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THE SANTA FE NATIONAL FOREST: CONFLICT BETWEEN
OFF-ROAD VEHICLE USE AND NON-MECHANIZED RECREATION

By

Kathryn A. Stapleton

B.A., Augustana College, 1974

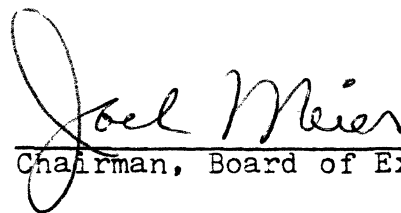
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Master of Science

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ABSTRACT

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The Santa Fe National Forest: Conflict between Off-Road Vehicle Use and Non-Mechanized Recreation (101 pp.)

Director: Dr. Joel F. Meier *JM*

This study used one district of the Santa Fe National Forest to examine the conflicts of public land use between two recreation groups: (1) off-road vehicle users, and (2) non-mechanized recreation users, including hikers, back packers, and horseback riders. The perceptions and opinions of users from each group were analyzed to determine possible methods of controlling the use of the Forest.

A self-administered questionnaire was administered to 230 users (ORV users=109, non-mechanized users=121) during the months of July and August in 1978. Information from the questionnaire focused on three main hypotheses: (1) Mechanized and non-mechanized users view their recreational activities as not mutually exclusive and feel they can share public lands without conflict, (2) when conflicts between the two user groups do exist, they tend to be "one-way," (i.e. directed toward ORV users), and (3) the personal characteristic profiles of mechanized and non-mechanized users are the same.

These hypotheses were tested using cross-tabulations, frequency distributions, factor analyses, and associated statistics.

It was found that there were statistically significant differences in socio-demographic characteristics between the two groups. The study also showed that there were differences between the two groups in attitudinal structure. This information gathered in the study allowed all three null hypotheses to be rejected.

From the findings in this study, it was suggested that the Forest Service restrict ORV use in the Santa Fe National Forest by providing a special area for ORV use. If the area is attractive enough to meet the needs of ORV users, most users will choose to use it, and it will be unnecessary to prohibit them in other areas of the Forest. If not, the Forest Service could (1) restrict ORVs to the area anyway, (2) expand or change the location of the area, or (3) go back to the original plan of dispersing ORV use.

ACKNOWLEDGMENTS

To my committee, without whose guidance and helpful comments this project would never have been successfully completed, I would like to express my sincere appreciation. I would especially like to thank my chairman, Dr. Joel Meier, for his constant support over the past three years. His encouragement enabled me to persevere through countless thesis drafts, months of waiting, and months of revising and retyping.

I would also like to thank Dr. Stephen McCool and Dr. Jon Driessen for serving on my committee. Having done extensive research in the area of conflicts between mechanized and non-mechanized recreation users, Dr. McCool was truly an asset to my committee and provided me with the ground work and statistical procedures needed to analyze my data. For his expertise I am very grateful. Dr. Driessen was kind enough to join my committee toward the completion of the project. His thoughts and guidance, from the sociologist's point of view, added some interesting dimensions to my thesis.

Finally, I would like to thank my family and friends for their continued support for the duration of this endeavor. Without their encouragement, this project may have been abandoned long ago. I would especially like to thank my friend, Marilyn Essex, for her guiding hand and expertise.

Danke schön and merci à tout le monde!

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGMENTS.	iii
TABLE OF CONTENTS.iv-v
LIST OF TABLESvi-vii
CHAPTER	
I. INTRODUCTION.	1
Statement of the Problem	2
Purpose of the Study	4
Need and Significance.	4
Delimitations.	8
Basic Assumptions.	9
Content of Remaining Chapters.	10
II. REVIEW OF LITERATURE.	12
The Theory of Conflict	12
Socio-Demographic Information of ORV Users	16
Benefits and Impacts of ORV Use.	18
The Role of Management	21
The One-Way Conflict among Users	26
Regulating Off-Road Vehicle Use.	27
Hypotheses	30
Summary.	31

III. PROCEDURES 34

 Study Area. 34

 Questionnaire Design. 35

 Sampling Design 37

 Organization and Analysis of Data 38

 Reliability and Validity of Measures. 39

IV. FINDINGS 41

 Sample Characteristics. 41

 General Attitudinal Differences 50

 Differences in Attitudinal Structure. 50

V. CONCLUSIONS, IMPLEMENTATIONS, AND RECOMMENDATIONS. 70

 Conclusions 70

 Implementations 74

 Recommendations 76

VI. LITERATURE CITED 79

VII. APPENDICES 84

 (A) Definitions of Terms. 84

 (B) ORV User Questionnaire. 88

 (C) Non-Mechanized User Questionnaire 94

 (D) Map of Santa Fe Segment of Tesuque District,
 Santa Fe National Forest. 100

TABLES

	PAGE
1. Chi Square Analysis of the Ages of Users of the Santa Fe National Forest.	41
2. Chi Square Analysis of the Race/Ethnic Groups of Users of the Santa Fe National Forest	42
3. Chi Square Analysis of Occupations of Users of the Santa Fe National Forest.	43
4. Chi Square Analysis of Levels of Education of Users of the Santa Fe National Forest	44
5. Chi Square Analysis of Community Sizes from which Users of the Santa Fe National Forest came.	45
6. Chi Square Analysis of the Number of Visits of Users in the Santa Fe National Forest during the past two years.	46
7. Chi Square Analysis of Group Types of Users of the Santa Fe National Forest.	47
8. Chi Square Analysis of Group Sizes of Users in the Santa Fe National Forest.	48
9. Frequency Distributions of Methods of Travel of ORV Users in the Santa Fe National Forest	49
10. Chi Square Analysis of User Reaction to the Statement "It bothers me to meet or pass off-road vehicles on this trail/road."	50
11. Chi Square Analysis of User Reactions to the Statement "Roaming into the mountains is an enjoyable part of my trip."	51
12. Chi Square Analysis of User Reactions to the Statement "Off-road vehicles should not be restricted in the Santa Fe National Forest."	52
13. Chi Square Analysis of User Reactions to the Statement "I wish I wouldn't see any other people on this whole trip."	53

14.	Chi Square Analysis of User Reactions to the Statement "It is unsafe to have off-road vehicles and foot travelers on the same trails."	54
15.	Chi Square Analysis of User Reactions to the Statement "There should be more areas and trails open to off-road vehicles in the Santa Fe National Forest."	55
16.	Chi Square Analysis of User Reactions to the Statement "I came here to become more aware of nature and to discover new vistas and places."	56
17.	Chi Square Analysis of User Reactions to the Statement "I am looking for challenge and adventure on this trip."	57
18.	Chi Square Analysis of User Reactions to the Statement "I like this area of the Tesuque District because of the facilities (campgrounds, restrooms, etc.) that are here."	58
19.	Percentages of Users favoring Specific Safety Standards and Regulations for ORVs	58
20.	Factor Loading for Attitudinal Variables of Non-Mechanized Users	60
21.	Factor Loading for Attitudinal Variables of ORV Users	61

CHAPTER I

INTRODUCTION

Man's technology in recent years has allowed him to spend much less time on the tasks of daily living, thereby increasing his leisure time. As the United States moves toward a leisure-oriented society, people must decide how they will choose to spend their new-found free time. Many are expanding their recreational pursuits in public recreation areas (See Appendix A for definition). Outdoor recreation participants often value solitude, quiet, and freedom, and these values are missing when an area becomes too crowded (Knopp and Tyger, 1973).

Because a large number of people are now using public lands for many diversified activities, conflicts (See Appendix A for definition) among users are increasing (Knopp and Tyger, 1973). Land managers must deal with these use conflicts, both on a day-to-day basis, and in creating long-range plans for the future.

The off-road vehicle (ORV) (See Appendix A for definition) has soared in popularity in the past 15 years. This is evident by facts and figures of sales presented throughout the literature (Heath, 1974). Use of such vehicles on public

lands has caused damage to the environment and conflicts with others who are seeking non-mechanized forms of outdoor recreation in the same area (American Association for the Advancement of Science, 1974). It has therefore become necessary to regulate ORVs in order to preserve the land and minimize conflicts. On February 8, 1972, Executive Order 11644 was issued to establish some guidelines for ORV regulation. The Order stated in part:

The widespread use of such vehicles on public lands--often for legitimate purposes, but also in conflict with wise land and resource management practices, environmental values, and other types of recreation activity--has demonstrated the need for a unified Federal policy toward the use of such vehicles on public lands.

In light of this Executive Order, public land managers must develop management plans which control and regulate the use of their areas. They are directed to establish regulations which will meet the needs of mechanized and non-mechanized recreationists. The Santa Fe National Forest in north central New Mexico is one such area where a management plan was created to establish regulations for the use of the Forest.

STATEMENT OF THE PROBLEM

The off-road vehicle, while providing enjoyment and excitement for many people, often causes adverse environmental impacts including erosion, soil and vegetation compaction, and noise and air pollution. It may disrupt wildlife patterns, and it may cause conflicts with those pursuing non-mechanized

forms of recreation in the same area. The problem discussed in this study is that of conflicts between mechanized and non-mechanized users on public lands. Managers, having been directed by Executive Order 11644 to control and regulate ORV use on the lands they administer, have dealt with the problem with varying degrees of success.

The Forest Service, which administers national forest lands in the United States, was one such agency directed to establish and implement an ORV Management Plan. The plan was to be researched and developed by the Forest Supervisor within each individual national forest. Each of the adverse effects of ORV use was to be discussed and dealt with. Included in the plan were to be some viable solutions to the problem of conflicting recreational uses in national forests.

Conflicts among users exist for a number of reasons. On many trails, the established foot and horse uses are not compatible with vehicular use because of trail design or location. Use conflicts also often occur in many areas where man, in pursuit of pleasures such as hunting, fishing, hiking, or his desire for solitude, is disrupted by the noise and presence of machines. The compatibility of unrelated recreational activities in specific areas of land is affected by the way in which ORVs are controlled.

Specifically, this study used one district of the Santa Fe National Forest to examine the conflicts of public land use between two recreation groups: (1) off-road vehicle users, and (2) non-mechanized recreation users, including

hikers, back packers, and horse-back riders. The perceptions and opinions of users from each group were analyzed to determine possible methods of controlling the use of the Forest.

PURPOSE OF THE STUDY

When different groups are seeking varied recreational experiences in a specific area, it is difficult to please each group all of the time. Therefore it appears that an effort must be made to place restrictions on some groups in order to manage the area in a satisfactory way. The purpose of this study was to identify the type and intensity of conflicts which may exist when mechanized and non-mechanized groups want to use the same areas at the same time. From data collected from participants in each group, possible conflict resolution techniques are suggested.

The Santa Fe segment of the Tesuque district in the Santa Fe National Forest, the recreation site used in this study, is located just a few miles outside of the city of Santa Fe. It is therefore very easily accessible, and it is a very popular area in the summertime. The sample for this study was drawn from users of this area.

NEED AND SIGNIFICANCE

The use of off-road vehicles on public lands has become increasingly popular in recent years. The Utah State Division of Parks and Recreation reported that ORV use has doubled over the past six years (Utah's Off-Highway Vehicle

Users, 1974). This astounding surge in ORV popularity, which is now occurring nationwide, has caused much heated controversy. Arguments on both sides have been emotional, subjective, opinionated, and supported by little valid information. On the one hand, many ORV users believe that they have the right to go anywhere they desire on public lands, during any weather conditions or seasons, with any type of vehicle. On the other hand, opponents of ORV use would like to ban ORV use all together on public lands.

Because both groups enjoy using many of the same areas of the Tesuque district in the Santa Fe National Forest, conflicts exist and need to be managed. In compliance with Executive Order 11644, the Forest Service evaluated areas in the Forest where off-road vehicle use was affecting the land and environment in order to develop controls to minimize adverse effects of their use. The task of preparing a master Management Plan for controlling ORV use was carried out by the Forest Supervisor. In preparing the plan, each of the seven district rangers was required to submit an Environmental Analysis Report (E.A.R.) concerning each district. Prior to the preparation of their reports, the entire Forest was studied to determine the percentage of land that was eligible for inclusion in the ORV Management Plan. The Forest Service determined that 87% of the Forest should be studied. The seven district ranger reports were considered by the Forest Supervisor as the final master plan was prepared. Comments from

governmental agencies, private organizations, and individuals were also taken into consideration.

The objectives of the Off-Road Vehicle Management Plan for the Santa Fe National Forest, issued in January of 1977, included provisions for the protection of resources, promotion of the safety of all users, and the reduction of use conflicts. It was designed to provide management direction for ORV use, and to limit ORV use in the Forest (Department of Agriculture, January, 1977). The Plan must be revised annually by the land use planning process, whereby each of the seven district rangers is required to submit a report concerning the condition of the land and environment where ORV use is permitted in their district. The Forest Supervisor reviews these reports and makes the necessary revisions in the existing Management Plan.

The ORV Management Plan for the Santa Fe National Forest has been a controversial document ever since it was issued. With this Plan, the Forest Service intends to accomplish effective management by dispersing ORV use over a large area, which approximates 87% of the land studied. This policy allows most of the areas studied to remain open until the Forest Service determines that the damage to the area is so great that it cannot allow ORV use to continue in that area.

