RECREATIONAL USE OF THE UPPER CLARK FORK RIVER AND ITS TRIBUTARIES

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ABSTRACT

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The primary purpose of this study was to determine the nature and extent of recreational use on the Upper Clark Fork River and its tributaries. This study was requested by the Montana Department of Fish and Game in conjunction with its efforts to quantify the amount of water needed for fish, wildlife and recreation in the Upper Clark Fork River.

Observation of recreational use on the main river and its tributaries was made by driving roads parallel to the river, floating sections of the river, sitting at access points and flights over the river. All recreational use was noted and questionnaires were distributed to all recreational users contacted. The observations and questionnaires provided information on the amount, type and distribution of use in the study area. Information on visitors' backgrounds, preferences and perceptions was also acquired.

Recreational use on the tributaries exceeded use on the Upper Clark Fork River. Fishing was the major activity in the study area. In addition, a plurality of recreationists rated the Upper Clark Fork River equal to many well-known Montana rivers.

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Chapter 1

INTRODUCTION

"Rivers are fragile ecosystems that represent a multiplicity of resource values as well as recreational opportunities" (Lewis and Marsh, 1977). The demands being made on rivers are increasing rapidly. Montana's rivers are no exception, with industry, agriculture and "beneficial uses" all vying for the limited resource. As the controversy over who should have how much heats up, an increasing need arises to find out more about the ecological and recreational values of rivers.

In 1973 Montana recognized these diverse values by passing the Montana Water Use Act (1973). This act recognized fish, wildlife and recreation as beneficial uses of the state's water resources, allowing the Montana Department of Fish and Game to make applications for instream water reservations. With the Act, an offensive could be mounted to protect rivers from major depletions, where previously only a defense against other people's activities was allowed.

The first test of the Montana Water Use Act came with the allocation of Yellowstone River water by the Montana Board of Natural Resources in December, 1978. The decisions reached by the Board followed a lengthy process of legal hearings on applicant requests for reservations of the river. These requests were based on numerous studies that justified the needs of the various applicants.

The Montana Department of Fish and Game, along with the Department of Health and Environmental Sciences and the Bureau of Land Management,

applied for instream reservations of the Yellowstone River. The Board of Natural Resources granted many of their requests, allowing substantial amounts of water to remain in the river for a free-flowing river system. This victory for fish, wildlife and recreation marked the beginning of a long struggle to preserve Montana's rivers.

Realizing the need to set aside water on other Montana rivers for fish, wildlife and recreation, the Montana Department of Fish and Game began studies on several rivers to determine the volume of water needed for the "beneficial uses." With increasing demands from agriculture, industry and recreation, the Upper Clark Fork River was cited as one of the first study rivers. Since it is important to determine for water allocation and river management purposes the kinds of activities dependent on and related to instream flows, the Department requested a recreational use survey of the Upper Clark Fork River. Determination of the amount and type of recreational use was requested, along with information on visitor preferences for facility development and access sites. The Department plans to incorporate the recreation information with other Upper Clark Fork River studies to provide a basis for instream flow requests.

Research Objectives

The overall goal of this study is to estimate the volume and type of recreational use on the Upper Clark Fork River. This information may be helpful in estimating the amount of water needed to sustain recreational use and should aid in the eventual development of a river management plan.

The specific objectives of the study are to:

1. Determine the type of recreational use in the study area.
2. Estimate the amount and distribution of use during one year.
3. Acquire background information on visitors.
4. Determine visitor preferences for facility development and access sites.
5. Determine visitor perceptions of the river in relation to other well-known Montana rivers.

Chapter 2

LITERATURE REVIEW

River studies pose several unique problems, both in sampling and in estimating use. River recreation encompasses a great diversity of use and users. This diversity poses problems in research design, particularly in establishing a sampling method which measures different recreation activities (Driver and Bassett, 1977).

Another problem associated with the design of a river survey is the recreation population size. Since the total population of recreationists may be large, it must be sampled. The random selection of a sample population poses problems. For example, trout fishermen are difficult to contact or even observe, because they are in the stream and tend to be active in the evening and early morning (Driver and Bassett, 1977). Special considerations must be made in setting up a survey design, to assure all types of users of a selected sample are considered.

Sampling Design Considerations

To gain a better knowledge of the complexity of users and use patterns, Chilman (1977) emphasizes the importance of doing several recreation studies on a river. Understanding this complexity takes time, and a "one-shot" approach may only scratch the surface.

An important component of many river recreation studies is estimation of the amount of recreational use occurring on a river. A variety of sampling techniques can be employed to estimate recreational

use. One study (James, 1971) pilot-tested a sampling technique for estimating fishing use on a unique trout stream during the fall and winter of 1969-70. Twenty sample days were randomly selected within a 135-day use period. A short questionnaire was placed on car windshields at the access area, and the driver was requested to fill it out and place it in a nearby box. License numbers were recorded on a separate sheet to determine the percentage of visitors who completed and deposited a questionnaire. In addition, a traffic counter was installed to determine the relationship between fishing use and traffic flow. Estimates of use were made from the questionnaire data with confidence intervals set at the 67 percent level of probability. The estimated number of persons who fished the stream was 1,025, with a confidence interval of ± 24.9 percent. James (1971) concluded that the project produced "ball park" estimates of use.

Another study estimated recreational use by interviewing departing recreationists on two sections of the Grand River in northwestern Missouri (Fleener, 1977). Access sites were selected on the basis of known use patterns and assigned a "weight" (depending on the amount of known use at the site), which determined sampling frequencies. Sampling frequencies were altered depending upon usage at sites. This insured more adequate sampling and increased the accuracy of use estimates (Fleener, 1977). The average use per day was assumed to be twice as heavy on weekend days and holidays as on weekdays (Fleener, 1977).

Fleener (1977) used the following equation to estimate recreational visits:

Estimated Visits of a Recreational Use =

$$\frac{1}{\text{Sampling Probability}} \times \text{Total Recreational Use Measured in Visits} \quad (0)$$

Sampling probability is the product of the access probability, multiplied by the time of day probability, multiplied by the day of the week probability. All probabilities were established by the researcher and set forth in tables. Confidence intervals were determined by subtracting or adding the standard deviation of the estimated visits from or to the estimated number of visits. On the average, 67 percent of such intervals would include the true number of visits if sampling was done an unlimited number of times.

According to Fleener (1977), it is difficult to obtain statistically precise estimates of outdoor recreational use. Standard errors are frequently high, even at the 67 percent level of probability. For instance, James and Harper (1965) determined recreational use in Ocala National Forest in Florida and had a standard error of ± 22 percent. According to Fleener (1977), the technique of using probabilities allowed him to estimate all recreational uses and provide better sampling efficiencies than for other available methods.

A study of hikers in the Virgin River Narrows estimated upstream users by a "ratio estimate" (McCool and Haydock, 1976). The procedure used a ratio of registered to non-registered users as the basic estimate technique. An independent sample of Narrows' hikers was used to estimate the proportion of unregistered groups and users to registered groups and users which provided a ratio designed to allow managers to make estimates of the number of users for future years.

Often overlooked in estimating recreational use is a "length of stay bias." The bias arises because the probability of observing a recreationist is dependent on both the recreationist's and the observer's length of stay on the site (Lucas, 1963). As a result, the length of stay estimates from on-site samples are biased upwards. Lucas and Schweitzer (1965) provide a computation procedure to remove the effect of the bias.

Montana River Studies

Several recreation studies have been completed for Montana rivers. Since these studies dealt with dispersed river recreation, sampling techniques and use estimation procedures might be applicable to the Upper Clark Fork River study.

One noteworthy study of recreational use took place on the Blackfoot River, a tributary of the Upper Clark Fork River. Walker (1977) not only counted visitors, but also counted their vehicles. An average number of recreationists per vehicle was used to estimate the total amount of recreational use (20,000 recreational visits for the 1976 summer season, June 21 to September 22). Walker also distributed questionnaires to recreationists. These questionnaires were filled out on the site and returned to the interviewer, thus providing a very high rate of return. The questionnaire data and use estimates were determined to help formulate the Blackfoot River Conservation and Recreation Management Plan.

Another Montana study (Baty, 1977) employed similar methods on the Madison River. Vehicles and recreationists were counted to provide a daily average of recreational use. Seasonal use was estimated by multi-

plying the daily average to the total days in the season (24,777 recreational visits were estimated for July 1 to September 5, 1977).

Erickson (1976) completed a recreation study on the Yellowstone River for the Montana Department of Fish and Game. Two years were spent collecting data from questionnaires, car counters and observations. Recreational use was counted during automobile and airplane trips along the river by the researcher and department personnel. No attempt was made to estimate overall recreational use on the Yellowstone River. Instead, observed use data was used to evaluate flow impacts and determine recreational visitation frequencies at particular areas.

Ames and Ream (1978) estimated recreational use on the Flathead River below Flathead Lake, Montana. Four sampling locations were identified, and use estimates were derived from observations of recreationists at these locations (4,300 visits were estimated for the summer season, June 16 to September 11, 1977). An interview card was given to recreationists to fill-out to determine how users felt about the future management and development of the Flathead River.

Other Relevant Studies

While no previous recreation use studies have occurred on the Upper Clark Fork River, several studies have taken place that have implications for recreationists. For instance, the Clark Fork of the Columbia River Basin cooperative study was initiated to help plan for optimum use and development of the water and related land resources of the basin as part of the Montana State Water Plan (U.S. Department of Agriculture, 1977). Data is presented on land use, vegetation, grazing resources,

wildlife habitat, outdoor recreation, conservation district programs, land treatment measures, potential small project measures, municipal and rural water and sewer development, forestry management and land treatment needs on federal and nonfederal forested lands, and potential rural electrification projects. Most of the information is of a general nature, useful mainly as background material on the resources in the area.

Also, the Montana Water Quality Bureau conducted a water quality inventory and presented a management plan for the Upper Clark Fork River Basin in 1975 (Casne et al., 1975). The major purpose of this study was delineation of water quality and water quality related problems. The report provided information on physical characteristics in the basin, present uses of the resources, sources of water pollution and water quality problems.

In 1976 the Montana Department of Fish and Game initiated an investigation to define minimum stream flows necessary to sustain the fish and wildlife resources of the Upper Clark Fork River (Knudson and Hill, 1978). Diel dissolved oxygen and temperature measurements, periphyton sampling, and common ion and nutrient analyses were conducted to provide initial data on the water quality. Studies are continuing in this area, but to this date, minimum stream flows necessary to sustain the fish and wildlife resources have not been determined.

In conclusion, river recreation research is a relatively new field, and techniques for estimating recreational use are evolving rapidly. It is, moreover, difficult to obtain statistically accurate estimates of recreational use. This difficulty arises from the nature of the subject; the recreationist is not stationary and his use patterns are not set.

Recreational use is influenced by a number of factors (stream quality, fishing quality, crowding, weather, etc.) which add to the difficulty of measurement. In addition, actual observation of use is very difficult to measure, since use is often dispersed over a large area, with many access points. To overcome these difficulties, many different research methods have been devised. Most river studies are unique, however, and methods used in one study may not be applicable to another. In recognizing the diverse nature of recreation research, there is a need to incorporate a variety of these research techniques.

Chapter 3

THE RESOURCE

Physical Characteristics

The Upper Clark Fork River originates at the confluence of Warm Springs Creek and Silver Bow Creek, and flows one hundred miles to Milltown dam near Missoula (Figure 1). Interstate 90 and the railroad parallel the river for its entire distance as it meanders through irrigated pastures, cottonwood groves and coniferous forests. Oxbows, repeated bends and brushy banks mark the uppermost sections, while the lower stretches are straighter and broader with cottonwoods and conifers lining the banks. The Upper Clark Fork River has three major tributaries: Flint Creek, Rock Creek and the Little Blackfoot River.

The "Upper Clark Fork basin," as defined in the Water Quality Inventory and Management Plan (Water Quality Bureau, 1975), "comprises approximately 6,000 square miles of land which includes all of Granite County, portions of Powell, Missoula, Lewis and Clark, Deer Lodge and Silver Bow Counties. The Continental Divide forms the basin's northeastern, eastern and southern borders. Most of the western border is the divide of the Sapphire Mountains, and a portion of the northern border extends to the southern end of the Mission and Swan Mountains."

The average flow of the river, 849 cubic feet per second (cfs), taken at Drummond permits a variety of recreational activities. The lowest recorded flow was 58 cfs in 1973. The highest flow, 8,490 cfs, was recorded in 1975 (U.S. Department of Interior, 1977).

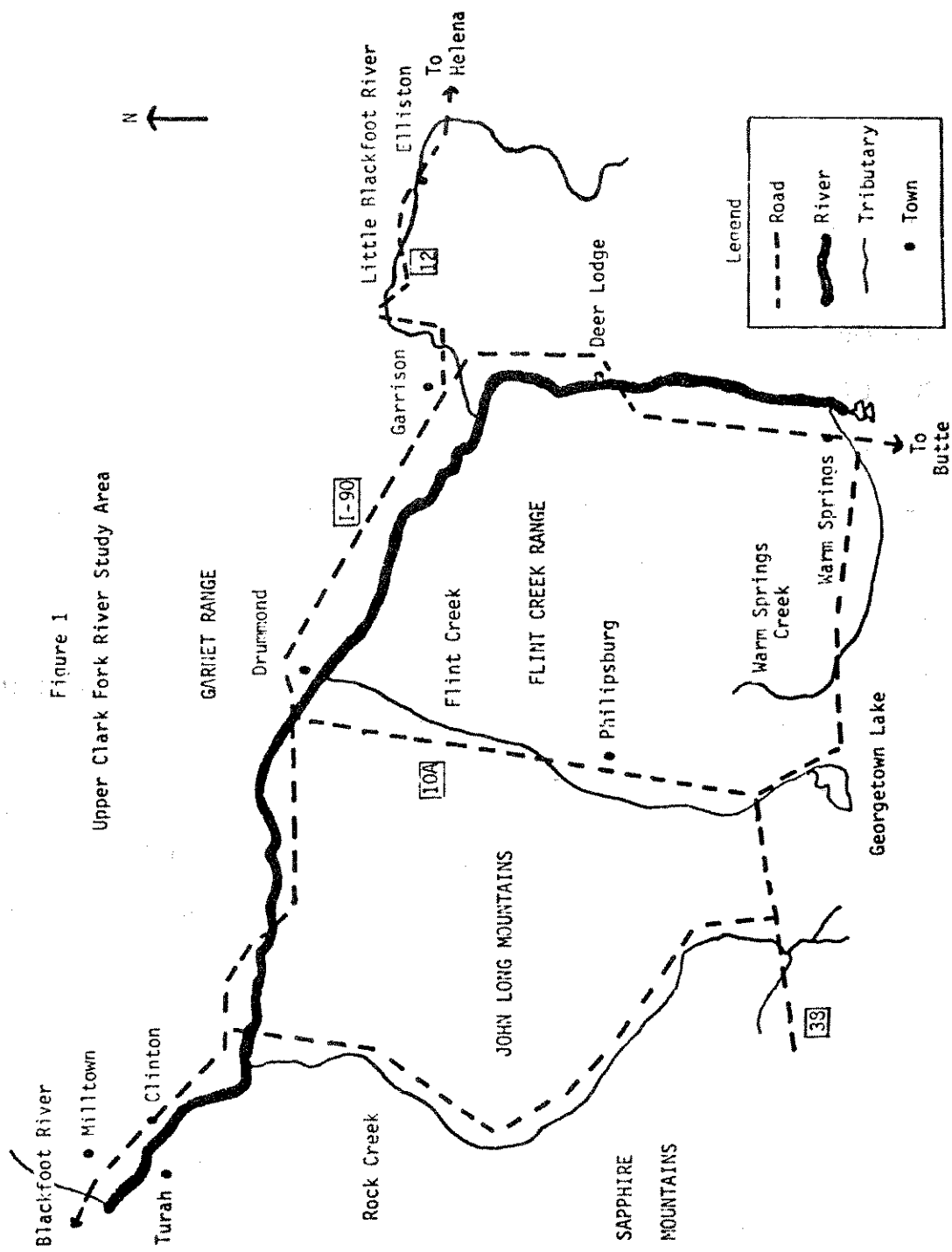
Figure 1
Upper Clark Fork River Study Area
N
Blackfoot River
Milltown
Clinton
Turah
Rock Creek
GARNET RANGE
Drummond
I-90
Garrison
Little Blackfoot River
Elliston
To Helena
12
Deer Lodge
Flint Creek
FLINT CREEK RANGE
Philipsburg
10A
JOHN LONG MOUNTAINS
SAPPHIRE MOUNTAINS
39
Warm Springs Creek
Warm Springs
To Butte
Georgetown Lake
Legend
Road
River
Tributary
Town

The varied topography of the river basin creates wide variation in climatic conditions. The tributaries generally flow through mountainous regions that typically have colder climates and heavier precipitation than the valley areas of the mainstem. Dry winters with high precipitation in April, May and June characterize valley weather. Approximately 50 percent of the annual precipitation falls between April 1 and June 30 (Water Quality Bureau, 1975). Summers are usually pleasant, with an average temperature registered at Missoula of 63.5° for June through August, 1940 to 1970. The average temperature registered in Missoula for June through August, 1978, was 63.3°. On 14 days in 1978, summer temperatures in Missoula reached 90° or higher (U.S. Department of Commerce, 1978).

