Conflict Among Hikers and Horseback Riders in the Mount Rogers High Country of Virginia

by

Carolyn June Widner

Thesis submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

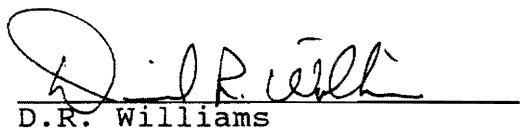
MASTER OF SCIENCE

in

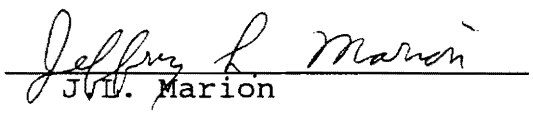
Forestry

APPROVED:

J. W. Roggenbuck



D.R. Williams



J.L. Marion

June, 1994
Blacksburg, Virginia

CONFLICT AMONG HIKERS AND HORSEBACK RIDERS
IN THE MOUNT ROGERS HIGH COUNTRY OF VIRGINIA

by

Carolyn June Widner

Committee Chairman: Joseph W. Roggenbuck
Forestry

(ABSTRACT)

Conflict among recreationists in natural resource settings is a long-term problem that continues to grow in many areas. This study was conducted to provide an assessment of conflict between hikers and horseback riders in the Mount Rogers High Country of Virginia.

Conflict was examined using three separate measures: crowding, impacts and interference. Examination of an index measure of conflict revealed that 64% of hikers experienced conflict toward horseback riders, while only 3% of horseback riders reported conflict due to hikers.

Because of the clearly asymmetric nature of the conflict, the conflict predictor variables (past experience, wilderness involvement, place attachment and perceived similarity) were examined for the hiker population in the study. Discriminant analysis revealed that the model tested can predict with more than 68% success whether hikers will experience conflict due to horses. The perceived similarity

of values variable was shown to be the most important and perceived similarity of socio-economic status the second in importance in explaining conflict. Hikers that perceived horseback riders to be different from themselves in how they value the High Country and in their socio-economic status were more likely to experience conflict with horseback riders than hikers that perceived horseback riders as similar to themselves.

Measures of past experience and wilderness involvement were also significant predictors of conflict. However, relative to the perceived similarity items, these variables did not contribute much information or "predictive power" to the model. The two place attachment factors, place identity and place dependence, were not significant in the model.

TABLE OF CONTENTS

Page

Introduction.....1
Research Objectives.....5
Conflict in Outdoor Recreation: A Literature Review....6
Theoretical Foundations for Recreation Conflict.....7
Jacob and Schreyer's Contribution.....7
Owens' Contribution.....13
Other Theoretical Contributions.....14
Case Studies.....16
Asymmetrical Relationships.....18
Environmental Dominance.....19
Tolerance.....21
Attitudes and Values.....22
Perceptions.....24
Experience.....25
Research Questions and Hypotheses.....26
Asymmetrical Conflict.....27
Place Attachment.....27
Wilderness Involvement.....28
Past Experience.....29
Perceived Similarity.....29
Research Methods.....30
Study Area and Population.....30
Sampling Plan.....31
Data Analysis Instruments.....36
Data Collection Procedures.....37
Response Rate.....37
Data Analysis.....38
Conflict Measure.....38
Measures of Predictors of Conflict.....42
Data Analyses Procedures.....44
Results.....48
Nature of Conflict.....48
Significance of Conflict Predictors.....50
Significance of Conflict Model.....61
Discussion and Conclusion.....63
Research Implications.....65
Management Implications.....70
Appendix A-On-site Contact Sheet.....78
Appendix B-Questionnaire.....82
Appendix C-First Cover Letter.....98
Appendix D-Postcard.....100
Appendix E-Second Cover Letter.....102

LIST OF TABLES

Page
Table 1-Sampling Schedule.....33
Table 2-Questionnaire Response Rate.....37
Table 3-Horseback riders saw too many hikers.....38
Table 4-Hikers saw too many horseback riders.....38
Table 5-Enjoyment impaired by other visitor's behavior....39
Table 6-Group that interfered.....39
Table 7-Perception of recreation impacts.....41
Table 8-Perceived cause of resource impacts.....41
Table 9-Conflict between hikers and horseback riders.....42
Table 10-Existence and extent of conflict between horseback riders and hikers.....50
Table 11-Hikers' perception of similar socio-economic status.....51
Table 12-Hikers' perception of similar values.....52
Table 13-The extent of place identity of hikers.....52
Table 14-The extent of place dependence of hikers.....52
Table 15-The extent of wilderness involvement of hikers...53
Table 16-The extent of general wilderness experience of hikers.....53
Table 17-The extent of site experience of hikers.....53
Table 18-Student's T-Test for differences between hikers in conflict and hikers not in conflict regarding their perceived similarity of socio-economic status with horseback riders.....55
Table 19-Student's T-Test for differences between hikers in conflict and hikers not in conflict regarding their perceived similarity of values with horseback riders.....55
Table 20-Student's T-Test for differences in the place identity of hikers in conflict versus hikers not in conflict.....56
Table 21-Student's T-Test for differences in the place dependence of hikers in conflict versus hikers not in conflict.....56
Table 22-Student's T-Test for differences in the wilderness involvement of hikers in conflict versus hikers not in conflict.....56
Table 23-Student's T-Test for differences in the site experience for hikers in conflict versus hikers not in conflict.....57
Table 24-Student's T-Test for differences in the general wilderness experience of hikers in conflict versus hikers not in conflict.....57

Table 25-Predictors of hiker-horseback conflict among hikers: discriminant analysis results.....58
Table 26-Correlational relationship among predictor variables of conflict and degree of conflict.....60
Table 27-Overall Conflict Model.....61

ACKNOWLEDGEMENTS

In any research effort, many people besides those directly involved in data collection and analyses contribute to its successful completion. This was certainly the case with this study of conflict between hikers and horseback riders in the Mount Rogers National Recreation Area High Country. I would first like to thank the Jefferson National Forest for funding this research. I also appreciate the input and interest in the study from Tim Eling, Mike Evans and Steve Sherwood of the Jefferson National Forest. I also want to thank Alan Watson and David Turner of the USDA Forest Service Intermountain Research Station for their input and advice in developing the survey sampling plan.

I next want to thank the 1072 Mount Rogers High Country recreationists who took time from their busy schedules to complete on-site interviews and intensive mailback questionnaires. Their interest and participation in the study made data collection easy and enjoyable.

I also express my gratitude to my fellow graduate students Andy Mowen, Dennis Stratton, Carl Riden and Jane Dombroski for their assistance in data collection and for their moral support through this arduous process. Their laughter, input and friendship made work enjoyable and

interesting. I also thank Jennifer Roggenbuck, Kurt Stromberg, Jody Buchanan and Cathy Martin for their assistance in data collection.

I am also grateful to Cathy Barker for her personal and professional assistance in this study. Her excellent word processing and clerical help made this study possible. I thank Jenny Williams for coding the study's questionnaires and contact sheets with speed and efficiency. I would also like to thank Sue Snow for the assistance and for always having the often illusive answer. I acknowledge Mike Patterson for always being there when I had a computer or data analysis question or crisis. His input and advice made data analyses understandable, easy and enjoyable. I also greatly appreciate Dr. Greg Brown, Dr. William Hyde and Virginia Tech's Department of Forestry for providing funds when project monies ran out long before the job was done.

Next, I would like to thank the members of my committee Dr. Joseph Roggenbuck, Dr. Jeff Marion and Dr. Dan Williams. Dan made often difficult concepts, theories and ideas come to life. With his help I came to understand but more importantly to question. His input and assistance in this project were insightful and appreciated. Jeff Marion helped me integrate and expand approaches and understandings of recreation conflict situations. His input and perspectives encouraged me to consider the many aspects of recreation

conflict. I appreciate his assistance and support when I had data analysis questions. I would also like to thank the chair of my committee, Dr. Joseph Roggenbuck. He challenged my mind, ideas and endurance. His always open door, and the persistence and vigor he demonstrated in following my progress was greatly appreciated. His guidance directed me and his trust allowed me to pursue various avenues on my own. His overall assistance made my growth as a researcher, student and a professional enjoyable and possible.

Finally, I thank my family. I thank my mother Patty Widner and my father Raymond Widner for giving me the freedom and the roots to pursue my dreams and goals. They never questioned my motives or methods and always believed in me. That faith allowed me to grow and learn and challenged me to always challenge myself. I thank my sisters Connie Gravley, Caren Blanchett and Cathy Martin. Their love, support, friendship and food made this research possible. They always understood and provided a shoulder or a slap, whichever was appropriate, and I thank them.

INTRODUCTION

The Wilderness Act of 1964 (Public Law 88-577) set aside certain lands in a National Wilderness Preservation System for the "preservation of their wilderness character" and to provide "outstanding opportunities for solitude or a primitive and unconfined type of recreation." These mandates gave managers the formidable task of protecting the naturalness of an area while simultaneously providing a recreational setting that is conducive to wilderness experiences. Since the creation of legal wilderness areas in 1964, the National Wilderness Preservation System has grown from 9.1 million acres to almost 100 million acres.