The Sierra Club and the New Mexico Public Interest Research Group (University of New Mexico, Albuquerque) completed an administrative appeal concerning the legality of

the policy underlying the Plan. The controversy in this appeal centered around the legitimacy of the Forest Service's plan to allow areas to remain open to ORV use until actual or imminent damage has been shown to occur. The appellants maintained that before an area or trail should be open to ORV use, more quantitative data were needed concerning the area's ability to tolerate such use. Furthermore, the appellants stated that the Forest Service's policy of dispersing the use of ORVs over the approximately 87% of the Forest studied ignores the President's directive to minimize conflicts among users (Supporting Statement: Santa Fe National Forest ORV Management Plan, 1977). Section One (Purpose) of the Executive Order states:

It is the purpose of this Order to establish policies and provide for procedures that will insure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, and to minimize conflicts among the various uses of those lands (Executive Order 11644, 1972).

Therefore, the question of where to allow ORV use in the Santa Fe National Forest involves consideration not only of potential damage to the land resource, but the confrontations which might occur and the safety hazards which may exist when ORV users encounter those pursuing non-mechanized forms of recreation.

The Forest Service made the assumption that conflicts between users are minimized by dispersing use of ORVs over a large area, which should cause fewer encounters with hikers,

back packers, and horsemen (U.S.D.A., 1977). However, no quantitative study was done to analyze the opinions of each group or to account for the friction between the groups in order to justify such an arbitrary conclusion. The ORV Management Plan for the Santa Fe National Forest was withdrawn as the management guideline soon after its release because of criticism for its lack of quantitative data concerning each of the two user groups, (1) ORV enthusiasts and (2) non-mechanized users.

This study is a first step in providing profiles of the users, as well as opinions, suggestions, and preferences from individuals in both groups. The problem of use conflicts and the limiting versus dispersion of ORV use is also discussed. The Forest Service, as well as other recreation land managers and planners, need such information.

DELIMITATIONS

The area studied as a representative sample of the Santa Fe National Forest was the Santa Fe segment of the Tesuque Ranger District (see map in Appendix D). The Santa Fe segment is one of four in the district. The Tesuque district is one of seven districts in the National Forest.

The types of off-road vehicles under study in this investigation were limited to two- and four-wheel drive vehicles, motorcycles, and trail-bikes. Because the study was conducted during the summer months, snowmobile use was not

studied, and therefore is not discussed.

The other group of users of the Forest included day hikers, back packers, and horseback riders. Again, because this study was not conducted during the winter months, cross-country skiers and snowshoers were not included and therefore are not discussed.

The study was conducted during the months of July and August in 1978. In order to insure that those who participated in the survey study understood all the questions, the minimum acceptable age for participants was fourteen.

BASIC ASSUMPTIONS

In order to satisfactorily complete this study, it was necessary to make certain basic assumptions. First, the Forest Service assumed in its Environmental Statement issued in 1973 (U.S.D.A., Forest Service, Environmental Statement, 1973) that the use of off-road vehicles in the Santa Fe National Forest was an established form of outdoor recreation, and that it would be allowed to continue in the Forest. Forest Service lands have been set aside for multiple use purposes, and Executive Order 11644 had determined that ORV use would be allowed to continue on Federal lands. Therefore, eliminating their use on Forest Service land was not considered an option or possible solution to solving ORV/non-mechanized user conflicts. Second, due to the increased use of ORVs--approximately 20 to 30 million participants

(Nelson, 1976)--it appeared that they might need to be controlled in some way. Methods of controlling their use were therefore examined and discussed. Third, non-mechanized forms of recreation have also been increasing rapidly. The increasing number of participants causes more frequent encounters with motorized recreationists. Fourth, foot travelers and horseback riders were not considered conflicting use groups in the area studied (Statement by Garth Heaton, 1978). They were thus grouped together under the category of non-mechanized recreationists. Fifth, it was assumed that the statistics used in the study were valid, reliable measuring instruments. Finally, one must assume that the responses given by those surveyed were valid.

CONTENT OF REMAINING CHAPTERS

In order to deal with the problem of conflicts between ORV users and non-mechanized recreation users, this study next discusses recent literature which pertains to the problem. Articles, reports, and similar studies are discussed to look at the problem from the following viewpoints: (1) the theory of conflict and how it may exist in the recreation setting; (2) identification of ORV users; (3) benefits and impacts of ORV use; (4) the role land managers play in making decisions on controlling and regulating ORV use on the public lands they administer; (5) support for the theory that conflicts between ORV users and non-mechanized users tend to be one-way,

with non-mechanized users being more bothered by sharing areas with ORV users than visa versa; and (6) methods of regulating ORV use.

The third chapter in this study discusses the procedures used in studying the problem. Following a description of the study area, it outlines the steps followed in carrying out the study by discussing the development of the questionnaire, the sampling design used, and how the data were organized and analyzed.

The fourth chapter presents the findings of the study by discussing and using tables to present the results of the survey questionnaire. Socio-demographic characteristics of both user groups are compared, general attitudinal differences regarding the use of the Santa Fe National Forest are discussed, and attitudes which cause conflicts between the two user groups are analyzed.

Following the discussion of the survey findings, conclusions are drawn, implementations for the study are suggested, and recommendations for further study are presented. The study is then supported by a list of references cited. Copies of the ORV and non-mechanized surveys can be found in Appendices B and C. A map of the Santa Fe National Forest study area is found in Appendix D.

CHAPTER II

REVIEW OF LITERATURE

The conflict between off-road vehicle users and those pursuing non-mechanized forms of recreation on public lands has been discussed extensively in recent articles and reports. The literature very definitely emphasizes the need to control and regulate ORV use. Even ORV users agree that some regulations are necessary. Without sacrifices and compromises by all concerned, the quality of outdoor recreation will diminish substantially.

THE THEORY OF CONFLICT

The reasons for conflicts among public land users can better be understood if the theory of conflict is discussed. A "conflict," as described by Jacob (1977), involves "goal interference" because of the behavior of another. Each individual or group has certain expectations and goals when participating in a recreational activity. When the behavior of another individual or group interferes with a person's goals, a conflict may result. Each person has his own idea of what is appropriate behavior for an area, both for himself and for other participants. When another participant's behavior does not meet his expectations, a conflict may also result. As more and more people begin to use a particular

public area, more interactions among users will result. If these users have very diverse lifestyles and differing needs and goals, the stage is set for conflicts to arise (Jacob, 1978).

Each time individuals visit a public recreation site, their expectations for goal achievement increase. Users remember their most recent experiences at the site and the positive things that happened to help them reach these goals. Users know that certain sites will accommodate their needs, so they return to those places. With each visit, the user has firmer expectations, and develops more complex, well-defined definitions of appropriate behavior. Jacob (1977) calls these people "resource specific" since they travel repeatedly to the same area.

On the other hand, the person who is visiting an area for the first time may arrive with few or no expectations. His or her goals are not well-defined and there are no definite preconceptions of what are acceptable social behavior patterns. If the visitor's behavior differs from another person's expectation of appropriate behavior, the newcomer will not be welcomed, and his or her behavior may become a source of conflict (Jacob, 1977). This is so because frequent users of a particular area develop a "sense of possession," feeling that they deserve to have some input concerning how an area is to be used (O'Leary, 1976).

Bernard (1957) provides a "mutually exclusive model,"

which states that two objects cannot occupy the same space at the same time. A public land resource will only become involved in a conflict if two groups of users want to use it for different purposes at the same time. When the two uses are mutually exclusive, a conflict will result. Along this same line, McCool and Roggenbuck (1974) define conflict as a "clash, opposition, disagreement, or incompatibility between two groups seeking recreational experiences spatially and/or temporally simultaneous." The conflict may involve behaviors, attitudes, or values.

Mack and Snyder (1957) define conflict as a kind of social interaction process or relationship between two parties with incompatible values. They state that certain properties are necessary for a social conflict to develop. First, the two parties involved must have some contact and visibility with each other. Second, their values oppose each other, based on the scarcity of the resource (the land, in this case). Then, each group desires to control the other, in a relationship where one can gain only at the expense of another. Each group is striving to acquire power by gaining control of scarce resources. Fink (1968) also agrees that object-centered motivation is very important in all conflicts. Both parties desire to use or control the same resource at the same time.

Coleman (1956) maintains that there is potential for social conflict when people feel a strong identity with a group, setting themselves apart from those who are not in

the group. The group will reinforce a person's values. If members of the group tend to associate only with others in the group, their lack of out-group interaction can cause fear and hostility. It would seem logical, then, that more inter-group dialogue and education would reduce tension.

People who share a common purpose often form an "organization," according to North, Koch, and Zinnes (1960). In this way, members are able to communicate with one another, co-ordinate activities, and establish policies. Sometimes the purpose or goal of the organization is mutually incompatible with that of another group. These two parties can deal with their conflicts by (1) withdrawing contact from each other, (2) allowing one party to dominate or destroy the other, (3) reaching a compromise or, (4) integrating freely. Conflicts somehow often seem to involve a struggle for power. Compromising is usually a more feasible and realistic method of dealing with conflict than is integration. The first step in this direction is to reduce the intensity of the conflict by discussing the dissatisfactions of each group openly. Opening the channels of communication can often cause each party to reexamine its desires and understand the other group's needs and goals, thereby making compromising more feasible.

Research in the nature of conflicts offers public land managers greater insight into the reasons behind user dissatisfactions. If the origins of conflict are better

understood, then it is easier to appreciate what is meant by a quality recreation experience.

SOCIO-DEMOGRAPHIC INFORMATION OF ORV USERS

Conflicts in outdoor activities do not always begin with the recreational activity itself. They often originate elsewhere in society, and public lands serve as the stages for acting out these conflicts (Jacob, 1977). A study of the conflict between snowmobilers and cross-country skiers (Knopp and Tyger, 1973) revealed that recreation activities can serve as a symbolic identification for a specific cultural group in society. ORV users sometimes stereotype hikers and backpackers as "long-haired unemployed hippies" or "elitist millionaires." On the other hand, ORV users are often stereotyped as "lower-class, uneducated, consumption-oriented." Each group tends to describe itself differently, however. The ORV users, for instance, see themselves as "family people," "patriotic," and "hard-working middle-class citizens." It would seem beneficial, then, to discuss what recent literature has shown regarding these two groups.

One recent study (Nelson, 1976) stated that approximately 20 to 30 million people are involved with the use of off-road vehicles, with about 7 million vehicles in use on public lands. A 1970 Gallup Poll indicated that 10% of all American households owned a trail bike (Badaracco, 1976). By 1975, that figure had risen to 13.4% with 10% also owning more than one bike (Utah's Off-Highway Vehicle Users, 1974).

In a profile study of trail bikers (Chilman and Kupcikevicius, 1973), it was found that the majority of bikers came from rural areas. About 60% used trail biking as a family activity. Riding was definitely a group-oriented activity, with the average group size being seven riders. The majority of riders was found to have had 4.8 years of riding experience, with 36-59 riding experiences during the past year. Most of the respondents in the study were laborers and craftsmen. A study conducted in Utah (Utah's Off-Highway Vehicle Users, 1974) showed that the median age of trail riders was 24, with 49% being married. Riders having a high school education totalled 65%, with another 31% having some college education.

A 1971 Motorcycle Industry Council survey supported these findings. They found the average cyclist to be male, in his mid-20's, married with two children. He was generally a skilled or semi-skilled laborer with a higher than average income. A startling 77% of responding households were found to have more than one trail bike (King, 1972).

A Motorcycle Statistical Annual published in 1977 stated that 89.2% of all owners were male, the average age being 28.8, with 59.8% found to be married. The highest percentage of owners had a high school education (51.7%), with another 30.1% having a college degree. Occupations were varied, with the highest percentages falling into the categories of student (22.5%) and professional/technical (20.2%). Most owners fell into the \$10,000-\$14,999 income category,

with another 20.2% having an annual income of \$15,000-\$19,999.

It seems that the majority of research concerning the socio-demographics of off-road vehicle users has dealt primarily with the trail biker. This could be because motorcyclists often join together in clubs, organizations, or associations. It is these groups which often provide information about users.

It is known that sales of four-wheel drive vehicles made in America increased 96% over the past four years (Sheridan, 1979), while sales of all-terrain vehicles (ATVs) jumped from 2,000 in 1960 to 12,000 in 1970 (King, 1971). However, research involving profiles of these users does not seem to be available. It appears that public land managers did not expect the surge in ORV sales and participation. In fact, a 1971 Bureau of Outdoor Recreation report does not even mention motorized recreation in a listing which projects outdoor recreation activities to the year 2000 (Selected Outdoor Recreation Statistics, 1971).

BENEFITS AND IMPACTS OF ORV USE

The American Dream has long been the desire to explore the unknown and conquer the primitive. The ORV has helped many people reach those dreams. Now there seem to be very few places that are not accessible with these machines (Department of the Interior Task Force Study, 1971).

