A black and white photograph of a river flowing through a forested area. The river is turbulent, with white water rapids and large, dark rocks scattered throughout. The background is filled with tall, thin evergreen trees. The overall scene is a natural, rugged landscape.

Rogue River Study -- Report 1
Field Investigations of River
Use Within the Wild River Area
of the Rogue River, Oregon

by
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ROGUE RIVER STUDY -- REPORT 1

FIELD INVESTIGATIONS OF RIVER USE WITHIN THE
WILD RIVER AREA OF THE ROGUE RIVER, OREGON

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Period of Research: June 1, 1974 to May 31, 1975

FOREWORD

The majority of the field research for this report was carried out between June, 1974 and October, 1974. An interim report entitled "Field Investigations of River Use within the Wild River Area of the Rogue River, Oregon" was submitted to the Oregon State Marine Board, December, 1974. Additional field work on the recreational impact on the Meadow Creek campground was carried out between June, 1974 and June, 1975 and was reported to the State Marine Board in July, 1975. These field efforts have now been revised and brought together in a single report.

This report, concerned with a field-based evaluation of the Wild River Area of the state and federally designated Wild and Scenic Rogue River, is a companion to the Rogue River Study -- Report 2, The Concept of Carrying Capacity: Its Application for Management of Oregon's Scenic Waterway System (Oregon State Marine Board and Oregon State University Water Resources Research Institute, WRRRI-32) June 1975 by Robert E. Pfister and Robert E. Frenkel. Rogue River Study -- Report 2... analyzes the carrying capacity concept as it might be applied to scenic waterways and proposes a set of principles including goals and standards necessary for implementing the carrying capacity concept. The field study in Rogue River Study -- Report 1... presents the preliminary results of a field-administered questionnaire which was aimed at understanding river user attitudes toward crowding, aspects of their trip and various management issues. A second aspect of this study was to inventory the Wild River

Area of the Rogue River to determine possible biophysical limits to the river's capacity for river-based recreation. Finally, an ecological assessment was made of one heavily used campsite at Meadow Creek.

We wish, particularly, to acknowledge the financial support of the Oregon State Marine Board which made this research possible. The generous cooperation and technical assistance of state and federal agency personnel who administer programs on the Wild and Scenic Rogue River is deeply appreciated. Particularly valuable to the field work was the support and time contributed by F.W. "Ted" Burgess, Robert L. Kiser and Earl Southart of the Gold Beach District Office, U.S. Forest Service.

Dr. Gerald M. Gillmore, University of Washington, and Dr. George Stankey, U.S. Forest Service, made special contributions to the design and analysis of the survey instrument used in this study. Appreciation is also extended to Dr. David Faulkenberry, Department of Statistics, Oregon State University, for his thoughtful refinement of the sampling procedures. The comments provided by all three individuals were instrumental to the success of the user survey.

The dedicated perseverance of Dennis Frates, Charles Ciecko, Terry Joseph, Mike McGregor, and Susan McGee, made it possible to complete a seemingly year's worth of work in less than six months.

TABLE OF CONTENTS

Chapter		Page
	Foreword.....	iii
I	OVERVIEW.....	1
	Introduction.....	1
	Purpose of the Study.....	2
	Scope of the Report.....	2
	Review of Legislation.....	2
II	VISITOR SATISFACTION PHASE.....	7
	Introduction.....	7
	Research Procedures.....	11
	Results.....	15
III	ENVIRONMENTAL PHASE: SITE CHARACTERISTICS.....	37
	Introduction.....	37
	Evaluation of Site Characteristics.....	43
IV	MEADOW CREEK ECOLOGICAL ASSESSMENT.....	85
V	SUMMARY.....	95
	Visitor Satisfaction.....	95
	Site Characteristics.....	97
	Ecological Assessment.....	100
	LITERATURE CITED.....	101
	APPENDIX.....	103

CHAPTER I

OVERVIEW

INTRODUCTION

In February of 1974, preliminary discussions were initiated between the Oregon State Marine Board and Oregon State University concerning the management problems associated with the recreational use of wild and scenic rivers in the state. The Marine Board subsequently indicated that they might support a pilot project on the Rogue River which would, in the short run, provide some data for management decisions on the Rogue, and in the long run formulate a management framework that would provide guidelines for the establishment of acceptable levels of use on other rivers within state jurisdiction. In May, 1974, A Memorandum of Understanding was approved by the Marine Board and the Department of Geography, Oregon State University, to initiate research on "A Management Model: The Carrying Capacity of Wild and Scenic Rivers."

The rapid growth in recreational use of Oregon rivers has presented the state as well as federal agencies with some difficult decisions concerning the number of users that the rivers can support and still achieve the management objectives of state and federal legislation. The decisions confronting these agencies are particularly difficult because little is known about the public who participate in the recreational opportunities offered by wild rivers. The recreational values of free-flowing, whitewater rivers were important to the legislative decision to designate a system of wild and scenic rivers and are also important to the management decisions affecting those rivers.

PURPOSE OF THE STUDY

The purpose of the study is two-fold. First, it is to provide the Oregon State Marine Board with information on the recreational use of the wild area of the Rogue River pertinent to river management decisions. Second, it is to provide the Board with a management framework which outlines principles for determining acceptable levels of recreational use of the rivers within the State Scenic Waterway System.

Specific research objectives for the field investigations are stated in the introductory sections of chapters I and II of this report. In addition to the field research, it was requested that legislation which applies to the Rogue River be reviewed since it specifies the goals and objectives for recreational use of the area. This legislative review is included in this part of the report.

SCOPE OF THIS REPORT

This report summarizes the field investigations conducted during the summers of 1974-1975 on the wild area of the Rogue River. The Chapter on visitor satisfaction discusses the survey research methodology, data collected, and analysis of those particular questions pertinent to management concerns. The remainder of the survey instrument will be analyzed, interpreted, and reported at a later date. The Chapter on the environmental phase outlines the site inventory methodology and presents a preliminary analysis of 75 river terraces suitable for camping in the wild river area of the Rogue River.

REVIEW OF LEGISLATION

The analysis of legislation establishing the Rogue River as a unit of the National Wild and Scenic Rivers System (PL 90-542) and the Oregon Scenic Waterways System (ORS 390.805) is important

to the question of carrying capacity of the river for recreational use and for the development of necessary management plans. The rapid increase in recreational use has generated concern that the river may not be providing the kind of opportunities indicated by the legislation and furthered by management plans. Furthermore, there is a concern that recreational opportunities desired by the users are not being fulfilled. With the potential for conflict between different kinds of users increasing, it becomes important to understand the opportunities that can and might be provided and what management action could be taken to achieve the indicated goals. For this reason, one of the first steps taken was to review the legislation and plans applicable to the wild area of the Rogue River.

Two pieces of legislation are important to management decisions for the Rogue. In 1968, the National Wild and Scenic Rivers System Act (Public Law 90-542) designated a system of eight federally protected areas on segments of particular free-flowing rivers. In 1970, the citizens of Oregon approved an initiative measure to establish the Oregon Scenic Waterways System (ORS 390.805-390.925) comprising segments of six free-flowing rivers in the state. The Rogue River from its confluence with Applegate River to its juncture with Lobster Creek was designated in both the state and federal legislation. Each of the acts have implications to decision-makers and researchers concerned with the concept of recreational carrying capacity and with the adoption of management alternatives to control use.

Public Law 90-542 states that:

Sec. 10 (a) Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is

consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archeologic, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area.

The recreational values that caused the river to be included in the wild and scenic river system are discussed in the revised Development and Management Plan for the Rogue. As published in the Federal Register, July 7, 1972, this plan states that the management objectives for the wild area will be to:

- (1) provide river-oriented recreation opportunities in a primitive setting, and
- (2) preserve the river, and its immediate environment in a natural, wild, and primitive condition essentially unaltered by the effects of man.

These management objectives according to the plans will be achieved by actions outlined in statements concerning management direction. With regards to the provision of river-oriented recreation opportunities the plan states.:

Recreation use of the Wild River Area will require a maximum degree of outdoor skills. The absence of man-made developments and the unmodified natural environment will dominate. . . Since boating, fishing, and sight-seeing are the main recreational uses on the river, top priority for recreational development will be given to improving the quality of these activities. . . Care will be taken that use levels do not reach the point where the quality of recreation experience or quality of the stream environment deteriorates.

With respect to the second management objective, the plan indicates:

Recreational developments will be of a primitive nature and will include only those facilities necessary for sanitation, safety, fire, and site protection and administrative purposes. . . Recreationists using the area at any given time will be limited to levels consistent with the Wild River management objectives. No more facilities than are necessary to meet these levels will be provided.

Interpretation of the management plan is difficult because the management objectives, which are crucial to the concept of carrying capacity, are not clearly stated. Thus, the decision-maker who seeks to delimit an appropriate level of use, based upon what is stated in federal management plan for the Rogue, is faced with initially deciding what opportunities are appropriate.

Noticeably missing in the management document is any reference to specific conditions that describes what constitutes a quality experience. A quality experience could be a fast pace, high intensity, jet boat race from Agnes to Foster Bar or it could be a tranquil low intensity float trip from Grave Creek to Foster Bar. Both qualify as "river-oriented recreational opportunities in a primitive setting." but the compatibility of the two activities is questionable.

Overuse is cited as a problem because of the impact of crowding and congestion on the river experience. However, crowding is a condition that must also be judged with reference to a specified criterion such as "outstanding opportunities for solitude" (Public Law 88-577). Solitude is cited because it has been discussed as a necessary condition for a quality experience (Wagar, 1964; Stankey, 1973). To date, however, no reference to solitude is found in the management plan for the Rogue nor in legislation designating the area. This does not mean that it is not important to the recreationist, it only points out that a decision-maker has no statutory or management guidelines on the subject.

Second, there appears to be conflicting statements concerning the level of development and the preservation of primitive conditions.

For example, if priority is given to the development of recreational facilities as a method of achieving the first management objective, it would be in direct conflict with the second management objective. It seems difficult to give "top priority for recreational development" of particular activities and at the same time "preserve primitive conditions essentially unaltered by the effects of man."

The Oregon Scenic Waterways Act and the rules and regulations pertaining to it, give consideration to the management objectives and directives stated in the Federal Register. Statutory and management guidelines by the State of Oregon do not yet exist with respect to the recreational opportunities. Under the circumstances, future effort to improve the management guidelines at the state and federal level is necessary prior to making decisions about carrying capacity. As noted by Lucas and Stankey (1974):

Management objectives are standards against which managers judge whether or not use is consistent with an area's carrying capacity. If objectives change because of agency policy, public pressure, or other reasons, so does the definition of what is appropriate and what is not. In the absence of clear objectives, however, attempts to make consistent and defensible judgments about capacity will be futile.

Thus, it is apparent that the lack of a management plan can be a major inhibiting factor for making operational the carrying capacity concept and for the meaningful interpretation of user survey information. The attitudes and perceptions of the users stand alone without any reference points or standards with which to be compared. Identification and description of the specific recreational opportunities the plan intends to make available and the specific environmental protection standards to be enforced have not yet been published. This must be corrected in order to make defensible management decisions in the future. User and manager alike would benefit from such an endeavor.

CHAPTER II

VISITOR SATISFACTION PHASE

INTRODUCTION

Understanding sources of visitor satisfaction is important to decisions concerned with providing opportunities for outdoor recreation. This idea first received widespread attention twelve years ago in a report to the Outdoor Recreation Resources Review Commission by Michigan State University (O.R.R.R.C. Report No. 5). The report, The Quality of Outdoor Recreation as Evidenced by User Satisfaction, initiated a pioneering research effort in user expressions of satisfaction and dissatisfaction as a measurement of quality in outdoor recreation.

Not surprising, however, is that the attention to visitor satisfaction has been transitory in nature. One reason for this is, that public agencies have continually decided to measure the success of their programs by the number of people who participate in them. It generally began with traffic counts at entrance stations, then visitor counts (often placed into an activity category), and finally the tabulation of user days. As an administrative procedure for justifying budget requests, a census of the people who "use" an area is beneficial. As a means for deciding about carrying capacity, it is a necessary ingredient but an inadequate procedure because the question of visitor satisfaction is ignored. Recent research in wilderness recreation has shown that as use increases, satisfaction decreases (Stankey, 1973), confirming one of several hypotheses published ten years ago by J. Alan Wagar (1964). In Wagar's article, the importance

of visitor satisfaction as influenced by increasing use is succinctly stated:

Because the objective of recreation is to provide benefit and enjoyment for people, managers of recreation areas must consider how management procedures will affect satisfaction of the needs that motivate recreation. To decide whether it is appropriate to define a carrying capacity and to limit use, they must know how this satisfaction, which determines the quality of recreation, will change with different amounts of crowding.

Although crowding in the simplest form might be viewed as too many people, it is not just a question of numbers. Empirical studies in wilderness areas have documented that type and location of heavy use, more than total number of users, are very often more important to visitor satisfaction. For example, method of travel (Lucas, 1964), party size, time and location of encounter (Stankey, 1971) appear to be more crucial considerations to crowding than simple numbers. These results shed doubt on the all-to-common conclusion that restriction of numbers of users alone will solve the problem. Whether these findings are equally applicable to river travelers is what needs to be explored.

Research Objectives

The specific objectives for this phase of the research are to:

1. identify the importance of selected river-oriented recreational opportunities to the satisfaction realized by commercial and non-commercial river travelers;
2. identify and describe the impact of crowding upon commercial and non-commercial river travelers;
3. determine if differences exist between the attitudes of commercial and non-commercial river travelers with respect

to management restrictions;

4. describe the feelings and opinions of river travelers regarding motor boats, site improvements, and historic features in the wild river zone.

Justification for Research

The importance of recreational carrying capacity research can be attributed to the dramatic increase in use of our wild and scenic rivers. River running has become an extremely popular recreational activity. The increased availability of equipment (neoprene rafts, inflatable and fiberglass kayaks, aluminum boats) and published river guides makes it possible for a broader spectrum of the public to enjoy the opportunities available on wild and scenic rivers. In addition, commercial river runners advertise extensively and offer attractive trip packages for every type of interested individual. These improvements in the means of making such trips has been supplemented by more widespread and increased news coverage and publicity. Newspapers, periodicals, and television documentaries have created a new public awareness of river-oriented recreation opportunities. Even film stars recently added a level of glamour to the Rogue and Deschutes rivers in Oregon.

When demand for a river recreational opportunity increases and supply remains the same, it places the burden upon resource managers to examine the question of carrying capacity and to decide about acceptable use-levels. Carrying capacity research is likely to increase in its importance because it is basic to efficient and acceptable resource management decisions. This applies to both the

protection of the resource and the provision of recreational opportunities. Neither component can be overlooked when a management decision must be made.

Too frequently, decisions to implement management controls have been made with little knowledge of public sentiment to such a decision. This has led to the growing use of the courts by groups dissatisfied with public land management regulations. In some cases, the decisions rendered by the court have been detrimental to future land management alternatives as well as to the agencies' public image. This is unfortunate for the land manager, the agency, and the public. It is also a primary reason for the examination of the satisfactions that the public derives from particular opportunities such as running wild rivers.

First, with the knowledge of what river travelers like, how they feel about crowding and management restrictions, the resource manager is in a better position to make a judgment concerning alternatives for managing the area. Obviously, it is not possible to satisfy everyone's preferences. Some people use the areas for the wrong reasons. They are the wrong reasons because they are inconsistent with legislative mandates and contrary to stated management objectives. This is when it becomes necessary to compare user perceptions and attitudes with the guidelines documented in legislation and management plans.

Second, all management judgments are not limited to situations where conflicting values exist. In many cases, managers simply do not know what the river traveler enjoys. If a decision can be made to improve visitor enjoyment and satisfaction, yet remain within the scope of statutory permissibility, everyone benefits. Such a decision

passengers in a "boat carrying passengers for hire" where a fee, charge, or other compensation is collected by the guide or outfitter for services rendered.

Non-commercial travelers* - Those people who travel in private boats not part of any profit-making operation.

Attitude - One's disposition towards an idea, object, or condition.

RESEARCH PROCEDURES

Selection of Sample

Based upon the use figures for the previous summer, a stratified random sample was selected after consultation with statisticians at Oregon State University. The population was stratified according to number of people per day on the river. This assured that a representative sample would be obtained for the questions concerned with crowding. Particular use-periods received greater numbers of people than others. Thus, it was important to identify these high and low intensity use periods and randomly select survey days within them.

On each survey day, a twenty percent systematic sample of the river travelers was taken upon completion of their wild river trip. The sample was from every party and not every fifth party that day.

Data Collection

The procedure for visitor satisfaction data collection consisted of two techniques: (1) a direct self-administered survey instrument and (2) a nondirect participant observation form (Appendix A). This means that the survey instrument was provided to the river traveler by the field investigator and each respondent completed the form on his own. Prior to this, the field investigator recorded each party and noted several observable items. This included type and

number of boats, size of party in each boat, whether they were commercial or non-commercial and time of arrival.

The survey completed by the river traveler consisted of six general groups of data: (1) socio-economic data; (2) characteristics of their trip; (3) feelings about overall satisfaction and items contributing to it; (4) attitudes and perceptions of crowding; (5) attitudes toward management controls; (6) feelings toward motor boat use, site development and historic features. The wording of the attitudinal questions was adapted from a survey instrument used and tested by the Wilderness Management Research Unit at the Forest Sciences Laboratory in Missoula, Montana. This adaptation greatly reduced the time necessary to prepare the questions used in this study.

The format for the socio-economic and trip characteristics data was a combination of multiple choice and free response questions. Each item provided new information about the characteristics of the visitors and offered an opportunity to group them into categories other than mode of transportation (commercial and non-commercial). Trip characteristics were useful for plotting travel zones based upon the number of nights on the river. The correlation of responses to number of previous trips with perception of crowding is another example of how trip characteristics could be useful.