Winters are generally cold, with an average Missoula 1978-79 temperature of 28° for November through March. Heavy snows in the higher elevations of the basin provide the major water source for the Upper Clark Fork River.

The varied geology of the basin results from glaciation, folding and faulting. Between one million and 15,000 years ago, many small glaciers scoured out valleys, causing erosion and sedimentation (Water Quality Bureau, 1975). Between Garrison and Missoula, the river follows a major fault which today is concealed by river gravel and soil. Gold was present in the basin, with mining occurring in the 1800's in the Garnet Range and at Gold Creek. The first discovery of gold in Montana reportedly occurred at Gold Creek, seven miles west of Garrison, in 1858 (Alt and Hyndman, 1978).

The soils in the area vary widely due to the geological history and diverse climate. In the Deer Lodge valley, thick layers of silt, sand, gravel and clay have eroded and formed terraces (Environmental Protection Agency, 1972). Irrigation is significant, with 6,651 irrigated acres along the Clark Fork River drainage. These acres are a source of river pollution in the form of nitrogen and phosphorous compounds, dissolved organic solids, chlorides and bacteria during storm runoff and irrigation return flows (Water Quality Bureau, 1975). Between Drummond and Milltown, agriculture is minimal because of the mountainous terrain.

Many species of wildlife exist in the basin. Deer, elk, black bear, beaver, muskrat and racoon were observed during the 1978-79 research period. Bald eagles (listed as an endangered species by the U.S. Fish and Wildlife Service (U.S. Department of Interior, 1979a) were sighted, as were osprey, red-tailed hawks, rough-legged hawks, yellow-bellied sapsuckers, flickers and many species of songbirds. Game birds including ruffed grouse, pheasant and Hungarian partridge are common, as are many species of waterfowl.

Past Uses of the River

In 1806 Captain Meriwether Lewis explored the Clark Fork River near Missoula on his return trip through Montana. Since he proceeded up the Blackfoot River instead of the Upper Clark Fork, he explored only a small segment of the river (Devoto, 1953). The confluence of the Blackfoot River and the Upper Clark Fork River was called "Aicestem" (place of more bull trout) by the Flathead Indians (Bicentennial Committee, 1976). In the 1830's the upper river was given another name, The Arrowstone River, by W. A. Ferris of the American Fur Company

(Flint, 1977). The name was derived from a semi-transparent stone found near it and used by Indians for making points of arrows.

The path of an historic trail, the Mullan Road, followed the river. Constructed in 1858, it extended from Walla Walla, Washington, to Fort Benton, Montana. Present day Interstate 90 follows much of the old trail from Bonner to Garrison.

Present Uses of the River

Agriculture, industry and municipalities are the major consumers of the water in the basin. Agriculture accounts for the largest use of water (diversions of about 500,000 acre feet per year with a net depletion of one-half the amount) and industry is next (89,000 acre feet per year) (Water Quality Bureau, 1975). The average annual discharge of the Clark Fork measured just east of Missoula is 2,184,000 acre feet per year, with most of this coming from the Blackfoot River (1,999,000 acre feet per year) (U.S. Department of Interior, 1977).

Much of the wildlife in the river basin requires adequate amounts of water to supply habitat and food. Several species of fish, including whitefish, suckers, peamouth chub, redside shiners, squawfish, sculpin, longnosed dace, dutthroat trout, rainbow trout, brown trout and Dolly Varden depend on the quality and quantity of water for their life functions.

A major nonconsumptive use of the water in the Upper Clark Fork River drainage is recreation. Developed Montana Department of Fish and Game access sites are located at Turah and Beavertail. Both provide for camping and picnicking opportunities. Undeveloped Department of Fish

and Game access sites are at Kohrs Bend north of Deer Lodge, Medicine Tree west of Drummond and Schwartz Creek south of Clinton.

Land ownership patterns are complex in the river basin. Most land immediately adjacent to the river is, however, privately owned. In many cases the land is posted against trespassing. County bridges provide the only public access along much of the river.

Chapter 4

STUDY METHODS

Study Area

The Upper Clark Fork River, its three major tributaries (Little Blackfoot River, Flint Creek and Rock Creek) and Warm Springs Creek comprise the study area. The Upper Clark Fork River begins at the confluence of Warm Springs Creek and Silver Bow Creek, directly west of the town of Warm Springs. Since a large amount of water at the river's origin flows from Anaconda Company settling ponds (located directly south of the confluence), this study includes recreational use on and adjacent to the settling ponds. See Figure 1 on page 12.

Recreational use on the main river (from its start to Milltown dam), the three above-mentioned tributaries, Warm Springs Creek and the area adjacent to the river was noted. Roads paralleling the river or geological features such as mountains serve as boundaries for the riparian habitat. If no such natural boundaries exist, approximately one hundred yards on both sides of the river were delineated as the study area.

Study Population

The study population included all people within the study area participating in a recreational activity. A recreational activity was defined as any activity pursued during an individual's leisure time. This definition excluded people who were working near the river, such as highway construction workers, farmers and ranchers, railroad workers

and government inspectors. If these persons stopped and entered into a noncompulsory activity, however, they were then considered part of the study population. Only persons fifteen and over were included within the questionnaire sample.

Sampling Design

Sampling was divided into summer and winter seasons. The summer season began June 1, 1978, with sampling beginning June 23, 1978, and continuing through September 4, 1978 (Labor Day). The winter season began September 5, 1978, and continued through May 31, 1979. The two seasons received separate consideration since their characteristics are distinctive. Refer to Appendix A for the sampling schedule.

A one-week pilot study began June 15 to test the sampling design and the questionnaire. Based on the pretesting, some changes were made before the June 23 starting date; only minor changes in the sampling design occurred during the season. These changes resulted from observations in recreation patterns. For instance, two floating sections were cancelled because of poor access and a scarcity of recreationists.

Sampling was conducted on 54 days between June 23 and September 4. Since weekends and holidays were assumed to receive more recreational use, weekdays received separate consideration from weekends and holidays. Thirty-seven weekdays and 17 weekends and holidays were sampled.

Summer sampling was divided into nine river sections along the Upper Clark Fork River and its tributaries. A total of 77 samplings were conducted during the summer season, with samples covering only one river section. Everywhere in the study area except Rock Creek, three sampling methods were used--driving, floating and sitting (stationary).

On Rock Creek, sampling was limited to the north end where the Montana Department of Fish and Game creel checking station was located. Questionnaires were given to fishermen who stopped. Use estimates for Rock Creek were derived completely from Forest Service information.

Upper Clark Fork River study area sampling sections are outlined below. For a complete map of the study area with river miles indicated, refer to Appendix B.

Summer Season

Driving Sections:

1. Bearmouth (mile 31) to Drummond (mile 49) and return.
2. Phosphate (mile 70) to Warm Springs Creek (mile 112) and return.
3. Little Blackfoot River from mile 1 to mile 40 and return.
4. Flint Creek from mile 1 to mile 39 and return.
5. Warm Springs Creek from mile 24 to mile 27 and return.

Stationary Sections:

6. Milltown dam (mile 1), Turah bridge (mile 6), Turah campground (mile 7), Schwartz Creek bridge (mile 15), Rock Creek bridge (miles 18 and 19) and Beavertail bridge (miles 23 and 24).
7. Drummond city campground (mile 50) and Gold Creek bridge (mile 67).

Floating Sections:

8. Beavertail (mile 24) to Schwartz Creek (mile 15).
9. Schwartz Creek (mile 15) to Milltown dam (mile 1).

Driving samples generally consisted of eight-hour periods between 9 a.m. and 9 p.m. Recreational use was observed by driving roads

paralleling the river and its tributaries. Summer driving samples covered at least two sections.

Different time periods were employed in the two stationary samples. In Section 6, sampling was done in 2½-hour blocks at each of six sites. Since stationary samples occurred at only two sites above Beavertail (Section 7), four hours were spent at each site.

Winter season sampling along the Upper Clark Fork River combined driving and flying methods. Two weekdays, two weekend days and one weekend flying day (weather permitting) were completed each month during the winter season. Both driving and flying methods covered the entire river on a randomly-determined sampling day. Winter use was not observed on the tributaries.

Winter Season

Driving Section:

1. Milltown dam (mile 1) to Warm Springs Creek (mile 112) and return.

Flying Section:

2. Milltown dam (mile 1) to Warm Springs Creek (mile 112) and return.

Two researchers sampled during the summer months, and one researcher sampled during the winter season. Daily starting times varied on all sections according to the randomly-selected, predetermined schedule.

Questionnaire Design and Administration

The questionnaire (Appendix C) deals with three major areas: trip content (activity participation, group size and type, and length of trip),

user background (residence and familiarity with the river), and perceptions (facility development, access needs, quality of experience and comparisons to other rivers). The only differences between the summer and winter questionnaire were a list change for activities in question seven (hunting was changed to waterfowl, big game and upland game bird) and a clarification change for question eight (Flathead, the three forks, was changed to North, South and Middle Forks Flathead).

All persons fifteen and over sighted by the researcher and accessible were asked to fill out the questionnaire. Usually no more than five minutes was required to complete the questionnaire. In groups of six or more, a questionnaire was not always given to every member because of time limitations on the researcher. Refusals by an entire group were extremely rare, but it was often difficult to get all members to fill out the questionnaires. Family groups would often only fill out one questionnaire, despite the urgings and explanations of the researcher. In a few cases, the recreationist insisted on having the questions read while the researcher filled out the questionnaire.

Certain persons within the sample[1] did not fill out a questionnaire. Reasons included refusals, people who were inaccessible and those people whose vehicles were observed but could not be found. Inaccessibility problems usually resulted when the recreationist was observed across the stream or floating down the river.

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[1]The study population consists of those persons within the study area participating in a recreational activity. The sample is those persons and vehicles within the study population that were observed by the researcher. The subsample includes all persons who filled out a questionnaire.

All persons and vehicles within the sample were counted and noted on an observation sheet (Appendix D). Use estimates were derived from vehicle counts and observed recreationists. Table 1 compares the sample size (number observed) to the subsample size (number of questionnaires completed).

Since all members of large groups were not given questionnaires, a possibility of response bias could exist. This is not a serious problem, however, since 94 percent of all groups in the sample had fewer than five members in their group.

Approximately 70 percent of the sample was not given questionnaires, because many cars were sighted and the occupants could not be found. These "misses" are assumed random and therefore do not bias the responses.

A possible bias in questionnaire responses arises from the propensity for only one person in a family to complete a questionnaire. This may cause family member responses to be less represented than other groups.

Table 1

Sample Size of the Upper Clark Fork River Study Area

Type of Recreationist	Sample[a]	Subsample[b]	Percent of Sample[c]
Montana Resident	1,873	689	36.8
Out-of-State Resident	615	297	48.3
Residence Unknown	836	0	00.0
Total	3,324	986	29.7

[a]Sample is those persons and vehicles within the study population that were observed by the researcher.

[b]Subsample includes all persons who filled out a questionnaire.

[c]The percent of sample is quite low since it includes vehicle observations. Many vehicles were observed without their occupants in sight. When this occurred, 2.5 recreationists were listed on the observation sheet for summer samples, and 2.0 recreationists were listed for winter samples (this figure was derived from observation data on the number of recreationists per vehicle). Thus, total observations were increased without any increase in the number of questionnaires filled-out.

Chapter 5

RESULTS

The primary findings of this study are derived from questionnaire responses and direct observation. These findings have been placed into tables that show what percent of recreationists were observed or responded to a particular question. Direct observation was also used to determine the distribution of recreational use, amount of use and type of use.

The questionnaire results are categorized under three major areas: trip content, user background and perceptions. The questionnaire is found in Appendix C.

Direct observations by the researcher were tallied on an observation sheet found in Appendix D. This primarily provided use estimate data, but it also gave information on distribution of use as well as recreational activities, type of floater craft, time of observations and sampling day temperatures. The findings verify the questionnaire results in addition to providing other useful information.

Responses to the Questionnaires

During the summer season, 2,463 observed recreationists on the Upper Clark Fork River and its tributaries completed 918 questionnaires. Of the 918 summer questionnaires, 460 came from Clark Fork recreationists. 193 from Flint Creek, 20 from Warm Springs Creek, 111 from Rock Creek and 134 from the Little Blackfoot River.

During the winter season, 68 questionnaires were completed by 861 observed recreationists. All winter questionnaires were from the Upper Clark Fork River only.

Trip content. Two aspects of activity participation were dealt with in the questionnaire. All activities which the recreationists planned to or did engage in were checked once. The single activity which the person engaged in the most was checked twice.

Of the activities participated in, fishing was the most popular and was listed by 73.7 percent of the respondents. Next came rest or relaxation with 48.4 percent and then walking or hiking with 38.4 percent.

Of the activities checked twice (the one activity engaged in the most), fishing again ranked first with 59.3 percent of the participants. Rest or relaxation was next and recreational vehicle camping followed (Table 2).

Table 3 shows the percentages of the types of groups on the Upper Clark Fork River. About 51 percent of the respondents were among the "family" group type.

As shown in Figure 2, the majority of visitors stayed four hours or less on the Upper Clark Fork River. A relatively large percent, however, stayed the entire day (24 hours).

User background. About 40 percent of the respondents were visiting the river for the first time, and 12.6 percent had visited the river for 20 or more years.

Of the resident respondents, 25.4 percent were visiting the river for the first time. Residents visiting 20 or more years totaled 15.5 percent.

Table 2

Recreational Activity Participation by Upper Clark Fork River Study Area Recreationists[a]

Activity	Resident Percent (N = 689)	Non-Resident Percent (N = 297)	Total Percent (N = 986	Activity Engaged in Most Percent (N = 514)
Fishing	82.9	52.5	73.7	59.3
Rest or Relaxation	45.1	55.9	48.4	6.8
Walking or Hiking	35.8	44.4	38.4	2.1
Picnicking	34.2	25.9	31.7	2.3
Sightseeing	26.3	41.8	30.9	2.1
Recreational Vehicle Camping	15.7	38.0	22.4	4.7
Water Play	20.9	15.5	19.3	3.3
Photography	15.7	23.9	18.2	0.4
Tent Camping or No Cover	13.4	23.2	16.3	6.4
Floating	19.7	4.7	13.2	3.9
Nature Study	10.3	11.8	10.8	0.4
Float Fishing	10.4	3.7	8.4	3.1
Mushroom or Berry Picking	9.3	4.0	7.7	0.0
Hunting	11.9	2.0	8.9	4.9
Trail Biking	4.4	0.7	3.2	0.0
Other	2.8	1.7	2.4	0.2

[a]Percents do not total 100% because respondents often participated in more than one activity.

Table 3

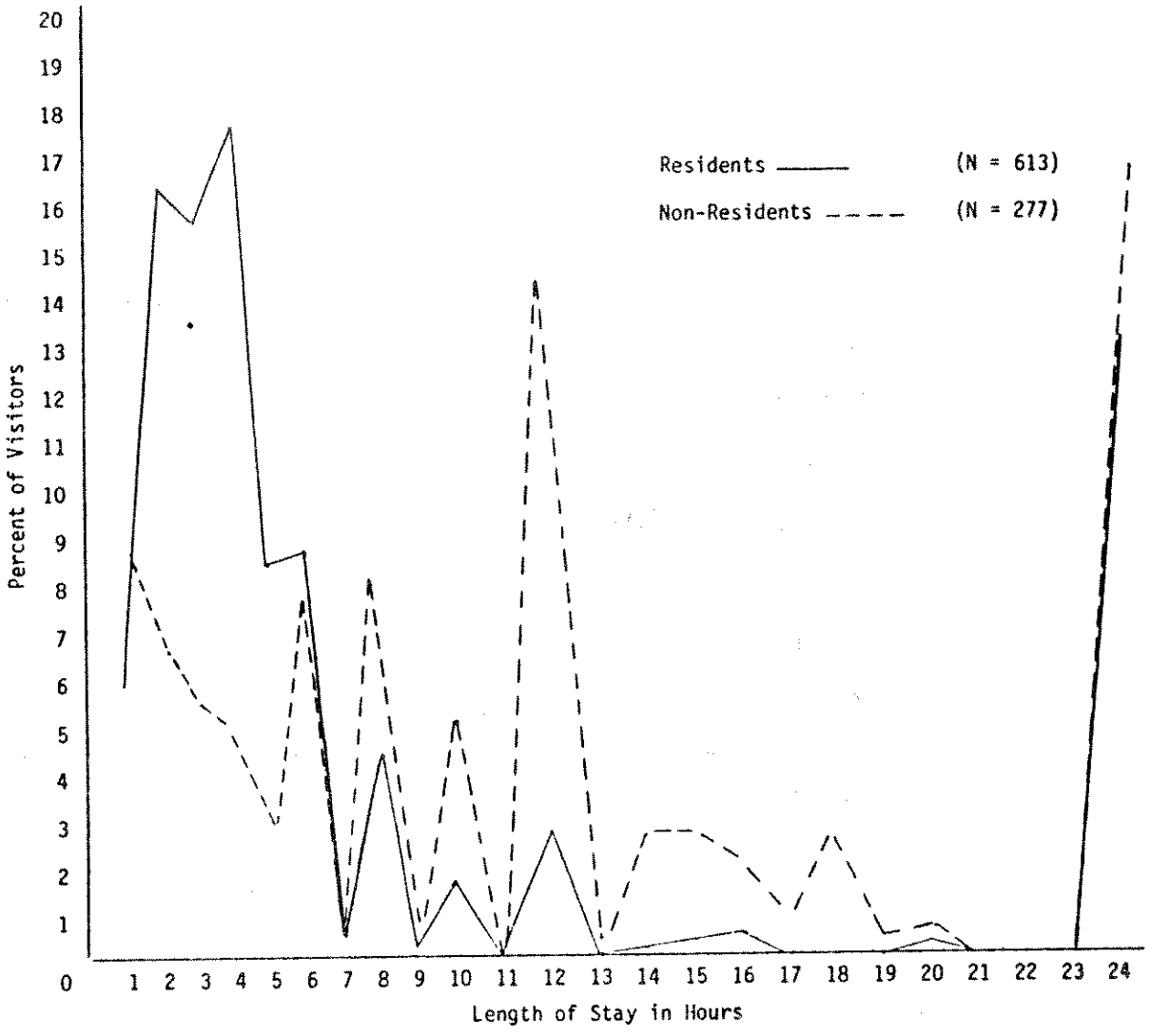
Type of Group on the Upper Clark Fork River

Group Type	Resident[a] Percent (N = 689)	Non-Resident Percent (N = 297)	Total Percent (N = 981)
Family	44.3	65.4	50.6
Friends	24.5	13.0	21.1
Family and Friends	16.7	13.4	15.7
Alone	13.2	7.9	11.6
Organization	1.3	0.3	1.0
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the $\alpha = .05$ level.

