FLATHEAD RIVER FISHERMAN CENSUS

By

Wade Fredenberg and Patrick Graham

Montana Department of Fish, Wildlife and Parks
Kalispell, Montana 59901

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EXECUTIVE SUMMARY

A census of fishermen was conducted on the mainstem Flathead River from Flathead Lake upstream to its confluence with the North Fork from May 16 through November, and on the North Fork to the Canadian border from May 16 through September 7. Information from this census was analyzed to determine use and harvest of gamefish and characteristics of the fisherman population. Data on use was collected by aerial survey and direct interviews.

Interviews were conducted on 1,245 parties on the mainstem and 604 parties on the North Fork. Total use was estimated at 115,727 hours (35,940 man-days) on the Flathead River and 21,911 hours (9,485 man-days) on the North Fork. Total harvest was 89,273 gamefish on the Flathead River with 86% kokanee, 10% cutthroat and 2% bull trout. Total harvest on the North Fork was 17,996 gamefish of which 91% were cutthroat, 6% whitefish and 2% bull trout.

The fishery and fisherman population was characterized by specific seasonal fisheries which reflected timing and distribution of migrating fish populations. Average annual values for the fishery do not reflect these variations. More specific information is presented in this report. In addition, the float fishery on three forks is presented. There were significant differences between the types of users and their relative success on the three forks. No estimates of use or harvest were made on the North Fork above the Canadian border, the Middle or South Forks of the Flathead River.

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INTRODUCTION

The present investigation was conducted by the Department of Fish, Wildlife and Parks as part of a five-year baseline inventory of the Flathead River Basin. The stated objectives were two-fold. First was to evaluate the use and economic value of water-based recreation in the Flathead system. This objective was met by combining data obtained through this river census, a census on Flathead Lake (Graham and Fredenberg 1982) and a study on economic values of recreation (Sutherland 1982). The second objective was to provide an accurate base of data on fisherman distribution and use and confirm seasonal patterns of movement and abundance of migratory gamefish populations. This objective was addressed in combination with the census of Flathead Lake and the fall kokanee fishery (Graham and Fredenberg 1982, Fredenberg and Graham 1982).

DESCRIPTION OF STUDY AREA

The Flathead River originates at the confluence of its North and Middle Forks along the western edge of Glacier National Park in northwest Montana (Figure 1). It then flows south for 15 km before being joined by the South Fork near the town of Hungry Horse. The Flathead River is then confined in a narrow canyon for 8 km until it reaches the town of Columbia Falls and enters the Flathead valley. The Flathead River enters the north end of Flathead Lake 89 km downstream from the junction of its North and Middle Forks. The gradient for the mainstem Flathead River averages 1.6 m/km above Columbia Falls and 0.4 m/km downstream from Columbia Falls.

The North Fork of the Flathead River arises in Southeast British Columbia and flows south into the United States (Figure 1). About 28 percent of the drainage area lies in Canada and contributes 32 percent of the mean annual discharge. The 94 km reach of the North Fork in the United States flows on a southerly course and forms the western boundary to Glacier National Park. There are at least 16 major tributaries to the North Fork in the United States, four of which drain major lakes in Glacier Park. The gradient of the North Fork is relatively uniform throughout, averaging 2.9 m/km on the United States side of the border.

The Middle Fork of the Flathead River originates at the northern end of the Bob Marshall Wilderness (Figure 1). It flows generally northwesterly through the Great Bear Wilderness and then on to its confluence with the North Fork. From Bear Creek downstream it forms most of the southern boundary of Glacier National Park. Numerous tributaries drain into the river from both sides. One of these, McDonald Creek, drains 6,800 acre Lake McDonald in Glacier National Park.

The gradient of the Middle Fork averages 4.9 m/km for the entire length. The lower reaches from the mouth to Harrison Creek and from Harrison Creek to Ole Creek have average gradients of 2.5 m/km and 3.2 m/km, respectively.

The South Fork of the Flathead River originates at the southeast end of the Bob Marshall Wilderness and runs through the heart of it before entering Hungry Horse Reservoir (Figure 1). The reservoir is a 65 km long impoundment backed up by 564 foot high Hungry Horse Dam which was closed in 1952. No fish passage facility exists. The South Fork above the reservoir has an average gradient of 3.9 m/km. The 8 km reach of the South Fork below Hungry Horse Dam is grossly altered by the dam and subject to extreme fluctuations in discharge. Fluctuations on the South Fork also cause considerable flow variation in the mainstem Flathead River below the junction of the South Fork.

The Swan River drains the Swan and Mission Ranges and flows north for 111 km to enter the northeast corner of Flathead Lake after flowing through 2,680 acre Swan Lake, which lies adjacent to Flathead Lake on the east. A twelve foot high power diversion dam at Bigfork, constructed

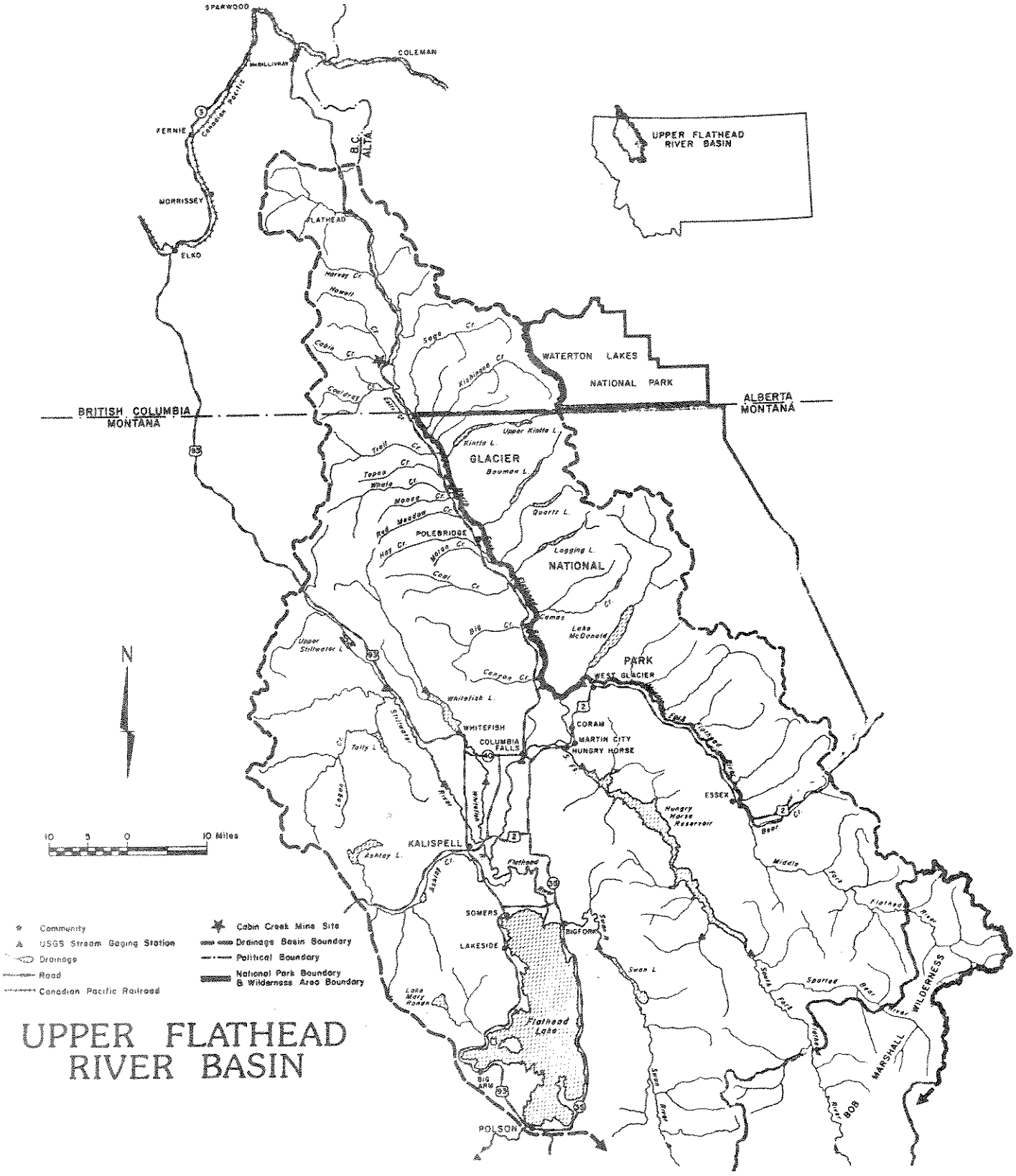

Figure 1. Map showing the general relationship of streams in the upper Flathead drainage and Flathead Lake.

in 1902, acts as a barrier for fish going upstream from Flathead Lake to the Swan drainage. A fish ladder exists here but due to design flaws it is not functional. Only 2 km of the Swan River lies below this dam.

A considerable amount of information on water temperatures, flows, geology, water quality, and land use in the Flathead River and its tributaries was summarized in earlier reports by the Department of Fish, Wildlife and Parks (Graham et al. 1980, Fraley et al. 1981, McMullin and Graham 1981, Perry and Graham 1981).

The three forks of the Flathead River are approximately equal in size with mean annual flows of 3,000-3,500 cfs (Table 1). The maximum flow of the Middle Fork during the catastropic 1964 flood was the highest on record and more than double that recorded on either of the other two forks (Table 1). The minimum flow of 7 cfs on the South Fork occurred during construction of Hungry Horse Dam. The normal operating regime of Hungry Horse Dam has allowed daily fluctuations on the South Fork from a low of 150 cfs to as high as 11,400 cfs in only a few hours with vertical fluctuations as great as 2.5 meters (McMullin and Graham 1981).

The three forks of the Flathead River were designated as part of the National Wild and Scenic Rivers System in 1976 (Figure 2). The North Fork was designated "Scenic" from the Canadian border downstream to Camas Creek and "Recreational" from Camas Creek to the confluence of the Middle Fork. The Middle Fork was classified as "Wild" from its headwaters downstream to Bear Creek and "Recreational" from Bear Creek to the confluence of the North Fork. The South Fork was designated "Wild" from its headwaters to Spotted Bear at the edge of the Bob Marshall Wilderness and "Recreational" from Spotted Bear downstream to the upper end of Hungry Horse Reservoir. The mainstem Flathead River from the confluence of the North and Middle Forks to the confluence of the South Fork was also designated "Recreational" river. The entire North Fork and the "Recreational" portions of the Middle Fork, South Fork, and mainstem Flathead flow largely through public land and offer easy and abundant access. There are at least 25 major public access sites on these rivers. The "Wild" portions of the Middle and South Forks flow through wilderness areas with well established trail systems which allow access by horseback or on foot. In addition, the upper Middle Fork is accessible by airplane from Schafer Meadows airstrip located about midway on the "Wild" Middle Fork.

During this study, the Flathead River system was divided into seven river segments, four on the mainstem and three on the North Fork. The four sections of the mainstem Flathead River range in length from 10.6 to 36.0 km and were numbered in upstream order starting from the mouth, ie. MS1, MS2, etc (Table 2, Figure 3). North Fork stream sections (NF) were also numbered in upstream order. The Middle Fork and South Fork were not censused as part of this study, but comparative data from studies are reviewed in this report (Fredenberg and Graham 1982b, McLaughlin et al. 1982).

There were at least 22 fish species present in the Flathead River upstream from Flathead Lake (Table 3). Bull trout, westslope cutthroat

Table 1. Discharges (cubic feet per second) and drainage areas of components of the Flathead River system (USGS 1981).

Drainage	Drainage area (km^2)	Avg. annual discharge flow(cfs)	Maximum flow(cfs)	Minimum recorded flow(cfs)
Flathead River near Polson	18,379	11,730	82,000	<5
Flathead River at Columbia Falls	11,562	9,743	176,000	798
North Fork near Columbia Falls	4,009	2,991	69,100	198
Middle Fork near West Glacier	2,9 2	2,942	140,000	<173
South Fork near Columbia Falls	4,307	3,566	46,200	7
Swan River near Bigfork	1,738	1,168	8,890	193

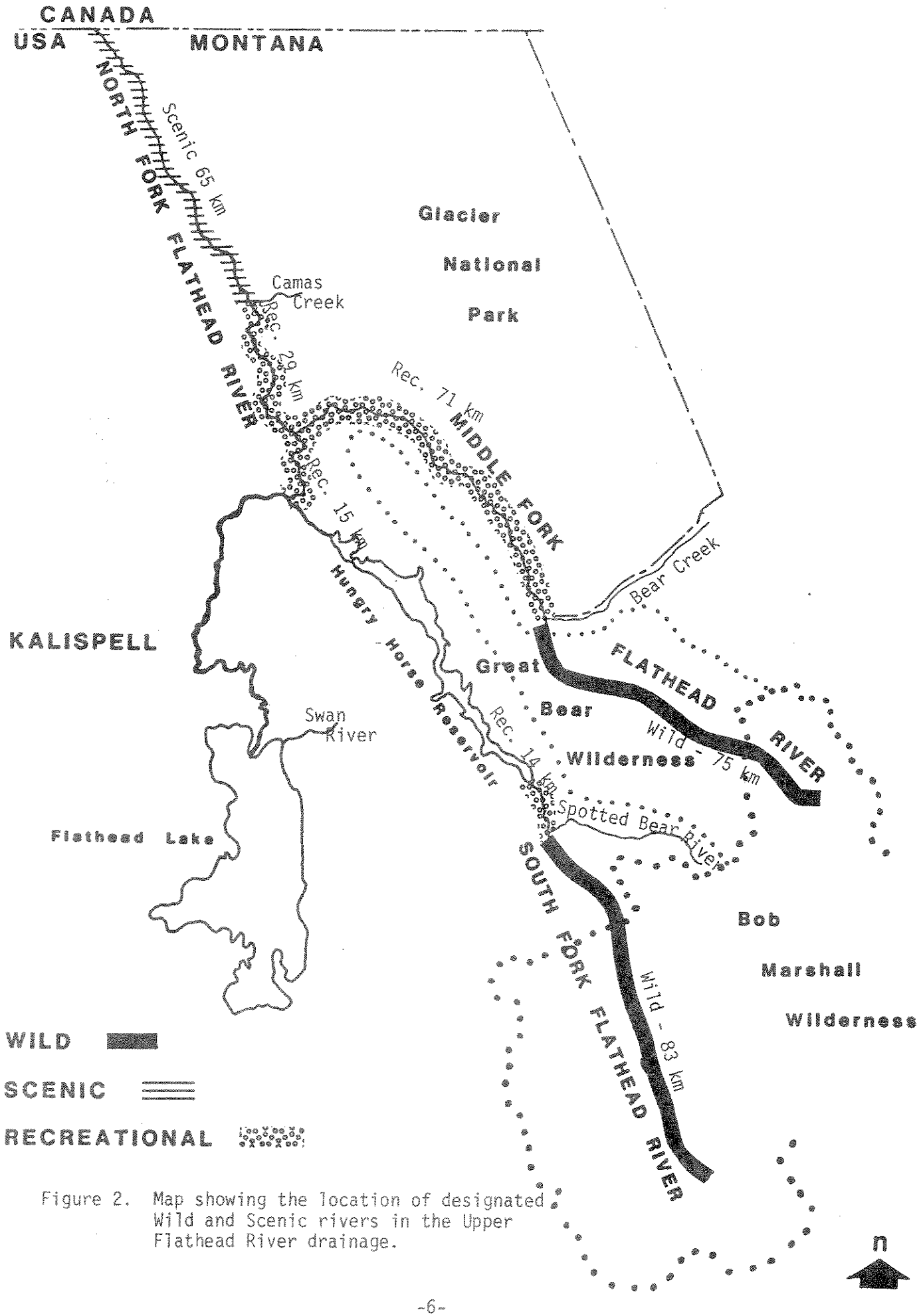

Figure 2. Map showing the location of designated Wild and Scenic rivers in the Upper Flathead River drainage.

Table 2. Reach descriptions, lengths, and abbreviations for river sections included in this study.

