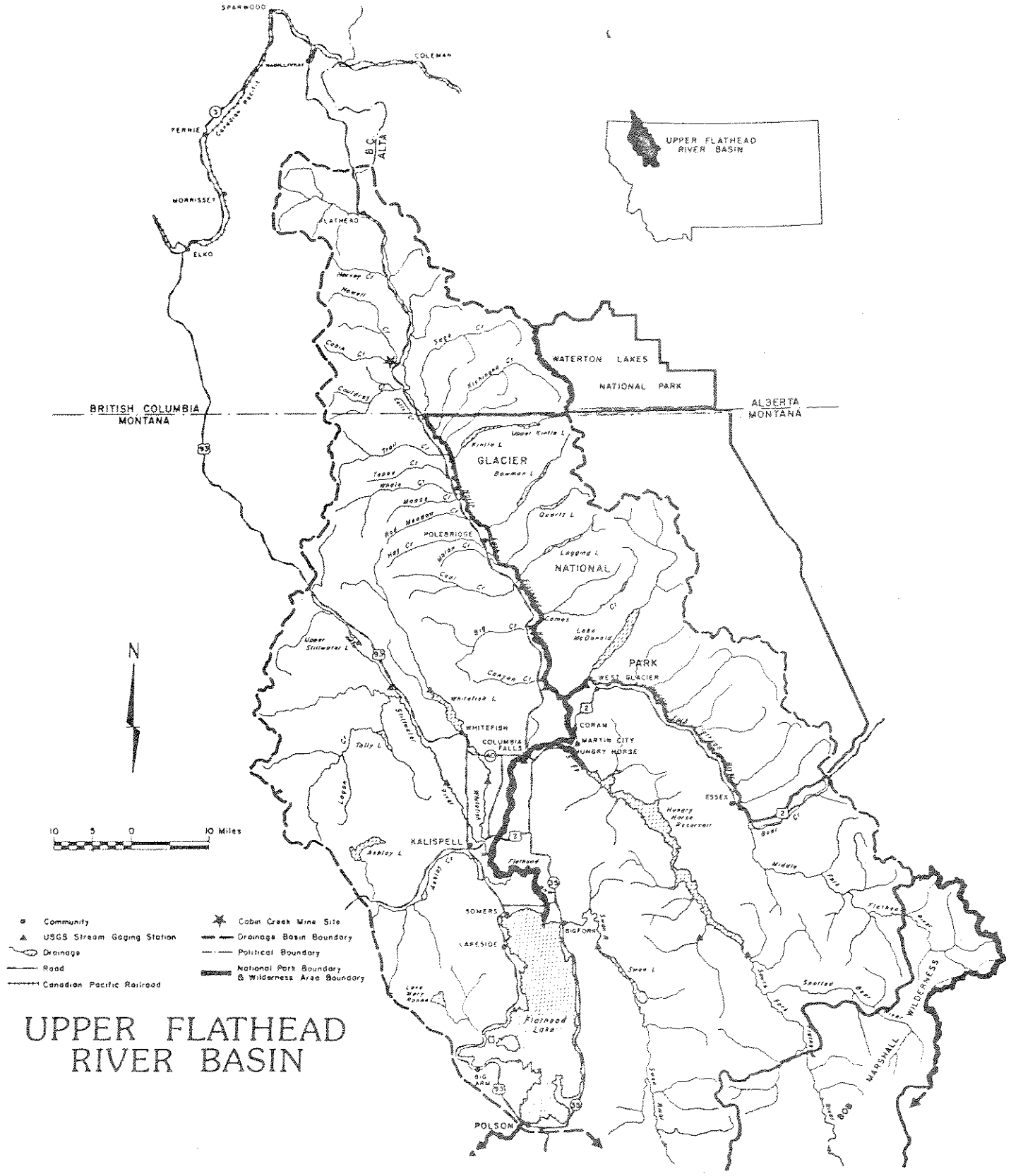

Figure 1. Map of the Upper Flathead River Basin. Adapted from Montana Department of Natural Resources and Conservation (1977).

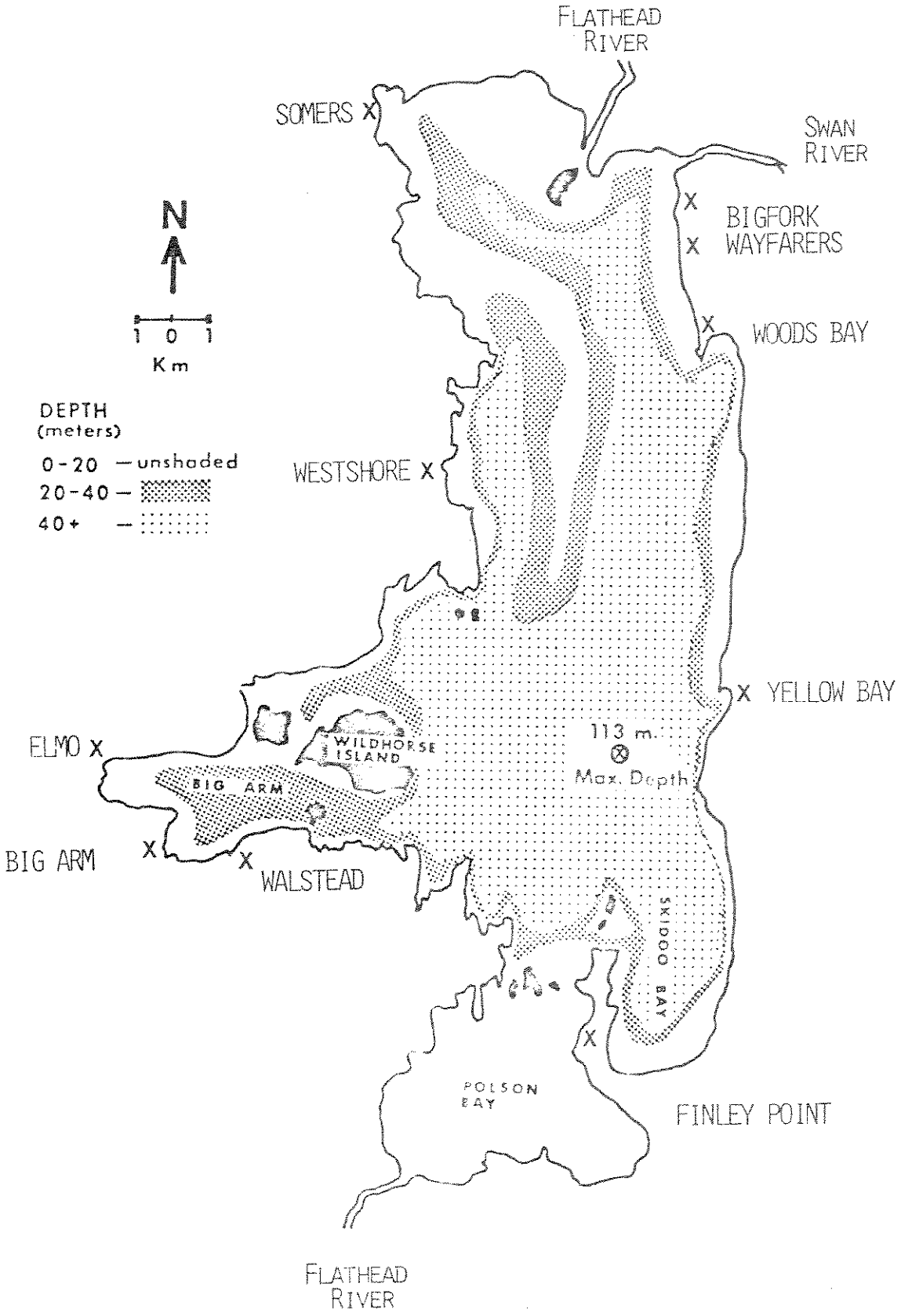

Figure 2. Map of Flathead Lake, Montana including 20 meter depth contours and state-owned boat access sites.

Table 1. Morphometric data for Flathead Lake (from Potter 1978).

Elevation (maximum regulated)	882.4 m
Maximum length	43.9 km
Maximum breadth	24.9 km
Mean breadth	10.5 km
Maximum depth	113.0 m
Mean depth	32.5 m
Maximum length Main Basin	39.4 km
Maximum length Polson Bay	10.5 km
Area	
Total	476.6 km^2
Islands	14.3 km^2
Water	462.3 km^2
Drainage	18378.6 km^2
Volume	24.9 km^3
Shoreline	
Total	301.9 km
Islands	42.2 km
Mainland	259.7 km
Shoreline development	3.9
Volume development	0.86

2. Kokanee - thirty-five fish daily and seventy in possession.

3. Whitefish - Thirty fish daily and sixty in possession.

There were no limits on nongame species such as perch. Various other limits applied to some of the uncommon gamefish species such as brook trout, bass, etc. Snagging for kokanee along the lakeshore was open from September 1 through December 31 during 1981.

METHODS

A partial creel census was conducted on Flathead Lake from May 16, 1981 through May 14, 1982. The procedure used was a modified version of direct interviews and car counters for conducting recreation surveys as described by Mischon and Wyatt (1979).

Census data was analyzed for each month with the last 16 days of May, 1981 and the first 14 days of May, 1982 combined for the month of May. Holidays were treated as weekend days including Monday, May 25 (Memorial Day), Friday, July 3 (Independence Day), Monday, September 7 (Labor Day), Wednesday, November 11 (Veteran's Day), Thursday, November 26 (Thanksgiving), Friday, February 12 (Lincoln's Birthday), and Monday, February 15 (Washington's Birthday).

Weekdays were treated separately from weekend days in setting up the sampling schedule. During the summer season (May 16 through September 7), four weekdays and three weekend days were chosen at random out of every two-week stratum. The starting time was chosen at random between 7:00 a.m. and 12:00 a.m. with non-replacement by weekday and weekend to insure adequate coverage of daylight hours. Creel clerks worked a 10-hour day. The lake was divided into four quadrants and one roving clerk in a boat conducted interviews and counts of recreationists along the shoreline in one randomly chosen lake quadrant each day. The information gathered by this clerk was used to determine the proportion of recreationists involved in boating, fishing and swimming and whether or not they had crossed car counters. Information was also collected from fishermen through direct interview.

During the summer season, two additional clerks worked at the ten state-owned accesses (Figure 2). They worked every weekend day and two of every five weekdays (randomly chosen). The day was broken down into four interview periods, 7:00-11:00 a.m., 11:00 a.m.-3:00 p.m., 3:00-7:00 p.m., and 7:00-11:00 p.m. Starting times of 7:00 a.m., 11:00 a.m., or 3:00 p.m. were randomly chosen for each day. Each clerk worked eight hours a day conducting interviews, spending four hours at two different access sites. Thus, on any given sample day, four of the 10 state accesses were monitored.

These 10 state-owned accesses were equipped with either electric or pheumatic car counters. The creel clerks monitored the counters for accuracy and adjustments in the counts were made where necessary. In addition to fishery data, the clerks conducting interviews at the state accesses gathered information on the proportion of cars being counted that contained people who were actually recreating at the sites. This information was used to eliminate casual traffic and commercial vehicles from the counts (Mischon and Wyatt 1979).

During the summer season, park caretakers read car counters Friday evenings and Monday mornings. This information, in conjunction with the State access interviews, was used to determine the number of fisherman days originating from state accesses. The proportion of fishermen that

crossed car counters (as determined by roving clerk on the lake) was used to expand car counter data to arrive at the total fisherman days on Flathead Lake. The estimated recreation days spent by fishermen was multiplied by the average number of hours per completed trip to yield estimates of fishing pressure on Flathead Lake. This analysis is described in more detail in Appendix A.

Following the summer period, the number of creel clerks on Flathead Lake was reduced to two from September 8 through October 10 and one the remainder of the year. The number of counters monitored was reduced to four and later to the two sites that received the most use. Readings were taken on a monthly basis with spot-checks to insure accuracy. The single creel clerk spent about one-fourth (one hour) of the sample period doing interviews in the boat and three-fourths of the period at one of the two car-counter sites. Scheduling, placement of counters, and boat interview activity were reviewed at the end of each month to assess factors which changed angler distribution and use. These factors included seasonal changes in boat access due to the 10 foot winter drawdown of Flathead Lake, day length, distribution of fish, and other combinations of circumstances. Monthly sampling was then designed to maximize contacts at access sites but maintain random sampling of anglers in the roving census.

Creel clerks interviewed fishermen on a party basis with emphasis on the collection of completed trip interviews. A party member was asked the number of anglers, where they were from, whether they fished from shore or used a boat, what they used for terminal tackle, how many hours they had fished, and whether or not they were done fishing for that day. Terminal tackle was called combination if any two types were used together (i.e. baited lures) or separately during the trip (i.e. flies then lures). In addition, the number and species of gamefish kept as well as those released was recorded. After July 25, 1981 anglers on the lake were also asked what species they were pursuing in order to assess catch rates of anglers pursuing specific species of fish.

Data obtained from interviews was recorded directly on coding forms for keypunching for computer analysis. Raw counter data were analyzed by hand calculator and then entered in the computer to obtain pressure estimates. Procedures used followed those of Mischon and Wyatt (1979) with computer programs developed by the Montana Department of Fish, Wildlife and Parks.

Monthly and seasonal catch rates were calculated as the number of fish caught divided by the total number of hours for the sample of anglers interviewed. Harvest estimates were obtained by multiplying the pressure by the harvest rate, which is the catch rate for those fish kept by anglers.