The Eastern Wilderness Act (Public Law 93-622), signed into law by President Ford in 1975, increased the difficulty of the challenge for wilderness managers. A Congressional intent of the act was to locate wilderness areas near population centers, and to include areas typically smaller in size than previously accepted (Hendee, Stankey and Lucas, 1990). Managers are left with the difficult task of protecting a natural setting that is conducive to a wilderness experience, open to recreational use, relatively small, and often heavily used.

Mount Rogers National Recreation Area (NRA) is located

in Southwest Virginia. The High Country of Mount Rogers NRA consists of two wilderness areas and a largely treeless Crest Zone. The 5,802 acre Lewis Fork Wilderness contains Mount Rogers, the highest peak in Virginia at 5,729 feet. In 1986, Lewis Fork Wilderness was the sixth most heavily visited wilderness area of the 329 national forest wildernesses. The 3,855 acre Little Wilson Creek Wilderness contains Little Wilson, a native trout stream. This wilderness receives much lower use and thus offers a potentially different experience. The two wilderness areas are about a mile apart, separated by a special management region called the Crest Zone. The Crest Zone consists of alpine-like open mountain balds and rocky ridges interspersed with Fraser fir and red spruce. The Forest Service maintains the open zone through prescribed burning and through controlled grazing by cattle and ponies.

These three areas form the High Country and provide a wide array of unique resources. Several factors contribute to the biodiversity of the area. First, the Appalachian Mountains in Southwest Virginia are a transition zone for many flora and fauna species. In addition, the high elevations, abundance of water and age of the mountains (i.e., Mount Rogers is believed to be over 500 million years old) combine to form unique and rich resources. The same factors, however, that produce the biodiversity of the area

also contribute to the fragile nature of the resources.

The diverse land classifications and characteristics of the Mount Rogers High Country provide a setting for a myriad of recreational uses. Over thirty different types of visitors, including horseback riders, hikers, hunters, fishermen, blueberry pickers and long distance hikers, use and enjoy the NRA. Mountain bike riders, hikers, horseback riders and pack llamas often use the same trails in the High Country. The most common visitor experiences are day trips into the High Country, and horseback riders and hikers are the most frequent visitors.

There are sixteen entry points including the Appalachian Trail, that allow for quick, easy access into the wildernesses and the Crest Zone. Grayson Highlands State Park is a 4,700 acre, scenic park that abuts the Mount Rogers High Country. Hiking and horseback riding are popular activities in the state park, and several of the park's trails provide principal access routes to the High Country of Mount Rogers. Fox Creek horse camp attracts horse riders from around the region, and is also adjacent to the High Country.

In summary, the High Country of Mount Rogers combines several land classifications with a large number of diverse recreationists in a relatively small, fragile area. In situations such as this, unacceptable problems are likely.

Environmental impacts are one potential problem because resources are fragile and use levels are often high. A second problem, resulting from the wide range of users participating in activities independently of but in close proximity to each other, is social conflict among user groups. In fact, Hendee, Stankey, and Lucas (1990) suggest that social conditions within a resource affect experiences more than the resource conditions themselves.

The Mount Rogers High Country exemplifies a crucial management challenge: to maintain a quality wilderness experience and to protect the naturalness of the setting. The problem is that this must be accomplished in a relatively small area that has a large diversity of users. Several potential conflicts exist in the Mount Rogers High Country. Conflicts within and between user types are possible. For example, hikers may experience conflict with other hikers, horseback riders with other horseback riders and so forth. However, conflicts are more likely to occur between individuals engaged in different activities. For example, conflicts between hikers and hunters, mountain bike riders and hikers, and hikers and horseback riders are all possible (Watson, Niccolucci, and Williams, 1993; Watson, Williams, and Daigle, 1991; Stankey, 1973). However, of all the potential conflicts, hikers and horseback riders, because of their high use levels and different modes of

travel, are likely the primary conflicting groups. As a result, this study focuses on conflicts between hikers and horseback riders in the Mount Rogers High Country.

RESEARCH OBJECTIVES

The overall goal of the study was to obtain information on the existence, nature, and correlates of conflict among users of the High Country of Mount Rogers. Information was collected to describe the diversity of use and user characteristics, visitors' opinions, preferences, and satisfaction levels and the social and resource conditions encountered. More specifically, the research objectives of this project were as follows:

1. Determine the existence and extent of conflict between horseback riders and hikers.
2. Determine the significance of wilderness involvement as a predictor of conflict between hikers and horseback riders.
3. Determine the significance of perceived similarity as a predictor of conflict between hikers and horseback riders.
4. Determine the significance of experience level as a predictor of conflict between hikers and horseback riders.

5. Determine the significance of place attachment as a predictor of conflict between hikers and horseback riders.

CONFLICT IN OUTDOOR RECREATION: A LITERATURE REVIEW

Conflict in natural resource settings is considered one of the most common and difficult management problems today (Hammitt 1988; Wellman, 1987). Recreation conflict research began in the early 1960s as the demand for a limited resource increased (Owens, 1985). Since the 1960s a variety of factors have been postulated to play important roles in shaping recreation conflict. Competition for space, incompatibility of activities, and differences in the values, norms and perceptions of visitors are a few of the hypothesized causes. The literature on conflict in natural resource settings can be classified into two general types. One branch of the literature focuses on understanding the theoretical foundations of conflict. Descriptive case studies are the second general type of recreation conflict research, and they form the bulk of leisure conflict literature.

Theoretical Foundations for Recreation Conflict

Jacob and Schreyer's Contribution

The theoretical approach to understanding recreation conflict most often used today was developed by Jacob and Schreyer (1980). Their work was an elaboration based on some initial work done by Jacob (1977). It was also one of the first attempts to conceptually understand and define conflict. Jacob and Schreyer (1980, p.369) define conflict for an individual as "goal interference attributed to another's behavior." This definition of conflict postulates that people recreate to achieve desired goals. Conflict, then, can result if there exists a difference between the desired and actualized goals. A second important element of this definition is that the goal interference must be "attributed" to another's behavior. Visitors in conflict must be willing to designate another as responsible for that conflict. It should also be noted that scapegoating may take place when goal interference is not directly attributable to another (Jacob and Schreyer, 1980). For example, if a hiker encounters poor trail conditions in an area where horse use is allowed, they may blame the conditions on horse users without any other reason except that they are there.

Jacob and Schreyer (1980) also indicate the importance

of social contact. They point out that the "knowledge of another's behavior" is social contact and is a necessary condition for conflict (Jacob and Schreyer, 1980, p.369). Contact can be either a direct face-to-face encounter or an indirect encounter. The knowledge of the mere presence of another user group (indirect contact) can result in conflict (Jacob and Schreyer, 1980). For example, in the case of the hikers and horseback riders, simply seeing manure on the trails can bring about a conflict for a hiker without ever actually encountering a horse (Hammitt and Cole, 1987).

Based on literature reviews, case studies and interviews, Jacob and Schreyer (1980) identify four major classes of factors that produce conflict in outdoor recreation: activity style, resource specificity, mode of experience, and lifestyle tolerance. They contend that examination of these factors permits the researcher to clearly understand the potential for conflict. It is important to review these concepts in greater detail since the majority of conflict research has incorporated them in some fashion (e.g., see Gramann and Burdge, 1981; Hammitt, 1988; Noe, Wellman and Buhyoff, 1982; Owens, 1985; Watson, Daigle and Williams, 1991; Watson, Niccolucci and Williams, 1993).

According to Jacob and Schreyer (1980), activity style and resource specificity factors can be examined using the

three concepts: central life interest, status, and evaluations of quality. The first concept is termed "central life interest," which Jacob and Schreyer (1980, p.370) define as "the preferred behaviors and behavioral settings manifested when a person is given the choice." The resource or the activity as a "central life interest" can be viewed as the degree of significance or importance the individual ascribes to the activity or the resource. The degree of significance can vary substantially among individuals using the same area and even participating in the same activity. Conflict often results from the differences in personal meanings that individuals assign to the activity and the resource, and not necessarily any difference in the specific recreation activities or settings themselves.

Status hierarchy is a second concept considered under both the resource specificity and the activity style factors. According to Jacob and Schreyer (1980), status hierarchies in recreation are often based on possessing equipment, expertise and knowledge. For some participants, recreation goals may involve obtaining high status. For these recreationists, the latest equipment and visible demonstrations of skill are considered external referents of status. However, other participants may not value these attributes or even consider status a recreation goal. For

example, they may view the status seeking recreationist as a "showoff". Another example of the role status plays in conflict perception is demonstrated in the conflict between hikers and horseback riders. Hikers are expected to yield the right-of-way to horses when meeting on a trail. This action often leaves the hiker with the impression that they have a lesser status than the horse user (Watson, Niccolucci, and Williams, 1993). This evaluation, according to Jacob and Schreyer (1980), may result in the hiker experiencing conflict.

Evaluation of quality is the third element considered in both the resource specificity and the activity style factors described by Jacob and Schreyer (1980). Evaluations of a quality resource and a quality experience vary depending upon a participant's level of experience. Novices have little experience on which to base their evaluations of quality. Experienced users, on the other hand, have more specific expectations for a quality experience. For example, the inexperienced user may evaluate a set of conditions as acceptable that the veteran user considers substandard.