Reach Description	Abbreviation	Reach length	
		Kilometers	Miles
Flathead River - Flathead Lake to confluence of Stillwater River	MS1	36.0	22.4
Flathead River - Mouth of Stillwater River to Pressentine Fishing Access Site	MS2	19.0	11.8
Flathead River - Pressentine Access to State Highway 40 Bridge at Columbia Falls	MS3	10.6	6.6
Flathead River - State Highway 40 Bridge to confluence of North and Middle Forks	MS4	23.3	14.5
North Fork of Flathead - Confluence of Middle Fork to confluence of Camas Creek	NF1	29.4	18.3
North Fork of Flathead - Mouth of Camas Creek to confluence of Bowman Creek at Polebridge.	NF2	24.5	15.2
North Fork of Flathead - Mouth of Bowman Creek to U.S. - Canada Border	NF3	39.9	24.8
Middle Fork of Flathead - Confluence of North Fork to confluence of Harrison Creek	MF1	21.7	13.5
Middle Fork of Flathead - Mouth of Harrison Creek to confluence of Ole Creek	MF2	41.5	25.8
South Fork of Flathead - Mouth to Hungry Horse Dam	SF1	8.4	5.2

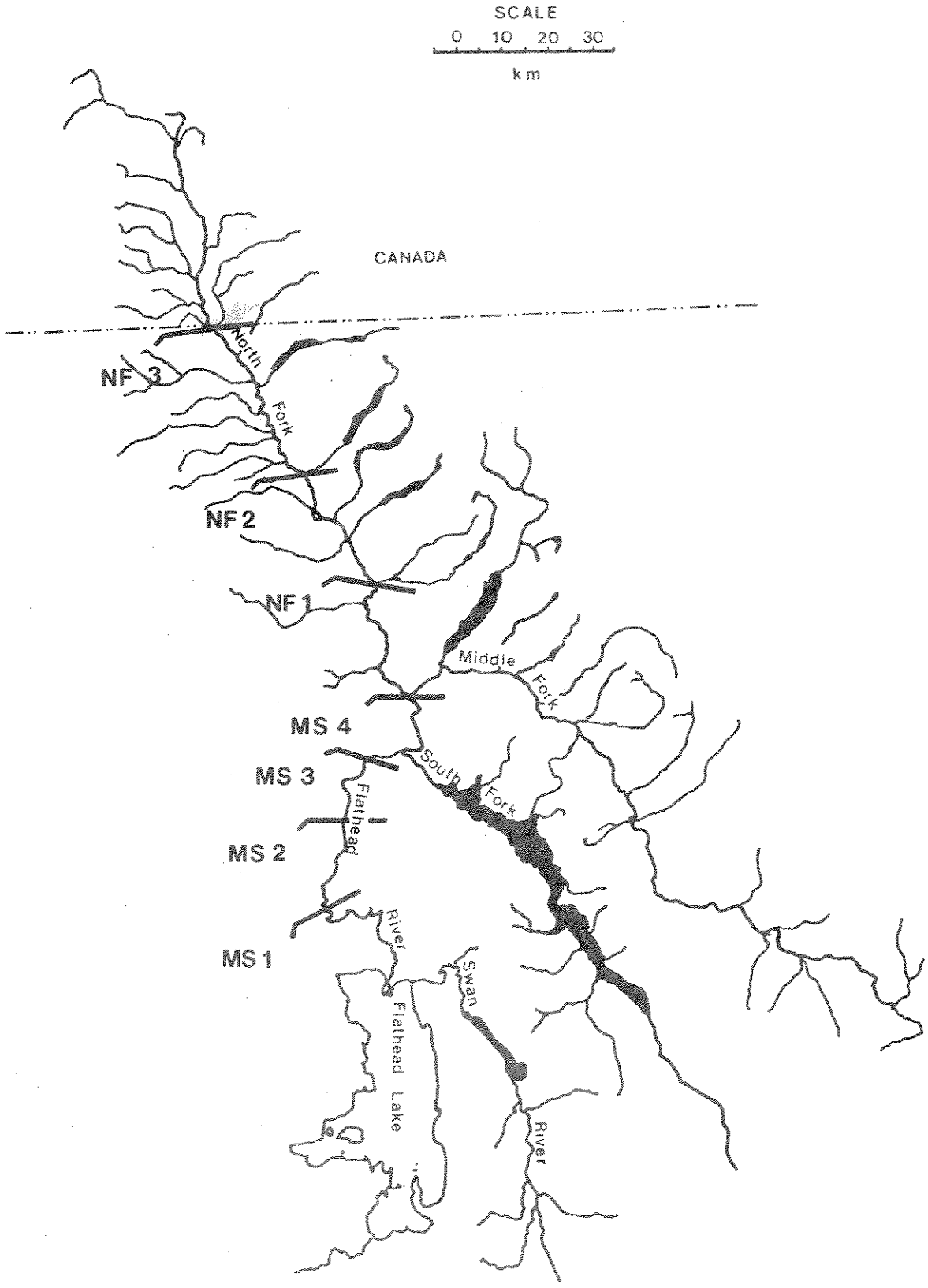

Figure 3. Study area. Map showing the locations of the 8 primary river sections included in this study.

Table 3. A list of fish species occurring in Flathead Lake and the Flathead River upstream from Flathead Lake and their relative abundance: C - common, U - uncommon, and R - rare.

Fish Species	Abundance	
	Mainstem Flathead River	Flathead Lake
Cutthroat trout	C	C
Westslope (*Salmo clarki lewisi*)	C	C
Yellowstone (*Salmo clarki bouvieri*)	R	R
Bull trout (*Salvelinus confluentus*)	C	C
Rainbow trout (*Salmo gairdneri*)	U	R
Brook trout (*Salvelinus fontinalis*)	R	R
Lake trout (*Salvelinus namaycush*)	R[1]/	C
Kokanee (*Oncorhynchus nerka*)	C[1]/	C
Lake whitefish (*Coregonus clupeaformis*)	U[1]/	C
Pygmy whitefish (*Prosopium coulteri*)	U[1]/	C
Mountain whitefish (*Prosopium williamsoni*)	C	C
Arctic grayling (*Thymallus arcticus*)	R	-
Slimy sculpin (*Cottus cognatus*)	C	C
Shorthead sculpin (*Cottus confusus*)	C	?
Mottled sculpin (*Cottus bairdi*)	?	?
Longnose sucker (*Catostomus catostomus*)	U	C
Largescale sucker (*Catostomus macrocheilus*)	C	C
Peamouth (*Mylocheilus caurinus*)	C	C
Northern squawfish (*Ptychocheilus oregonensis*)	C	C
Northern pike (*Esox lucius*)	R[2]/	R
Redside shiner (*Richardsonius balteatus*)	R[2]/	C
Largemouth bass (*Micropterus salmoides*)	R[2]/	U
Pumpkinseed (*Lepomis gibbosus*)	R[2]/	R
Yellow perch (*Perca flavescens*)	R[2]/	C
Black bullhead (*Ictalurus melas*)	R[2]/	R

[1]/ Refers to seasonal abundance.

[2]/ Common in some sloughs along the lower river.

trout and kokanee were the most important game species found in the river. A brief life history is presented for these three species.

FISH POPULATIONS AND FISHING REGULATIONS

Bull and Cutthroat Trout Life History

The bull trout population in the Flathead drainage was almost entirely adfluvial, living in a lake as subadults or adults and migrating into tributaries to spawn. The migratory pattern of bull trout was similar in the North and Middle Forks. These fish resided in Flathead Lake, began moving up the lower Flathead River in early spring, and arrived in their spawning tributaries from July through September. Most spawning occurred during September and early October after which spawners returned rapidly to Flathead Lake.

Three basic life history patterns have been identified throughout the range of westslope cutthroat trout. These patterns are migratory between lakes and streams, migratory from small tributaries to main rivers, and non-migratory stocks (Behnke 1979) which are referred to as adfluvial, fluvial and resident, respectively.

Adfluvial westslope cutthroat spawners began moving up the lower Flathead as early as October and probably moved into tributaries sometime in April or May. They spent a varying amount of time on the spawning grounds and most returned to the main river around the time of peak runoff. Adult adfluvial cutthroat were found entering North Fork tributaries in May (Fraley et al. 1982). Time spent in the river between the tributaries and Flathead Lake appeared to be quite variable. Snorkeling transects in the main North Fork showed very few adult adfluvial cutthroat remained in the river during July.

Juvenile cutthroat and bull trout spent from one to four growing seasons in the tributaries before moving into the main river. The majority spent two to three seasons in the tributaries. Adfluvial juvenile trout emigrated from streams in late spring and early summer. They may spend several months in the river before entering Flathead Lake.

The mainstem Flathead River from Flathead Lake upriver to the mouth of the Middle Fork was used by adfluvial cutthroat and bull trout adults primarily as a migratory corridor and as an overwintering area for cutthroat and juvenile bull trout. There was also seasonal utilization by adfluvial cutthroat and bull trout in response to increased food abundance in the lower river. A fluvial (resident) population of rainbow and possibly cutthroat trout were also present in the mainstem throughout the year.

The North and Middle Forks contained some adfluvial and fluvial cutthroat year-round. Adult adfluvial cutthroat, which were considerably larger than fluvial adults, were seldom caught in the North and Middle Forks after July, but juvenile adfluvials were abundant during the summer fishing season. Adult and juvenile bull trout were found in both the

North and Middle Forks throughout most of the general fishing season (May-November).

The North and Middle Forks contained very few of the less common species found in the lower river (Table 3). Species other than cutthroat and bull trout, kokanee, mountain whitefish, suckers and sculpins were rarely encountered by either fishermen or electrofishing crews. In all sections of the Flathead River system the most abundant species by far was mountain whitefish, a fish that anglers seldom utilized.

Kokanee Salmon Life History

Large numbers of migrating kokanee first appeared in the lower Flathead River during early September. Timing of the initial appearance was fairly constant, but the subsequent migration rate and abundance of kokanee has varied from year to year (McMullin and Graham 1981). Kokanee use the mainstem Flathead River as both a migration corridor and a spawning area.

Kokanee spawning occurred between mid-October and mid-December in the Flathead River system. Following spawning, the adults died. Eggs deposited in the gravel developed over the winter and fry emerged and moved downstream to Flathead Lake during the spring, primarily in April and May. After three to five growing seasons in the lake (four for the majority), the adult fish returned to the spawning grounds to complete the life cycle.

Kokanee spawning occurred throughout the mainstem Flathead in suitable areas, primarily in side channels and spring-influenced sloughs. Heavy mortality of spawned eggs occurred in the river downstream from the South Fork as well as the South Fork below the dam due to dewatering caused by fluctuating water levels from Hungry Horse Dam (McMullin and Graham 1981, Fraley and Graham 1982). A major portion of the kokanee migrated up the Middle Fork, the majority of which spawned in McDonald Creek in Glacier National Park. Some kokanee also spawned in the main Middle Fork and some of its other tributaries. Kokanee were seldom found above Nyack Flats on the Middle Fork which is just above Section MF1. Kokanee were rarely observed in the North Fork.

Fishing Seasons and Limits

The general stream fishing season in the Flathead River system was open from the third Saturday in May through the end of November. In 1981, this included 199 days from May 16 through November 30. The snagging season for kokanee was open from September 1 through December 31 except for the segment of the mainstem Flathead downstream from the South Fork which was closed by emergency order of the Fish and Game Commission after October 23, 1982. There was also an extended whitefish fishing season on all portions of the Flathead River system. Whitefish were the only species that could be kept from December 1 through March of 1982, but during this season the river received very little fishing pressure.

Each fisherman on the Flathead River system could take all of the following limits:

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

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

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

Various other limits applied to some of the gamefish species less frequently encountered on the Flathead River and its forks.

METHODS

RIVER FISHERMAN CENSUS

A partial creel census was conducted on Sections MS1, MS2, MS3 and MS4 of the mainstem Flathead River from May 16 through November 30, 1981, thus providing complete coverage of the 199-day open stream fishing season in Northwest Montana.

On the North Fork of the Flathead River (Sections NF1, NF2 and NF3), a partial creel census was conducted from May 16 through September 7, 1981, a total of 115 days which included 16 weeks plus the Labor Day weekend. This period included the majority of the annual fishing activity.

On the Middle Fork of the Flathead River (Sections MF1 and MF2), a partial creel census was conducted from September 12 to November 30, 1981, a total of 80 days including 11 weeks plus the final three days of the season. The purpose of this census was to gather data on the kokanee snag fishery which provided the majority of annual fishing pressure on the lower Middle Fork. The kokanee fishery was reported in Fredenberg and Graham (1982), but was also used in calculating pressure and harvest estimates in this report.

In summary, the mainstem Flathead River was censused throughout the fishing season with the North Fork censused through the summer and the Middle Fork during the fall. This schedule allowed censusing each stream during seasons of peak use.

Weekdays were treated separately from weekend days in setting up the sampling schedule. Four weekdays and three weekend days were chosen at random for each two-week sampling period resulting in half of the days being censused during the season on the mainstem Flathead.

Starting times were chosen at random with non-replacement within two week intervals to assure that counts and interviews were conducted during all the daylight hours. As the season progressed, the starting and ending times were adjusted to compensate for fewer hours of daylight. The holidays of Monday, May 25 (Memorial Day), Friday, July 3 (Independence Day), and Monday, September 7 (Labor Day) were all sample days and were treated as weekend days. The holidays of Wednesday, November 11 (Veterans Day) and Thursday, November 26 (Thanksgiving) were not scheduled sample days.

The basic creel census design was a modification of the method by Neuhold and Lu (1957). In river sections MS1 through MS4 (the mainstem Flathead River), aerial counts from a fixed-wing aircraft were made twice a day on all scheduled sample days, weather permitting, from May 16 through November 30. The time of flight was randomly chosen on the half hour between 7:30 a.m. and 7:30 p.m. The second flight of the day was six hours before or after the start of the first flight, depending on the hours of available daylight. All flights originated from Kalispell and

counts were conducted in upstream order. During the peak salmon fishing period of September 13 to October 30, flights were conducted three times a day at three hour intervals from a randomly selected starting hour.

In river sections NF1, NF2 and NF3 (the North Fork of the Flathead River), aerial counting flights were conducted only once on each sampling day from May 16 through September 7. This single daily count was conducted following one of the two lower river counts with random selection between early and late starting times, weather permitting. These counts were also made in upstream order.

With the onset of the fall kokanee spawning runs, there was a pronounced increase in fishing pressure associated with the Middle Fork of the Flathead River (Sections MF1 and MF2). In response to this, aerial flights on the North Fork, which does not support significant kokanee spawning runs, were terminated and counts were initiated on the Middle Fork. Counts were made three times daily at three-hour intervals on Section MF1 from September 14 through November 30, and on Section MF2 from October 9 through November 30.

All counts required less than fifteen minutes per section and thus are considered to be instantaneous in the analysis of the data. A normal flight from Flathead Lake to the U.S.-Canadian border, via the North Fork of the Flathead River during good weather conditions required about 45 minutes. Concentrations of fishermen or poor weather conditions occasionally required up to 1.5 hours flight time. Only those individuals seen actually fishing or with rods nearby were counted as fishermen. People associated with boats were considered to be boat fishermen even if they were fishing from the shore at the time they were censused.

Creel clerks worked eight 10-hour days during each two-week period. At least one creel clerk was on the ground during most scheduled count days. As fisherman use increased due to the kokanee run, up to three creel clerks were used. The majority of interviews by creel clerks were conducted in the mainstem Flathead River, Sections MS1-MS4.

Interview information was also collected to establish catch rates on the North Fork during May and the Middle Fork from September to November by Department of Fish, Wildlife and Parks creel clerks.

Creel clerks interviewed fishermen on a party basis with emphasis on the collection of complete trip interviews. Party representatives were asked questions about the number of anglers, where they were from, whether they fished from shore or used a boat, what type of terminal tackle they used, how many hours they had fished, and whether or not they were done fishing for that particular day. Information was also gathered on the number and species of gamefish kept as well as those released. Measurements of lengths of fish harvested was taken by the clerks as time allowed. In classifying bait types, "combinations" were considered to have been used if any combination of two types, such as baited lures, occurred. Also, any anglers who used two types, but at different times, such as bait in the morning and flies in the evening, were recorded as having fished with "combination".