Figure 2

Recreationists' Length of Stay During the Day Observed[a]



[a]Differences are statistically significant at the $\alpha = .05$ level.

Of the non-residents, 73.8 percent were visiting the river for the first time. Only 3.4 percent of the non-residents had 20 or more years of experience. Differences between residents' and non-residents' previous experience was statistically significant at the 95 percent confidence level (Table 4).

Again, there was a statistically significant difference between residents and non-residents for the number of visits during a year on the Upper Clark Fork River. As would be expected, residents visited the river much more often during the year than non-residents. Approximately 31 percent of the participants visited the river less than once a year. Recreationists visiting the river ten or more times a year were 24.1 percent of the sample (Table 5).

Montana residents comprised 69.1 percent of the visitors, while 30.9 percent were out-of-state visitors. Missoula residents were found most frequently among in-state recreationists. Helena, Butte, Anaconda and Clinton followed consecutively in decreasing representation.

California had the highest representation from out-of-state visitors, and Washington ran a close second. Table 6 shows the cities, states and countries whose citizens were most often encountered along the river and tributaries.

Perceptions. One question dealt with the recreationist's perception of her experience (improved, deteriorated or no change) over the years. No change in the quality of the experience was most often checked by the respondents (29.6 percent). Furthermore, more participants perceived a positive change in their experience over the years

Table 4

Previous Experience of Recreationists in the Upper Clark Fork River Study Area

Previous Experience (in years)	Resident[a] Percent (N = 678)	Non-Resident Percent (N = 290)	Total Percent (N = 968)
1	25.4	73.8	39.9
2	9.6	5.5	8.4
3	8.1	2.8	6.5
4	5.8	3.8	5.2
5	7.5	2.1	5.9
6	4.7	1.4	3.7
7	2.2	0.7	1.8
8	2.9	2.1	2.7
9	1.2	0.3	0.9
10	4.9	1.0	3.7
11	1.2	0.7	1.0
12	1.8	0.3	1.3
13	1.2	0.0	0.8
14	0.4	0.0	0.3
15	3.7	1.4	3.0
16	0.7	0.0	0.5
17	0.6	0.0	0.4
18	0.7	0.3	0.6
19	1.2	0.0	0.8
20+	15.5	3.8	12.6
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the α = .05 level.

Table 5

Number of Visits During the Year on the Upper Clark Fork River or its Tributaries

Number of Visits/Year	Resident[a] Percent (N = 686)	Non-Resident Percent (N = 285)	Total Percent (N = 971)
< 1/Year	16.0	66.7	30.9
1-2/Year	22.0	21.8	21.9
3-9/Year	29.9	6.7	23.1
10+/Year	32.1	4.9	24.1
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the α = .05 level.

Table 6

Residence of Recreationists in the
Upper Clark Fork River Study Area

All Recreationists Percent (N = 961)		Montana Residents Percent (N = 664)		Out-of-State Residents Percent (N = 297)	
Montana	69.1	Missoula	37.6	Washington	15.8
Out-of-State	30.9	Helena	12.2	California	14.8
		Butte	10.1	Idaho	5.7
		Anaconda	6.3	Minnesota	5.1
		Clinton	4.2	Colorado	5.1
		Deer Lodge	4.2	Michigan	3.7
		Philipsburg	2.1	Arizona	3.7
		Billings	1.7	Illinois	3.4
		Bozeman	1.4	Utah	3.4
		Hamilton	1.4	Canada	3.4
		Other	18.8	New York	3.0
				Oregon	3.0
				Ohio	2.4
				Wisconsin	2.4
				Iowa	2.0
				Other	23.1
Total	100.0		100.0		100.0

than a negative change. A larger proportion of residents checked the improved category than did non-residents. These differences were statistically significant at the 95 percent confidence level (Table 7).

A plurality of participants (44.5 percent) felt there was an adequate number of access sites. Residents felt access was adequate more often than non-residents. The differences between residents and non-residents were statistically significant (Table 8).

Most participants (68.8 percent) felt the access sites they visited should remain unchanged. Twenty-four percent felt more development was needed, and 6.8 percent felt the site should be less developed (Table 9). Table 10 shows those areas checked for more development.

The reason cited most often for selecting the Upper Clark Fork or one of its tributaries was fishing potential. Out of 916 responses, 176 respondents (19.2 percent) stated fishing as a major reason for selecting the river or its tributaries.

The second major reason was the closeness of the river to the participants' homes; it was mentioned by approximately 18 percent of the respondents. Table 11 gives the reasons most often mentioned for selecting the river and its tributaries.

Another question asked respondents to check the frequency of use on five well-known Montana rivers (Madison, Big Hole, Yellowstone, Missouri and the three forks of the Flathead River). The majority of respondents have never visited the major Montana rivers listed (Table 12). The Yellowstone River was visited least (31.5 percent having visited the river). Although not a substantial difference, the North, South and Middle Forks of the Flathead River were visited most (38.2 percent).

Table 7

Quality of the Study Area Recreationist's Experience Over Time

Quality of the Experience	Resident[a] Percent (N = 686)	Non-Resident Percent (N = 281)	Total Percent (N = 967)
Much Improved	8.5	6.4	7.9
Improved	22.3	12.5	19.4
No Change	32.4	22.8	29.6
Deteriorated	15.9	4.3	12.5
Much Deteriorated	4.5	2.5	3.9
Do Not Know	16.4	51.6	26.7
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the $\alpha = .05$ level.

Table 8

Adequacy of Present Access Sites in the Upper Clark Fork River Study Area

Adequacy of Sites	Resident[a] Percent (N = 686)	Non-Resident Percent (N = 289)	Total Percent (N = 975)
Adequate Number	46.9	38.8	44.5
More Sites Needed	32.9	22.8	29.9
Too Many Sites	7.4	1.4	5.6
Do Not Know	12.7	37.1	19.8
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the $\alpha = .05$ level.

Table 9

Desired Development of Access Sites Along the Upper Clark Fork River and Its Tributaries

Desired Development	Resident Percent (N = 587)	Non-Resident Percent (N = 250)	Total Percent (N = 837)
More Development	23.7	25.6	24.3
Left As Is	68.5	69.6	68.8
Less Development	7.9	4.8	6.8
Total	100.0	100.0	100.0

Table 10

Recreationist-Selected River Miles
That Need More Development

River	Mile	Percent
		(N = 83)
Upper Clark Fork	1	12.0
	6	1.2
	7	31.3
	15	16.9
	17	2.4
	19	1.2
	23	4.8
	24	1.2
	30	2.4
	36	1.2
	39	1.2
	40	1.2
	46	1.2
	67	4.8
	97	1.2
	105	1.2
	107	2.4
	109	1.2
	111	6.0
	112	2.4
	Total	100.0
		(N = 24)
Little Blackfoot	7	20.8
	10	8.3
	11	4.2
	14	12.5
	36	4.2
	37	8.3
	38	4.2
	39	33.3
	40	4.2
	Total	100.0
		(N = 89)
Flint Creek	18	7.8
	19	5.6
	20	1.1
	23	1.1
	39	1.1
	39	84.3
	Total	100.0

Table 11

Reasons for Selecting the Upper Clark Fork River and its Tributaries Over Other Streams

Reasons	Resident[a] Percent (N = 639)	Non-Resident Percent (N = 273)	Total Percent (N = 916)
Fishing	22.4	11.7	19.2
Close to Home	24.1	4.8	18.3
Convenient	2.7	15.4	6.4
Passing Through	1.7	15.8	5.9
Recommended	6.3	10.3	7.4
Like the Area	5.0	2.9	4.4
Scenic	3.4	6.2	4.3
Easy Access	3.8	5.5	4.3
Quiet	3.1	4.4	3.5
Visiting Area	2.3	2.6	2.5
Clear Stream	2.3	0.0	1.9
Old Time Spot	2.2	0.7	1.7
Rest Stop	0.3	3.3	1.2
Never Been Before	1.7	0.0	1.2
Working in Area	2.0	0.4	1.5
Good Floating Stream	1.6	0.0	1.1
Good Picnic Spot	0.6	2.2	1.1
Other	14.5	13.8	14.1
Total	100.0	100.0	100.0

[a]Differences are statistically significant at the $\alpha = .05$ level.

Table 12

Number of Visits on Five Montana Rivers
by Study Area Recreationists

Rivers (N = 986)	Percent					
	None	< 1/Year	1-2/Year	3-9/Year	10+/Year	Total
Madison	65.2	15.8	13.2	5.1	0.7	100.0
Big Hole	60.4	12.4	14.1	9.3	3.7	100.0
Yellowstone	68.2	16.7	10.6	3.3	0.9	100.0
Missouri	65.8	12.5	10.6	6.2	4.9	100.0
North/South/ Middle Forks Flathead	61.8	13.8	13.2	8.8	2.4	100.0

From the respondents visiting the listed rivers, the Missouri River had the highest percent (4.9 percent) returning ten or more times a year. The Madison River had the lowest percent (0.7 percent) returning ten or more times a year.

Visitors were also asked to rate the listed streams in relation to the Upper Clark Fork River. Of the visitors with an opinion, the majority felt the listed rivers ranked "about the same" as the Upper Clark Fork River.

The Missouri River received the greatest percentage of negative ratings. It was rated less desirable than the Upper Clark Fork River by 21.1 percent of its visitors. The North, South and Middle Forks of the Flathead River (rivers within the national Wild and Scenic Rivers System) and the Madison River received the greatest percent of positive ratings. Table 13 shows how recreationists rated these streams in relation to the Upper Clark Fork River.

Survey respondents mentioned the Blackfoot and Bitterroot Rivers most often as two other streams visited. Table 14 lists the ten streams most often mentioned.

Table 15 lists the number of visits the recreationists made during a year on the ten streams most often mentioned.

Respondents were also asked to rate the streams they listed in relation to the Upper Clark Fork River. The Blackfoot and Bitterroot Rivers were rated "about the same as the Upper Clark Fork" by 44.3 percent and 50.0 percent of the respondents, respectively. See Table 16.

Since many long-time visitors (20 or more years of experience) may have more knowledge about the river, their opinions and characteristics will be considered separately.

Table 13

Rating of Montana Rivers by Upper Clark Fork River Recreationists that have Visited the Rivers Listed

River Ratings	Madison	Big Hole	Yellowstone	Missouri	North/South/ Middle Forks Flathead
	Percent				
	(N = 175)	(N = 196)	(N = 165)	(N = 166)	(N = 217)
Much Less Desirable than Upper Clark Fork	3.4	2.6	3.0	3.6	2.3
Less Desirable than Upper Clark Fork	7.4	9.7	10.9	17.5	7.8
About the Same as Upper Clark Fork	28.0	26.5	22.4	30.1	28.1
More Desirable than Upper Clark Fork	17.7	18.4	15.8	9.6	18.9
Much More Desirable than Upper Clark Fork	13.1	15.3	6.7	4.8	12.0
No Opinion	30.3	27.6	40.6	34.3	30.4
Total	100.0	100.0	100.0	100.0	100.0

Table 14

Ten Streams Most Often Visited by Recreationists[a]

Streams	Resident Percent (N = 646)	Non-Resident Percent (N = 79)	Total Percent (N = 826)
Blackfoot River	16.7	6.3	13.7
Bitterroot River	12.4	12.7	10.9
Lower Clark Fork	6.2	1.3	5.0
Fish Creek	5.4	3.8	4.6
Jefferson River	4.2	2.5	3.5
Beaverhead	2.9	6.3	2.9
Lolo Creek	3.1	3.8	2.8
Gallatin River	1.7	8.9	2.3
Swan River	2.8	1.3	2.3
Clearwater River	2.2	0.0	1.7
Other	42.4	53.1	50.3
Total	100.0	100.0	100.0

[a]Not included are the Upper Clark Fork River or its tributaries and the five rivers listed in question 8.

Table 15

Number of Visits During a Year on Streams Most Often Visited by Recreationists

Number of Visits/Year	Rivers									
	Blackfoot	Bitterroot	Fish Creek	Lower Clark Fork	Jefferson	Lolo Creek	Beaverhead	Gallatin	Swan	Clearwater
	Percent									
	(N = 65)	(N = 59)	(N = 12)	(N = 22)	(N = 18)	(N = 12)	(N = 11)	(N = 11)	(N = 8)	(N = 10)
< 1/Year	0.0	5.3	8.3	0.0	16.7	8.3	0.0	27.3	0.0	20.0
1-2/Year	23.1	15.8	58.3	4.5	5.6	16.7	27.3	27.3	25.0	20.0
3-9/Year	38.5	35.1	16.7	50.0	38.9	33.3	63.6	18.2	50.0	20.0
10+/Year	38.5	43.9	16.7	45.5	38.9	41.7	18.2	27.3	25.0	40.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 16

Ten Streams Most Often Visited and How They Were Rated
Compared to the Upper Clark Fork River

River Ratings	Rivers (using percent of recreationists checking each category)									
	Blackfoot	Bitterroot	Fish Creek	Lower Clark Fork	Jefferson	Lolo Creek	Beaverhead	Gallatin	Swan	Clearwater
	Percent									
	(N = 61)	(N = 56)	(N = 11)	(N = 21)	(N = 17)	(N = 11)	(N = 10)	(N = 11)	(N = 7)	(N = 10)
Much Less Desirable than Upper Clark Fork	1.6	1.8	0.0	0.0	5.9	9.1	0.0	9.1	0.0	0.0
Less Desirable than Upper Clark Fork	8.2	21.4	9.1	14.3	5.9	0.0	0.0	9.1	0.0	0.0
About the Same as Upper Clark Fork	44.3	50.0	27.3	38.1	23.5	54.5	20.0	27.3	42.9	70.0
More Desirable than Upper Clark Fork	34.4	14.3	36.4	38.1	23.5	18.2	20.0	9.1	42.9	20.0
Much More Desirable than Upper Clark Fork	11.5	12.5	27.3	9.5	41.2	18.2	60.0	45.5	14.3	10.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Of the recreationists who have visited the river for 20 or more years, approximately 41 percent felt their recreational experiences on the river had improved or much improved over the years. Forty-two percent felt their experiences had deteriorated or much deteriorated. About 14 percent felt their experiences had not changed over the years.

In comparison, 20.9 percent of visitors with five or fewer years of experience felt their experiences had improved or much improved, and only seven percent felt their experiences had deteriorated or much deteriorated.

The reasons behind these opinions were not determined from the questionnaire, but some of these recreationists volunteered reasons to the researcher. Mentioned for both an improved and a deteriorated experience were Anaconda Copper Company actions and increased numbers of recreationists.

Old timers selected the river mainly for its fishing potential and its proximity to their homes. Over 80 percent of the old timers were engaged in fishing during the sampling observation periods. In comparison, about 70 percent of respondents having five or fewer years of experience on the river were engaged in fishing.

The Observation Sheet

On the observation sheet (Appendix D) the researcher recorded recreationists, vehicles, location and time of the observation, number of persons per vehicle, activity participation, floater location and floater craft.

Recordings on vehicles and number of persons per vehicle provided the data for use estimates (Chapter 6).

Recordings on vehicles and number of persons per vehicle, and data on the location of these sightings helped determine the distribution of use. The most concentrated use along the Upper Clark Fork River and its tributaries occurred at the designated campgrounds. The public campgrounds included in the study area were Montana Department of Fish and Game's Turah and Beavertail campgrounds, and the Forest Service's Flint Creek campground, Warm Springs Creek campground and Kading campground. Use at these sites far exceeded use at all undesignated areas.