"Mode of experience" is the third class of factors Jacob and Schreyer (1980) identify as a potential cause of conflict. They suggest that recreationists vary on the extent that they focus on the environment. Recreationists

classified as unfocused perceive the environment in generalities and spatial relationships. They experience broad, sweeping impressions of the landscape. In fact, Jacob and Schreyer (1980) contend that the "sense of movement" may be the primary goal for recreationists operating in the unfocused mode. These unfocused recreationists will typically not experience conflict unless their movement is restricted. On the other end of the continuum is the focused visitor. The focused mode of experience is characterized by a detailed examination of the environment. Movement is interrupted to allow for complex input of sensory details. A recreationist in the focused mode of experience will likely have strict guidelines of acceptable stimuli, and often any external or man-made stimuli are considered unacceptable. Focused recreationists, according to Jacob and Schreyer (1980), are more conflict-prone than unfocused recreationists because their definitions of acceptable stimuli are more rigid and more easily disrupted.

The last major factor that Jacob and Schreyer (1980) propose to explain recreational conflict is "lifestyle tolerance." This factor is exemplified by a "my-group/your-group" mentality. It can be viewed as a measure of perceived similarity between users. Jacob and Schreyer (1980) suggest the amount and kind of recreational

technology used, the level of resource consumption, and prejudice are all aspects that affect how similarly individuals perceive themselves to another user. Jacob and Schreyer (1980) are careful to point out that the perceptions of similarity may be misconceptions guided by the formation of general user type categories (i.e., a skier, a snowmobiler). For example, the pickup-driving, gun-carrying visitor might be viewed by the urban hiker as a redneck hunter. Assumptions about the similarities and differences are often made based on the stereotypes associated with a particular mode of experience. Finally, individuals intolerant of lifestyle diversity are more likely to experience conflict than those accepting of lifestyle diversity (Jacob and Schreyer, 1980). For example, in society some people are accepting of others that are different, while other individuals are far less accepting. This judgement of difference can be based on many characteristics, for instance, age, race, ethnic background, recreation activities and so forth.

Jacob and Schreyer (1980) conclude that the existence of any or all of these characteristics does not necessarily mean conflict is experienced. However, when these factors are present, the potential for conflict is high. They also propose that conflict often begins as an asymmetrical or one-way relationship and then evolves toward a more

symmetrical relationship as one group pulls the other into the conflict.

Owens' Contribution

Owens (1985), in a review of conflict literature, also theoretically examines conflict in natural resource settings. He, like Jacob and Schreyer (1980), separates conflict from a purely crowding and/or an activity dependent concept and links it to a social interpretation of events. However, Owens (1985) includes the additional element of the individual's coping abilities in the conflict equation.

His first theoretical proposition is that conflict is a "process of social interaction which is operationalized with the general motivational goal of eliminating environmental instability and restoring perceived equilibrium" (Owens, 1985, p.244). Owens views conflict in resource settings as a process that often begins with crowding or the perception of crowding. Individuals then employ coping mechanisms to deal with the crowding. When coping does not yield the expected benefits within a certain time frame, the initial feeling of crowding leads to conflict. Owens contends that the distinction between conflict and crowding is durational in nature. Crowding is viewed as a here-and-now concept, but conflict is a cumulative process. This idea led Owens to his second proposition that "conflict is a cumulative

process of social interaction which once established becomes an enduring psychological state guiding the behaviour of individuals and/or groups in their attempts to restore perceived equilibrium" (Owens, 1985, p.252). Conflict should not be perceived as the result of a single incident, and is not necessarily even a confrontational experience. Instead, it may be a simmering frustration or resentment that has developed over time.

Owens (1985) contends that conflict should be examined as a process of social interaction. He points out that a cumulative measure of conflict is needed. Owens (1985) also identifies the need for empirical work to test his theories, and to help identify the possible causes of conflict.

Other Theoretical Contributions

Few other theoretical research efforts have been undertaken to understand conflict in natural resource settings. Most subsequent theoretical work on conflict incorporates various elements of Jacob and Schreyer's (1980) and/or Owens' (1985) views of conflict, and reiterates past findings in light of new applied studies. For instance, Cole, Petersen, and Lucas (1987) propose that the factors that influence visitor conflict are the type of use and behavior of visitors encountered, location of the encounter and expectations regarding the encounter. They conclude

that conflicts are most severe when they occur between groups that perceive themselves as different. This idea of "perceived dissimilarity" influencing or inducing conflict was also identified by Jacob and Schreyer (1980) and Owens (1985). Kuss, Graefe and Vaske (1990), in a review of the various impacts to the recreation experience, also conclude that " the extent of conflict is influenced by the degree to which various user groups perceive each other as dissimilar" (p.192). The method of travel and group size are the most visible cues recreationists use to evaluate their similarity to other groups (Kuss, Graefe, and Vaske, 1990).

Moore (in press), while not proposing any new theories, provides an excellent synthesis of the conflict literature. He identifies the general causes of conflict, as well as some of the specific factors that lead to conflict. This report is unique, in that it discusses both theoretical approaches and findings of conflict in applied managerial terms. Moore (in press) links conflict to three challenges faced by multiple-use trail managers: maintaining user safety, protecting natural resources and providing a high quality user experience. Conflicts between users often arise from issues of safety. Accidents, collisions and near misses among trail users often result in conflict. Moore (in press) also identifies protecting natural resources as a management challenge that is often connected to feelings of

conflict. Impacts and indications of others can lead to feelings of conflict. Providing a high quality user experience is the third management challenge that is affected by conflict perception.

Moore (in press) identifies five general factors that cause conflict. Although these factors have somewhat different labels, the domains they cover are in line with Jacob and Schreyer's (1980) propositions. The five general causes of conflict are labeled: activity style (mode of travel, level of technology, and environmental dominance), attitudes toward and perceptions of the environment, perception of others as different, violation of norms, and level of tolerance. Moore (in press) also describes specific causes of conflict reported by trail managers including noise, speed, smell of exhaust, surprise, lack of courtesy, trail damage, uncontrolled dogs, horse manure and fouled water sources, littering, and lack of respect for others. Moore (in press) indicates that conflict has both physical and psychological contributing elements.

Case Studies

Ad hoc case studies comprise the majority of the recreational conflict literature. Although most of the studies focus on conflict between recreationists practicing

different activities, they all do so with a slightly different approach. Some approach conflict as resulting from an incompatibility of activities, while others consider conflict as a competition for a limited space. Still others view conflict as stemming from differences in the perceptions, values, and norms of visitors. Within each of these approaches, theoretical elements of conflict are combined and incorporated in various manners and degrees. Even studies that use the same theoretical approach to and common indicators of conflict, often operationalize and define terms in very different ways. Various theoretical approaches to and indicators of conflict from previous research are selected, incorporated, and expanded upon, while others are ignored. The result is a myriad of studies that overlap in some theories, definitions and approaches while differing in others. A discussion of the plethora of these case studies is not practical. The most effective discussion of these investigations would be of the common themes and patterns that are frequently repeated. An examination of these themes and patterns contributes to an understanding of the nature of conflict and helps shed some light on the meanings of constructs and relationships among them suggested by the various theories.

Asymmetrical Relationships

One of the most common and well documented findings of recreation conflict research is that, regardless of the user types involved, conflict usually begins as an asymmetrical or one-way relationship (Adelman, Heberlein and Bonnicksen, 1982; Jackson and Wong, 1982; Hammitt, 1988; Owens, 1985; Stankey, 1973; Watson, Williams and Daigle, 1991). For example, in a study of conflict between mountain bike riders and hikers, only one mountain bike rider indicated conflict with hikers, while 32% of the hikers reported conflict when meeting bicyclists (Watson, Williams and Daigle, 1991). Some research contends that over time, visitor displacement and/or one group pulling the other into the conflict, results in the relationship shifting towards a more symmetrical one (Hendee, Stankey and Lucas, 1990; Jackson and Wong, 1982; Kuss, Graefe and Vaske, 1990; Owens, 1977). For example, visitors experiencing conflict may relocate to another area, or visitors previously unaware of another's conflict with them, may learn about it and begin to feel conflict in return. Visitors that learn about complaints lodged against their particular user type may begin to experience conflict toward the group lodging the complaint. However, Adelman, Heberlein and Bonnicksen (1982) report an asymmetrical conflict between paddling canoeists and motorcraft users in the Boundary Waters Canoe Area more than

fifteen years after Lucas (1964) documented the asymmetrical relationship. In this case, the asymmetrical nature of conflict has persisted.

Environmental Dominance

One of the earliest and most documented findings regarding conflict is its prevalence between motorized and non-motorized users. Lucas' (1964) study of Boundary Waters Canoe Area (BWCA) users was the first study to document this type of conflict. Since Lucas' (1964) seminal work, many other studies have linked conflict to participants in activities that use different levels of technology. The conflict between snowmobilers and skiers was examined by Knopp and Tyger (1973) and Jackson and Wong (1982). Other examples of conflict between participants using different levels of technology include: canoe paddlers and motorcraft users (Adelman, Heberlein and Bonnicksen, 1982), hikers and mountain bike riders (Watson, Williams and Daigle, 1991), fishermen and boat users (Owens, 1977), and off-road vehicle riders and non off-road vehicle users (Noe, Hull, and Wellman, 1982; Noe, Wellman and Buhyoff, 1982).