People interviewed were also asked several questions about any other forms of water-based recreation they had engaged in on the Flathead (swimming, boating, etc.). Answers to these questions and others were used as part of a study on water-based recreational economics on Flathead River and Lake (Sutherland 1982).

Data obtained from interviews was recorded directly on coding forms and keypunched for computer analysis. Count information was also computerized. Analysis was done by the Department of Fish, Wildlife and Parks following the procedures of Neuhold and Lu (1957), using a computer program developed by the Department. Estimates were formulated on a monthly basis with weekdays and weekends lumped together after determining there were no significant differences between them. Pressure estimates were based on the average number of daylight hours available during the month under consideration (one-half hour before sunrise to one-half hour after sunset.

Monthly, seasonal, and overall catch rates were calculated as the number of fish caught divided by the total number of hours fished using the sample of anglers interviewed. Harvest rate was calculated using only those fish kept by anglers. The harvest was estimated by multiplying pressure by harvest rate for each stratum (month) and then adding the months together.

SUMMER RIVER BOAT USE

During 1980 and 1981 the University of Idaho Department of Wildland Recreation Management conducted a study of floater use and attitudes on the three forks of the Wild and Scenic Flathead River (McLaughlin et al. 1982). Partial funding for the project was provided by the Montana Department of Fish, Wildlife and Parks. During the course of that study, contact card surveys were conducted at floater put-in and take-out points along the North, Middle and South Forks of the Flathead River.

The 1981 survey was conducted over the 107-day peak floating season from May 24 to September 7. All floaters contacted were asked to fill out survey cards individually. Those contacted at take-out points that had finished their trips were given cards that asked several questions about fishing. These included questions on how many hours they had fished, what they caught, what they kept, and what was used as terminal tackle.

Results of the survey were totalled individually for each of five river sections then combined to give results for each of the three forks. No data were obtained for the Wild segment of the Middle Fork so results for the Middle Fork included only the lower Recreational section from Bear Creek downstream to the mouth. The entire upper South Fork from the headwaters to Hungry Horse Reservoir and the entire North Fork from the United States-Canadian border to its mouth were surveyed.

RESULTS

MAINSTEM FLATHEAD RIVER

Distribution of Fisherman Interviews and Characteristics of the Fisherman Population

A total of 1,245 fisherman parties were interviewed on the mainstem Flathead River during 1981. The distribution of these interviews and frequencies of responses to the various questions asked are contained in this section. Sample sizes varied because not all parties answered all questions. The responses summarized represent only the fisherman population that was sampled and not a random sample of the population at large. However, the sample is sufficiently large that the trends found in the sample should reflect the fisherman population as a whole.

Seventeen percent of the parties interviewed were snag fishermen pursuing kokanee. Because of the unique nature of this kokanee fishery, it was covered more extensively in a separate report (Fredenberg and Graham, 1982). The remainder of this report primarily addresses those anglers using conventional tackle (non-snagger). The pressure and harvest estimates, however, included all fishermen, snaggers and non-snaggers combined, because they could not be distinguished in aerial counts used to calculate these estimates.

Distribution of Party Interviews

Conventional (non-snagging) anglers made up 83% of all parties that were interviewed on the mainstem Flathead River (Section MS1-MS4). A total of 62% of the parties interviewed were in Section MS2, 18% in Section MS1, 17% in Section MS3 and 3% in Section MS4 (Table 4). The majority of party interviews by month were conducted on Section MS2 during May through August and Section MS1 during September through November. About 52% of the parties were interviewed during weekends and holidays and the other half during the week.

Distribution of Interview Hours and Length of Completed Trips

Conventional anglers that were interviewed fished 4,666 hours of which 56% occurred in Section MS2, the Flathead River section nearest to Kalispell (Table 5). These fishermen expended 23% of their effort in Section MS1, 19% in Section MS3 and 3% in Section MS4.

Monthly breakdown of the hours fished by those anglers using conventional tackle showed a fairly uniform decline from May to November (Table 5). May and June were popular months for bull trout fishermen. The decline in hours fished by conventional anglers during September-November was offset by a large increase in the number of kokanee snaggers (Fredenberg and Graham 1982). About 55% of the hours fished occurred during weekends and holidays and the remainder during weekdays.

Shore fishermen were responsible for 76% of the hours fished by conventional anglers and the remainder were by boat fishermen. Flathead

Table 4. Numbers of non-snagging fisherman parties interviewed and their distribution by area and month on the mainstem Flathead River during 1981.

Month	Number of parties interviewed (percent)				
	MS1	MS2	MS3	MS4	Total
May	38	158	39	4	239(23)
June	28	226	37	4	295(28)
July	0	120	72	16	208(20)
August	14	96	27	4	141(14)
September	46	21	1	0	68(7)
October	24	10	1	1	36(3)
November	38	13	0	0	51(5)
TOTAL	188(18)	644(62)	177(17)	29(3)	1,038

Table 5. Fisherman hours sampled and their distribution by area by month on four sections of the mainstem Flathead River during 1981. Includes non-snaggers only.

Month	Fisherman hours interviewed				
	MS1	MS2	MS3	MS4	Total
May	296.9	745.6	256.2	14.5	1,313.2
June	153.6	928.7	164.4	23.0	1,269.7
July	0	372.5	276.0	56.3	704.8
August	97.0	360.8	109.0	42.0	608.8
September	269.5	114.0	14.0	0	397.5
October	109.0	39.0	30.0	4.0	182.0
November	128.5	61.5	0	0	190.0
TOTAL	1,054.5	2,622.1	849.6	139.8	4,666.0

County residents accounted for nearly 85% of the hours fished. Residents from other areas of Montana produced only 5% of the total hours and non-residents (including foreigners) accounted for 10%.

Bait fishing was by far the most frequently used method comprising nearly 60% of the total sample hours. This was followed by lures (21%), combinations of bait, fly or lure (15%) and flies (4%).

The average length of time fished for completed trips was 5.5 hours per angler party (332 parties and 3.2 hours per individual angler (568 anglers). Average number of hours fished per angler per completed trip was also examined by area, month, tackle type, party size, angler origin and shore versus boat (Appendix Table 1). There was very little variation in average length of trip amongst these parameters. The greatest amount of variation occurred between months and may have been due in part to variations in sample size. It appeared as though bait fishermen, the majority of anglers in May and June, tended to fish longer than anglers using other types of tackle.

Party Size

The mean party size was 1.7 anglers (1,038 parties, 1,730 anglers). Party size ranged from one to eight (Table 6). Over half of the parties (52%) consisted of only one angler, but they made up only 31% of the total anglers interviewed. Nearly 43% of all anglers interviewed were in parties of two. The mean party size during the week was 1.6 anglers which increased slightly to 1.7 anglers per party on weekends and holidays.

Party sizes were calculated by area, month, bait type, angler origin and shore versus boat fishermen (Appendix Table 2). Party sizes amongst these parameters were quite uniform. The most notable exceptions were apparent trends to larger party sizes during midsummer (July-September) and for nonresident and boat anglers.

Angler Origin

Flathead County residents comprised 88% of the 1,034 parties interviewed compared to 5% for residents from other areas of Montana and 7% nonresidents. Residents of Flathead County made up 83-91% of the angler parties on each of Sections MS1-MS3, but only 45% of all parties on Section MS4; the sample size there was smaller.

The average distance from home for all angler parties was 70 miles. Flathead County residents averaged 13 miles from home, compared to 212 miles for other Montanans and 690 miles for nonresidents. Larger parties generally traveled further from their place of residence. Single-angler parties averaged 44 miles from home as compared to 90, 122 and 111 miles traveled for parties of 2, 3 and 4 or more anglers, respectively.

The mean distance traveled for fisherman parties increased from 10 miles in May to 32 miles in June and then held relatively constant at 130, 132 and 138 miles in July, August and September, respectively.

Table 6. Distribution of anglers by party sizes on the mainstem Flathead River during 1981. Snag fishermen not included.

Party size	Number of parties(%)	Number of individuals(%)
1	538(52)	538(31)
2	369(35)	738(43)
3	89(9)	267(15)
4	29(3)	116(7)
5	9(1)	45(3)
6	3	18(1)
7	0	0
8	1	8
TOTAL	1,038	1,730

It then dropped off again to 54 miles in October and 15 miles in November.

The mean distance traveled also increased in upstream order on the four river sections. On Section MS1 anglers traveled 54 miles on average versus 59 miles on MS2, 87 miles on MS3, and 329 miles on Section MS4.

Fishing Methods and Types of Terminal Tackle

Overall, 57% of the conventional anglers used bait, 21% used lures, 15% used some combination of the three types, and 7% used flies (Table 7).

The type of terminal tackle used by anglers followed a seasonal pattern. Bait fishing was dominant during the high runoff period of May and June. During the mid-summer months of July and August, there was a fairly even distribution between the four types of terminal tackle. During September and October, lures and combinations were used most frequently, excluding fishermen snagging for kokanee. During November, most of the anglers interviewed used bait.

A breakdown of terminal tackle types used by area (Table 8) showed that while bait was most popular in three of the four sections, it was especially dominant in Section MS2 where nearly two-thirds of all parties interviewed were bait fishing. Flies were used most frequently in Sections MS3 and MS4 and lures were popular in all but MS2.

A breakdown of tackle types by angler origin showed that 61% of parties of Flathead County residents used bait, 18% used lures, 14% used combinations and 7% used flies. By comparison, anglers from other areas of Montana and nonresidents used 33% bait, 41% lures, 22% combinations and 4% flies. Bait fishing was most common during the early part of the season when a very high proportion of the anglers were Flathead County residents.

Shore fishing parties used 69% bait, 14% lures, 12% combinations and 6% flies (830 total parties). Boat fishing parties by comparison used 48% lures, 31% combinations, 12% flies and only 9% bait (202 total parties).

Shore Versus Boat Fishing

Overall, 80% of the parties interviewed were shore fishermen (Appendix Table 3). On a monthly basis, boat use by non-snag fishermen peaked during September when 87% of the parties interviewed used boats. Boat use by parties during other months was 58% in October, 44% in August, 33% in November and 15% in July. During the high runoff periods of May and June only 1% and 4% of the parties interviewed, respectively, used boats.

The highest proportion of boat use by section occurred in Section MS1 where 43% of all parties interviewed used boats. This decreased in upstream progression to 15% in Section MS2, 14% in Section MS3 and

Table 7. Number and percent (in parentheses) of parties by month using bait, flies, lures and combinations on the mainstem Flathead River during 1981.

Month	Number of parties interviewed (percent)				Total
	Bait	Flies	Lures	Combinations	
May	235(98)	0(0)	2(1)	2(1)	239
June	235(80)	3(1)	44(15)	12(4)	294
July	51(25)	37(18)	67(32)	51(25)	206
August	30(22)	27(19)	39(28)	43(31)	139
September	2(3)	0(0)	45(67)	20(30)	67
October	6(17)	0(0)	13(36)	17(47)	36
November	30(59)	3(6)	4(8)	14(27)	51
TOTAL	589(57)	70(7)	214(21)	159(15)	1,032

Table 8. Number and percent (in parentheses) of parties by area using bait, flies, lures, and combinations on the mainstem Flathead River during 1981.

Area	Number of parties interviewed (percent)				Total
	Bait	Flies	Lures	Combinations	
MS1	93(50)	1(<1)	62(33)	31(17)	187
MS2	425(67)	40(6)	83(13)	92(14)	640
MS3	66(37)	25(14)	54(31)	31(18)	176
MS4	5(17)	4(14)	15(52)	5(17)	29
TOTAL	589(57)	70(7)	214(21)	159(15)	1,032

10% in Section MS4. Slightly over 18% of the angler parties from Flathead County used boats compared to 28% of parties from other origins.

A total of 45%, 39% and 34% of the parties using lures, combinations and flies, respectively, were fishing from boats, although only 20% of all parties used boats. However, only 3% of parties using bait were boat fishermen. Type of terminal tackle used by boat anglers differed from that preferred by shore fishermen even though most boat fishermen spent at least part of their trip fishing from shore.

Catch Rates and Composition of the Catch

Catch Rates

This section details the species composition of the catch and catch rates of fish by anglers on the mainstem Flathead River, excluding those snagging for kokanee. Overall, anglers interviewed caught 832 cutthroat (52%), 435 kokanee (27%), 277 bull trout (14%), 84 whitefish (5%) and 33 rainbow trout (2%) for a total of 1,611 fish.

Cutthroat catch rates fluctuated widely between months and areas. Overall, anglers interviewed caught 0.2 cutthroat per hour on the mainstem Flathead River (Table 9). The cutthroat catch rate in Section MS3 was over twice as high as any other section. August was the only month that cutthroat catch rates exceeded 0.5 fish per hour. The next highest monthly catch rates occurred in November, July and October. Cutthroat catch rates were less than 0.1 during May, June and September.

Kokanee catch rates were highest in Section MS1 (Table 10). Anglers caught an average of 0.5 kokanee per hour during the period kokanee were in the river (late August-November).

Bull trout catch rates were fairly consistent between months and sections. Anglers caught 0.05 bull trout per hour (Table 11). Catch rate of bull trout was highest in Section MS4 (0.11) followed by Sections MS1 (0.06), MS3 (0.05) and MS2 (0.04). May through August produced bull trout at about equal rates (0.04-0.06 per hour). Very few bull trout were caught during September and October. During November, Section MS1 produced the highest catch rate of any single month. These fish were probably spent spawners returning to the lake.

Catch rates for whitefish were very low with only 0.02 whitefish caught per hour (Table 12). They were fairly equally distributed between months and sections. It is suspected that because whitefish were not a popular gamefish that at least some of the whitefish caught and released were not reported to the clerks.

The 33 rainbow trout caught were also well distributed with some caught during every month and in every section of the mainstem Flathead River.

Table 9. Monthly cutthroat catch and catch rates (in parentheses) for anglers not using snagging hooks who were interviewed on Sections MS1-MS4 of the Flathead River during 1981.

Month	Numbers of cutthroat caught (catch rates per hour)				
	MS1	MS2	MS3	MS4	Total
May	1(0.003)	19(0.03)	14(0.05)	4(0.28)	38(0.03)
June	0(0)	26(0.03)	12(0.07)	0(0)	38(0.03)
July	----	111(0.30)	166(0.60)	12(0.21)	289(0.41)
August	1(0.01)	190(0.53)	116(1.06)	5(0.12)	312(0.51)
September	5(0.02)	10(0.09)	3(0.21)	-----	18(0.05)
October	33(0.30)	17(0.44)	0(0)	1(0.25)	51(0.28)
November	56(0.44)	30(0.49)	----	----	86(0.45)
TOTAL	96(0.09)	403(0.15)	311(0.37)	22(0.16)	832(0.18)

Table 10. Monthly kokanee catch and catch rates (in parentheses) for 169 angler parties not using snagging hooks who were interviewed on Sections MS1-MS4 of the Flathead River during August-November, 1981.

Month	Numbers of kokanee caught (catch rates per hour)				
	MS1	MS2	MS3	MS4	Total
August	28(0.29)	---	---	---	28(0.29)
September	311(1.15)	23(0.20)	1(0.07)	---	335(0.84)
October	38(0.35)	18(0.46)	15(0.50)	0(0)	71(0.39)
November	---	1(0.02)	---	---	1(0.01)
TOTAL	377(0.62)	42(0.20)	16(0.36)	0(0)	435(0.50)

Table 11. Monthly bull trout catch and catch rates (in parentheses) for anglers not using snagging hooks who were interviewed on Sections MS1-MS4 of the Flathead River during 1981.

