ANGLER PRESSURE AND GAME FISH HARVEST ESTIMATES FOR 1975 IN THE FLATHEAD RIVER SYSTEM ABOVE FLATHEAD LAKE

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ABSTRACT

Fishing pressure and harvest estimates were obtained during the 1975 fishing season, from the Middle Fork, North Fork and the main stem of the Flathead River above Flathead Lake. Estimates were derived by expansion of creel census contact data using statewide mail survey fishing pressure estimates. An estimated 63,123 anglers fished a total of 230,976 hours with a total catch of 245,032 fish.

The summer fishery, May through September, consisting primarily of cutthroat trout and Dolly Varden, comprised 54.6 percent of the total fishing pressure (34,465 angler trips) and 27.7 percent of the total catch (67,832 fish). The catch per angler hour during the summer fishery was 0.43 fish per hour.

The winter fishery, October through April, consisted primarily of kokanee moving up the river from Flathead Lake during their fall spawning migration. This fishery comprised 45.4 percent of the total fishing pressure (28,658 angler trips) and 72.3 percent of the total catch (177,200 fish). The catch per angler hour during the winter fishery was 2.00 fish.

The greatest fishing pressure, 840 angler trips per mile, was expended in the main stem of the Flathead River. This segment of the river was fished by 46,193 anglers comprising 73.2 percent of the total fishing pressure and who harvested 89.9 percent of the catch (217,610 fish). The North Fork River was fished by 9,557 anglers comprising 15.1 percent of the total fishing pressure and who harvested 8.5 percent of the total catch (20,766 fish). The Middle Fork River was fished by 7,373 anglers comprising 11.7 percent of the total fishing pressure and who harvested 2.7 percent of the total catch (6,656 fish). Fishing pressure on the North Fork and Middle Fork Rivers was 184 and 102 angler trips per mile, respectively.

INTRODUCTION

Description of Area

The upper Flathead drainage is a unique river system originating along the Continental Divide in Northwest Montana. This headwater area of the Clark Fork of the Columbia River system is comprised of three main forks, the North, Middle and South Forks and the main stem Flathead River (Figure 1). Waters in this system drain the western slopes of Glacier National Park and the Bob Marshall Wilderness. The North Fork, an international river, originates and flows some 40 miles in southwestern British Columbia, Canada, before entering the United States. The system is an environmentally "fragile" area. This aesthetic river system empties into Flathead Lake, a large, deep oligotrophic lake.

The North Fork River enters the United States at an elevation of 3,970 feet (msl) and during the 1975 water year averaged 3,053 cfs (range 350 to 24,800 cfs). The gradient of this river averages 14.8 feet per mile, and is quite uniform from the Canadian border to Blankenship Bridge, a distance of 59 miles. The Middle

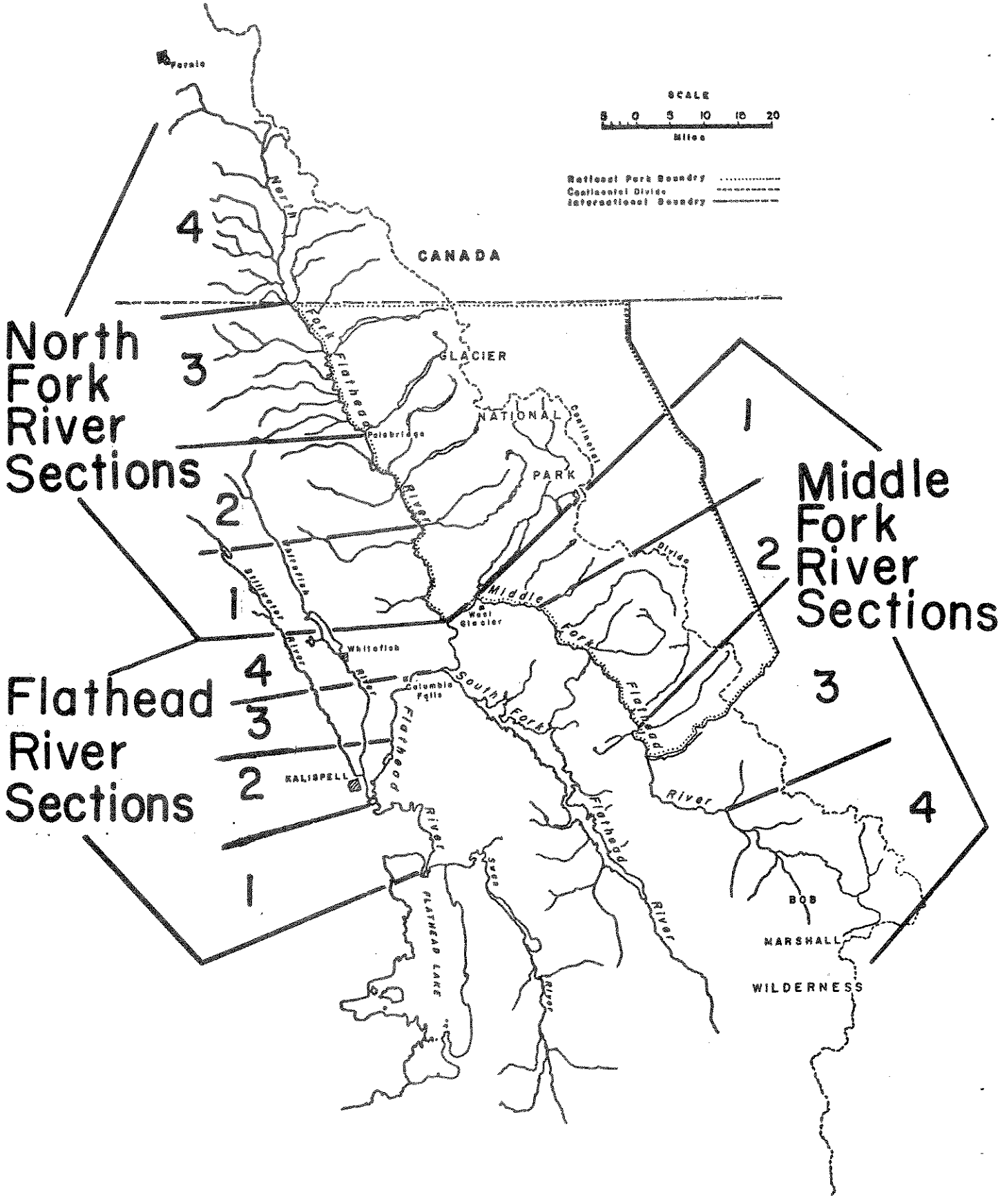

Figure 1. A map of the upper Flathead River drainage depicting river sections used during the 1975 censusing program