Often linked to technology is the general theme of environmental dominance. This finding emerges from the literature that connects conflict to users who differ in the level of importance they give to "conquering" the

environment. For example, Jackson and Wong (1982) link conflict between snowmobilers and cross-country skiers to the general orientations each group has to the environment. The snowmobilers seek adventure, escape and socialization, while the skiers pursue goals of solitude, tranquility, and awareness of the natural environment (Jackson and Wong, 1982). As a result, the snowmobilers' means of achieving their goal often conflicts with the goals of the skiers. Bury, Holland and McEwen (1983, p.402) link environmental dominance to the "challenge and risk-taking aspects of activities". They contend that some individuals recreate because of the desire to maintain maximum individual control. These individuals participate in activities that allow expression of dominance over the environment such as hunting, mountain climbing and off-road motorcycling. On the other hand, some recreationists participate in activities with low dominance over the environment such as birdwatching, nature walks and sightseeing. Instead of trying to dominate the environment, these individuals are often trying to protect it. Regardless of the individual's motives for recreation, Bury et al. (1983) contend that environmental dominance can be assessed simply by the individual's participation in a particular activity (i.e., a hiker versus a hunter).

Tolerance

An individual's level of tolerance is another factor studies relate to conflict in natural resource settings. For example, an individual's tolerance of crowding, activities, behavior, technology, and lifestyle diversity are some of the aspects previously related to conflict (Ivy, Stewart, and Lue, 1992; Owens, 1977; Watson, Williams, and Daigle, 1991). Ivy, Stewart and Lue (1992) examined the role of tolerance within the goal-interference model of conflict described by Jacob and Schreyer (1980). Ivy et. al. (1992, p.348) examined tolerance as "one's willingness to share resources with members of other activity groups." They conclude that tolerance is a dispositional variable affecting conflict levels and often resulting from stereotyping recreational activities (Ivy, Stewart, and Lue, 1992). Williams (1993) notes that this stereotyping may be linked to the technology and environmental dominance of the activity.

Response to varying numbers of contacts or encounters is a factor closely linked to the general theme of tolerance, and is perhaps one of the oldest factors cited to "explain" conflict. Moore (in press) indicates that tolerance levels vary depending upon situational factors including group size, where contact occurs, and the frequency of use. Owens (1977) suggests that conflict

between anglers and boat users in a wetland recreation area likely stems from the differences in the tolerance levels each group has toward contacts. The number of encounters or contacts is cited throughout the literature as a contributing factor to perceptions of conflict. In fact, Jacob and Schreyer (1980) contend that without some from of social contact, either direct or indirect contact, conflict will not occur. Conflict research often looks at contributing factors of conflict (e.g., attitudes, values, perceptions and background) given an encounter between users (Kuss, Graefe and Vaske, 1990). Although much of the recent conflict research has attempted to separate "crowding" from conflict, most all acknowledge that some form of interaction does occur and is a necessary precursor to conflict perception.

Attitudes and Values

Another common finding of conflict research is the significance of an individual's attitudes and values. Users in conflict have been found to have different attitudes toward and values of the environment (Knopp and Tyger, 1973; Saremba and Gill 1991). Knopp and Tyger (1973) in a study of conflict between snowmobilers and cross-country skiers suggest that snowmobiling is associated with a laissez-faire, anything goes attitude, while skiing is, in

comparison, more closely linked to an attitude of concern toward protecting the environment. They conclude that conflict between snowmobilers and skiers in Minnesota can best be understood in light of these basic attitude differences. Driver and Bassett (1975) conclude that the conflict among canoeists, fisherman, and vacation home owners in Michigan is predominantly due to attitude differences among these three groups. For example, individuals who view the environment as an integral part of the recreation experience are more susceptible to conflict than those who perceive the environment as just a setting for the activity. Individuals may also have different attitudes and perceptions of the condition of the resource, the proper behavior in and uses of the resource, the best management practices and so forth (Hendee, Stankey and Lucas, 1990; Moore, in press; Noe, Wellman and Buhyoff, 1982).

Often closely linked to the general theme of attitudes and values is the concept of place attachment. Place attachment can be viewed as characterizing the participants' relationship to the resource (Williams and Roggenbuck, 1989). For example, some participants may view the resource as necessary for their recreational activities, while others may perceive the resource as simply a setting in which to recreate. According to Hammitt (1988), repeated users and

those who live close to a resource often have a possessive attitude toward the resource. An individual's attachment to the resource may stem from more than simply perceiving the place as the best setting for his particular recreational activities. For example, Jacob and Schreyer (1980) indicate that a resource may be a special, unique place, not because of physical qualities, but because of memories and traditions a visitor associates with the place. Several case studies have empirically determined measures of place attachment to predict conflict between visitors (Watson, Niccolucci and Williams, 1993; Watson, Williams and Daigle, 1991). Individuals that are attached to the area may come to view others as "outsiders", not having as much "right" to the area as they do (Driver and Bassett, 1975; Hammitt, 1988; Jacob and Schreyer, 1980).

Perceptions

Much of the conflict literature links the individual's perceptions of others to feelings of conflict. This factor assesses the degree to which visitors see others as different from themselves. Studies indicate that visitors experiencing conflict perceive others to be different from themselves in terms of background, lifestyle, levels of education, feelings about wilderness, activities and incomes (Adelman, Heberlein and Bonnicksen, 1982; Watson, Niccolucci

and Williams, 1993). Many studies have implemented perceived similarity measures to explain conflict (Hammitt, Knauf and Noe, 1989; Jacob and Schreyer, 1980; Kuss, Graefe and Vaske, 1990; Watson, Williams and Daigle, 1991). In fact, Kuss, Graefe and Vaske (1990, p.192) conclude that "the extent of conflict is influenced by the degree to which various user groups perceive each other as dissimilar." However, Watson, Williams and Daigle (1991) point out that although perceptions of dissimilarities may contribute to conflict, they are in fact often misconceptions. Visitors are in reality more similar to each other than they perceive themselves, especially since visitors often use characteristics such as group size and method of travel to evaluate their similarity to other groups (Kuss, Graefe and Vaske, 1990).

Experience

Another theme cited throughout conflict research is the significance of past experience. Jacob and Schreyer (1980) suggest that novices have little experience on which to assess the resource and social conditions encountered and therefore experience less conflict than the veteran visitor who over time has often developed rigid guidelines of acceptable conditions. Todd and Graefe (1989) also suggest that the more experienced visitor is more sensitive to

perceptions of conflict. Schreyer, Lime and Williams (1984) conclude that not only do past experience levels affect conflict perception, but they also are related to differences in behavior, motives for participation, assessments of wilderness character and quality, satisfactions with the trip and attitudes toward management strategies. Watson, Niccolucci and Williams (1993) indicate that both the general wilderness experience level and the specific site experience level are likely to influence conflict perception.

RESEARCH QUESTIONS AND HYPOTHESES

The study objectives coupled with the theoretical foundations and case studies regarding conflict directed the formulation of research questions and hypotheses. The basic theory of conflict outlined by Jacob and Schreyer (1980) was followed. In addition, the predictors of conflict used in this study are in line with Jacob and Schreyer's (1980) proposed determinants of conflict. Selection of conflict indicators was based on literature reviews, stated objectives and measurability of variables and/or constructs.

Asymmetrical Conflict

In any recreation setting where resources are limited and use is diverse and high, conflict is likely (Hendee, Stankey and Lucas, 1990). Moore (in press) indicates that conflict is probable in any situation where multiple uses are confined to one trail. In addition, one of the most common and documented findings of recreation conflict is that it usually begins as an asymmetrical or one-way relationship. The existence of conflict in multiple use recreation areas and the prevalence of a one-way conflict relationship between recreationists led to the first research question:

> **RQ_1: What is the nature and extent of conflict between horseback riders and hikers in the High Country of the Mount Rogers National Recreation Area? If there is a conflict, is it an asymmetrical relationship?**

Place Attachment

Repeated throughout the literature is the importance of place attachment as a predictor of conflict. Jacob and Schreyer (1980) indicated the significance of place attachment in the discussion of what they termed "central life interest." They concluded that the degree of resource attachment that an individual has directly affects the individual's proclivity toward conflict. Following Jacob and Schreyer's (1980) theoretical foundations of the role

place attachment plays in conflict situations, several case studies have documented the significance of place attachment in predicting conflict (Watson, Niccolucci and Williams, 1993; Watson, Williams and Daigle, 1991). These findings led to the first hypothesis:

H_1: Visitors that are more attached to the High Country are more likely to experience conflict than visitors that are less attached.