Month	Numbers of bull trout caught (catch rates per hour)				
	MS1	MS2	MS3	MS4	Total
May	33(0.11)	23(0.03)	6(0.02)	5(0.34)	67(0.05)
June	6(0.04)	41(0.04)	6(0.04)	4(0.17)	57(0.04)
July	----	7(0.02)	25(0.09)	5(0.09)	37(0.05)
August	0(0)	31(0.09)	6(0.06)	1(0.02)	38(0.06)
September	0(0)	0(0)	0(0)	----	0(0)
October	4(0.04)	0(0)	0(0)	0(0)	4(0.02)
November	24(0.19)	0(0)	----	----	24(0.13)
TOTAL	67(0.06)	102(0.04)	43(0.05)	15(0.11)	227(0.05)

Table 12. Monthly whitefish catch and catch rates (in parentheses) for anglers not using snagging hooks who were interviewed on Sections MS1-MS4 of the Flathead River during 1981.

Month	Numbers of whitefish caught (catch rates per hour)				
	MS1	MS2	MS3	MS4	Total
May	0(0)	5(0.01)	6(0.02)	1(0.07)	12(0.01)
June	0(0)	13(0.01)	2(0.01)	0(0)	15(0.01)
July	----	18(0.05)	0(0)	0(0)	18(0.03)
August	0(0)	25(0.07)	6(0.06)	0(0)	31(0.05)
September	4(0.01)	0(0)	0(0)	----	4(0.01)
October	1(0.01)	0(0)	0(0)	0(0)	1(0.01)
November	0(0)	3(0.05)	----	----	3(0.02)
TOTAL	5(.005)	64(0.02)	14(0.02)	1(0.01)	84(0.02)

Catch rates of the various species by tackle type shows some interesting relationships (Appendix Table 4). Kokanee were caught almost exclusively on lures and combinations. Cutthroat, on the other hand, were taken most readily on flies. Although the overall cutthroat catch rate was only 0.2 fish per hour, fly fishermen landed 1.7 fish per hour. Bull trout were mostly caught on lures and bait, with lures being slightly more effective. Whitefish were caught with about equal effectiveness on all types of tackle.

Examination of catch rates by anglers originating from different parts of the country showed nonresidents had the highest overall success (Appendix Table 4). Catch rates of kokanee by nonresidents were almost five times higher than for Flathead County anglers and six times higher than for other Montanans. This may be due to the increased concentration of nonresidents during the kokanee run. Nonresidents also caught cutthroat at twice the rate of local anglers.

Boat anglers had higher catch rates than shore anglers for all species except bull trout (Appendix Table 4). Despite boat anglers making up a small share of the total sample, they caught almost 96% of the kokanee recorded, and caught them at a rate of 37 times as high as shore fishermen. However, this sample did not include snag fishermen. The cutthroat catch rate for boat anglers was 2.5 times higher than for shore fishermen. Bull trout catch rates were about equal for both shore and boat anglers. Boat anglers also caught four times as many whitefish per hour as did anglers not using boats.

Proportion of the Catch Harvested

The proportion of the catch that was kept varied considerably between species. Virtually all kokanee caught were kept. Anglers also kept 30 of 33 rainbow trout (91%) and 65 of 84 whitefish (77%).

Of 832 cutthroat caught, 56% were kept (Appendix Table 5). This figure, however, requires further examination. During the spring (May, June) and fall (September-November), the anglers interviewed kept 90% of the 231 cutthroat they caught. During the July-August period anglers kept only 43% of 601 cutthroat caught. This disparity can be partly attributed to the sizes of fish being caught. During the months of spring runoff (May-June) and in the fall a substantial portion of the catch were large, migratory adult cutthroat. The mid-summer fishery was dominated by smaller, juvenile cutthroat migrating downstream from the upper forks of the Flathead.

Anglers interviewed on the mainstem Flathead kept 47% of the 227 bull trout they caught (Appendix Table 6). The highest proportion kept by section was 63% in MS3 and the lowest was 34% in MS1. On a monthly basis the proportion kept was generally about 50% except for August when only two of the 38 bull trout caught were kept (5%). Catch rate for bull trout was high in August but most of the fish caught were juveniles as spawning adults had moved into tributary streams.

Flathead County anglers kept 61% of the cutthroat and 44% of the bull trout they caught. Anglers from other areas kept only 35% of the cutthroat, and 61% of the bull trout they caught.

Fly fishermen kept only 41% of the cutthroat they caught versus 54% for anglers using combinations, 68% for lure fishermen and 79% for bait fishermen. Fly fishermen that were interviewed did not catch any bull trout. Amongst other tackle groups, combination fishermen kept 26% of the bull trout they caught, bait fishermen kept 48% and lure fisherment kept 51%. Boat fishermen kept 62% of the cutthroat and 14% of the bull trout they landed, whereas shore anglers kept 52% of the cutthroat caught and 55% of the bull trout.

Catch Per Angler Per Completed Trip

Another method of evaluating success of anglers was catch per angler per complete trip. About 32% of the parties (568 anglers) had completed fishing when interviewed and were responsible for 39% of the total hours fished by conventional anglers. This figure ranged from 35% to 55% of the hours by area and from 19% to 92% by month. In general, a much higher proportion of completed trip interviews were collected during the fall season due to more concentrated angler pressure and more creel clerks in the field in association with the fall kokanee fishery.

These 568 anglers caught 514 cutthroat, 389 kokanee and 82 bull trout. This averaged out to 0.9 cutthroat, 0.7 kokanee and 0.1 bull trout caught per angler per completed trip. In general, anglers fishing exclusively for one of these three species experienced greater than average success for that species.

Fishermen caught an average of 0.9 cutthroat per angler per completed trip and kept 60% of the catch. The overall catch was strongly influenced by fly fishermen who caught nearly six cutthroat per trip (Appendix Table 7). The most cutthroat were caught during August coinciding with increased fly fishing. Section MS3 was the area where the highest number of cutthroat per trip were caught (Appendix Table 7). Flathead County anglers caught more cutthroat per trip than anglers from other areas and boat anglers caught about twice as many cutthroat per trip as shore anglers.

Mainstem fishermen caught 0.1 bull trout per completed trip and kept 43% of their catch. Observation indicated that most of those released were smaller than the eighteen inch minimum size limit. Most bull trout were caught during May to August. The bull trout catch per trip increased in the four sections in upstream progression (Appendix Table 8). Bait and lures were most effective in catching bull trout. Shore fishermen were more successful in catching bull trout than were boat fishermen.

Most of the kokanee caught by nonsnag fishermen were caught during September in Section MS1 by anglers using lures and baited lures fishing from boats (Appendix Table 9). Conventional fishermen interviewed on the mainstem Flathead River kept more kokanee per completed trip (0.7) than any other species, even though kokanee were only available for a few weeks during the fall.

The average angler on the Flathead River would have to make 1.4 trips to harvest a kokanee, 1.8 trips for every cutthroat kept, and over 16 trips to harvest a bull trout. However, this type of analysis is misleading because the seasonality of these fisheries make it impractical to characterize the "average angler".

Sizes of Fish Harvested

Creel clerks took total length measurements of fish harvested as time allowed. The data collected roughly approximated a random sample, as all months and areas were represented on the mainstem Flathead River.

Cutthroat

A length frequency of 273 cutthroat harvested from the mainstem Flathead River (Sections MS1-4) showed a pronounced bimodal distribution with peak frequencies occurring at 210-219 mm and 370-379 mm (Figure 4). Analysis suggested that the harvest was composed of two distinct size classes of fish. The grouping in the smaller size range (140-290 mm) were apparently juvenile cutthroat that were moving downstream from natal streams to rearing areas in the lower Flathead River and Flathead Lake. The fish in the larger size range (290-440 mm) were mainly adult, migratory cutthroat in pre-spawning or post-spawning condition that had entered the river from Flathead Lake. These conclusions were supported by data from previous studies on the Flathead River system (Montana Department Fish and Game 1979, Graham et al. 1980, Fraley et al. 1981, McMullin and Graham 1981, Leathe and Graham 1981, Shepard et al. 1982). Age and growth analysis on scales taken from Flathead Lake cutthroat indicated that fish exceeding 290 mm in length were mostly age five and older (Leathe and Graham 1981). A higher proportion of the larger cutthroat were caught in Section MS1 (Table 13) and most of these adult size adfluvial fish were caught during early summer and fall (Table 14). The interim period (July-September) was dominated by catches of the smaller outmigrant fish (Table 14). This information supports observations on timing and distribution of cutthroat migrations in the river.

Bull trout

Bull trout did not attain sexual maturity in the Flathead drainage until they were about 18 inches or greater in length and harvest of fish was regulated by an 18-inch minimum size limit. Fish in the harvest ranged from 435 to 815 mm and averaged 581 mm (Figure 4).

More large bull trout were caught in Section MS3 than in other river sections (Table 15). This may be a reflection of sample sizes and sampling effort. There was no recognizable trend in the sizes of bull trout harvested during the course of the season (Table 16). Mean lengths for all months were similar. However, a sample of 27 bull trout harvested in the North Fork drainage in Canada during July, 1981 had a mean length of 631 mm, larger than any of the mainstem Flathead River sections.

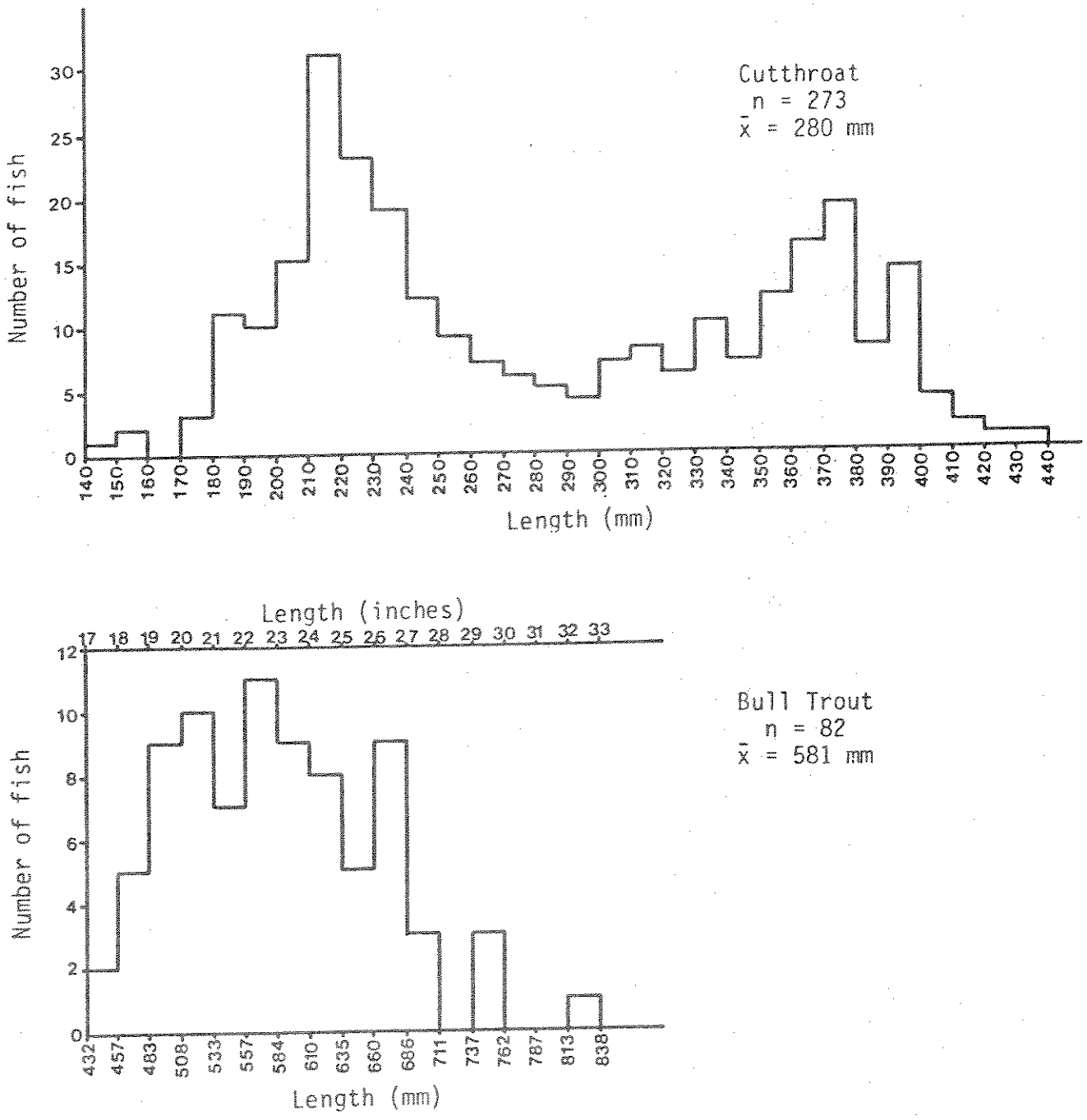

Figure 4. Length frequency distribution of 273 cutthroat trout and 82 bull trout harvested by fishermen from the Flathead River (Sections MS1-MS4) during 1981.

Table 13. Mean lengths and size ranges of 273 cutthroat trout harvested by fishermen from four sections of the mainstem Flathead River (MS1-4) during 1981.

Flathead River section	Number of cutthroat	Mean length (mm)	Size range (mm)	
			Minimum	Maximum
MS1	42	363	250	439
MS2	133	281	183	400
MS3	90	239	145	424
MS4	8	302	220	417
Total	273	280	145	439

Table 14. Monthly mean lengths and size ranges of 273 cutthroat trout harvested by fishermen from the mainstem Flathead River (Sections MS1-4) during 1981.

Month	Number of cutthroat	Mean Length (mm)	Size Range (mm)	
			Minimum	Maximum
May	32	314	231	417
June	29	338	220	424
July	95	235	145	400
August	61	231	183	370
September	2	335	270	400
October	16	370	325	439
November	38	368	305	409
Total	273	280	145	439

Table 15. Mean lengths and size ranges of 82 bull trout harvested by fishermen from four sections of the mainstem Flathead River (MS1-4) during 1981.

River section	Number of bull trout	Mean length (mm)	Size range (mm)	
			Minimum	Maximum
MS1	20	565	476	660
MS2	39	574	450	760
MS3	21	619	435	815
MS4	2	515	500	530
Total	82	581	435	815

Table 16. Monthly mean lengths and size ranges of 82 bull trout harvested by fishermen from the mainstem Flathead River (sections MS1-4) during 1981.

Month	Number of bull trout	Mean Length (mm)	Size range (mm)	
			Minimum	Maximum
May	26	582	476	760
June	27	587	480	740
July	14	594	435	815
August	2	545	500	590
September	0	--	--	--
October	2	491	480	502
November	11	578	475	660
Total	82	581	435	815

Kokanee

The average length of 489 kokanee taken from the mainstem Flathead River (Sections MS1-4) and lower Middle Fork (Section MF1) during September and October was 361 mm. The range was 321-420 mm. Most of these fish were taken by snagging. The frequency distribution of these 489 kokanee (Figure 5) showed a bunched sample with a strong mode at 350-370 mm. This uniformity of size was consistent with what would be expected from a spawning run dominated by fish in one age class. The mean length in 1981 was the largest size of kokanee spawners since record-keeping began in 1951.

Rainbow trout

The 22 rainbow trout checked in the creel averaged 296 mm in total length with a range of 206-380 mm. Their size distribution was scattered.

Fishing Pressure

During the 1981 fishing season, anglers on the mainstem Flathead River fished an estimated 115,727 hours (Table 17). This total includes conventional and snag fishermen because they could not be separated in the aerial counts. Of this total pressure, 13% occurred in Section MS1, 47% in Section MS2, 20% in Section MS3 and 20% in Section MS4. Per length of stream, Section MS2 was the most heavily fished, with 2,838 fisherman hours/km. This was followed in order by MS3, MS4 and MS1 with 2,192, 1,001 and 423 fisherman hours/km, respectively.

Man-days fishing was also used for examining fishing pressure. This was the estimated total pressure in hours divided by the average length of completed trip for a particular section or time period. On the mainstem Flathead River the average length of a completed trip was 3.2 hours. Thus, the total estimated 115,727 fisherman hours represented 35,940 man-days of fishing pressure.