RESULTS

DISTRIBUTION OF FISHERMAN INTERVIEWS AND CHARACTERISTICS OF THE FISHERMAN POPULATION

The distribution of fisherman party interviews conducted on Flathead Lake and the frequencies of responses to the various questions asked are summarized and discussed in this section of the report. Sample sizes vary according to the number of respondents on each question. The results represent only the fisherman parties that were interviewed and not necessarily a statistically random sample of the entire fisherman population. However, the large sample size and stratified sample design ensured that all areas of the lake and all months of the year were well represented. Therefore, relationship derived from this sample should accurately reflect the population of anglers.

Distribution of Party Interviews and Interview Hours

A total of 3,210 party interviews were conducted on Flathead Lake. Fifty-five percent were conducted on weekends and holidays and 45% on weekdays. Anglers were classified by the quadrant from which they entered the lake and not necessarily the area fished. Anglers tended to use access sites near the location they intended to fish, although some fished in more than one quadrant or selected a more distant access site for some other reason.

Approximately 33% of the interviews were of parties who used access on the northeast quadrant of Flathead Lake (Table 2). The southeast quadrant accounted for 27% compared to 21% in the northwest quadrant and 18% in the southwest quadrant. Most of the fishing activity was in the southeast quadrant of the lake from November through April. Use was more evenly distributed around the lake during May-July and concentrated in the northeast quadrant during August-October as reflected in the distribution of interviews. Shifts in use were primarily related to distribution of kokanee and will be discussed later.

Party interviews were almost equally distributed between shore (45%) and boat (52%) (Appendix B, Table 1). The remainder were ice fishermen during the months of December-February.

Thirty-two percent of the parties interviewed crossed car counters (Appendix B, Table 2). This ranged from 13% during the winter months when only two counters were used to approximately 50% during the summer months when 10 counters were used. Approximately 24% of the parties interviewed in boats crossed car counters.

The parties interviewed accounted for 18,703 total fisherman hours. Two-thirds of the hours sampled were during the peak summer months of June through September (Appendix B, Table 3). Saturdays, Sundays and holidays accounted for approximately 56% of the total interview hours

Table 2. Monthly distribution of party interviews by lake quadrant for the period May 16, 1981 through May 14, 1982 on Flathead Lake. Percentages by month are in parentheses.

	Number of parties interviewed and percent (in parentheses)				
Month	NW Quadrant	NE Quadrant	SW Quadrant	SE Quadrant	Total
Jan	9(10)	16(18)	33(37)	32(35)	90
February	6(5)	9(8)	10(9)	88(78)	113
March	21(9)	3(1)	0(0)	213(90)	237
April	34(28)	12(10)	3(2)	73(60)	122
May	59(25)	78(34)	52(22)	44(19)	233
June	60(10)	175(29)	280(46)	88(15)	603
July	245(41)	151(25)	84(14)	124(20)	604
August	167(24)	314(46)	98(14)	102(15)	681
September	53(15)	237(68)	22(6)	36(10)	348
October	5(12)	32(76)	1(2)	4(9)	42
November	1(2)	27(43)	5(8)	29(47)	62
December	9(12)	21(28)	5(7)	40(53)	75
TOTAL	669(21)	1,075(34)	593(18)	873(27)	3,210

and nearly 93% of the hours sampled were expended by boat fishermen. Shore and ice fishermen each comprised 3-4% of the sample.

Nearly half (47%) of the hours sampled were by anglers who had crossed car counters. This is biased upward because more interviews were at campgrounds. For anglers with incomplete trips, which were more likely sampled by boat, only 32% had crossed car counters.

A portion of the boat angler parties (1,399) were categorized by the species they were pursuing. This sample represented 51% (8,831 hours) the total boat fisherman hours sampled. Boat fishermen were separated into "kokanee boats", "bull-lake trout boats" and "other or combination".

"Kokanee boats" were exclusively pursuing salmon primarily by trolling with leaded line during the spring, summer and fall and jigging from anchored boats during the winter. Seventy percent of the boats (974) were "kokanee boats". The category "bull-lake trout boats" was comprised of anglers fishing exclusively for either of these trophy trout species. In general, this involved trolling in deep water with steel line or down-riggers using large lures or plugs. Twenty-one percent of the boats (293) were categorized as bull trout or lake trout. The remaining 9% of the boats (132) were classified as "other or combination" as they were pursuing other species or were fishing for some combination of these gamefish.

Forty-one percent of the parties interviewed were residents of Flathead County, followed by 20% from Lake County and 17% from out-of-state. Missoula-area residents and people from areas of Montana not previously classified composed 11% and 9% of the total parties, respectively. Only 1% of the parties were from foreign countries, primarily Canada.

Thirty-eight percent of all parties interviewed had completed fishing for the day comprising 51% of the total hours interviewed. Thirty percent of the parties had completed trip interviews during the peak use period of May-September, while 60-70% completed trip interviews were obtained during the remainder of the year.

Length of Completed Trips

The average length of time fished per angler per completed trip for nearly 2,500 anglers in 1,200 parties was 3.8 hours per day. Boat fishermen tended to fish longer than shore/ice fishermen (Table 3). They averaged over four hours/trip versus less than 2.5 hours per trip for shore/ice fishermen. Of the categorized boat types, "bull-lake trout fishermen" fished the longest averaging 4.4 hours/trip. Larger parties tended to fish longer and anglers tended to spend more time fishing if came from further away than Flathead or Lake County.

Party Size

The mean party size in the sample was two anglers. Party size ranged from one to seven (Table 4). Nearly 57% of all parties were composed

Table 3. Average length of completed trip per angler (in hours fished) by month, quadrant, shore-boat type, bait type, party size, and angler origin on Flathead Lake during May 16, 1981 - May 14, 1982.

Month	Length of trip	Lake quadrant	Length of trip	Shore/boat type	Length of trip	Bait type	Length of trip	Party size	Length of trip	Angler origin	Length of trip
Jan	3.9	NW	3.8	Shore/ice	2.4	Bait	3.3	1	3.4	Flathead County	3.6
Feb	3.7	NE	3.8	Kokanee/ boat	4.0	Fly	2.2	2	3.8	Lake County	3.3
Mar	4.2	SW	3.3	Bull-lake trout/boat	4.4	Lure	3.9	3	4.1	Missoula County	4.6
Apr	3.8	SE	3.9	Other combo boat	3.6	Combo	3.7	4+	4.0	Other Montana	4.0
May	3.3			Total boat	4.0	Snag	2.4			US non-resident	4.3
Jun	3.4									Foreign	3.4
Jul	3.7										
Aug	3.8										
Sep	4.6										
Oct	2.4										
Nov	2.6										
Dec	3.7										

Table 4. Distribution of party sizes for 3,210 angler parties interviewed on Flathead Lake from May 16, 1981 through May 14, 1982.

Party size	Number of parties	Percent of parties	Number of individuals	Percent of individuals
1	703	22	703	11
2	1,817	57	3,634	55
3	544	17	1,632	25
4	129	4	516	8
5	13	<1	65	1
6	2	<1	12	<1
7	2	<1	14	<1
TOTAL	3,210	100	6,576	100

of two anglers and parties of two comprised over 55% of the total anglers on the lake.

The average party size on weekends and holidays was 2.1 anglers compared to two anglers/party on weekdays. Party sizes by month, quadrant, shore-boat type, terminal tackle type, and angler origin were remarkably consistent (Table 5). Larger than average parties were attracted to Skidoo Bay in the southeast quadrant of the lake during February through April to take advantage of this productive fishery for kokanee. Party sizes for people not residing in Flathead or Lake counties was somewhat higher than for the local area residents.

Angler Origin

A breakdown of angler origin by month showed that the winter fishery was dominated by local area residents (Table 6). Anglers from Flathead County, Lake County and Missoula collectively made up 73% of all parties interviewed, but increased to 92% of those interviewed during October, 1981 through February, 1982. During the month of April there appeared to be an unusually high proportion of other Montana residents and non-residents apparently attracted to the late winter kokanee fishery.

The trend in distances traveled to fish at Flathead Lake followed the general pattern of the local tourist season. Of 1,477 parties surveyed, the average distance from home was 111 miles. The mean distance traveled was only 46 miles from October through March and 93 miles from April through May. The peak was 152 miles during June-July and declined to 98 miles during August-September (Figure 3).

Anglers from Flathead and Lake counties averaged 16 and 21 miles from home, respectively. Missoula anglers averaged 93 miles versus 217 miles for anglers from other non-local areas of Montana. Foreigners were mostly from Canada and averaged 267 miles from home where U.S. citizens from other states traveled an average of 476 miles to reach Flathead Lake. There was no noticeable relationship between party size and distance traveled.

Fishing Methods, Types of Tackle

Lures were the dominant type of terminal tackle used by anglers on Flathead Lake (Table 7). The only exceptions were from January to April when fishermen commonly used lure-bait combinations to jig for kokanee and during November when some fishermen were snagging for kokanee. Bait, snag and fly fishermen comprised only an insignificant 6% of the total parties interviewed.

A breakdown of the type of terminal tackle used by shore and boat types shows that "kokanee boats" and boats pursuing other species and/or combinations of both used about three-fourths lures and one-fourth combinations (Appendix B, Table 4). "Bull-lake trout boats", on the other hand, used mostly lures (83%) with bait making up most of the remainder. Shore and ice fishermen primarily used combinations (45%), while the remainder

Table 5. Average number of anglers per party by month, quadrant, shore-boat type, bait type, and angler origin during May 16, 1981 through May 14, 1982.

Month	Average party size	Lake quadrant	Average party size	Shore/boat type	Average party size	Bait type	Average party size	Angler origin	Average party size
Jan	1.9	NW	2.1	Shore/ice	1.9	Bait	1.7	Flathead County	1.9
Feb	2.1	NE	1.9	Kokanee boats	2.2	Fly	1.6	Lake County	1.9
Mar	2.4	SW	2.0	Bull-lake trout boats	1.9	Lure	2.0	Missoula County	2.2
Apr	2.4	SE	2.2	Other & combo boats	2.3	Combo	2.2	Other Montana	2.1
May	1.9			Total boats	2.1	Snag	2.0	US non-residents	2.2
Jun	2.0							Foreign	1.9
Jul	2.1								
Aug	2.1								
Sep	2.0								
Oct	1.8								
Nov	1.8								
Dec	1.7								

Table 6. Monthly distribution of angler origin for 2,121 fisherman parties interviewed on Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by month in parentheses.

	Number of parties (percent)						
Month	Lake County	Flathead County	Missoula County	Other Montana	U.S. Nonresident	Foreign	Total
Jan	44(51)	29(34)	11(13)	0(0)	2(2)	0(0)	86
Feb	15(31)	19(39)	11(22)	4(8)	0(0)	0(0)	49
Mar	16(16)	34(35)	22(22)	5(5)	21(21)	0(0)	98
Apr	7(6)	43(37)	6(5)	17(15)	43(37)	0(0)	116
May	42(23)	77(42)	29(16)	12(6)	23(12)	2(1)	185
Jun	152(27)	195(34)	55(10)	39(7)	125(22)	6(1)	572
Jul	76(14)	230(43)	57(11)	64(12)	93(17)	13(2)	533
Aug	32(18)	82(45)	18(10)	19(10)	27(15)	5(3)	183
Sep	16(10)	82(52)	15(10)	28(18)	13(8)	3(2)	157
Oct	5(14)	23(66)	2(6)	3(9)	1(3)	1(3)	35
Nov	12(30)	15(38)	8(20)	4(10)	1(2)	0(0)	40
Dec	14(21)	42(63)	6(9)	1(2)	4(6)	0(0)	67
TOTAL	431(20)	871(41)	240(11)	196(9)	353(17)	30(1)	2,121

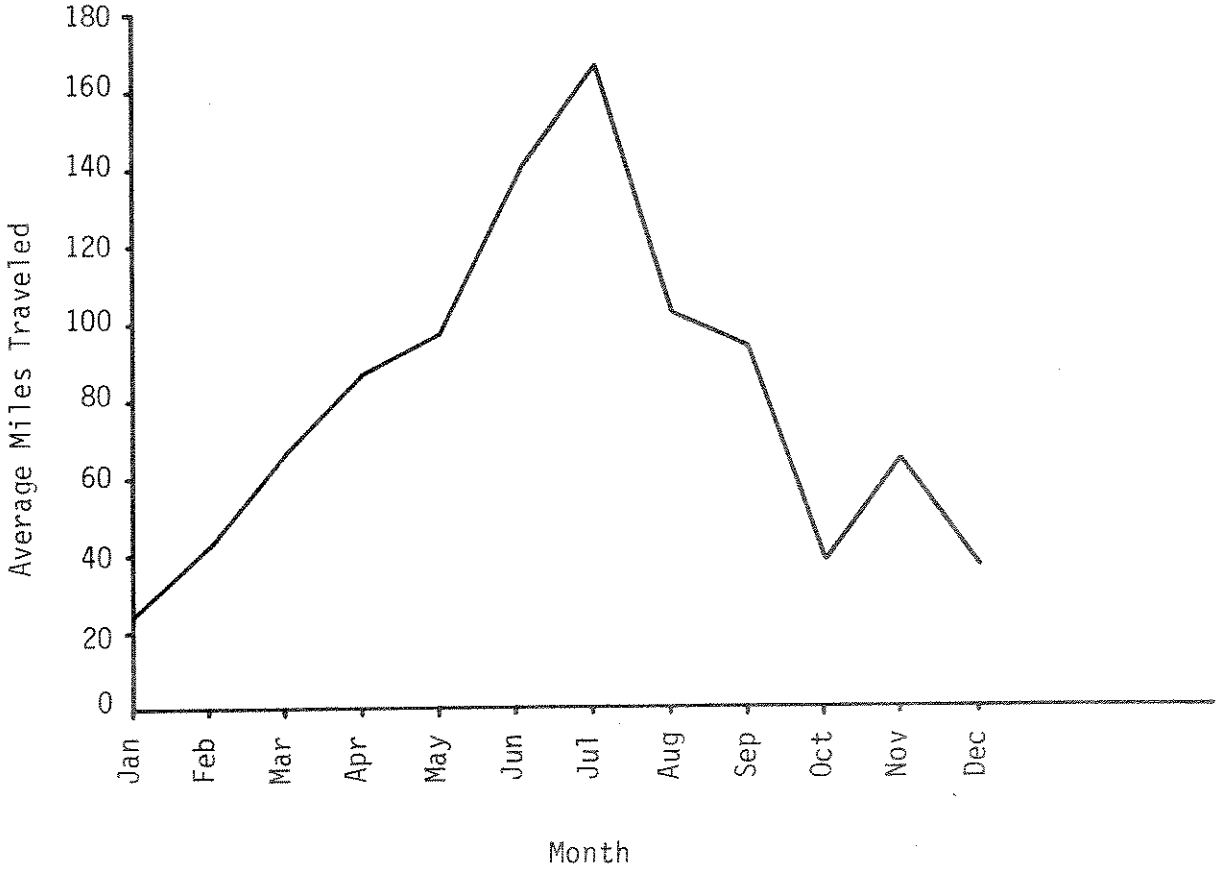

Figure 3. Monthly mean distance traveled to arrive at Flathead Lake for 1,477 angler parties interviewed from May 16, 1981 through May 14, 1982.