Wilderness Involvement

The inclusion of wilderness involvement as a potential "cause" of conflict stems from two main factors. First, wilderness involvement is similar to place attachment, but instead of assessing dimensions directly related to the specific place, it evaluates levels of attachment to and involvement with wilderness areas in general. In fact, Graefe et al. (1990) conclude that place attachment is an indicator of involvement. Watson, Niccolucci and Williams (1993, p.32) conclude that hikers most likely to experience conflict with horseback riders also have "stronger relationships with the wilderness". Secondly, wilderness users are frequently less tolerant of encounters and have more strict guidelines of acceptable resource and social conditions (Hendee, Stankey and Lucas, 1990; Kuss, Graefe and Vaske, 1990). These findings led to the second hypothesis:

H_2: Visitors with high wilderness involvement levels are more likely to experience conflict than visitors with low wilderness involvement levels.

Past Experience

The third indicator of conflict used in this study is past experience. Past experience is perhaps one of the most important variables cited to explain conflict. This stems from the fact that a visitor's experience level also affects place attachment and wilderness involvement levels. Studies suggest that as the experience level of the individual increases, so do the place attachment and wilderness involvement levels (Jacob and Schreyer, 1980; Moore, in press; Watson, Niccolucci and Williams, 1993). Experienced visitors are considered to have more information on which to assess the resource and social conditions encountered than do the inexperienced users. As a result, the experienced user is more likely to assess conditions as unacceptable and because of that assessment, to experience conflict. In line with these findings, the third hypothesis is:

H_3: The more past experience visitors have, the more likely they are to experience conflict.

Perceived Similarity

The fourth possible "cause" of conflict examined in this study is perceived similarity. Jacob and Schreyer

(1980) discuss the importance of perceived similarity under the heading "lifestyle tolerance." They point out that visitors that perceive others as different from themselves and assess that difference as interfering with their goal are likely to experience conflict. Several case studies have empirically determined perceived similarity to affect conflict perception (Hammitt, Knauf and Noe, 1989; Kuss, Graefe and Vaske, 1990; Watson, Williams and Daigle, 1991). In fact, Kuss, Graefe and Vaske (1990, p.192) conclude that "the extent of conflict is influenced by the degree to which various user groups perceive each other as dissimilar." These findings led to the fourth hypothesis:

H_4: Visitors who do not perceive themselves as similar are more likely to experience conflict than visitors who do perceive themselves as similar.

RESEARCH METHODS

Study Area and Population

The study area was the High Country of the Mount Rogers National Recreation Area. The High Country was defined to be the 3,855 acre Little Wilson Creek Wilderness, the 5,802 acre Lewis Fork Wilderness and the Crest Zone that separates the two wildernesses by about a mile. The study population was the adult (16 years and up) visitors to the area during

a one-year period from May 23, 1992 through May 22, 1993.

Sampling Plan

The sampling plan was developed with the assistance of a social scientist and a statistician from the USDA Forest Service Intermountain Research Station. The overall sampling goal was to contact enough visitors to permit an accurate description of the existence, nature and correlates of conflict among users of the High Country of Mount Rogers.

In addition to this goal, several other factors were considered in the formation of the sampling plan. One important element was the availability of only two field technicians, who typically worked five days each week during intensive sampling periods. Next, data collection was stratified by the season of use, day of use, time of use, and trail used. The season of use was important because most of the use in the High Country apparently occurs during the spring and summer months. These seasons were sampled most intensively. Less frequently sampled were the fall and winter recreationists. However, too few visitors were contacted during the winter season to draw any conclusions regarding conflict among winter users.

Time of use was also a consideration in the designing of the sampling plan. The goal was to efficiently cover all daylight hours of each day of the week. Since weekend days

(Saturday and Sunday) seem to receive more intensive use than weekdays, the two field technicians worked both weekend days and three weekdays each week. During the spring and summer, days were segmented into three sampling frames: morning (8:00 am to 11:30 am), afternoon (12:00 pm to 3:30 pm), and evening (4:00 pm to 7:30 pm). The half-hour segments between the sampling frames allowed the technicians to drive to the various High Country entry points. The fall sampling days were divided into two frames: morning (9:00 am to 1:00 pm) and evening (2:30 pm to 5:30 pm).

Finally, the sixteen High Country entry points were identified. To maximize efficiency, all trailheads were sampled in proportion to their agency estimated use levels. However, some trailheads received less than 1% of all estimated use. To ensure inclusion of those recreationists that frequent the less popular areas, no trail was sampled less than ten times (i.e., approximately 4% of the total sampling time). During intensive sampling periods (i.e., spring and summer) each field technician sampled two trailheads for a 3.5 hour period each sampling day. Thus, four different entry points could be sampled on any given day. Within this sampling framework, research technicians were randomly assigned to trailheads. Table 1 provides a listing of all the sampling frames by date, time, day of the week, and trailhead.

Table 1 cont. MOUNT ROGERS HIGH COUNTRY STUDY
Sampling Schedule (5/23/92-5/22/93)

Trail Number	Monday			Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday		
	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM
12	8/3 1	8/3 8/2 4	5/2 5	8/1 8		8/2 5		7/8 7/2 2			7/9 8/1 3 5/1 3		7/17 8/21 8/28 11/2 7 5/21	7/1 0 7/3 1 8/2 1	7/3 7/24 8/21 9/4 11/2 0	7/11 11/1 4 4/24 5/15	6/13 7/11 9/5	7/11 8/8	7/12 7/19		8/21
13				8/1 8	8/2 6		8/5 5/5		8/5	7/9 5/2 0	7/3 0		11/2 7			5/22 5/23 6/27	8/22	5/23 11/1 4			7/6
14	7/8 7/2 0	6/2 5 7/2 0	7/8	7/1 4 7/2 8 5/1 1		8/1 8				5/1 3	7/2 3	7/1 6	7/3 11/2 0	7/3 1 5/1 4	7/10 11/2 7	5/23 6/20 7/25 9/5 11/2 8 10/3 4/1	5/30 6/13 7/11	6/6 6/27 7/4	5/31 6/21 6/28 8/16	5/3 1 8/7 10/ 4	5/24 6/21 8/16 10/1 1
15	8/3	9/7		8/1 1	7/2 8 8/1 8				7/8	9/3			7/24				10/3 4/17	6/20 7/18	10/1 1		7/12 10/4
16				8/4			7/29 11/2 9	8/1 9		8/2 7					8/28	7/4 8/8	7/18	8/22	7/5		5/24

* am = 8 - 11:30 am
mid = 12 noon - 3:30 pm
pm = 4 pm - 7:30 pm

10					9/1	8/25				8/13			8/7	9/4	8/14	6/6 8/1	8/29			8/16	
11	6/1 7/27	5/25 8/17 8/31 3/1	7/20 8/17		6/1 8	8/4	7/15	6/3	6/3 8/12	7/23	7/23 5/13 5/20		8/14 11/27		7/10 7/17 8/7 11/20	5/30 8/8 8/15 11/1 4 4/24 5/15	6/27 8/22 10/10	5/30 8/29	6/14 7/12 7/19 8/2 10/1	6/14 6/21 6/28 7/26 8/9 2/28	6/7 7/26 8/23 10/4

Table 1. MOUNT ROGERS HIGH COUNTRY STUDY
Sampling Schedule (5/23/92-5/22/93)

Trail Number	Monday			Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday		
	AM*	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM	AM	mid	PM
1	7/13 11/1 6		6/29 7/13	5/2 6 6/2 8/4	6/2 3 6/3 0	6/2 6/2 3 6/3 0		6/3 8/1 7	6/3	6/1 1 6/2 5		6/1 1 6/1 8 6/2 5 8/1 3	6/26	6/1 9 5/2 1	6/12 6/19	6/20 9/5 10/3	6/27 10/1 0 5/22	6/20 9/5 11/2 8	4/18 5/31 7/26 8/9 8/30	5/2 4 8/2 8/3 0 5/1 6	7/12 8/2 8/23 9/5 10/1 1 11/1 5
2		6/2 9	6/1		6/9 6/2 3	6/2 6/2 3	6/1 7	6/1 0	6/1 0	6/2 5	6/1 8	6/2 5	5/29 6/12 11/2 7	6/2 6	11/2 7	11/2 8			8/30	8/9	
3			6/1 6/29	6/2 6/1 6		5/2 6 6/9		6/2 4				5/2 8	7/3	6/1 2 6/2 8	7/3	6/13 7/4		7/4		5/2 4 7/5	
4	5/26 6/1 9/7	7/1 3 8/1 7	6/15 7/13 8/3						6/1 0			7/2	7/10		5/29 8/21	7/18	7/25 8/15	6/13		6/1 4 8/3 0	8/18
5	6/29	9/7		5/2 6	5/1 8 5/1 1	7/1 4	6/1 0	6/1 2 8/2 6	6/1 2	7/3 0		8/1 3		9/4		7/25	8/1 8/29 10/3	6/6 6/8 8/8 10/1 0	6/7 7/5 5/16	6/2 6 9/6 4/1 8	7/26 8/9 9/6
6		8/3 1					8/2 6				5/2 8	8/6			7/31 9/4	8/22		5/30	8/23	8/2 3	
7	8/31	7/2 0	11/1 5 8/17 9/7	9/1	5/2 6			5/5	7/2 2	7/2 3							4/24	11/2 8 8/1 8/15	11/1 5 6/7 9/6 5/2	5/3 9/6	7/19
8			6/24			5/1 8		6/1 7	6/1 7 7/1 5	5/6	8/6 9/3		8/28 5/14		6/12 7/31	6/6 10/1 0	4/24 8/1	5/23 8/29	6/14	10/	7/19
9		6/1 5			8/2 5		6/2 4	7/2 9		7/1 6				8/2 1		7/18		7/25 8/15			8/28

Data Collection Instruments

The study was conducted using two data collection instruments: a short on-site interview and a longer mailback questionnaire. The on-site information was collected by the field technicians and included the time, date, and location of contact, type of user group (e.g., horse rider or day hiker), number and relationship of group members, distance travelled to the Mount Rogers NRA, route taken through the High Country, camp spots selected, and the length of stay in the High Country. (See Appendix A for a copy of the on-site contact sheet).