Equally important was the necessity to have data compatible with that secured in previous studies. The socio-economic data permits comparisons of river travelers with recreationists in other forms of outdoor recreation such as wilderness canoeists. The data solicited in this category was:

- 1) Size of party
- 2) Type of group

- 3) Age, sex, and level of education
- 4) Memberships in organizations
- 5) Population of community where respondent grew up
- 6) Occupation
- 7) Length of stay

The study of attitudes focused upon satisfaction, crowding, and statements concerning management controls. These were measured by means of the Likert Attitude Scale in which the respondent ranks himself in terms of his level of agreement or disagreement to a series of attitudinal statements (Oppenheim, 1966). In this study, the attitude positions used were (a) important - unimportant; (b) pleasant - unpleasant; and (c) agree - disagree. Each scale displays five intervals on an attitude continuum. For scoring, the negative end of the scale was always assigned the low values (1 and 2), neutral scored as (3), and the positive end as high values (4 and 5).

Analysis of the Data

To check internal consistency of the responses to management controls, coefficients of correlation were calculated using the Pearson Product Moment Coefficients. Subsequently, to determine if one group differed significantly from another group in its responses to each question, the means were compared using the Student "t" Test for significant difference. To determine if differences existed between groups concerning their perception of crowding, totals were plotted to form satisfaction curves (Stankey, 1973). In addition, the chi-square test was used on questions about tolerance of large parties to determine whether or not an observed frequency distribution differed significantly from the distribution expected by chance.

The content analysis procedure for the free response questions on motor boats and site development are explained in the section which summarizes the user's feelings.

RESULTS

Evaluation of Survey Procedure

The use of self-administered questionnaires proved successful for both river travelers and hikers. During the survey period, only two commercial outfitters refused to allow their clients to cooperate. The total level of non-response (incomplete surveys, failure to return, refusal to cooperate) was less than ten percent of the sample (348 questionnaires).

In some cases, the respondents were in a hurry to depart from the take-out point where the survey was administered. When this occurred, the field surveyors obtained their name and address. The questionnaire was then mailed with a pre-paid return envelope. A ninety-two percent return rate, without a follow-up letter, was obtained from the sixty-four questionnaires that were handled by mail. In several cases, lengthy letters were returned with the questionnaire. From the high return rate of mailed questionnaires, and other events, it was evident that the river travelers on the Rogue were very responsive to the survey. The specific reasons for such good response are not known but it does offer commentary on the level of public interest in research concerned with recreational opportunities on the Rogue River.

Description of User Characteristics

Table 1 provides a descriptive analysis of the characteristics of the river travelers in the commercial and non-commercial categories. The question directed at the occupation of the individual was open-ended. This required that a standardized classification system be selected for placing the responses. The categories presented below are those used by the Bureau of the Census, Department of Commerce, thereby making the occupational information compatible with the extensive data reported in the 1960 and 1970 population census. Data concerning level of education, age, and number of previous trips were placed into categories based upon the range of responses and not according to standardized categories.

Table 1. Personal characteristics of commercial and non-commercial respondents to the Rogue River visitor satisfaction survey.

<u>Question</u>	(N=209) <u>Commercial</u> (percent)	(N=139) <u>Non-Commercial</u> (percent)
1. What is your occupation?		
Professional/technical	32	28
Manager/administrator	9	15
Clerical and kindred work	2	4
Sales work	4	4
Craftsmen and kindred work	3	9
Service workers	4	2
Laborers	<1	6
Private Household	8	9
Unemployed	30	17
No or Multiple Response	8	7
2. What is your age?		
15-21	26	16
22-39	44	68
40-59	26	16
60+	4	1
3. Respondent had made Rogue River trip		
Once before	12	15
Two or more times	12	39

Comment. The main difference between the two groups, according to occupation, is in the managerial, craftsmen, laborer and unemployed categories. The unemployed category is distorted by the predominance of younger age groups (Y.M.C.A., etc.). All "student" responses to the question were classified as unemployed and this inflated that percentage. The other three categories are more strongly represented among non-commercial users. All occupational categories considered, the commercial river traveler has distinct representation in two occupations: the professional/technical and also in the unemployed (student) category. The non-commercial river traveler on the other hand is generally more balanced and heterogeneous in employment composition.

The age categories reflect a "young" user population with the "under 40" age group dominant among both the commercial (70%) and non-commercial (83%) respondents. Considering the strenuous and skilled nature of the activity, this is not surprising. More noteworthy, however, is the higher representation in the "over 40" age group among the commercial participants. It might be that the skill provided by the outfitter makes it possible for this segment of the population to participate in such trips.

The number of people making their first trip is distinctly different between the commercial and the non-commercial groups. Less than one-fourth of the commercial travelers made previous trips whereas over one-half the non-commercial travelers are repeat visitors. The ratio between the commercial and non-commercial groups

is even more pronounced (1:3) for those river travelers who have made two or more previous trips. This difference may be important for the interpretation of attitudes and will be discussed in that section.

River travelers were also asked if they had membership in any conservation or outdoor recreation organizations (Table 2). In addition to the percentage that have such affiliation, the names of club or organization were recorded and placed into one of the two categories "conservation" or "outdoor" organizations. The reasons one selects when joining "conservation" organizations are usually not the same as for selecting membership in "outdoor" clubs (Faich and Gale, 1971). It may be that the feelings expressed by river travelers might vary according to membership in such organizations.

Table 2. Personal characteristics of commercial and non-commercial respondents to the Rogue River Visitor Satisfaction Survey.

<u>Question</u>	(N=209) <u>Commercial</u> (percent)	(N=139) <u>Non-Commercial</u> (percent)
4. Do you belong to any organizations that are primarily concerned with conservation or outdoor recreation?		
Yes	34	33
Which?		
Conservation	24	11
Outdoor Recreation	10	22
5. What was your last year of school completed?		
Elementary (8th grade)	1	*
High School		
1-3 years	13	8
4 years	10	22
College		
1-3 years	17	35
4 years	19	19
5 or more years	35	27
No response	5	4

*less than 1%

The percentage of commercial and non-commercial respondents with membership in conservation/outdoor recreation organizations is almost the same for both groups. The primary difference is in the distribution of the memberships. The commercial traveler tends to be affiliated with conservation organizations and the non-commercial affiliated with outdoor recreation organizations.

Both groups of river travelers tend to be a highly educated segment of the population. When compared with the state or national pop-

ulations, river travelers have a substantially higher percentage in the college level education categories. This characteristic has been found to be true of wilderness travelers as well (Hendee et al., 1968)

Comparative Analysis of Attitudes

Differences in the attitudes of river travelers concerning several management issues was investigated. The management concerns selected for study were questions about crowding, site improvements, and use restrictions. Comparisons between different groups of river travelers were made to evaluate if there was any significant difference in their responses to each question. In this manner, it is possible to judge the strength of their agreement (or disagreement) to the question.

For a more comprehensive comparison, a group of occasional river travelers might have been included. This would be the personnel of those agencies which make management decisions about the recreational use of the Rogue River. This additional sample group would have permitted an analysis of the inclination or disposition of the managers with respect to the two user groups, commercial and non-commercial. Research recently conducted on the Middle Fork of the Salmon River compared manager and user attitudes. It found the agency personnel (1) appeared to be more development-oriented than users; (2) stressed stronger feelings toward the need for controls; and (3) did not generally accurately perceive user responses to management alternatives for restricting use (Peckfelder, 1973). Each of these observations

is germane to the attitude questions employed in this research. It is unfortunate responses from both managers and users of the Rogue River are not available for a more extensive comparison of attitudes. That, however, was outside the scope of this research.

Attitudes towards crowding. The attitude of river travelers to crowding is not well understood other than too much crowding generates complaints. Unfortunately, the information contained in letters of complaint and newspaper articles often lacks detail or distorts important dimensions to the problem. Moreover, one could too easily be influenced by the more vocal segment of the population without the benefit of the views of a broader user population.

In this research, the problem of crowding was considered in two dimensions: (1) the number of encounters per day with other parties; and, (2) the size of the parties encountered. With respect to anticipated differences among river travelers, these dimensions have been examined separately for commercial and non-commercial groups.

Number of encounters per day. To analyze the responses in this respect, satisfaction curves were constructed as in previous research (Stankey, 1973). The percentage of respondents who indicated "very pleasant" or "pleasant" experience on the 5-point scale were totaled and placed on the vertical axis of Figure 1. The number of encounters per day stated in each item were placed on the horizontal axis. The curves reflect a general decrease in satisfaction with increased encounters for both the commercial and the non-commercial groups.

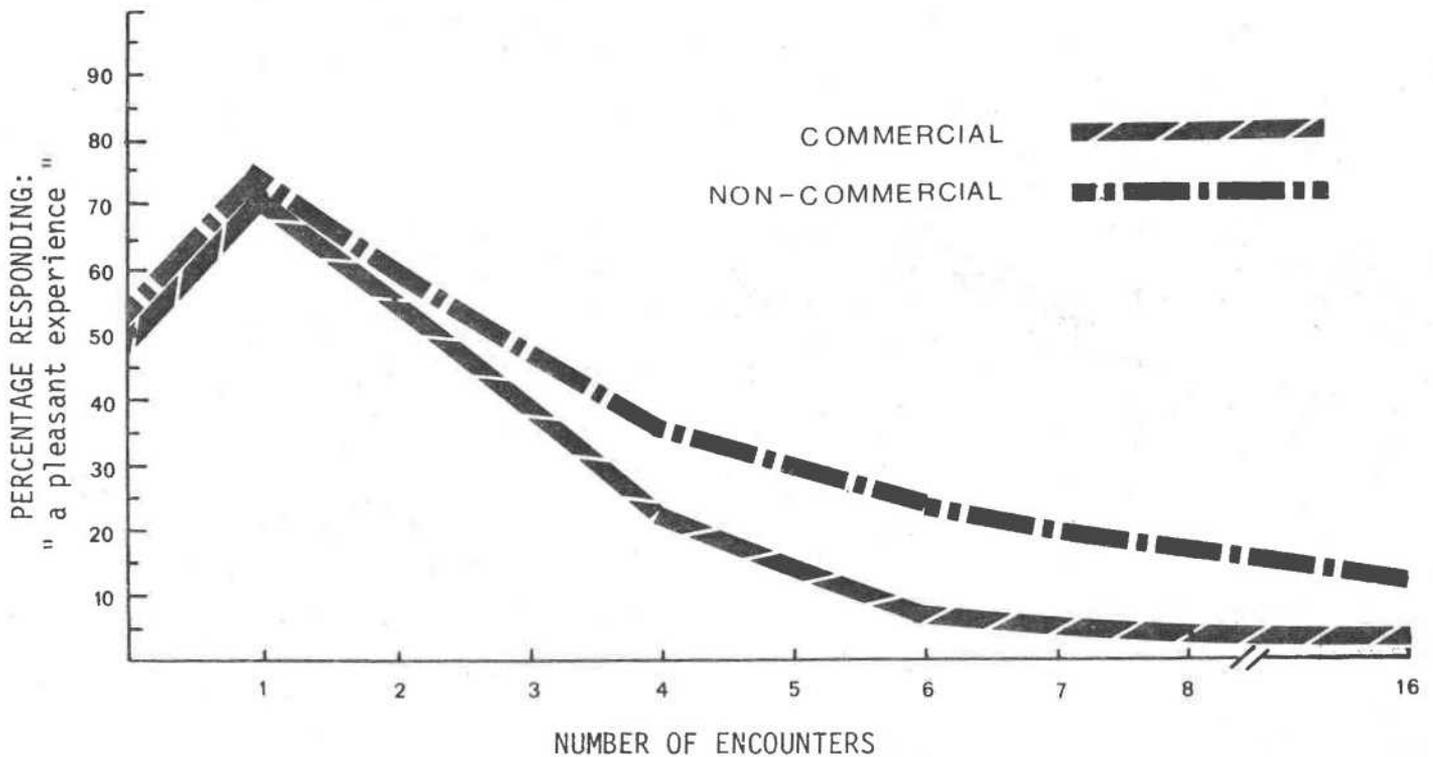


Figure 1. Satisfaction curves for encounters with other river travelers.

From these curves it can be noted: (1) only fifty percent of each group responded that a situation completely free of any contacts with other parties (zero encounters per day) was enjoyable ("a pleasant experience") and it appears that river travelers are not completely satisfied when placed in an isolated situation; (2) both commercial and non-commercial river travelers responded that one or two encounters with other parties per day is more enjoyable than none at all; (3) with increasing numbers of encounters above two or three per day, both commercial and non-commercial groups received less satisfaction

from their river experience; and (4) the non-commercial river traveler apparently enjoys encounters with river travelers more than the commercial user at all levels of crowding. In essence, this group appears to be somewhat more tolerant of crowded conditions.

Figure 2 shows satisfaction curves for encounters between river travelers and hikers as expressed by the river user.

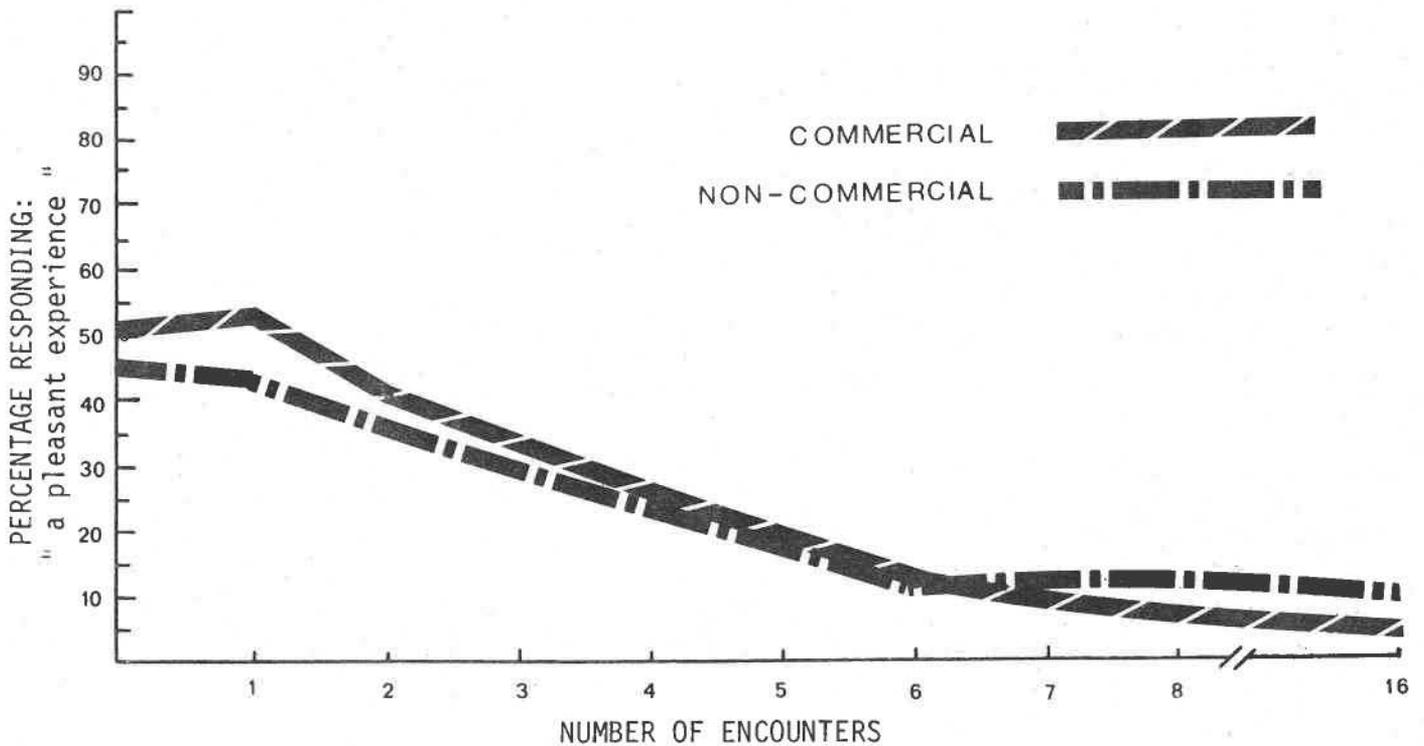


Figure 2. Satisfaction curves for encounters with hikers.

Several observations should be noted about curves shown in Figure 2: (1) both groups responded that encounters with hikers decreased enjoyment steadily after one encounter; and, (2) there is no substantial difference between commercial and non-commercial

tolerance level at the various intensity of encounters with hikers.

Comment on number of encounters. Further research is necessary to explain the differences in the responses of commercial and non-commercial river travelers to crowding on the river. Non-commercial users appear more tolerant to crowding than commercial. This difference could relate to one or several factors. One consideration might be the amount of previous experience on the river; another could be the motivation of the river traveler for seeking recreational opportunities on wild river.

The amount of previous experience is suggested because there is a distinct difference between the number of previous trips each group has taken on the Rogue. The majority of non-commercial users had made previous trips and their expectations might be quite close to their actual experience. Most commercial users (passengers, not guides) on the other hand, tend to be making their first trip on the river and may have higher expectations than the actual situation affords. An additional element is the fact that commercial river guides promote the "wild" aspect of their trips as an incentive to their clients who, in turn, might expect a "wilderness-type" experience. It could also be that experience with crowding increases ones tolerance to it. Or, it might be that only the more tolerant river users return for subsequent trips. Having quantified the differences between the groups, a number of possibilities arise and additional analysis is necessary to find out what accounts for these differences.

Size of parties encountered. The effect of party size upon

visitor satisfaction is another management concern on the Rogue River. To determine if encounters with large parties as opposed to small parties affected the wild river experience for the two groups, the users were asked if

seeing a large party (a dozen or more people from a club, etc.) reduces the feeling that you are in a 'wild river area....

Nearly two-thirds of the non-commercial users agreed with this statement and half of the commercial users agreed with it. It would appear that users who traveled in larger groups (i.e., commercial users) are more tolerant of large-size groups than non-commercial users who commonly travel in smaller parties. This appears reasonable and parallels the results of other studies (Jubenville, 1971; Merriam and Ammons, 1968; Stankey, 1973).