Fork River, originating in the Bob Marshall Wilderness, is at an elevation of 4,820 feet at Schafer Meadows and flows an average of 3,321 cfs (276 to 54,400 cfs) and drops at an average rate of 23.9 feet per mile for 72 miles. The upper Middle Fork, above Bear Creek, drops at a rate of 35.4 feet per mile or twice the gradient of the lower Middle Fork (17.0 feet per mile). The Flathead River runs an average of 14,400 cfs (1,060 to 70,700 cfs) and drops some 3.8 feet per mile in the 55 miles from Blankenship Bridge to Flathead Lake. Flow patterns in the river below the mouth of the South Fork of the Flathead River, which is the outlet of Hungry Horse Reservoir, are subjected to frequent and often violent discharge changes. The gradient in the more typical "running water" areas of the Flathead River, upper 33 miles above Flathead Lake, averages 6.4 feet per mile.

The Flathead National Forest personnel, in their preparation of the "Flathead River, Wild and Scenic River Study Report", 1973, further described the physical factors of this drainage.

The fishery in this river and lake system depends entirely upon natural reproduction and/or the migratory habits of the dominant fish species:west-slope cutthroat trout, Dolly Varden, mountain whitefish and kokanee. All but the latter are indigenous to the drainage. Tag and recapture information on cutthroat trout and Dolly Varden (Block, 1955 and Hanzel, 1966) has documented an interdependent relationship between the lake and river system. The South Fork River was lost to the system in 1953 with the completion of Hungry Horse Dam, 10 miles upstream from its confluence with the main river.

Fishing Season and Limits

The 1975 fishing season on the upper Flathead drainage encompassed 319 days. The summer season (137 days) is considered a period from May through September, while the winter season (182 days) extends from October through April of the following year. The stream fishing season regularly starts the third Saturday of May (May 17, 1975) and continues through November. The opening date of tributaries of the North and Middle Fork Rivers is delayed one month (June 21).

The specialized "snag" fishery for kokanee begins September 1 and continues through January. An extended season for mountain whitefish occurs from December 1 through March.

The fishing limits imposed in the drainage were as follows:

1) Trout limit: (included species listed and/or any combination) cutthroat trout, Dolly Varden, rainbow trout and Arctic grayling; daily possession limits shall be ten pounds and one fish or ten fish, whichever comes first.

2) Salmon limit: kokanee - 35 fish daily and 70 fish in possession.

3) Whitefish limit: mountain whitefish - 30 fish daily and 60 fish in possession.

There was a minimum size limit of 18 inches in total length imposed on the Dolly Varden in the system.

The east half of the North Fork River is contained within the boundary of Glacier National Park and is under the Park's jurisdiction. No Montana fishing license is required to fish this portion of the river. Fortunately, park season limits and regulations in this river coincide with the State's.

OBJECTIVES

The assessment of fisherman harvest is essential in determining the present status of this fishery and setting management goals for the future. To date, only fragmentary river harvest and pressure data are available, (Block, 1955 and Holton, 1970). Robbins (1966) did assess fisherman harvest and pressure in Flathead Lake. An assessment of conditions in this system during the next decade is most important because of the possible impact of coal, oil and gas, and river bottom development. Also dams and other water development projects are proposed for this drainage.

It was the objective of this job to measure the total fish harvest in the 185 miles of free flowing river and tributary system above Flathead Lake.

METHODS - BASIC CONCEPTS

The migratory, or often termed, "elusive or transitory," type of fishery existing in this river system is unique and required a specially designed census program. The harvest survey covers a large area which includes portions of a wilderness, a national park and a foreign country. Resource management agencies of the United States Government, State of Montana and of Canada, have to recognize the need for a "holistic-type" study approach in this drainage before anyone can collectively gather the information necessary to define, monitor and preserve its fishery.

During the winter of 1974, Montana Department of Fish and Game biologists met with concerned agencies to explain the proposed harvest estimate project. Support and assistance were offered by the Flathead National Forest, Glacier National Park and the British Columbia Fish and Wildlife. The National Park Service offered additional support to the harvest proposal by funding the time and expenses of two census clerks. Following the acceptance of the study, the Montana Department of Fish and Game agreed to coordinate the harvest estimate program and provide one census clerk and prepare the final report.

Total harvest figures were obtained by expanding creel catch and success information to total pressure and harvest estimates using the fishing pressure data obtained from a wave form mail-out census on these waters. This system of estimating pressure (Holton, 1970) has been found to be satisfactory by the State of Montana for measuring fishing and recreational use on large lakes, reservoirs and/or river systems. Such a technique is useful where it is impossible to sample fishing pressure by more direct means.

In essence, a fixed number of mail-out census cards was sent, every two weeks, to randomly selected persons who had purchased Montana fishing licenses. Pressure estimates using this technique were not divided into segments smaller than rivers;i.e., North, Middle and main stem of the Flathead River above Flathead Lake.

Creel composition and success information were gathered by three field census clerks, each assigned to cover one of the free flowing rivers. These assignments enabled the clerks to become more familiar with each river and its own fishing patterns. Access by one primary road on each of the three river areas enabled the clerks to cover their sections in one day if it was warranted. Only the upper 20 miles of the Middle Fork did not have road access. Since pressure estimates were derived independently of the creel data, the clerks attempted to contact as many anglers as possible during an eight-hour census day. Often, or as deemed necessary, the census day was split so that contacts could be made during the more popular fishing periods: daylight (6:00 to 10:00 a.m.) and dusk (6:00 to 10:00 p.m.). The census area was also adjusted to fit the time and movement patterns of the migrating fish. Major census efforts were expended in areas where anglers concentrated. However, the entire census area was checked at least once a week. Each clerk spent at least one day of each weekend and all holidays censusing her assigned stretches of the river system.