Concentrated use also occurred at private campgrounds in the study area (Bearmouth Chalet, KOA in Deer Lodge and the Drummond city campground). Campground managers provided use information for their areas. Although campground use may not be directly dependent on the river and instream flows, activities associated with camping (fishing, swimming, etc.) are directly related to the river environment.

Other than campgrounds, heavy use areas occur wherever there is good vehicle access. These areas include Milltown dam at the railroad crossing bridge, the frontage bridge before Turah campground, Schwartz Creek bridge, Rock Creek bridge, the bridge adjacent to Beavertail campground, and undesignated campsites near Kading campground on the Little Blackfoot River.

Table 17 lists those areas, by river miles, which received the heaviest use. River miles are also indicated on the maps in Appendix B.

Data on recreational activities was also noted on the observation sheet. Fishing was the activity observed most often (41.8 percent of the recreationists were observed fishing during the summer and 52.5 percent during the winter), and recreational vehicle camping was next

Table 17

River Miles Receiving the Heaviest Use[a]

River	Mile	Summer Percent	Winter Percent
		(N = 701)	(N = 677)
Upper Clark Fork	1	5.1	1.3
	6	6.4	1.8
(excluding overnight use)	7	3.6	8.7
	15	13.1	6.5
	18	1.4	1.2
(excluding overnight use)	23	3.3	3.2
	24	1.0	2.4
	27	1.0	1.9
	30	2.1	0.0
	35	1.1	1.5
	36	1.9	1.0
	38	0.0	1.8
	49	1.9	0.0
	50	0.6	1.8
	67	3.9	1.0
	72	1.6	2.5
	92	3.4	1.5
	89	1.9	1.2
	102	0.7	1.2
	107	4.0	4.1
	109	4.3	4.7
	111	3.7	7.4
	112	0.0	11.8
	Other	34.0	29.1
	Total	100.0	100.0
		(N = 599)	
Little Blackfoot	7	10.5	
	9	3.5	
	11	4.7	
	36	4.2	
	37	6.3	
	38	7.1	
	39	21.3	
	Other	42.4	
	Total	100.0	
		(N = 607)	
Flint Creek	11	2.3	
	18	2.6	
	19	2.6	
	20	3.6	
	23	3.0	
	25	2.3	
	39	70.3	
	Other	13.3	
	Total	100.0	

[a]Excluding private campgrounds and Drummond city campground.

(24.1 percent of the summer recreationists and 6 percent of the winter recreationists). Refer to Table 18. These findings are similar to those gathered from the questionnaires.

The observation sheet also provided information that was not on the questionnaire. Table 19 shows the location of floaters (putting in, floating or taking out). River mile one is the point where the greatest percent of floaters were found (21.3 percent). Turah campground (mile 7) and Schwartz Creek (mile 15) areas received the next heaviest use (12.8 percent at both sites).

Table 20 provides information on the type of floater crafts. Canoes were the craft most often observed (46.8 percent). Rafts were used by 26.6 percent of the floaters.

Table 21 gives information on the time of observations. Only 28.2 percent of the summer use was observed between 8 a.m. and 12 p.m.; whereas 44.3 percent was observed between 12 p.m. and 4 p.m. Forty-two percent of the winter use occurred between 8 a.m. and 12 p.m., and 49.8 percent of the use occurred between 12 p.m. and 4 p.m.

Table 18

Observed Activity Participation by Groups

Activity	Summer Percent (N = 818)	Winter Percent (N = 275)
Fishing	41.8	52.5
Floating	3.4	1.8
Water Play	6.9	0.4
Hunting	0.3	23.0
Big Game		(0.4)
Waterfowl		(21.1)
Upland Game Bird		(1.5)
Walking	0.5	1.8
Float Fishing	2.8	0.4
Sightseeing	1.6	0.0
Trail Biking	1.2	0.0
Recreational Vehicle Camping	24.1	6.0
Tent Camping or No Cover	6.4	4.0
Picnicking	4.0	2.5
Rest or Relaxation	4.6	3.6
Photography	0.1	0.7
Nature Study	0.1	1.5
Mushroom or Berry Picking	0.5	0.0
Other	1.7	1.8
Total	100.0	100.0

Table 19

Floater Location at the Time of an Observation
on the Upper Clark Fork River

Clark Fork River Mile	Number of Crafts Observed			Total Percent (N = 47)
	Putting In	Floating	Taking Out	
1	1	4	5	21.3
2		2		4.3
3			1	2.1
5	1	1		4.3
6	2		1	6.4
7	2	2	2	12.8
8		1		2.1
9		1		2.1
10		1		2.1
13		1		2.1
15	6			12.8
18	1			2.1
19			1	2.1
20			1	2.1
21		1		2.1
23		1		2.1
24			2	4.3
33		1		2.1
39		1		2.1
67	1			2.1
109	1			2.1
111	1	1		4.3
Total				100.0

Table 20

Type of Floating Crafts Observed on the Upper Clark Fork River

Craft	Number Observed (N = 64)	Percent (N = 64)
Canoe	30	46.8
Raft	17	26.6
Kayak	2	3.1
Rowboat	6	9.4
Other[a]	9	14.1
Total	64	100.0

[a]Includes innertubes, McKenzies, and motorboats.

Table 21

Time of Observations

Time	Summer Percent (N = 1,076)	Winter Percent (N = 353)
0800	1.4	8.2
0900	4.9	5.4
1000	5.8	6.2
1100	6.8	6.5
1200	9.3	16.1
1300	7.6	19.0
1400	13.0	6.5
1500	11.0	16.4
1600	12.7	7.9
1700	8.5	3.4
1800	5.3	4.2
1900	5.9	
2000	4.4	
2100	2.0	
2200	0.5	
Total	100.0	100.0

Chapter 6

USE ESTIMATION

Procedures

For the study year June 1, 1978, through May 31, 1979, use estimates are based on the two different sampling seasons (summer: June 23 to September 4, 1978, and winter: September 5, 1978, to May 31, 1979). The summer estimates include tributary use, and the winter estimates consider only the Upper Clark Fork River. Three different sampling methods (driving, floating and sitting) are combined in determining the summer estimates. Winter estimates employ only two sampling methods (driving and flying).

Results from each of the three sampling methods of the summer season were calculated separately. The same procedure for determining use estimates was used for all the moving samples; the procedure was somewhat different for stationary samples.

Winter use estimates for the entire Upper Clark Fork River were made from both the driving and flying methods for comparison purposes. Since flying was done only on weekends, however, the winter use estimate from driving will be used to compute the study year estimate.

Use information was derived from data (number of recreationists and vehicles) on the observation sheet. Use estimates are reported as recreational visits (one recreational visitor observed along the river during any part of a day). Each vehicle observed without its occupants in sight was counted as 2.5 visits for the summer and 2.0 visits for the

winter. This was derived from actual observations of the number of recreationists per vehicle. Appendix A provides the sampling schedule with starting times and dates.

River use (floaters) and shore use are treated differently since their sampling characteristics differ (Lucas, 1978). Floaters were counted during stationary samples, and shore use was observed during floating samples. All recreational use was counted during driving samples, because floaters were considered essentially stationary users during this sampling method.

Adjusting for the Length of Stay Bias

All use estimates include a "length of stay" adjustment factor. A bias arises in on-site surveys because the probability of observing a recreationist is dependent on the recreationists' and observers' length of stay on the site. The longer the stay of a recreationist, the greater the chances are for observation (Lucas, 1978). As a result, the length of stay estimates are biased upwards, and the total use estimate is biased downwards. A formula for determining the probability of observing a recreationist, which compensates for the bias, is as follows:

$$R_i = \frac{L_v + L_o}{T}, \; L_v + L_o < T \qquad (1)$$

$$= 1, \; L_v + L_o \geq T$$

where: R_i = probability of observation

L_v = length of stay of the visitor

L_o = length of stay of the observer

T = length of the recreation day

Use Estimation for Moving Samples

In the moving sampling methods, L_o is essentially 0 because the observer is always moving up or down the river. Therefore,

$$R_i = \frac{L_v}{T}, \; L_v < T \qquad (2)$$

$$= 1, \; L_v \geq T$$

Using this formula for determining the probability of observation, the following formula was used to estimate recreational use for the moving samples:

$$Y_t = \underbrace{\left(\sum_{i=1}^{12} \frac{P_i}{R_i} \right)}_{A} \underbrace{\left(\sum_{j=1}^{2} N_j \bar{Y}_j \right)}_{B} \qquad (3)$$

where:

Y_t = the estimated recreational use

$\sum_{i=1}^{12} \frac{P_i}{R_i}$ = length of stay adjustment factor

$\sum_{j=1}^{2} N_j \bar{Y}_j$ = estimated recreational use for the season without a length of stay adjustment factor

P_i = proportion of recreationists staying i hours

R_i = probability of observing a recreationist staying i hours during a 12-hour recreation day

$= \frac{i}{12}$

N_j = total number of possible days of observation for jth days

j = 1 (weekdays)

= 2 (weekend days)

$\bar{Y}_j = \sum_{l=1}^{n_j} C_{jl}$

$\sum_{l=1}^{n_j} C_{jl}$ = total number of recreationists observed during n_j days and lth observation period

n_j = number of days of observation on jth days

Therefore: $Y_t = AB$ (4)

All use estimates are just that, estimates, and not actual observed use. Statistical procedures were used to determine the precision of these estimates. To determine the variance and the subsequent standard error of the estimates, the following formula was employed. The symbol definitions above apply throughout all the formulas.

$$v(Y_t) = v(AB) = A^2v(B) + B^2v(A) \quad (5)$$

where:

$v(Y_t)$ = variance of the estimated recreational visits

$$v(B) = \left(\sum_{j=1}^{2} \frac{N_j{}^2 s^2{}_j}{n_j}\right)\left(1 - \frac{n_j}{N_j}\right)$$

$$s^2{}_j = \frac{\left(\sum_{l=1}^{n_j} C^2{}_{jl}\right) - \left(\sum_{l=1}^{n_j} C_{jl}\right)^2 \Big/ n_j}{(n_j - 1)}$$

$$v(A) = \left(\sum_{i=1}^{12} \frac{P_i(1-P_i)}{(m-1)R_i{}^2}\right)\left(1 - \frac{m}{M}\right)$$

m = number of valid questionnaires

M = total number of questionnaires

But, v(A) is very small in relation to v(B). Therefore, this term will be ignored and expression (5) becomes:

$$v(Y_t) = A^2 v(B) \quad (6)$$

To determine the standard error of the estimated recreational visits, the following formula was used:

$$s.e.\ (Y_t) = A\sqrt{v(B)} \quad (7)$$

where:

s.e. (Y_t) = standard error of the estimated recreational visits

Use Estimation for Stationary Samples of 2½ Hours

A similar approach was applied to estimate recreational visits for stationary samples. In this case, the researcher only observed floating use, so the probability of observing a recreationist is dependent on the observer's length of stay:

$$R_i = \frac{L_o}{T},\ L_o < T \quad (8)$$

$$= 1,\ L_o \geq T$$

Six sites were visited for 2½ hours (Milltown dam, Turah bridge, Turah campground, Schwartz Creek, Rock Creek and Beavertail bridge). The number of floaters observed at these sites provided the information needed to estimate the amount of floating visits, using the following formula:

$$Y_t = AB \quad (9)$$

where:

$$A = \frac{P}{R}$$

$$P = 1$$

$$R = \frac{2.5}{14}$$

B = B in equation (3)

Use Estimation for Stationary Samples at Drummond and Gold Creek

This stationary sampling method consisted of two four-hour periods at Drummond and Gold Creek. These sites were the only two above Beavertail where use was expected to be heavy at individual sites.

Since a driving sample did not overlap to provide a count of stationary visitors, all users (shore users and river users) at the two sites were noted. Taking into consideration a length of stay bias (equation (1)), the following formula expands the observed use to the entire season.

$$Y_t = AB \qquad (10)$$

where:

$$A = \sum_{i=4}^{12} \frac{P_i - 4}{R_i}$$

B = B in equation (3)

Use Estimates

During the 1978-79 study year, an estimated 102,631 recreational visits occurred on the Upper Clark Fork River and its tributaries. Excluding private campground use, this figure dropped to 70,432 recreational visits. These figures do not include winter recreational use on Flint Creek, the Little Blackfoot River and Warm Springs Creek, or any recreational use on Rock Creek.

During the summer season, 82,423 recreational visits occurred on the Upper Clark Fork River and its tributaries. Excluding private

campground use, 55,894 summer visits occurred. Over half of these visits occurred on three tributaries: Flint Creek, the Little Blackfoot River and Warm Springs Creek.

Winter use on the Upper Clark Fork River was less than summer use. An estimated 20,208 recreational visits occurred between September 5, 1978, and May 31, 1979. Approximately 5,700 of these visits were at private campgrounds (Deer Lodge KOA and Bearmouth Chalet).

Tables 22 through 24 provide the use estimates and standard errors associated with the estimates. A standard error was not determined for the campground figures, since this information was derived from other sources (the campground managers).

The rather high standard errors suggest a very fluctuating population. To determine what number of samples were needed to reduce the standard errors to ten percent of the estimate, the following formula was used:

$$D = \frac{\left(\sum_{j=1}^{2} N_j s_j\right)^2}{\frac{(ZY_t)^2}{A} + \sum_{j=1}^{2} N_j s^2 j} \qquad (11)$$

where:

D = the number of samples needed for a ten percent standard error of the estimate

Z = .1

Table 25 shows the number of samples needed for each sampling method during the summer and winter to achieve a ten percent standard error of the estimates. In most cases, the number of samples needed is

Table 22

Summer Estimates of Recreational Use for the Upper Clark Fork River Study Area

SUMMER (June 1 to September 4, 1978)

Area/Sampling Method/ Section[a]	Estimate	Standard Error
Upper Clark Fork River		
Driving		
Section 1	1,730	334
Section 2	3,786	1,058
Sitting		
Section 6	1,289	372
Section 7	1,530	593
Floating		
Section 8	5,036	1,378
Section 9	9,680	2,881
Total	23,051	6,616
Tributaries		
Driving		
Section 3	15,585	1,882
Section 4	11,948	2,246
Section 5	1,714	528
Total	29,247	4,656
Public Campgrounds (Turah and Beavertail)	3,596	
Private Campgrounds	26,529	
Total	30,125	
TOTAL SUMMER USE	82,423	

[a]See page 19 for an explanation of sampling sections.

Table 23

Winter Estimates of Recreational Use for the Upper Clark Fork River Study Area

WINTER (September 5, 1978 to May 31, 1979)

Area/Sampling Method/ Section[b]	Estimate			Standard Error
	Weekdays	Weekend Days	Total	
Upper Clark Fork River				
Driving				
Section 1	4,257	10,281	14,538	2,411
Flying				
Section 2		16,518		5,429
Private Campgrounds			5,670	
TOTAL WINTER USE[a]			20,208	

[a]Driving and flying methods covered the same sections, so the total estimated winter use was taken only from the driving method estimates.

[b]See page 20 for an explanation of sampling sections.

Table 24

Total Estimated Recreational Use for the Upper Clark Fork River Study Area

Season	Estimate
Summer	82,423
Winter	20,208
Total	102,631

Table 25

Number of Samples Needed to Achieve a Ten Percent Standard Error of the Estimated Recreational Use

Sampling Method/ Section[a]	Weekdays		Weekend Days		Total	
	Number of Samples Needed	Actual Number of Samples	Number of Samples Needed	Actual Number of Samples	Number of Samples Needed	Actual Number of Samples
Driving						
Section 1	25	11	17	6	42	17
Section 2	8	12	24	5	32	17
Section 3	4	12	9	5	13	17
Section 4	43	11	8	6	51	17
Section 5	32	5	4	3	36	8
Sitting						
Section 6	78	39	88	21	166	60
Section 7	79	20	141	12	220	32
Floating						
Section 8	20	5	22	2	42	7
Section 9	13	4	15	3	28	7
Total	302	119	328	63	630	182

[a]See pages 19 and 20 for an explanation of sampling sections.

larger than the actual number of samples undertaken. To acquire an estimate with a ten percent standard error was neither possible (due to only two researchers) nor feasible in the Upper Clark Fork River study.

Rock Creek Use Estimates

Rock Creek use estimates from the U.S. Forest Service were considered separately from the rest of the Upper Clark Fork River study estimates. Use studies on Rock Creek were completed by the U.S. Forest Service from 1959 to 1970 and again in 1975 and 1976. A car counter at the north end of Rock Creek and periodic observations by personnel were used by the U.S. Forest Service to derive seasonal use estimates (approximately May 1 through November 30) (Rice, 1979). An effort was not made to distinguish between recreationists and persons living in the area.

Using Forest Service estimates from 1959 to 1970, there was a 4.75 percent annual increase in vehicles traveling along Rock Creek. In 1975 and 1976, this figure went up to 8 percent (U.S. Department of Agriculture, 1979). Using the more conservative figure of 4.75 and using two as the number of persons per vehicle (arrived at by the U.S. Forest Service as the average for Rock Creek), Rock Creek received approximately 167,000 recreational visits for the 1978 season. This figure is not completely applicable to the Upper Clark Fork River study, as not all recreationists traveling along the Rock Creek road were involved in river recreation. Also, the method used to determine recreational use differs from the Upper Clark Fork River methodology. Therefore, use estimates may not be comparable.