Table 7. Monthly distribution of bait types used by 3,154 angler parties interviewed on Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by month in parentheses.

Month	Number of parties interviewed (percent)					
	Bait	Fly	Lure	Combination	Snag	Total
Jan	19(22)	0(0)	31(35)	38(43)	0(0)	88
Feb	4(4)	0(0)	25(22)	82(74)	0(0)	111
Mar	0(0)	0(0)	63(27)	174(73)	0(0)	237
Apr	4(3)	0(0)	64(53)	534(44)	0(0)	121
May	20(9)	3(1)	176(82)	16(7)	0(0)	215
Jun	48(8)	3(0.5)	487(82)	54(9)	0(0)	592
Jul	18(3)	2(0.3)	463(78)	109(18)	0(0)	592
Aug	5(1)	0(0)	546(81)	126(19)	0(0)	677
Sep	3(1)	0(0)	253(74)	80(23)	6(2)	342
Oct	1(2)	0(0)	28(67)	1(2)	12(27)	42
Nov	7(11)	0(0)	24(39)	7(11)	24(39)	62
Dec	17(23)	0(0)	53(71)	5(7)	0(0)	75
TOTAL	146(5)	8(0.3)	2,213(70)	745(24)	42(1)	3,154

used lures (29%) or bait (19%). Most of the combination bait types used involved baited lures.

Shore Versus Boat Fishermen

Nearly 90% of the total interviews were conducted with boat fishermen. Shore fishermen comprised 0-24% of the interviews on a monthly basis. Ice fishermen comprised 7% of the total parties interviewed during December and 44% and 53% during January and February, respectively. These were the only three months which ice fishing occurred.

Boats were categorized into the type of fishery they were involved in for all months except June (Figure 4). "Kokanee boats" comprised nearly 90% of the summer boat fishery during July through September. "Bull-lake trout boats" were the dominant category during the rest of the year, generally making up 69-90% of the total boats surveyed. An exception occurred during March-April when the winter surge in the kokanee fishery resulted in temporary dominance by kokanee fishermen. Fishermen pursuing cutthroat, perch, or combinations of species generally made up 7-14% of the total boats for all months.

Over half of the boat anglers originating from other states, foreign countries, and Lake County were fishing for kokanee, while 57% and 58% of the boats from Flathead and Missoula counties, respectively, were fishing for bull and/or lake trout (Appendix B, Table 5). Flathead County anglers fished in greater numbers on the north end of the lake, whereas anglers from Missoula more commonly fished the south end.

Ice Fishing

The total of 106 ice fishing parties interviewed accounted for 639 hours from December, 1981 through February, 1982. Nearly 90% of these were in Skidoo and Polson bays on the south end of Flathead Lake. Skidoo Bay was the site of an intense winter kokanee fishery. Polson Bay was the center of winter perch fishing. Ice fishing primarily for bull trout and some whitefish also occurred on bays around the north end of the lake.

CATCH RATES AND COMPOSITION OF THE CATCH

Catch Rates

The overall total catch rate of gamefish and perch was 1.1 fish per hour. Generally catch rates is a good indicator of fishing quality for a specific fishery. However, analysis was complicated during any given time period because at least two and at times four species-specific fisheries were occurring on Flathead Lake with little overlap in resulting catch. Other factors including angler success, weather, fish size and local tradition also determined how fishing pressure was allocated amongst the various fisheries.

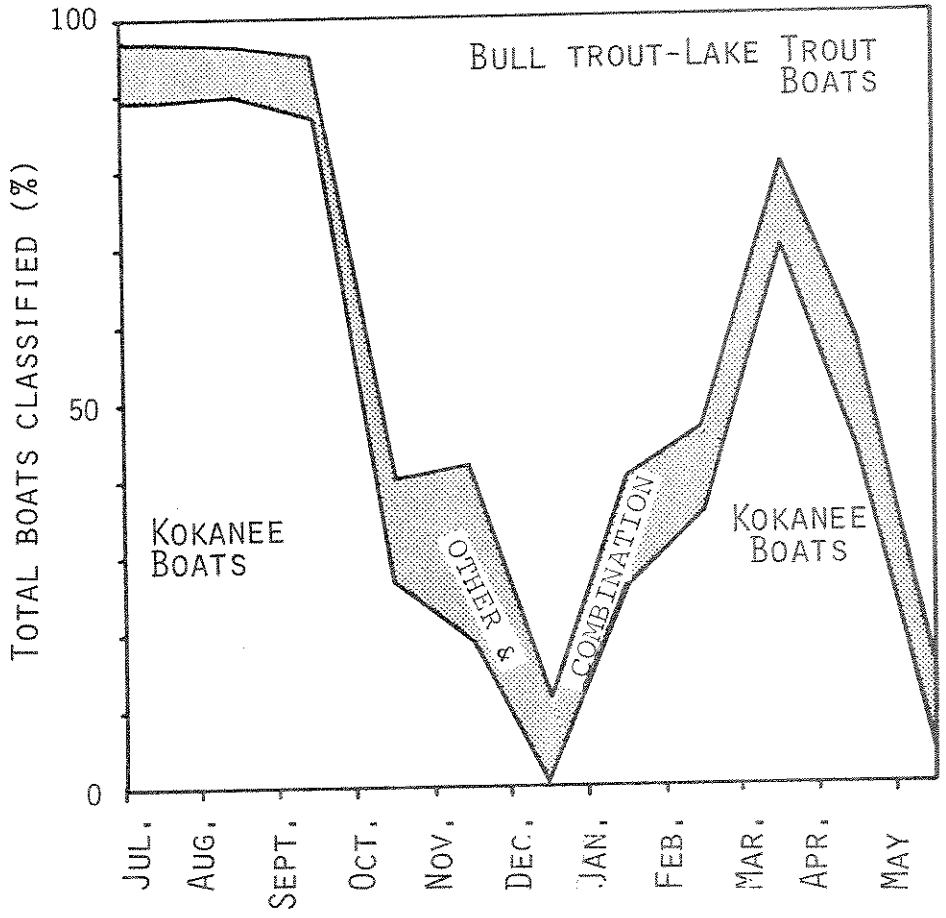

Figure 4. Monthly distribution of boat types for 1,399 boats classified by species of fish pursued on Flathead Lake from July 1, 1981 through May 14, 1982.

As a result, analysis of catch rates based on total pressure must be viewed with respect to trends in fishermen use. For example, the winter kokanee fishery resulted in a relatively large increase in pressure from February through March. Therefore, a lower proportion of the total pressure was allocated to bull trout fishing than in the fall producing substantially smaller catch rates for bull trout. The quality of the bull trout fishing had probably not changed, but lower catch rates were produced because kokanee fishermen seldom catch bull trout.

The catch rate for kokanee was high throughout most of the year with a peak during late winter (Table 8). Catch rates ranged from 0.6 to 0.9 fish per hour from June through October. Kokanee were generally taken on lures by anglers trolling with leaded line. Success was dependent on locating schools of kokanee.

Catch rates of kokanee decreased in the fall following the upstream spawning migration into the Flathead River. This period was followed by an intense, localized fishery from February through April. Average catch rates increased to 1.25 to 2.63 fish per hour during this period. Ice fishing was employed in February and boat fishing during March and April following ice-out.

Anglers that were interviewed caught 18,150 kokanee but released only 28. Therefore, the catch rate (0.97 kokanee per hour) was essentially the harvest rate.

The catch rate for boat fishermen specifically fishing for kokanee was 1.6 fish per hour, 68% higher than the overall catch rates. Catch rates for boat fishermen peaked during March with an average of 3.45 kokanee/hour.

The overall catch rate for bull trout was 0.02 fish/hour and peaked at 0.09 fish/hour in May (Table 9). Catch rates were highest during the April-May and October-November periods. Low catch rates for bull trout during February and March were probably a result of the dominant kokanee fishery.

The average catch rate for bull trout by boat anglers fishing specifically for bull or lake trout was 0.08 fish per hour, a four-fold increase over bull trout catch rate for all anglers. Peaks in catch rates by month still occurred in April-May and October-November ranging from 0.10 to 0.18 fish per hour.

Fishermen pursued bull trout more intensively on the north end seeking the concentrations of bull trout preparing to leave the lake on their upstream spawning migration (April-May) or after their return to the lake (October-November). These fishermen trolled the north end using large lures or plugs and monofilament line in relatively shallow water. The winter and summer fisheries generally occurred in deeper water.

Only 48% of the 361 bull trout caught were kept, the lowest proportion of any gamefish species. This was related to the 18-inch (457 mm) minimum

Table 8. Monthly kokanee catch and catch rate for anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Number of kokanee			Hours fished	Total kokanee per hour
	Kept	Returned	Total		
Jan	343	0	343	574.7	0.60
Feb	1,944	0	1,944	739.3	2.63
Mar	4,905	0	4,905	1,961.2	2.50
Apr	1,262	0	1,262	1,006.4	1.25
May	196	3	199	1,092.5	0.18
Jun	1,817	12	1,829	2,644.6	0.69
Jul	2,908	8	2,916	3,317.8	0.88
Aug	3,052	1	3,053	4,190.4	0.73
Sep	1,381	0	1,381	2,329.6	0.59
Oct	142	2	144	163.6	0.88
Nov	146	2	148	267.2	0.55
Dec	26	0	26	416.0	0.06
TOTAL	18,122	28	18,150	18,703.3	0.97

Table 9. Monthly bull trout catch and catch rate for anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Number of bull trout			Hours fished	Total bull trout per hour
	Kept	Returned	Total		
Jan	15	17	32	574.7	0.056
Feb	12	2	14	739.3	0.019
Mar	15	20	35	1,961.2	0.018
Apr	23	50	73	1,006.4	0.073
May	27	73	100	1,092.5	0.092
Jun	21	7	28	2,644.6	0.011
Jul	15	3	18	3,317.8	0.005
Aug	10	2	12	4,190.4	0.003
Sep	9	2	11	2,329.6	0.007
Oct	8	1	9	163.6	0.055
Nov	8	6	14	267.2	0.052
Dec	11	4	15	416.0	0.036
TOTAL	174	187	361	18,703.3	0.019

size limit imposed for this species.

Overall catch rates for lake trout of 0.02 fish/hour was the same as for bull trout. The highest catch rates occurred during the winter from November through January with consistently low catch rates during the summer from June through September (Table 10). Catch rate of lake trout by boat anglers fishing specifically for lake and bull trout was 0.09 fish per hour, a four-fold increase from the overall average. Catch rate by month was consistent, mostly ranging from 0.05 to 0.15 fish/hour. Lake trout do not migrate out of the lake for spawning and appeared to provide a stable year-round population for anglers to pursue.

The winter lake trout fishery was popular, particularly in the area off Yellow Bay. Considerable lake trout fishing also occurred in mid-summer and early fall particularly around Wild Horse Island. In general, lake trout fishing was a deep-water sport with wire line or downriggers used to fish at depths of 100 feet or more. Large plugs or lures were usually trolled near the bottom.

Anglers kept 69% of the lake trout they caught. Unlike bull trout, many of those released were larger fish. Lake trout less than 18 inches (457 mm) were seldom caught by anglers.

The combined catch rate of bull and lake trout by boat anglers fishing specifically for these two species was 0.17 fish per hour. The fish provided a substantial trophy fishery where fish over 10 pounds of both species were common and lake trout over 20 pounds were frequently caught.

The catch rate for cutthroat trout was 0.01 fish per hour (Appendix B, Table 6). Peak catch rates, up to 0.04 fish per hour, occurred during April-May and October. In general, this was the same pattern seen for bull trout.