The second and more intensive data collection instrument was a 15-page mailback questionnaire (see Appendix B). It took about 30 minutes to complete. In keeping with the overall goal of the study, the questionnaire was designed to acquire the following information from High Country recreationists: 1) socio-demographic information, 2) activities and trip characteristics, 3) attachment and experience levels with the High Country, 4) wilderness knowledge and involvement, 5) satisfaction with the High Country trip, 6) opinions of resource, social, and management conditions, 7)perceptions of conflict, and 8) preferences for High Country management strategies.

Data Collection Procedures

During each sampling frame, all groups entering or exiting the trailhead were interviewed. Contact information was obtained, and addresses from up to four members of each group were collected. The study questionnaire was mailed to the participants within a few weeks of the field contact. Included with the questionnaire was a cover letter (see Appendix C) and a postage-paid, self-addressed, return envelope. After one week a postcard reminder was sent (Appendix D). Two weeks later an identical survey packet with a somewhat stronger cover letter (Appendix E) was sent to respondents who had not yet returned the questionnaire.

Response Rate

During the course of the study 1571 participants were sent the study questionnaire. Twenty of these had bad addresses. Of the remaining 1551 respondents contacted, 1072 returned their questionnaire, for a final response rate of 69% (Table 2).

Table 2. Questionnaire response rate.

Mailed Out (N)	Returned (N)	Rate(%)
1551	1072	69

DATA ANALYSIS

Conflict Measure

For this study of conflict between horseback riders and hikers, an index measure of conflict was created from three conflict-related questions. In line with previous conflict research, a measure of crowding was included. The crowding component of the conflict measure was whether or not hikers saw too many horseback riders and if horseback riders encountered too many hikers. Seeing too many was considered to be "conflict". (see Tables 3 and 4).

Table 3. Horseback riders saw too many hikers.

Total (N)	No	Yes	No Resp.
	% of total		
227	94	3	3

Table 4. Hikers saw too many horseback riders.

Total (N)	No	Yes	No Response
	% of total		
647	71	26	3

A second component of the conflict index followed Jacob and Schreyer's (1980) definition of conflict and Owens'

(1985) call for a cumulative measure of conflict. Hikers and horseback riders were asked if the behavior of any other group or individual interfered with their enjoyment of the Mount Rogers High Country (Watson, Niccolucci and Williams ,1993). If respondents said yes, they were then asked to identify the group or individual responsible and the problem behavior. Thus, hikers included in the "conflict with horses" group said "yes" their enjoyment was impaired and "horseback riders" were responsible. Similarly, horseback riders included in the "conflict with hikers" group responded "yes" to the question and indicted hikers as the culprit (Tables 5 and 6).

Table 5. Enjoyment impaired by other visitor's behavior.

Usertype	Total (N)	Enjoyment Impaired		
		No	Yes	No Resp.
		% of total		
Hikers	647	80	19	0.8
Horseback Riders	227	86	12	2

Table 6. Group that interfered.

Usertype	Total (N)	Group Identified			
		Hikers	Horses	Other	No Resp.
		% of total			
Hikers	124	14	48	35	3
Horseback Riders	27	4	26	63	7

The third element included in the conflict index measure was awareness of resource impacts. The rationale for the inclusion of "resource impacts" in the conflict index measure results from the two user groups being studied. Many researchers contend that impacts due to horse use often lead to feelings of conflict among hikers (Hammitt and Cole, 1987). In fact, some research concludes hikers' primary complaint regarding horseback riders is the horse manure left on the trails (Watson , Niccolucci and Williams, 1993; Hammitt and Cole, 1987). For this element of the conflict index, respondents were asked if they noticed any resource impacts to the High Country, and if so, to what user type they attributed those impacts. Horse users that saw impacts and attributed them to "hikers" were included in the "conflict with hikers" group. Similarly, hikers that witnessed resource impacts and believed "horseback riders" to be the causal agent of those impacts were included in the "conflict with horses" group. All other responses were considered "no conflict" (Tables 7 and 8).

Table 7. Perception of recreation impacts.

Usertype	Total (N)	Resource Impacts		
		No	Yes	No Resp.
		% of total		
Hikers	647	49	49	2
Horseback Riders	227	79	19	2

Table 8. Perceived cause of resource impacts.

Usertype	Total (N)	Group Identified				
		Hikers	Horses	Other	Don't Know	No Resp.
		% of total				
Hikers	317	14	45	33	7	1
Horseback Riders	43	2	40	30	28	0

The two "conflict" groups used in the analyses (i.e., horseback riders in conflict with hikers and hikers in conflict horseback riders) were formed from respondents who felt conflict on any one of the three components of the conflict index measure (Table 9). The "no conflict" groups (i.e., horseback riders not in conflict with hikers and hikers not in conflict with horseback riders) consisted of respondents that did not report conflict in any of the three individual conflict measures (i.e., crowding, impacts and

interference).

Table 9. Conflict between hikers and horseback riders.

Usertype	total (N)	Conflict		No Conflict	
		N	percent	N	percent
Hikers	545	198	36	347	64
Horseback Riders	189	6	3	183	97

Measures of Predictors of Conflict

The following four dimensions that potentially affect conflict were used in this study: wilderness involvement, place attachment, perceived similarity and experience level. The potential conflict predictors concerning experience levels were single item responses. One experience variable measured specific site experience and the other, general wilderness experience (See Appendix B, questions 4a and 15). The remaining conflict predictors were multiple-item scales of a Likert format, with response categories ranging from "strongly agree" to "strongly disagree" (See Appendix B, questions 12, 19 and 25).

Factor analysis was used to determine the number of dimensions or constructs defined by each of the multiple-item wilderness involvement, place attachment, and perceived similarity scales. A principal components factor analysis using a varimax orthogonal rotation was used to identify

underlying factors. Identification of unique factors or dimensions included in each scale depended on the total variance explained by each factor (eigenvalue) and the factor structure matrix (Norusis, 1990). Factor analysis performed on the ten "perceived similarity between horseback riders and hikers" items produced two factors, one with high loadings on "similar values" and one with high loadings on a "similar socio-economic status" factor. Factor analysis performed on ten attachment items yielded two clear factors, one pertaining to a measure of "place identity" and the other concerning "place dependence". Place identity is the extent to which the environment plays a role in defining and maintaining a visitor's self-identity. Place dependence is the degree that a place meets the visitor's needs better than an alternative place. The six wilderness involvement items did not factor into separate, unique dimensions, and thus were combined into one summative scale. In total, factor analysis produced five predictor variables.

Cronbach's Alpha was used to determine the internal consistency of items included in each summative scale (Norusis, 1990). Alpha coefficients of 0.80 were sought. Individual items determined to be related by factor analysis and found to be strongly related by reliability assessments were used to form the final scales. Summative scale scores used in subsequent study analyses were derived by adding

across the related items and dividing by the total number of items included in the scale. Individuals not responding to the specified number of items in the scale were excluded from the study. For example, the perceived similarity of values scale contains three items. If respondents did not answer one of the items, they were dropped from the analyses. The perceived similarity of socio-economic status scale consists of six items. Respondents that answered at least four of the items were included in analyses. The involvement scale contained six items and respondents included in the study had to answer at least four items. Respondents included in the study also had to answer all three of the items in the place identity scale and at least three of the items in the four item place dependence scale. This was done to ensure that scale scores were not based on only one or two items in the scale.

Data Analysis Procedures

Three types of data analysis were performed in this study of conflict. The first analysis addressed the first research question concerning the existence and extent of conflict between horseback riders and hikers. Frequency tables were created to examine the existence of conflict reported by horseback riders and hikers in each of the three components of the conflict index and in the total conflict

index measure. The two "conflict" groups were compared on the extent to which each reported conflict. Chi-square measures of association were used to statistically test for population differences.

Discriminant analysis and Student's T-tests were used to assess the ability of the seven variables wilderness involvement, place identity, place dependence, perceived similarity of values, perceived similarity of socio-economic status, site experience and general wilderness experience to predict conflict. Student's t-tests revealed each variables singular ability (bivariate) to "explain" conflict, and discriminant analysis considered all variables simultaneously (multivariate analysis).