Section MS2 also contributed the most fisherman hours during most months. During May through September 40-55% of the total fisherman hours each month were expended on Section MS2. During October, Section MS3 was more popular due in part to the emigration of kokanee upstream. In November, 62% of the pressure occurred in Section MS1. Overall, Section MS1 appeared to be more popular early and late in the season (May and November). Sections MS3 and MS4 in general supported pressure nearly equal to each other throughout the year.

An estimated 39% of the total fishing pressure on the Flathead River occurred during the month of September, coinciding with the onset of the fall kokanee run in the mainstem. The second most heavily fished month was May, the opening month of the season. Despite the season being open only the last 16 days of May, 9% of the total pressure occurred during that time. The next most popular fishing months were June and July, each accounting for a little over 15% of the total pressure. October, which included the latter part of the kokanee run accounted for 10% of the total pressure. This would have been higher, but the kokanee snag

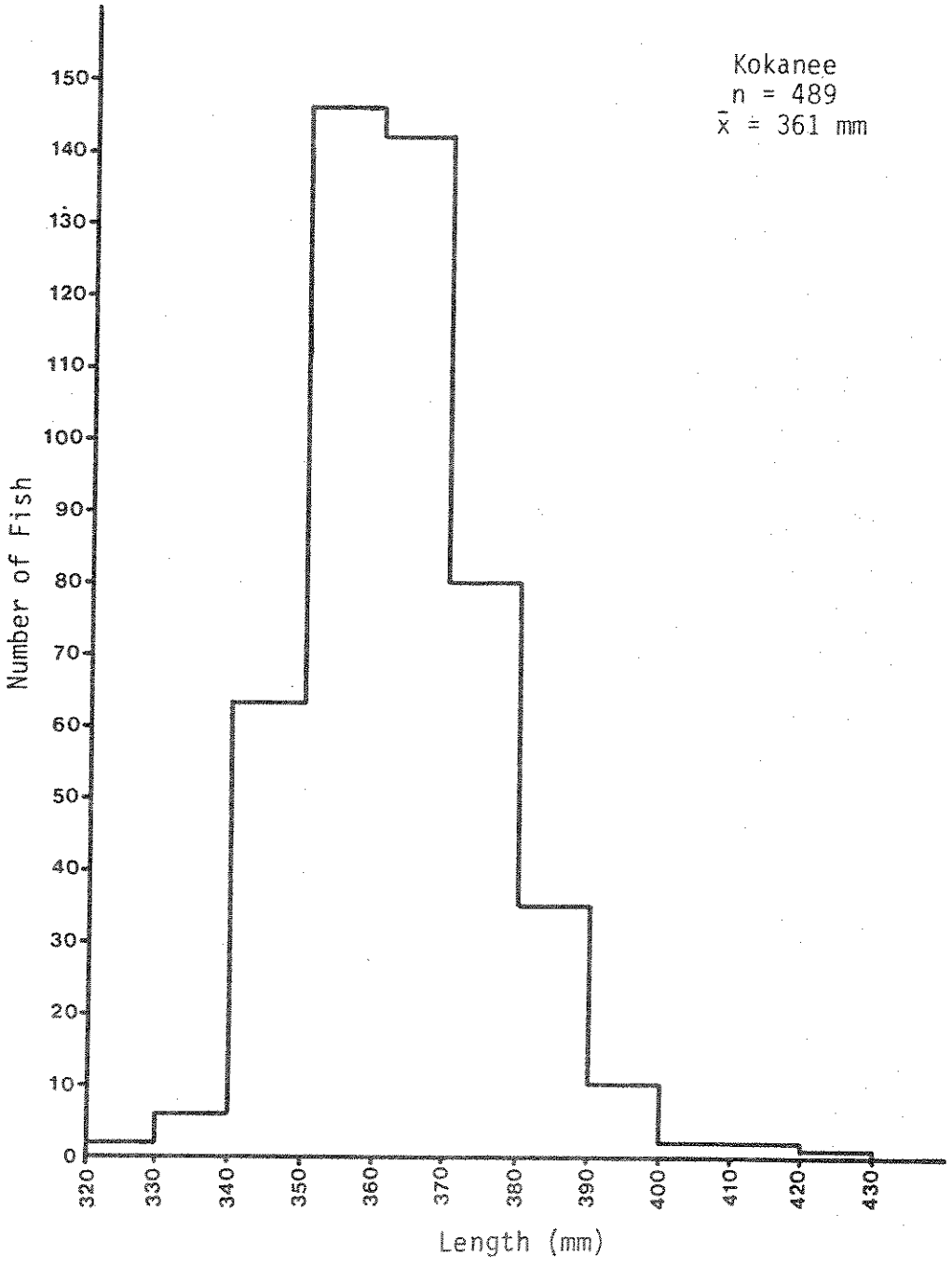

Figure 5. Length frequency distribution of 489 kokanee harvested by fishermen from the Flathead River (Sections MS1-MS4) and lower Middle Fork (Section MF1) during 1981.

Table 17. Total estimated fishing pressure in hours by month with 95 percent confidence intervals (in parentheses) for Sections MS1-MS4 of the Flathead River during 1981.

Month	Days	Total Daylight Hours	Estimated fishing pressure (hours)[1]/ Section MS1	Section MS2	Section MS3	Section MS4	Total
May 16-31	16	256	2,921 (±1192)	4,939 (±1,312)	2,093 (±993)	496 (±252)	10,449 (±2,048)
June	30	510	3,825 (±786)	8,466 (±1,068)	3,145 (±1,090)	2,530 (±858)	17,966 (±1,919)
July	31	527	1,054 (±357)	6,996 (±1,394)	5,306 (±1,333)	4,307 (±989)	17,663 (±2,197)
August	31	465	727 (±376)	4,694 (±910)	2,732 (±697)	2,400 (±703)	10,553 (±1,396)
September	30	420	2,964 (±823)	24,636 (±5,846)	6,096 (±1,465)	11,100 (±3,257)	44,796 (±6,900)
October	31	372	2,214 (±481)	3,321 (±1,001)	3,773 (±985)	2,498 (±949)	11,806 (±1,762)
November	30	300	1,535 (±662)	865 (±396)	94 (±112)	0	2,494 (±780)
Total	199	2,850	15,240 (±1,800)	53,917 (±6,141)	23,239 (±2,633)	23,331 (±3,570)	115,727 (±7,786)

1/ Includes conventional anglers as well as snag fishermen.

season ended by an emergency closure on October 23, 1982 in the mainstem below the mouth of the South Fork. November accounted for only 2% of the total fishing pressure.

Nearly 73% of the total fishing pressure on the mainstem Flathead was by shore anglers (Appendix Table 10). Boat anglers made up the other 27% (Appendix Table 11). Total boat fishing pressure was highest in Section MS2 with 829 fisherman hours per km, followed by Sections MS3, MS1 and MS4 with 482, 186, and 170 hours/km, respectively. Total shore fishing pressure was 238 hours/km on Section MS1, 2,009 hours/km on Section MS2, 1,711 hours/km on MS3, and 831 hours/km on Section MS4. Part of the reason for lower shore pressure on Section MS1 may have been limited access.

Almost 44% of the total pressure was by boat anglers in Section MS1 which was the only section deep enough to allow easy motor boat travel. The second most popular boating section was MS2 where 29% of the total fishing pressure was by boat anglers. Observation indicated that the majority of boat anglers here were floaters. The use of boats continued to decrease in upstream order. Boat use in Sections MS3 and MS4 was primarily by floaters who contributed 22% and 17% of the total pressure in each section, respectively.

Effort by shore fishermen followed the same monthly trends as total estimated pressure. September was the peak use month followed in order by May, June, July, October, August, and November. September was also the most popular boat fishing month contributing 49% of the total boat pressure, followed in order by July and August (both 16%), May (5%, despite only half as many days), October (7%), June (5%) and November (3%).

Harvest

Total estimated harvest on the mainstem Flathead River during 1981 for all anglers (including snaggers) was 89,273 gamefish. Of this estimated total, about 86% were kokanee, 10% cutthroat trout, 2% bull trout, 2% whitefish, and 0.5% rainbow trout. Kokanee harvest by snag fishermen was included in this estimate because snag fishermen could not be distinguished in the aerial user counts needed to determine harvest.

Almost the entire kokanee harvest occurred during only two months, September and October (Table 18). A few kokanee were harvested at the end of August by boat fishermen in Section MS1, but they contributed only 0.2% of the total (Appendix Tables 12 and 13). Over 75% of the kokanee harvest occurred during September. A detailed discussion of the kokanee harvest is available in a separate report (Fredenberg and Graham 1982).

The total estimated cutthroat harvest on the mainstem Flathead River was 8,557 fish (Table 19). The peak months were July and August, each producing about 30% of the total annual harvest of cutthroat. The months of September-November also yielded cutthroat harvests of about equal magnitude, each contributing 10-11% of the total. The months of May

Table 18. Total estimated monthly kokanee harvest by all anglers on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of kokanee harvested[1/]				
	MS1	MS2	MS3	MS4	Total
August	138	0	0	0	138
September	5,377	30,467	5,464	16,822	58,130
October	524	1,323	11,940	4,775	18,562
November	0	0	0	0	0
Total	6,039	31,790	17,404	21,597	76,830 (±18,836)

1/ Includes snag fishery as well as conventional anglers.

Table 19. Total estimated monthly cutthroat harvest by all anglers on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Total	Estimated numbers of cutthroat harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	7	116	88	93	304
June	0	177	191	0	368
July	0	1,229	1,051	249	2,529
August	0	1,019	1,257	290	2,566
September	40	517	337	0	894
October	532	416	0	20	968
November	636	292	0	0	928
Total	1,215	3,766	2,924	652	8,557 (±1,976)

and June produced the lowest estimated cutthroat harvests of the year. They were also equal to each other with 4% of the total cutthroat harvest occurring during each of these two months.

The distribution of the cutthroat harvest by areas was 44% in Section MS2, 34% in Section MS3, 14% in Section MS1 and 8% in Section MS4 (Table 19). Almost all of the projected cutthroat harvest in Section MS1 occurred during September-November. Section MS2 was the most consistent producer with some cutthroat harvested throughout the season. In Sections MS3 and MS4 most of the harvest of cutthroat occurred during July and August.

Almost 48% of the cutthroat harvest was attributed to boat fishermen (Appendix Table 14) and 52% to shore anglers (Appendix Table 15). No cutthroat were harvested by boat anglers prior to July 1. The highest proportion of the harvest by boat anglers was during August, when 62% of the total cutthroat harvest was attributed to boat fishermen. Boat fishermen harvested a disproportionately high number of cutthroat considering they exerted only 27% of the total pressure on the mainstem Flathead. Boat anglers were responsible for 60% of the cutthroat harvest in Section MS2, 42% in Section MS3, 41% in Section MS1, and only 13% in Section MS4.

The total estimated bull trout harvest on the mainstem was 1,827 fish (Table 20). Most of this harvest occurred early in the season with July, May, and June contributing 35%, 30% and 21% of the total, respectively. By August, most of the bull trout migration through the mainstem had passed and bull trout harvest did not pick up again until October-November when spawned-out bull trout returned downstream to Flathead Lake. About 12% of the total bull trout harvest occurred during this post-spawning period (Table 20) with harvest recorded only in Section MS1.

On an area basis the most productive bull trout fishing was in Section MS1 where 34% of the total harvest occurred. The harvest decreased slightly in upstream order with each of sections MS2 and MS3 contributing 23% of the total and Section MS4 producing 19%.

The upstream migration of bull trout in the spring and early summer was reflected in the harvest during the months of May through July. In May, 69% of the bull trout harvest occurred in Section MS1 (Table 20). In June, 69% of the harvest occurred in Section MS2. By July, 92% of the bull trout were harvested in Sections MS3 and MS4.

Only 22% of the bull trout harvest was by boat fishermen (Appendix Table 16) and 85% of that was in Section MS1 during the month of May. Shore fishermen accounted for 78% of the total bull trout harvest (Appendix Table 17).

The total estimated whitefish harvest on the mainstem Flathead River during 1981 was 1,582 fish (Table 21). This was distributed throughout all months with the majority occurring from July through October (79%) and in Section MS2 (88%). The whitefish season remained open through the winter but was not censused.

Table 20. Total estimated monthly bull trout harvest by all anglers on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	381	98	40	31	550
June	36	265	69	13	383
July	0	50	287	311	648
August	0	12	23	0	35
September	0	0	0	0	0
October	59	0	0	0	59
November	152	0	0	0	152
Total	628	425	419	355	1,827 (±500)

Table 21. Total estimated monthly whitefish harvest by all anglers on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	0	18	48	31	97
June	0	80	42	0	122
July	0	317	0	0	317
August	0	253	0	0	253
September	32	336	0	0	368
October	14	279	16	0	309
November	0	116	0	0	116
Total	46	1,399	106	31	1,582 (±870)

Boat anglers were responsible for 31% of the total whitefish harvest (Appendix Table 18), and shore anglers the remainder (Appendix Table 19). Most of the boat angler harvest came from Section MS2 during July and August.

An estimated 477 rainbow trout were harvested during the season (Table 22). Some rainbow were harvested during every month of the season with the highest total being 156 during August. The estimated rainbow trout harvest increased in an upstream progression through the river sections with Section MS4 contributing 34% of the total. This followed trends in population abundance assessed by electrofishing (McMullin and Graham 1981).

About 45% of the rainbow trout harvest was attributed to boat anglers (Appendix Table 20). Most of this occurred during August. Shore anglers caught most of the rainbow trout that they harvested during May-July (Appendix Table 21).

NORTH FORK FLATHEAD RIVER

Fisherman contacts during the 1981 creel census were limited in number. This was due in part to the interview technique employed by University of Idaho clerks (McLaughlin et al. 1982) which let anglers voluntarily fill out cards as opposed to asking direct questions. A high proportion of the cards were not filled out completely enough to be used in the analysis. As a result, the total number of anglers interviewed (216) and fisherman hours sampled (432) did not provide an adequate sample to correlate with the aerial counts to calculate catch, use and harvest estimates.

A survey by Department personnel yielded more completed interviews in 1979 although no counts were made. The data recorded has not previously been reported. Realizing there were limitations in applying interview data from 1979 to the 1981 use data, the benefits derived from combining the best quality data from the two years outweighed the limitations. The data base from the 1979 survey was almost ten times as large as that from the 1981 census and both were conducted using similar methods, i.e. direct interviews. Variations in the catch rates in 1979 and 1981 would not be expected to vary significantly and from the analysis of a limited amount of 1981 interview data this appeared to be the case. It was more likely that catch rates varied more seasonally than between years because of the migratory nature of species in the fishery. In that case, extrapolation of the limited number and distribution of interviews in 1981 would be wholly inadequate to represent the fishery.

Distribution of Fisherman Interviews and Characteristics of the Fisherman Population

During 1979 a total of 604 parties (1,188 anglers) who fished 4,009 hours were interviewed during the period May 19 to September 7 on the North Fork of the Flathead River (Section NF1, NF2, and NF3). Fifty percent of the hours fished by those interviewed occurred in Section

Table 22. Total estimated monthly rainbow trout harvest by all anglers on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of rainbow trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	7	12	24	0	43
June	18	27	42	0	87
July	0	0	16	62	78
August	0	24	50	82	156
September	0	29	0	0	29
October	41	0	0	20	61
November	23	0	0	0	23
Total	89	92	132	164	477 (±210)

NF1 with 30% in Section NF2, 10% in Section NF3 and the remaining 10% in some combination of the three sections (Table 23). Mean party sizes and average lengths of completed trips increased in upstream order, as was observed in 1981. Overall, the average party consisted of 2.0 anglers in 1979 which was similar to the average party size of 1.8 in 1981. However, the mean length of completed trips in 1979 of 3.5 hours was 52% larger than the 2.3 hours/trip in 1981.

Half (50%) of the total interview hours were surveyed during July, 25% during June and 18% during August (Table 24). Thus, of the fisherman hours interviewed during 1979, 75% were after the first of July whereas in 1981 over 71% occurred before July 1. This was due to inadequate sampling effort during 1981 rather than any actual change in fishing pressure that occurred between the two years.

Overall, interviews were conducted mainly on weekends in 1979. Nearly 73% of the total interviews occurred on Saturday or Sunday. Weekends represented 63% of the total of 41 sample days.