Field data were obtained by three methods; 1) direct field interview of anglers who had completed their fishing trips; 2) field interview of anglers who were not through fishing. Information on the balance of their trip was provided by the fishermen on postal cards furnished by the census takers, 3) completed fishing trip information on returned postal cards either given fishermen at the start of a fishing trip or left on his parked vehicle at an access area along the river. Although the system depended upon voluntary fishing information on postal cards, it did allow maximum effort to be spent by limited personnel to make as many river contacts as possible and also offered the minimum of interview interference to the anglers.

Fishing information obtained by the clerks stressed an informal interview approach rather than a more direct inquisitional pursuit of data. Field data collected included the hours fished, kinds and number of fish caught and/or released back to the water. Whenever possible, additional fish information was obtained by the clerks, i.e., length, weight, sex development and scale samples.

Public cooperation and assistance was solicited throughout the season by the local news media.

TECHNIQUES AND RESULTS

Census Effort and River Conditions

This drainage-wide census program was started on May 17th, the opening of the stream fishing season.

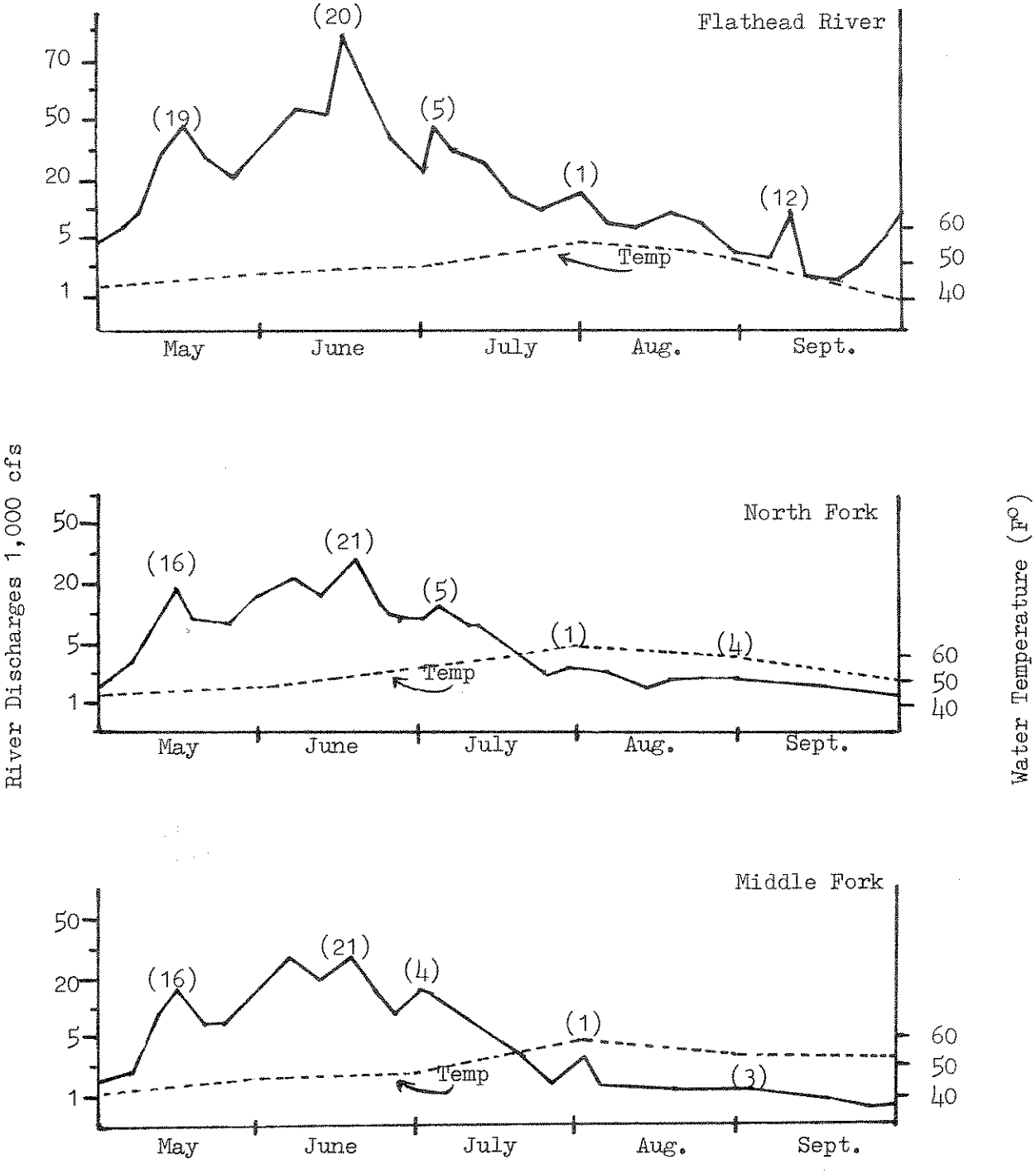

Figure 2. Weekly river discharges and monthly water temperatures on the Flathead, North and Middle Forks of the Flathead River, 1975

Monthly peak flow indicated by date in parentheses

Table 1. Monthly fishing effort and success as determined by field contacts during the 1975 season on the upper Flathead River system

	Angler /party	No.of anglers	Hours/ angler	Total hours	Total fish	Fish/ hour	% fish kept
Flathead River							
May	1.37	211	4.73	998.7	180	0.18	66.48
June	1.45	195	4.41	860.1	138	0.16	66.19
July	1.71	320	4.55	1455.0	405	0.28	77.37
August	1.78	164	3.63	595.5	481	0.81	73.33
Sept.	1.92	121	3.91	473.5	697	1.47	99.15
Oct.	2.13	315	3.60	1135.3	2260	1.99	99.52
Total		1326		5518.1	4161	0.75	92.41
North Fork							
June	2.17	15	2.78	42.1	10	0.24	76.19
July	2.12	387	4.04	1564.8	919	0.59	54.21
August	2.05	373	3.90	1454.3	877	0.60	58.36
Sept.	2.33	7	2.33	16.3	12	0.74	66.67
Total		782		3077.5	1818	0.59	56.53
Middle Fork							
July	2.23	208	3.21	667.1	215	0.32	70.78
August	1.84	339	3.50	1186.2	691	0.58	70.22
Sept.	1.67	7	2.50	16.7	7	0.42	71.43
Total		554		1870.0	913	0.49	70.36
Total All Rivers		2662		10465.6	6892	0.66	80.76

As was anticipated, fisherman use during the early part of the season was limited by high spring runoff flows. Angler use during May and June was principally in the Flathead River from the lake to the confluence of the North and Middle Forks at Blankenship Bridge. One clerk initiated the program and was able to cover the entire use area alone during the month of May. An additional clerk was assigned to assist during June as the use expanded. A third clerk was added during July and August with each assigned to cover one of the three main rivers.