Student's t-tests were performed as the initial tests of study hypotheses. This analysis procedure identifies any difference between the two groups (i.e., hikers experiencing conflict and hikers not experiencing conflict) on each of the seven predictor variables. However, because this analysis procedure does not account for correlations among the variables, it cannot provide a relative ranking of the significant predictor variables.

Discriminant analysis was the third type of data analysis used in this study. It was used to determine the study's predictor variables' relative contribution to explaining conflict, and to assess their collective ability

to explain conflict. Discriminant analysis was selected for several reasons. First, the conflict measure was a nominal scale (i.e., conflict/no conflict), and the seven predictor measures combined interval-like and ratio scale variables. A second rationale for selecting discriminant analysis was its ability to distinguish the relative importance or predictive power of each predictor variable simultaneously. Discriminant analysis is equivalent to multiple regression for two groups (Brown and Tinsley, 1983). This analysis procedure uses linear combinations of the predictor variables to find the combination that maximizes the prediction ability of the model.

Decisions on the relative importance or predictive power of the conflict predictors were based on several measures produced by the discriminant analysis. The standardized discriminant coefficients and the structure matrix were both considered in determining how each discriminant variable related to group differences. Standardized discriminant coefficients directly reflect the relative contribution of each discriminant variable to group discrimination. In general, the more the variable discriminates among the groups, the greater will be the magnitude of the discriminant coefficient. However, because discriminant function coefficients can be deceiving if discriminator variables are correlated, the structure matrix

was also examined. For example, if two predictor variables are correlated and both are highly predictive of the dependent measure, the variable with the greatest discriminatory power will be weighted much more heavily. Because the bulk of the variance attributed to group differences is ascribed to only one of the variables, the remaining correlated variables receive a misleadingly low weight (discriminant coefficient). The structure matrix indicates the correlation between scores on each discriminator variable (predictor variable) and scores on the function (discriminant scores) (Brown and Tinsley, 1983).

In order to further reduce the likelihood of finding spurious results, the canonical correlation, Wilk's lambda, Chi-square, multivariate omega squared and group centroids were also considered in the interpretation of the discriminant analysis. The group centroids are the mean discriminant scores for each group. They indicate how well each conflict group was discriminated relative to the other. The canonical correlation was used to determine the proportion of the variance in the function that was related to differences between the two groups. Wilk's lambda and the chi-square were used to indicate the statistical significance of results, and the multivariate omega squared was examined to determine the practical significance of the

results (Brown and Tinsley, 1983). The multivariate omega squared indicates the amount of variance in the discriminant function which is really attributable to group differences as opposed to simply an artifact of sample size. For example, the chi-square can indicate that a significant level of discriminatory information exists in the model, but if the multivariate omega squared is low, this information probably has little practical utility (Brown and Tinsley, 1983).

RESULTS

Two kinds of results of this study are presented: 1) the extent and nature of conflict between hikers and horseback riders based on the three conflict measures, and 2) the significance and relative importance of conflict predictor variables and the conflict model in explaining the nature and extent of conflict.

Nature of Conflict

Analyses conducted to address the first research question revealed that conflict does exist between hikers and horseback riders. In addition, the conflict is in the form of the expected asymmetrical or one-way relationship. On the first part of the conflict index measure, crowding,

only 3% of horseback riders reported that they saw too many hikers, while 26% of the hikers saw too many horseback riders (See Tables 3 and 4, page 38). The number of hikers and horseback riders that reported environmental impact was much higher. Almost half (49%) of the hikers saw resource impacts they attributed to another recreationist, and 45% of them believed horse use to be the causal factor. Nineteen percent of horseback riders reported conflict on this item, and only 2% of them blamed hikers (Tables 7 and 8, page 41). The third measure of conflict also produced a strong asymmetrical relationship. Nineteen percent of the hikers indicated that the behavior of other groups had interfered with their enjoyment of the High Country. Horseback riders were the group that interfered 48% of the time. Twelve percent of the horseback riders indicated interference by other groups, and only 4% of those indicated hikers as the group that interfered (Tables 5 and 6, page 39).

The extent of conflict experienced by horseback riders and hikers based on the three index measures are shown in Table 10. Over one-third (36%) of the hikers reported conflict with horseback riders, while only 3% of the horseback riders felt conflict on any one of the three index measures. Because of the clearly asymmetric nature of the conflict, (i.e., only 6 horseback riders reported conflict with hikers, while 198 hikers indicted conflict with

horseback riders), the subsequent analyses conducted in this study was performed only on the hikers. Testing the significance of seven predictor variables on a group of six people is neither appropriate nor meaningful.

Table 10. Conflict index groups.

Usertype	total (N)	Conflict		No Conflict	
		N	percent	N	percent
Hikers	545	198	36	347	64
Horseback Riders	189	6	3	183	97

Significance of Conflict Predictors

The means, standard deviations and frequencies of hiker responses to the seven predictor variables were examined. This was done in order to assess the level of place attachment, wilderness involvement, perceived similarity and experience for the hikers. Table 11 shows that the greatest percentage of hikers perceive horseback riders as different from themselves in their socio-economic status. Table 12 indicates that somewhat more hikers perceive horseback riders as similar to themselves rather than different in how they value the High Country. Table 13 shows that by far the majority of hikers (84%) identify with the place Mount Rogers. However, hikers are fairly well split (i.e., 41% disagree or strongly disagree and 39% agree of strongly

agree) on how dependent they are on the Mount Rogers High Country for their particular recreational activities (Table 14). Table 15 reveals that 83% of hikers have high wilderness involvement levels. Table 16 indicates the extent of general wilderness experience of hikers. A plurality of hikers (28%) have visited three to five other wilderness areas. However, Table 17 shows that 42% of the hikers had never previously visited Mount Rogers, and that 29% of hikers had previously visited the area one to five times.

Table 11. The extent to which hikers perceive their socio-economic status as similar to horseback riders' socio-economic status.

Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree	No Resp.
N=15	N=145	N=159	N=247	N=38	N=43
2%	22%	25%	38%	6%	7%

Mean= 3.1
Standard Deviation= .70

strongly agree= 1-1.99, somewhat agree= 2-2.99, neutral= 3, somewhat disagree= 3.01-4.00, strongly disagree= 4.01-5.00.

Table 12. The extent to which hikers perceive their values as similar to horseback riders' values.

Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree	No Resp.
N=45	N=198	N=153	N=155	N=49	N=47
7%	31%	24%	24%	8%	7%

Mean= 2.9
Standard Deviation= .97

strongly agree= 1-1.99, somewhat agree= 2-2.99, neutral= 3, somewhat disagree= 3.01-4.00, strongly disagree= 4.01-5.00

Table 13. The extent of place identity of hikers at the Mount Rogers High Country.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Resp.
N=5	N=31	N=42	N=338	N=207	N=24
1%	5%	7%	52%	32%	4%

Mean= 3.9
Standard Deviation= .67

strongly disagree= 1-1.99, disagree= 2-2.99, neutral= 3, agree= 3.01-4.00, strongly agree= 4.01-5.00

Table 14. The extent of place dependence of hikers at the Mount Rogers High Country.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Resp.
N=31	N=230	N=118	N=172	N=80	N=16
5%	36%	18%	27%	12%	3%

Mean= 3.1
Standard Deviation= .85

strongly disagree= 1-1.99, disagree= 2-2.99, neutral= 3, agree= 3.01-4.00, strongly agree= 4.01-5.00

Table 15. The extent of wilderness involvement of hikers.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Resp.
N=233	N=305	N=26	N=74	N=4	N=5
36%	47%	4%	11%	1%	1%

Mean= 2.2
Standard Deviation= .71

strongly agree= 1-1.99, agree= 2-2.99, neutral= 3, disagree= 3.01-4.00, strongly disagree= 4.01-5.00

Table 16. The extent of general wilderness experience of hikers.

Number of other wilderness areas visited

0	1-2	3-5	6-10	> 10	No Response
N=63	N=126	N=179	N=118	N=149	N=12
10%	20%	28%	18%	23%	2%

Table 17. The extent of site experience of hikers.

Number of prior visits to Mount Rogers

0	1-5	6-10	11-20	> 20	No Response
N=271	N=188	N=59	N=55	N=44	N=30
42%	29%	9%	9%	7%	5%

Mean= 7.2
Standard Deviation= 19.6

The seven Student's t-tests were examined to determine the significance of the differences between the two groups on the seven predictor variables. All variables except place identity and place dependence were significant. Table 18 clearly shows that statistically significant differences exist between hikers experiencing conflict and hikers not experiencing conflict regarding each group's perceptions of their socio-economic status as compared with horseback riders. Hikers experiencing conflict tended to perceive horseback riders as more different from themselves on their socio-economic status. Table 19 indicates that significantly more hikers not in conflict with horseback riders perceive horseback riders as similar to themselves in how they value the High Country. Tables 20 and 21 show the results of the Student's t-tests for the place attachment variables. Neither the place identity nor the place dependence distributions for the two groups were significantly different. Hikers in conflict with horseback riders felt greater wilderness involvement than did hikers who didn't experience conflict, i.e., hikers in conflict more likely felt wilderness is a part of them, get greater satisfaction out of visiting wilderness areas than other recreation areas, organize their life around wilderness use, and go to Mount Rogers primarily to visit its wilderness areas (Table 22). The two hiker groups had significantly

different site experience and general wilderness experience levels. Table 23 indicates that hikers experiencing conflict had significantly greater site experience (mean= 10.38 previous visits) than did the hikers that did not experience conflict (mean= 5.40). Table 24 shows the Student's t-test results for the general wilderness experience variable. As with site experience, hikers feeling conflict toward horseback riders had significantly greater general wilderness experience than hikers that did not feel conflict toward horseback riders.