ORVs appeal to a large number of people because they are fun to operate. They provide a feeling of power, control,

and excitement. No physical effort is needed to operate them, and it is possible to cover more ground by machine than by traveling on foot. They permit millions of Americans to escape modern, urban living for their mental health and well-being. They provide a chance for families to spend time together, and they develop comradary with other ORV users. They also bring community dollars to cities and towns that are surrounded by areas suitable for ORV use. Many ORVs are now priced so that most Americans can afford them (Sheridan, 1979). Manufacturers benefit from increased sales of ORVs. Some are now producing mini-versions designed for children, the mini-bike and "kitty-cat" (snowmobile) being two examples (Hope, 1972). The ORV allows people of all ages to experience the outdoors.

There are many people, however, who believe that ORV use on public lands is not legitimate for a number of reasons. Noise is the most commonly cited disturbance (Baldwin and Stoddard, 1973). At one time, noise was only an urban problem, and one objective in participating in outdoor recreation activities was to experience solitude and communicate with nature. Now, with the advent of the ORV and its accompanying noise, fewer places are able to remain quiet and tranquil. Noise is an abnormality in many places where ORVs operate. The noise from ORVs drowns out natural wilderness sounds, disrupting the survival of many species (Heath, 1974). The impacts of noise on man range from irritation to the

creation of stress, which can lead to ulcers, hypertension, and heart disease. But noise to one person can be music to another (Baldwin and Stoddard, 1973). To many ORV enthusiasts, noise gives a feeling of power. Manufacturers of ORVs admit that it would be possible to produce quieter machines, but they are afraid that sales will drop if they do so (Badaracco, 1976).

Noise is measured in decibels, from 0 (threshold of audible sound) to 120 (threshold of pain). Many motorcycles today operate at 100 decibels at a distance of 50 feet (Heath, 1974). An anonymous author (1971) suggests limiting the noise level to approximately 80 decibels, which is the same as a car traveling at 50 miles per hour. Efficient mufflers are required to achieve this.

Bury and Fillmore (1975) conducted a study of the effects of a newly created motorcycle area near a campground. Campers questioned as to how they felt about the idea found it disturbing. Noise was listed as the major disadvantage, even though the campsites became less noisy after the area was opened. Cyclists rode in the newly designed area instead of through the campground. This suggests that the opinions of the campers were based on their biases instead of on actual experience.

Other environmental damage caused by ORVs has often been cited in the literature, including air pollution, soil erosion and compaction, and fires from a stray engine spark.

Much of the literature concerning ORV use on public lands has concentrated on the destruction of the California desert. Its degradation has provided man with a warning of what will happen to other areas without sufficient controls. Obviously a certain amount of environmental degradation is unavoidable wherever ORV use is permitted, and therefore the key in management planning seems to lie in choosing sites for ORV use that can withstand the intense use. Since this study centers around conflicts among public land users, ORV damage to the land and environment will not be dealt with here.

THE ROLE OF MANAGEMENT

When off-road vehicles first came on the scene a few years ago, they were welcomed by many state and local agencies and allowed to "cruise to their hearts' content" (Hope, 1972). Now, some agencies feel quite embarrassed for having invited trouble, and are beginning to realize that careful planning and restrictions are needed (Hope, 1972).

Public land managers have a difficult, contradictory role in protecting the land while also providing for ORV use, which is a resource-consuming activity (Hope, 1972). The issues are: how much damage to the land and environment should be permitted in order to accomodate recreational activities, and how can the problem of conflicts in outdoor activities be resolved?

Public land managers are assigned the task of providing safe, legal recreational opportunities for all citizens.

Some people feel, therefore, that allowing ORV use is not compatible with the intent of this trust (Dunn, 1970). Problems arise as the number of ORV participants continues to skyrocket, and areas that can withstand their use are shrinking. Because of the nature of the activity, ORV use tends to limit recreation areas to that single use. Consequently, areas which could be serving a larger number of people through a broader spectrum of activities are being reduced to ORV use only.

Assuming that ORV use is appropriate on public lands, where are they to be permitted? Dunn (1970) believes that they are not physically supportable by the environment, and they must one day be eliminated from public lands. Her "Dismal Cycle" explains what happens when they are permitted. The cycle has been summarized and quoted by many authors, and is worthy of inclusion here:

- 1) ORV sales produce a small, identifiable group of owners of a particular vehicle displaying one common problem: no land of their own.
- 2) They begin to use public or private land, with or without permission.
- 3) The group grows, damage occurs, and initial conflict develops.
- 4) Either (a) users are prohibited completely and no alternative site is offered (return to #2), or (b) some informal agreement is reached, usually with public land managers.
- 5) The existence of an approved site is publicized by the users (to friends) and by vehicle dealers (to potential customers): more sales, more users.
- 6) "Bad apples" emerge to jeopardize the initial agreement; conservationists, neighbors, other user types form a coalition which forces a "shot-gun wedding" between recreation vehicle users and the manager. More sales, more users, and more outsiders begin to come.

- 7) 'Self-organization and policing' as well as explicit management controls are initiated. Subtle co-operation of public agency has occurred, and the manager feels compelled to make the 'marriage' work.
- 8) Publicity about favorable features is distributed; Equilibrium is attained: more sales, more users.
- 9) Too many 'bad apples,' too much damage, too few 'police,' and the Saturation Point is reached. The anticollation reactivates. A 'final straw' event occurs.
- 10) The manager declares total elimination of ORVs from the area. If alternate site is offered, go to #4b; if not, go to #2 and repeat cycle.

It is difficult for managers to decided where to allow ORV use on public lands, but thus far, legislation such as Executive Order 11644 has shown that ORV use will be allowed to continue. If the trend in the rapid increase in ORV use continues, management controls will play an increasingly important role in guiding the problem. Continuing to allow ORVs to go almost anywhere will eventually completely displace quieter, non-mechanized activities (Department of the Interior, 1978 and Baldwin and Stoddard, 1973).

Many recent studies suggest spatial and/or temporal zoning as a solution to the problem. Studies by Lime and Stankey (1971) and Lucas (1971) have shown that the benefits from separating conflicting land uses far outweigh the money it costs to provide the zoned areas. Zoning assures that a range of recreational activities will be maintained in a given area allowing the user to have some degree of freedom of choice. Temporal zoning can be accomplished in a number of ways: (1) An activity can be permitted during certain hours of the day. For example, fishing on a lake could be

permitted in the morning and evening and water skiing permitted in the afternoon (Wagar, 1966). (2) A fixed number of people can be permitted to use an area at a given time to prevent crowding. Reservations may be necessary to achieve this. (3) Uses of specific sites can be rotated to allow time for the site to recuperate from damaging use. (4) An area can be temporarily closed for recuperation (Lime and Stankey, 1971).

In deciding which public land area could best support ORV use, it is wise to first seek out those areas that would be least likely to interfere with other activities. Abandoned mining areas might represent an appropriate area for use, while natural areas or dangerous or unhealthy areas should not be considered (Baldwin and Stoddard, 1973). Managers should also weigh other characteristics of land necessary to meet the needs of ORV users. Public hearings can provide valuable input in this direction (Geological Society of America, 1977).

Funding will, of course, be necessary to create and maintain new areas designed for ORV use. Without funding to provide areas that can withstand ORV use, one study showed that 50% of the managers would opt to exclude ORV use (Michel, 1973).

Once an area has been designated for ORV use, buffer zones should surround it to shield other areas from the sight and sounds of the machines. An adequate number of accesses will help to distribute use over the entire area (Mahoney, 1973).

The Texas State Parks and Wildlife Department has set aside areas for motorbike riding in twenty state parks. These areas are isolated from other activities, and the sites chosen are not of major ecological importance. Environmental damage has been minimal since the bikers were informed from the start that the areas may be temporary if not used properly. Management monitoring of the areas is constant, and the plan seems to be working well so far (Barnett, 1971).

In attempting to provide recreation areas for a variety of users, managers must consider the real needs of users. Managers and recreationists sometimes differ in their concept of what is an "environmental experience" (Clark, Hendee, and Campbell, 1971). If a manager sees an area becoming heavily used, he may assume that hardening the site will improve the facility. Those who are seeking dispersed experiences in recreation may think that developing an area would ruin it, and they will go elsewhere to find a place where their needs can be met (Seventh World Forestry Congress, 1972). Demand for dispersed recreation settings is increasing with the rise in the number of users and because many users are shifting their preferences toward the primitive end of the recreation spectrum (Hendee and Stankey, 1973).

The goal of managing recreation areas is to provide a wide variety of opportunities to meet the many different needs of users. Managers should plan the uses of specific

areas according to the needs of recreationists (Wagar, 1966). Studies have shown that ORV use on public lands is here to stay. Management of their use is essential. Conflicts between managers and users need to be recognized and understood in order to improve the managers' ability to make the right decisions in land use planning.

THE ONE-WAY CONFLICT AMONG USERS

Conflicts between managers and users represent only part of the recreation land use problem. Managers are given the task of managing public lands to minimize conflicts among users. It would seem helpful, then, to identify the types of conflicts that exist between user groups. Identification of the types of conflicts involved can, in turn, guide managers in their decision-making process as they decide how public lands will be used.

Many studies have shown that the conflict between mechanized and non-mechanized recreationists is "one-way." Very often, those pursuing non-mechanized forms of recreation are bothered by the presence of ORV users. The ORV users, however, are often indifferent to or unaware of the presence of non-mechanized users. A study by Lucas (1964) in the Boundary Waters Canoe Area in Minnesota showed that canoeists objected to seeing and hearing motor boats, but those in motor boats did not mind seeing canoeists. Some even thought that their experience was enhanced by the sight of canoes.

Nevertheless, because the goals of non-mechanized recreation participants are often not achieved because of the presence of ORVs, the incompatibility of the two activities requires management decisions. If the conflict is one-way, then it would seem pointless to regulate the non-mechanized activities. The ORVs are the ones to be regulated because they are impairing the experience of other groups (Department of the Interior, 1978).

REGULATING OFF-ROAD VEHICLE USE

Executive Order 11644 was issued in 1972 to provide a unified federal policy for the use of ORVs on public lands. It directed each land agency head to develop and issue regulations and administrative instructions concerning ORVs. The order also directed the agencies to determine on which areas ORV use should be permitted or prohibited. Then in 1977, Executive Order 11989 was issued to clarify and emphasize the right of land managers to close particular areas or trails threatened by serious damage.

The development of regulations for ORV use by each of the public land agencies has had varying success. ORVs have been completely prohibited on land administered by the Army Corps of Engineers and the Bureau of Reclamation. The National Park Service restricts them to designated roads. The Fish and Wildlife Department allows them to travel only on roads leading to observation points.

The Bureau of Land Management (BLM) leaves all lands "undesignated" until the areas can be studied. All BLM lands must be designated by 1987 as "open," "closed," or "restricted" for ORV use. The designated lands are monitored, and the authorized officer has the right to make changes in the designations when necessary (Department of the Interior, 1976). Because lands administered by the BLM are for multiple use, ORV use is considered appropriate. However, vehicle operations must comply with land designation regulations, operating conditions, and vehicle standards (Department of the Interior, 1975).

The Forest Service also administers lands for multiple use, and ORVs are considered an appropriate use. The Regional Foresters were given the responsibility of designating areas and trails for ORV use. The analysis of ORV use was to consider noise, safety, the quality of the recreation experiences provided, potential impacts on soil, vegetation, wildlife, habitat, and existing or proposed recreational uses of the same or neighboring lands (Department of the Interior, 1975).

The BLM and Forest Service have been plagued with criticism since their Environmental Impact Statements (EIS) and ORV regulations were released. Many critics believe that, following Executive Order 11644, the Federal agencies have not taken advantage of their authority to construct environmentally sound and effective ORV regulations (Rosenberg,

1976). EISs and ORV management plans have also been criticized for being too vague. Many of the ORV plans do not list use standards and do not specifically state procedures to be followed in determining the ability of an area to meet such standards under the pressure of ORV use (ORV Monitor, 1976). The Society of American Foresters (1979) recommends that "(o)ff-road vehicles should be allowed only on forest roads, trails and areas, either new or existing, which are explicitly designated for such use." Rosenberg (1976) suggests marking all trails and areas with signs to prevent confusion. He stresses that unifying regulations within the Forest Service would prevent lax regulations in one jurisdiction from defeating stricter regulations in another. The American Motorcycle Association (A.M.A., undated) agreed that an inventory of existing trails should be taken to identify adverse environmental effects. The Association maintains, however, that not every "effect" is "damage." They suggest that managers take minimum steps to halt adverse effects.

When the ORV regulations on BLM lands were overturned by the National Wildlife Federation vs. Morton case in 1975, new regulations had to be made. The Wilderness Society (1976) urged the public to support the protection of BLM lands by writing letters to the agency. They maintained that the BLM would not make many changes in their original regulations because of their fear of repercussions from the large, well-organized, aggressive ORV lobby effort. The Society suggested

closing most BLM lands to ORV use until a detailed study could be conducted. Only those existing trails and rough roads and areas that were already heavily used should continue to provide ORV opportunities.