Activity Participation

The observation sheet provided data on the types of activities recreationists engaged in when they visited the Upper Clark Fork River study area. By using the summer use estimates of 55,894 visits and the winter estimate of 14,538 visits (which exclude private campground use), and the information on the percent of recreationists participating in each activity, the recreational visits for each activity can be computed.

The greatest number of visits were by fishermen, with an estimated 30,996 fishing visits during the study year. Table 26 provides the estimates for the activities.

Table 26

Activity Participation Estimates for the
Upper Clark Fork River Study Area

Activity	Summer		Winter	
	Visits	Percent (N = 55,894)	Visits	Percent (N = 14,538)
Fishing	23,364	41.8	7,632	52.5
Rest or Relaxation	2,571	4.6	523	3.6
Walking or Hiking	279	0.5	262	1.8
Picnicking	2,236	4.0	363	2.5
Sightseeing	894	1.6	0	0.0
Recreational Vehicle Camping	13,470	24.1	872	6.0
Water Play	3,857	6.9	58	0.4
Photography	56	0.1	102	0.7
Tent Camping or No Cover	3,577	6.4	582	4.0
Floating	1,900	3.4	262	1.8
Nature Study	56	0.1	218	1.5
Float Fishing	1,565	2.8	58	0.4
Mushroom or Berry Picking	280	0.5	0	0.0
Hunting	168	0.3	3,344	23.0
Big Game			(58)	(0.4)
Waterfowl			(3,068)	(21.1)
Upland Game Bird			(218)	(1.5)
Trail Biking	671	1.2	0	0.0
Other	950	1.7	262	1.8
Total	57,894	100.0	14,538	100.0

Chapter 7

CONCLUSIONS AND RECOMMENDATIONS

Amount of Use and Its Distribution

An estimated 102,631 recreational visits occurred on the Upper Clark Fork River and its tributaries during the study year, June 1, 1978, through May 31, 1979. A majority of these visits occurred on the tributaries. Because of the popularity of these tributaries, applications for water withdrawals should consider implications on tributary recreation.

Using Forest Service estimates, the Rock Creek area received approximately 167,000 visits between May 1 and November 30, 1978. In comparison, 102,631 recreational visits were estimated for the Upper Clark Fork River and its other tributaries for the entire study year. Rock Creek use estimates do, however, include all recreational use in the drainage, as well as residents of the area. As a consequence, Rock Creek estimates may not be comparable to Upper Clark Fork River estimates. Regardless, Rock Creek use is substantial, probably higher than on the Upper Clark Fork River and its other tributaries.

Summer recreational use on the mainstem Upper Clark Fork River was estimated at 26,647 recreational visits. Areas receiving the heaviest use were Milltown dam, Turah bridge, Turah campground, Schwartz Creek, Rock Creek, Beavertail and county bridges crossing the river near Warm Springs.

Winter recreational use on the Upper Clark Fork River was estimated at 14,538 recreational visits (excluding private campground use). This use was concentrated above Deer Lodge during the waterfowl hunting season and between Beavertail and Drummond during winter whitefish season. From March to June, trout fishing was the dominant use and was concentrated between Schwartz Creek and Milltown, and between Warm Springs and Deer Lodge.

Winter use on the Upper Clark Fork River may have been less than during normal years. Since the November through January weather was the coldest on record, recreational activity on the river may not be typical of an average winter. Several recreationists who were interviewed reported that they had not been out as much this year as in previous years because of the unusually cold weather.

Campgrounds received the highest percent of use along the river. The question may arise as to the significance of the river to these campgrounds and whether this use is really related to the river. In all cases, the river or its tributaries flow directly by these campgrounds. Although probably not all persons at the campgrounds directly use the river, it probably adds to campers' overall enjoyment at the campground (aesthetic pleasure).

The water quality of the Upper Clark Fork River may have played a role in the distribution of use. For instance, in the sections from Rock Creek to Milltown and above Deer Lodge, prime fisheries and high water quality prevail (Knudson, 1979). Excluding overnight campground use, more than 60 percent of the summer recreational use occurred in these sections. This area comprises about one-third (approximately 42 miles) of the entire river (approximately 112 miles).

Type of Use

Fishing was the activity most often engaged in by recreationists in the study area. In addition, fishing potential was one of two main reasons recreationists selected the Upper Clark Fork River over other Montana rivers. The other major reason for selecting the Upper Clark Fork River was its closeness to the recreationists' homes.

The amount of water in the river is critical to many recreational activities. During the study year, the greatest water flow measured at Drummond was 2,550 cfs on June 10, 1978. The average August, 1978, flow at Drummond was 402 cfs, and the average September flow was 780 cfs (U.S. Department of Interior, 1979b). From personal observation and experience, late summer and early fall water levels approached the minimum possible to support floating crafts. If water levels are reduced further, it may preclude floating and float fishing.

The fish and wildlife which the river supports are also important to recreationists. Insufficient flows to support fisheries will cause substantial numbers of anglers to be displaced. Impacts on hunting, fishing, wildlife study and photography should be considered when making decisions on water allocation.

Experience and Residence of Visitors

The river and its tributaries have been used by recreationists for a long time. Approximately 13 percent of the recreationists in the questionnaire population have been visiting the river for 20 or more years. On the other hand, about 40 percent were visiting for the first time. The majority of recreationists had, however, visited the river three years or longer.

Many of the recreationists who use the Upper Clark Fork River and its tributaries visit them quite frequently. Approximately 25 percent of the recreationists estimated that they visited the river or its tributaries ten or more times during the year. Another 25 percent visited the river from three to nine times a year. Evidently the recreational qualities are high enough to bring users to the river again and again.

Montanans comprised nearly 70 percent of all recreationists in the study area. Many of these recreationists visit no other Montana streams than the Upper Clark Fork River and its tributaries. River flows that negatively affect recreational activity could displace this group entirely.

Since the Blackfoot and Bitterroot Rivers were mentioned most often as alternative rivers by Upper Clark Fork recreationists, these rivers might receive large increases in use. This possibility and the resulting impacts from this should be considered during any hearings on water allocations for the Upper Clark Fork River.

Although the majority of non-residents are first time visitors, 3.8 percent have been visiting the river for 20 or more years. In addition, approximately 25 percent of all recreational visits were by non-residents. These recreationists, who typically need food, lodging and equipment, are important to the tourist trade in Montana. This income should be calculated into any cost-benefit analysis of projects affecting the river.

Perception of the River

Most Upper Clark Fork recreationists rated the river as "about the same" as the Madison, Big Hole, Yellowstone, Missouri or any of the

three forks of the Flathead River. From comments made to the researcher by recreationists filling out the questionnaires, it seems fishing success was typically used as a means of rating desirability. The positive comparison of the Upper Clark Fork River to other well-known Montana fisheries is a good indication of the recreational value of the river.

To compare one Montana river against another may not be a fair comparison. When comparing Montana rivers to each other, the scale of comparison is probably very high. For instance, if the Upper Clark Fork River was compared to a river in Ohio or New Jersey, it might rate substantially higher than if it were compared to the Madison River or the Yellowstone River. Therefore, the value of the river should be considered in relation to rivers throughout the United States.

The Blackfoot and Bitterroot Rivers were most often named as other Montana streams visited by Upper Clark Fork River recreationists. Approximately half of those selecting these rivers rated the Upper Clark Fork as "about the same."

Management Recommendations

River access and site development were rated as adequate by a majority of users. Although there are only four designated Montana Department of Fish and Game access sites along the river, many other private areas are accessible. While recreationists feel access is adequate, there is no guarantee that these private areas will remain open to the public. Therefore, the Montana Department of Fish and Game should acquire easements or buy private areas presently being used by recreationists.

From personal observations on present use patterns, good purchase sites along the Upper Clark Fork River would include acreage around the county bridges between Warm Springs and Deer Lodge, as well as access sites at Rock Creek, Gold Creek, and between Drummond and Bearmouth. Along Flint Creek, good sites for purchase would include lands between Philipsburg and Maxville, as well as lands around the bridge east of New Chicago. Little Blackfoot River purchases might include sites between Garrison and Avon, and between Avon and Elliston. These purchases would guarantee public access to areas presently open to the public but which are privately owned. The purchases would also help distribute use. These sites should be clearly marked by signs so the public can find them.

Generally, there should be no increased facility development at fishing sites along the rivers. Some recreationists, however, suggested improvements for Montana Department of Fish and Game campgrounds at Beavertail and Turah. They included sewage dumping stations for both and improved sanitary facilities at Turah.

Recommendations for Further Study

Further river recreation studies should be conducted on the Upper Clark Fork River to assess trends in the amount and type of use. Trend information (determined from several years of study) might be more helpful in formulating management plans than data collected for only one year.

Also, further study should be conducted to place specific figures on the amount of water needed to sustain various recreational activities.

In addition, this study should be considered with Montana Department of Fish and Game water quality and fisheries studies on the Upper Clark Fork River. Similarities between the distribution of recreational use in time and space should be considered in light of water quality and fish productivity. If correlations can be made, the three instream "beneficial uses" of water (fish, wildlife and recreation) can be inextricably interwoven, providing a stronger case for instream flow reservations.

Further river recreation studies should consider using several different sampling methods. The use of a number of different methods on the Upper Clark Fork River and its tributaries allowed for the observation of all types of recreational use on an equal basis. If only one method were employed, recreational use in certain activities might be underestimated (e.g., trout fishing use might be missed by an observer sitting only at designated access points).

Finally, the Montana Department of Fish and Game should standardize methods for estimating recreational use. Without standards, use estimation on different Montana rivers is not comparable.

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APPENDIX A

Summer Sampling Schedule

Date		Sampling Method	River Section	Temperature (degrees F.) Max.	Min.	Starting Time
Fri.	6/23/78	Sitting	3	80	46	8 am
Sun.	6/25/78	Driving	1	55	47	9 am
Mon.	6/26/78	Driving	2	72	48	9 am
Tues.	6/27/78	Floating	2	81	41	2 pm
Wed.	6/28/78	Driving	1	88	46	9 am
Thurs.	6/29/78	Driving	2	87	52	12 noon
		Sitting	2			8 am
Fri.	6/30/78	Sitting	1	75	48	8 am
Sat.	7/1/78	Floating	1	81	50	9 am
		Floating	2			2 pm
Mon.	7/3/78	Sitting	1	68	47	12 noon
Tues.	7/4/78	Sitting	2	67	52	12 noon
		Floating	2			9 am
Wed.	7/5/78	Driving	1	67	53	12 noon
		Driving	2			12 noon
Thurs.	7/6/78	Driving	2	81	48	12 noon
Fri.	7/7/78	Sitting	3	78	51	12 noon
Sat.	7/8/78	Driving	1	74	50	12 noon
Tues.	7/11/78	Sitting	2	73	39	8 am
		Sitting	3			12 noon
Wed.	7/12/78	Driving	2	77	40	9 am
Fri.	7/14/78	Sitting	1	89	47	8 am
Sat.	7/15/78	Driving	2	92	54	9 am
		Sitting	2			12 noon
Sun.	7/16/78	Driving	1	80	58	12 noon
Mon.	7/17/78	Driving	2	69	50	12 noon
Tues.	7/18/78	Driving	1	73	43	8 am
		Sitting	2			8 am
Wed.	7/19/78	Driving	1	73	42	8 am
		Floating	1			2 pm
Thurs.	7/20/78	Sitting	1	76	43	12 noon
		Driving	1			8 am
Sat.	7/22/78	Driving	2	88	46	12 noon
Sun.	7/23/78	Sitting	1	92	49	8 am
		Sitting	3			12 noon
Mon.	7/24/78	Driving	2	94	54	9 am
		Sitting	3			8 am
Tues.	7/25/78	Driving	2	94	48	9 am
Thurs.	7/27/78	Floating	2	90	62	9 am

(continued)

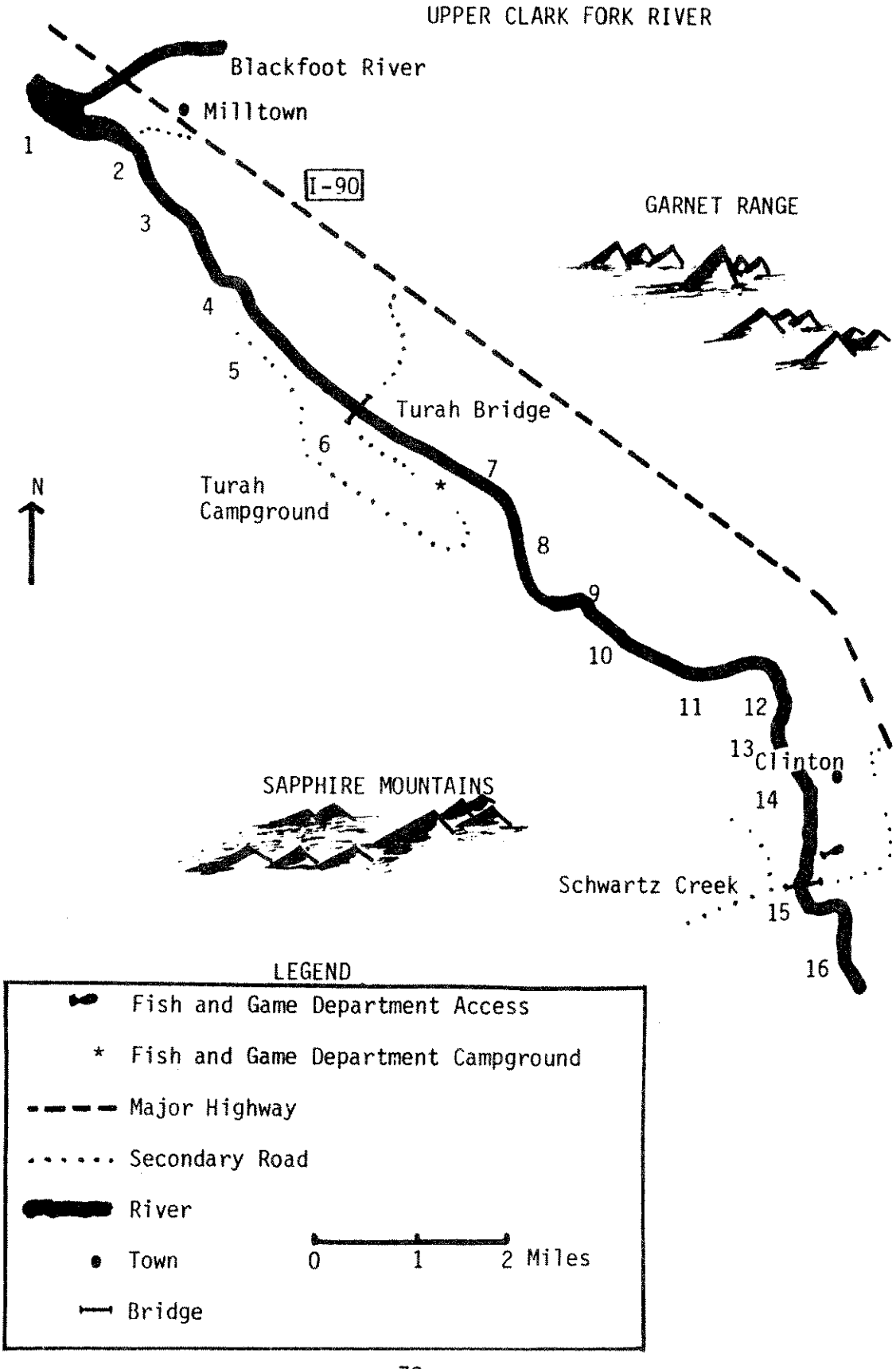
Summer Sampling Schedule (continued)

Date		Sampling Method	River Section	Temperature (degrees F.) Max.	Min.	Starting Time
Tues	8/1/78	Floating	1	86	50	9 am
Wed.	8/2/78	Driving	2	82	55	2 pm
		Sitting	1			8 am
Thurs.	8/3/78	Driving	1	86	49	2 pm
Fri.	8/4/78	Driving	1	94	47	9 am
Sat.	8/5/78	Sitting	2	95	60	8 am
Sun.	8/6/78	Sitting	1	93	51	12 noon
Mon.	8/7/78	Sitting	1	93	51	2 am
Tues.	8/8/78	Driving	1	94	52	9 am
		Sitting	2			2 pm
Wed.	8/9/78	Driving	1	95	53	9 am
		Driving	2			9 am
Thurs.	8/10/78	Floating	1	89	54	9 am
Sun.	8/13/78	Floating	2	66	51	9 am
		Driving	2			2 pm
Mon.	8/14/78	Driving	1	71	50	2 pm
		Driving	2			2 pm
Tues.	8/15/78	Sitting	3	74	50	2 pm
Fri.	8/18/78	Sitting	2	69	46	2 pm
		Sloating	2			2 pm
Sat.	8/19/78	Floating	1	73	47	4 pm
		Driving	1			2 pm
Sun.	8/20/78	Driving	1	78	48	9 am
		Driving	2			9 am
Tues.	8/22/78	Driving	1	63	51	9 am
Wed.	8/23/78	Sitting	2	69	45	8 am
Thurs.	8/24/78	Floating	1	80	42	2 pm
Fri.	8/25/78	Floating	1	74	44	4 pm
Sat.	8/26/78	Sitting	3	72	49	2 pm
Mon.	8/28/78	Driving	2	77	39	2 pm
		Sitting	1			8 am
Wed.	8/29/78	Sitting	3	81	42	8 am
Sat.	9/2/78	Sitting	2	91	45	2 pm
		Driving	2			2 pm
Sun.	9/3/78	Floating	1	91	51	9 am
		Driving	1			2 pm
Mon.	9/4/78	Sitting	1	89	53	2 pm
		Sitting	3			8 am