High turbid flows continued in this system through late June (Figure 2), a time when river temperatures were approaching the mid 40's and low 50's (degrees fahrenheit). By mid-July, the rivers were clearing and their temperatures were increasing to maximums in the high 50's and low 60's. A progressive shift of angler use is reflected in the number of contacts made during the census (Table 1). July's major fishing use shifted from the Flathead River to the North Fork. This shift, however, is not indicated in the contact figures since the change occurred during the month. Angler use on the Middle Fork, although monitored, did not show an increase until late July and peaked during August with 61.2 percent of its use occurring during that month. Peak use on the Flathead River was spread out and occurred during July and October with one-fourth of the total use occurring during each month. On the North Fork, peak use occurred during July and August. Nearly equal use occurred during that period and totaled 97.2 percent of the use of that river.

Major fishing use for the drainage during August was confined to the North and Middle Fork Rivers. This peak was followed by a very sharp decline of use in these upper areas after Labor Day (September 1, 1975). Fishing effort, thereafter, was concentrated on the Flathead River between the lake and Columbia Falls. Censusing clerks were decreased in September to one and on October 27th, the census was terminated. During the peak use period, census clerks drove an average of three miles to make each angler contact.

The pattern of fishing use described above is considered to be the norm for this river system. There is the possibility that a two-week shift can occur, triggered by weather patterns causing the early or late spring runoff period.

Source of Contact Data

Information on creel composition and angler success was obtained from field interviews by census clerks. Since pressure estimates were not derived from the contact data, interviewers tried to make as many contacts and cover as much of the river area as possible to obtain the largest and best source of data from which bag and success estimates could be estimated. Such a technique depends upon some field data supplied by the angler on a voluntarily returned postage-paid card.

To improve the quality and completeness of the postcard data, clerks filled out as much of the card as possible before leaving the card. At the time of presentation, the angler was informed how later data should be recorded. This task was made as simple as possible by circling the hour when fishing was completed and inserting the number and sizes of fish caught and/or released back to

the water. The data on a card was to include only fishing effort and success for one day and was to include the catch information of members in that party.

The interview-card technique provided complete trip information from 85.8 percent of the parties contacted on the Flathead River (total 689), 82.7 percent of the North Fork contacts (total 329) and 78.3 percent of the Middle Fork contacts (total 258). The quality of data returned on the cards could be debated, but with most of the card being completed by the clerks, including partial catch data up to the time of the interview, the data obtained are believed to be satisfactory. The source and type of contact data from the three rivers are presented in Table 2.

Table 2. The number and type of field contacts by percent --- information obtained on the Flathead River, North and Middle Fork Rivers during the 1975 census

Site	Contacts	Source of Data				
		Interviews only	Cards only	Interview/ card comb	Incomp cards	Cards not returned
		Percent				
Flathead River	689	18.4	1.0	64.6	6.5	9.4
North Fork	329	27.7		53.2	6.4	12.8
Middle Fork	258	11.6	0.4	69.8	10.9	7.4

Over 90 percent of the cards issued were returned. The majority of the cards not returned had been left on cars parked at fishing access sites without the clerk contacting anyone. Instructions were left with each card requesting its return even though the recipient had not been fishing. A follow-up of non-returned cards through license plate identification found most recipients to be engaged in outdoor activities other than fishing; therefore, they did not feel it necessary to return the cards.

The census clerks along the North Fork River made contacts at access points on both sides of the river, inside and outside of Glacier National Park. These contacts included both resident and non-resident Montana licensed anglers and particularly non-licensed visiting guests at Glacier National Park. Although these latter groups of anglers were not included in the estimated pressure for this river; their fishing experiences did represent a part of the angling on this river and, therefore, their success and creel composition were included in the total analysis.

Contact Data Analysis

All field contact data were summarized by computer at the Statistical Laboratory in Bozeman, Montana, under the direction of Dr. Kenneth J. Tiahrt. A print-out of all summarized data requested was received and used during the analysis of the survey.

Total fishing pressure estimates were also analyzed at the lab by Dr. Tiahrt, but were estimated from a completely different set of data as explained in the "Methods" section.

Contact data were expanded to express the catch rate in fish per hour and the percent of fish caught and kept by the month for these three rivers. Catch rates and the percentage of fish kept changed between the rivers censused and during the census season. The lowest success rate occurred during June, (0.16 fish/hour), when river flows were high. The highest success rate (1.99 fish/hour) occurred in October. Both extremes occurred on the Flathead River. Generally, all three rivers reflected lowest rates early in the season and rates progressively increased throughout the season. Only the Middle Fork decreased slightly in success the last month. This success rate, however, was determined from only a small number of anglers on the river that month.

Since the fishery within the system is dependent upon fish movements, seasonal species composition and their relative availability to the angler are reflected by the changes in the fish/hour rates. A change in the monthly percentage of fish kept usually reflected changes in both species and sizes of fish available to the anglers (Table 1).

Over the year, an average-sized party on the Flathead River consisted of 1.9 anglers who would fish 4.2 hours, catch fish at a rate of 0.75 fish per hour and take 92.4 percent home. An average party on the North Fork consisted of 2.4 persons who would fish 3.9 hours, catch fish at a rate of 0.59 per hour and take home only 56.5 percent. On the Middle Fork, an average party of 2.1 would fish 3.3 hours, catch fish at a rate of 0.49 fish per hour and take home 70.4 percent.

Monthly average party size, hours fished and catch rate by river are presented in Table 1.

Collectively, an angler fishing the Flathead system above Flathead Lake would be expected to catch fish at a rate of 0.66 fish per hour and take home 80.8 percent of them.