HYPOTHESES

As interest in outdoor recreation activities increases, more and more people are using finite areas of land. Unfortunately, the size of recreation land areas cannot increase with the increasing number of people who want to use them. Recreational activities are not always compatible, and compromise and controls are often necessary.

The literature has shown that recreation lands sometimes serve as stages for conflicts. Two or more mutually exclusive activities happening in the same place at the same time may cause a conflict. This leads to the first and most important null hypothesis of this study: mechanized and non-mechanized users view their recreational activities as not mutually exclusive and feel they can share public lands without conflict. This hypothesis will be tested using two different kinds of conflict: (1) general attitudes regarding use of the Santa Fe National Forest, and (2) attitudes toward the other group--- what they think of each other and whether or not they mind sharing the same public lands for their activities.

The first hypothesis is closely related to the second: when conflicts between the two user groups do exist, they are equally experienced by both groups. Non-mechanized

users are no more often bothered by the presence of ORVs than ORV users mind seeing non-mechanized users.

The socio-demographic information of ORV and non-mechanized users will be compared and contrasted (1) to see if, as one study suggested (Knopp and Tyger, 1973), participants in each group fit into the stereotypical molds their counterparts put them in, (2) to see if the ORV users in the Santa Fe National Forest have similar characteristics to those in other studies cited in the literature (Chilman and Kupcikevicius, 1973), and (3) to provide socio-demographic information on non-mechanized users, since little seems to be available in the literature. This information leads to the third hypothesis: the personal characteristic profiles of mechanized and non-mechanized users are the same.

SUMMARY

In summary, the literature has shown that there are many individuals and groups who feel very strongly about the management of ORVs on public lands. Some support their use very strongly, while others believe that the federal agencies need to strengthen their backbones and use their authority to make ORV regulations more strict.

This polarization of views is caused by lack of communication and understanding between the two user groups, lack of common expectations for use of recreation areas, and lack of common values.

Most socio-demographic information on ORV users

described the trail biker. Personal profile information showed bikers to be, among other things, predominantly male, about 29 years old, and traveling in groups, often with families. Trail biking and other off-road vehicle riding tend to be a social as well as an outdoor experience.

Off-road vehicles provide enjoyment for many people. They provide opportunities for families to spend time together in an age when the existence of the family as an institution is in jeopardy.

There are many, however, who see problems created by ORVs on public lands. Noise is one of the major disturbances because it is incompatible with the goals of solitude and communicating with nature.

Public land managers must also deal with the conflicts between mechanized and non-mechanized users. It is they who often hold the key to reducing and solving user conflicts by the choices they make in administering their lands. They must search for the best balance of activities by conducting user studies, asking for user input, and integrating or dispersing activities which may cause conflicts.

Finally, it is stated throughout the literature that ORVs need to be regulated. Since many of the user conflicts are "one-way" conflicts, it would be pointless to restrict or regulate the non-mechanized group. Public land agencies have been directed by Executive Orders 11644 and 11989 to establish regulations for ORV use. These agencies need to

use their power constructively to create effective, yet fair, regulations. This will require more quantitative data concerning user opinions, suggestions, and perceptions of the problem.

CHAPTER III

PROCEDURES

This chapter presents the methodology used in this study. Specifically, it describes the study area, the survey questionnaire and the data obtained, in addition to the statistical procedures utilized in analyzing that data. This methodology was designed to differentiate between two outdoor recreation user groups--mechanized and non-mechanized users--to compare their socio-demographic characteristics, background information, general attitudes toward the use of the Forest, and attitudes which cause conflicts between the two groups.

STUDY AREA

The following description is provided to assist the reader in becoming more familiar with the study area:

The Santa Fe National Forest is located in north central New Mexico near the towns of Santa Fe and Los Alamos. It is a generally heavily wooded area, easily accessible from either town. The area is extremely mountainous, with elevations ranging from 7,000 to 12,000 feet. Because of its proximity to the urban area of Santa Fe (pop. 50,000), the Santa Fe segment of the Tesuque district (hereafter referred to as the Tesuque district) of the Santa Fe National Forest

is particularly heavily used. Outdoor recreation activities span all four seasons, with hiking, backpacking, camping, fishing, and horseback- and vehicle-riding on back-country roads, areas, and trails concentrated in the summer and fall.

The Tesuque district is ribboned with trails which are in various states of existence, some resembling six-foot wide super-highways, and some almost non-existent because of lack of use. The district also contains the Santa Fe Ski Basin with a paved road leading from Santa Fe to the ski area, a distance of about 15 miles. The road is heavily used all year around because it passes Hyde State Park camping and picnic areas and many trail-heads. Beyond the ski basin, the Tesuque district borders the Pecos Wilderness area, with the Winsor Trail (#254) entering into the wilderness approximately one mile from the ski basin. Because this entire segment of the Forest district is so heavily used by mechanized and non-mechanized recreationists, it provides an excellent setting for a study concerning recreation conflicts.

QUESTIONNAIRE DESIGN

The main tool for gathering information in this field study was a self-administered questionnaire. In order to make the survey relevant to each user group, its questions and statements were designed to deal directly with each subgroup. Therefore, a separate survey was prepared for each group: one for ORV users and one for non-mechanized recreation enthusiasts, each containing the same or opposite statements so that a

comparison of responses of the two groups could be made. The survey contained questions on socio-demographic characteristics, general attitudes on the use of the Forest, and attitudes which cause conflicts between the two user groups. The socio-demographic characteristics and background information variables were categorized variables. The ethnic group, sex, occupation, and group type variables were nominally categorized. The variables of age, education, group size, community size, and number of visits to the area were ordinally categorized. Attitudinal variables concerning the use of ORVs on public lands were categorized as Likert scales. All variables in this study were used as they appear in the survey, in no case requiring the construction of additional indices because each variable measured separate and distinct attitudes.

Rather than pretesting or conducting initial screening interviews, the following sources and experts in the fields of the development of surveys and in public land management were consulted as this survey was developed: (1) a similar study conducted in the Little Sahara Recreation Area of central Utah (Nelson, 1976), (2) a survey specialist from the Heritage Conservation and Recreation Service in Albuquerque, New Mexico, (3) an education co-ordinator from the New Mexico State Department of Education, (4) a Sierra Club lawyer, (5) an assistant attorney general whose client is the State Department of Education, and (6) recreation specialists from the Forest Service Southwest District office and Tanguas District.

SAMPLING DESIGN

Specific trails and areas were chosen as survey collection sites using the suggestions made by a district ranger from the Tesuque District (Statement by Garth Heaton, 1978). The Santa Fe segment of the Tesuque District contained certain trails and areas which were recognized as areas heavily used by both groups. These included: (1) the Winsor Trail (#254), which is an access trail for the Pecos Wilderness leading from the Santa Fe Ski Basin, (2) Aspen Meadows, (3) the vicinity of Aspen Ranch, (4) Aspen Vista, (5) the Borrego Trail (#150), (6) Hyde State Park, (7) the Big Tesuque Trail, (8) the Santa Fe Ski Basin, and (9) Caja del Rio. An effort was also made to survey users in the Atalaya Mountain area, but there were no users at the time of survey collection.

The on-site surveys were conducted during the months of July and August of 1978. An effort was made to reach weekday and weekend users, as well as morning and afternoon users by conducting the survey on Tuesday through Sunday of each week. Surveys were taken in four-hour time spans each day, alternating between the hours of 8 and 12 a.m. and 12 to 4 p.m. Thus, during the first week, surveys were collected from 8-12 a.m. on Tuesday, Thursday, and Saturday, and from 12-4 p.m. on Sunday, Wednesday, and Friday. During the following week, the time spans were reversed to provide a random sample of

both user groups. As might be expected, weekend use of the Forest was heavier than weekday use, and afternoon use exceeded morning use.

The best method of reaching users during the on-site survey collection periods was to remain for a period of time on one location in a specific area or on one trail. As participants passed, they were asked to take five minutes to fill out a questionnaire concerning outdoor recreation activities in the Santa Fe National Forest. Each person in every group that passed was asked to complete the survey, provided he or she was above the age of 14. Therefore, there were no certain characteristics sought in choosing participants in the survey. Surveys were taken from ORV users (N=109) and non-mechanized users (N=121). Each questionnaire was checked over carefully to make sure that all parts had been completed. If an item was missed, the questionnaire was returned to the participant for completion. A short discussion often followed the completion of the surveys to get a better feel for the opinions and attitudes of users.

ORGANIZATION AND ANALYSIS OF DATA

Data from surveys were coded, keypunched and placed in a computer system file. The computer program, Statistical Package for the Social Sciences (SPSS), was used for the organization of data and analysis procedures. Data were organized into subfiles.

A combination of univariate, bivariate, and multi-

variate statistical techniques were used for these analyses. Univariate frequency distributions and associated statistics were used for delineating basic sample characteristics of all variables. Cross-tabulations were used to evaluate differences between ORV and non-mechanized users in their socio-demographic characteristics and general attitudes toward the use of the Forest. Specifically, chi square was chosen as the test statistic since it not only indicates the strength of a relationship between nominal or ordinal variables, but also evaluates the level of significance of the relationship between two variables. The conventional .05 level of significance was used in the analyses. Factor analysis was used to discover the differences between the two user groups in the underlying structure of their attitudes toward each other's use of the Forest. Although factor analysis is specifically designed for interval or ratio level data, the use of ordinal level data does not appear to compromise its accuracy (Kim, 1975.)

RELIABILITY AND VALIDITY OF MEASURES

The issues of reliability and validity (see Appendix A for definitions) are critical in any research endeavor. Whether the variables designed for a study are reliable and valid indicators of what the researcher intends to measure determines the accuracy and usefulness of the results. These issues, however, are not nearly as complex when evaluating single item measures as they are for evaluating multiple-item

measures, or scales.

The primary focus of this study is not to measure some abstract concept by the use of a number of items (e.g. intelligence as measured by a multiple-item test). Rather, the study concerns itself with a number of demographic and activity-related facts about each respondent, in addition to a number of attitudes measured by single items. Thus, whether a group of items reliably measures some abstract concept (i.e. the basic issue of reliability) is not relevant to this study.

In addition, the validity of the single-item measures in this study is best judged simply on the basis of their face value (i.e. face validity--see Appendix A for definition) since both content validity and construct validity (see Appendix A for definitions) are more applicable for multiple-item measures. On this basis, the attitude items appear to measure what they are purported to measure. Furthermore, the fact that the attitude items differentiate mechanized from non-mechanized users indicates that they are associated with a respondent's "behavior in situations to which they should predict if (they are) measuring what (they) purport to measure" (i.e. criterion validity--see Appendix A for definition) (Neale and Liebert, 1980).

CHAPTER IV

FINDINGS

The purpose of this chapter is to present the findings of this study. It includes sections and tables which describe the characteristics of the sample, the differences between ORV users and non-mechanized users in their use of the Santa Fe National Forest, and the attitudinal differences between the two user groups. There are no missing cases in any of the statistical analyses because each questionnaire was filled in completely.

SAMPLE CHARACTERISTICS

This section describes the frequency distributions of the responses of each user group concerning their socio-demographic characteristics and general information regarding use of the Forest. In addition, cross-tabulations and chi square are used to evaluate any significant differences between the two groups.

Chi square is calculated by using the formula
$$X^2 = \sum \frac{(O-E)^2}{E}$$
 wherein E denotes the expected frequency, while O denotes the observed frequency (Johnson, 1973). Chi square shows whether or not there is actually a relationship between the independent and dependent variables by comparing the observed or attained results with those expected by chance.

A total of eleven chi square tests were made, six of which were found to be significant at the five percent level of confidence.

The non-mechanized user group was almost equally divided between males and females, with slightly more being males (51.2%) than females (48.8%). The ORV user group, however, approached three-fourths (70.6%) male. This discrepancy between the two groups resulted in a statistically significant difference ($p \cong .004$) when tested with chi square.

Table 1 presents the chi square analysis which determined a statistically significant difference ($p \cong .009$) between the ages of ORV users and non-mechanized users.

TABLE 1. Relative Frequencies and Chi Square Analysis of the Ages of Users of the Santa Fe National Forest.

Age	ORV Users (N=109)	Non-Mechanized Users (N=121)
14-20	33.0%	28.1%
21-30	42.2%	29.8%
31-40	17.4%	22.3%
41-50	4.6%	11.6%
<u>Over 50</u>	<u>2.7%</u>	<u>8.3%</u>
TOTAL	100.0%	100.0%
	$X^2 = 13.31$	
	df = 4	
	$p \cong .009$	

This two by five classification of the ages of users according to whether they were ORV or non-mechanized participants produced a chi square value of 13.31. With four degrees of freedom, the value of 13.31 was significant beyond the five percent level of significance.

Over 80% of all non-mechanized respondents were 40 years old or younger, while the ORV user group was generally younger. Slightly more than three-fourths (75.2%) of all ORV respondents were 30 years old or younger.

Table 2 presents the chi square analysis which illustrates a statistically significant difference ($p=.000$) between the races or ethnic groups to which ORV and non-mechanized respondents belonged.