In order to consider the effect of user tolerance to encountering different party sizes, respondents were asked to select which option they preferred when placed in each of the following situations:

- (i) Seeing one large party of 20 people during the day or ten parties of two people each, spaced through the day?
- (ii) Seeing one large party of 20 people over a two to five day period and no one else the rest of the trip or three or four small parties every day for the two to five day period:
- (iii) Seeing one large party of 20 people during the day and no else or one small party of 2 people and no one else?
- (iv) Seeing one large party of 20 people during the day and no one else or five small parties of 2 people spaced through the day?

Table 3 User preference (in percent) between options of party size in four different situations (large party versus small party encounter).

Situation	COMMERCIAL			NON-COMMERCIAL		
	Large party option	Small party option	Don't care	Large party option	Small party option	Don't care
(i)	41	23	36	24	38	38
(ii)	32	38	30	12	57	31
(iii)	11	55	34	5	58	37
(iv)	30	43	27	20	47	33

When faced with choices as to the size of party to be encountered, several important preference patterns can be detected among users: (1) non-commercial users consistently preferred contacts with small parties in every situation; (2) commercial users, when faced with the options of situation (i), preferred the large party encounter; (3) when the commercial users was placed in situation (ii), they showed a split preference; and, (4) when the commercial user was placed in the last two situations (iii) and (iv), they preferred encounters with small parties.

The overall observation is that encounters with large parties are not preferred by river travelers. Of eight options, large party encount-

ers were chosen once. This preference for contacts with small parties needs to be explored further. Current regulatory practices are to allot twice as many daily river starts to large parties than to small parties for commercial users and this practice would seem to be in conflict with user preference.

Attitudes towards use restrictions. The problem of assessing the attitudes and preferences of river travelers toward the implementation of use restrictions is difficult. To begin with, certain restrictions have already been initiated on the river and any survey question on them may appear to the user to be a moot point. Second, agency publicity efforts and newspaper coverage has continued to advocate the need for controls to protect the river and the opportunities it provides and this situation could confuse interpretation of a question regarding restrictions.

Based upon agency statements, it seemed appropriate to test the popular notion that commercial and non-commercial users agree on need for use restrictions. Four questions were asked. Two asked if there should be use restrictions and two suggested use restrictions as a means of handling overcrowded conditions (Tables 4,5,6,7).

To statistically compare the two groups, the "t" value* was computed and compared with the table value at the .001 confidence level. This would constitute the highest level of statistical significance and would require a computed "t" value of greater than 3.291

*The Student's "t" statistic is a parametric test of significance suitable for uncorrelated data from two sample groups.

Table 6 Percent response to question concerning use restrictions:

"If a river area becomes overcrowded, restrictions on the number of people allowed to visit it should be enforced."

N	RESPONSE					ANALYSIS		
	SA (5)	A (4)	N (3)	D (2)	SD (1)	mean \bar{x}	s.d. s	t value
348								
COMMERCIAL 204	52%	39%	3%	3%	3%	4.333	.908	5.143
NON-COMMERCIAL 131	31%	41%	10%	5%	13%	3.710	1.310	
NO RESPONSE 13								

Table 7 Percent response to question concerning use restrictions:

"It would be better to be able to go to a "wild river" area whenever you want to, even if it was badly crowded, than to have any regulation of use. . ."

N	RESPONSE					ANALYSIS		
	SA (5)	A (4)	N (3)	D (2)	SD (1)	mean \bar{x}	s.d. s	t value
348								
COMMERCIAL 203	5%	6%	5%	28%	56%	1.758	1.115	4.221
NON-COMMERCIAL 130	11%	11%	14%	30%	34%	2.330	1.337	
NO RESPONSE 15								

The hypothesis that there is no significant difference between the groups was rejected. In all cases, the computed "t" value was greater than the table value at the .001 confidence level. The popular

assumption that commercial and non-commercial users are essentially in agreement on the question is not valid. The commercial users responded more strongly that restrictions are needed than did the non-commercial user.

Of importance concerning this difference in outlook between the commercial and non-commercial river traveler was that, of nineteen statements to which these two groups responded, and for which "t" values were calculated, only five statements had computed "t" values which were significant at the .001 confidence level. Four of these cases, discussed above, dealt with use restrictions and the fifth concerned whether "meeting other people around the campfire at night should be part of a river trip" to which the non-commercial user assented.

The apparent support among the commercial users for use restrictions (Table 6 & 7) as a means of resolving overcrowding deserves further analysis but this is not carried out in the present report. It is interesting that despite their differences toward the need for restriction on use, the majority of both commercial and non-commercial travelers responded negatively when questioned if they felt the river is currently overcrowded.

Attitudes towards improvements. The placement of signs and additional toilets within the wild river area are improvement actions available to managing agencies. To determine user attitudes on these two possible actions, the following questions were presented to both commercial and non-commercial river travelers:

Table 8 Percent response to question concerning improvements:

"Mile marker signs should be placed every mile along the trail. . ."

N	RESPONSE					ANALYSIS		
	SA (5)	A (4)	N (3)	D (2)	SD (1)	mean \bar{x}	s.d. s	t value
348								
COMMERCIAL 201	5%	10%	32%	23%	30%	2.358	1.149	0.826
NON-COMMERCIAL 133	6%	11%	24%	20%	39%	2.248	1.252	
NO RESPONSE 14								

Table 9 Percent response to question concerning improvements:

"Mile marker signs should be placed every mile along the river . . ."

N	RESPONSE					ANALYSIS		
	SA (5)	A (4)	N (3)	D (2)	SD (1)	mean \bar{x}	s.d. s	t value
348								
COMMERCIAL 202	2%	3%	23%	24%	48%	1.881	1.005	0.060
NON-COMMERCIAL 135	4%	5%	16%	22%	53%	1.874	1.135	
NO RESPONSE 11								

Table 10 Percent response to question concerning improvements:

"Toilets should be placed at camping areas along the river."

N	RESPONSE					ANALYSIS		
	SA (5)	A (4)	N (3)	D (2)	SD (1)	mean \bar{x}	s.d. s	t value
348								
COMMERCIAL 205	26%	38%	18%	10%	8%	3.649	1.198	2.888
NON-COMMERCIAL 133	19%	29%	26%	10%	16%	3.248	1.316	
NO RESPONSE 10								

The placement of mileage marker signs was not supported by either commercial or non-commercial river travelers. On the other hand, both groups agreed on the placement of toilets at camp sites although not to the same degree, the commercial user favoring this development more than non-commercial.

Motor Boats on the Wild Area of the Rogue River

Content Analysis. The subject of motor boats on the wild area of Rogue River was presented to river travelers in the form of an open, free response question with enough space to permit full expression of feelings on this issue. Tenor of response was evaluated and each response was placed into one of three preference categories: favorable (yes), unfavorable (no), or neutral. Qualifications of the remarks were also noted.

Attitudes toward motor boats. The question was phrased: "What are your feelings concerning motor boats on the river?" The verbatim responses to this question were transcribed along with the respondents' occupation and age. Of the 318 responses, 254 (80%) indicated a preference for no motor boats, nine (2%) indicated "yes", or a preference for motorized craft on the river, and 56 (18%) had neutral responses.

Over one-third of the responses to the question were qualified or modified by a specific reference. Six types of qualifications were identified:

- (1) Spatial - Where reference is made to locations on the river where motor boats should be prohibited.
- (2) Functional - Where reference is made to the permissible use of motor boats for transportation to cabins, for maintenance, etc.
- (3) Number/type of boats - Where reference is made to the number of or types of motor boats permissible.
- (4) Pollution - Where reference is made to water, noise, or air pollution as caused by motor boats.
- (5) Wild River Experience - Where reference is made to nature, natural surroundings, and the incompatibility of mechanization to these values.
- (6) Seasonal - Where reference is made to a specific time of year when motor boats might be permissible.

These qualifications are useful for comparing preferences and gives attention to those respondents who clarified their feelings on the question. This analysis of the preferences, by type of qualification, is presented, along with an example of each in Table 11,12, 13,14,15.

Table 11. Attitudes toward motor boats and sample reasons for qualifying negative response (N=94)

Pollution (26%):	"Jet boats are polluters with noise, smoke and oil--a major distraction to a beautiful natural resource."
Wild River Experience (26%):	"Does not seem consistent with a wild river."
Type and Number of Boats (20%):	"Should be controlled and limited."
Spatial (16%):	"Would like to see them restricted to certain stretches of the river."
Functional (9%):	"Should be banned except for supplies and transportation to lodges."
Seasonal (2%):	"Restrict during summer."

Table 12. Attitudes toward motor boats and sample reasons for qualifying neutral response (N=22).

Type and Number of Boats (64%):	"Keep a limit on number and speed."
Spatial (23%):	"O.K. - As long as they stay on the lower river."
Functional (16%):	"Should be limited to those absolutely necessary - like permanent residents."

Table 13. Attitudes toward motor boats and sample reasons for qualifying positive response (N=7)

Spatial (29%):	"Below Blossom."
Functional (29%):	"Very necessary at times."
Type and number of boats (29%):	"Small motors."
Other (13%):	"They should be allowed because of wind."

Comment. The feelings expressed by commercial and non-commercial river travelers towards motor boats are distinctly negative. The qualifications on one-third of the negative remarks indicate two factors contribute to over one-half the negative sentiments: (1) pollution (water, air, sound), and (2) conflict with the wild river experience.

Further analysis revealed, the sentiments expressed did not vary with the age of the respondent. The feelings were uniformly distributed among all age groups as the following table indicates.

Table 14. Attitudes toward motor boat use with respect to age group.

<u>Age</u>	<u>Percent No</u>	<u>Percent Neutral</u>	<u>Percent Yes</u>	<u>Total N=</u>
15-21	75	22	3	69
22-35	82	15	3	136
36-49	82	15	3	70
50-65	79	21		33
> 66	100			1
age not indicated	75	25		<u>8</u>
				318

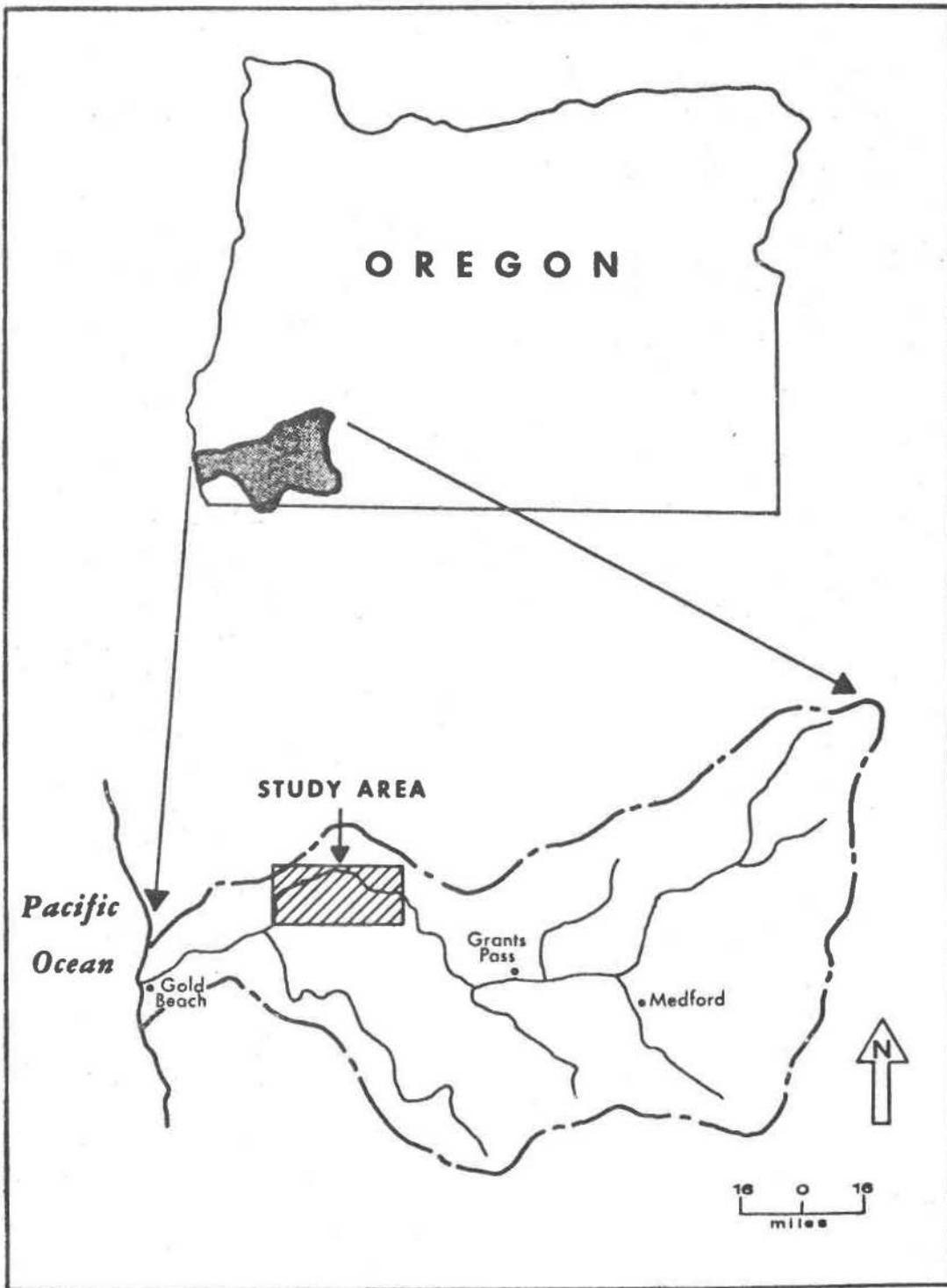


Figure 3. Relative location of the Rogue River drainage basin and the area selected for study.

CHAPTER III
ENVIRONMENTAL PHASE: SITE CHARACTERISTICS
INTRODUCTION

Objectives

The purposes of this phase of research were to (1) locate all feasible campsites, (2) inventory selected bio-physical site characteristics, (3) inventory selected amenity characteristics, and (4) identify bio-physical impacts associated with recreational use of the Wild Area of the Rogue River between Grave Creek and Foster Bar (Figure 3). Because recreationists were observed to camp and picnic almost exclusively at sites offering supplies of potable water, feasible campsites were identified if they were accessible to tributary water supplies or springs. Seventy-five (75) identified campsites were judged available to either or both river travelers and hikers.

This phase of the Rogue River carrying capacity study was judged necessary in order to adequately assess the physical capacity for camping along the wild section of the river and to serve as a benchmark for further research. The emphasis of this research phase was to objectively rate selected site characteristics so that valid comparisons of campsites can be made and camping patterns for various user groups could be analyzed with respect to the attributes of the campsites.

Definition of Terms

Several terms are used throughout this section of the report and

may differ from other meanings often attached to the same term elsewhere. In the interests of precision, the following terms are defined.

Site characteristics are biological, physical or perceived traits that influence the desirability of a site for camping or picnicking. Site characteristics were rated on a scale ranging from one to five.

Campsite is defined for the purposes of this report as any flat segment of terrain (slope not exceeding 3%) of sufficient area to accommodate a party of four for sleeping purposes, and having a potable water supply within a reasonable distance (5 minutes walk or less). A minimum campsite was assumed to be about 100 ft².

Campsites were identified regardless of current use patterns.

Spatial capacity refers to the maximum number of users a given site can hold not taking into consideration perceptual or ecological limiting factors. The dimensions of campsite area, and its expressions as an area class, is a measure of spatial capacity.

Carrying capacity refers to the number of users a given site can hold based upon limits identified in stated management goals. Goals should specify: a) the kinds of recreational opportunities provided, and b) the environmental standards that must be met for protection of the natural conditions of the site. When both these complex elements are outlined in the management goals, the concept of limiting factors is important to the carrying capacity of the site.

An application of the limiting factor concept would be the quantitative relationship between the perceptual factors associated with the users and the environmental factors associated with site deterioration. One perceptual factor might be the measurement of user tolerance to crowding at the site. One ecological factor could be the measurement of vegetation change at the site as the result of treading. The smallest of the two measurements, concerning the number of users a site could hold, becomes the limiting factor.

River terrace refers to any topographic bench along the river formed by aggradational or degradational processes associated with the Rogue River, and its tributary streams.

If in proximity to potable water, most river terraces are potential campsites. Most terraces exist as unvegetated sand bars associated with eroded rocky banks. Some of the higher terraces exhibit soil development and forest vegetation cover.

Site code is a means of objectively locating sites along the river course and employs the letter N or S to refer to north or south bank respectively followed by a number designating the site. Letter-number designators were desirable because a number of sites inventoried were nameless. Site names are keyed to site codes in Appendix B. Earlier in the field work phase of this research an alphabetic abbreviation was used to identify campsites.

Accomodation zones are river segments in which parties habitually camp or are provided overnight accomodation. These night-use zones are dependent upon whether the user takes two, three, four, or more days to make his trip.

Organizing Concepts

Several different approaches to the organization of the bio-physical and amenity data for the Rogue River campsites were experimented with. For example, north and south bank sites were separated and the 47 north bank sites could be analyzed separately from the 28 south bank sites. Another approach was to divide the river into landscape zones between Grave Creek and Foster Bar and evaluate site characteristics for each zone. A third approach was to group all sand terraces which are innundated yearly or possibly biennially and treat these as separate from the higher vegetated terraces subject to flooding at less frequent intervals. Each of these approaches has advantages and drawbacks.

The organizational approach selected for descriptive purposes is to initially address individually each site characteristic and to subsequently consider river and campsite use in terms of accomodation zones.

Site characteristics were judged in the field by measurement and by visual observation. These evaluations were expressed by a rating scale from one to five. In most instances the range of measured site characteristics or definition on the scalar category is given in

tabular form in the discussion of an individual site characteristic. For consistency, a rating of "I" indicates a poor or undesirable site characteristic while "V" designates a more desirable condition.

Site Limitations

Two of the seventeen site characteristics inventoried impose obvious limitations on use; namely, the area of flat ground and the availability of potable water.

Since almost all campsites coincided with river terraces (sand bar to higher terrace) the amount of sleepable flat ground (ground less than 3% slope) is directly proportional to the extent of terrace formation. Since terrace development varies from year to year in an absolute sense, campsite availability and character will also vary annually. This variability could not be evaluated in a single season but it is the type of problem demanding further research.