Fishing from shore outnumbered all other modes of fishing, eight to one, on the Flathead River system. While various angling methods; i.e., lures, flies, bait and snagging were about equally used by Flathead River anglers; lures and/or flies were the preferred methods on the North and Middle Fork Rivers.

Fishing Use by River Area

Angler use was generally concentrated near population centers and at convenient access sites. Anglers used a total of 53 access points on the Flathead,

North and Middle Forks of the Flathead River. The number of access sites on each river was 17, 16 and 20, respectively. An access point could vary from a well developed overnight campground to a simple parking area along the river.

The largest concentrations of anglers on the Flathead River occurred in Section 2, Figure 1., where 73.1 percent of the total use was exerted (Table 3). This section of river is 14 miles in length and extends from Pressentine Fishing Access Site to Foys Bend. This section is also located adjacent to the city of Kalispell and is the first stretch of the river not directly influenced by the elevations of Flathead Lake.

Table 3. Percent of fishing pressure as determined by field censusing on the Flathead, North Fork and Middle Fork Rivers, 1975 (length of river sections given in miles in parentheses)

	Percent of fishing pressure by river section				
	1.	2	3	4	River Length Miles
Flathead River	10.0(19)	73.1(14)	7.1(13)	9.7(9)	55
North Fork River	62.6(18)	15.2(16)	21.9(25)	0.3(40)*	59
Middle Fork River	24.8(14)	32.6(25)	41.5(20)	1.2(13)	72
Total Miles					186

* This section of the North Fork River is in Canada and data from this section were excluded from the analysis.

The majority of anglers on the North Fork of the Flathead River utilized the lowest section of the river and exerted 62.6 percent of the total pressure in this area. This section is located between the mouth of Camas Creek and Blankenship Bridge, a river length of 18 miles. The North Fork River was divided into four fishing sections; however, only three sections were located in the United States. The fourth section delineated the portion of this river located in Canada. Less than one percent of the total fishing pressure on the North Fork was reported from Canada. Since the program was not designed to census Canadian waters, all data pertaining to these waters was deleted from final analysis.

Angler use on the Middle Fork River was more or less evenly distributed in the lower three-fourths of this river (Sections 1,2 and 3). Heaviest concentrations were reported in the stretch of river from the mouth of Granite Creek to the townsite of Essex, a river length of 20 miles.

SPECIES DATA

Species Composition

Cutthroat trout, kokanee, Dolly Varden and mountain whitefish were the major game fish species caught by anglers in the Flathead River system (Table 4). These species collectively represented 98.1 percent of all fish caught during the census program. During the summer fishing period, May through September, cutthroat trout was the primary species representing 59.5 percent of the total fish; with kokanee, Dolly Varden and mountain whitefish representing 19.9, 9.9 and 8.1 percent, respectively. During October, kokanee completely dominated the catch representing 95.6 percent of the total bag. This "snag" fishery for the spawning salmon was entirely concentrated on the Flathead River between the cities of Kalispell and Columbia Falls.

The monthly catch composition percentages did reflect seasonal and area availability as the fish moved through the system. Nearly half of the creeled fish during May and June were Dolly Varden with the remainder composed of equal numbers of cutthroat trout and mountain whitefish. Creel composition thereafter, July through August, shifted to a cutthroat trout predominance, 49.2 to 88.8 percent. Kokanee first appeared in the creels during August and then dominated the catch through October.

Since Dolly Varden and cutthroat trout were the predominant fish in the summer catch and were the target species of this study, a further monthly breakdown of catch for each species is presented in Table 5.

Dolly Varden

Over half, 53.7 percent, of all the Dolly Varden caught were from the main stem of the Flathead River, with the North and Middle Forks producing the other half in almost equal numbers. Catches of Dolly Varden by month in the main Flathead River were quite similar during May, June and July and did not indicate a significant peak month. Numbers of Dolly Varden taken in the North Fork River peaked suddenly during July and then continued to produce well through August. Fishing for Dolly Varden in the Middle Fork started in late July, peaked in August and dropped off sharply to nothing in September. Collectively, most Dolly Varden were caught during the month of July, which was then followed by numbers caught in August, May and June.

Angling for Dolly Varden in this river system is considered a "trophy" river fishery and is dependent upon a supply of large, mature sized fish that range in weight from 5 to 16 pounds. Since a minimum size limit of 18 inches is imposed on the Dolly Varden in the system, many small fish were caught and released back to the water. Several small illegal Dolly Varden were kept by anglers on the Middle Fork River (Figure 3). These cases were referred to our Enforcement

Table 4. Species composition, percent and total fish caught per month in the Flathead River System, May through October, 1975

Monthly Species Composition -- Percent

	Species 1/						
	DV	Ct	Wf	Rb	Kok	Others	Total
Flathead River							
May	47.8	35.0	13.9	2.8	0.6	--	180
June	48.6	20.3	22.5	6.5	2.2	--	138
July	19.3	48.2	28.6	3.2	0.3	0.5	405
August	3.1	53.6	2.7	2.5	37.4	0.6	481
Sept.	--	5.3	1.2	0.1	93.4	--	697
Summer Total	12.9	30.6	10.2	2.1	44.0	0.3	1901
October	0.1	1.8	2.0	--	95.6	0.5	2260
Season Total	5.9	15.0	5.7	1.0	72.0	0.4	4161
North Fork							
June	30.0	20.0	10.0	--	--	40.0	10
July	6.1	88.8	3.4	0.2	1.2	0.3	919
August	5.1	84.3	7.1	1.1	--	2.4	877
Sept.	33.3	66.7	--	--	--	--	12
Summer Total	5.9	86.1	5.2	0.7	0.6	1.5	1818
Middle Fork							
July	18.6	69.8	8.8	2.8	--	--	215
August	9.1	65.9	10.0	1.0	10.9	3.2	691
Sept.	--	85.7	14.3	--	--	--	7
Summer Total	11.3	66.9	9.8	1.4	8.2	2.4	913
Rivers Combined Summer Total	9.9	59.5	8.1	1.4	19.9	1.2	4632

1/ DV = Dolly Varden, Ct = cutthroat trout, Wf = mountain whitefish, Rb = rainbow, Kok = kokanee, Others = Arctic grayling, largemouth bass, lake trout, brook trout, and yellow perch