TABLE 2. Chi Square Analysis of the Race/Ethnic Groups of Users of the Santa Fe National Forest.

Race/Ethnic Group	ORV Users (N=109)	Non-Mechanized Users (N=121)
Hispanic	50.5%	16.5%
Anglo	45.0%	79.3%
American Indian	3.7%	2.5%
Black	0.9%	0.0%
<u>Other</u>	<u>0.0%</u>	<u>1.7%</u>
TOTAL	100.0%	100.0%
	$X^2 = 34.18$	
	df = 4	
	$p \cong .000$	

The non-mechanized group was overwhelmingly Anglo (79.3%), while the ORV group was approximately equally divided between Hispanics (50.5%) and Anglos (45.0%). There were very few respondents in either group who were not Hispanic or Anglo.

Table 3 presents the chi square analysis which determined a statistically insignificant difference ($p \approx .660$) among the occupations of all respondents.

TALBE 3. Chi Square Analysis of Occupations of Users of the Santa Fe National Forest.

Occupations	ORV Users (N=109)	Non-Mechanized Users (N=121)
Agriculture	1.8%	0.8%
Clerical and/or Sales	4.6%	1.7%
Housewife	3.7%	3.3%
Professional/Managerial	33.9%	34.7%
Unskilled Labor	11.9%	12.4%
Skilled Labor	16.5%	12.4%
Service	5.5%	4.1%
<u>Other (eg. Student)</u>	<u>22.0%</u>	<u>30.6%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 5.88$	
	df = 8	
	$p \approx .660$	

The occupations of both groups were distributed basically the same with approximately one-third of respondents in both groups falling into the professional-managerial category. The remaining seven categories were also distributed similarly.

In contrast to the similar occupations of the two user groups, the levels of educational background were markedly different. Table 4 presents the chi square analysis which determined a statistically significant difference ($p \cong .000$) between the levels of education attained by ORV and non-mechanized respondents.

TABLE 4. Chi Square Analysis of Levels of Education of Users of the Santa Fe National Forest.

Level of Education	ORV Users (N=109)	Non-Mechanized Users (N=121)
Less than 8th grade	0.0%	0.8%
Eighth grade graduate	1.8%	4.1%
Some high school	19.3%	18.2%
High school graduate	39.4%	6.6%
Less than 2 yrs. college	11.9%	11.6%
More than 2 yrs. college, no degree	9.2%	13.2%
Bachelor's Degree	11.9%	19.8%
Master's Degree	3.7%	18.2%
PhD.	<u>2.8%</u>	<u>7.4%</u>
TOTAL	100.0%	100.0%
$X^2 = 115.29$	df = 8	$p \cong .000$

The non-mechanized group is generally the more educated group, with more than 70% being educated beyond high school. Only 39.4% of the ORV respondents were even high school graduates, with an additional 39.5% having more than a high school education.

Two variables helped to establish from where users came to use the Santa Fe National Forest study area. The vast majority of users in both groups were residents of New Mexico. However, significantly ($p \approx .002$) more ORV users (89%) were residents than non-mechanized users (71.9%). There was no significant difference ($p \approx .088$) between the size of the communities from which each group came. Table 5 presents the chi square analysis which determined a statistically insignificant difference ($p \approx .088$) between the sizes of the communities from which respondents of both groups came.

TABLE 5. Chi Square Analysis of Community Sizes from which Users of the Santa Fe National Forest came.

Community Size	ORV Users (N=109)	Non-Mechanized Users (N=121)
Rural	8.3%	8.3%
Village (under 2,500)	11.9%	4.1%
Town (2,500-9,999)	4.6%	5.0%
Small City (10,000-99,999)	65.1%	62.8%
<u>Large City (100,000 or more)</u>	<u>10.1%</u>	<u>19.8%</u>
TOTAL	100.0%	100.0%
$X^2 = 8.09$	df=4	$p \approx .088$

A large majority in each group came from a small city, many of those being from the city of Santa Fe. A much smaller percentage came from a large city, with an additional 11.9% of the ORV respondents coming from a village.

For the majority of both groups, the visit they were experiencing at the time of filling out the questionnaire was not their first visit to the area. More than three-fourths (77.1%) of the ORV respondents had been to the area before, and a slightly lower percentage (67.8%) of the non-mechanized users were also not on their first visit. This is not a statistically significant difference ($p \approx .155$).

Table 6 presents the chi square analysis which determined a statistically insignificant difference ($p \approx .270$) between the number of times respondents in each group had visited the Santa Fe National Forest during the past two years.

TABLE 6. Chi Square Analysis of the Number of Visits of Users in the Santa Fe National Forest during the past two years.

Number of Visits	ORV Users (N=109)	Non-Mechanized Users (N=121)
1 - 2	12.8%	18.2%
3 - 5	16.5%	14.0%
6 -10	13.8%	9.9%
More than 10	33.9%	25.6%
<u>None</u>	<u>22.9%</u>	<u>32.2%</u>
TOTAL	100.0%	100.0%
$X^2 = 21.24$	df=4	$p \approx .270$

Many respondents from both groups were well-established users, with one-fourth of the non-mechanized users and one-third of the ORV users having been to the area more than ten times. In general, the distributions of this variable were similar for both user groups.

Table 7 presents the chi square analysis which determined a statistically insignificant difference ($p \approx .062$) between the types of groups with which users from each group were travelling.

TABLE 7. Chi Square Analysis of Group Types of Users of the Santa Fe National Forest.

Group Type	ORV Users (N=109)	Non-Mechanized Users (N=121)
Alone	3.7%	4.1%
Family	28.4%	27.3%
Friend	46.8%	33.1%
Family and Friends	9.2%	9.1%
<u>Club</u>	<u>11.9%</u>	<u>26.4%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 8.97$	
	df = 4	
	$p \approx .061$	

Most users from both groups were travelling with either family or friends. Another one-fourth (26.4%) of non-mechanized users were travelling with a club or organized group, whereas only 11.9% of ORV users were with such groups.

Table 8 presents the chi square analysis which determined a statistically significant difference ($p \cong .000$) in the size of the groups with which users were travelling.

TABLE 8. Chi Square Analysis of Group Sizes of Users in the Santa Fe National Forest.

Group Size	ORV Users (N=109)	Non-Mechanized Users (N=121)
1 - 2	22.9%	45.5%
3 - 5	23.9%	27.3%
6 -10	16.5%	11.6%
11-20	19.3%	0.0%
<u>21 or more</u>	<u>17.4%</u>	<u>15.7%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 21.24$	
	df = 4	
	p \cong .000	

Most of the non-mechanized users were travelling in smaller groups than the ORV users. Almost three-fourths (72.8%) of the non-mechanized users were in groups of five or less, and almost one half (45.5%) were alone or in pairs. However, only 46.8% of the ORV users were in groups of five or less, and only 22.9% were alone or in pairs. Furthermore, about 37% of the ORV respondents were in groups of ten or more, while only 15.7% of the non-mechanized users were in such large groups.

Finally, the variable that showed the method of travel

for users in each group revealed that the overwhelming majority of non-mechanized users was day hiking (85.1%), with an additional 13.2% back packing, and only 1.7% horseback riding. Table 9 presents the frequency distributions of the methods of travel for the ORV users in the study.

TABLE 9. Frequency Distributions of Methods of Travel of ORV Users in the Santa Fe National Forest.

Method of Travel	ORV Users (N=109)
Four-wheel drive	11.9%
Pick-up truck	35.8%
Passenger car	22.9%
Motorcycle or Trail Bike	17.4%
Minibike	0.0%
<u>Other (i.e. Van)</u>	<u>11.9%</u>
TOTAL	100.0%

GENERAL ATTITUDINAL DIFFERENCES

There are eighteen variables in this portion of the study, nine of which measure general attitudes toward use of the Forest, and nine of which show how users feel about the importance of certain safety standards and regulations for ORVs. The nine general attitudinal variables were evaluated using cross tabulations and chi square. Of these, seven showed a statistically significant difference between the two user groups. The nine variables measuring safety standards were evaluated using frequency distributions and percent

differences.

The first attitude measured, whether or not users were bothered by meeting or being passed by ORVs, showed a statistically significant difference ($p \cong .000$) between the two user groups. Table 10 presents the chi square analysis of user reaction to the statement "It bothers me to meet or pass off-road vehicles on this trail/road."

TABLE 10. Chi Square Analysis of User Reaction to the Statement "It bothers me to meet or pass off-road vehicles on this trail/road."

User Reaction	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	9.2%	47.9%
Agree	11.0%	17.4%
Neutral	45.9%	20.7%
Disagree	25.7%	8.3%
<u>Strongly Disagree</u>	<u>8.3%</u>	<u>5.8%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 52.96$	
	df = 4	
	$p \cong .000$	

Most non-mechanized users (65.3%) strongly agreed or agreed with the statement, while few ORV users (20.2%) felt the same way. Many ORV users strongly disagreed or disagreed (34.0%), and those who did not disagree were neutral (45.9%).

Table 11 presents the chi square analysis of user

reactions to the statement "Roaming into the mountains is an enjoyable part of my trip."

TABLE 11. Chi Square Analysis of User Reactions to the Statement "Roaming into the mountains is an enjoyable part of my trip."

User Reaction	ORV Users (N=109)	Non-mechanized Users (N=121)
Strongly Agree	54.1%	62.8%
Agree	32.1%	29.8%
Neutral	12.8%	3.3%
Disagree	0.0%	4.1%
<u>Strongly Disagree</u>	<u>0.9%</u>	<u>0.0%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 13.12$	
	df = 4	
	p \cong .011	

Reactions from each user group were shown to have statistically significant differences ($p \cong .011$). However, there were five out of ten cells which had an $N \leq 5$, causing the distribution of responses between the two groups to look significantly different when, in fact, the percentages were actually quite similar. Thus, the overwhelming majority of users from both groups (ORV=86.2%, non-mech.=92.6%) agreed or strongly agreed with the statement, with much higher percentages (ORV=54.1%, non-mech.=62.8%) strongly agreeing.

Table 12 presents the chi square analysis of user reactions to the statement "Off-road vehicles should not be

restricted in the Santa Fe National Forest."

TABLE 12. Chi Square Analysis of User Reactions to the Statement "Off-road vehicles should not be restricted in the Santa Fe National Forest."

User Reaction	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	16.5%	6.6%
Agree	17.4%	9.9%
Neutral	22.0%	9.9%
Disagree	22.0%	25.6%
<u>Strongly Disagree</u>	<u>22.0%</u>	<u>47.9%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 23.85$	
	df = 4	
	p \cong .000	

Almost three-fourths (73.5%) of the non-mechanized group disagreed or strongly disagreed. Contrary to expectations, although ORV users showed much less disagreement, a large percentage of them (44%) still felt that some restrictions were necessary. On the other hand, 33.9% of ORV users agreed or strongly agreed with this statement as compared to only 16.5% of the non-mechanized users.

Table 13 presents the chi square analysis of user reactions to the statement "I wish I wouldn't see any other people on this whole trip." The statement, designed to show

the importance of solitude for users of each group, measured a statistically significant difference ($p \cong .000$).

TABLE 13. Chi Square Analysis of User Reactions to the Statement "I wish I wouldn't see any other people on this whole trip".

User Reactions	ORV Users	Non-Mechanized Users
	(N=109)	(N=121)
Strongly Agree	8.3%	14.9%
Agree	8.3%	21.5%
Neutral	22.9%	25.6%
Disagree	33.0%	30.6%
<u>Strongly Disagree</u>	<u>27.5%</u>	<u>7.4%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 22.66$	
	df = 4	
	$p \cong .000$	

Solitude, as measured by this statement, was more important to non-mechanized users (36.4%) than ORV users (16.6%). About one-fourth of all users was neutral toward this statement, and about one-third of the users disagreed. A striking difference can be seen in the percentages of those who strongly disagreed (ORV=27.5%, non-mechanized=7.4%). It was these differences in the extreme categories of the variable which caused the statistically significant differences between the two groups.

Table 14 presents the chi square analysis of user reactions to the statement "It is unsafe to have off-road vehicles and foot travelers on the same trails."

TABLE 14. Chi Square Analysis of User Reactions to the Statement "It is unsafe to have off-road vehicles and foot travelers on the same trails."

User Reactions	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	14.7%	30.6%
Agree	27.5%	44.6%
Neutral	23.9%	19.8%
Disagree	26.6%	4.1%
<u>Strongly Disagree</u>	<u>7.3%</u>	<u>0.8%</u>
TOTAL	100.0%	100.0%
	$X^2 = 37.12$	
	df = 4	
	p \cong .000	

Not only did three-fourths (75.2%) of the non-mechanized users agree or strongly agree that it is unsafe for ORVs and foot travelers to share trails, but only 4.9% disagreed or strongly disagreed. Many ORV users (42.2%) also agreed, but in a much smaller percentage than non-mechanized users. The real difference lies in the fact that one-third (33.9%) disagreed or strongly disagreed.