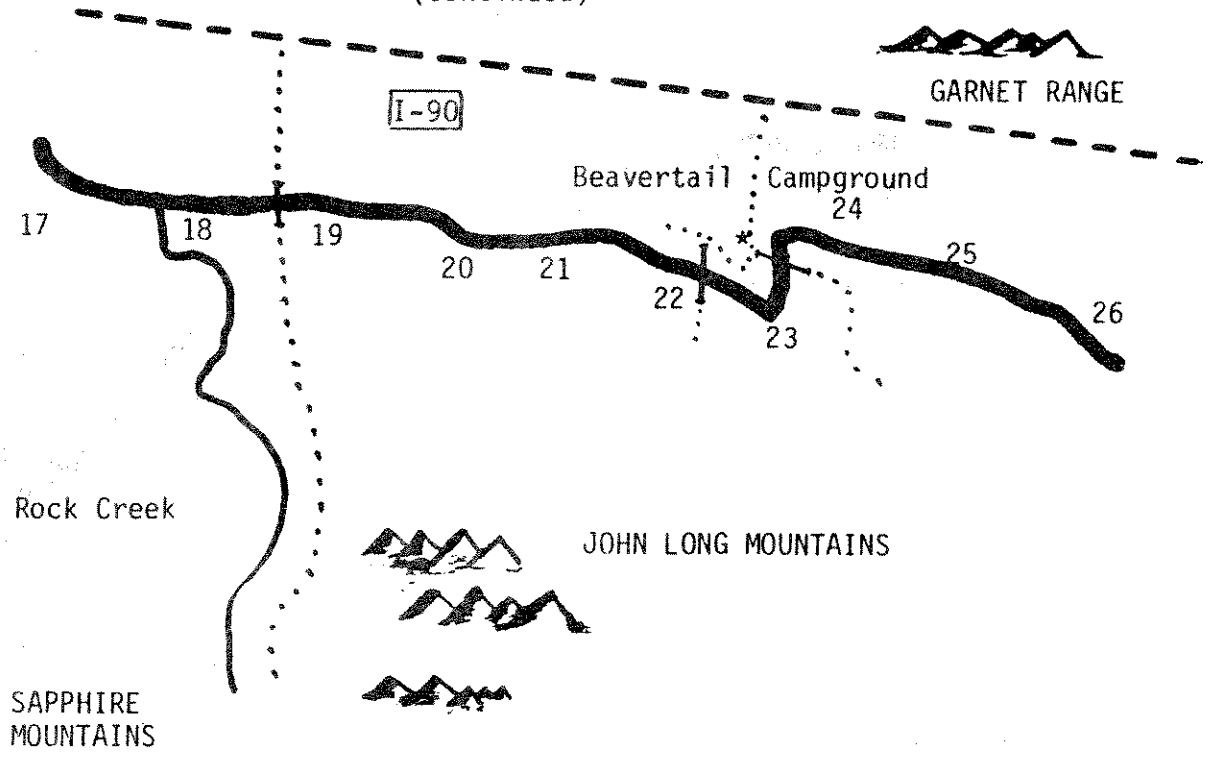
Winter Sampling Schedule

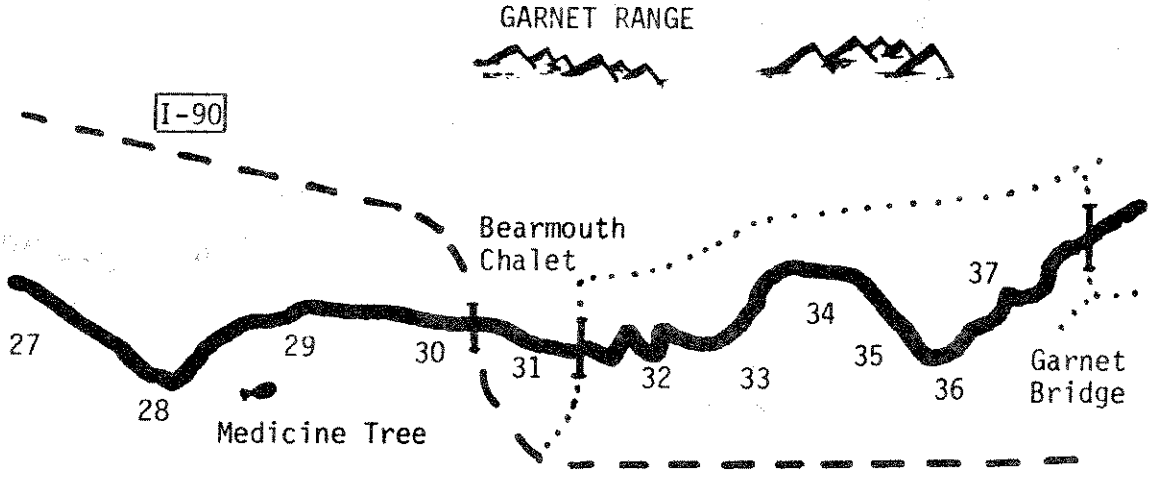
Date		Sampling Method	River Section	Temperature (degrees F.) Max.	Min.	Starting Time
Mon.	9/25/78	Driving	all	80	39	8 am
Sat.	9/30/78	Driving	all	67	33	8 am
Wed.	10/4/78	Driving	all	66	30	8 am
Sat.	10/14/78	Driving	all	64	25	12 noon
		Flying	all			8 am
Sun.	10/15/78	Driving	all	66	26	8 am
Tues.	10/23/78	Driving	all	60	28	8 am
Fri.	11/3/78	Driving	all	54	30	12 noon
Sat.	11/4/78	Driving	all	59	32	8 am
Tues.	11/14/78	Driving	all	27	10	8 am
Sat.	11/18/78	Driving	all	34	16	8 am
Sun.	11/19/78	Flying	all	14	7	8 am
Sat.	12/2/78	Driving	all	20	15	12 noon
Sun.	12/3/78	Driving	all	25	18	8 am
Wed.	12/6/78	Driving	all	20	5	8 am
Sun.	12/10/78	Flying	all	12	-12	8 am
Sun.	12/17/78	Driving	all	21	4	12 noon
Mon.	1/8/79	Driving	all	-7	-21	9 am
Sat.	1/20/79	Driving	all	28	16	9 am
Sun.	1/21/79	Driving	all	22	43	9 am
Wed.	1/31/79	Driving	all	0	-19	9 am
Sun.	2/4/79	Driving	all	26	12	9 am
Wed.	2/7/79	Driving	all	32	28	9 am
Thurs.	2/8/79	Driving	all	25	7	9 am
Sat.	2/10/79	Driving	all	37	30	9 am
Sat.	2/17/79	Flying	all	35	20	12 noon
Sun.	3/4/79	Driving	all	36	21	9 am
Mon.	3/5/79	Driving	all	41	32	9 am
Sun.	3/11/79	Driving	all	43	20	9 am
Mon.	3/19/79	Driving	all	53	31	9 am
Tues.	4/17/79	Driving	all	60	43	9 am
Sat.	4/21/79	Flying	all	60	27	11 am
Sun.	4/22/79	Driving	all	52	36	9 am
Sun.	4/29/79	Driving	all	71	36	9 am
Mon.	4/30/79	Driving	all	65	42	9 am
Fri.	5/4/79	Driving	all	55	47	9 am
Sat.	5/5/79	Driving	all	55	47	9 am
Sun.	5/6/79	Driving	all	53	40	9 am

APPENDIX B

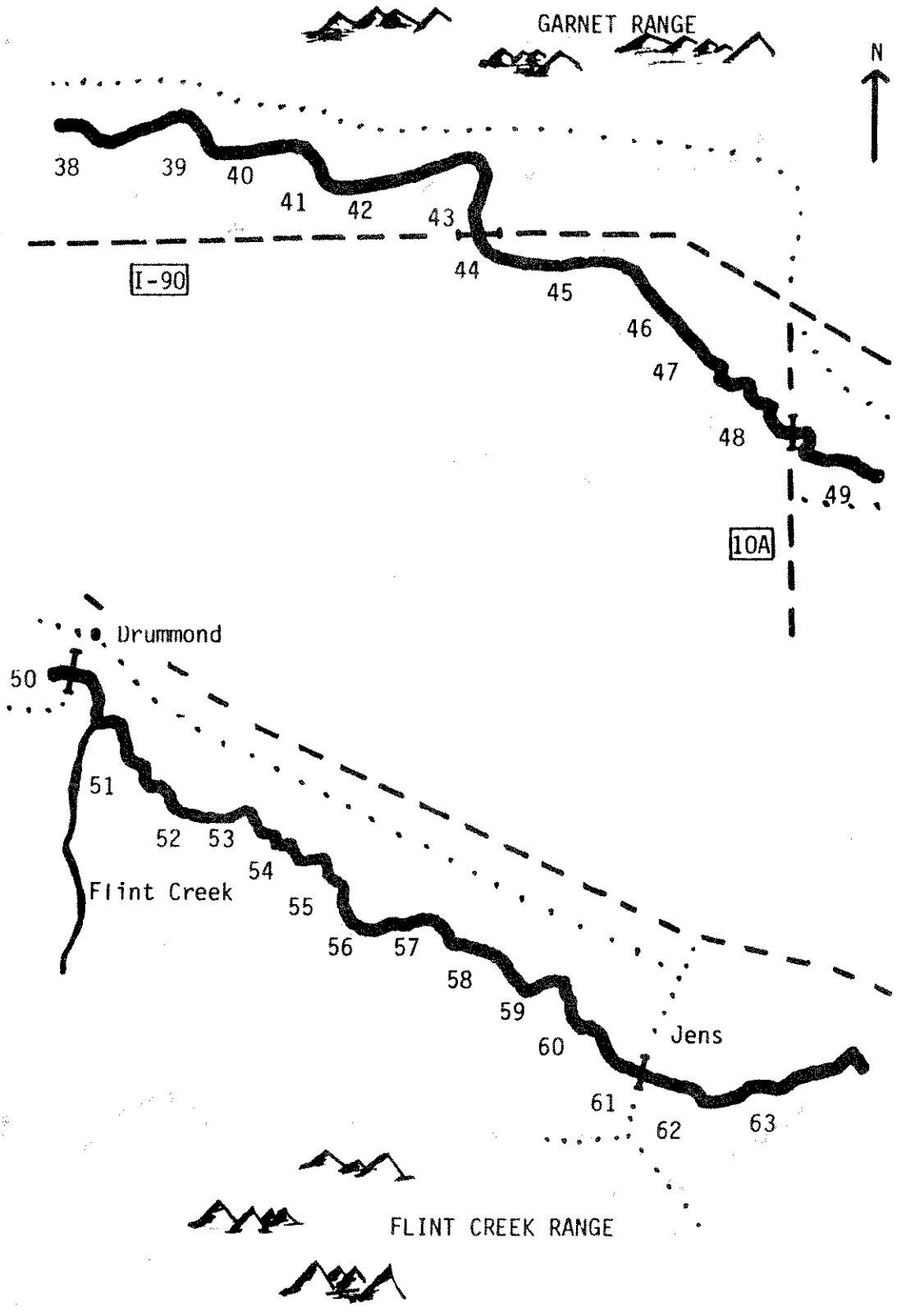

UPPER CLARK FORK RIVER
Blackfoot River
Milltown
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
I-90
GARNET RANGE
Turah Bridge
Turah
Campground
N
SAPPHIRE MOUNTAINS
Clinton
Schwartz Creek
LEGEND
Fish and Game Department Access
Fish and Game Department Campground
Major Highway
Secondary Road
River
Town
Bridge
0
1
2 Miles

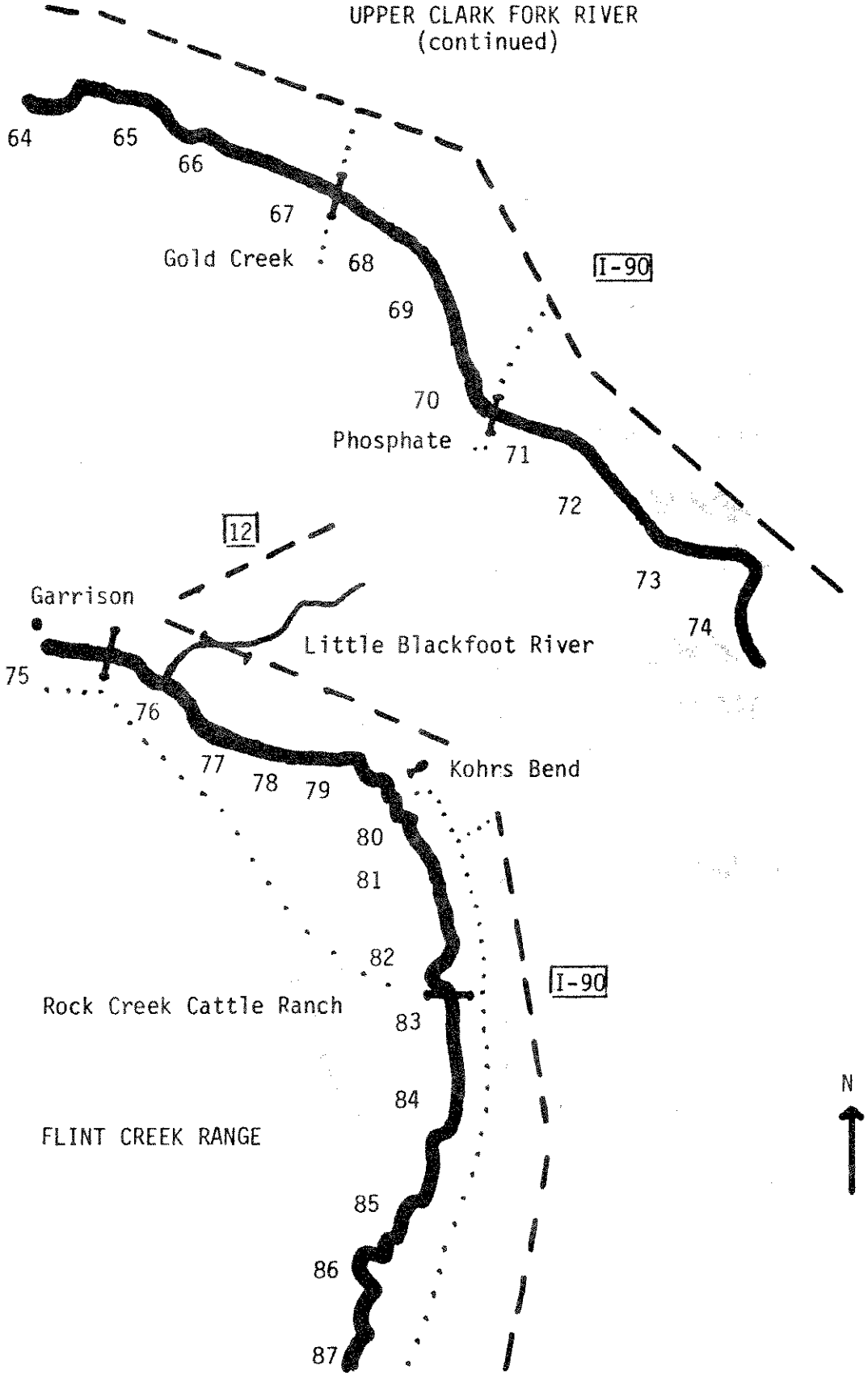
UPPER CLARK FORK RIVER
(continued)