As discussed previously, no distinct cutthroat fishery existed in Flathead Lake, particularly for boat fishermen. Rather, cutthroat were taken as an incidental species by fishermen pursuing bull trout or kokanee, usually by trolling. Cutthroat food habits in Flathead Lake were strongly keyed to terrestrial insects (Leathe and Graham 1981 and 1982). As a result, they frequented shoreline areas and were also fished for by shore anglers, particularly during the fall and spring. Anglers sampled kept over 99% of the cutthroat they caught.

The fishery for yellow perch was erratic with most of the sample catch coming during the months of January and May (Appendix B, Table 7). The overall catch rate for perch was 0.07 fish per hour. Fishermen catching perch kept 92% of what they caught. Ice fishermen caught most of the perch in the sample and during December-January they kept 99% of the fish they caught.

The catch of three whitefish species was small. Only 33 whitefish were reported caught during the entire year for an overall catch rate of 0.002 fish per hour. This occurred despite the fact that the three

Table 10. Monthly lake trout catch and catch rates for anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Number of lake trout			Hours fished	Total lake trout per hour
	Kept	Returned	Total		
Jan	16	4	20	574.7	0.035
Feb	21	1	22	739.3	0.030
Mar	24	32	56	1,961.2	0.029
Apr	13	1	14	1,006.4	0.014
May	25	11	36	1,092.5	0.033
Jun	26	20	46	2,644.6	0.017
Jul	23	8	31	3,317.8	0.009
Aug	19	4	23	4,190.4	0.005
Sep	7	4	11	2,329.6	0.005
Oct	2	0	2	163.6	0.012
Nov	9	5	14	267.2	0.052
Dec	39	10	49	416.0	0.118
TOTAL	224	100	324	18,703.3	0.017

species of whitefish are abundant in Flathead Lake (Leathe and Graham 1981 and 1982). A few anglers ice-fish for whitefish, but otherwise they were almost totally ignored. Of the 33 whitefish reportedly caught, 30 (or 91%) were kept.

Catch rates were compared by looking at the quadrant of the lake in which the anglers began their trip (Appendix B, Table 8). The highest catch rate for kokanee occurred in the southeast quadrant where anglers caught 1.6 kokanee/hour, twice as high as any of the other quadrants. As expected, the bull trout and cutthroat catch rate was highest for anglers originating their trips in the northwest quadrant of the lake, the primary area of focus for anglers pursuing these species. Lake trout catch rates were highest in the southeast quadrant, which includes most of the area fished during the winter near Yellow Bay.

"Kokanee boats" caught almost double the average catch rate for kokanee and "bull-lake trout boats" caught four to five times as many bull and lake trout per hour as the average and about twice as many cutthroat (Appendix B, Table 9). "Unclassified" and "other and combination boats" caught mixed species bags dominated by kokanee.

Shore and ice fishermen were grouped together, although they produced very different catch rates. Shore fishermen overall had the lowest total catch rate of any group, largely related to poor success in catching kokanee. Shore anglers did experience better than average success rates on bull trout and perch and average catch rates for cutthroat and lake trout. Ice fishermen, primarily in Skidoo Bay, experienced the highest catch rate for kokanee of any group at 2.7 fish per hour. Ice fishermen caught only two other species, bull trout and perch, both of which were caught at rates considerably higher than the overall angler average.

Lures were the dominant method used, making up two-thirds of the total hours sampled (Appendix B, Table 10). Three times as many kokanee/hour were caught on combinations (mostly baited lures) as on lures alone. Bull trout fishermen were apparently more successful using bait than lures. Lures were the most effective type of terminal tackle for catching lake trout.

Catch rates for kokanee by out-of-state (nonresidents) anglers were almost double the overall average (Appendix B, Table 11). Flathead County anglers experienced the highest catch rates for bull trout and cutthroat trout. Missoula anglers caught the most lake trout per hour whereas Lake County anglers were the most effective at catching yellow perch.

Species Composition of the Catch

Kokanee comprised 89% of the catch from Flathead Lake (Table 11). Yellow perch were the second most frequently caught species, comprising 6% of the catch. Other species caught were bull trout (2%), lake trout (2%), cutthroat (1%) and whitefish species (<1%).

Table 11. Species composition of angler catch by month from Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by month in parentheses.

Month	Number of fish (percent)						
	Kokanee	Bull trout	Lake trout	Cutthroat	Perch	Whitefish	Total
Jan	343(32)	32(3)	20(2)	2(<1)	680(63)	10(1)	1,087
Feb	1,944(94)	14(1)	22(1)	0(0)	73(4)	5(<1)	2,058
Mar	4,905(98)	35(1)	56(1)	10(<1)	0(0)	0(0)	5,006
Apr	1,262(91)	73(5)	14(1)	27(2)	6(<1)	3(<1)	1,385
May	199(31)	100(16)	36(6)	40(6)	260(41)	6(<1)	641
Jun	1,829(91)	28(1)	46(2)	37(2)	72(4)	5(<1)	2,017
Jul	2,916(95)	18(1)	31(1)	37(1)	74(2)	3(<1)	3,079
Aug	3,053(98)	12(<1)	23(1)	23(1)	0(0)	0(0)	3,111
Sep	1,381(97)	11(1)	11(1)	15(1)	10(1)	0(0)	1,428
Oct	144(91)	9(6)	2(1)	3(2)	0(0)	1(1)	159
Nov	148(84)	14(8)	14(8)	1(1)	0(0)	0(0)	177
Dec	26(14)	15(8)	49(25)	21(11)	82(42)	0(0)	193
TOTAL	18,150(89)	361(2)	324(2)	216(1)	1,257(6)	33(<1)	20,341

Kokanee composed over 90% of the catch during all but four months. During December, January and May, yellow perch were the most frequently caught fish species in the sample. Bull and lake trout made up 16% of the total catch during November.

The species composition of the catch by different shore and boat types further indicated the high degree of selectivity for kokanee. Kokanee comprised nearly 100% of the fish caught by boat fishermen specifically pursuing that species (Table 12). Bull trout and lake trout composed over 82% of the catch of boat fishermen fishing for these two species, while 11% of their catch was cutthroat trout. Boats designated as fishing for other species or combinations caught a variety of species. Overall, boat fishermen caught 93% kokanee and small numbers of all other species. Shore and ice fishermen caught 64% kokanee, 33% perch, and fewer numbers of other species. Most of the non-boat kokanee catch was taken through the ice during February.

Lures and combinations were the dominant bait-type for all the species (Appendix B, Table 12). Kokanee comprised over half the catch amongst groups of all origins (Appendix B, Table 13).

Catch Per Anglers Per Completed Trip

Another way to evaluate the success of anglers is the number of fish caught per angler per completed trip. This type of analysis can be used to assess the affect of number limits for a species on harvest. Analysis of 2,473 completed trips showed peak catch per trip occurred during different months for different species (Table 13). The overall average for kokanee was 4.3 fish per angler per trip. Catch increased to 9.9 and 11.4 fish per angler per trip in February and March, respectively.

Anglers fishing from boats exclusively for kokanee had an average catch rate of 11.4 kokanee per angler per trip. This increased to 15.0 kokanee per angler per trip in the winter (January-April) and decreased to 3.8 kokanee in the summer (July-September).

Bull trout catch per angler per trip averaged 0.1 fish and peaked at 0.3 and 0.4 fish per angler during April and May, respectively (Table 13). Lake trout catch also averaged 0.1 fish per angler per trip, peaking in November and December. Lake trout catch also averaged 0.1 fish per angler per trip. Catch was relatively consistent from November through May, but peaked in December at 0.4 fish per trip.

Catch per completed trip for 317 boat anglers fishing specifically for these species was four to five times higher than the overall average for bull and lake trout (Appendix B, Table 14). The number of bull trout per trip for these anglers was highest during April and May. Lake trout catch per trip was relatively constant although higher success was experienced during March and August.

The number of cutthroat caught per trip was less than 0.1 fish per hour for all months except May and December (Table 13). Cutthroat were largely an incidental species taken by kokanee anglers and bull trout

Table 12. Species composition of angler catch by shore and boat type from Flathead Lake during May 16, 1981 through May 14, 1982. Percentage by type in parentheses.

Shore/boat type	Number of fish (percent)						
	Kokanee	Bull trout	Lake trout	Cutthroat	Perch	Whitefish	Total
Shore/ice	1,846(64)	56(2)	14(1)	10(1)	945(33)	15(<1)	2,886
Kokanee boat	9,662(100)	9(1)	1(1)	30(1)	0(0)	3(<1)	9,705
Bull-lake trout boat	24(6)	161(40)	170(42)	46(11)	0(0)	1(<1)	402
Combination and other boat	569(61)	32(3)	30(3)	20(2)	280(30)	1(<1)	932
Undesignated	6,045(94)	103(2)	109(2)	110(2)	32(1)	13(<1)	6,412
Total boat	16,300(93)	305(2)	310(2)	206(1)	312(2)	18(<1)	17,451
TOTAL	18,150(89)	361(2)	324(2)	216(1)	1,257(6)	33(<1)	

Table 13. Monthly distribution of fish caught per angler per completed trip for 2,473 anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

	Number of fish per trip					
Month	Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch	Total anglers
Jan	2.9	0.2	0.2	0	3.3	120
Feb	9.9	0.1	0.1	0	0.4	169
Mar	11.4	0.1	0.1	<0.1	0	333
Apr	4.3	0.3	0.1	0.1	<0.1	185
May	0.2	0.4	0.1	0.2	2.0	127
Jun	2.5	<0.1	0.1	<0.1	<0.1	317
Jul	3.5	<0.1	<0.1	0.1	<0.1	381
Aug	2.5	<0.1	<0.1	<0.1	0	361
Sep	2.9	<0.1	<0.1	<0.1	<0.1	284
Oct	2.5	0.1	0	0.2	0	54
Nov	1.0	0.2	0.2	0	0	69
Dec	>0.1	0.2	0.4	0.3	1.1	73
AVERAGE	4.32	0.09	0.08	0.05	0.34	
TOTAL ANGLERS						2,473

fishermen. Occasionally, good catches of cutthroat were reported by shore anglers. An average of one in every 20 anglers caught a cutthroat.

The perch fishery on Flathead Lake was mostly localized in Polson Bay. Highest catch per trip occurred during January through the ice. Ice fishing was the most popular type of perch fishing during most of the year.

Catch per angler per completed trip by shore versus boat type exhibited the same trends reported by catch rate. Shore fishermen caught mostly perch and bull trout (Table 14). Ice fishermen were highly successful at catching kokanee in Skidoo Bay. "Kokanee boats" caught over 11 kokanee per trip, but very little else. Over 80% of the fish caught by "bull-lake trout boats" were target species. These anglers also had the highest success for cutthroat of any group, catching 0.12 cutthroat per trip per angler.

The highest numbers of kokanee per trip were caught by non-resident anglers with all other major origin groups being about equal (Appendix B, Table 16). Their high catch rate can be partially attributed to their success in the winter kokanee fishery. Flathead County residents had the highest catch rate for bull trout and Missoula residents the highest for lake trout.

Sizes of Fish Harvested

Kokanee

Length of kokanee harvested reflected seasonal changes in growth and distribution of fish. The size of kokanee remained similar during the winter period (January-April) which would be expected as growth slows over winter (Figure 5 and Appendix B, Table 17). Length frequency of fish in the catch during this period was also uniform with 92% of the fish between 290 and 340 mm in length (Figure 6).

Average size of kokanee in the catch did not increase until August and September as might be expected as growth was initiated (Figure 6). Morphological changes in male kokanee preparing for spawning also increases fish length during the fall. The impact of increased growth of three year old fish was partially off-set as two year old fish entered the fishery. Average length of kokanee in the catch was nearly identical between the winter (January-April) and summer (June-August) catch, but 23% of the fish were less than 290 mm and 21% were longer than 340 mm.

Average length of the catch increased into the fall with age three and four year-old kokanee making up the major portion of the catch. These fish were beginning to mature in preparation for spawning. Once these fish were removed from the fishery by harvest or death after spawning, the average size and maximum size decreased.

Cutthroat

The average length of cutthroat caught from April-December, 1981

Table 14. Distribution of fish caught per angler per completed trip for 2,449 anglers classified by shore/boat type on Flathead Lake during July 1, 1981 through May 14, 1982.