Table 5. Monthly percent of catch found in angler's creels of Dolly Varden and cutthroat trout for the Flathead, North and Middle Fork Rivers, 1975

River	May	June	July	Aug.	Sept.	Oct.	Seasonal Total	Percent
				Dolly Varden				
Flathead River	34.5	27.3	31.7	6.0	--	0.4	249	(53.7)
North Fork	--	2.8	52.3	41.3	3.64	--	109	(23.5)
Middle Fork	--	--	38.7	61.3	--	--	106	(22.8)
Rivers Combined	18.5	15.3	38.1	26.9	0.9	0.2	464	
				Cutthroat				
Flathead River	9.9	4.3	30.9	42.0	5.7	7.3	648	(22.8)
North Fork	--	0.1	52.6	46.8	0.5	--	1583	(55.6)
Middle Fork	--	--	24.9	74.1	1.0	--	614	(21.5)
Rivers Combined	2.2	1.1	41.7	51.6	1.8	1.7	2845	

Division for appropriate action. A total of 52.2 percent of the total catch was of legal size, 18 inches or larger (Figure 3). This revealed that some 4.4 percent of the legal sized Dolly Varden were also returned to the water, thus reflecting a characteristic of Flathead River anglers. Of all fish over 18 inches, 51.8 percent were found within the larger size groups, 24 inches and larger. Most small or immature (less than 18 inches) Dolly Varden were reported to have been caught in the main stem of the Flathead River with the major portion of this group represented by fish 10.0 and 17.9 inches in length. The largest number of fish less than 10 inches was found to have been reported in the North Fork River. The greatest percentage of fish larger than 24 inches was also taken in the North Fork.

The monthly catch of Dolly Varden larger than 18 inches increased as the season progressed, peaking in July with 68.4 percent being legal size fish. During August, fewer larger fish were reported with their percentage dropping to 39.2 percent. This would indicate a relative increase in the availability of small or immature Dolly Varden in the system during that month, which coincides with observations that this is the main period of downstream smoltification of the species. An angler would have to fish an average of ten hours to catch a Dolly Varden in this system.

Cutthroat trout

Over half, or 55.6 percent, of all cutthroat trout caught were taken in the North Fork River. The remainder was produced in nearly equal numbers by the other two rivers. Cutthroat trout were represented in the catch during all months of the census on the Flathead River, peaking during the month of August. Cutthroat trout fishing on the North Fork River occurred primarily during July and August; with the catch being split evenly between the two months. August was the most productive month for cutthroat trout on the Middle Fork River as well as being the most productive throughout the system.

The size composition of cutthroat trout found in the creels for the Flathead and Middle Fork Rivers was similar (Figure 3). The bulk of the catch in these two rivers was from two major frequency groups, 6-9 inches and 10-14 inches. A greater percentage of small (6-9 inches) fish was caught from the North Fork River. The significance of this observation is unknown, but may indicate greater total recruitment from the North Fork River. The numbers of cutthroat trout released back to the water, even though no minimum size regulation exists, were similar throughout the system and averaged 62.7 percent for the season. An angler would have to fish an average of three hours to catch a cutthroat trout in the system.

Kokanee

Kokanee were first introduced into the drainage in 1916, but were not recognized as a manageable species until 1935. Since that time, they have been an integral part of the lake population and to a varying degree, a part of the river population during their fall migration. The first concentrations of