The responses of users to the idea that there should be more areas open to ORVs in the Santa Fe National Forest

were particularly interesting because agreement and disagreement of the two user groups were absolutely reversed. Table 15 presents the chi square analysis of user reactions to the statement "There should be more areas and trails open to off-road vehicles in the Santa Fe National Forest."

TABLE 15. Chi Square Analysis of User Reactions to the Statement "There should be more areas and trails open to off-road vehicles in the Santa Fe National Forest."

User Reactions	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	15.6%	7.4%
Agree	40.4%	14.9%
Neutral	21.1%	19.8%
Disagree	13.8%	28.1%
<u>Strongly Disagree</u>	<u>9.2%</u>	<u>29.8%</u>
TOTAL	100.0%	100.0%
	$X^2 = 34.92$	
	df = 4	
	p \cong .000	

Almost 60% (57.9%) of the non-mechanized users disagreed or strongly disagreed, while 56.0% of the ORV users agreed or strongly agreed. These opposite responses were coupled with equally opposite responses on the other end of the spectrum. Almost 23% (22.3%) of non-mechanized users agreed or strongly agreed while 23.0% of ORV users disagreed or strongly disagreed.

The last variable for which a statistically significant difference was shown ($p \approx .000$) was the statement "I came here to become more aware of nature and to discover new vistas and places." Table 16 presents the chi square analysis of user reactions to this statement.

TABLE 16. Chi Square Analysis of User Reactions to the Statement "I came here to become more aware of nature and to discover new vistas and places."

User Reactions	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	22.0%	36.4%
Agree	39.4%	47.1%
Neutral	30.3%	9.1%
Disagree	6.4%	7.4%
<u>Strongly Disagree</u>	<u>1.8%</u>	<u>0.0%</u>
TOTAL	100.0%	100.0%
	$X^2 = 20.52$	
	df = 4	
	$p \approx .000$	

No real differences existed in the amount of disagreement with this statement by the two user groups. The important difference was in the strength of their agreement, with 83.5% of all non-mechanized users agreeing or strongly agreeing and only 61.4% of ORV users in the same categories. In addition, a large percentage of ORV users (30.3%) were neutral.

There were only two attitudinal variables which showed no statistically significant differences. Table 17 presents the chi square analysis of the first of these two variables, "I am looking for challenge and adventure on this trip."

TABLE 17. Chi Square Analysis of User Reactions to the Statement "I am looking for challenge and adventure on this trip."

User Reactions	ORV Users	Non-Mechanized Users
	(N=109)	(N=121)
Strongly Agree	18.3%	14.9%
Agree	43.1%	30.6%
Neutral	30.3%	41.3%
Disagree	7.3%	10.7%
<u>Strongly Disagree</u>	<u>0.9%</u>	<u>2.5%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 6.36$	
	df = 4	
	p \approx .174	

Although statistically insignificant, ORV users agreed more often (61.4%) with the statement than did non-mechanized users (45.5%). This difference is masked, however, when neutral responses are considered (ORV=30.3%, non-mechanized=41.3%), thus making the percentages of non-disagreement responses of the two user groups similar (ORV=91.7%, non-mechanized=86.8%).

The other statement which showed no statistically

significant differences was "I like this area of the Tesuque District because of the facilities (campgrounds, restrooms, etc.) that are here." Table 18 presents the chi square analysis of user reactions to this statement.

TABLE 18. Chi Square Analysis of User Reactions to the Statement "I like this area of the Tesuque District because of the facilities (campgrounds, restrooms, etc.) that are here."

User Reactions	ORV Users (N=109)	Non-Mechanized Users (N=121)
Strongly Agree	11.9%	6.6%
Agree	25.7%	19.0%
Neutral	35.8%	39.7%
Disagree	17.4%	24.8%
<u>Strongly Disagree</u>	<u>9.2%</u>	<u>9.9%</u>
TOTAL	100.0%	100.0%
	$\chi^2 = 4.65$	
	df = 4	
	p \approx .325	

Responses to this statement showed slightly more agreement among ORV users (37.6%) than non-mechanized users (25.6%). This might reflect the fact that ORV users are more likely to use Forest facilities.

Table 19 presents the nine variables of specific safety standards and regulations for ORVs and the percentages of users

from each group that were in favor of those ORV controls.

TABLE 19. Percentages of Users favoring Specific Safety Standards and Regulations for ORVs.

Safety Standard or Regulation	ORV Users (N 109)	Non-Mechanized Users (N 121)
Spark Arrestors	61.5%	68.6%
Mufflers	67.0%	80.2%
Vehicle Inspections	41.3%	50.4%
Speed Limits	53.2%	67.8%
Permit System	25.7%	63.6%
Trail Signs to show Open/Closed Areas	72.5%	86.8%
Additional Law Enforcement	13.8%	43.8%
Other (e.g. "effective barriers")	4.6%	14.9%
None of the Above	5.5%	5.0%

In general, more non-mechanized users were in favor of safety standards and regulations for ORVs although 95% of the participants in both groups felt that some controls were necessary.

DIFFERENCES IN ATTITUDINAL STRUCTURE

This section describes the results of the factor analysis. . Factor analysis can be used to discover underlying structures or patterns of variables or to verify hypotheses. Here it is used as a discovery technique to determine the attitudes that ORV and non-mechanized users have

toward each other.

The non-mechanized group variance resulted in three factors, while the ORV group had four. This indicates that the responses of the non-mechanized group were more homogeneous, since the smaller number of factors indicates a more similar variance for the sample. Tables 20 and 21 present the factor loadings, eigenvalues, and percents of variance of factors for each recreation group, ORV users and non-mechanized users, respectively. The variables indicate that there were fewer differences in attitudes for the non-mechanized group than for the ORV group. This is further shown by the first factor of the non-mechanized group, which accounts for almost 74% of the variance for the total variable. However, the first factor for the ORV group accounts for only 58.6% of the variance.

Although there are three variables for the non-mechanized group, almost all share a loading of .4 or above with Factor 1, with the exception of Variable 30. This variable is probably different from the other variables and thus forms the basis of a separate factor because it deals with a specific type of ORV, namely the pick-up truck. This probably also accounts for the fact that Variable 14 has a higher loading for Factor 3 than for Factor 1, because pick-up trucks are specifically mentioned. All other variables have higher loadings in Factors 1 or 2. The cumulative percentage of the variance of the first two factors is almost 92%. Because the

TABLE 20. Factor Loading for Attitudinal Variables of Non-Mechanized Users.

Factor Name and Item	Factor Loading
1. <u>Anti-ORV Encounters</u>	
Variable 20. Preference for encountering other hikers/horseback riders than off-road vehicles.	.918
Variable 17. Dislike for having pace interrupted by off-road vehicles.	.749
Variable 19. Preference for prohibiting off-road vehicles in the study area.	.743
Variable 11. Dislike for meeting motorcycles and mini-bikes on this trail/road.	.564
Variable 18. Choice of trail to avoid meeting pick-up trucks and four-wheel drive vehicles.	.538
Variable 14. Dislike for being passed by four-wheel drive vehicles and pick-up trucks.	.434
2. <u>Aesthetics</u>	
Variable 21. Opinion that vehicle drivers are more careless than horseback riders in the disposal of litter.	.736
Variable 27. Opinion that vehicle drivers lack a sense of adventure and challenge.	.582
Variable 13. Enjoyment of hiking/horseback riding in the Forest because it makes more areas accessible.	.528
Variable 12. Opinion that off-road vehicle drivers are the main cause of litter in the Santa Fe National Forest.	.488
Variable 24. Opinion that ORV drivers are more aware of nature than horseback riders.	-.447

Factor Name and Item	Factor Loading
<u>3. Prohibition of ORVs</u>	
Variable 14. Dislike for being passed by four-wheel drive vehicles and pick-up trucks.	.661
Variable 30. Prohibition of pick-up trucks on this trail/road.	.623
Variable 11. Dislike for meeting motorcycles and mini-bikes on this trail/road.	.460
EIGENVALUE for Factor 1 = 5.052, Factor 2 = 1.255, Factor 3 = 0.541	
R ² for Factor 1 = 73.8%, Factor 2 = 18.3%, Factor 3 = 7.9%	

TABLE 21. Factor Loading for Attitudinal Variables of ORV Users.

Factor Name and Item	Factor Loading
<u>1. Trail Possessiveness</u>	
Variable 17. Dislike for having speed interrupted by meeting foot travelers on trail.	.678
Variable 12. Opinion that hikers and backpackers are the main cause of litter in the Santa Fe National Forest.	.583
Variable 14. Dislike for having to pass horseback riders on trail.	.563
Variable 10. Desire to see how fast one can go and how much vehicle can take on trail.	.540
Variable 11. Dislike for meeting hikers and backpackers on trail.	.530

Factor Name and Item	Factor Loading
Variable 18. Choice of trail to avoid meeting horseback riders.	.430
<u>2. Negative Imagery of Non-Mechanized Users.</u>	
Variable 21. Opinion that horseback riders are more careless than vehicle drivers in the disposal of litter.	.604
Variable 30. Prohibition of hikers, backpackers, and horses on trail/road.	.549
Variable 27. Opinion that hikers lack a sense of adventure and challenge.	.502
Variable 15. Enjoyment of having a good machine to show off.	.476
Variable 20. Preference for encountering other ORV users than hikers or backpackers.	.407
<u>3. Physical Inability</u>	
Variable 19. Inability to make this trip on foot.	.686
Variable 18. Choice of trail to avoid meeting horseback riders.	.557
<u>4. Preference for ORV Encounters</u>	
Variable 23. Preference for meeting other vehicle drivers than hikers/backpackers on trail.	.936
Variable 20. Preference for encountering other ORV users than hikers or backpackers..	.434

EIGENVALUE for Factor 1=3.996, Factor 2=1.340, Factor 3=0.792, Factor 4=0.691
 R^2 for Factor 1=58.6%, Factor 2= 19.6%, Factor 3= 11.6%, Factor 4= 10.1%

factors are printed out in the order of their importance, and because Factor 3 accounts for only about 8% of the variance, it is therefore ignored.

The responses of the ORV group showed more variance by requiring four factors. The first accounted for only about 59% of the total variance. The percentage of the variance for three factors must be studied before 90% of the total variance is reached. Then, one may have to also consider the fourth variable because its percentage (10.1%) is almost equally as high as the third (11.6%).

The four factors for ORV users and the two for non-mechanized users reflect a series of attitudes. When looking at specific variables and loadings within each factor, one major similarity and several differences between non-mechanized and ORV user groups can be seen. The similarity is that the first factor for each group, which indicates the most important attitudes, reflects a negative view toward sharing trails and areas with other groups.

The first variable for non-mechanized users was named "Anti-ORV Encounters," based on those variables which had factor loadings greater than or equal to .4. The variable with the highest loading (.918) was "I'd rather encounter other hikers/horseback riders than off-road vehicles." The high loading of this variable indicates that the statement strongly reflects the overall attitudes measured by the factor.

Two statements had very similar factor loadings. The variable, "I don't like to have my pace interrupted by having to move aside for off-road vehicles," had a loading of .749, and the variable, "Motorized vehicles should not be allowed here," had an almost equally high loading (.743).

The two variables with the next highest loadings were "I don't like meeting up with motorcycles and mini-bikes on this trail/road" (factor loading=.564), and "I chose this trail to avoid meeting pick-up trucks and four-wheel drive vehicles (factor loading=.538).

The last variable which had a loading greater than .4 is the statement "It bothers me to be passed by four-wheel drive vehicles and pick-up trucks here." Its factor loading was .434, but it also had a higher loading for Factor 3 (.661). Thus, it does not specifically reflect anti-ORV encounters. Because this variable shares a high degree of variance with more than one factor, it is ignored in this study, as is the common procedure.

The second factor for the non-mechanized group is of much less importance to those users, accounting for only 18.3% of the variance. It also contains different variables and measures different attitudes than Factor 1. Again, based on the variables with factor loadings greater than or equal .4, this factor was called "Aesthetics."

The most important variable in this factor was "Vehicle drivers are more careless than horseback riders in the

disposal of litter" (factor loading=.736). The two variables with the next highest loadings were "Vehicle drivers lack a sense of adventure and challenge" (factor loading=.582), and "I enjoy hiking/horseback riding in the Forest because it makes more areas accessible to me" (factor loading=.528). Finally, the last two variables with loadings greater than .4 were "Off-road vehicles drivers are the main cause of litter in the Santa Fe National Forest" (factor loading=.488), and "Off-road vehicles drivers are more aware of nature than horseback riders" (factor loading=-.447). This negative factor loading indicates that the non-mechanized group agreed with the opposite of this statement. All five of these variables revealed the non-mechanized users' appreciation for the aesthetics of the Forest.

The ORV user group had a more evenly distributed variance among all four factors. The first factor, which represented 58.6% of the variance, was named "Trail Possessiveness." The variable with the highest factor loading (.678) was "I don't like to have my speed interrupted by meeting foot travelers on this trail." Then there were four variables with similar loadings. They were "Hikers and backpackers are the main cause of litter in the Santa Fe National Forest" (factor loading=.583), "It bothers me to have to pass horseback riders on this trail" (factor loading=.563), "I want to see how fast I can go and how much my vehicle can take on this trail" (factor loading=.540), and "I don't like meeting up with hikers

and backpackers on this trail" (factor loading .530). The statement, "I chose this trail to avoid meeting horseback riders," also had a loading above .4 (.430), but it shared this loading with the higher loading of .557 in Factor 3. It was therefore ignored because it did not neatly show an attitude related to one factor.