Shore/boat type	Total anglers	Number of fish per trip				
		Kokanee	Bull trout	Lake trout	Cutthroat trout	Yellow perch
Shore	290	5.4	0.1	0.02	0.01	2.0
Kokanee boat	493	11.1	0.01	0	0.01	0
Bull-Lake trout boat	318	0.1	0.4	0.4	0.1	0
Other & combination boat	111	2.2	0.2	0.1	0.1	2.2
Total boat	2,159	4.2	0.1	0.1	0.05	0.1
TOTAL	2,449	4.4	0.1	0.1	0.05	0.3

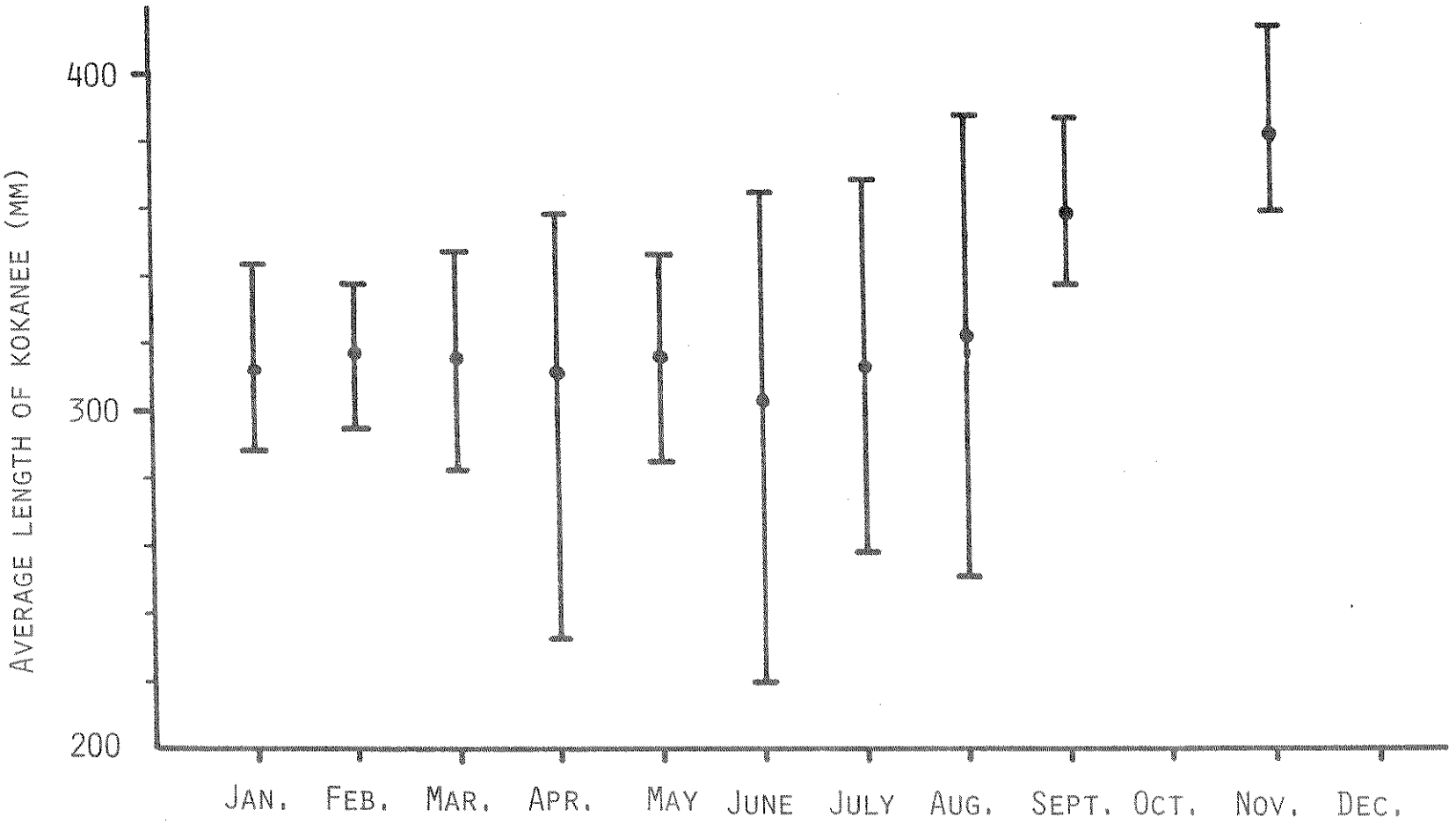

Figure 5. Mean monthly lengths and sizes of kokanee harvested from Flathead Lake by fishermen during the period May 16, 1981 through May 14, 1982.

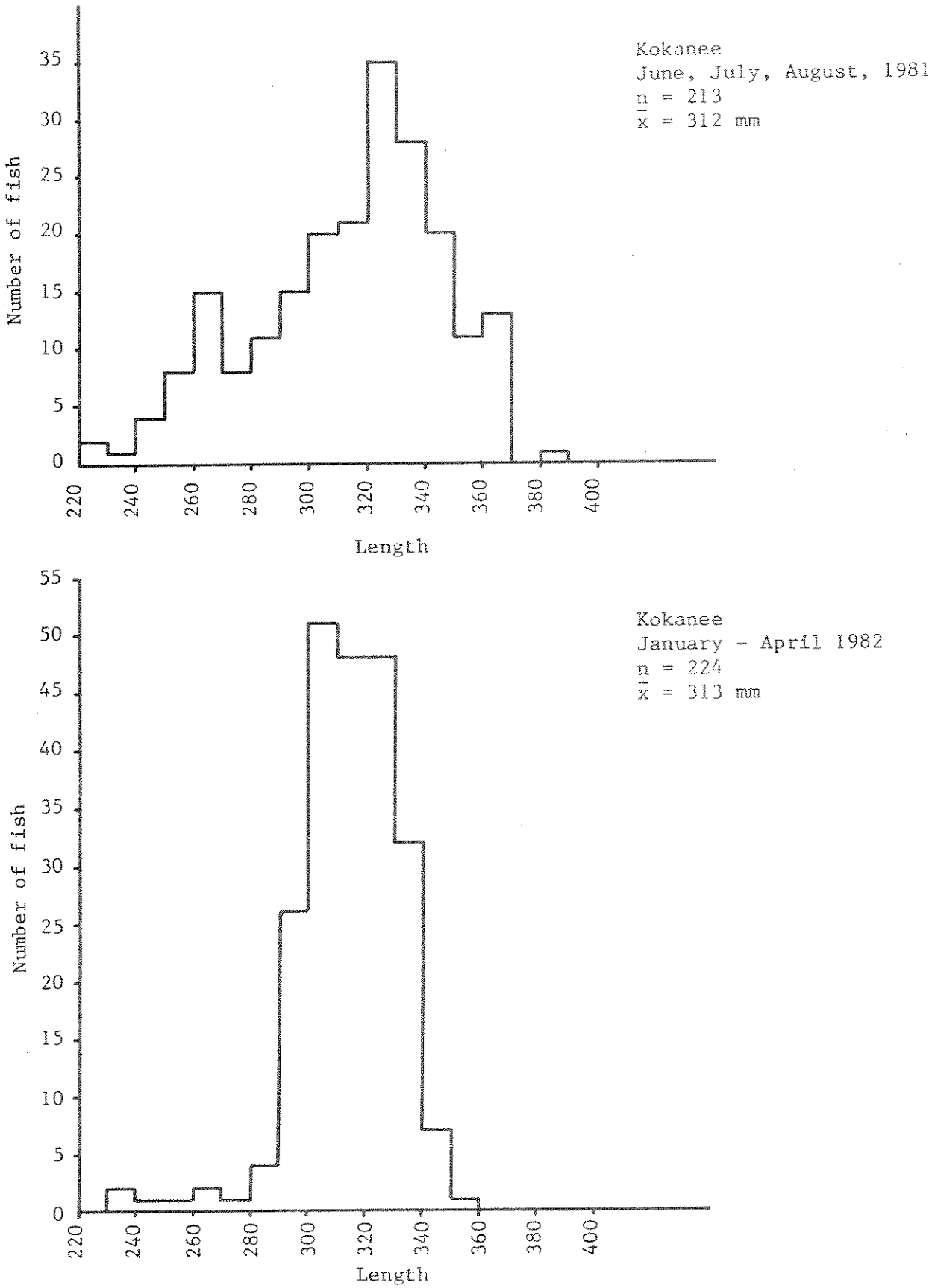

Figure 6. Length frequency comparisons of kokanee harvested by Flathead Lake fishermen during June-August, 1981 (top) and January-April, 1982 (bottom).

was 12.6 inches (320 mm). The length frequency of 56 westslope cutthroat trout was uniform in distribution (Figure 7). This was in part due to the variable time periods spent in natal streams by juvenile fish (1-4 years) and consequent variability in length of cutthroat of the same age class (Leathe and Graham 1981 and 1982). The size distribution of this sample reflects the catch as nearly all cutthroat caught were kept.

Bull Trout

The mean length of 50 bull trout harvest throughout the year was 22.6 inches (Figure 7). Only nine of these fish (18%) exceeded 24 inches (610 mm). The average length of 25 bull trout measured from May through November was 550 mm. During the period December-April, the mean length of 25 bull trout harvested was 602 mm, an increase of 52 mm over the summer period. The same phenomenon was noted in gill net catches from Flathead Lake (Leathe and Graham 1981 and 1982). It is likely the result of a portion of the population migrating to the river system during the summer to spawn.

The eighteen inch minimum size limit on bull trout required fishermen to release fish less than 18 inches (457 mm) long. Creel clerks noted that many bull trout released during this census were in the 14-17.9 inch (350-450 mm) range. As mentioned above, anglers kept only 48% of the bull trout they caught. A length frequency which included bull trout released would probably reveal a more bell-shaped distribution with the peak somehwere near the present 457 mm length limit.

Lake Trout

The mean length of 51 lake trout collected throughout the year was 795 mm (Figure 7). Although no minimum size limits are imposed for this species, the smallest specimen checked was 490 mm. The lake trout sample had relatively uniform length frequency (Figure 7). The average length of 37 lake trout harvested during the winter (November-March) was 833 mm. This was 136 mm larger than the average of 697 mm for fourteen lake trout harvested during June-August.

FISHING PRESSURE

Anglers on Flathead Lake fished an estimated 605,160 hours between May 16, 1981 and May 14, 1982. This represented 168,792 man-days of fishing pressure. Estimated pressure was equivalent to 365 angler days per square km of lake surface area or 1.34 angler days per acre.

Highest monthly pressure occurred during August, when 31% of the total estimated angler hours were expended (Figure 8 and Appendix B, Table 18). Five months (May-September) accounted for 81% and 79% of the total estimated fishing pressure by hours and angler days, respectively. Pressure increased steadily from May until August then declined through November. November had the least total pressure of any month. Pressure increased in February and March during the winter kokanee fishery.

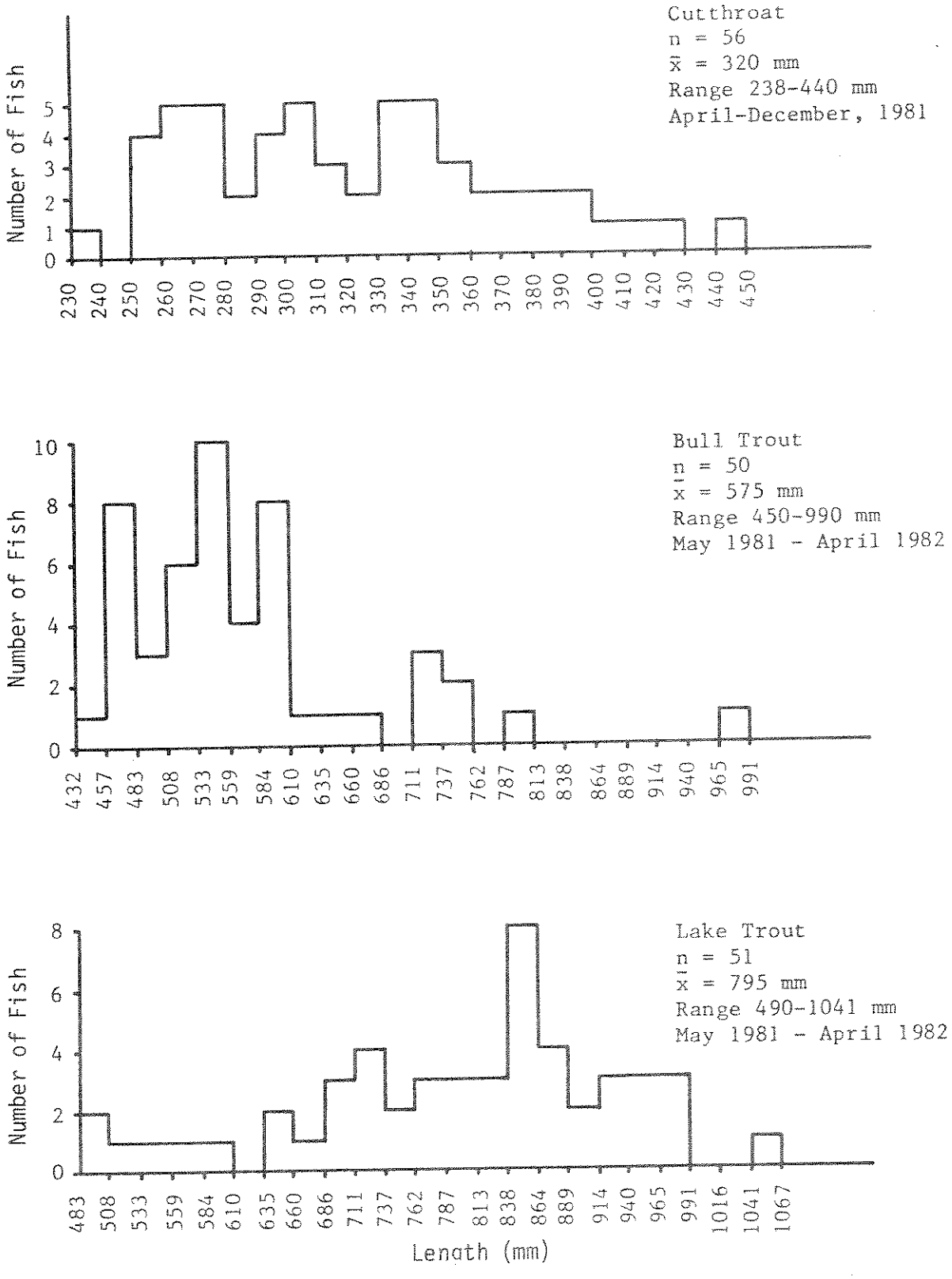

Figure 7. Length frequencies of 56 cutthroat trout (top), 50 bull trout (middle) and 51 lake trout (bottom) harvested by anglers from Flathead Lake during the period May 16, 1981 through April 30, 1982. Note that the length scales differ.