Terrace development also has implications for management. Only the highest terraces, those subject to return frequency floods of 50 years or more, can be used for permanent installations such as fire pits, picnic tables, and sanitary stations. If these installations are placed on lower terraces they must either be moved or be expected to be destroyed in winter or spring flooding. Likewise, the lowermost sandbar terraces subject to annual flooding and annual reformation can be expected to be "cleansed" of litter, fire pits, piled fire wood, and undecomposed feces. The degree to which such

"cleansing" takes place should be systematically studied as it has a very definite impact on the river environmental capacity to absorb summer users.

For the opposite reasons, infrequently inundated terraces will bear the accumulated impact of users over a number of years with the remains of many unplanned fire pits, trampled paths, litter accumulation, firewood depredations, etc. Meadow Creek and Whisky Creek are two good examples of this problem.

While minimal management is necessary to sustain the quality of lower level terraces, the upper terraces require persistent careful management in order to prevent excessive degradation under use. Although in the above discussion reference to high terrace and lower sand bars has been made, these terraces are arrayed in an elevational continuum with reference to the river.

Availability of potable water provides the second site limitation. It was assumed in this study that the Rogue River water was not potable; however, no water quality measurements were taken to support this assumption. It was also assumed that all tributary streams and springs provided potable water, again no measurements were available to support this assumption. It was observed throughout the summer season that very few users carried their own water supplies; almost all camped or picknicked near the water supplies. A number of attractive potential campsites exist without water supply and the carrying capacity of the river could be increased if users were to carry their own water and be willing to camp at these dry

sites. No inventory of dry sites was made but this research should take place in the future.

EVALUATION OF SITE CHARACTERISTICS

Campsite Area

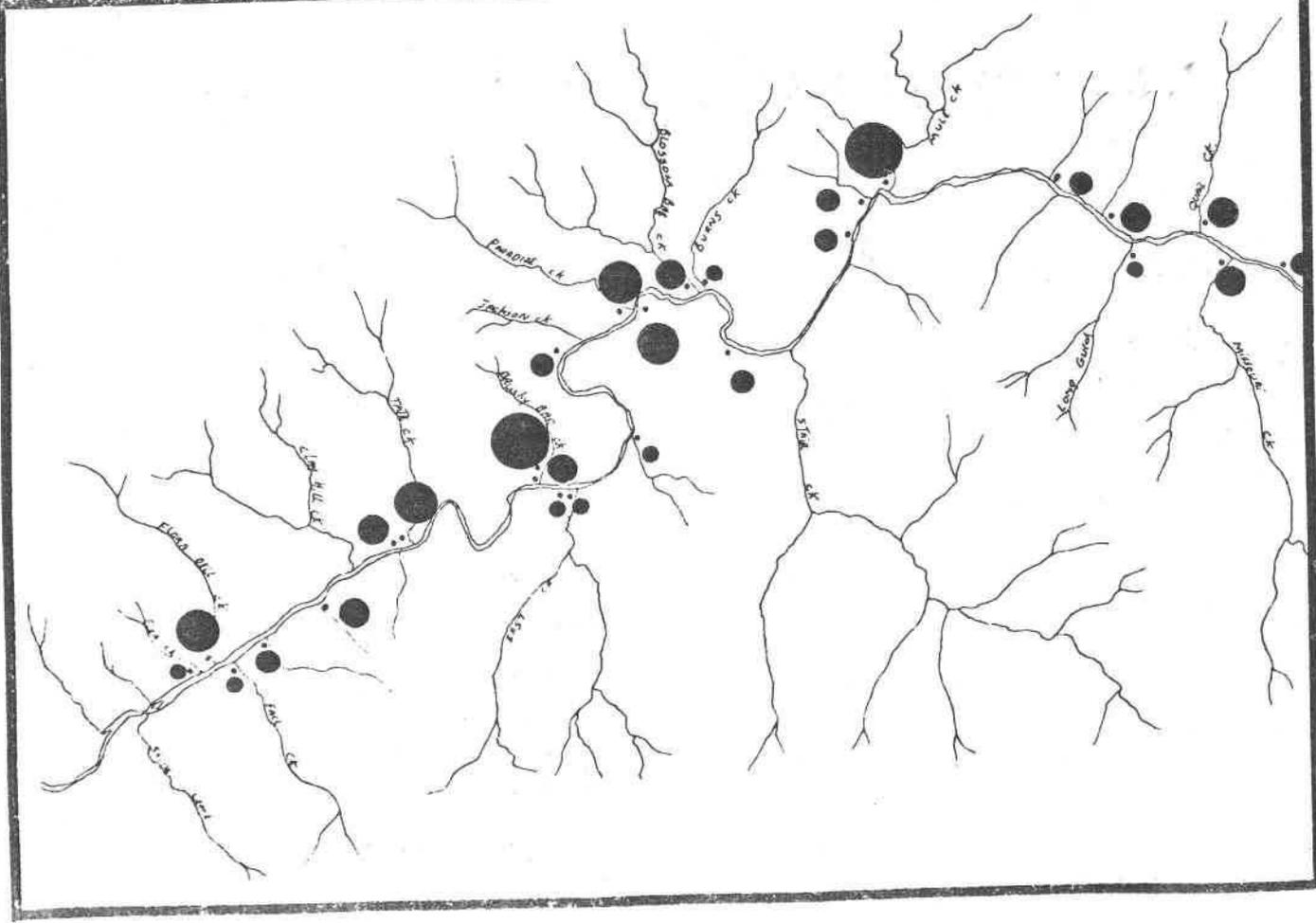
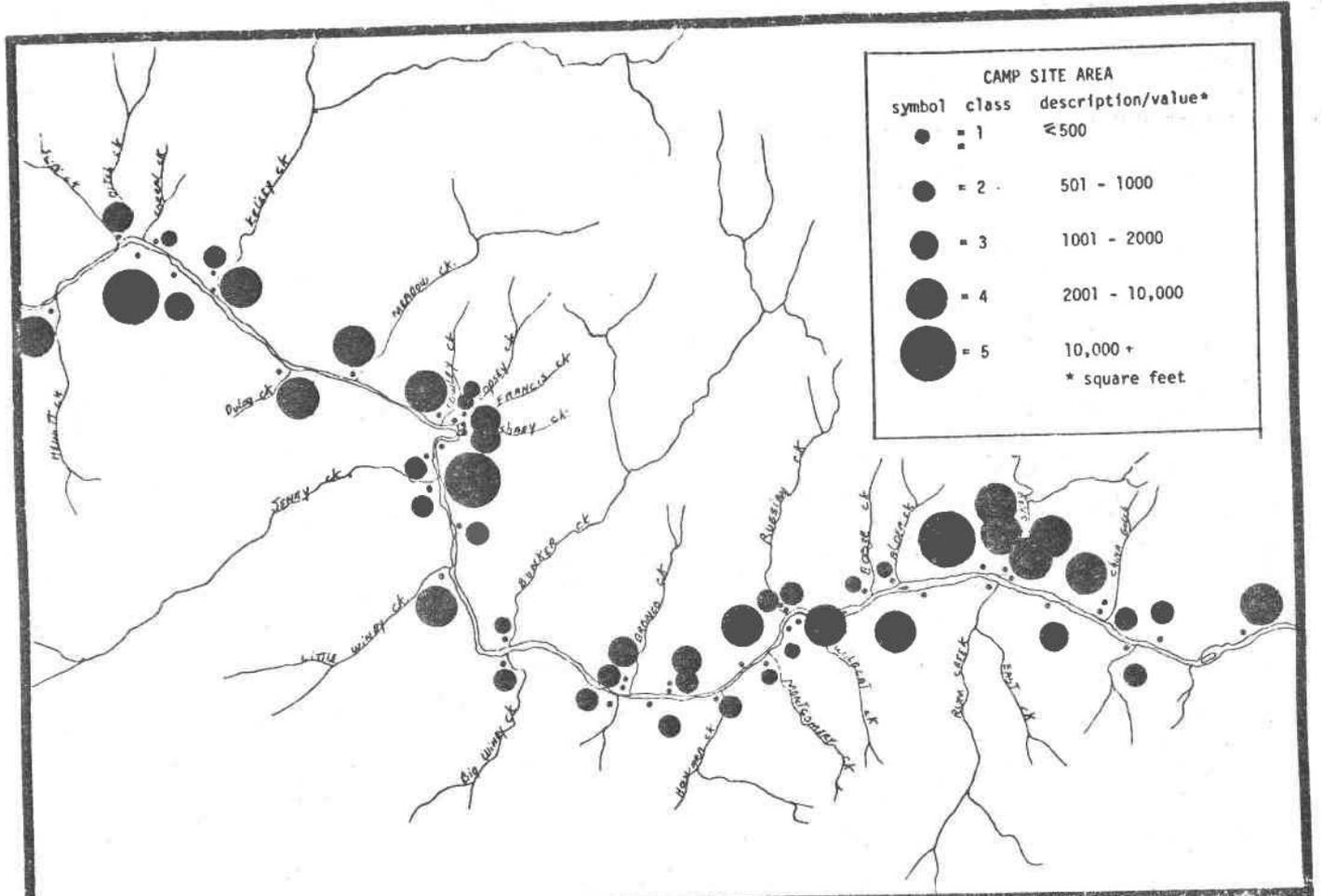
Methods. Campable area of each site was determined by pacing and was expressed in field notes as square feet campable area. More precise measurements with tape were attempted but the additional precision was not warranted given the excessive time taken by these measurements.

Only relatively flat areas were included and ground with a slope in excess of 3% was excluded and judged "non-sleepable". Sites which by either minor or major excavation could be made "sleepable" were also excluded.

Tabulations for campsite area should not be regarded as defining all the "sleepable" area present, rather they indicate both the currently used area and that area that potentially might be used for camping.

In order to more easily analyze the data base campsite area measurements were grouped into five classes:

<u>Campsite Area Class</u>	<u>Area (ft²)</u>	<u>No. Sites</u>
I	≤ 500	16
II	501-1000	21
III	1001-2000	13
IV	2001-10,000	20
V	> 10,001	5



Discussion. Of the 75 inventoried sites, only five fall into class V with area in excess of 10,000 ft². Of these, four are north bank sites. Thus, both by number (48 north bank sites compared with 27 south bank sites) and by size, the north bank has greater spatial carrying capacity than south bank.

In terms of carrying capacity, however, campsite area can be misleading. For example, Rainie Falls, Horseshoe Bend, Wildcat Creek, and Battle Bar each provide sites with large areas yet because of poor water supply and other deficiencies, these large-area sites are infrequently used. It is therefore necessary to evaluate campsite carrying capacity partly in terms other than area alone. For example, as many as 150 overnight users were recorded at one time at Brushy Bar*. At Horseshoe Bend, a comparably large site, total visitor useage for the entire 1974 season was probably less than 150. In this instance, difficulty in boat landing and distance to potable water accounts in part for poor useage.

Additional research The relationship between intensity and frequency of flooding to each campsite would be a valuable piece of information as flooding characteristics relate to the exposure and development of campable areas.

The quality of a campable area also depends on the degree of diversity of small separate camping spaces. This topic is dealt with in the section concerned with internal seclusion.

*Earl Southard U.S.F.S. personal communication

Tributary Size Index

Methods. Tributary size index was based on combined measurements of tributary width and depth. Width was determined by averaging four taped measurements, the first of which was taken either at the narrowest or broadest portion of the stream in proximity to the confluence of the tributary to the main trunk of the Rogue. Alternating measurements were then taken between narrow and wide sections of the stream. After each measurement, care was exercised in selecting the next narrow or broad portion as required in the sampling scheme so that completed sets of four measurements occurred consecutively.

A similar procedure was employed in determining tributary depth. Taped depth measurements were taken at the same transverse locations as width. Depths were determined by averaging four randomly placed depths from the water surface to stream bottom taken in the stream course at each width transect yielding a total of 16 depth measurements for each stream.

Tributary size was computed by multiplying the mean depth by the mean width as determined above. Tabulated below is the range of mean depth and width as measured for each stream together with the tributary size index (size class) rated on a scale of five.

Only 71 out of 75 sites are registered in the tabulation. The remaining four sites represent potable water supplies provided by perennial springs. These include: Big Slide and Montgomery Creek (downstream of creek).

<u>Tributary Size Index</u>	<u>Range Mean Width (in)</u>	<u>Measured Mean Depths (in)</u>	<u>Approximate Stream Size (in²)</u>	<u>Number of Sites</u>
I	$\bar{<} 50$	$\bar{<} 5$	$\bar{<} 500$	43
II	51-100	6-10	501-1000	8
III	101-150	11-15	1001-2000	7
IV	151-200	16-20	2001-10,000	8
V	$\bar{>} 201$	$\bar{>} 21$	$\bar{>} 10,001$	5

Discussion. Since Rogue River water was assumed to be non-potable and most river travelers and all hikers did not carry sufficient water for camping purposes, proximity to potable water supplies was judged an over-riding consideration in campsite selection by users. Therefore only sites within a reasonable distance to a water supply were inventoried as potential camping locations. "Reasonable distance" was a matter of researcher's judgement but generally a five minute walk was used as a cut-off.

A few small sites with evidence of ephemeral streams and springs which became dry during the summer season were not inventoried. An exception to this exclusion was made with essentially waterless sites having large, otherwise desirable camping areas and displaying either signs of past use or evidence of current use. Such sites included: Rainie Falls, Battle Bar, and Gleason Bar.

It should be borne in mind that stream size, although given measurement in this analysis, varies with season and size, data here reflects middle to late July moisture conditions. Earlier site visits

would yield "larger" streams, later visits "smaller" streams.

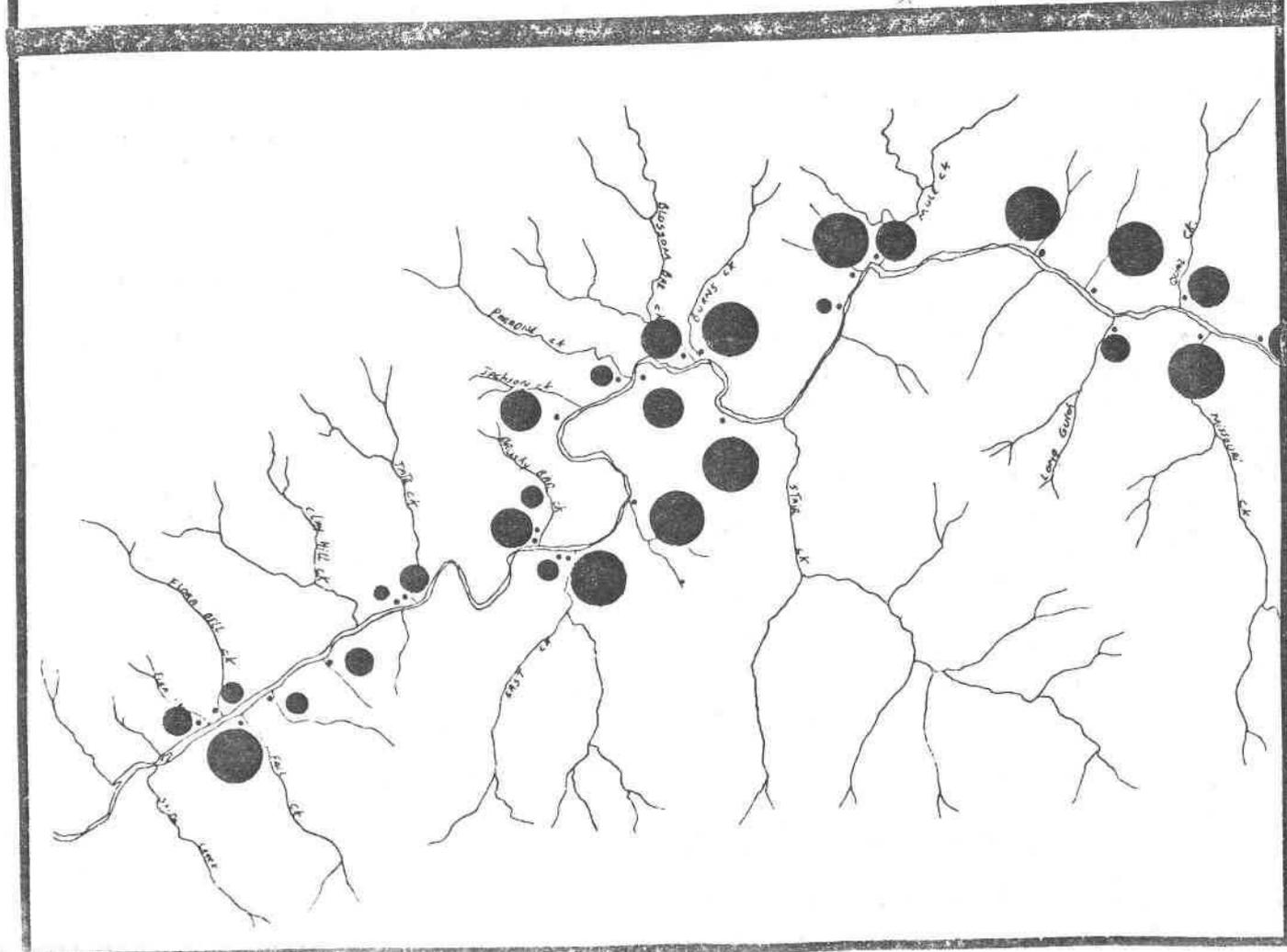
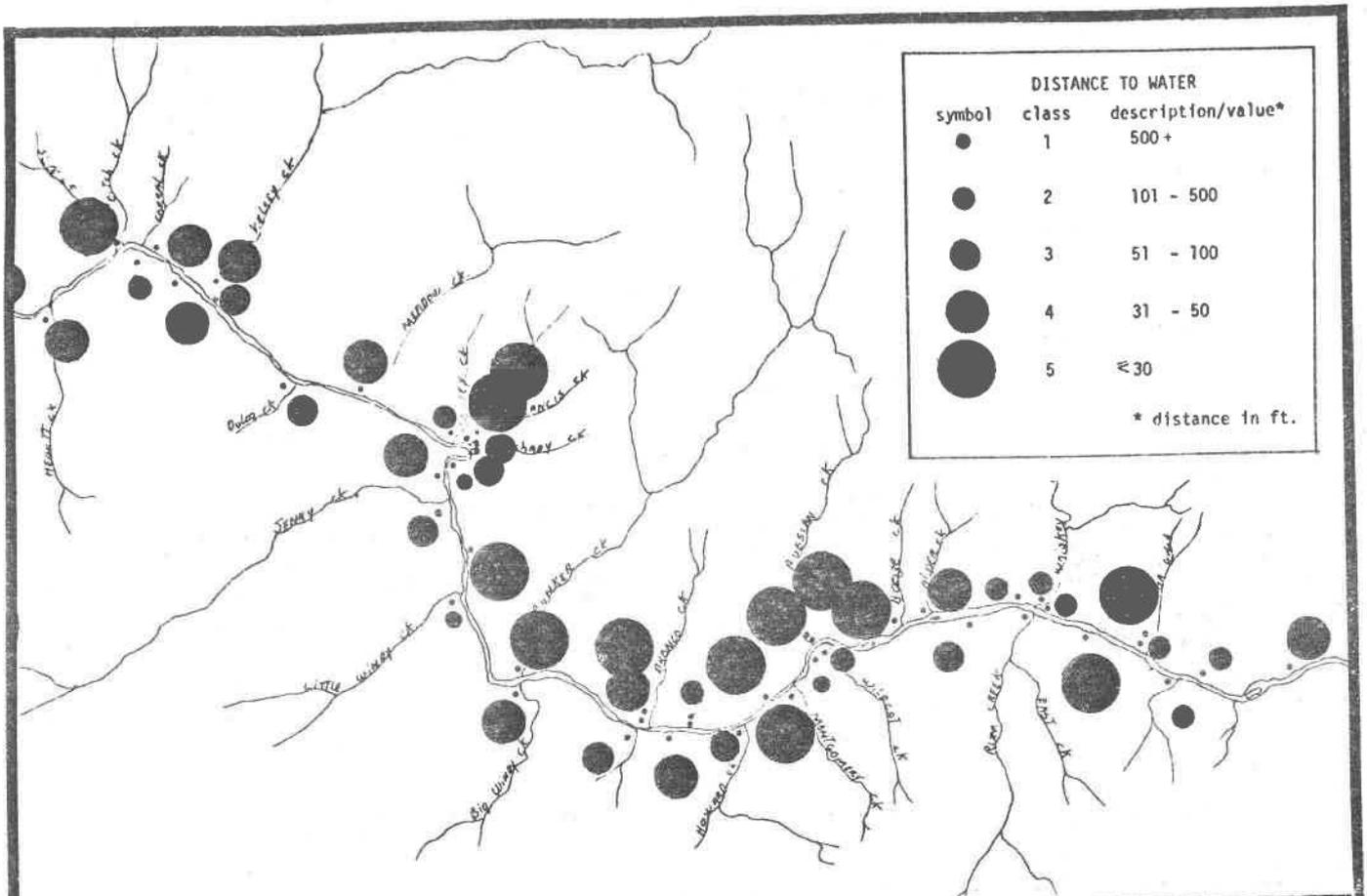
Only four tributaries (Howard Creek, Kelsey Creek, Mule Creek and Blossom Bar Creek) fit into the largest size class.