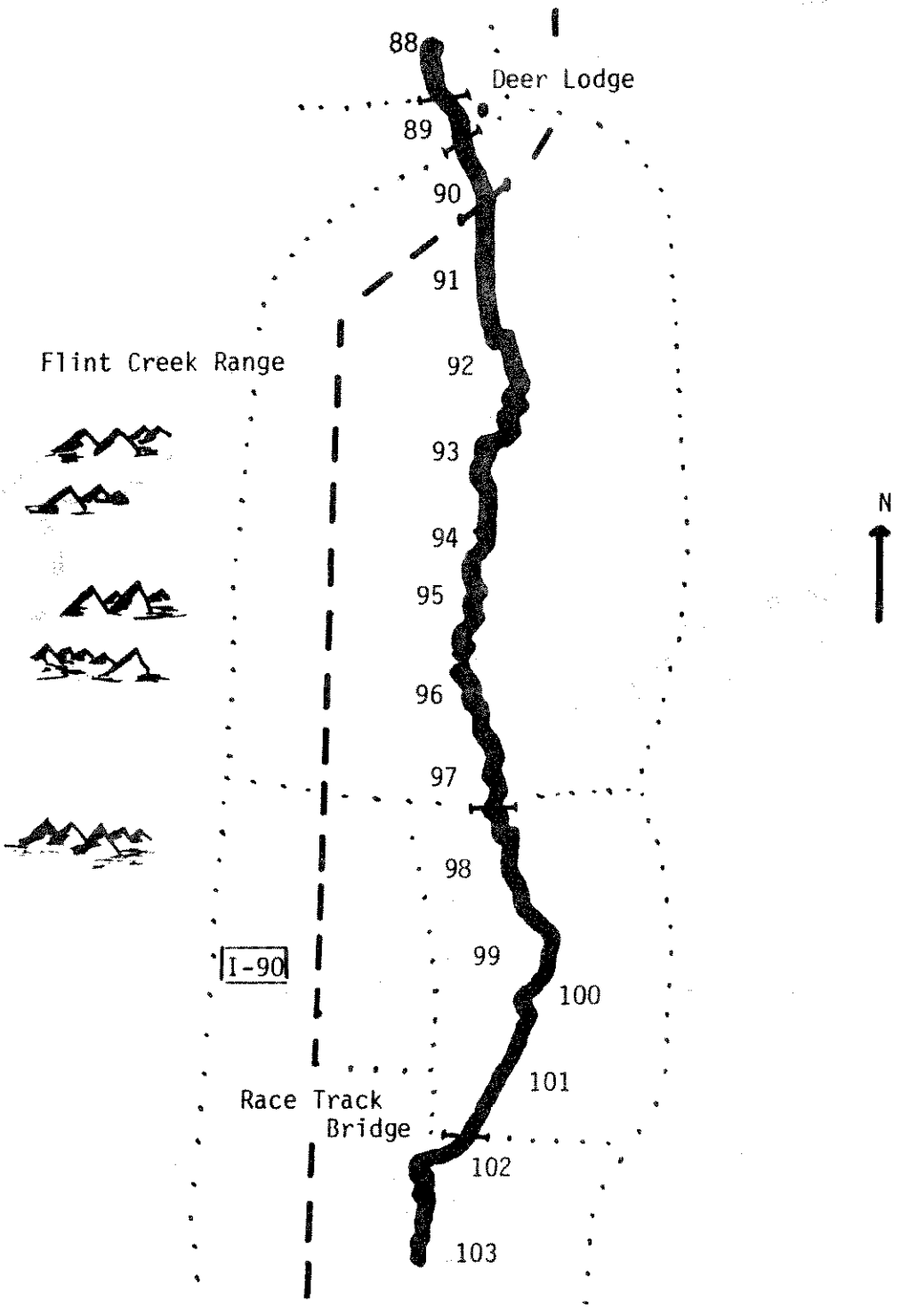


UPPER CLARK FORK RIVER
(continued)

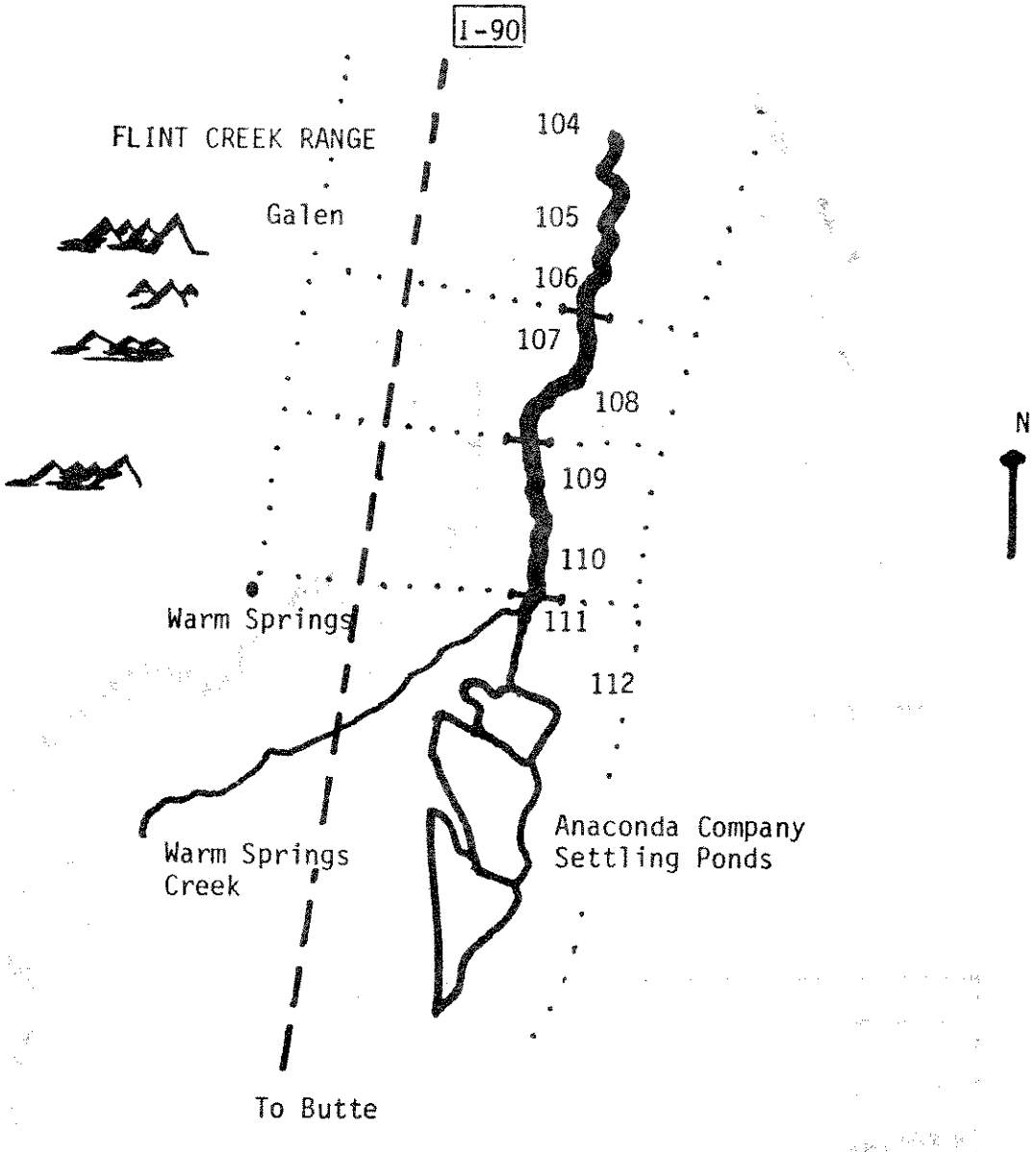


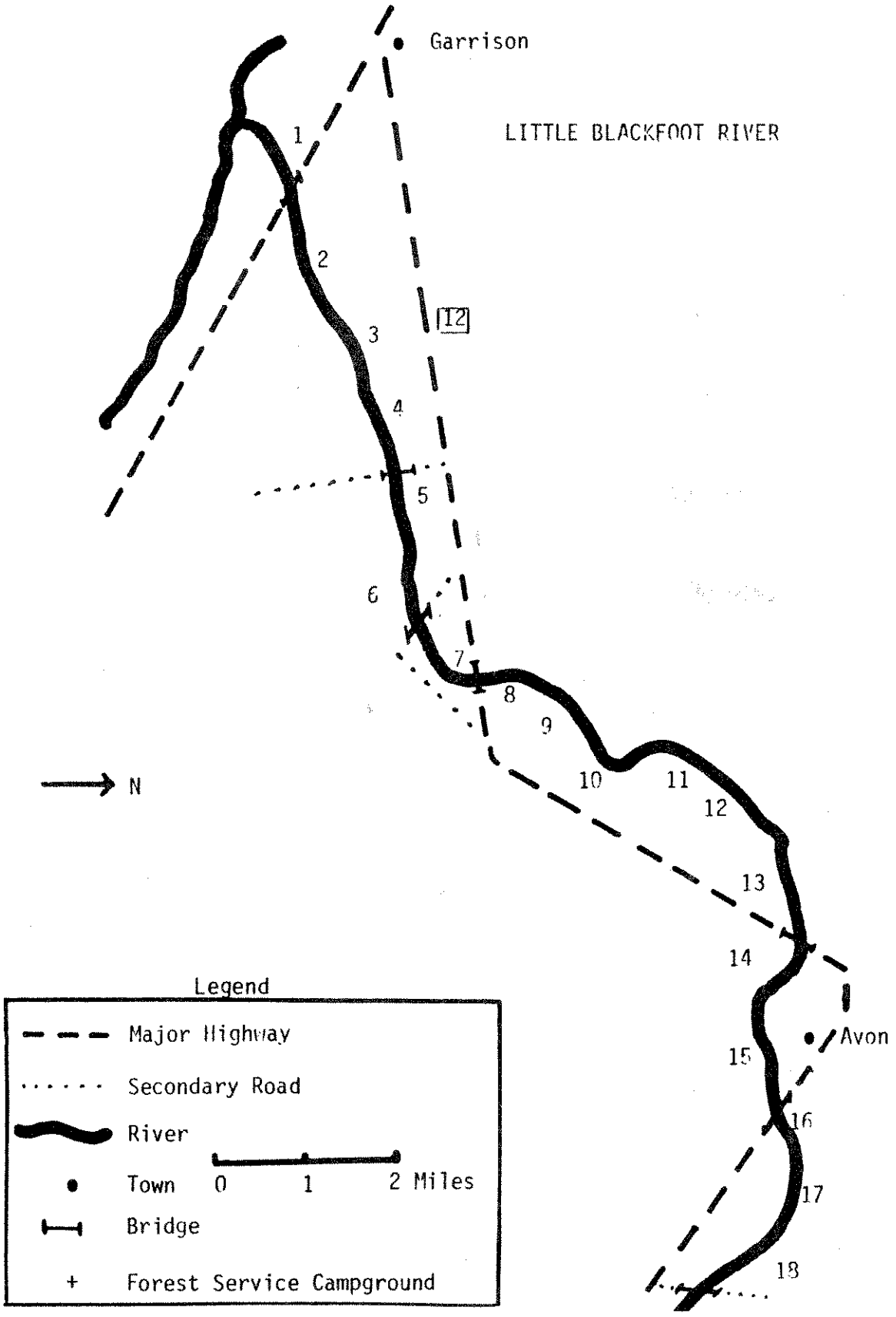

64
65
66
67
Gold Creek
68
I-90
69
70
Phosphate
71
72
73
74
12
Garrison
Little Blackfoot River
75
76
77
78
79
Kohrs Bend
80
81
82
I-90
Rock Creek Cattle Ranch
83
84
FLINT CREEK RANGE
85
86
87
N

UPPER CLARK FORK RIVER
(continued)

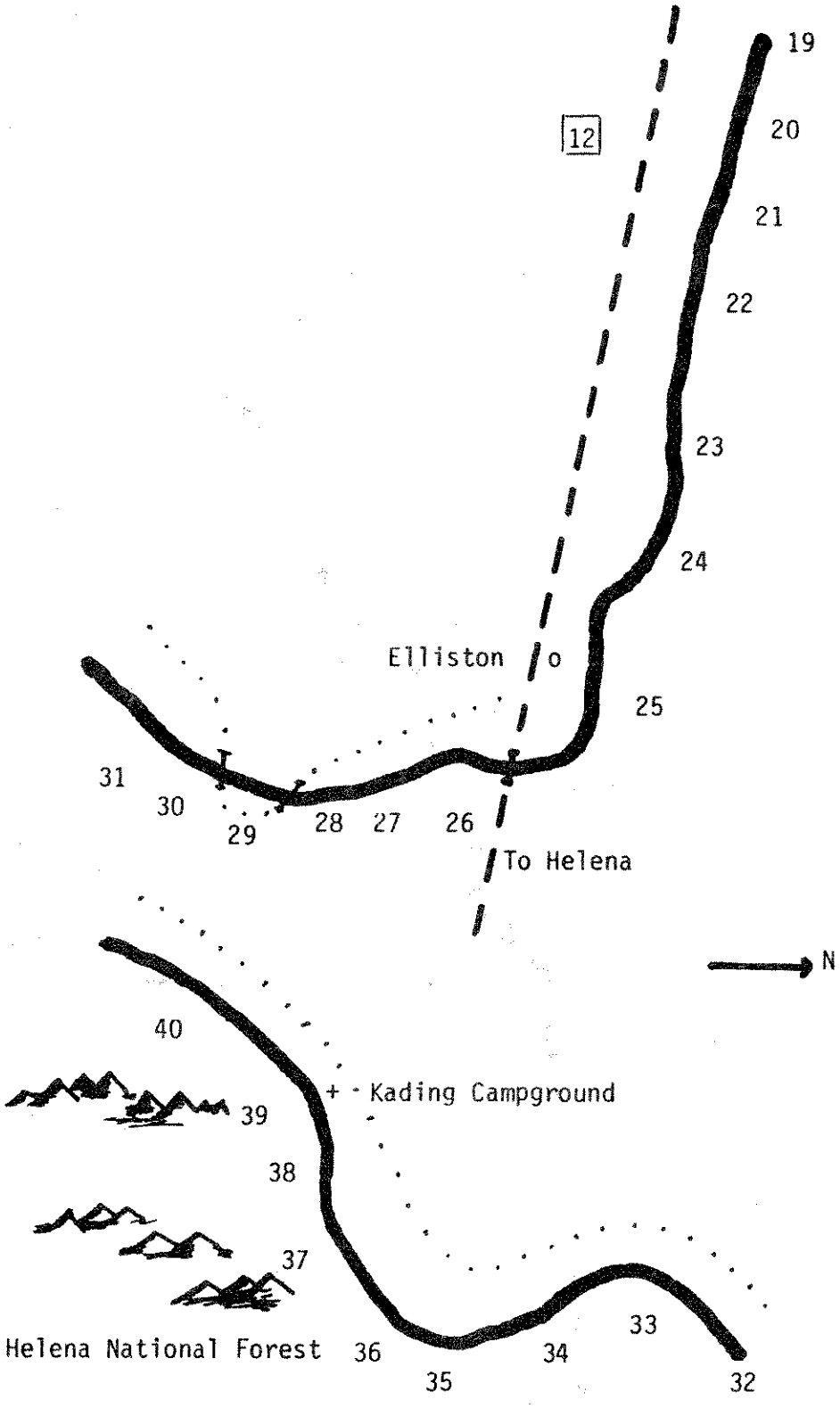


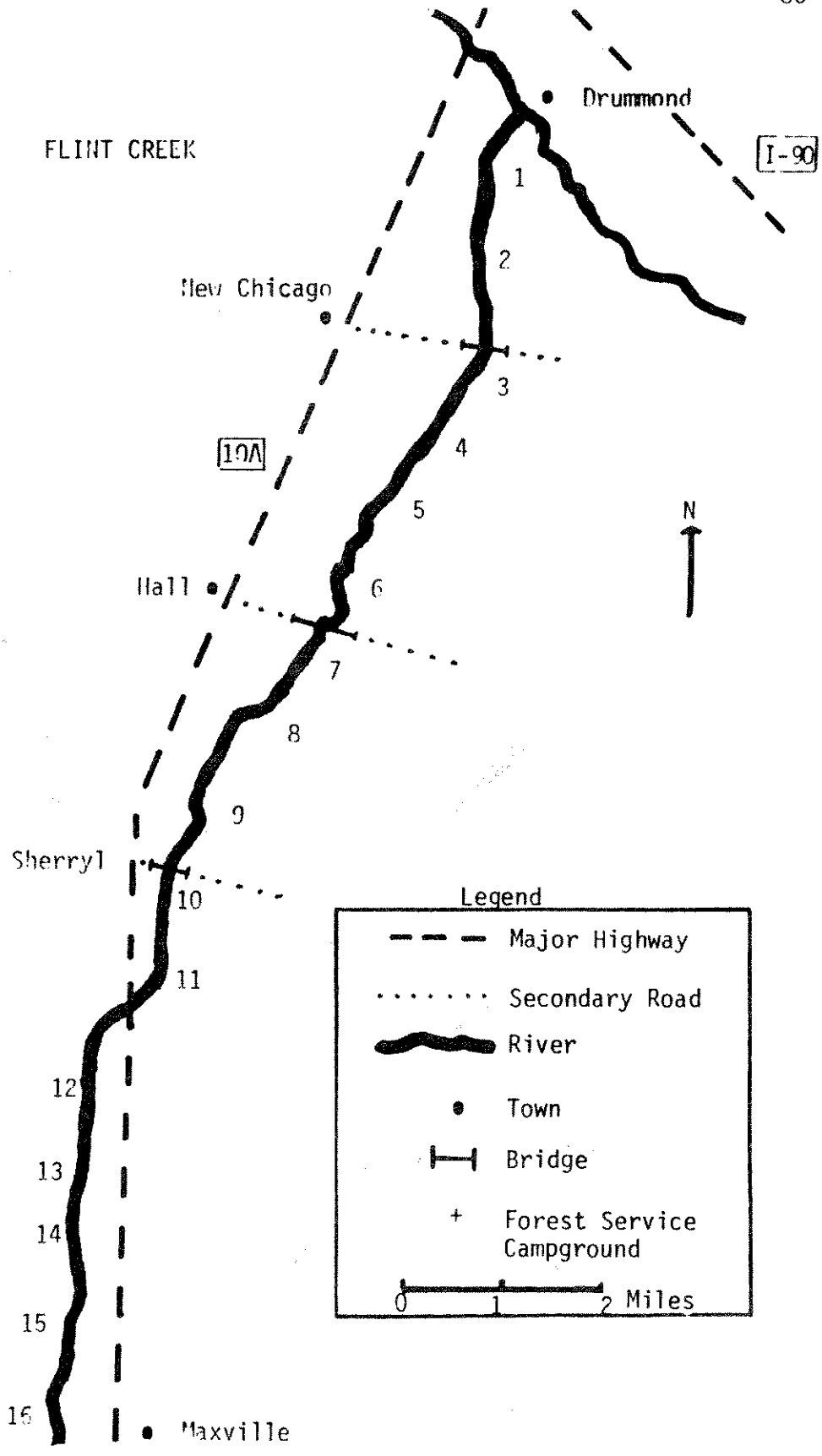
UPPER CLARK FORK RIVER
(continued)