The second factor for the ORV group, which accounted for 19.6% of the variance, was named "Negative imagery of non-mechanized users." The variable with the strongest factor loading (.604) was "Horseback riders are more careless than vehicle drivers in the disposal of litter."

The next two variables with similar loadings were "Hikers, backpackers, and horses should be prohibited on this trail/road (factor loading .549), and "Hikers lack a sense of adventure and challenge (factor loading .502).

Variable 15, "I enjoy having a good machine to show off," had a factor loading of .476. Even though this is above the conventional .4 minimum, the statement does not intuitively relate to this factor in the same way the other variables do. In some sense, by expressing a love of machines, it also expresses superiority over non-mechanized users. However, the variable does not have a high loading on any factor. Thus it seems to be an inadequate variable.

The statement, "I'd rather encounter other off-road vehicle users than hikers or backpackers," had a loading barely above .4 (.407). Thus, it does not clearly reflect

the negative imagery toward non-mechanized users.

Factors 3 and 4 were similar to Factor 3 for non-mechanized users in that they were basically determined by one variable which did not fit anywhere else. Thus, Factor 3 for ORV users was primarily determined by Variable 19, "I am not physically able to make this trip on foot" (factor loading .686). The only other factor loading above .4 was that of Variable 18, "I chose this trail to avoid meeting horseback riders" (factor loading .557), which also had a factor loading above .4 on Factor 1. Therefore, Factor 3 actually measured "Physical Inability."

The fourth and final factor was primarily determined by Variable 23, "I prefer to meet other vehicle drivers than hikers/backpackers on this trail." Its strong factor loading (.936) measured the preference ORV users had for meeting other ORV users, rather than non-mechanized users. Variable 20, "I'd rather encounter other off-road vehicle users than hikers or back packers" (factor loading .434), also reflected this attitude. Again, however, it shared its variance with another factor, Factor 2, with a loading of .407. This factor was named "Preference for ORV Encounters."

In conclusion, it can be seen that the attitudes of ORV users were not as clearly defined as those of non-mechanized users. This was shown by the fact that the attitudes of the ORV group contained more dimensions, illustrated by the four factors resulting for that group, as compared to the three factors resulting for non-mechanized users.

CHAPTER IV

CONCLUSIONS, IMPLEMENTATIONS, AND RECOMMENDATIONS

This chapter presents the conclusions drawn from the findings of this study, possible implementations of the study by the Forest Service, and recommendations for further study.

CONCLUSIONS

In general, the conclusions drawn from this study pertain to the differences in socio-demographic characteristics of the two user groups studied and differences in their attitudes toward each other and the use of the Santa Fe National Forest. These conclusions allow the three null hypotheses presented in Chapter II to be rejected.

The ORV user group was found to be a younger, predominantly Hispanic, less educated group as compared to the non-mechanized users. Almost three-fourths of ORV users were male, in contrast to the almost even distribution between males and females in the non-mechanized group. The occupations of the two groups, however, were similar, with approximately one-third of the users in both groups falling into the professional/managerial category.

A large percentage of users in both groups were New Mexico residents. The two groups generally came from the same size communities, with many users coming from nearby

Santa Fe. The ORV group tended to be the more frequent users of the study area, and a large majority of users from both groups were not on their first visit. Many users had been to the study area more than ten times within the past two years.

Both user groups were travelling with family or friends, but the ORV users were often travelling in larger groups. Most of the non-mechanized users were day hiking, while the majority of ORV users was travelling in pick-up trucks or passenger cars. Thus, because of these differences, the hypothesis that the two groups have the same socio-demographic characteristics is rejected.

There were not only differences in user characteristics, but also differences in their attitudinal structure. One major conclusion that can be drawn about the joint use of recreation areas is that the two user groups cannot use the same areas without conflicts between the groups. More non-mechanized users were bothered by meeting or being passed by ORVs than ORV users minded meeting other vehicles. In fact, most non-mechanized users thought that it was unsafe for ORVs and foot travelers to share the same trails, while many ORV users thought that safety was not a problem. Many ORV users felt that there should be more areas open to ORVs in the Santa Fe National Forest, but non-mechanized users generally disagreed. In addition, the factor analyses showed that the

non-mechanized group was bothered by sharing the study area with ORV users, while the majority of ORV users did not mind the presence of non-mechanized users as much. Many non-mechanized users felt so strongly against ORVs that they felt that ORVs should be completely eliminated from the study area. This supported the conclusion that where conflicts between the two groups existed, they tended to be one-way (i.e. directed toward the ORV group). The attitudes of non-mechanized users were more clearly negative toward the ORV group.

The next general conclusion that can be drawn from the findings of this study is that non-mechanized users were more critical of ORV users than visa versa, as illustrated by the fact that they were, in general, much more supportive of specific ORV regulations and safety standards than was the ORV group. The majority of non-mechanized users felt that ORVs needed to be more restricted in the areas where they could and could not go in the Santa Fe National Forest, while ORV users thought that restricting their activities would be either unnecessary or unfair. Non-mechanized users were also more in favor of regulating ORV use by placing controls on them, although the vast majority of users from both groups felt that some controls were necessary. The highest percentages of users in each group thought that trail signs to indicate areas that were open or closed to ORV use were necessary. This was followed closely by strong feelings toward requiring mufflers and spark arrestors on ORVs. In talking

with many ORV enthusiasts, it was discovered that most were not interested in riding unnecessarily loud and dangerous machines through the Forest. For this reason, they did not mind a few reasonable restrictions.

These findings allow the second and third hypotheses to be rejected. These hypotheses stated that the two user groups are able to share recreation areas without conflict, and that, when conflicts do arise, they are equally felt by both groups.

Finally, it can be concluded that non-mechanized users were more interested in using the study area to become more aware of nature and to discover new vistas and places than were ORV users. Solitude was more important to those without machines than those with machines. This would seem logical because of the noise produced by any ORV. The factor analyses showed that non-mechanized users had a strong preference for the aesthetics of the Forest, unlike many ORV users. This may have been because ORV users were often mainly interested in being with friends or family, rather than enjoying nature's beauty. Challenge and adventure were often their goals, unlike many non-mechanized users. Slightly more ORV users seemed to like the study area because of the facilities available there. Perhaps this indicates that they would be more likely to use man-made Forest facilities than would non-mechanized users.

The findings of this study have shown that conflicts between the two user groups do indeed exist. The problems,

however, are not insurmountable. It would seem that the Forest Service has a number of options for dealing effectively with these user conflicts. Thus, the following implementations are suggested.

IMPLEMENTATIONS

This study provided quantitative data concerning ORV and non-mechanized user attitudes toward sharing trails and areas in one district of the Santa Fe National Forest, New Mexico. Because the Santa Fe National Forest ORV Management Plan was recalled soon after its issuance for its lack of such data, this study could be useful to the Forest Service in its preparation of a new plan. No such information involving user attitudes was previously available.

The Forest Service, in its Plan, had assumed that dispersing ORV use over the 87% of the Forest deemed capable of supporting such use would minimize conflicts by causing fewer encounters with non-mechanized users. However, the study area, as well as many other areas in the Santa Fe National Forest, is very heavily used by both groups, and encounters are quite frequent.

Since it has been shown that conflicts between the two user groups are usually one-way (i.e. directed toward the ORV users), the Forest Service would be unwise to restrict non-mechanized users in the Forest. However, it might be wise to provide for a specific area for ORV use to concentrate use

over a smaller area of land. In this way, those who are seeking challenge and adventure and do not mind meeting other ORVs on the trails would be more likely to use the designated area. Since many ORV users enjoy the sport for the social aspect of being with family or friends, they are often not as interested in observing the beauty of nature. Therefore, an area which could withstand the heavy use of ORVs could be chosen, saving the more scenic areas for those whose main goal is "to become more aware of nature and to discover new vistas and places." A more intensive study of the Santa Fe National Forest would need to be completed for quantitative data concerning the ability of certain areas to support intense ORV use.

If the areas for ORV use is attractive enough to meet the needs of many ORV users, there would possibly be no need for the Forest Service to prohibit use in other areas of the Forest now shared by ORV and non-mechanized users. The number of contacts between the two groups would diminish, thereby also decreasing conflicts between the two groups.

A one or two-year trial period with a follow-up survey study of user attitudes toward the new plan could then be put into effect. If the ORV area is found to not be attracting enough users to draw ORVs away from other areas of the Forest, alternative plans could be tried. Among the possibilities are: (1) restrict all ORVs to the designated ORV area even though they have not chosen to go there on their own, (2) expand or

change the location of the area, taking into account ORV user input and preferences, or (3) go back to the original plan of dispersing ORV use over 87% of the Forest. If it becomes necessary to go back to the original plan, at least other methods would have been tried, and more quantitative data would have been collected to satisfy users and the New Mexico Public Interest Research Group and the Sierra Club, who were originally responsible for the recall of the ORV Management Plan. As it has been shown, Executive Orders 11644 and 11989 provide for continued use of ORVs on public land. Therefore, the option of eliminating them from the Santa Fe National Forest is not possible.

The Forest Service's use of the information gathered in this study would provide a basis for making decisions involving management of ORV use. Continued research and implementation of these suggested alternative plans for ORV management may lead to the Forest Service goal of minimizing conflicts among users. Resource managers are in constant need of additional research to recognize and understand user conflicts, so that they may suggest a wider range of management responses to the problem.

RECOMMENDATIONS

This study is the first attempt at identifying conflicts among users in the Santa Fe National Forest. It has only scratched the surface and could be modified and expanded in a number of ways.

Using the data collected in these survey, one could look at other related conflicts. It has been stated that recreation areas often have little to do with user conflicts. They only function as stages for acting out the conflicts which originate elsewhere in society (Jacob, 1977). One such conflict in Santa Fe, New Mexico, is the conflict between ethnic groups. Particularly apparent are the conflicts between Anglos and Hispanics. The data in this study have shown that the majority of ORV users are Hispanic, while the majority of non-mechanized users are Anglo. Perhaps it would be beneficial to explore the possibility that ORV/non-mechanized user conflicts in the Santa Fe National Forest are closely linked to the ethnic background of each group. Further research into the nature of user conflicts would provide more insight into user dissatisfaction. Managers can be aided by an understanding of the origins of conflicts.

It has also been suggested in the literature (Jacob, 1977) that a user's expectations increase each time he or she visits the same specific area. Many users of the study area in the Santa Fe National Forest were frequent, repeated users of the area. From the data in this study, it would be interesting to test the relationship between the number of times a user visited the study area and how his or her expectations changed or increased with each visit. For example, perhaps a non-mechanized user who is visiting the area for the first time is not as bothered by the presence of ORVs as someone

who has been to the area a number of times and has experienced being in the area with and without ORVs around. He or she may enjoy and appreciate the visit more without meeting ORVs along the way. The first-time visitor, on the other hand, may not realize that the visit could be enhanced by the absence of ORVs.

The data concerning the attitudes which cause conflicts between the two user groups could be expanded. One could look at each subgroup separately to see if the variables of age, educational background, occupation, or sex had any bearing on user responses to attitudinal variables.

Further studies could be conducted using the same questionnaire in other areas of the Santa Fe National Forest. The questionnaire could also be expanded, modified or rewritten altogether to gain insight into user opinions for alternative ways of dealing with ORVs. The idea of a specific area set aside for ORVs could be probed. User input could help the Forest Service decide which areas might serve best as ORV areas, and whether or not they would be used by ORV enthusiasts if established.

There seem to be very few studies available for Forest Service officials and other public land managers to find the necessary quantitative data needed in making responsible management decisions. This study is intended to be a step in that direction.

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APPENDIX A
DEFINITIONS OF TERMS

DEFINITIONS OF TERMS

The following definitions are presented in order to assist the reader in interpreting the study. The first seven are quoted from the Santa Fe National Forest Off-Road Vehicle Management Plan:

- 1.) OFF-ROAD VEHICLE - An off-road vehicle (ORV) is any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain, except that such term excludes (A) any registered motorboat, (B) any military, fire, emergency, or law enforcement vehicle when used for emergency purposes, and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, licence, or contract. (For the purpose of this study, off-road vehicles include only two- and four-wheel drive vehicles, motorcycles, and trail bikes.)
- 2.) TRAIL - A trail is a designated path or way which is commonly used by and maintained for hikers, horsemen, snow travelers, bicyclists, or for motorized vehicles which have a total width of 40 inches or less.
- 3.) AREA - Areas are public lands under the custody and control of the Forest Service where no roads and trails are present.
- 4.) ROAD - A road is a designated path of varying width

commonly used by or maintained for motorized vehicles which have a total width greater than 40 inches.

5.) OPEN AREAS AND TRAILS - Open areas and trails are places where off-road vehicles may be operated, subject to prescribed operating regulations and vehicle standards.