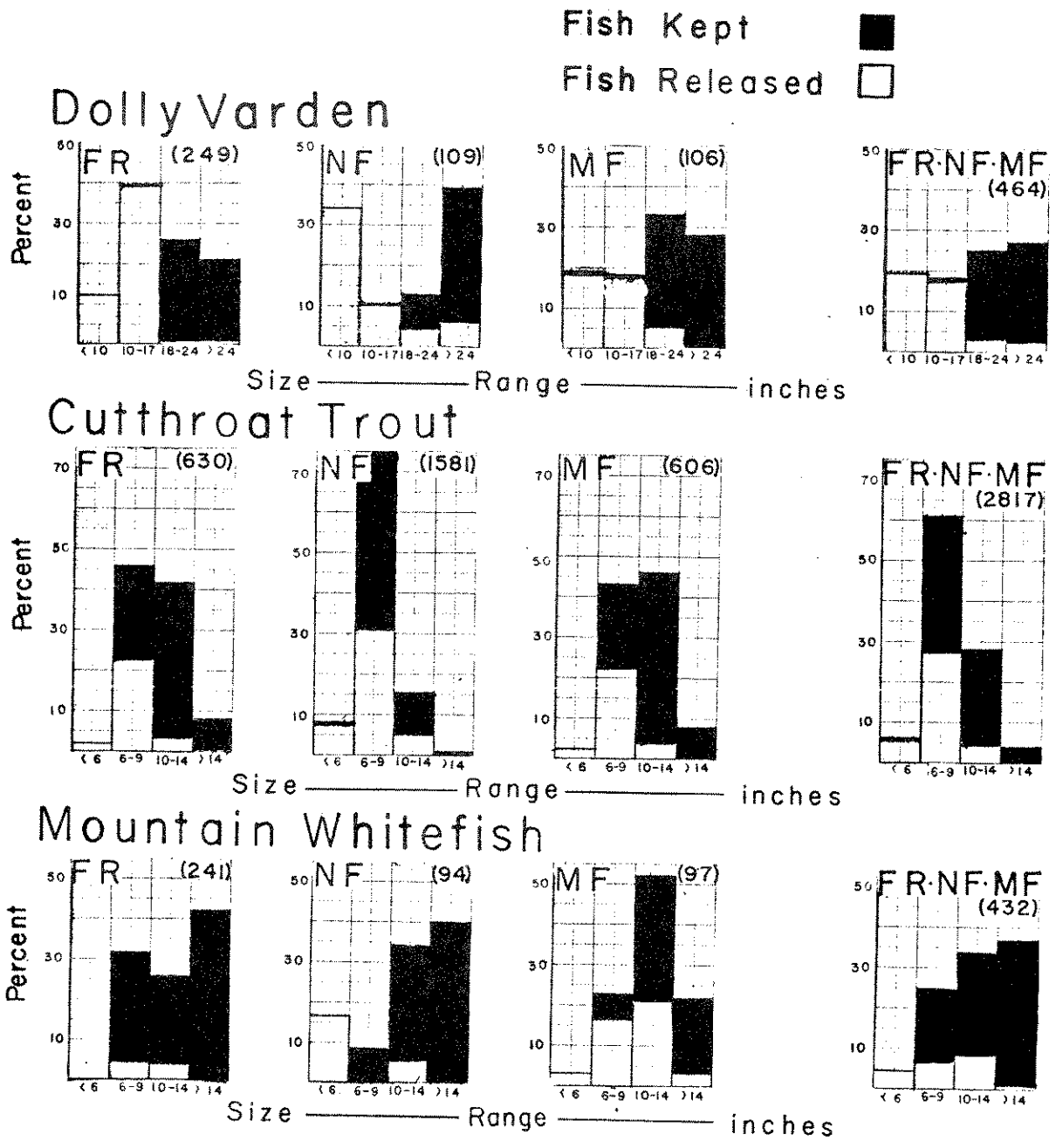

Figure 3. Size composition of Dolly Varden, cutthroat trout and mountain whitefish caught by anglers in the Flathead (FR), North Fork (NF), Middle Fork (MF) and rivers combined (FR,NF,MF,) during the 1975 season. Ratio of fish kept to those released is shown by shaded area in each frequency interval. Total number of fish checked are in parentheses.

spawning salmon appeared in the lower Flathead River during August. Fishing for salmon at this time had to be by the conventional fishing techniques, e.g. spinning, since the specialized "snag" fishery started on September 1st and continued through December.

The appearance of the fall run of salmon in the river was abrupt and caused an increase in the catch rate of three times the rate experienced during July. As the larger salmon concentrations arrived during September and October, catch rates increased five and then to seven times the success rate of July. The kokanee fishery, mostly on the Flathead River, accounted for 44.7 percent of all fish caught during the entire season and 95.6 percent of the fishery during October. A limited amount of salmon fishing occurred during September along the lower 30 miles of the Middle Fork River. Previous to this census program, no kokanee had been reported from the North Fork River. This is peculiar since two natural reproducing populations of kokanee have existed in lakes within Glacier National Park for years and are tributary to the North Fork River. During September, 1975, kokanee were collected by electrofishing in the North Fork River near the mouth of Camas Creek. These fish were the first official records of mature salmon in the North Fork River.

Mountain whitefish

Although mountain whitefish represented 8.1 percent of the total catch and anglers kept 80.1 percent of all caught, this fish was considered by the Flathead anglers as an "incidental" species. It is believed that the winter fishery for this species, popular statewide, was over shadowed by the special and liberal kokanee fishery available to the anglers during that season.

The main Flathead River produced over half of all the whitefish caught during the census, 56.6 percent. The remainder of the catch was equally distributed between the North and Middle Fork Rivers. The largest percent of fish over 14 inches total length was caught in the Flathead River while the greatest numbers of small whitefish, less than six inches, were reported from the North Fork River. Regardless of size, a greater percentage of whitefish caught in the Middle Fork River was returned back to the water (Figure 3).

Rainbow trout

Rainbow trout, an exotic species in the drainage, occurred in all rivers, but represented only 1.4 percent of the total catch. Catches of rainbow trout were reported during the months when cutthroat trout fishing was good. Although clerks were schooled on the techniques of separating these two species, it is believed they and/or reporting anglers could have misidentified specimens or hybrids of these two closely related fishes.

Rainbow trout were first introduced into the drainage in 1914 and through 1954, more than six million were released into waters in or above Flathead Lake. Previous information on the catch of rainbow trout from the river or lake was very limited.

One private commercial hatchery, rearing rainbow trout, operated along the Flathead River near Coram, Montana, from 1958 through 1975. Its out-flow waters entered directly into the upper Flathead River. The majority of rainbow trout taken both prior and during the census program have been at three locations: 1) an area just below the out-flow of the commercial hatchery; 2) at the confluence of the Flathead River and the South Fork River; 3) in the river area adjacent to Kalispell.

The highest monthly catch of rainbow trout during the census was reported on the Flathead River in June, when they represented 6.5 percent of the month's catch. Although rainbow trout were reported from creels on the North and Middle Fork Rivers, some doubt exists as to the identification of these fish. Prior to this census when extensive tagging studies were conducted on these rivers (1953 through 1965) no verified specimens were caught or observed.

Others

Fish listed under the "others" category include, in decreasing order of their catch: Arctic grayling, brook trout, peamouth, northern squawfish, yellow perch, largemouth bass, lake whitefish and lake trout. Except for the grayling, all these species were caught in small numbers in atypical river habitats such as oxbow sloughs of the lower river. The grayling were found only in the North Fork River during August, in an area just above Polebridge. They are believed to be the result of downstream drift from Red Meadow Creek drainage. This tributary, associated with a small lake, contains a self-sustaining population of grayling and empties into the North Fork.

Sizes caught

The following size ranges of fish were those that were measured by census clerks and do not necessarily represent the extreme size ranges of all fish caught: Dolly Varden - 9.0 to 32.0 inches; cutthroat trout - 6.0 to 14.8 inches; mountain whitefish - 6.0 to 14.9 inches; rainbow trout - 7.8 to 15.3 inches; kokanee - 10.5 to 13.5 inches; and grayling - 6.0 to 12.0 inches.

Pressure and Harvest Estimates

Total fishing pressure estimate for the upper Flathead River drainage was 63,123 anglers during the 1975 season. This pressure occurred on the 186 miles of river during the 319 day fishing season and averaged 339.4 anglers per mile. The summer fishery, May through September, accounted for 54.6 percent of the total pressure. Total use on the Flathead River alone represented 73.2 percent of the anglers using the drainage. Pressure estimates of summer and winter seasons on the Flathead and Middle Fork Rivers were nearly the same for the two seasons (Table 6). Summer pressure on the North Fork River was fourteen times the winter pressure estimate. Resident anglers predominated in the system, representing 83.4 percent of the seasonal total. Non-resident anglers showed heavier use on the North Fork with resident anglers making up only 56.1 percent.

The percent of resident anglers on the Flathead and Middle Fork River was 86.3 and 92.1 percent, respectively.