Regardless of tributary size, all springs and streams were judged adequate for drinking purposes. Although water quality information was not taken by our research team, the U.S.G.S. has collected standardized water quality data on the Rogue near Agness (station 14372300), these water quality data provide little information regarding water potability.

Distance to water. This site characteristic was paced from the center of each campsite and is expressed in feet. Where sites were split on each side of a stream, an average of the two measurements gave the "distance". Difficulty was encountered in defining the "center" of the camping area. It was assumed that water was taken from the tributary streams and that associated springs were not used. In a few instances this was not an adequate assumption.

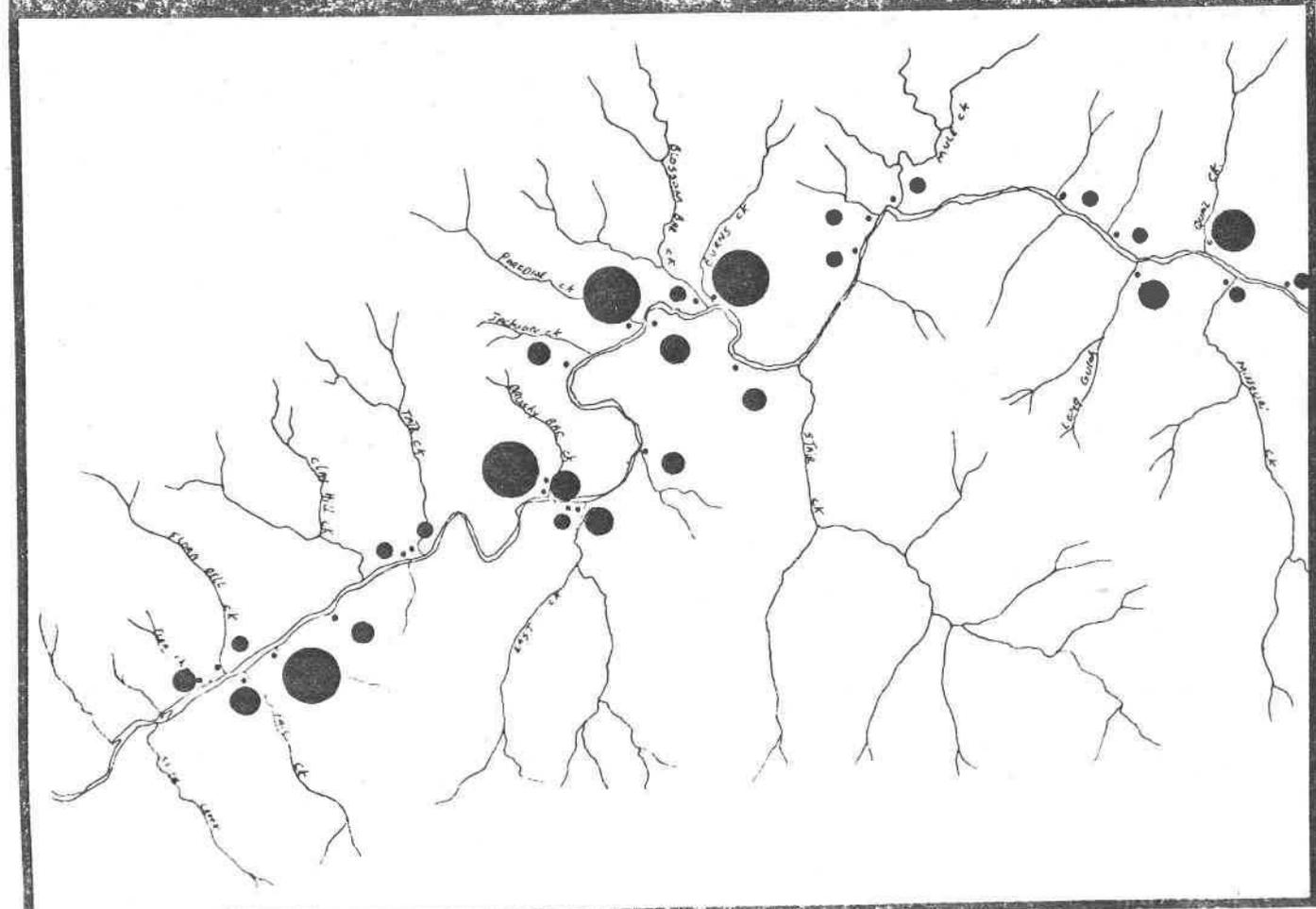
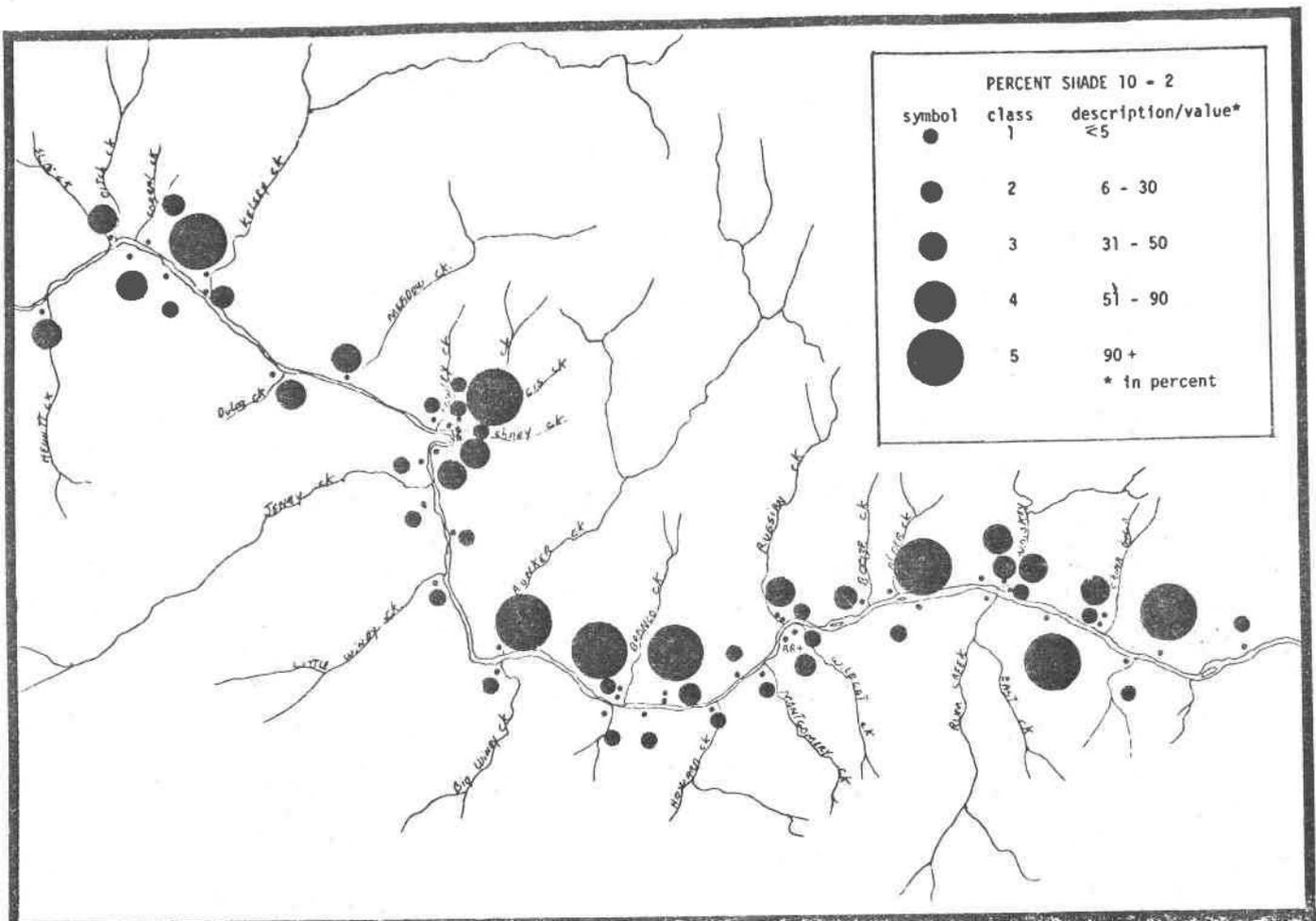
<u>Class</u>	<u>Distance to Water (ft.)</u>	<u>Number of Sites</u>
I	> 500	5
II	100-500	19
III	51-100	12
IV	31 -50	18
V	≤ 30	21

Discussion. Distance to water did not appear to be a critical limiting factor for the site inventory. However, it should be re-



membered that, for the most part, only those sites within a "reasonable" distance of a potable water source were listed. Over half of the inventoried sites had potable water within 50 feet. Many small and many large waterless sites were observed and could potentially be used by river travelers if they carried their own water supplies, but these dry sites were not inventoried in this study. On the other hand trail hikers were necessarily dependent on the accessibility of adequate water supplies.

Additional research. A systematic survey of microbiologic and dissolved solid water quality would be desirable for several reasons. (1) The Rogue River should be sampled on seasonal basis at three or four locations depending on major settlements, such as Marial, Black Bar Lodge and tributaries to determine the effect of these recreational settlements on water quality, (2) Tributary streams should be sampled periodically to assure safe drinking water. This is particularly important for those streams known to receive heavy use such as Whisky Creek. (3) Surveys of water quality could be correlated with intensity of recreational use. It was observed that recreationists often used faulty techniques in personal sanitation. Although these observations were most common on those sites without public conveniences, sites with chemical toilets were not immune to hygienic degradation. (4) Water quality studies could provide a valuable base line against which to measure future change. (5) Such studies involving chemical and microbiological analysis were beyond the financial



scope of the present study.

A second area of research would be to determine the degree to which drift boat users and other river travelers are presently self-sufficient with respect to water supply and also their willingness to carry their own water if they do not now do so.

A third area of research would be to systematically analyze stream activity to determine which sites go dry (when) and which have adequate flows late into the summer season.

Finally, there is need to locate all campable sites, regardless of water availability, as has already been discussed.

Shade

Methods. Percent shade for each campsite was determined by visual observation. Those localities lacking trees and large rock formations presented few problems, for the shade estimate was made entirely by considering shade cast by surrounding canyon walls. Other sites, also without problems, were those that were completely canopied. The possibility of error in shade estimate was consequently greatest for intermediate ranges, between 10 and 90% shade. For these intermediately shaded campsites an attempt was made to consider the daily trajectory of the sun, the height and width of trees, boulders, and walls, and density of foliage in order to estimate shade conditions for different parts of the day. An additional complication introduced into this estimate is the change in shade conditions with seasonality. Observations reported here generally

held for late July. Shade conditions were sub-divided as to morning shade and afternoon shade, 10 a.m. to 2 p.m. and 2 p.m. to 6 p.m. respectively. Five shade classes for these two time periods were then developed.

Discussion. Shade class for morning and afternoon for 75 inventoried camp sites are shown below.

<u>Shade Class</u>	<u>Range in Percent</u>	<u>Number of Sites</u>					
		<u>Morning (10-2)</u>			<u>Afternoon (2-6)</u>		
		<u>N</u>	<u>S</u>	<u>Total</u>	<u>N</u>	<u>S</u>	<u>Total</u>
I	< 5	19	15	34	19	9	28
II	6-30	6	4	10	8	10	18
III	31-50	9	7	16	5	5	10
IV	51-90	1	1	2	3	2	5
V	> 90	12	2	14	12	2	14

There is a strong bias in the data for poorly shaded sites particularly with respect to morning shade over the first 20 miles of the wild river section. Additionally, low lying sand terraces would be expected to be poorly shaded, and a correlation exists with percent bare (unvegetated) area reflecting the presence of a sand terrace. Twenty-three sites had no shade at all. Some sand terraces are shaded by local rocks and canyon walls. Both morning and afternoon shade maps depict a greater degree of shaded sites on the north bank than south. Eight localities have shaded conditions throughout the day (Rainie Falls, Alder Creek, Slate Slide, Bronco Creek, Upper Copsey Creek, Upper Burns Creek, Paradise Creek, and Brushy Bar) as

opposed to only one south bank site (Fall Creek). Although this is partly a topographic phenomena reflecting the orientation of the shade-casting canyon walls, it is also explicable by the fact that the trail occurs on the upper north bank and the trail provides access to several long-developed heavily shaded sites; as well as by the fact that there are more "high terrace" sites which are heavily tree covered on the north bank than south. Desirability of shade relates to weather conditions. During much of the late spring and summer the recreationist desires shaded sites whereas in fall, sunny sites are preferred.

Morning Shade. (10 a.m. to 2 p.m.) Often a sunny site is preferred by campers during early morning hours prior to 10 a.m. Thereafter, shade becomes desirable for lunch stops. This was especially true for trail hikers, less true for river travelers. Compensation for lack of shade at mid-day and early afternoon occurs if adequate swimming is available.

Intermediately shaded sites are especially lacking for morning hours only a third of the sites receive patchy shade, the bulk of the sites are sunny especially north side sites as already discussed.