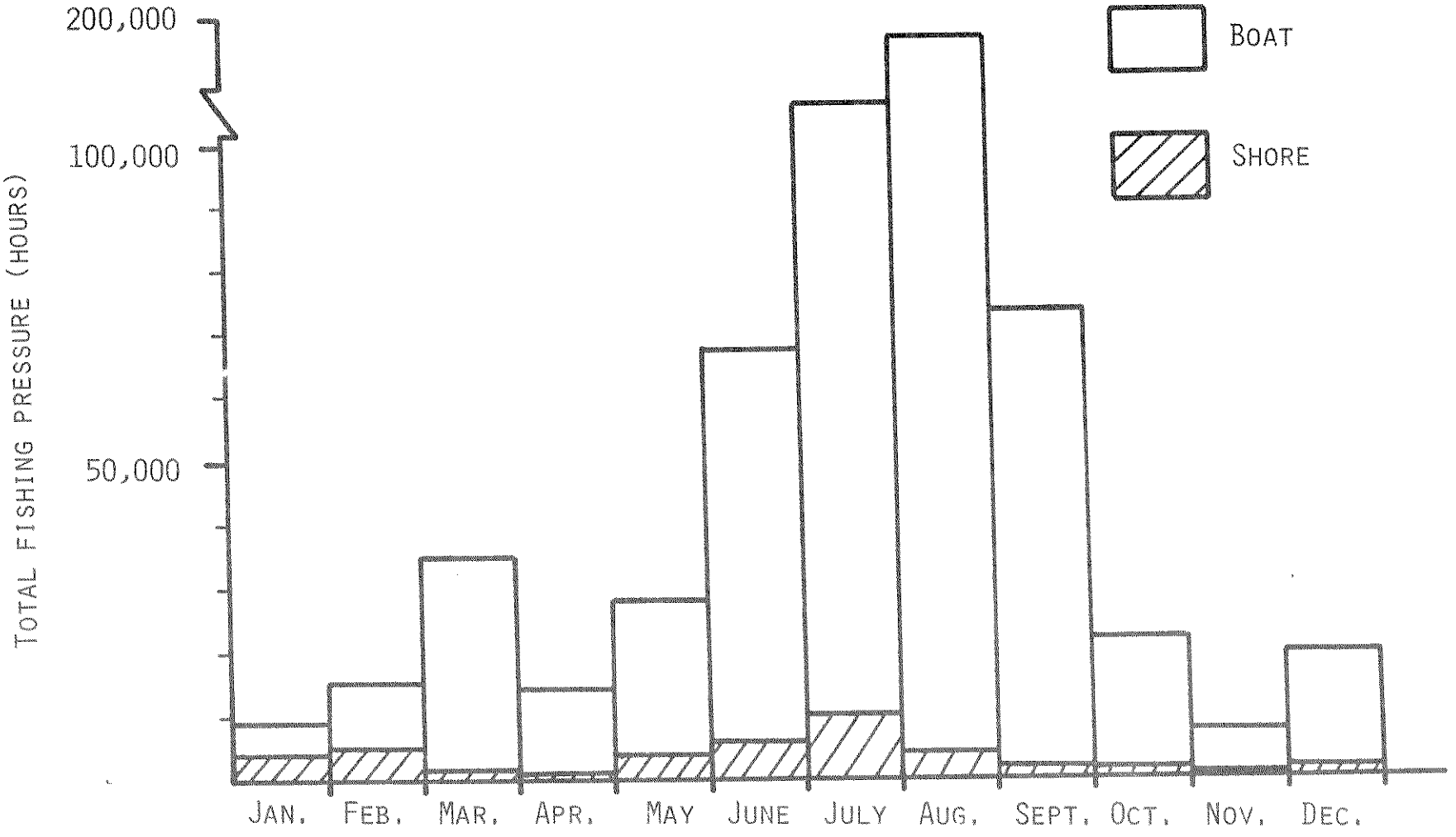

Figure 8. Total estimated fishing pressure (hours) by month for boat and shore anglers on Flathead Lake during May 16, 1981 through May 14, 1982.

The trend in man-days was basically the same as for total hours. The average length of an angler day varied from a low of 2.4 hours in October to a high of 4.3 hours during September (Figure 9 and Appendix B, Table 19). The overall average was 3.6 hours per angler day. Boat anglers averaged 3.8 hours per day which was over twice as high as the 1.9 hours per day for shore anglers.

Boat anglers were responsible for over 93% of the total estimated angler hours on Flathead Lake (Appendix B, Table 18) and almost 88% of the estimated man-days (Appendix B, Table 19). For the most part, the shore fishing pressure was less than 20% of the total pressure on a monthly basis. The two exceptions were the months of January and February.

Ice fishing from December through February accounted for nearly all of the estimated shore angler pressure. The estimates of ice fishing pressure were minimum estimates based only on the three areas of most intense use (Somers, Skidoo Bay, Polson Bay). Ice fishermen were responsible for 45% of the total fishing pressure during January, and 34% of the total estimated angler hours during February.

HARVEST

Total estimated harvest of gamefish on Flathead Lake was 536,870 (Table 15). Of this total, 495,910 (92%) were kokanee. The second most abundant fish was yellow perch (20,903 fish) accounting for 4% of the total harvest. Lake trout, cutthroat trout, and bull trout each made up about 1% of the total harvest with an estimated 6,947 lake trout, 6,910 cutthroat, and 5,452 bull trout ending up on the creel. The only other species to occur in the harvest in substantial numbers were white-fish, with an estimated harvest of 748 fish.

Kokanee comprised over half the harvest during every month of the year except January, May and December. Kokanee made up as much as 99% of the harvest during March. In general, kokanee harvest was highest during the months of highest pressure. Two monthly peaks in the kokanee harvest occurred during March and August. The first was an intense fishery during the month of March which contributed almost 17% of the total kokanee harvest for the year. The four summer months of June-September were responsible for 75% of the total estimated pressure and about 67% of the total kokanee harvest.

Over 94% of the kokanee harvested were caught by boat fishermen (Appendix B, Table 20). The only substantial harvest of kokanee by shore anglers was the nearly 23,000 caught by ice fishermen during the month of February (Appendix B, Table 21).

The total estimated harvest of bull trout was 5,452 fish (Table 14). At least 200 bull trout were estimated to have been harvested during every month of the year. The highest bull trout harvest occurred during spring and fall. October produced an estimated harvest of 1,061 bull trout, over 19% of the annual total. Bull trout anglers concentrated near the mouth of the Flathead River during the fall to catch fish returning

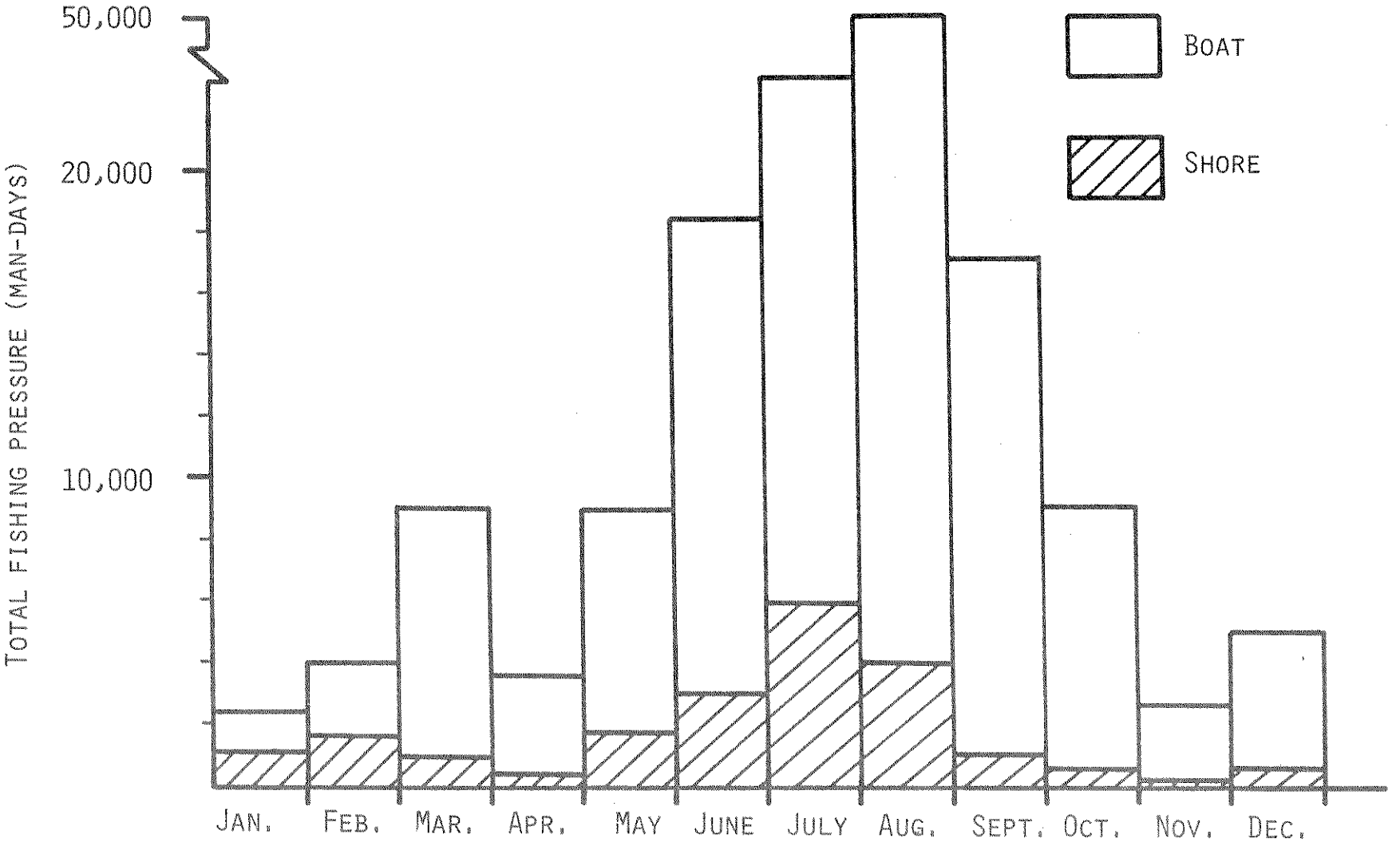

Figure 9. Total estimated fishing pressure (man-days) by month for boat and shore anglers on Flathead Lake during May 16, 1981 through May 14, 1982.

Table 15. Total estimated monthly harvest of six major fish species from Flathead Lake for the period May 16, 1981 through May 14, 1982.

Month	Number of fish						
	Kokanee	Bull trout	Lake trout	Cutthroat trout	Yellow perch	Whitefish	Total
Jan	4,787	233	223	28	9,363	166	14,800
Feb	29,874	222	598	0	578	97	31,369
Mar	83,435	255	408	170	0	0	84,268
Apr	17,168	348	177	367	0	45	18,105
May	5,320	687	509	986	4,989	145	12,636
Jun	46,353	508	659	900	732	125	49,277
Jul	106,620	549	843	1,398	3,833	37	113,280
Aug	136,588	443	842	1,020	0	0	138,893
Sep	42,615	277	216	431	0	0	43,539
Oct	18,775	1,061	265	392	0	133	20,626
Nov	3,342	289	325	36	0	0	3,992
Dec	1,033	580	1,882	1,182	1,408	0	6,085
TOTAL	495,910	5,452	6,947	6,910	20,903	748	536,870

from their spawning migrations up the Flathead River. The second highest estimated monthly harvest occurred during May. Eighty-nine percent of the total bull trout harvest was by boat fishermen.

The estimated lake trout harvest was 6,947 fish (Table 15). The peak months were February, June through August, and December. Nearly 90% of the boat fishing parties interviewed during December were classified as fishing for "bull-lake trout". Lake trout harvest during this month was 1,882 fish or 27% of the annual total (Table 15). Lake trout were the dominant fish in the creel during December. The June through August period produced 34% of the total harvest. Shore fishermen harvested only 3% of all lake trout creeled (Appendix B, Table 21).

The estimated total harvest of cutthroat trout was 6,910 fish (Table 15). Forty-eight percent of the cutthroat harvested were caught between June 1 and August 31. Observation had indicated that cutthroat were more readily caught during the spring and fall in conjunction with the peaks in the bull trout fishery. The small sample size of shore anglers in the spring and fall may have produced an underestimate of harvest during this period. There was also a peak in cutthroat harvest during December when nearly 1,200 cutthroat were estimated to have been creeled. Shore fishermen contributed 403 cutthroat to the total harvest (Appendix B, Table 21). This was about 6% of the total, in near proportion to the amount of pressure exerted by these shore anglers.

The second most common species in the harvest were yellow perch. There were essentially two distinct and highly localized fisheries for this species that produced an estimated harvest of 20,903 fish (Table 15). Both of these fisheries were localized in Polson Bay. The winter ice fishing period produced an estimated harvest of 11,349 perch, all by shore (ice) fishermen (Appendix B, Table 21). The other fishery occurred from May through July. An estimated 9,554 perch were harvested. Of this total, 49% were caught by shore fishermen (Appendix B, Table 21) and 51% by boat anglers (Appendix B, Table 20).