As in 1981, most of the anglers were Flathead County residents. During both years the same proportion (78%) of the parties were made up of Flathead County residents. During 1979 a little over 79% of the total interview hours fished were by local anglers. Other Montanans and nonresidents comprised 10% and 11%, respectively, compared to 11% and 9%, respectively, in 1981. Foreigners were a little less than 1% of the sample in both years.

Flathead County residents averaged 2.0 anglers per party in 1979. Other Montanans averaged 2.2 anglers per party and nonresidents 1.8 anglers per party.

In both 1979 and 1981, boat anglers were not sampled in proportion to their use due to the greater difficulty in making contacts with them. Only 12% of the total parties were boat anglers, but they represented 22% of the total interview hours fished in 1979. Boat anglers tended to be in larger parties, averaging 2.3 anglers per party versus 1.9 for shore anglers. Boat anglers also fished longer averaging 5.1 hours per completed trip, 59% larger than the 3.2 hours per trip by shore anglers.

Overall, the angler populations in 1979 and 1981 were remarkably similar. The major differences occurred in the larger proportion of boat anglers and proportionally much higher use of flies versus bait in 1979. Both of these factors can be related to a more even distribution of completed interviews in 1979. In the 1979 sample, 410 anglers (35%) used lures, 363 anglers (31%) used flies, 258 (22%) used combinations and only 157 (13%) used bait. Lures, flies, combinations, and bait, in that order, accounted for 34%, 30%, 24%, and 12% of the total hours fished in 1979 and 33%, 9% 21% and 3%, respectively in 1981. Mean party size and length of completed trips were similar in all tackle groups.

Table 23. Characteristics of parties and complete trips for 1,188 anglers interviewed on the North Fork of the Flathead River during May-September, 1979.

River section	Number of parties interviewed	Number of anglers	Average party size	Total Hours fished	Number of complete trips	Average hours per complete trip
NF1	343	659	1.92	2,012.0	236	3.32
NF2	172	342	1.99	1,215.8	128	3.47
NF3	50	104	2.08	385.2	36	4.20
Combinations	39	83	2.13	396.0	31	4.66
Total	604	1,188	1.97	4,009.0	431	3.53

Table 24. Monthly distribution of interviews and fisherman hours sampled on the North Fork of the Flathead River during May-September, 1979.

Month	Number of parties	Number of hours interviewed
May	4	15.8
June	155	987.0
July	302	1,999.5
August	101	706.5
September	42	300.2
Total	604	4,009.0

Catch Rates and Composition of Catch

During 1979 the anglers interviewed caught 2,719 cutthroat (93%), 81 bull trout (3%), 117 whitefish (4%) and five grayling for a total of 2,922 fish (Table 25).

The overall catch rate for cutthroat was 0.7 fish per hour. Cutthroat catch rates by month were fairly consistent, ranging from 0.5 fish per hour in June to as high as 0.8 fish per hour in July. Catch rate of cutthroat on flies was 1.3 fish per hour. Cutthroat were caught on combinations, bait, and lures at the rates of 0.6, 0.6 and 0.2 fish per hour, respectively. Catch rates for cutthroat varied little between sections (Table 25). Boat anglers caught 0.9 cutthroat per hour as compared to 0.6 fish per hour for shore fishermen.

Catch rates for bull trout were 0.02 fish per hour. The bull trout catch rate was the same (0.02) for each of the four main sample months June-September. The catch rate for bull trout was 0.05 fish per hour with lures compared to 0.01 fish per hour with other types. Shore and boat anglers had about equal success catching bull trout. The bull trout catch rate improved in upstream sections, peaking at 0.05 fish per hour in Section NF3 (Table 25).

Whitefish were caught at the rate of 0.03 fish per hour. Because whitefish were generally considered less desirable, a portion of those caught and released probably went unreported. The whitefish catch rate increased through the summer from 0.01 fish per hour in June to 0.06 fish per hour in September. Flies and combinations were the most effective types of tackle, taking whitefish at the rates of 0.04 and 0.05 fish per hour, respectively. The highest success rate was experienced in Section NF3 at 0.08 fish per hour (Table 25). Boat fishermen caught 0.05 whitefish per hour compared to 0.02 whitefish per hour for shore fishermen.

Grayling were incidental in the catch, drifting down into the river from lakes stocked with this species. The five grayling caught in 1979 were all caught on flies in Sections NF1 and NF2.

Fishing Pressure

During the period from the opening of the general stream fishing season in northwestern Montana (May 16, 1981) through the Labor Day Holiday (September 7, 1981) anglers on the U.S. portion of the North Fork of the Flathead River fished an estimated 21,911 hours (Table 26). Of this total pressure, 62% occurred in Section NF1, 15% in Section NF2 and 23% in Section NF3.

The total estimated pressure in hours (21,911) divided by the average length of completed trip (2.31 hours) equalled 9,485 estimated man-days of fishing pressure on the North Fork between May 16 and September 7, 1981.

Table 25. Cutthroat, bull trout, and whitefish catch and catch rates for anglers interviewed on the three sections of the North Fork of the Flathead River during 1979.

	NF1	NF2	NF3	Combination	Total
Cutthroat caught	1,311	930	285	193	2,719
Cutthroat per hour	0.65	0.76	0.74	0.49	0.68
Bull trout caught	26	25	20	10	81
Bull trout per hour	0.01	0.02	0.05	0.03	0.02
Whitefish caught	54	15	31	17	117
Whitefish per hour	0.03	0.01	0.08	0.04	0.03

Table 26. Total estimted fishing pressure (hours) by month with 95% confidence intervals (in parentheses) for Sections NF1-NF3 of the North Fork of the Flathead River during 1981.

		Estimated fishing pressure (hours)				
Month	Days	Total daylight hours	Section NF1	Section NF2	Section NF3	Total
May 16-31	16	256	796 (±549)	57 (±129)	0 (0)	853 (±564)
June	30	510	4,554 (±1,917)	619 (±433)	1,166 (±990)	6,339 (±2,201)
July	31	527	4,931 (±2,003)	1,957 (±1,535)	2,635 (±1,155)	9,523 (±2,776)
Aug 1 - Sep 7	38	570	3,360 (±1,392)	696 (±480)	1,140 (±575)	5,196 (±1,581)
Total	115	1,863	13,641 (±2,968)	3,329 (±1,576)	4,941 (±1,535)	21,911 (±3,639)

Anglers expended the most pressure (464 fishermen hours per km) in Section NF1. Pressure decreased in upstream order with anglers expending 136 and 125 fisherman hours per km on Sections NF2 and NF3, respectively.

Section NF1 received the most pressure by month providing over one-half the total estimated fisherman hours during all months of the sampling period. The total fishing pressure on the North Fork was not sampled during the remainder of the season (September 8 - November 30). Had this period been sampled the total pressure estimate on the North Fork would have been increased somewhat, perhaps to about 25,000 fisherman hours.

Overall, 43% of the total fishing pressure on the North Fork for the period May 16 to September 7, 1981 occurred during the month of July (Table 26). The second most popular month was June which accounted for 29% of the total followed by August-September 7 with 24%, and May with 4% in only 16 days. Thus, the fishing pattern on the North Fork followed a bell-shaped distribution with a mid-summer peak.

The upper sections of the North Fork (NF2 and NF3) received over half their fishing pressure during July (Table 26). In Section NF1 the pressure was more evenly distributed throughout the summer with 36%, 33% and 25% of the pressure occurring during the months of July, June and August to September 7, respectively.

Shore and boat anglers accounted for 71% and 29% of the total fishing pressure on the North Fork, respectively (Appendix Tables 22 and 23). The entire North Fork is a high-gradient mountain river with practically no use of motorized boats. Boat fishermen were primarily float fishermen. The largest number of estimated boat fishermen hours occurred in Section NF1 but much higher proportions of the total fishing pressure were attributed to boat anglers in Sections NF2 and NF3. In Section NF2, over half (59%) of the total fishing pressure was attributed to boat anglers. This decreased to 33% in Section NF3 and 19% in Section NF1.

On a monthly basis, boat use was heaviest during July and the August-September 7 periods comprising 37% and 47% of the total estimated fisherman hours, respectively (Appendix Table 23). Total boat fishing pressure was largest in Section NF1 at 90 fisherman hours per km, followed by Section NF2 with 80 hours per km and Section NF3 with 41 fisherman hours per km.

Overall, shore fishermen produced 38% of their total estimated pressure during each of the months June and July, 18% in the period August 1 to September 7, and 5% in May. Total shore fishing pressure was 374 fisherman hours per km on Section NF1 compared to 56 hours per km on Section NF2 and 83 hours per km on Section NF3.

Harvest

The interview data collected during 1981 was insufficient for use in projecting harvest on the North Fork of the Flathead River. However,

the 1979 interview data has been combined with 1981 pressure counts to produce harvest estimates. As previously stated, there are limitations to this type of analysis. The harvest estimate represents a hybrid of two years and as such is not statistically meaningful. However, combining the best data available from the two years in this manner does provide a more precise and reasonably accurate estimate of harvest on the North Fork.

The total estimated harvest on the North Fork for the period May 16 to September 7 was 17,996 gamefish. This total was composed of 16,381 cutthroat (91%), 1,101 whitefish (6%), 404 bull trout (2%), 73 rainbow trout (<1%) and 37 arctic grayling (<1%).

The rainbow trout harvested were not verified by a trained biologist and this estimated total could be partially or totally composed of rainbow-cutthroat hybrids or misidentified cutthroat. Rainbow trout have been rarely observed by trained Department personnel in the North Fork on fish inventories or trapping operations. The estimated harvest of 37 grayling probably represented fish drifting into the river from Red Meadow Creek, which drains a lake stocked with arctic grayling.

Cutthroat trout comprised the bulk of the North Fork harvest. Of the total estimated harvest of 16,381 cutthroat, 25% were caught during the period May 16 to June 30, 53% during July, and 22% during August 1 to September 7 (Table 27). July was also the month when the highest proportion of total pressure occurred.

In a section by section analysis, 58% of the cutthroat harvest came from Section NF1, 18% from NF2 and 24% from NF3 (Table 27). This was similar to the proportions of total pressure in the three sections.

Further analysis showed 62% of the cutthroat harvest was by shore fishermen (Appendix Table 24), and 38% by anglers using boats (Appendix Table 25). Boat fishermen accounted for only 5% of the total cutthroat harvest during spring runoff (May 16-June 30) compared to 49% of the harvest in the period following spring runoff (July-September 7). Cutthroat harvest by boat fishermen was about 32% of the total in both Sections NF1 and NF3 and 66% of the total in Section NF2, the most popular section for float fishermen.

The total estimated harvest of bull trout was 404 fish (Table 28). Of this total, 56% were caught during July with 21% creeled prior to July and 22% after July 31. Analysis by sections revealed that Section NF3 produced 57% of the bull trout harvest from only 23% of the total fishing pressure on the North Fork. Another 33% of the bull trout harvest came from Section NF1 with the remaining 10% coming from Section NF2.

About 74% of the total bull trout harvest was by shore fishermen (Appendix Table 26) and 26% by boat anglers (Appendix Table 27). Boat fishermen did not harvest any bull trout prior to July 1, but harvested 34% of the total thereafter. The only significant bull trout harvest prior to July 1 occurred in Section NF1, the section furthest downstream. As the season

Table 27. Total estimated monthly cutthroat trout harvest by all anglers on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of cutthroat trout harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	2,786	353	944	4,083
July	4,167	1,596	2,944	8,707
August-September 7	2,623	930	38	3,591
Total	9,576	2,879	3,926	16,381 (±4,344)

Table 28. Total estimated monthly bull trout harvest by all anglers on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested			
	NF1	NF2	NF3	Total
May 16-June 30	83	3	0	86
July	19	34	175	228
August-September 7	30	4	56	90
Total	132	41	231	404 (±231)

continued the bulk of the harvest moved to Sections NF2 and NF3 following upstream spawning migration.

The total estimated harvest of whitefish on the North Fork was 1,101 fish (Table 29). About 75% of this total were creeled during one month, July. Another 10% of the harvest occurred between May 16 and June 30 and the remaining 15% between August 1 and September 7. About 68% of the whitefish harvest came from Section NF3.

Shore anglers contributed only 30% of the total whitefish harvest (Appendix Table 28). The majority of the whitefish harvest (70%) was attributed to boat fishermen even though they only exerted 29% of the total pressure (Appendix Table 29). Over 56% of the total whitefish harvest was produced during July on Section NF3 by boat anglers.

In summary, these harvest figures on the North Fork were the product of 1979 interview data combined with 1981 pressure counts and may not accurately reflect either the 1979 or 1981 harvest, but should approximate the annual harvest on the North Fork during the study period.

FLOAT FISHERMAN USE

This section summarizes the results of the contact card survey conducted of boaters on the three forks of the Flathead River by the University of Idaho Department of Wildland Recreation Management (McLaughlin et al. 1982). A total of 328 people reported they had fished at some time during their float trip. On the three rivers, the proportion of floaters who fished was significantly different. On the lower Middle Fork (essentially Sections MF1 and MF2) only 18% of floaters reportedly fished. On the North and South Forks 40% and 82% of the floaters fished, respectively.

Of the 328 float fishermen surveyed, over 61% were nonresidents (Appendix Table 30). This ranged from only 37% on the North Fork to 71% on the Middle Fork. Flathead County residents were 46% of the North Fork float fishermen versus 15% on the South Fork and only 14% on the Middle Fork. Montanans from outside Flathead and Lake counties made up almost 11% of the total float fishermen sampled including almost 20% of those on the South Fork, 15% on the North Fork, but only 6% on the Middle Fork.

In recent years commercially-guided float trips have become popular on the South and Middle Forks. This may account for the higher numbers of out-of-county and especially out-of-state and foreign anglers on these two streams. The North Fork was more easily accessible and required less skill to float successfully.

Of the 328 anglers surveyed only 152 provided sufficient information to be used in the analysis of catch data. The 152 anglers accounted for 1,391 hours fished during their trips (Table 30). The interview hours were well distributed over the survey period (May 24-September 7).

Table 29. Total estimated monthly whitefish harvest by all anglers on three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	19	0	90	109
July	143	24	660	827
August-September 7	163	2	0	165
Total	325	26	750	1,101 (±1,104)

Table 30. Monthly distribution of angler interviews and fisherman hours (in parentheses) for 152 boat fishermen on the North, Middle and South Forks of the Flathead River during 1981.

River	Number of anglers interviewed and hours fished[1/]				
	June	July	August	September	Total
North Fork	9(47)	25(71)	18(54)	3(10)	55(182)
Middle Fork	3(36)	21(113)	13(40)	0(0)	37(189)
South Fork	0(0)	24(581)	36(439)	0(0)	60(1,020)
Total	12(83)	70(765)	67(533)	3(10)	152(1,391)

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

The average length of trip for floaters was 1.1 days on the Middle Fork, 1.6 days on the North Fork and 4.4 days on the South Fork. The average angler fished 5.1 hours/trip on the Middle Fork, 3.3 hours/trip on the North Fork, and 17.0 hours/trip on the South Fork. The average number of hours fished per angler per day on each of the three streams was only 2.0 hours on the North Fork, 3.8 hours on the South Fork and 4.5 hours on the Middle Fork. Thirty-eight percent of all anglers interviewed used flies exclusively. Lures were used by 29% of the anglers, 2% used only bait, and 32% used some combination of the three types. There was no appreciable difference between fishing methods used by local versus nonlocal anglers.

Fifty-eight percent of the total hours sampled were by anglers who used flies exclusively (Appendix Table 31). Another 25% were by anglers using some combination of bait, fly or lure, 16% used lures and 1% used bait. The proportion of fisherman hours where flies were used was two to three times higher on the South Fork than on the other two rivers. Lures were most popular on the North Fork, while fishermen on the lower Middle Fork used some combination of bait, flies, or lures most frequently.