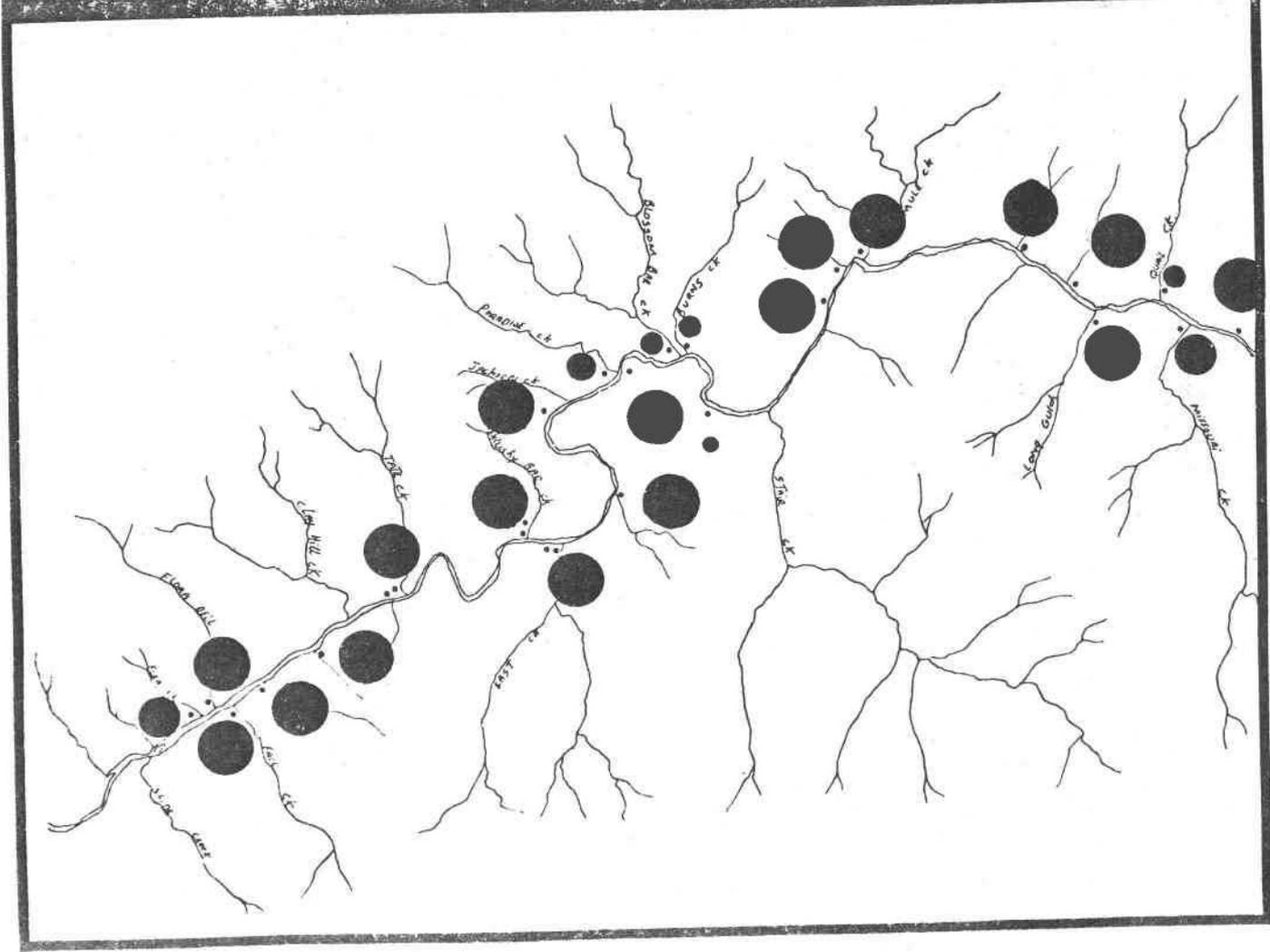
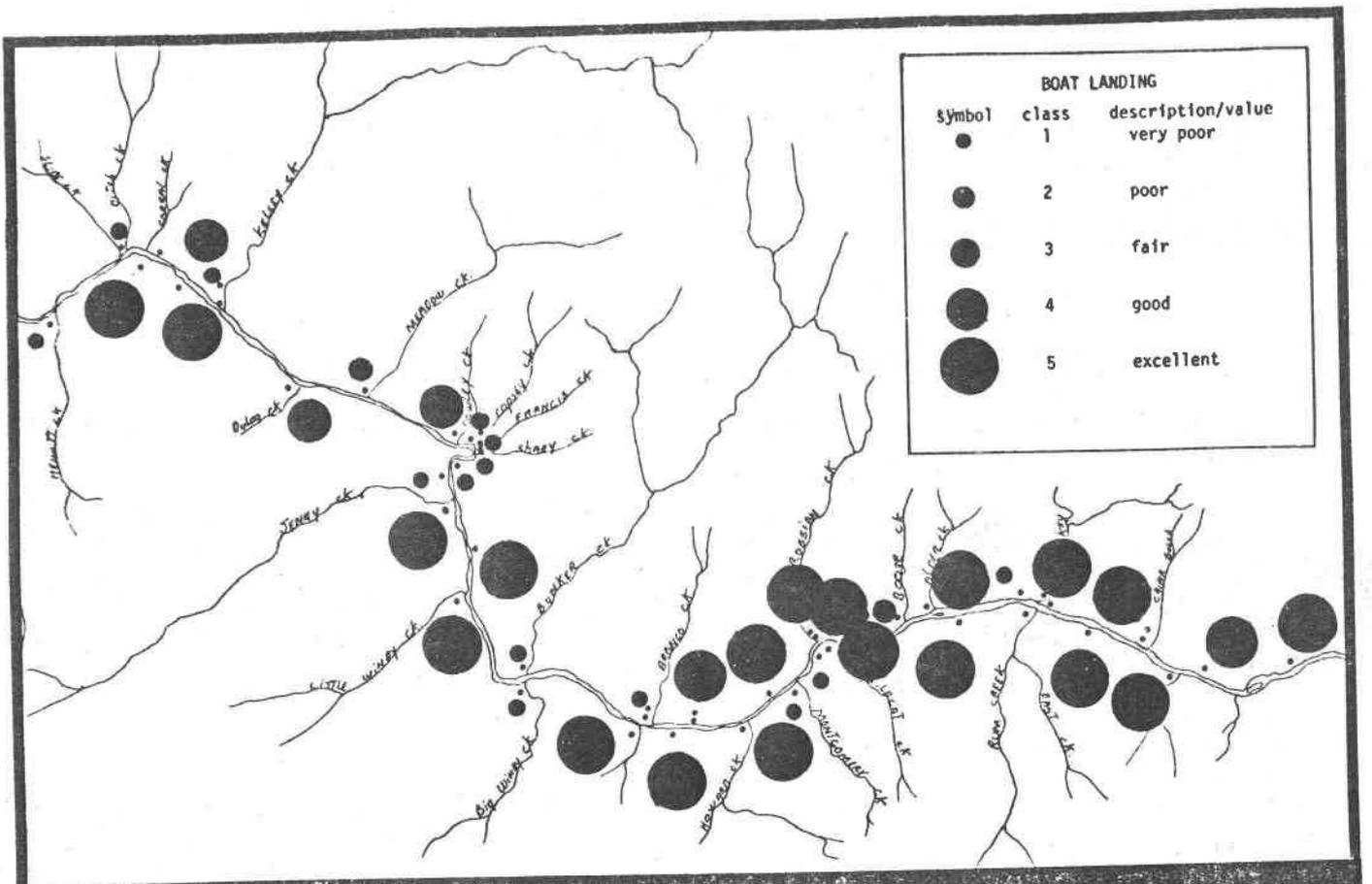
Afternoon Shade (2 p.m. - 6 p.m.) If a site tends to be in a high morning shade class it, in most cases, will also be in a high afternoon shade class, these are obviously canopied sites and these are especially important to those users who remain for more than a single night at a camp and, of course, for hikers.

More sites tend to have afternoon shade than morning reflecting canyon orientation. Many more north bank sites are shaded in the afternoon than south bank sites (see table).

Additional research The following questions require further research. (1) Tree damage was observed at a number of sites, presumably caused by firewood removal. Is this damage serious enough to weaken or permanently destroy the existing tree cover? Evaluation should be made as to the level of damage that can be sustained without destroying trees. Associated with the observation of tree damage is the related question of the perception of this damage; namely, is the user offended by this impact. What level of damage offends the user? (2) In what ways and to what degree does the availability of swimming compensate for the lack of shade?

Boat Landing

Methods Boat landing characteristics were assessed by our research team based on the shoreline characteristics, landing attempts using different craft, and from the observation of river travelers. Boat landing refers to the ease or difficulty in mooring or otherwise beaching a craft in order to gain access to a given campsite. Landing ease was judged for each campsite listed and rated in the field on a scale of one to five from very poor to excellent.



<u>Boat Landing Class</u>	<u>Description</u>	<u>Number of Sites</u>
I	very poor	18
II	poor	5
III	fair	1
IV	good	8
V	excellent	43

Landings with steep rock cliffs with no place to tie down a boat or to easily gain access to the campsite were judged poor. Similarly for reaches where river current was especially fast or turbulent, landings were judged to be poor. On the other hand, landings with gradual sandy beaches, at which a boat could be pulled ashore, were judged good or excellent.

Discussion Generally boat landings along the Rogue were judged good to excellent. Of 75 sites, 23 were judged to have poor to very poor landings. These tended to be on the north side of the river. In some instances, as with landings near Horseshoe Bend, swift currents made access almost impossible despite the presence of a sandy point bar where a boat might be easily beached. However, poor landing at otherwise adequate campsites had the advantage to the users who managed to beach or moor their craft in greater seclusion.

Additional research Monitoring of the changing conditions of boat landings as the season progresses is needed. Some landings became more difficult as the season progressed (Kelsey Creek and Little Windy Creek) others became easier (Meadow Creek). These changes

relate to changes in current and in shore morphology with respect to lowered river level, e.g., beach exposure.

Wind Protection

Methods Wind protection as a site characteristic was also judged in the field based on the experienced judgement of the research team. Five classes of wind protection were rated, Class I the least protection, Class V the greatest. In many instances wind protection had to be evaluated inferentially by considering the barrier effect of large rocks, cliffs, trees, and also valley fetch and its orientation.

<u>Wind Protection Class</u>	<u>Description</u>	<u>Number of Sites</u>
I	very poor	32
II	poor	10
III	fair	4
IV	good	10
V	excellent	19

Discussion Many sites (42 out of 75) were judged to have poor or very poor wind protection characteristics. North bank sites displayed a greater degree of protection than south, a correlation with shade which in turn relates especially to tree cover. Wind protection is especially important on sand terraces. On a number of occasions dessicated surface sand would be blown quite high on open terraces exposed to considerable fetch, making camping unpleasant. Even when

tents were erected by river travelers, this sand blast factor was detrimental to a pleasant river experience. As the season progresses into the fall, the relation of wind protection to wind chill becomes important.

Accessibility from Trail and River

Methods The degree of trail and river accessibility was judged in the field based on the research team's experience with both the Rogue River trail, the river, and observation of and encounters with river and trail users. Accessibility was classed from I (very poor) to V (excellent).

<u>Accessibility class</u>	<u>Description</u>	<u>Number of Sites</u>	
		<u>Trail (47)</u>	<u>River (75)</u>
I	very poor	16	22
II	poor	4	5
III	fair	0	5
IV	good	4	6
V	excellent	23	37

Trail access Because of the north bank location of the trail, access was only judged on that side of the river. Of the 47 north bank sites 27 were judged to have good to excellent access. Either the trail serviced the site directly, a spur trail connected the site to the trail, or terrain was easily traversible. Of the 47 sites, 20 were judged to have difficult access usually occurring where a sand terrace or upper terrace was blocked from the trail by

steep cliffy banks or talus slopes. A prime example exists at Horse-shoe Bend where steep terrain inhibits trail hiker's use of otherwise desirable campsites. Often the trail hiker is more mobile than the river traveler and he is able to more easily negotiate rough terrain to use sites of difficult access.

River Access Steep shoreline profile, shoreline obstacles such as large rocks and cliff were factors leading to poor access by river travelers. Often sites with easy trail access have poor river access. Because of the access to both banks of the river, more sites are available to the river traveler than trail hiker. Of 75 inventoried sites, 42 were judged to have good to excellent access. North side sites tended to have poorer access to the river user than south side sites.

It is conceivable that increased camping capacity could be provided to the trail traveler by constructing spur trails to presently inaccessible sites. However this procedure would be ineffective in most instances for the river traveler since any access trail would be wiped out with annual or periodic high water.

Visibility from Trail and River

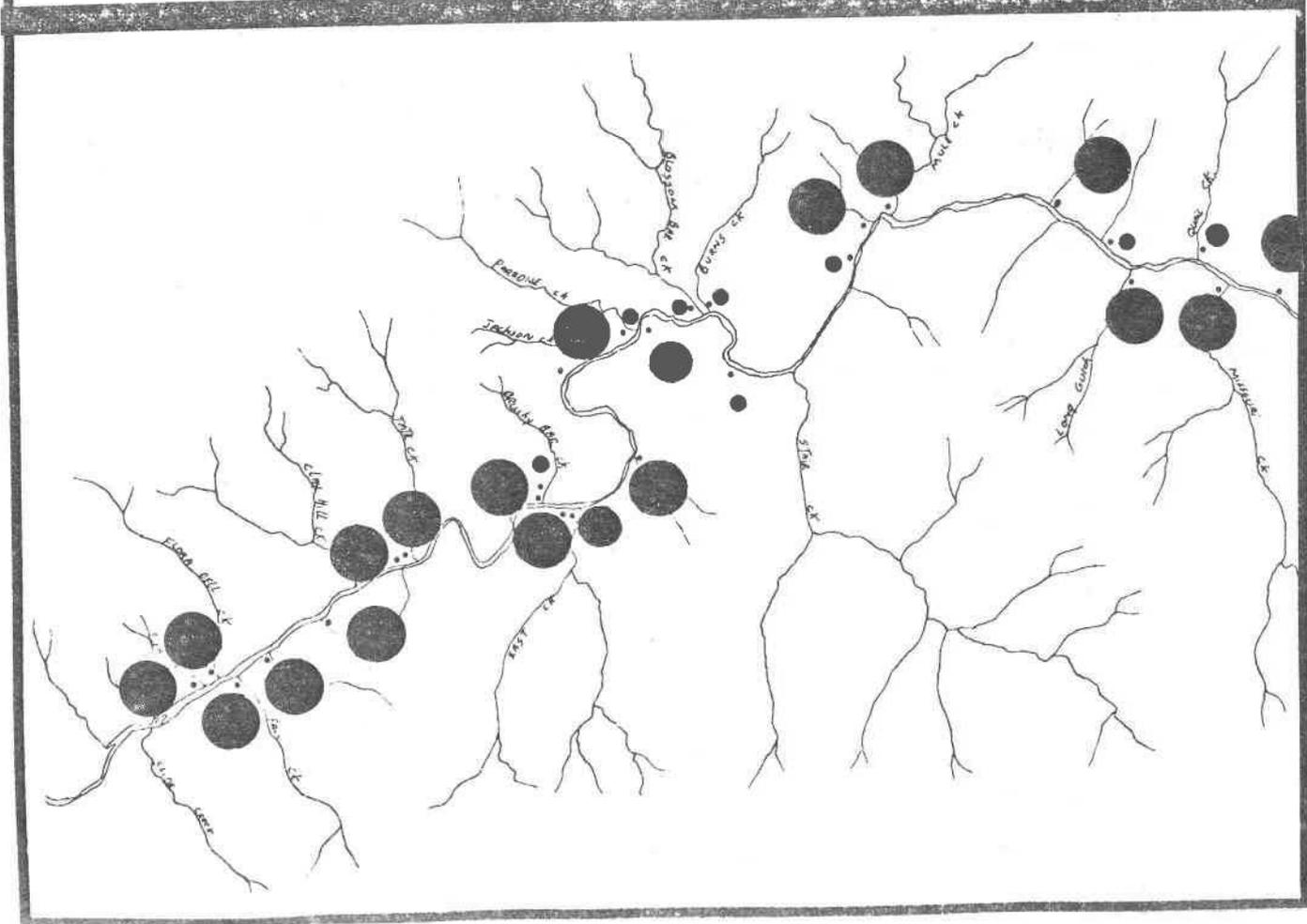
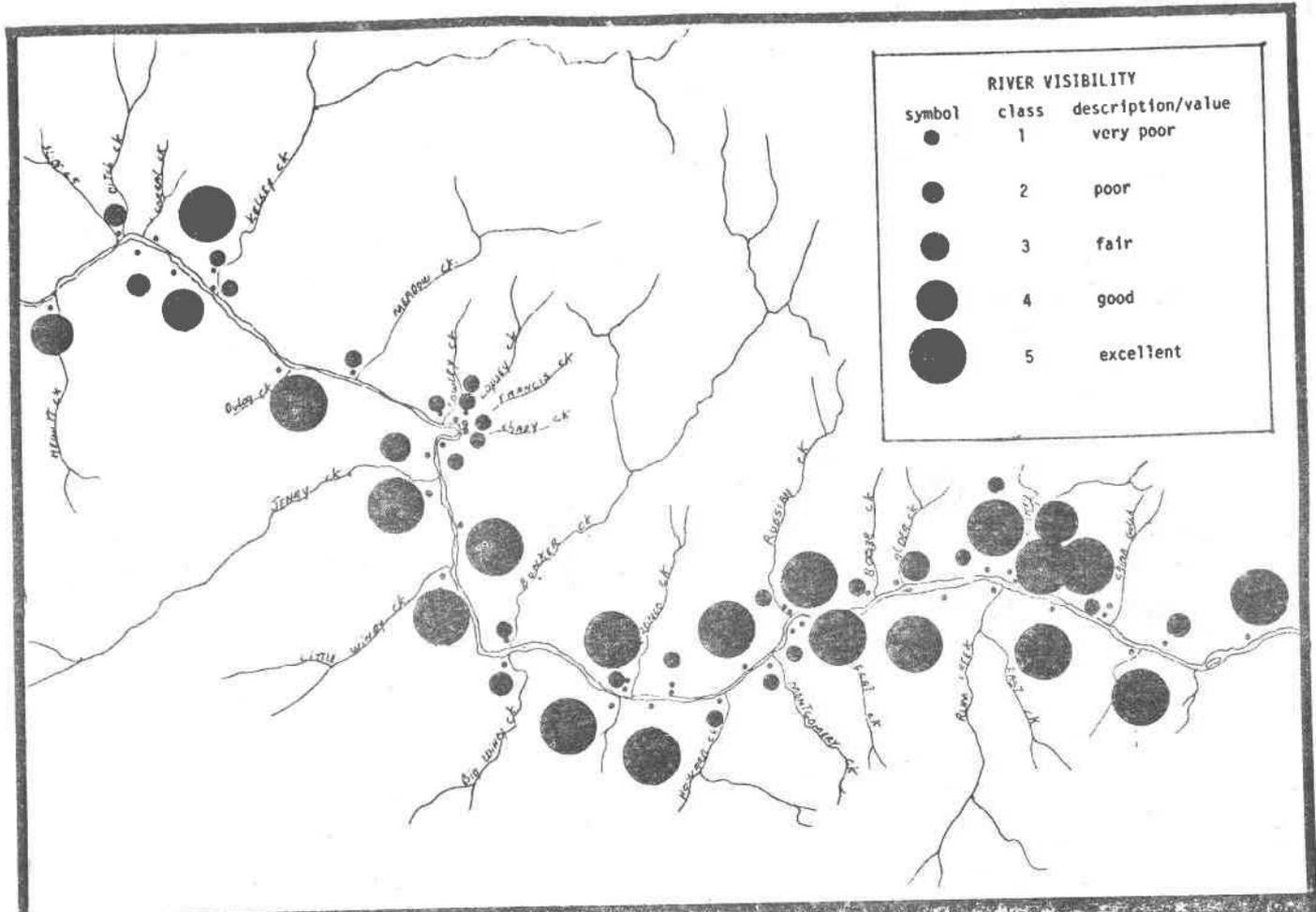
Methods As with access, visibility of campsites from trail and river was judged in the field based on researcher experience and questioning of recreationists. Visibility was evaluated by a 5 category scale.