The estimated total harvest of whitefish on Flathead Lake was only 748 fish (Table 15). This total was evenly distributed from January through July with October being the only other month that whitefish harvest was recorded. About 65% of the whitefish harvested were caught by boat anglers (Appendix B, Table 20) and 35% by shore fishermen (Appendix B, Table 21). Most of the whitefish harvest by shore anglers was through the ice during January and February.

The only other gamefish species creeled by Flathead Lake anglers interviewed was rainbow trout. Identification of rainbow trout, as opposed to cutthroat and rainbow-cutthroat hybrids, was often uncertain and the numbers of rainbow caught were insufficient to calculate a harvest estimate. Their numbers are extremely small as indicated by gill net catches (Leathe and Graham 1982).

DISCUSSION

Comparisons between this survey, the 1962-63 survey (Robbin 1966) and Department statewide angler use surveys were difficult because of the different methods and the summary reporting used in the earlier surveys. Attempts to locate Robbins' original data were not successful. It was apparent during analysis that average or seasonal values were of limited value in comparisons between years. The fishery and fisherman population was characterized by specific seasonal fisheries in which the location, type of gear, success and origin of anglers varied considerably. The following comparisons should be viewed accordingly.

Catch rates of kokanee were higher in the 1981-82 survey (0.97 fish/hour) than in the 1962-63 survey (0.78 fish/hour). This occurred despite indications that kokanee numbers have declined in recent years (Fraley and Graham 1982, Hanzel, personal communication). Estimated harvest was 56% larger (178,810 fish) in 1981-82 than 1962-63 and use was 31% larger (39,792 man-days) in 1981-82. Harvest was smaller for cutthroat by 18% and bull trout by 55%, but larger for lake trout by 250% in 1981-82 than 1962-63. Average size of fish was 580 and 574 mm for bull trout, 345 and 320 mm for cutthroat and 742 and 795 mm for lake trout in 1962-63 and 1981-82, respectively.

Distribution of use between seasons was similar during the two census periods. Boat fishing comprised 93% of the use in 1981-82, but only 63% in 1962-63. A snagging fishery for kokanee was censused in 1962-63 during the spawning season producing catch rates of 2.4 fish per hour, but few snag fishermen were observed in the fall of 1981, a reflection of the low numbers of lakeshore spawners reported (Decker-Hess and Graham 1982). Conversely, a large number of anglers fished for kokanee in Skidoo Bay during the late winter of 1982, but this fishery did not occur in 1963.

Statewide angler mail surveys were conducted during 1968-69 and 1975-76 fishing seasons. These surveys are useful as trend estimates, but may not represent accurate use figures for a particular year. Use was 64,996 and 97,774 angler days in 1968-69 and 1975-76, respectively, compared to 129,000 and 168,729 in 1962-63 and 1981-82, respectively. The summer (May-September) use was 75%, 76%, 86% and 79% of the annual use in 1962-63, 1968-69, 1975-76 and 1981-82, respectively. No harvest data is available from the statewide surveys.

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APPENDIX A

Fishing Pressure Estimate Methodology Using Car Counters

APPENDIX A

Because the eight-step methodology used in expanding the car counter data to a fishing pressure estimate was developed specifically for this census, it is presented here in a more detailed discussion.

Step 1 - Reduction of Raw Counts

Weekly raw vehicle counts obtained from the car counters were separated into weekdays versus weekends by area and then were corrected by multiplying by a factor of "Proportion of Recreational Vehicles (RV's) ÷ 2". The proportion of recreational vehicles was determined by creel clerks as they monitored the areas. Only vehicles that actually used the area for recreational purposes were counted as RV's. Turnaround traffic, commercial vehicles, etc. were excluded. The division by two was necessary to correct for the fact that each counter was crossed twice by every vehicle, once on entry and then again on exit. During any weeks that the counters malfunctioned, the count for that period was estimated by interpolation. The three pneumatic counters were found to be less reliable than the eight electric ones, so a percent efficiency was determined for the pneumatic counters and factored into the equation. Pneumatic counters also had to be corrected by dividing by the numbers of axles per vehicle whereas the electric counters only counted once for each vehicle each time it crossed. The numbers of recreational vehicles counted was then summed to provide monthly totals for each monitored area. During the nonsummer period (9/8/81-5/14/82), all calculations were made on a monthly rather than a weekly basis. Overall, a total of 186,444 counts were registered by the car counters. After deducting for the various factors just described, the corrected RV count was 45,513, about 24.4% of the raw count total.

Step 2 - Reduction of corrected RV counts

The corrected RV counts by area and month were then entered into the computer for reduction for multiple counts. The first reduction accounted for anglers who crossed more than one counter. This was done on a monthly basis. People interviewed were asked what other sites they had entered to determine whether or not they had crossed more than one counter. All of the multiple crossing occurred during the period May-September when the maximum number of counters was being monitored. The total reduction for multiple counter crossings was about 11%, leaving an adjusted total of 40,950 RV counts.

The second reduction was to account for parties that crossed the same counter more than twice (entry and exit) during their stay. This was done on an area by month basis. Parties interviewed had been specifically asked how many round trips they had made across the counter. The result was a reduction of about 8½% to a final adjusted RV count of 37,730 recreational vehicles across the counters.

Step 3 - Anglers per vehicle

All interviews of parties who crossed car counters were analyzed to determine the number of anglers per vehicle. This was done separately for boat and shore anglers by area by month. This figure ranged from 0-2.9 boat anglers per vehicle and 0-1.2 shore fishermen per vehicle.

Step 4 - Angler days across counters

The number of RV's by area and month from Step 2 was multiplied by the number of boat and shore anglers per vehicle from Step 3 to arrive at total fishermen days across each counter by month, by boat versus shore. At this point, areas were combined for each month to yield monthly totals for both boat and shore anglers. It was found that the number of shore anglers interviewed that crossed counters was inadequate to yield a reliable estimate for all but the peak pressure months of May-September. Thus, shore pressure for the months of October-April was estimated by a different method (Steps 6 and 7 below).

This total of fisherman days across the counter did not take into account fishermen parties that were camping. They could produce more than one angler day despite crossing the counter only twice (entry and exit). It was found that the average fisherman party camping at state access areas actually fished an average 3.3 fisherman days. Since 21% of the angler parties crossing counters were campers, the total angler days across counters had to be inflated by multiplying through by a factor of (3.3 x .21) + .79 = 1.48; where .79 equals the proportion of one-day angler trips. The same adjustment was done for angler parties not crossing counters, but since most of the camping occurred at state-owned campgrounds, the inflation factor for angler parties not crossing counters was only 1.05.

Step 5 - Calculation of total fisherman days

At this point the calculation of total fisherman days on Flathead Lake became a matter of simple division. The total fisherman days across counts by month by boat and shore (Step 4) are divided by the proportion of shore or boat anglers during that month that crossed the counters. For boat anglers, this proportion ranged from a low of 6.2% that crossed the counters during March to a high of 38.7% that crossed during May. For the months of October-February, individual sample sizes were less than 100 and quite erratic, so an overall average of 11.4% was used for that period for boat anglers.

The sample of shore anglers was also small, so an overall average of 17.8 percent was used for the period of May-September during which the car counter method was employed to estimate shore pressure.

The net result of Step 5 was the total number of angler days on Flathead Lake (excluding shore fisherman pressure for the period not estimated).

Step 6 - Shore pressure for December-February

During the months that ice fishing occurred on the lake, a very low proportion of ice fishermen, who for the purposes of the census were treated as shore anglers, crossed the counters. Thus, a direct count method similar to that used on the Flathead River (Fredenberg and Graham 1982a and 1982b) was employed during this period to estimate pressure. The three main areas that ice fishermen used were Skidoo Bay, Polson Bay and Somers Bay (Figure 2). Random counts of ice fishermen were made in these three areas. The total number of anglers per count for each month was expanded by the number of days in the month times the number of hours per day of daylight to estimate total fisherman hours in the three areas (Neuhold and Lu 1957). These estimates of total fisherman hours were then divided by the number of hours per completed trip (from interviews) to calculate total angler days for each of the three months. Since only the three bays where ice fisherman pressure was most intense were included in this estimate, the total shore fishing pressure for December-February must be considered an underestimate of the total pressure.

Step 7 - Shore pressure for October, November, March and April

The previously described survey method used was inadequate to estimate the shore fishing pressure that occurred during nonsummer months. Since shore angler pressure was observed to be light and scattered around the lake no direct estimation technique was employed for the four months of October, November, March and April. For the months of May through September, the shore fishing pressure estimated by the car counter method ranged from 2.2 percent to 15.3 percent of the total boat pressure. The weighted average for these months was 5.5 percent. Thus, for the months of March, April and October-November, shore fisherman pressure was conservatively estimated to be 5% of the boat total. Although this represents only a crude approximation it was included to provide a more accurate total pressure estimate for the entire year. The 5% figure was conservative, therefore pressure for the year remained an underestimate. Overall, the four months estimated in this manner contributed only 9% of the total shore fisherman pressure and less than 1% of the total fisherman pressure on Flathead Lake. These estimated total hours were divided by the average number of hours per completed trip for anglers interviewed during this period to calculate fisherman days.

Step 8 - Fisherman days converted to pressure in hours

For all boat pressure estimates and the shore pressure estimates from May-September, the final step was to convert fisherman days into fisherman hours. For each month the average length of time fished (boat and shore separate) for parties interviewed with completed trips was multiplied by the estimated number of fisherman days to obtain the estimated total fisherman hours.

APPENDIX B

Table 1. Monthly distribution of party interviews at campgrounds/shore, boats on the lake and ice fishermen for the period May 16, 1981 through May 14, 1982 on Flathead Lake. Percentages by month in parentheses.

Month	Number of parties interviewed (percent)			
	Campground/ shore	From boat	Ice fisherman	Total
Jan	49(54)	1(1)	40(44)	90
Feb	47(42)	5(4)	61(54)	113
Mar	147(62)	90(38)	0(0)	237
Apr	90(74)	32(26)	0(0)	122
May	151(65)	82(35)	0(0)	233
Jun	247(41)	356(59)	0(0)	603
Jul	249(41)	355(59)	0(0)	604
Aug	186(27)	495(73)	0(0)	681
Sep	157(45)	191(55)	0(0)	348
Oct	36(86)	6(14)	0(0)	42
Nov	45(73)	17(27)	0(0)	62
Dec	46(61)	24(32)	5(7)	75
TOTAL	1,450(45)	1,654(52)	106(3)	3,210

Table 2. Monthly distribution of parties interviewed by boat clerk and the proportions who crossed car counters for the period May 16, 1981 through May 14, 1982 on Flathead Lake. Percents are in parentheses.

Month	Number of parties (percent)		Total
	Crossed counter	Did not cross counter	
Jan	0(0)	1(100)	1
Feb	0(0)	5(100)	5
Mar	14(16)	76(84)	90
Apr	12(35)	22(65)	34
May	33(45)	41(55)	74
Jun	72(20)	291(80)	363
Jul	85(22)	302(78)	387
Aug	125(25)	373(75)	498
Sep	57(30)	136(70)	193
Oct	2(33)	4(67)	6
Nov	1(6)	16(94)	17
Dec	4(17)	20(83)	24
TOTAL	405(24)	1,287(76)	1,692

Table 3. Distribution of fisherman hours by month for all angler parties interviewed on Flathead Lake during the period May 16, 1981 through May 14, 1982.

Month	Total hours sampled (percent)
Jan	574.7(3)
Feb	739.3(4)
Mar	1,961.2(11)
Apr	1,006.4(5)
May	1,092.5(6)
Jun	2,644.6(14)
Jul	3,317.8(18)
Aug	4,190.4(22)
Sep	2,329.6(13)
Oct	163.6(1)
Nov	267.2(1)
Dec	416.0(2)
TOTAL	18,703.3

Table 4. Distribution of bait types used by 1,720 angler parties who were classified by shore/boat type on Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by bait type in parentheses.

Bait type	Number of parties interviewed (percent)				
	Shore/ice	Kokanee boat	Bull-lake trout boat	Combination and other boat	Total
Bait	63(19)	1	42(15)	2(2)	108
Fly	4(1)	0	0	0	4
Lure	95(29)	739(76)	242(83)	98(74)	1,174
Combo	146(45)	227(23)	6(2)	32(24)	411
Snag	16(5)	7(1)	0	0	23
TOTAL	324	974	290	132	1,720

Table 5. Distribution of boat types classified by species pursued for 491 angler parties interviewed on Flathead Lake from July 1, 1981 through May 14, 1982. Percentages by column are in parentheses.