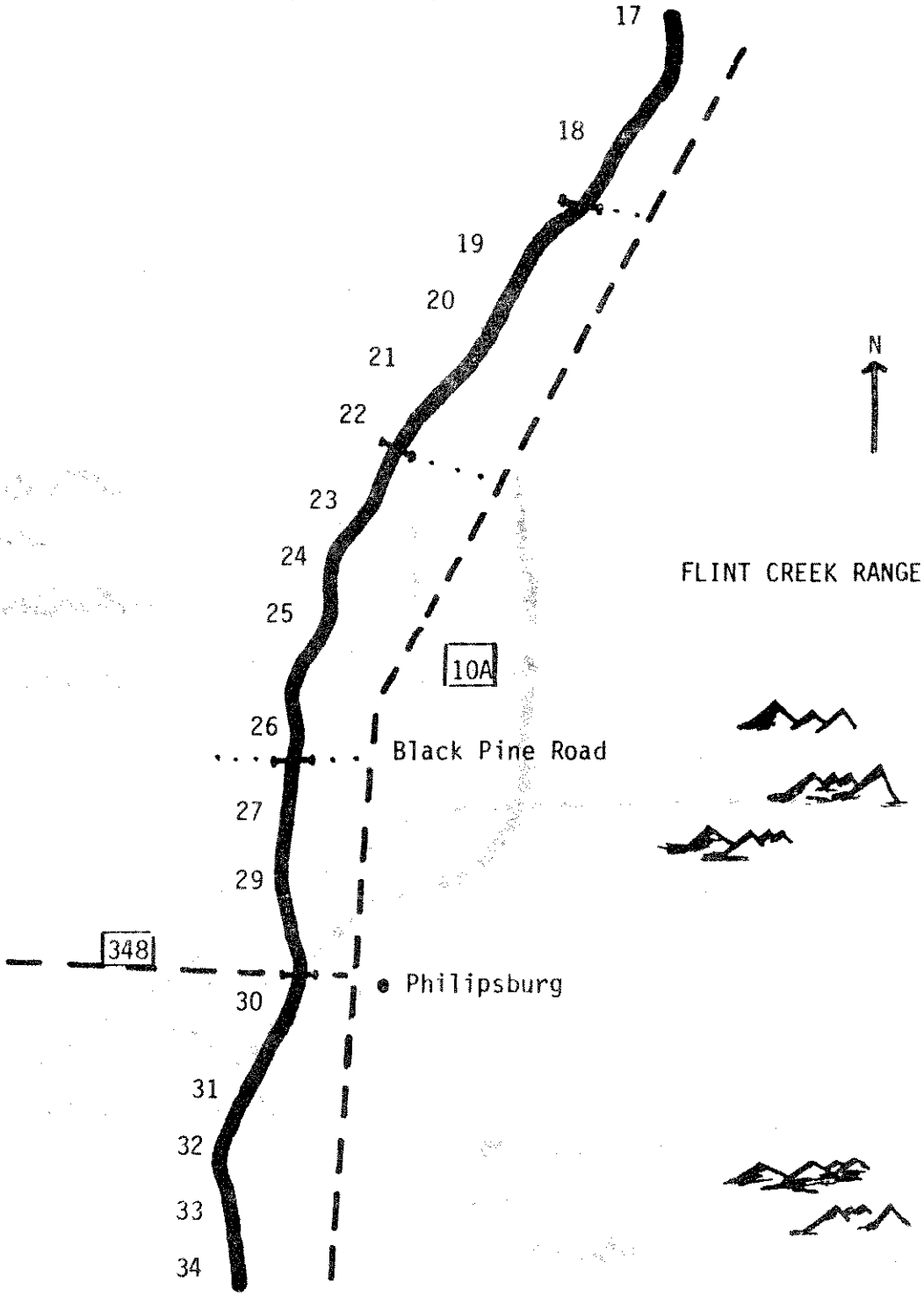

Garrison
LITTLE BLACKFOOT RIVER
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
I2
N
Avon
Legend
Major Highway
Secondary Road
River
Town
Bridge
Forest Service Campground
0
1
2 Miles

LITTLE BLACKFOOT RIVER
(continued)

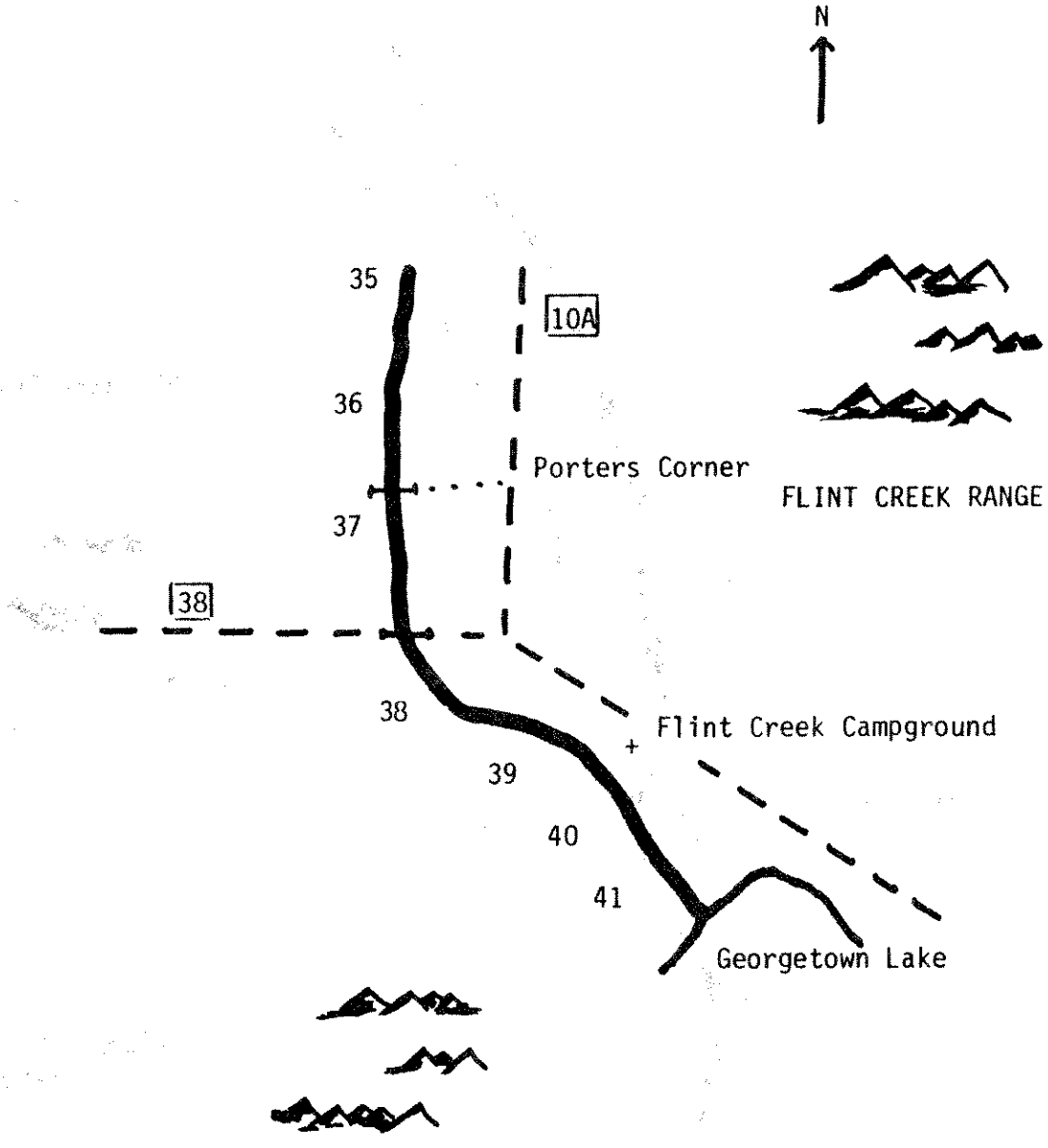


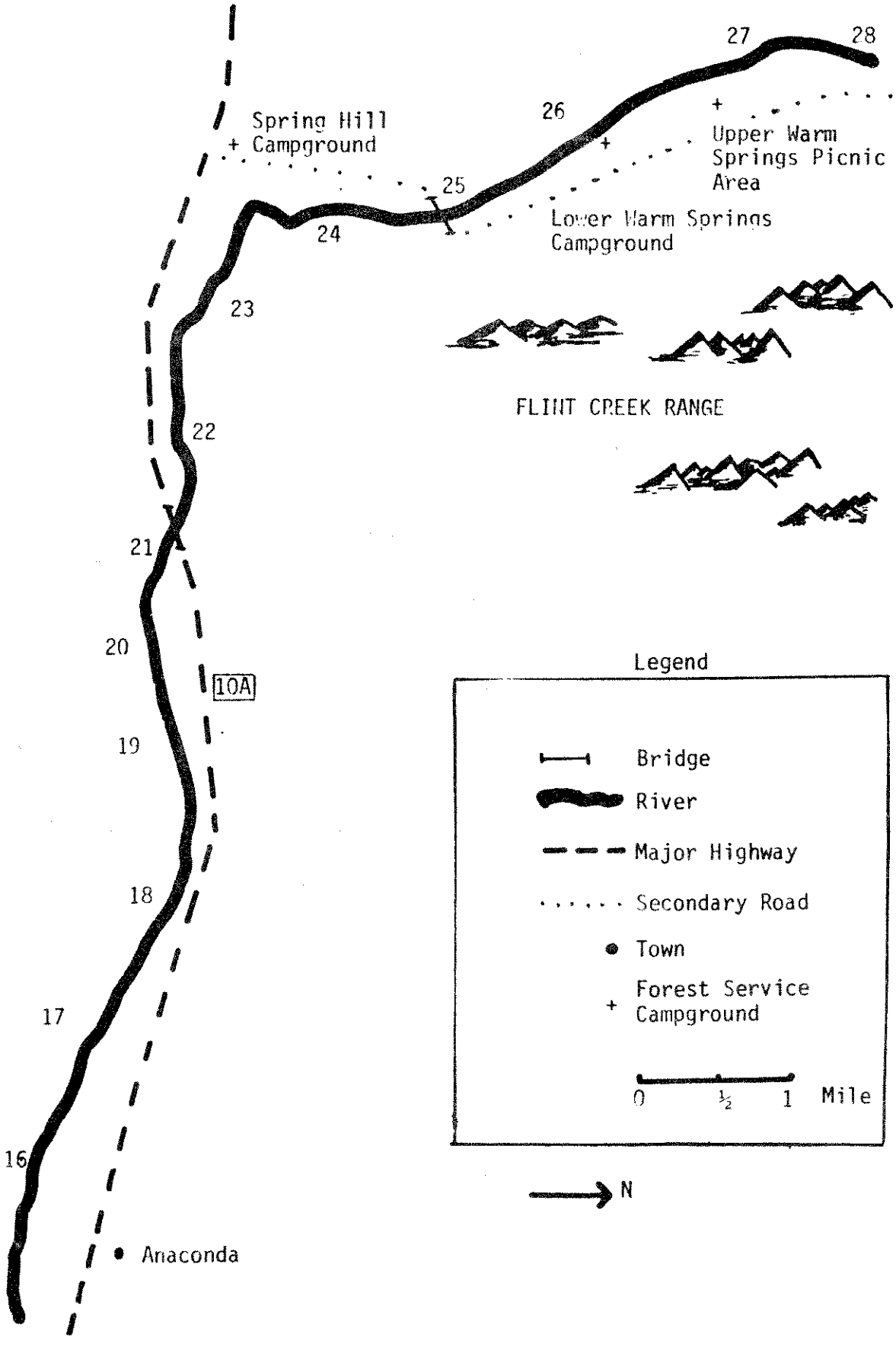

FLINT CREEK
Drummond
I-90
1
2
New Chicago
3
10A
4
5
N
Hall
6
7
8
9
Sherryl
10
11
12
13
14
15
16
Maxville
Legend
Major Highway
Secondary Road
River
Town
Bridge
Forest Service Campground
0
1
2 Miles

FLINT CREEK
(continued)



FLINT CREEK
(continued)




27
28
26
Spring Hill
Campground
Upper Warm
Springs Picnic
Area
25
24
Lower Warm Springs
Campground
23
FLINT CREEK RANGE
22
21
20
10A
19
18
17
16
Anaconda
Legend
Bridge
River
Major Highway
Secondary Road
Town
Forest Service
Campground
0 ½ 1 Mile
N

APPENDIX C

N_____

L_____
D_____
T_____

QUESTIONNAIRE

The Montana State Parks Division is conducting a recreation survey of the Upper Clark Fork River(Bonner to Warm Springs) and its four major tributaries. The following questionnaire has been developed to evaluate the recreational use in this area. An accurate reply to the following questions will provide needed information on present recreational use patterns and will aid in providing for your future recreational needs.

---

1. How many years have you visited the Upper Clark Fork River? Include this year.
   _____years

2. In an average year, how often do you visit the Upper Clark Fork River?
   _____less than once a year
   _____1-2 times a year
   _____3-9 times a year
   _____10 or more times a year

3. How has the quality of your recreational experience changed since you first visited the Upper Clark Fork River?
   _____much improved
   _____improved
   _____no change
   _____deteriorated
   _____much deteriorated
   _____do not know

4. How do you feel about the number of access sites on the Upper Clark Fork River?
   _____There are an adequate number.
   _____More sites are needed.
   _____There are too many sites.
   _____Do not know.

5. Do you feel the access site you are now visiting should be:
   _____more developed(toilets, picnic tables, etc.)
   _____left as is
   _____less developed

6. Why did you select the Upper Clark Fork River over other streams for this visit? Be specific.

   _____

   _____

7. Which of the following recreational activities do you plan to participate in, or have you participated in while at the Upper Clark Fork River during this visit? Check all that apply and place a double check next to the one activity you will engage in the most.

_____fishing	_____float fishing	_____picnicking
_____floating	_____sightseeing	_____rest, relaxation
_____water play	_____trail biking	_____photography
_____big game hunting	_____trailer camping	_____nature study
_____waterfowl hunting	_____tent camping or no cover	_____walking, hiking
_____upland bird hunting		_____other, specify

8.

	How often do you visit each stream? Please check.					How do you rate these streams in relation to the Upper Clark Fork River?					
	not at all	less than once a year	1-2 times a year	3-9 times a year	10 or more times a year	Much less desirable	Less desirable	About the same	More desirable	Much more desirable	No opinion
Madison											
Big Hole											
Yellowstone											
Missouri											
North, South & Middle Fork Flathead											

9. List and rate 2 other Montana streams you most often visit. Do not include the Upper Clark Fork River, Rock Creek, Little Blackfoot River, Flint Creek, or Warm Springs Creek.

	How often do you visit each stream? Please check.				How do you rate these streams in relation to the Upper Clark Fork River?				
STREAMS	less than once a year	1-2 times a year	3-9 times a year	10 or more times a year	Much less desirable	Less desirable	About the same	More desirable	Much more desirable
1._____									
2._____									

10. What is your residence?
_____Montana, zip code_____Go to question 11.
_____out-of-state(indicate)_____, zip code _____
If out-of-state:
How many days will you be in Montana?_____days
How many days will you be visiting the Upper Clark Fork River?_____days

11. How many people are in your group(include yourself)?
_____number of males
_____number of females

12. How many vehicles were used by your group to get to this location?
_____vehicles

13. What type of group is this?
_____family
_____friends
_____family and friends
_____alone
_____organization, specify_____

14. How many hours do you plan to spend, or did you spend at the Upper Clark Fork River today?
_____hours

APPENDIX D

OBSERVATION SHEET: UPPER CLARK FORK RIVER DRAINAGE

DATE_____ SAMPLING PERIOD_____ WEATHER_____ LOCATION_____

Activities code: 1 - fishing 5 - hiking 9 - camping 13- snowshoeing
2 - floating 6 - horseback riding 10- picnicking 14-other____
3 - swimming 7 - pleasure driving 11- ski touring
4 - hunting 8 - motor biking 12- snowmobiling

Floaters code: 1 - start 1 - canoe 4 - row boat
2 - midway 2 - raft 5 - other_____
3 - ending 3 - kayak
Floating observer - 999 Vehicle, no license observed - V

	State/County if Montana	no vehicle no. observe	Location	Time	Group Size	Activity observed	Floater location	Craft
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								