<u>Visibility Class</u>	<u>Description</u>	<u>Number of Sites</u>	
		<u>Trail (47)</u>	<u>River (75)</u>
I	very poor	18	27
II	poor	0	5
III	fair	0	2
IV	good	7	6
V	excellent	22	35

Trail discussion Only the 47 north bank campsites were considered with respect to their visibility from the trail while all 75 camp sites were evaluated for visibility from the river. For hikers, a given campsite is seen differently depending on the direction the hiker is walking. For the purposes of this evaluation it was assumed the walker was traveling west. Eighteen campsites were regarded to have poor visibility from the trail, 29 had good to excellent visibility. In many cases, a site evaluated as having poor accessibility also had poor visibility, e.g. Flora Dell Creek campsite was protected by a steep embankment which caused both poor visibility and accessibility.

Poor site visibility from the trail causes under utilization of certain, otherwise desirable sites. Indeed, even among those visitors who have had considerable experience on the Rogue, finding some "hidden" sites presents a problem.

Complementary to poor site visibility is increased privacy. This characteristic was apparently valued by many recreationists, both on the trail and river.



River discussion Of 75 inventoried campsites, 32 had poor to very poor river visibility and 41 good to excellent visibility from the Rogue. Obviously visibility is rated based on a down-stream boater but in a few cases it is possible to travel up-stream a short distance to gain access to a missed site which became visible after the traveler passed it.

As with respect to trail visibility, those sites that had poor visibility from the river also usually had poor accessibility (e.g., Wiskey Upper, Booze Creek, Bunker Creek, Meadow Creek, and Blossom Bar Creek). Good to excellent site visibility was critical to novice river travelers because of the problem of overshoot and difficulty in upstream rowing.

It was considered difficult to maintain a signing system in the flood zone of the Rogue, and possibly such a site signing project would be objectionable to travelers because of its perceived inconsistency with wild river concepts. However, poorly visible sites might receive more equitable use from non-experienced river travelers if a detailed map were provided clearly locating campsites with respect to major river features.

Internal and External Seclusion

Methods By internal seclusion is meant the degree of privacy afforded a single party within a campsite with multiple units. Internal seclusion develops from the pattern of partitioning provided by large boulders, rock formations, small hills, gullies and

clumps of trees. Thus, a low sand bar with no well-defined multiplicity of camp units, would have poor internal seclusion. In a way, internal seclusion is an index of local microtopography as it measures the degree partitioning found in a given site.

External seclusion refers to the degree of privacy afforded a given camp site from "outside" users. Therefore, external seclusion correlates closely with visibility from river and trail, being the complement of that characteristic.

Both external and internal seclusion were judged in the field using a 5 point scale and were based on researcher experience. The following tabulation presents seclusion distributions.

<u>Seclusion Class</u>	<u>Description</u>	<u>Number of Sites</u>	
		<u>Internal</u>	<u>External</u>
I	very poor	36	11
II	poor	13	34
III	fair	6	9
IV	good	9	13
V	excellent	10	8

Internal seclusion-discussion Only 19 of 75 inventoried sites were judged to have good to excellent internal seclusion, the majority (49) had poor to very poor internal seclusion. Sand terraces, as might be anticipated have poor internal (and external) seclusion. Additionally large terraces are often under utilized because of the disinclination of parties to camp within proximity of each other.

External seclusion-discussion Visual and audial confinement from trail or river traveler is an important value for many users who desire a degree of solitude. External seclusion may not be as important to the user as internal seclusion, however, for when one is using a site, it is often between 5 p.m. and 9 a.m. when river and trail hikers are few in number. External seclusion becomes important to the day user of a campsite.

Percent Bare Area

Methods Percent unvegetated area was estimated in the field by visual inspection. In most cases vegetation, as on sand bars, constituted a small portion of the total campsite area. Only the "campable" area was considered as the base area for this estimate. The following tabulation shows the distribution by cover class, percent unvegetated and number of sites.

<u>Bare Area Index</u>	<u>Range (%)</u>	<u>Number of Sites</u>
I	>90	55
II	51-90	9
III	31-50	6
IV	5-31	4
V	<5	1

Discussion Of the 75 inventoried sites, 64 have more than half the campable area unvegetated. Only 15 sites had appreciable plant cover. Bare sites, of course, include sand terraces and these ephemeral features support growth of introduced annuals (Melilotus

albus, Chenopodium spp., etc.) and native perennials (Vitis californica, Salix spp., etc.). Only China Gulch Upper was completely covered by vegetation and the continuity of grasses at this site was assumed to correlate with very low levels of use.

Those vegetated campsites on higher levels often supported a combination of trees reflecting the regional vegetation (Douglas-fir, canyon live oak, madrone, Kellogg oak, Garry oak, ponderosa pine, and tanbark oak). Understory vegetation consisted of shrubs among which was poison oak and a carpet of annual herbaceous vegetation comprised principally of introduced species not native to North America. The high complement of introduced annuals, a situation typical of the California annual grassland, was not surprising given the historical pattern of disturbance associated with mining in the area, the periodic disturbance of upper terraces by flooding and erosion and the ease with which propagules of these alien annual plants are dispersed.

The degree to which the vegetative cover has been damaged by recreation use per se was difficult to assess. In most instances bare campsites were the product of natural disturbance and processes. In a few instances, for high terraces, recreational use caused damage to the fragile annual carpet of vegetation, e.g., Meadow Creek. However, the vegetation here became dormant in early June and its ability to recover recreational damage is currently being studied. In instances of shaded campsites natural plant cover in the understory is low and damage did not appear excessive.

Additional research Work is continuing on impact on recreational use at Meadow Creek where a single strand exclosure has been constructed to determine the degree of recovery of a heavily trampled site when recreation pressure is removed. Likewise, at the same locale, a site is being studied which is carrying heavy recreation use for the first time to see the degree to which vegetation is damaged.

Firewood Availability

Methods Based on researcher judgement in the field firewood availability was rated into five classes. By walking the length of each site and across each site several times, the degree of difficulty by which firewood, including driftwood, could be collected was assessed. Living trees were not considered.

<u>Firewood Class</u>	<u>Description</u>	<u>Number of Sites</u>
I	very poor	7
II	poor	34
III	fair	7
IV	good	12
V	excellent	15

Discussion Many users carry their own stoves and fuel and do not require fires for cooking although they prefer fires for warmth or conviviality in the evening. As camping styles change, it is probable that still more users will have their own stoves. For those users dependent on fires for cooking or otherwise desiring fires, firewood availability may present problems. Firewood availability was

judged very poor at seven sites where it was both scarce and almost impossible to secure. All of these sites were sand bar terraces. However other sand terraces had fine supplies of wood, e.g., Wildcat Creek and Brushy Bar Lower. Other sites had good accumulations of drift wood which obviously can be an ephemeral situation.

In most cases upper terrace sites had adequate supplies of down wood but in some instances these supplies were judged poor or fair, e.g., Whisky Creek Upper.

Additional research It is impossible to assess firewood availability on sand terraces for a single season, since seasonal inundation may deposit or erode away large quantities of driftwood. Furthermore, it is important to know how many visitors utilize only LPG or gasoline stoves for cooking or how many visitors carry their own supply of burnable wood.

As we observed, poor wood supplies (or perhaps just vandalism), often cause users to remove tree limbs, or, in some instances to cut down entire living trees.

Artifacts and Impacts

Discussion. Initially, the degree of human impact for each site was assessed by considering a variety of impacts at each site caused either directly or indirectly by man. These attributes included: fire pits, damaged standing vegetation (axe-scarred trees and broken limbs), litter (paper, foil, cans, etc.), emplaced artifacts (toilets, stoves, grills, bedsteads, tires, abandoned boats, old mining equipment, etc.), structures (bridges, cabins and mining works) and vegetation removal associated with camp use. In sum, these cultural attri-

butes could be used to define the degree of ecological damage and the degree of artificiality of the site.

Almost immediately our research team encountered difficulty in applying this methodology for at the same time that we were judging damage, the BLM and USFS were implementing vigorous maintenance programs. Camps were cleaned-up bi-weekly by either rafting-out debris or by jet boat clean-up. Toilets were emplaced and relocated, fire pits removed, others built, bridges constructed, etc.

Two site attributes were consistently evaluated: (1) number of artifacts and structures, and, (2) number of fire pits. Together these attributes provide a measure of artificiality for each site.

Artifacts and structures. Each site was inspected in terms of the area of campable surface occupied by artifacts and structures. The following tabulations gives the distribution.

<u>Artifact & Structure Class</u>	<u>Range (ft.²)</u>	<u>Number of Sites</u>
I	> 90	3
II	51-90	6
III	31-50	3
IV	5-31	11
V	< 5	52

Most sites are reasonably free of structures and artifacts, such is expected for sand bars. On the other hand many of the higher terrace sites have the remains of cabins, mining equipment and assorted abandoned material. Based on these artifacts, the impression our research team gathered was that the wild area of the Rogue River was not particularly wild with respect to stated management objectives. (discussed in Chapter I)

Fire pits. Fire pits have been developed informally and represent a tangible feature of previous human use for a campsite. In some cases "permanent" fire pits have been constructed and during the 1974 season several camps were "fire-proofed" whereby fire rings were delineated by sinking cobbles in the ground from which combustible material had been removed to form a circle of about 10 feet in diameter and a tripod grate placed in the center of the circle.

<u>Fire Pit Class</u>	<u>Range (No. Pits)</u>	<u>Number of Sites</u>
I	> 4	16
II	3	10
III	2	10
IV	1	21
V	0	18

More than half the campsites (39) had one or no fire pits, on the other hand, 26 sites had three or more fire places indicating repetitive, if not heavy, use.

Accomodation Zones

Results-two night trips Questionnaires administered for the visitor satisfaction phase of this study provided data for the location of respondent's stops and number of days on the river. River travelers spent between two and five days on the Rogue between Grave Creek and Foster Bar. Of 203 parties interviewed, 136 responded to the question regarding number of days and location of night stops. Of these 67 percent (92 parties) comprising 1,050 individuals

spent two nights on the river. A very sharp break existed between the first night zone and the second night zone at Meadow Creek. All but two parties spent their first night up-river of Meadow Creek while all but two parties spent their second night at Mule Creek or down stream of that tributary.

A strong clustering of camping parties on the first night occurred between Dulog Creek and Black Bar Lodge, however a number of people preferred to spend their first night at Whisky Creek and Doe Creek. Black Bar Lodge catering almost exclusively to the commercial user, accomodated the largest number of parties (32) and individuals (578) of any of the camp sites. Large parties usually spent their first night at Black Bar Lodge, Little Windy Creek or Jenny Creek.

Second night stops were more evenly distributed between Clay Hill Creek and Mule Creek with Marial Lodge serving the largest number of parties (30) and number of individuals (547).

Results-three night trips. Of the respondents, 25 percent (34 parties) of the parties spend three nights on the river. Zones are also distinct for this pattern of use. The first night invariably spent upstream of Black Bar Lodge the majority of travelers preferring to spend their first night at Whisky Creek (12 parties and 137 individuals). However, Doe Creek, Alder Creek, Booze Creek, Russian Creek and Howard Creek proved popular as well.

The second night was usually spent between Horseshoe Bend and Marial, the majority of parties camping in the zone forsaken by the two day trip groups. Hewitt Creek and Missouri Creek were most

popular together catering to 12 parties numbering 143 individuals. Hewitt Creek accomodated larger parties.

Third night stops occured below Blossom Bar Ck. with the majority of river users camping at Brushy Bar or Taft Creek (together 13 parties and 187 individuals). In this case there tends to be considerable overlap between parties spending two nights on the river and three nights at these latter sites.

Results-four night trips. Eleven parties responding to the questionnaire numbering 176 individuals spent four nights on the wild section of the river. Accomodation zones were also clear for these groups. The first night was usually spent at Whisky Creek (9 parties and 144 individuals) conflicting with the three day users. The second night was scattered between Big Windy Creek and Mule Creek with Meadow Creek, Kelsey Creek and Mule Creek being the most popular stopping locations. The third night was often spent at Mule Creek and vicinity except for those parties which spent their second night at that locale in which case they proceeded to Tate Creek. Tate Creek was especially popular for the fourth night stop (and in some cases a lay-over from the third night) causing overlap with the river users who spent three days on the stream.

Two parties responding to the questionnaire spent five nights on the river and no pattern could be discerned for these because too few were involved.

Discussion. It would appear from this brief summary of accomodation zone pattern that the river's capacity to absorb additional

users could be enhanced by scheduling sites among different users depending on the time allocated for their trips. Additional analysis is required of this data to suggest how this might be worked out in a management scheme.

MEADOW CREEK ECOLOGICAL ASSESSMENT

Introduction

During a reconnaissance of recreational sites along the Rogue River from Grave Creek to Marial in company with BLM staff May 14-15, 1974, concern was expressed that intensive camping use on some higher river terraces was causing excessive damage to vegetation. It was hypothesized that camper-induced vegetation removal made river terraces more susceptible to erosion during occasional flooding than would be the case for terraces without vegetation removal. Initial observation of the heavily used site west of Meadow Creek situated under an isolated Douglas-fir suggested that this relation between use and susceptibility to river erosion was present. Considerable exposure of the root pattern of the Douglas-fir was evident.

To help evaluate the degree of vegetation removal by campers, the rate of recovery of vegetation cover when campers were excluded from an area and the interplay of vegetation removal/recovery on naturally caused erosion, two exclosures were established. One exclosure was placed in an area which received little camper impact, another in an area which had been denuded by recreation use. Furthermore, placement of the exclosures forced users to create a path, thereby removing vegetation (Figure 4). An area within one exclosure had a user path which was permitted to heal.

Methods

Two exclosures were established: (a) the "south" exclosure 10.9 x 3.9 m and (b) the "north" exclosure 7.65 x 3.9 m. The exclosures were staked and fenced with a single strand of wire at about 1 meter height. The fencing apparently discouraged trampling and possible grazing by deer.

Vegetation within the exclosures was analyzed floristically using a 20 x 50 cm quadrat, recording species presence and an estimate of species

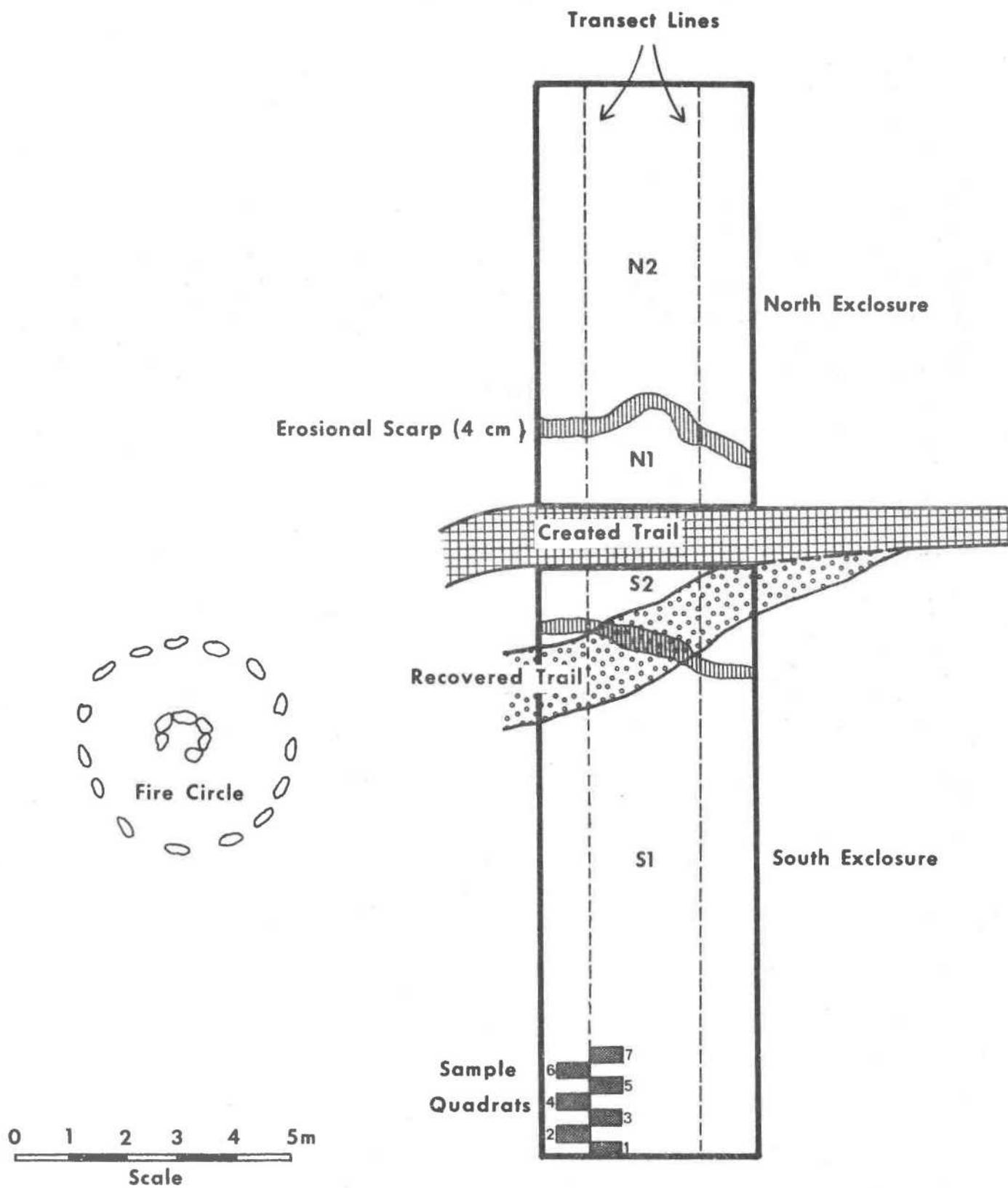


Figure 4. Enclosure arrangement at Meadow Creek.

cover to the nearest 5%. Because the two exclosures were not entirely homogeneous, they were each stratified into two more or less homogeneous units. For the south exclosure the lower or southern three-quarters is designated S1, the upper or northern one-quarter, S2. For the north exclosure the lower quarter is designated N1 and the upper three-quarters, N2. Data were expressed by percentage frequency (percentage of total number of plots in which a given species is found) and mean percent cover.