Float fishermen on the Middle Fork kept more than twice as many of the cutthroat they caught than did anglers on the other two rivers (Appendix Table 32). On all three rivers, anglers kept a little over one-third of the bull trout they caught (35-43%) with most of those released probably being under the 18-inch minimum size limit. North Fork anglers kept a higher proportion of the whitefish they caught than did anglers on the Middle and South Forks.

The total catch and catch rates for cutthroat, bull trout and whitefish on the three streams varied considerably (Table 31). Anglers on the South Fork caught more than three times as many cutthroat per hour as anglers on the North Fork. Cutthroat catch rates on the North Fork were nearly three times as high as those on the Middle Fork. In general, catch rates for cutthroat were highest in July (Table 31).

The largest bull trout catch rate occurred on the Middle Fork with the entire sample caught during July (Table 31). The bull trout catch rate was about half as large on the North Fork, but all three months were equally represented (June-August). Bull trout catch rates on the South Fork were all less than 0.01 fish per hour.

The whitefish catch rates on the South Fork were two to three times as high as those on the other two streams (Table 31). Overall catch rates for all three species were dominated by the South Fork data which accounted for 73% of the total sample hours and 93%, 25% and 88% of the total cutthroat, bull trout, and whitefish caught, respectively.

A part of the overall variation in catch rates between the three streams was undoubtedly due to the type of terminal tackle anglers used (Appendix Table 33). Fly fishermen experienced much better than average success at catching cutthroat and, to a lesser extent, whitefish. Lure fishermen caught more bull trout. No fish were caught by the small sample

Table 31. Monthly distribution of cutthroat, bull trout and whitefish catch and catch rates for boat anglers interviewed on the three forks of the Flathead River during June 1 - September 7, 1981.[1/]

Month	North Fork		Middle Fork		South Fork		Total	
	Number caught	Number per hour	Number caught	Number per hour	Number caught	Number per hour	Number caught	Number per hour
				Cutthroat				
June	8	0.17	2	0.06	---	---	10	0.12
July	57	0.80	17	0.15	1,197	2.06	1,271	1.66
August	35	0.65	18	0.45	500	1.14	553	1.04
TOTAL	100	0.55	37	0.20	1,697	1.67	1,834	1.32
				Bull Trout				
June	2	0.04	0	0	---	---	2	0.02
July	2	0.03	17	0.15	5	0.01	24	0.03
August	3	0.06	0	0	3	0.01	6	0.01
TOTAL	7	0.04	17	0.09	8	0.01	32	0.02
				Whitefish				
June	0	0	2	0.06	---	---	2	0.02
July	2	0.03	11	0.10	182	0.31	195	0.25
August	15	0.28	1	0.03	56	0.13	72	0.14
TOTAL	17	0.09	14	0.07	238	0.23	269	0.19

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

of bait fishermen. Overall, fly fishermen caught 1.7 cutthroat, 0.01 bull trout and 0.3 whitefish per hour. Anglers using lures exclusively caught 0.6 cutthroat, 0.06 bull trout, and 0.1 whitefish per hour. As expected, anglers using some combination of bait, fly or lures experienced catch rates for each of the three species that were intermediate, 1.2 cutthroat, 0.04 bull trout and 0.1 whitefish per hour, overall.

In summary, the float fisheries of the North, Middle and South Fork can be characterized quite differently. On the North Fork, an intermediate proportion of floaters were anglers, about 40%. Over half of them were local residents or from other areas of Montana. They fished mostly with lures and combinations and experienced fair catch rates of cutthroat and bull trout. Those who fished with flies caught two to five times as many cutthroat as those using other types of tackle. In general, float trips were one day with a smaller than average amount of time spent fishing (2.0 hours/day).

Floaters on the lower Middle Fork were mostly floating for fun with only 18% of the floaters fishing. They were mostly nonresidents with a high percentage floating with paid guides. They fished with a mixture of combinations, lures, and flies and experienced generally poor catch rates for cutthroat and comparatively high catch rates for bull trout. They floated almost exclusively on one-day trips. Those who fished, spent over 4.5 hours/day angling.

Floaters on the South Fork were avid fishermen with 82% of all floaters doing some fishing. Two-thirds of the float fishermen were nonresidents. They were mostly fly fishermen and experienced excellent catch rates for cutthroat and some whitefish, but caught few bull trout. Float trips were generally of long duration, averaging four to five days. Frequently paid guides were involved. Anglers spent nearly four hours a day fishing.

SUMMARY AND DISCUSSION

The total estimated pressure on the Flathead River during 1981 was 115,727 hours (35,940 man-days). This pressure produced an estimated total harvest of 89,273 gamefish of which 86% were kokanee, 10% cutthroat, 2% bull trout, 2% whitefish and less than 1% rainbow trout.

The fishery on the mainstem Flathead River reflected seasonal migrations of the major gamefish and was characterized by two periods of peak use. The first peak occurred during early summer (June-July) and the second in September associated with the kokanee spawning migration (Fredenberg and Graham 1982).

Bull trout were the principal gamefish harvested in May and June during spring runoff. Migrating adult cutthroat also made up a significant portion of the creel during May-June. Bull trout harvest continued into July. Increasing numbers of downstream migrating juvenile cutthroat began to appear in the catch as boat and fly fisherman use increased. Small cutthroat trout dominated the harvest in August.

September produced an abrupt change in the fishery as kokanee entered the system and completely dominated the harvest. This dominance continued into October but to a lesser degree. Following the kokanee run, the fishery was primarily for cutthroat, a large proportion of which were adults entering the river from Flathead Lake. A significant bull trout fishery also occurred in the lowest river section during October and November.

Total estimated pressure was 21,911 hours (9,485 man-days) on the North Fork of the Flathead River during the period May 16 to September 7, 1981. Total estimated harvest was 17,996 gamefish of which 91% were cutthroat trout, 6% whitefish, 2% bull trout and less than 1% each grayling and unconfirmed rainbow trout. Harvest was estimated from 1979 catch rate information and 1981 pressure estimates.

The fishery on the North Fork was characterized by a steady increase in pressure through July then pressure declined. The boat fishery was primarily concentrated in July and August.

The fishery in the North Fork reflected seasonal patterns of migrations of cutthroat and bull trout. Kokanee do not spawn in the North Fork. Cutthroat were the principal gamefish harvested in the North Fork during all months of the year, particularly during the mid-summer out-migration of juvenile cutthroat from the tributaries. Bull trout increased in the creel as the spawning run proceeded up the North Fork. During May and June, Section NF1 was the only section that produced significant bull trout harvest. The majority of the bull trout harvest occurred in July as the run moved upstream and harvest declined in August and September.

This study provided baseline data on pressure and harvest that can be compared to similar data from other years. On the mainstem Flathead

River, creel census studies were also conducted in 1968 and 1975-1976 (Table 32). In 1968, the census consisted of a pressure survey conducted through the mail (Montana Fish and Game 1969). The same type surveys were conducted in 1975 and 1976 but methods used between the three years were not consistent (Montana Fish and Game 1976 and 1977). The 1975 mail survey pressure estimate was applied to catch rate data obtained by on-the-ground interviews to provide catch and harvest information for that year (Hanzel 1977). Estimates from that report differ from this report because incorrect values were used for the winter pressure estimate in the original report.

Kokanee harvest on the mainstem Flathead River in 1981 was only 51% of the 1975 estimate (Table 32). This decline was related largely to mortality of incubating eggs in preceding years caused by water-level fluctuations from Hungry Horse Dam (Fredenberg and Graham 1982, Fraley and Graham 1982). A possible decline also has occurred in the harvest of cutthroat (down 18%) and bull trout (down 24%) since 1975 (Table 32). However, these differences were not statistically significant and may in part reflect the different methods used to estimate pressure between the two years.

A 29% decline occurred in hours fished on the mainstem from 1975 to 1981. This was due largely to a 45% reduction in fisherman hours during the kokanee snagging fishery in the fall of 1981.

Statewide mail surveys were also conducted on the North Fork of the Flathead River during 1968, 1975 and 1976. A complete fisherman census was also conducted on the North Fork during 1953 (Block 1954). Between 1953 and 1981, the estimated pressure in hours on the North Fork had increased by over three times (Table 33). The pressure between 1975 and 1981 showed a 42% decline in terms of hours, but little change in terms of man-days (fisherman trips). This was because anglers in 1981 had shorter completed trips. The reasons for this were unknown.

Estimates of cutthroat harvest for 1953, 1975 and 1981 showed a steady increase, being nearly seven times as high in 1981 as in 1953. Bull trout harvest was not significantly higher in 1975 than in 1981 but doubled from 1953 to 1981.

Basin-wide spawning counts of bull trout provide an estimate of the number of fish reaching spawning grounds. Based on the 1981 spawning counts, approximately 41% of the bull trout destined for spawning areas in the North Fork drainage (U.S. and Canada) were harvested in the mainstem Flathead River and U.S. portion of the North Fork during 1981. This calculation assumes 1,765 fish reached spawning grounds based on a correction factor for the number of redds observed by field crews (Shepard et al. 1982). These crews censused every kilometer of stream where spawning has or was believed to have occurred. This number was compared to harvest in the North Fork (404 fish) plus one-half of the harvest in the mainstem through August (808 fish). Present estimates indicate that spawning is nearly evenly distributed between the North and Middle Forks justifying use of only one-half the mainstem harvest. There was relatively little harvest in September because spawners were in closed tributary streams. Those fish caught after September

Table 32. Comparison of estimated fisherman pressure, harvest and catch (in parentheses) on the mainstem Flathead River during the years 1968, 1975, 1976 and 1981.

Year	Source	Fisherman Pressure		Harvest (catch)		
		Hours	Days	Kokanee	Cutthroat	Bull trout
1968	Statewide mail survey		34,703			
1975	Statewide mail survey Hanzel, 1977	162,450	40,716	149,644 (149,644)	10,463 (14,845)	2,398 (5,284)
1976	Statewide mail survey		30,315			
1981	Present study	115,727	35,940	76,830 (76,830)	8,557 (15,212)	1,827 (3,876)

Table 33. Comparison of estimated fisherman pressure, harvest, and catch (in parentheses) on the North Fork of the Flathead River during the years 1953, 1968, 1975, 1976 and 1981.

Year	Source	Fisherman pressure		Harvest (catch)	
		Hours	Days	Cutthroat	Bull trout
1953	Block, 1954	6,528*	1,364*	2,432*	185*
1968	Statewide mail survey		10,008		
1975	Statewide mail survey Hanzel, 1977	37,622	9,562	9,994 (17,875)	532 (1,233)
1976	Statewide mail survey		10,414		
1981	Present study	21,911	9,485	16,381** (32,120)	404** (748)

* Data from 1953 census was inflated by a factor of 1.12 to account for a known bias in incomplete coverage during weekends. No total catch estimates were available for this study.

** Based on 1979 catch rate information.

were post-spawners and were also excluded in this calculation.

An important but largely unquantified portion of this fishery for migratory cutthroat and bull trout occurs north of the Canadian border on the Flathead River. Incidental observation by personnel at the U.S. border station between July 7 and August 19, 1981 documented 30 bull trout between 29 and 33 inches in length caught by U.S. residents in Canada and brought back across the border. There was no estimate of total numbers of trout harvested in the Flathead River north of the border nor were estimates made for the Middle Fork.

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APPENDIX
Tables 1 through 35

Table 1. Average length of completed trip per angler (in hours fished) by area, month, bait type, party size, angler origin, and shore versus boat on the mainstem Flathead River during 1981. Includes non-snaggers only.

Area	Length of trip	Month	Length of trip	Bait type	Length of trip	Party size	Length of trip	Angler origin	Length of trip	Shore vs. boat	Length of trip
MS1	3.32	May	4.13	Bait	3.77	1	3.28	Flathead County	3.24	Shore	3.09
MS2	3.30	June	3.85	Fly	3.16	2	3.10			Boat	3.19
MS3	3.18	July	2.52	Lure	2.91	3	3.47	Other Montanan	3.33		
MS4	4.34	Aug	3.49	Combo	2.91	4+	3.15	Nonresi-dent	3.82		
		Sept	2.92								
		Oct	2.05								
		Nov	3.09								

Table 2. Average number of anglers per party by area, month, tackle type, angler origin, and shore versus boat on the mainstem Flathead River during 1981. Includes non-snaggers only.

Area	Average party Size	Month	Average party Size	Tackle type	Average party Size	Angler origin	Average party size	Shore versus boat	Average party size
MS1	1.72	May	1.55	bait	1.56	Flathead County	1.63	Shore	1.59
MS2	1.60	June	1.52	fly	1.57			Boat	1.97
MS3	1.78	July	1.82	lure	1.79	Other Montanan	1.78		
MS4	1.52	Aug	2.01	combo	1.94	Nonresi-dent	2.03		
		Sept	1.84						
		Oct	1.47						
		Nov	1.33						

Table 3. Number of parties interviewed by area by month fishing from shore as opposed to fishing from boats on the mainstem Flathead River during 1981.

	Number of parties interviewed									
	MS1		MS2		MS3		MS4		Total	
Month	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat	Shore	Boat
May	37	1	157	1	39	0	4	0	237	2
June	27	1	219	6	34	3	2	2	282	12
July	0	0	97	22	62	9	16	0	175	31
August	0	14	59	35	16	11	3	1	78	61
September	2	43	7	14	0	1	0	0	9	58
October	11	13	2	8	1	0	1	0	15	21
November	29	9	5	8	0	0	0	0	34	17
TOTAL	106	81	546	94	152	24	26	3	830	202

Table 4. Kokanee, cutthroat, bull trout and whitefish catch and catch rates per hour by bait type, angler origin, and shore versus boat for anglers not using snagging hooks who were interviewed on Sections MS1-MS4 of the Flathead River during 1981.

Bait Type	Fisherman hours Interviewed	Kokanee		Cutthroat		Bull Trout		Whitefish	
		Number	Number/hr	Number	Number/hr	Number	Number/hr	Number	Number/hr
Bait	2,785.6	0	0	205	0.07	135	0.05	34	0.01
Fly	196.1	1	0.01	330	1.68	0	0	3	0.02
Lure	965.1	292	0.30	82	0.08	73	0.08	30	0.03
Combo	706.7	141	0.20	215	0.30	19	0.03	17	0.02
Angler Origin									
Flathead County	3,927.0	281	0.07	682	0.17	189	0.05	74	0.02
Other Montana	285.4	15	0.05	9	0.03	22	0.08	0	0
Nonresident	414.8	134	0.32	138	0.33	13	0.03	10	0.02
Shore/Boat									
Shore	3,539.6	19	0.01	473	0.13	184	0.05	40	0.01
Boat	1,113.9	415	0.37	359	0.32	43	0.04	44	0.04

Table 5. Cutthroat kept/cutthroat caught by month and section for anglers not using snagging hooks who were interviewed on the Flathead River during 1981. Percentages of cutthroat kept are in parentheses for totals.

Month	Number of cutthroat kept/ caught (percent of fish kept)				
	MS1	MS2	MS3	MS4	Total
May	1/ 1	19/ 19	11/ 14	3/ 4	34/ 38 (90%)
June	----	20/ 26	9/ 12	----	29/ 38 (76%)
July	----	56/111	64/166	4/12	124/289 (43%)
August	0/ 1	81/190	49/116	5/ 5	135/312 (43%)
September	5/ 5	10/ 10	3/ 3	----	18/ 18 (100%)
October	24/33	17/ 17	----	1/ 1	42/ 51 (82%)
November	56/56	30/ 30	----	----	86/ 86 (100%)
TOTAL	86/96 (90%)	233/403 (58%)	136/311 (44%)	13/22 (59%)	468/832 (56%)

Table 6. Bull trout kept/bull trout caught by month and section for anglers not using snagging hooks who were interviewed on the Flathead River during 1981. Percentages of bull trout kept are in parentheses for totals.