6.) CLOSED AREAS AND TRAILS - Closed areas and trails are places in which the use of off-road vehicles is prohibited.

7.) RESTRICTED AREAS AND TRAILS - Restricted areas and trails are places in which the use of off-road vehicles is subject to closures by type of vehicle or times of use.

8.) CONFLICT OF USE - Conflict of use is the incompatibility of recreation use groups in terms of values, attitudes, and behavior in a specific area of public land (Bury, Wendling, and McCool, 1976).

9.) ATTITUDE - An attitude is a mental or neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related. (Allport, 1935).

10.) RELIABILITY - Reliability refers to the degree that a particular observation has yielded a "true" score. (Neale and Liebert, 1980).

11.) VALIDITY - Validity is the degree to which a test measures what it purports to measure or what the investigator

believes it to measure. (Neale and Liebert, 1980).

12.) FACE VALIDITY - Face validity, the most basic type of validity, is the acceptance of the truth of a measure at face value (Neale and Liebert, 1980).

13.) CONSTRUCT VALIDITY - Construct validity refers to the extent to which a test measures a particular entity with no actual existence that is hypothesized to operate in the causal chain of real events (Neale and Liebert, 1980).

14.) CRITERION VALIDITY - Criterion validity is the degree to which the test scores predict or are associated with an individual's behavior in situations to which they should predict if the test is measuring what it purports to measure. (Neale and Liebert, 1980).

APPENDIX B
ORV USER QUESTIONNAIRE

ORV User Survey (Variable 1)

Date _____ Weather Conditions _____
 Time _____ Temperature (C°) _____
 Location _____

----- DO NOT WRITE ABOVE THIS LINE -----

VARIABLE

- (2) 1. Is this your first visit to the Tesuque district?
 () Yes (If yes, please go to Question #2)
 () No (If no, please answer the following)
- (3) a. About how many times have you visited this area during the past 2 years?
 () 1 - 2 times
 () 3 - 5 times
 () 6 -10 times
 () more than 10 times
- b. In what year did you first visit the Tesuque district? _____
- (4) 2. With what type of group are you travelling?
 () alone
 () family
 () friends
 () family and friends
 () a club or organized group
 () other _____
- (5) 3. How many people are in your group including yourself?
 () 1 - 2
 () 3 - 5
 () 6 -10
 () 11-20
 () 21 or more
- (6) 4. What type of off-road vehicle are you using?
 () four-wheel drive (Jeep, Blazer, etc.)
 () pick-up truck
 () passenger car
 () motorcycle or trail bike
 () minibike
 () other _____

Please indicate your reaction to the following statements concerning your trip in the Tesuque district.

<u>VARIABLE</u>		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
(7)	1. I am looking for challenge and adventure on this trip.	SA	A	N	D	SD
(8)	2. It bothers me to meet or pass other vehicles on this trail/road.	SA	A	N	D	SD
(9)	3. Roaming into the mountains is an enjoyable part of my trip.	SA	A	N	D	SD
(10)	4. I want to see how fast I can go and how much my vehicle can take on this trail.	SA	A	N	D	SD
(11)	5. I don't like meeting up with hikers and backpackers on this trail.	SA	A	N	D	SD
(12)	6. Hikers and backpackers are the main cause of litter in the Santa Fe National Forest.	SA	A	N	D	SD
(13)	7. I enjoy using my vehicle in the Forest because it makes more areas accessible to me.	SA	A	N	D	SD
(14)	8. It bothers me to have to pass horseback riders on this trail.	SA	A	N	D	SD
(15)	9. I enjoy having a good machine to show off.	SA	A	N	D	SD
(16)	10. Off-road vehicles should not be restricted in the Santa Fe National Forest.	SA	A	N	D	SD
(17)	11. I don't like to have my speed interrupted by meeting foot travelers on this trail.	SA	A	N	D	SD
(18)	12. I chose this trail to avoid meeting horseback riders.	SA	A	N	D	SD
(19)	13. I am not physically able to make this trip on foot.	SA	A	N	D	SD
(20)	14. I'd rather encounter other off-road vehicle users than hikers or backpackers.	SA	A	N	D	SD

VARIABLE

(21)	15.	Horseback riders are more careless than vehicle drivers in the disposal of litter.	SA	A	N	D	SD
(22)	16.	I wish I wouldn't see any other people on this whole trip.	SA	A	N	D	SD
(23)	17.	I prefer to meet other vehicle drivers than hikers/backpackers on this trail.	SA	A	N	D	SD
(24)	18.	Horseback riders are more aware of nature than off-road vehicle drivers.	SA	A	N	D	SD
(25)	19.	It is unsafe to have off-road vehicles and foot travelers on the same trails.	SA	A	N	D	SD
(26)	20.	There should be more areas and trails open to off-road vehicles in the Santa Fe National Forest.	SA	A	N	D	SD
(27)	21.	Hikers lack a sense of adventure and challenge.	SA	A	N	D	SD
(28)	22.	I like this area of the Tesuque district because of the facilities (campgrounds, restrooms, etc.) that are here.	SA	A	N	D	SD
(29)	23.	I came here to become more aware of nature and to discover new vistas and places.	SA	A	N	D	SD
(30)	24.	Hikers, backpackers, and horses should be prohibited on this trail/road.	SA	A	N	D	SD

VARIABLE

1. Which of the following safety standards and regulations do you feel are necessary for off-road vehicles?
- (31) () Spark arresters
 (32) () Mufflers
 (33) () Vehicle inspections
 (34) () Speed limits
 (35) () Permit system
 (36) () Trail signs to show open/closed areas
 (37) () Additional law enforcement
 (38) () Other _____
 (39) () None of the above
2. Before using this area of the Forest, what preparations did you make?
- (40) () Obtained a map of this area
 (41) () Obtained a permit from the Forest Service
 (42) () Checked with the Forest Service to find out which areas are closed to off-road vehicles
 (43) () Tuned up and/or checked over my vehicle
 (43) () Other _____
3. Comments.
4. Age and Sex
- | | | | |
|------|-------------|------------|--|
| (44) | () 14-20 | (45) | |
| | () 21-30 | () Male | |
| | () 31-40 | () Female | |
| | () 41-50 | | |
| | () over 50 | | |

VARIABLE

- (46) 5. Race/Ethnic Group
- | | |
|--|--------------------------------------|
| <input type="checkbox"/> Hispanic | <input type="checkbox"/> Black |
| <input type="checkbox"/> Anglo | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Native American | |
- (47) 6. What is your occupation?
- Agriculture
 - Clerical and/or sales
 - Housewife
 - Professional, semi-professional, or managerial
 - Semi-skilled or unskilled labor
 - Skilled Labor
 - Service
 - Other _____
- (48) 7. Years of school completed
- Less than 8th grade
 - Eighth grade graduate
 - High school, unfinished
 - High school graduate
 - Two years of college or less
 - More than two years of college, no degree
 - Bachelor's degree
 - Master's degree
 - Other _____
- (49) 8. Are you a resident of New Mexico?
- Yes No
- (50) 9. Indicate the approximate size of the community in which you reside:
- Rural
 - Village (under 2,500)
 - Town (2,500-9,999)
 - Small City (10,000-99,999)
 - Large City (100,000 or more)

APPENDIX C

NON-MECHANIZED USER QUESTIONNAIRE

Non-mechanized Recreation Survey (VARIABLE 1)

Date _____ Weather Conditions _____
 Time _____ Temperature (C°) _____
 Location _____

 DO NOT WRITE ABOVE THIS LINE

VARIABLE

- (2) 1. Is this your first visit to the Tesuque district?
 () Yes (If yes, please go to Question #2)
 () No (If no, please answer the following)
- (3) a. About how many times have you visited this area during the past 2 years?
 () 1 - 2 times
 () 3 - 5 times
 () 6 - 10 times
 () more than 10 times
- b. In what year did you first visit the Tesuque district? _____
- (4) 2. With what type of group are you traveling?
 () alone
 () family
 () friends
 () family and friends
 () a club or organized group
 () other _____
- (5) 3. How many people are in your group including yourself?
 () 1 - 2
 () 3 - 5
 () 6 - 10
 () 11 - 20
 () 21 or more
- (6) 4. How are you traveling?
 () day hiking
 () back packing
 () horseback riding
 () other _____

Please indicate your reaction to the following statements concerning your trip in the Tesuque district.

<u>VARIABLE</u>		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
(7)	1. I am looking for challenge and adventure on this trip.	SA	A	N	D	SD
(8)	2. It bothers me to meet or pass off-road vehicles on this trail/road.	SA	A	N	D	SD
(9)	3. Roaming into the mountains is an enjoyable part of my trip.	SA	A	N	D	SD
(10)	4. I want to see how fast I can go and how much my body/horse can take on this trail.	SA	A	N	D	SD
(11)	5. I don't like meeting up with motorcycles and minibikes on this trail/road.	SA	A	N	D	SD
(12)	6. Off-road vehicle drivers are the main cause of litter in the Santa Fe National Forest.	SA	A	N	D	SD
(13)	7. I enjoy hiking/horseback riding in the Forest because it makes more areas accessible to me.	SA	A	N	D	SD
(14)	8. It bothers me to be passed by four-wheel drive vehicles and pick-up trucks here.	SA	A	N	D	SD
(15)	9. I like hiking/horseback riding to develop a healthier body.	SA	A	N	D	SD
(16)	10. Off-road vehicles should not be restricted in the Santa Fe National Forest.	SA	A	N	D	SD
(17)	11. I don't like to have my pace interrupted by having to move aside for off-road vehicles.	SA	A	N	D	SD
(18)	12. I chose this trail to avoid meeting pick-up trucks and four-wheel drive vehicles.	SA	A	N	D	SD
(19)	13. Motorized vehicles should not be allowed here.	SA	A	N	D	SD
(20)	14. I'd rather encounter other hikers/horseback riders than off-road vehicles.	SA	A	N	D	SD

VARIABLE

(21)	15.	Vehicle drivers are more careless than horseback riders in the disposal of litter.	SA	A	N	D	SD
(22)	16.	I wish I wouldn't see any other people on this whole trip.	SA	A	N	D	SD
(23)	17.	I prefer to meet other hikers/horseback riders than trail bikes on this trail.	SA	A	N	D	SD
(24)	18.	Off-road vehicle drivers are more aware of nature than horseback riders.	SA	A	N	D	SD
(25)	19.	It is unsafe to have off-road vehicles and foot travelers on the same trails.	SA	A	N	D	SD
(26)	20.	There should be more areas and trails open to off-road vehicles in the Santa Fe National Forest.	SA	A	N	D	SD
(27)	21.	Vehicle drivers lack a sense of adventure and challenge.	SA	A	N	D	SD
(28)	22.	I like this area of the Tesuque district because of the facilities (campgrounds, restrooms, etc.) that are here.	SA	A	N	D	SD
(29)	23.	I came here to become more aware of nature and to discover new vistas and places.	SA	A	N	D	SD
(30)	24.	Pick-up trucks should be prohibited on this trail/road.	SA	A	N	D	SD

VARIABLE

1. Which of the following safety standards and regulations do you feel are necessary for off-road vehicles?
- (31) () Spark arresters
 (32) () Mufflers
 (33) () Vehicle inspections
 (34) () Speed limits
 (35) () Permit system
 (36) () Trail signs to show open/closed areas
 (37) () Additional law enforcement
 (38) () Other _____
 (39) () None of the above
2. Before using this area of the Forest, what preparations did you make?
- (40) () Obtained a map of this area
 (41) () Obtained a permit from the Forest Service
 (42) () Checked with the Forest Service to find out which areas are closed to off-road vehicles
 (43) () Other _____
3. Comments.
4. Age and Sex
- | | | |
|------|-------------|------------|
| (44) | () 14-20 | (45) |
| | () 21-30 | () Male |
| | () 31-40 | () Female |
| | () 41-50 | |
| | () over 50 | |

VARIABLE

- (46) 5. Race/Ethnic Group
- | | |
|--|--------------------------------------|
| <input type="checkbox"/> Hispanic | <input type="checkbox"/> Black |
| <input type="checkbox"/> Anglo | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Native American | |
- (47) 6. What is your occupation?
- Agriculture
 - Clerical and/or sales
 - Housewife
 - Professional, semi-professional, or managerial
 - Semi-skilled or unskilled labor
 - Skilled Labor
 - Service
 - Other _____
- (48) 7. Years of school completed
- Less than 8th grade
 - Eighth grade graduate
 - High school, unfinished
 - High school graduate
 - Two years of college or less
 - More than two years of college, no degree
 - Bachelor's degree
 - Master's degree
 - Other _____
- (49) 8. Are you a resident of New Mexico?
- Yes No
- (50) 9. Indicate the approximate size of the community in which you reside:
- Rural
 - Village (under 2,500)
 - Town (2,500-9,999)
 - Small City (10,000-99,999)
 - Large City (100,000 or more)

APPENDIX D

MAP OF SANTA FE SEGMENT OF TESUQUE DISTRICT

SANTA FE NATIONAL FOREST