Shore/ boat type	Number of boats (percent)					
	Lake County	Flathead County	Missoula County	Other Montana	U.S. nonresident	Foreign
Kokanee boats	40(54)	68(30)	19(29)	14(40)	73(83)	4(67)
Bull-lake trout boats	21(28)	126(57)	38(59)	13(37)	10(11)	1(17)
Combination & other boats	13(18)	29(13)	8(12)	8(23)	5(6)	1(16)
TOTAL	74	223	65	35	88	6

Table 6. Monthly cutthroat trout catch and catch rate for anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Number of cutthroat Kept	Returned	Total	Hours Fished	Total cutthroat per hour
Jan	2	0	2	574.7	0.003
Feb	0	0	0	739.3	0
Mar	10	0	10	1,961.2	0.005
Apr	27	0	27	1,006.4	0.027
May	40	0	40	1,092.5	0.037
Jun	36	1	37	2,644.6	0.014
Jul	37	0	37	3,317.8	0.011
Aug	23	0	23	4,190.4	0.005
Sep	14	1	15	2,329.6	0.006
Oct	3	0	3	163.6	0.018
Nov	1	0	1	267.2	0.004
Dec	21	0	21	416.0	0.050
TOTAL	214	2	216	18,703.3	0.012

Table 7. Monthly yellow perch catch and catch rate for anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Number of perch			Hours fished	Total yellow perch per hour
	Kept	Returned	Total		
Jan	673	7	680	574.7	1.183
Feb	43	30	73	739.3	0.099
Mar	0	0	0	1,961.2	0
Apr	6	0	6	1,006.4	0.006
May	257	3	260	1,092.5	0.238
Jun	38	34	72	2,644.6	0.027
Jul	52	22	74	3,317.8	0.022
Aug	0	0	0	4,190.4	0
Sep	0	10	10	2,329.6	0.004
Oct	0	0	0	163.6	0
Nov	0	0	0	267.2	0
Dec	82	0	82	416.0	0.197
TOTAL	1,151	106	1,257	18,703.3	0.067

Table 8. Catch and catch rates by lake quadrant for the five major fish species caught by anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Quadrant	Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch	Total
Northwest						
Number of fish	2,885	186	66	86	2	3,225
Fish per hour	0.68	0.04	0.02	0.02	0.00	0.76
Northeast						
Number of fish	5,037	89	18	48	8	5,200
Fish per hour	0.82	0.01	0.00	0.01	0.00	0.84
Southwest						
Number of fish	974	45	40	49	265	1,373
Fish per hour	0.36	0.02	0.02	0.02	0.10	0.51
Southeast						
Number of fish	9,254	37	200	33	982	10,506
Fish per hour	1.65	0.01	0.04	0.01	0.18	1.87
TOTAL						
Number of fish	18,150	357	324	216	1,257	20,304
Fish per hour	0.97	0.02	0.02	0.01	0.07	1.09

Table 9. Catch and catch rates by shore/boat type for the five major fish species caught by anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Boat type	Hours fished	Number of fish (number per hour)				
		Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch
Unclassified boat	8,530.4	6,045(0.71)	103(0.01)	109(0.01)	110(0.01)	32(0.00)
Kokanee boat	5,942.2	9,662(1.63)	9(0.00)	1(0)	30(0.01)	0(0)
Bull-lake trout boat	1,929.4	24(0.01)	161(0.08)	170(0.09)	46(0.02)	0(0)
Combination & other boat	959.1	569(0.59)	32(0.03)	30(0.03)	20(0.02)	280(0.29)
Total Boat	17,361.1	16,300(0.94)	305(0.02)	310(0.02)	206(0.01)	312(0.02)
Shore	693.6	100(0.14)	25(0.04)	14(0.02)	10(0.01)	136(0.20)
Ice	638.6	1,746(2.73)	31(0.05)	0(0)	0(0)	809(1.27)
TOTAL	18,693.3	18,146(0.97)	361(0.02)	324(0.02)	216(0.01)	1,257(0.07)

Table 10. Catch and catch rates by type of terminal tackle used for the five major fish species caught by anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Bait type	Hours fished	Number of fish (number per hour)				
		Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch
Bait	689.0	231(0.34)	40(0.06)	9(0.01)	1(0.01)	117(0.17)
Fly	20.9	4(0.19)	0(0)	0(0)	0(0)	3(0.14)
Lure	12,295.8	7,865(0.64)	278(0.02)	296(0.02)	174(0.01)	252(0.02)
Combination	5,448.0	9,764(1.79)	41(0.01)	17(0.00)	35(0.01)	885(0.16)
Snag	174.3	203(1.16)	0(0)	0(0)	0(0)	0(0)
TOTAL	18,628.0	18,067(0.97)	359(0.02)	322(0.02)	216(0.01)	1,257(0.07)

Table 11. Catch and catch rates by angler origin for the five major fish species caught by anglers interviewed on Flathead Lake during May 16, 1981 through May 14, 1982.

Origin	Total hours	Number of fish (number per hour)				
		Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch
Lake County	2,021.8	1,258(0.62)	34(0.02)	44(0.02)	22(0.01)	904(0.45)
Flathead County	4,819.4	3,384(0.70)	192(0.04)	71(0.02)	86(0.02)	92(0.02)
Missoula County	1,639.5	816(0.50)	32(0.02)	76(0.05)	15(0.01)	30(0.02)
Other Montana	1,292.4	846(0.66)	16(0.01)	31(0.02)	16(0.01)	14(0.01)
US Nonresident	2,303.2	3,531(1.53)	12(0.01)	12(0.01)	34(0.02)	104(0.04)
Foreign	121.5	56(0.81)	4(0.03)	3(0.03)	0(0)	6(0.05)
TOTAL	12,197.8	9,891(0.81)	290(0.02)	237(0.02)	173(0.01)	1,150(0.09)

Table 12. Species composition of angler catch by type of terminal tackle used, from Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by type in parentheses.

Bait type	Number of fish (percent)						
	Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch	Mountain whitefish	Total
Bait	231 (56)	40 (10)	9 (2)	7 (2)	117 (28)	6 (2)	410
Fly	4 (57)	0 (0)	0 (0)	0 (0)	3 (43)	0 (0)	7
Lure	7,865 (89)	278 (3)	296 (3)	174 (2)	252 (3)	8 (<1)	8,873
Combo	9,764 (91)	41 (<1)	17 (0)	35 (<1)	885 (8)	18 (<1)	10,760
Snag	203 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (<1)	204
TOTAL	18,067 (89)	359 (2)	322 (2)	216 (1)	1,257 (6)	33 (<1)	20,254

Table 13. Species composition of angler catch by origin of anglers, from Flathead Lake during May 16, 1981 through May 14, 1982. Percentages by origin in parentheses.

Origin	Number of fish (percent)						
	Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch	Mountain whitefish	Total
Flathead County	3,384(88)	192(5)	71(2)	86(2)	92(2)	15(<1)	3,840
Lake County	1,258(55)	34(2)	44(2)	22(1)	904(40)	11(<1)	2,273
Missoula County	816(84)	32(3)	76(8)	15(2)	30(3)	1(<1)	970
Other Montana	846(92)	16(2)	31(3)	16(2)	14(2)	1(<1)	924
US Nonresident	3,531(96)	12(<1)	12(<1)	34(1)	104(3)	4(<1)	3,697
Foreign	56(80)	4(0)	3(4)	0(0)	6(9)	1(1)	70
TOTAL	9,891(84)	290(2)	237(2)	173(2)	1,150(10)	33(<1)	11,774

Table 14. Monthly distribution of bull trout and lake trout caught per angler per completed trip for 317 anglers fishing specifically for these species on Flathead Lake during August 1, 1981 through May 14, 1982.

Month	Number of anglers	Bull trout		Lake trout		Total bull trout and lake trout per trip
		Number caught	Number per trip	Number caught	Number per trip	
Jan	35	7	0.2	14	0.4	0.6
Feb	28	2	0.1	12	0.4	0.5
Mar	48	20	0.4	38	0.8	1.2
Apr	61	46	0.8	12	0.2	1.0
May	28	24	0.9	9	0.3	1.2
Jun	0	--	---	--	---	---
Jul	0	--	---	--	---	---
Aug	9	1	0.1	12	1.3	1.4
Sep	6	1	0.2	2	0.3	0.5
Oct	9	5	0.6	0	0	0.6
Nov	35	10	0.3	13	0.4	0.7
Dec	58	13	0.2	21	0.4	0.6
TOTAL	317	129	0.4	133	0.4	0.8

Table 15. Distribution of fish caught per angler per completed trip for 2,475 anglers classified by type of terminal tackle use on Flathead Lake during May 16, 1981 through May 14, 1982.

Bait type	Total anglers	Number per trip				
		Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch
Bait	135	1.4	0.2	0.1	0.02	0.2
Fly	5	0	0	0	0	0.6
Lure	1,172	2.2	0.2	0.2	0.1	0.2
Combo	1,113	7.0	0.03	0.01	0.02	0.5
Snag	50	2.3	0	0	0	0
TOTAL	2,475	4.4	0.1	0.1	0.05	0.3

Table 16. Distribution of fish caught per angler per completed trip for 1,963 anglers classified by origin on Flathead Lake during May 16, 1981 through May 14, 1982.

Origin	Total anglers	Number per trip				
		Kokanee	Bull trout	Lake trout	Cutthroat	Yellow perch
Flathead County	858	2.5	0.2	0.04	0.1	0.1
Lake County	347	2.3	0.05	0.1	0.02	1.8
Missoula	225	2.0	0.1	0.3	0.03	0.04
Other Montana	223	2.2	0.1	0.1	0.1	0.1
US Nonresident	297	8.3	0.02	0.04	0.1	0
Foreign	13	1.1	0.2	0.2	0	0.2
TOTAL	1,963	3.2	0.1	0.1	0.1	0.4

Table 17. Monthly mean lengths and size ranges of kokanee harvested from Flathead Lake by fishermen during the period May 16, 1981 through May 14, 1982.

Month	Number of fish	Average length (mm)	Range (mm)	
			Minimum	Maximum
Jan	92	312	288	345
Feb	20	317	294	338
Mar	53	316	282	348
Apr	58	311	232	359
May	6	316	285	346
Jun	74	302	220	365
Jul	63	313	257	368
Aug	87	321	250	387
Sep	15	357	335	385
Oct	0			
Nov	8	380	357	412
Dec	0			
TOTAL	476	315		

Table 18. Total estimated fishing pressure (hours) by month for boat and shore anglers on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Hours		
	Boat	Shore	Total
Jan	4,777	3,853*	8,630
Feb	9,995	5,221*	15,216
Mar	33,361	1,668**	35,029
Apr	13,402	670**	14,072
May	24,373	3,740	28,113
Jun	60,919	5,780	66,699
Jul	116,862	10,167	127,029
Aug	184,595	4,008	188,603
Sep	71,359	1,549	72,908
Oct	20,612	1,031**	21,643
Nov	7,254	363**	7,617
Dec	17,927	1,674*	19,601
TOTAL	565,436	39,724	605,160

* Ice fishing only in Skidoo, Polson and Somers bays.
** Estimated conservatively to be 5% of the boat total.

Table 19. Total estimated fishing pressure (man-days) by month for boat and shore anglers on Flathead Lake during May 16, 1981 through May 14, 1982.

Month	Man days		
	Boat	Shore	Total
Jan	1,188	1,189*	2,377
Feb	2,411	1,611*	4,022
Mar	8,017	916**	8,933
Apr	3,194	368**	3,562
May	7,292	1,716	9,008
Jun	15,437	3,000	18,437
Jul	31,868	5,903	37,771
Aug	46,789	4,007	50,796
Sep	16,061	1,032	17,093
Oct	8,485	566**	9,051
Nov	2,476	199**	2,675
Dec	4,550	517**	5,067
TOTAL	147,768	21,024	168,792

* Ice fishermen - Man-days based on three month average of 3.24 hours/ completed trip.

** Shore fishermen - Man-days based on nine-month average of 1.82 hours/ complete trip.

Table 20. Total estimated monthly harvest of six major fish species from Flathead Lake by boat fishermen for the period May 16, 1981 through May 14, 1982.

Month	Number of fish						
	Kokanee	Bull trout	Lake trout	Cutthroat trout	Yellow perch	Mountain whitefish	Total
Jan	4,787	84	223	28	0	0	5,122
Feb	7,095	114	598	0	0	57	7,864
Mar	83,435	255	408	170	0	0	84,268
Apr	17,168	286	177	367	0	14	18,012
May	4,994	606	509	945	4,460	145	11,659
Jun	45,464	308	615	744	154	103	47,388
Jul	106,461	549	843	1,319	256	37	109,465
Aug	134,773	443	842	1,020	0	0	137,078
Sep	42,480	277	216	431	0	0	43,404
Oct	17,630	1,061	265	265	0	133	19,354
Nov	2,997	289	325	36	0	0	3,647
Dec	844	563	1,745	1,182	0	0	4,334
TOTAL	468,128	4,835	6,766	6,507	4,870	489	491,595

Table 21. Total estimated monthly harvest of six major fish species from Flathead Lake by shore/ice fishermen for the period May 16, 1981 through May 14, 1982.

	Number of fish						
Month	Kokanee	Bull trout	Lake trout	Cutthroat trout	Yellow perch	Mountain whitefish	Total
Jan*	0	149	0	0	9,363	166	9,678
Feb*	22,779	108	0	0	578	40	23,505
Mar**	0	0	0	0	0	0	0
Apr	0	62	0	0	0	31	93
May	326	81	0	41	529	0	977
Jun	889	200	44	156	578	22	1,889
Jul	159	0	0	79	3,577	0	3,815
Aug	1,815	0	0	0	0	0	1,815
Sep	135	0	0	0	0	0	135
Oct	1,145	0	0	127	0	0	1,272
Nov	345	0	0	0	0	0	345
Dec*	189	17	137	0	1,408	0	1,751
TOTAL	27,782	617	181	403	16,033	259	45,275

* Partial estimate including ice fishermen only.
** No shore interviews were obtained for March.