The largest concentration of anglers (839.9 angler trips per mile) occurred on the Flathead River (total length 55 miles). The lightest concentration of anglers occurred on the Middle Fork River (72 miles) which had 162.0 anglers per mile. Angler use per mile during the summer season represented 390.8, 151.4 and 56.1 angler trips per mile for the Flathead, North and Middle Fork Rivers respectively.

A total of 245,032 fish was estimated to have been harvested by anglers in the upper Flathead River system during the entire 1975 season. The winter harvest of 177,200 fish represented 72.3 percent of the overall catch while the Flathead River alone produced 217,610 fish, 88.8 percent of the total (Table 6). The projected number of fish of each species caught by season is presented in Table 7. These data were derived by applying species composition figures (Table 4) to harvest estimates (Table 6).

DISCUSSION

The 1975 fishing pressure estimates, bag composition and angling success establishes a reference level enabling comparison with past or future surveys as well as comparisons with other river systems.

According to the 1970 edition of the "National Survey of Hunting and Fishing Report", freshwater anglers spend $9.50 per angler trip. Based on this figure, the upper Flathead River system supports an annual angler expenditure of nearly $600,000.

A creel census program conducted on the North Fork River by Block (1955) provided a basis for comparing catch composition, general size relationships and overall fishing success over a 22-year period.

The percent of the two major species, cutthroat trout and Dolly Varden, represented in the creels was about the same in both censuses. Cutthroat trout represented 83.3 percent in 1953 and 86.1 percent in 1975. Dolly Varden composed 6.4 and 5.9 percent for the two years respectively. Block found the average size of the cutthroat trout to be 8.5 inches in 1953; while Hanzel (1966) during a tagging program on this river, found them to average 8.4 and 8.5 inches in 1961 and 1962 respectively. During the 1975 census, a length frequency system was used to express general size rather than calculating an average size. Seventy-five percent of all the cutthroat trout taken on this river occurred in the frequency range of 6-9 inches. It appears the average size has not changed significantly. The major contribution of large sized Dolly Varden over 24 inches, also indicate that the average size has not significantly changed from the 24.3 inches found in 1953.

The seasonal catch rate on the North Fork River in 1953 was 0.45 fish per hour, while in 1975, fish caught and kept averaged 0.33 fish per hour. This catch rate differs from the 0.59 fish per hour catch rate expressed in Table 1 because the latter rate was calculated on the total number of fish caught, both kept and released.

Table 6. Total fish pressure and harvest estimates from the upper Flathead River drainage, 1975

	Est. Man-days of fishing	Average hours/angler	Total hours	Average fish/hour	Est. fish harvest
Flathead River					
Summer	21,493	4.3351	93,174	0.4337	40,410
Winter	24,700	3.6038	89,014	1.9907	177,200
	46,193		182,188		217,610
North Fork					
Summer	8,933	3.9345	35,155	0.5907	20,766
Winter	624 1/	--	--	--	--
Middle Fork					
Summer	4,039	3.3754	13,633	0.4882	6,656
Winter	3,334 1/	--	--	--	--
Rivers Combined					
Summer	34,465		141,962		67,832
Winter	28,658 2/		89,014		177,200
	63,123		230,976		245,032

1/ Only fishing pressure data available for this season

2/ Total fish estimates for this season were derived from partial pressure, Flathead River only.

Table 7. Estimate number of fish by species and season caught in the upper Flathead River drainage, 1975

	Species[2]						
	DV	Ct	Wf	Rb	Kok	Others	Total
Flathead River							
Summer	5,229	12,349	4,102	849	17,776	105	40,410
Winter	71	3,208	3,615	--	169,438	868	177,200
Season Total	5,300	15,557	7,717	849	187,214	973	217,610
North Fork							
Summer	1,233	17,875	1,074	137	127	320	20,766
Winter	--	--	--	--	--	--	--
Middle Fork							
Summer	751	4,454	649	95	547	160	6,656
Winter	--	--	--	--	--	--	--
Rivers Combined							
Summer	7,213	34,678	5,825	1,081	18,450	585	67,832
Winter [1]	71	3,208	3,615	--	169,438	868	177,200
	7,284	37,886	9,440	1,081	187,888	1,453	245,032

[1] Only Flathead River data available

[2] DV = Dolly Varden, Ct = cutthroat trout, Wf = mountain whitefish, Rb = rainbow, Kok = kokanee, Others = Arctic grayling, largemouth bass, lake trout, brook trout, and yellow perch.

In summary, fishing conditions on the North Fork during the 22-year period have not appeared to significantly affect the angler's catch composition, size or angling success.

Residents composed a higher percentage of the anglers (84.9) in the 1953 survey than in the 1975 survey (56.1). General fishing patterns on the river with the peak use during July and August and use decreasing sharply in September occurred in both years.

Fishing pressure on the Flathead River system has increased slightly since the last state wide pressure estimate in 1968. However, since the techniques used in the earlier estimate differed from those used in 1975; only general trends will be discussed. During this eight-year span, statewide fishing license sales increased 4.5 percent. The total fishing pressure in the entire Northwest Region, including the Flathead River system, increased by one-third. An eight-fold increase occurred during the winter fishing season, October through April, on the Flathead River. This increase was primarily attributed to the gain in popularity of a river snag fishery for kokanee. Snag fishing has been legal on this river since 1942, but had not gained prominence until more recent years. The increase also may reflect the result of a shift of kokanee snaggers from lakeshore areas to the river. In the late 1950's, the more popular snagging areas occurred along the shores of Flathead Lake, while the more recent trend favors the river banks. The 1975 pressure estimates for the North and Middle Fork Rivers are believed to have increased some 3 to 5 percent since 1968.

The 55 miles of the main stem of the Flathead River above Flathead Lake are classified as one of Montana's seven "blue ribbon" trout streams. It was so classed because of its national, as well as statewide, fishing value.

To compare angler pressure on the Flathead River to another popular "blue ribbon" stream; pressure data for the Madison River, located in south central Montana, was abstracted from the 1975 statewide pressure survey. The blue ribbon section of the Madison River, 51 miles in length, received an average of 953 angler trips per mile compared to 840 angler trips per mile on the Flathead. Major use on the Madison River generally occurs within the summer season, during July and August, while use on the Flathead River is more evenly distributed between the summer and winter seasons.

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