Month	Numbers of bull trout kept /caught (percent of fish kept)				
	MS1	MS2	MS3	MS4	Total
May	7/33	16/ 23	5/ 6	1/ 5	29/ 67 (43%)
June	2/ 6	30/ 41	4/ 6	1/ 4	37/ 57 (65%)
July	----	3/ 7	17/25	5/ 5	25/ 37 (68%)
August	----	1/ 31	1/ 6	0/ 1	2/ 38 (5%)
September	----	----	----	----	----
October	2/ 4	----	----	----	2/ 4 (50%)
November	12/24	----	----	----	12/ 24 (50%)
TOTAL	23/67 (34%)	50/102 (49%)	27/43 (63%)	7/15 (47%)	107/227 (47%)

Table 7. Distribution of cutthroat trout caught per angler per completed trip by month, area, bait type, origin, and shore versus boat on the Flathead River during 1981. Includes only interviews of 568 anglers not using snagging hooks.

Month	Number per trip	Area	Number per trip	Bait type	Number per trip	Angler Origin	Number per trip	Shore/ Boat	Number per trip
May	0.13	MS1	0.44	Bait	0.49	Flathead County	0.98	Shore	0.57
June	0.09	MS2	1.00	Fly	5.83	Other	0.57	Boat	1.20
July	0.97	MS3	1.66	Lure	0.31				
August	2.35	MS4	0.66	Combo	0.89				
September	0.17								
October	1.03								
November	1.66								

Table 8. Distribution of bull trout caught per angler per completed trip by month, area, bait type, origin, and shore versus boat on the Flathead River during 1981. Includes only interviews of 568 anglers not using snagging hooks.

Month	Number per trip	Area	Number per trip	Bait type	Number per trip	Angler Origin	Number per trip	Shore/ Boat	Number per trip
May	0.23	MS1	0.08	Bait	0.19	Flathead County	0.15	Shore	0.17
June	0.23	MS2	0.14	Fly	0	Other	0.12	Boat	0.11
July	0.14	MS3	0.22	Lure	0.18				
August	0.22	MS4	0.59	Combo	0.07				
September	0								
October	0								
November	0.18								

Table 9. Distribution of kokanee caught per angler per completed trip by month, area, bait type, origin, and shore versus boat on the Flathead River during 1981. Includes only interviews of 568 anglers not using snagging hooks.

Month	Number per trip	Area	Number per trip	Bait type	Number per trip	Angler Origin	Number per trip	Shore/ Boat	Number per trip
August	0.24	MS1	1.99	Bait	0	Flathead County	0.52	Shore	0.01
September	2.85	MS2	0.16	Fly	0.02	Other	1.76	Boat	1.35
October	1.22	MS3	0.01	Lure	1.23				
November	0.02	MS4	0	Combo	0.91				

Table 10. Total estimated shore fishing pressure in hours by month with 95 percent confidence intervals (in parentheses) for Sections MS1-MS4 of the Flathead River during 1981.

Month	Days	Total daylight hours	Estimated fishing pressure (hours)[1/]				
			Section MS1	Section MS2	Section MS3	Section MS4	Total
May 16-31	16	256	2,003 (±1,106)	4,518 (±1,253)	2,048 (±989)	448 (±231)	9,017 (±1,955)
June	30	510	2,720 (±685)	8,075 (±1,024)	3,043 (±1,081)	2,413 (±839)	16,251 (±1,841)
July	31	527	727 (±247)	4,997 (±1,055)	3,471 (±995)	3,507 (±801)	12,702 (±1,674)
August	31	465	233 (±141)	2,369 (±644)	1,395 (±424)	1,665 (±600)	5,662 (±987)
September	30	420	384 (±209)	15,396 (±4,496)	4,524 (±1,192)	9,024 (±3,184)	29,328 (±5,641)
October	31	372	1,346 (±396)	2,391 (±930)	3,561 (±953)	2,303 (±943)	9,601 (±1,679)
November	30	300	1,147 (±580)	424 (±320)	94 (±112)	0	1,665 (±672)
Total	199	2,850	8,560 (±1,420)	38,170 (±4,825)	18,136 (±2,274)	19,360 (±3,438)	84,226 (±6,503)

1/ Includes conventional anglers as well as snag fishermen.

Table 11. Total estimated boat fishing pressure in hours by month with 95 percent confidence intervals (in parentheses) for Sections MS1-MS4 of the Flathead River during 1981.

Month	Days	Total daylight Hours	Estimated fishing pressure (hours)[1/]				
			Section MS1	Section MS2	Section MS3	Section MS4	Total
May 16-31	16	256	919 (±446)	422 (±391)	45 (±96)	48 (±102)	1,434 (±610)
June	30	510	1,105 (±387)	391 (±306)	102 (±145)	118 (±176)	1,716 (±543)
July	31	527	327 (±258)	1,999 (±912)	1,835 (±887)	800 (±581)	4,961 (±1,423)
August	31	465	494 (±348)	2,325 (±643)	1,337 (±553)	735 (±367)	4,891 (±988)
September	30	420	2,580 (±796)	9,240 (±3,736)	1,572 (±851)	2,076 (±687)	15,468 (±3,974)
October	31	372	868 (±273)	930 (±372)	213 (±247)	195 (±106)	2,206 (±534)
November	30	300	388 (±318)	441 (±233)	0	0	829 (±395)
Total	199	2,850	6,681 (±1,106)	15,748 (±3,779)	5,104 (±1,328)	3,972 (±959)	31,505 (±4,282)

1/ Includes conventional anglers as well as snag fishermen.

Table 12. Total estimated monthly kokanee harvest by boat anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of kokanee harvested[1/]				
	MS1	MS2	MS3	MS4	Total
August	138	0	0	0	138
September	3,534	11,982	112	3,864	19,492
October	524	441	0	130	1,095
November	0	0	0	0	0
Total	4,196	12,423	112	3,994	20,725 (±8,771)

1/ Includes snag fishery as well as conventional anglers.

Table 13. Total estimated monthly kokanee harvest by shore anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of kokanee harvested[1/]				
	MS1	MS2	MS3	MS4	Total
August	0	0	0	0	0
September	1,843	18,485	5,352	12,958	38,638
October	0	882	11,940	4,645	17,467
November	0	0	0	0	0
Total	1,843	19,367	17,292	17,603	56,105 (±16,669)

1/ Includes snag fishery as well as conventional anglers.

Table 14. Total estimated monthly cutthroat harvest by boat anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of cutthroat harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	0	0	0	0	0
June	0	0	0	0	0
July	0	810	63	0	873
August	0	706	814	82	1,602
September	40	87	337	0	464
October	152	416	0	0	568
November	307	253	0	0	560
Total	499	2,272	1,214	82	4,067 (±1,581)

Table 15. Total estimated monthly cutthroat harvest by shore anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of cutthroat harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	7	116	88	93	304
June	0	117	191	0	368
July	0	419	988	249	1,656
August	0	313	443	208	964
September	0	430	0	0	430
October	380	0	0	20	400
November	329	39	0	0	368
Total	716	1,494	1,710	570	4,490 (±1,185)

Table 16. Total estimated monthly bull trout harvest by boat anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	347	0	0	0	347
June	0	0	5	13	18
July	0	0	32	0	32
August	0	12	0	0	12
September	0	0	0	0	0
October	0	0	0	0	0
November	0	0	0	0	0
Total	347	12	37	13	409 (±168)

Table 17. Total estimated monthly bull trout harvest by shore anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	34	98	40	31	203
June	36	265	64	0	365
July	0	50	255	311	616
August	0	0	23	0	23
September	0	0	0	0	0
October	59	0	0	0	59
November	152	0	0	0	152
Total	281	413	382	342	1,418 (±471)

Table 18. Total estimated monthly whitefish harvest by boat anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	0	0	0	0	0
June	0	0	0	0	0
July	0	183	0	0	183
August	0	239	0	0	239
September	32	29	0	0	61
October	14	0	0	0	14
November	0	0	0	0	0
Total	46	451	0	0	497 (±434)

Table 19. Total estimated monthly whitefish harvest by shore anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	0	18	48	31	97
June	0	80	42	0	122
July	0	134	0	0	134
August	0	14	0	0	14
September	0	307	0	0	307
October	0	279	16	0	295
November	0	116	0	0	116
Total	0	948	106	31	1,085 (±755)

Table 20. Total estimated monthly rainbow trout harvest by boat anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of rainbow trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	0	0	0	0	0
June	0	0	0	0	0
July	0	0	0	0	0
August	0	24	27	82	133
September	0	29	0	0	29
October	41	0	0	0	41
November	10	0	0	0	10
Total	51	53	27	82	213 (±122)

Table 21. Total estimated monthly rainbow trout harvest by shore anglers only on the four sections of the mainstem Flathead River during 1981. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of rainbow trout harvested				
	MS1	MS2	MS3	MS4	Total
May 16-31	7	12	24	0	43
June	18	27	42	0	87
July	0	0	16	62	78
August	0	0	23	0	23
September	0	0	0	0	0
October	0	0	0	20	20
November	13	0	0	0	13
Total	38	39	105	82	264 (±171)

Table 22. Total estimated shore fishing pressure in hours by month with 95% confidence intervals in parentheses for Sections NF1-NF3 of the North Fork of the Flathead River during 1981.

		Estimated fishing pressure (hours)				
Month	Days	Total daylight hours	Section NF1	Section NF2	Section NF3	Total
May 16-31	16	256	796 (±549)	57 (±129)	0 (0)	853 (±564)
June	30	510	4,517 (±1,915)	437 (±298)	1,056 (±963)	6,010 (±2,164)
July	31	527	3,463 (±1,680)	678 (±739)	1,888 (±1,020)	6,029 (±2,099)
Aug 1 - Sep 7	38	465	2,220 (±895)	190 (±240)	348 (±356)	2,758 (±993)
Total	115	1,863	10,996 (±2,594)	1,362 (±794)	3,292 (±1,365)	15,650 (±2,992)

Table 23. Total estimated boat fishing pressure in hourse by month with 95% confidence intervals in parentheses for sections NF1-NF3 of the North Fork of the Flathead River during 1981.

		Estimated fishing pressure (hours)				
Month	Days	Total daylight hours	Section NF1	Section NF2	Section NF3	Section Total
May 16-31	16	256	0	0	0	0
June	30	510	36 (±78)	182 (±314)	109 (±233)	327 (±399)
July	31	527	1,468 (±1,092)	1,280 (±1,345)	747 (±543)	3,495 (±1,816)
Aug 1 - Sep 7	38	465	1,140 (±1,067)	507 (±415)	792 (±451)	2,439 (±1,207)
Total	115	1,863	2,644 (±1,443)	1,969 (±1,361)	1,648 (±702)	6,261 (±2,073)

Table 24. Total estimated monthly cutthroat trout harvest by shore anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of cutthroat trout harvested			
	NF1	NF2	NF3	Total
May 16-June 30	2,705	235	944	3,884
July	2,142	572	1,669	4,383
August-September 7	1,703	165	38	1,906
Total	6,550	972	2,651	10,173 (±2,880)

Table 25. Total estimated monthly cutthroat trout harvest by boat anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of cutthroat trout harvested			
	NF1	NF2	NF3	Total
May 16-June 30	81	118	0	199
July	2,025	1,024	1,275	4,324
August-September 7	920	765	0	1,685
Total	3,026	1,907	1,275	6,208 (±3,335)

Table 26. Total estimated monthly bull trout harvest by shore anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	83	3	0	86
July	19	20	102	141
August-September 7	10	4	56	70
Total	112	27	158	297 (±177)

Table 27. Total estimated monthly bull trout harvest by the boat anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of bull trout harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	0	0	0	0
July	0	14	73	87
August-September 7	20	0	0	20
Total	20	14	73	107 (±153)

Table 28. Total monthly whitefish harvest by shore anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	19	0	90	109
July	103	10	41	154
August-September 7	65	2	0	67
Total	187	12	131	330 (±240)

Table 29. Total estimated monthly whitefish harvest by boat anglers only on the three sections of the North Fork of the Flathead River. Estimates compiled by combining 1979 interview data with 1981 estimated pressure. 95% confidence interval in parentheses for grand total.

Month	Estimated numbers of whitefish harvested			
	NF1	NF2	NF3	Total
May 16 - June 30	0	0	0	0
July	40	14	619	673
August-September 7	98	0	0	98
Total	138	14	619	771 (±1,105)

Table 30. Distribution of angler origins for 328 boat fishermen interviewed on the North, Middle and South Forks of the Flathead River during June 1 - September 7, 1981.

River	Total fishermen	Angler origin[1/] Flathead County	Lake County	Other Montana	US nonresident	Foreign
North Fork	81	37	1	12	30	1
Middle Fork	181	26	0	11	129	15
South Fork	66	10	0	13	43	0
Total	328	73	1	36	202	16

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

Table 31. The number of boat angler hours sampled and percent (in parentheses) using flies, bait, lures, and combinations on the three forks of the Flathead River during May 24 - September 7, 1981.

Area	Number of fisherman hours interviewed and percent[1/] Flies	Lures	Bait	Combinations	Total
North Fork	40(24%)	72(44%)	0(0%)	52(32%)	164
Middle Fork	35(27%)	39(30%)	3(2%)	55(42%)	132
South Fork	687(68%)	101(10%)	6(1%)	220(22%)	1,014
Total	762(58%)	212(16%)	9(1%)	327(25%)	1,310

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

Table 32. Percent of cutthroat, bull trout and whitefish caught that were kept by boat anglers on the three forks of the Flathead River during 1981.

Section	Percent of catch harvested[1/]		
	Cutthroat	Bull trout	Whitefish
North Fork	16	43	41
Middle Fork	38	35	29
South Fork	12	38	3
TOTAL (weighted by sample size)	13	38	7

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

Table 33. Distribution of cutthroat, bull trout and whitefish catch and catch rates by type of terminal tackle used for boat anglers interviewed on the three forks of the Flathead River during June 1 - September 7, 1981.[1/]

River	Bait		Fly		Lure		Combinations		Total	
	Number	Number per hour	Number	Number per hour	Number	Number per hour	Number	Number per hour	Number	Number per hour
Cutthroat										
North Fork	--	--	51	1.28	18	0.25	31	0.60	100	0.61
Middle Fork	0	0	10	0.29	5	0.13	22	0.40	37	0.28
South Fork	0	0	1,238	1.80	108	1.07	351	1.60	1,697	1.67
TOTAL	0	0	1,299	1.70	131	0.62	404	1.24	1,834	1.40
Bull Trout										
North Fork	--	--	1	0.03	3	0.04	3	0.06	7	0.04
Middle Fork	0	0	0	0	6	0.15	11	0.20	17	0.13
South Fork	0	0	5	0.01	3	0.03	0	0	8	0.01
TOTAL	0	0	6	0.01	12	0.06	14	0.04	32	0.02
Whitefish										
North Fork	--	--	2	0.05	11	0.15	4	0.08	17	0.10
Middle Fork	0	0	2	0.06	0	0	12	0.22	14	0.11
South Fork	0	0	195	0.28	16	0.16	27	0.12	238	0.23
TOTAL	0	0	199	0.26	27	0.13	43	0.13	269	0.21

1/ Data from University of Idaho Department of Wildland Recreation Management contact card survey.

Table 34. Interview hours as percent of estimate.

Month	MAINSTEM MS1	MS2	MS3	MS4	Total
May	10.2	15.1	12.2	2.9	12.6
June	4.0	11.0	5.2	0.9	7.1
July	0	5.3	5.2	1.3	4.0
August	13.3	7.7	4.0	1.8	5.8
September	11.4	2.3	0.8	1.0	2.4
October	4.9	2.7	5.7	5.2	4.6
November	8.4	7.1	0	--	7.6
TOTAL	7.4	5.8	4.6	1.6	4.9

Boat 1,392/31,505 = 4.4

Shore 4,309/84,226 = 5.1

Table 35. Interview hours as percent of estimate.

Month	NORTH FORK				
	1979 Interview	1981 Interview	1981 Pressure	1979 Percent	1981 Percent
May	15.8	224.0	853	1.9	26.3
June	987.0	83.8	6,339	15.6	1.3
July	1,999.5	106.5	9,523	21.0	1.1
August-September	1,006.7	17.5	5,196	19.4	0.3
TOTAL	4,009.0	431.8	21,911	18.3	2.0
Boat	870	34	6,261	13.9	0.5
Shore	3,139	397.8	15,650	20.1	2.5