South Exclosure

The south exclosure was placed in an area approximately 6 m east of the centrally located Douglas-fir and 3 m east of a well used fire pit. It had received heavy use prior to initial analysis 9 June 1974; the area also had been flooded during the winter of 1974. Consequently, in the flood-scoured, heavily trampled south three-quarters (S1) section of the exclosure, total vegetation cover was less than 2%, and was contributed by a single Vitis californica plant in the southeast corner of S1 and by 9 seedlings of Melilotus albus.

The upper quarter of the south exclosure (S2) was marked by an erosional nick probably caused by more intense scour during winter flooding with S2 being an erosional remnant with more root material. S2 supported a sparse stand of annual vegetation. Striking in a southwest-northeast direction in S2 was a 1 m wide pathway where vegetation had been removed by excessive trampling. In the southeast corner of S2 was a series of Rhus diversiloba plants which tended to tie together soil.

Table 15 shows the species frequency and mean cover for S1 and S2 based on an initial sampling 9 June 1974 and a resampling 24 May 1975. Exclosure section S1 being denuded by flood-scour and subsequent camper trampling increased in total vegetation cover from 2% to 14%. Litter (dead plant material) increased from less than 1% in 1974 to 17.8% in 1975. Species diversity

increased markedly from 2 to 23 species showing increased equitability as well as number diversity. Of the original species, Vitis was a rooted perennial and Melilotus an annual legume, both prominent stabilizers of riparian sandbars. The component of annual species in the stabilizing area was high, 87%. The proportion of introduced species (species not native to the flora of Oregon and California) was also high, 47%. Leguminous plants capable of fixing nitrogen were also prominent stabilizers accounting for 30% of the flora.

To compare the stabilized S1 enclosure to a similar adjacent area subject to camper trampling, a second plot was studied. This plot was the same size as S1 and has been designated S3. Total vegetation cover was 6% in the trampled plot compared with 14% in protected plot. Species diversity in S1 was 13 compared with a diversity of 23 in the protected plot, S3. Most species with high degrees of dominance in the protected plot also were present in the trampled plot with comparable frequency but diminished cover values. Litter accumulation diminished from 17.8% to 4.7% in the trampled area.

The upper quarter of the south enclosure bore a moderate cover of vegetation in June 1974, about 50% of the area was vegetated with a species diversity of 11 and extreme dominance given by Festuca megalura. A year later, cover was estimated at 87% excluding the moss cover on the western margin of the plot. Species diversity increased from 11 to 16 with marked reduced dominance of Festuca megalura and more equitable dominance of F. megalura, Trifolium microcephalum, Lupinus micranthus, and L. bicolor. Like in the south section of the enclosure, annuals and legumes played an important role in the vegetation cover. Introduced species were somewhat less prominent, 31%. Litter increased slightly in this upper enclosure section.

The trampled pathway noted in the 1974 survey, by 1975 had almost completely revegetated.

North Exclosure

The north exclosure was stratified in two sections, the southern one-quarter which had been partly eroded by winter flooding during the 1974 floods and the northern three-quarters which exhibited little signs of erosional damage. Table 16 shows the results of the two surveys of this exclosure.

In 1974, the southern section was about 15% covered by vegetation excluding a moss ground cover and had six species. The northern section exhibited greater cover, 66% excluding the moss layer, and a slightly greater diversity with 10 species. Dominance in both cases was shared by Bromus rigidus and Festuca megalura.

The resurvey in May 1975 showed extremely dense cover on both sections of the exclosure plot and a combined estimate of the north and south sections was made. Cover increased to 100%. Species number also increased from a total of 10 to 18 species. Dominance shifted from the grasses, Bromus rigidus and Festuca megalura to the legumes, Lupinus micranthus, L. bicolor, Trifolium microcephalum, and Lotus micranthus. Thus the role of nitrogen fixing annuals appears to be important in the dynamics of this upper meadow section.

Litter in the north exclosure appeared to increase over the year of observation, however estimates were difficult to make because the standing crop obscured litter accumulation.

The pathway created between the two exclosures in June, 1974 presented a vegetation pattern approximating that found in exclosure sections S2 and N1. By May, 1975, all vegetation had been removed by trampling and the soil surface lowered approximately 3 cm by a combination of trampling, subaerial erosion, and litter removal. Litter, which originally amounted to about 20% cover, was completely removed.

Table 16. Species percent frequency and mean percent cover for Meadow Creek north enclosure taken 9 June, 1974 and 24 May 1975.

Date	June 9, 1974				May 24, 1975	
Exclosure Section	South Part (N1)		North Part (N2)		Combined (N1-N2)	
Species	Frequency	Mean Cover	Frequency	Mean Cover	Frequency	Mean Cover
<i>Bromus rigidus</i>	93	7.6	100	12.7	100	15.2
<i>Festuca megalura</i>	79	7.1	100	41.6	100	7.4
<i>Bromus mollis</i>	36	+	100	10.9	100	5.2
Moss	57	22.0	88	25.2	?	?
<i>Brodiaea pulchella</i>	7	+	2	+	1	+
<i>Eremocarpus setigerus</i>	29	+	4	+	1	+
<i>Alra caryophyllea</i>			31	0.6	100	+
<i>Vicia angustifolia</i>			6	+	1	+
<i>Hypochaeris glabra</i>			4	+	8	+
<i>Cynosurus echinatus</i>			4	+	1	+
<i>Lupinus micranthus</i>					100	45.0
<i>Trifolium microcephalum</i>					100	21.0
<i>Lupinus bicolor</i>					76	6.2
<i>Lotus micranthus</i>					56	2.0
<i>Trifolium ciliolatum</i>					12	0.4
<i>Orthocarpus attenuatus</i>					8	+
<i>Thysanocarpus curvipes</i>					4	+
<i>Daucus pusillus</i>					4	+

Discussion and Summary

The understory vegetation of Meadow Creek terrace is dominantly annual with a high component of introduced species reflecting a long history of human disturbance dating to the Rogue River mining era. More recently, the specific site under the twin Douglas-fir tree has received heavy recreational use. Prince Helfrich, an Oregon river guide, established a temporary camp at this particular site from about 1961 to 1969. Camp was annually set up in August and abandoned in mid-fall coincident with the steelhead run. Since then, and probably prior to 1961, camping has occurred with some regularity throughout the river season.

The two Douglas-fir trees at the specific site were cored and had respectively 65 and 57 annual growth rings. An age estimate of 70 years is reasonable for these trees. Assuming recreationists desire shade, or partial shade, for their camping sites and that the two trees would begin to provide shade when they reached 30 years, the site is estimated to have received preferred recreational use starting in the mid-1930's. However, it is assumed that intense use has occurred since 1960.

Periodic flooding of the Meadow Creek terrace at a recurrence interval of about 25 years reaches the tree base. It is possible that soil erosion and associated root excavation would occur independently of recreation use. Indeed, other trees in non-used areas showed this kind of erosional exposure which is especially abetted by turbulence created by the tree itself hindering flood flow. Additional site damage caused by river erosion might be favored through vegetational removal by recreationists. However, annual vegetation provides little hindrance to sand and silt erosion. Furthermore, under deep tree shade, the incidence of dense annual and perennial plant growth is diminished.

It is concluded that tree excavation at this site was caused primarily by periodic river flooding and that human impact contributed to the excavation but was not a major factor in its occurrence.

A second major aspect of this ecological site assessment relates to the effects of camper trampling on vegetation. Camper use in this area was important in (1) removing existing annual and perennial vegetation, (2) removing litter and (3) hindering the establishment of stabilizing vegetation. These effects were evident in both exclosures as shown by decreased plant cover, decreased species diversity as determined by species number component and equitability component, decreased litter reflecting diminished plant growth and accumulation of soil organic matter, and decreased proportions of perennial and native species under human trampling. A single season's camping use was sufficient to denude much of the annual vegetation in the intensely trampled camp area.

Furthermore, recovery and stabilization of the sandy terrace by annual vegetation can be rapid in the absence of trampling and probably can be accomplished in two to four seasons. Additional research is needed to test the precise recovery rate.

CHAPTER V SUMMARY

This field study is primarily concerned with presenting the preliminary analysis of data collected during the 1974 river season for the visitor satisfaction and environmental phases of research project on "A Management Model: The Carrying Capacity of Wild and Scenic Rivers". Concerning the visitor use survey, priority was given to the analysis of those questions pertinent to the management issues of interest to the State Marine Board. Additional analysis of other user data will be essential for the preparation of a final report concerned with a management model to determine acceptable use limits on the rivers under state jurisdiction.

VISITOR SATISFACTION

User characteristics. The survey revealed differences between the people who choose commercial versus non-commercial means of river travel. The composition of these two categories of river users differs with respect to occupation, number of previous trips, membership in conservation and outdoor recreation organizations, and upper age group representation. A general knowledge of the characteristics of user groups is vital to understanding their attitudes and perceptions. The general personal characteristics of the user population is equally necessary for demographic comparisons with local, state, and national census data. The present and future demand for opportunities to travel on wild rivers is a function of the size, distribution, and composition of the user population. As changes occur within this

population, one could expect changes to occur in their demand for river-oriented outdoor recreation opportunities.

User attitudes. Comparisons between the commercial and non-commercial river travelers revealed differences in their attitudes towards use restrictions and levels of crowding. The adoption of use restrictions on the river would be more compatible with the perception of the commercial river traveler since their attitudes are favorable toward regulations and, as a group, they are sensitive to different intensities of crowding. The non-commercial river traveler is significantly different from the commercial user in his attitudes toward restrictions towards which he is disinclined. Moreover the non-commercial user is more tolerant to various intensities of crowding.

Comparisons between user group attitudes toward site improvements indicated strong disagreement to the placement of mileage signs and indicated general support for the placement of toilets at camp sites. The feelings of commercial and non-commercial users are distinctly negative towards motor boats on the river, however, one-third of the respondents qualified their responses.

Review of legislation. Existing management plans for the wild river area of the Rogue River do not provide adequate guidelines to make decisions concerning recreational carrying capacity. Without improvements in the present management plan, managers will be inhibited in their attempts to set acceptable limits for river use.

SITE CHARACTERISTICS

Seventeen selected site characteristics were evaluated for 75 inventoried campsites between Grave Creek and Foster Bar. In almost all cases campsites were identified with respect to availability of potable water from tributary creeks or springs and with respect to enough flat ground to accommodate a party of four.

Campsite area. Only 5 sites, 4 on the north bank, were large (>10,000 ft.²). North bank sites by number and area have greater spatial capacity than south. Additional research is needed to relate campsite availability to flooding and to river level.

Tributary size. The size of tributary creeks was measured by sampled cross-sections in middle July. Regardless of size (only four creeks were placed in a size class with >10,000 in.² cross section), all tributaries were judged to have potable water. Research is necessary to relate water quality to recreational use. Sanitation problems could easily damage the quality of the water supply.

Distance to water. Almost all campsites were within 500 feet of water supplies. Most campers and river travelers required water for camping. Many small (ephemeral) water supplies and waterless sites were observed. Needed is an inventory of waterless sites. It is possible to expand the spatial carrying capacity of this section of river by including these dry sites.

Shade. Quality of shade was evaluated for morning (10-2) and afternoon (2-6) conditions in terms of percentage shade. Shade conditions were important to hikers, those people stopping over in a

site during the day and for lunch stops. Most sites, especially sand bar situations, had poor shade conditions. Swimming might compensate for lack of shade, especially for river travelers.

Boat landing. The ease of boat landing was estimated for each site. Two-thirds of the sites had good landing situations. Twenty-three campsites were judged to have poor landing conditions caused by rough water or rock cliffs or both. Landing conditions changed with water level in most cases becoming easier as the season progressed.

Wind protection. Because so many campsites were located on sand bars, wind-blown sand was especially annoying and caused otherwise desirable camps to become less pleasant.

Accessibility. The ease by which a campsite could be reached by trail and from the river was judged. Sites either had excellent or very poor accessibility. Constructing spur trails to gain access to some sites from the river was judged impractical and undesirable. Trail access by spur trails exists in some cases and could be expanded.

Visibility. The degree of visibility of campsites was judged with respect to trail and river. Sites either were very visible or were difficult to find. Poor visibility usually meant that the site was private, a characteristic judged positively by most travelers. Signing of sites for the benefit of river users was considered impractical and undesirable. Signing of sites for the benefit of hikers is possible although probably not needed.

Seclusion. Internal seclusion, referring to the degree of partitioning inherent in a given campsite was assessed. Most low sand bars, for obvious reasons had poor internal seclusion. The larger upper terrace sites and those with close association with rock formations had good internal seclusion. External seclusion refers to the degree of privacy of a site and was considered less important than internal seclusion. Based on campsite area and internal seclusion, the manager could begin to objectively identify camping capacity for the river.

Unvegetated area. Most sites were devoid or near devoid of vegetation. The reason for this was the annual flooding damage and nature of the substrate and not a condition caused by excessive recreational pressure. A few sites showed trampling damage. Research work is continuing on an assessment of recreational damage to the vegetation at Meadow Creek.

Firewood availability. Fuel wood presence was judged for each site and found to be a minor factor with respect to campability of a site. In most cases either drift wood or down wood provided adequate fuel.

Artifacts. Presence of artifacts, structures, fire pits, etc. was evaluated for each site and gives an index of artificiality for campsites. The Rogue River is not immune to human impacts and a concerted clean-up program would probably greatly improve the quality of the river area.

Accomodation zones. The river reach between Grave Creek and Foster Bar was segmented into accomodation zones depending on where the parties spent the night. Definite segregation was displayed for different groups depending on whether a party spent two, three, four, or more nights on the river. The manager could use this pattern as a key to regulating use of the river.

MEADOW CREEK ECOLOGICAL ASSESSMENT

Two exclosures (fenced areas) were arranged at a heavily used site at Meadow Creek in order to evaluate recovery of a camper-damaged site and to simulate foot path disturbance in an area which had not received heavy walking pressure. A single season of use (approximately 1,500 pedestrian passes) was sufficient to remove all annual vegetation, most perennial vegetation and plant litter. The protected area showed recovery in terms of increased plant cover, increased species diversity, increased accumulated plant litter, and increased proportion of species native to the Oregon flora.

The role of herbaceous ground cover vegetation in protecting trees from erosion during occasional periods of high water was discussed. The role of the river as an eroding force on the campsite area far exceeds man's erosive impact upon the same site.

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APPENDIX B

CAMPSITE PLACE NAMES BETWEEN
GRAVE CREEK AND FOSTER BAR

<u>North Bank</u>		<u>River Mile*</u>	<u>South Bank</u>	
<u>No.</u>	<u>Name</u>		<u>Name</u>	<u>No.</u>
-	Grave Creek Landing	88.4		
N1	Sandersons			
N2	Rainie Falls	66.8	Rainie Falls South	S1
N3	China Gulch Upper		No Name	S2
N4	China Gulch Lower			
		65.3	Rum Creek	S3
N5	Upper Whisky Creek East	65.2		
N6	Lower Whisky Creek East			
N7	Upper Whisky Creek West			
N8	Lower Whisky Creek West			
N9	Big Slide			
			Doe Creek	S4
N10	Alder Creek			
N11	Booze Creek			
			Wildcat Creek	S5
N12	Russian Creek	63.2		
			Russian Rapids South	S6
			Montgomery Creek	S7
N13	Russian Creek +			
		62.3	Howard Creek	S8
N14	Slate Slide Upper			
N15	Slate Slide Lower			
			Slim Pickens Rapids	S9
N16	Bronco Creek Upper			
N17	Bronco Creek Lower			
			Bronco South	S10
N18	Bunker Creek	60.4		
			Big Windy Creek	S11
			Little Windy Creek	S12
			Black Bar Ranch	-
N19	No Name			
			Jenny Creek	S13
			Horseshoe Bend	S14
N20	Horseshoe Bend	57.7		
N21	Shady Creek			
N22	Francis Creek			
N23	Copsey Creek Upper			
N24	Copsey Creek Lower			
N25	Cowley Creek			
N26	Meadow Creek	56.7		

<u>No.</u>	<u>North Bank</u>		<u>South Bank</u>	
	<u>Name</u>	<u>River Mile*</u>	<u>Name</u>	<u>No.</u>
			Dulog Creek	S15
N27	Kelsey Creek Upper	55.0		
N28	Kelsey Creek Lower			
			Camp Secluded Battle Bar South	S16 S17
N29	Corral Creek	54.5		
N30	Ditch Creek			
N31	Missouri Creek North			Hewitt Creek Missouri Creek
N32	Quail Creek	51.6		
			Long Gulch	S20
N33	Long Gulch +	48.4		
N34	No Name			
N35	Mule Creek (Tucker Flat)			
N36	B.M. 424			
N37	Marial		47.9 46.7	
			Mule Creek Canyon	S21
N38	Burns Creek	45.3		
N39	Blossom Bar Creek			
			Devil's Staircase (Gleason Bar)	S22
N40	Paradise Creek	44.5		
N41	Johnson Creek			
			Sly Fox Creek (Huggins Canyon)	S23
		41.9	East Creek East East Creek West	S24 S25
N42	Brushy Bar Upper	39.7		
N43	Brushy Bar Lower			
N44	Tate Creek			
N45	Camp Tacoma			Clay Hill Creek South Falls Creek Falls Creek
N46	Flora Dell Creek	37.7		
N47	Flea Creek	33.8		
-	Foster Bar			

* River mile is measured upstream from the mouth of the Rogue River at Gold Beach.