Table 18. Student's T-test for differences between hikers in conflict versus the hikers not in conflict regarding their perceived similarity of socio-economic status with horseback riders.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	382	3.08	.67	-2.92	602	.004
Conflict	222	3.25	.74			

Table 19. Student's T-test for differences between hikers in conflict versus hikers not in conflict regarding their perceived similarity of values with horseback riders.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	380	2.70	.89	-7.58	598	.000
Conflict	220	3.29	.99			

Table 20. Student's T-test for differences in the place identity of hikers in conflict versus hikers not in conflict.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	396	3.86	.66	-1.65	621	.099
Conflict	227	3.95	.70			

Table 21. Student's T-test for differences in the place dependence of hikers in conflict versus hikers not in conflict.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	397	3.06	.802	-.29	431	.771
Conflict	234	3.08	.936			

Table 22. Student's T-test for differences in the wilderness involvement of hikers in conflict versus hikers not in conflict.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	408	2.29	.705	2.78	640	.006
Conflict	234	2.13	.698			

Table 23. Student's T-test for differences in the site experience of hikers in conflict versus hikers not in conflict.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	395	5.40	13.77	-2.58	288	.010
Conflict	222	10.38	26.81			

Table 24. Student's T-test for differences in the general wilderness experience of hikers in conflict versus hikers not in conflict.

	Number of Cases	Mean	Standard Deviation	t-value	Degrees of Freedom	2-tailed probability
No Conflict	402	2.17	1.32	-2.36	633	.018
Conflict	233	2.42	1.22			

Using Student's T-tests all of the predictor variables except the two place attachment measures were significantly different for the two groups. As previously stated, this analysis procedure indicates the significance of each predictor variable without considering any of the other variables. While this procedure provides insight into the significance of each variable's ability to "explain" conflict, it does not yield the relative or the collective

strength of the variables. It also does not take into consideration the effect of intercorrelation among the set of predictor variables themselves, a possibility which past theoretical and empirical work suggested to be likely and was found to exist in this study (See Table 25).

Discriminant analysis was used to determine the predictor variables' relative and collective ability to distinguish between the two groups: hikers in conflict with horseback riders, and hikers not in conflict with horseback riders. The results of the discriminant analysis are presented in Table 25.

Table 25. Predictors of hiker-horseback conflict among hikers: discriminant analysis results.

	Standard Coefficient	Structure Matrix Coefficient	Level of Significance
Similarities with horseback riders			
-values	(.79)	(.83)	(.000)
-socio-economic status	(.20)	(.40)	(.001)
Involvement			
-wilderness involvement	(-.27)	(-.38)	(.002)
Experience			
-site	(.27)	(.33)	(.007)
-wilderness	(.15)	(.31)	(.012)
Place Attachment			
-place identity	(.12)	(.23)	(.060)
-place dependence	(-.09)	(.02)	(.901)

canonical correlation = .34
squared canonical correlation = .11
Wilk's Lambda = .89, p =.00.
Group Centroids: Conflict = .47
No Conflict = -.27
similarity measures: lower the number, greater the perceived similarity

involvement measures: lower the number, greater the involvement
place attachment measures: lower the number, less the place attachment

Examination of the standard coefficients in light of the structure matrix coefficients revealed that correlations between some of the discriminating variables were resulting in the affected variables receiving a misleadingly low weight (standard coefficient) in the function. If two variables are correlated and both are related to differences among the groups, the variable with the stronger relationship will be weighted (the discriminant coefficient) more heavily. If two variables are correlated, examination of only the discriminant function scores could result in inaccurate conclusions regarding the individual importance of discriminator variables. For example, examining the structure matrix coefficients, it is clear that it is primarily the "similar values" variable (correlation = .83) that discriminates between the two conflict groups, with the "similar socio-economic status" and "wilderness involvement" variables secondarily involved (correlations of .40 and -.38 respectively). Now, examination of the standard coefficients reveals which of the variables are redundant given others in the set. Given the "similar value" variable (coefficient = .79), the "similar socio-economic status" variable is redundant since its coefficient is only .20.

Table 26. Correlational relationship among predictor variables of conflict and degree of conflict.

	A	B	C	D	E	F	G	H
A	-	.1182**	.2961**	.0662	.0121	-.1092**	.1219**	.0936*
B		-	.2607**	-.0310	-.0859*	-.0554	.0610	.0584
C			-	.0204	-.0740	-.0159	.0432	.0528
D				-	.5501**	-.4296**	.1528**	.0832*
E					-	-.2556**	.2564**	-.1413**
F						-	-.1728**	-.3935**
G							-	.0707
H								-

A-Conflict-Yes, No; B-similarity of socio-economic status; C-similarity of values; D-place identity; E-place dependence; F-wilderness involvement; G-site experience; H-general wilderness experience.

* -- significance level = .05
** -- significance level = .01

Examination of the discriminant analysis results in the above manner led to the ordering of the importance of the potential conflict predictors as shown in Table 25. Perception of similarity has the greatest ability to predict

conflict. Wilderness involvement measures (standard coefficient = -.27 and correlation = -.38) were second in significance in group discrimination. Specific site experience items and general wilderness experience measures (standard coefficients of .27 and .15 and correlations .33 and .31 respectively) were also found to be statistically significant in group discrimination power. Both attachment measures used in this study (i.e., place identity and place dependence) were found not to be statistically significant (i.e., level of significance = .0598 and .9006 respectively) in group discrimination. Note from the group centroid means (Table 25), that it is the hikers in conflict that tend to perceive less similarities with horseback riders and be more involved in wilderness. Hikers not in conflict with horseback riders are less involved in wilderness and tend to perceive the horseback riders as similar to themselves.

Significance of Conflict Model

Table 27 indicates the predictive ability of the entire conflict model.

Table 27. Overall Conflict Model

Actual	# of observations	Classified by Model	
		Conflict	No Conflict
		% of total	
Conflict	198	64.6	35.4

No Conflict	347	30.0	70.0

Overall Predictive Power: 68.07

The model correctly classified 68% of the cases. The squared canonical correlation, Wilks' Lambda, chi-square, multivariate omega squared and the chance prediction ability were used to help determine the effectiveness and practical utility of the conflict model. The Wilks' Lambda and chi-square values (.888 and .000 respectively) indicate the statistical significance of the conflict model. The larger the Wilk's lambda value, the less discriminatory information there is remaining in the predictor variables. The discriminator variables are, according to the Wilks' Lambda and chi-square values, significant in their ability to account for the variance associated with group differences.

As with many statistical tests, differences having little practical significance can achieve statistical significance if the sample size is large. Using the following formula outlined by Brown and Tinsley (1983),

$$W^2 = 1 - n/(N-K)\ (1 + e_1)(1 + e_2)\ldots(1 + e_f) + 1$$

where: f = the number of functions (or eigenvalues),
n = the number of subjects in the total sample,
e = the eigenvalue associated with each function, and
k = the number of groups (Tatsuoka, 1970)

the multivariate omega squared is .11. This indicates that only 11 percent of the variance accounted for by the

function is attributable to differences between the groups. Another method to determine the significance of the proportion of the correct classifications by the model is a comparison with the proportion of correct predictions expected on the basis of chance. Using the following formula outlined by Morrison (1974) and recommended by Brown and Tinsley (1983),

$$p_1a_1 + p_2a_2 + \ldots + p_ka_k$$

where: $p_1 \ldots k$ = the proportion of cases in the sample belonging to each group,
$a_1 \ldots k$ = the proportion of cases in the sample classified as belonging to each group, and
k = the number of groups.

chance is calculated to be 51%. The model classifies individuals into either the conflict or no conflict group, 17% better than by chance alone.

DISCUSSION AND CONCLUSION

The above analyses demonstrate that conflict does exist between hikers and horseback riders in the Mount Rogers High Country of Virginia. The conflict relationship is asymmetrical with significantly more hikers experiencing conflict toward horseback riders than horseback riders feel toward hikers. Thirty-six percent of hikers experienced conflict toward horseback riders, and this level of conflict is not that different from levels of conflict found in a

similar study by Watson, Niccolucci, and Williams (1993).

Discriminant analysis and Student's T-tests demonstrated that the five variables, perceived similarity of values, perceived similarity of socio-economic status, wilderness involvement, site experience, and general wilderness experience were significant in their individual ability to predict conflict. The place attachment variables, place identity and place dependence, were not significant in either statistical test.

Discriminant analysis revealed that the "perceived similarity of values" predictor variable was, relative to the other variables, the most important in the model. Hikers that perceive horseback riders as having similar values about the High Country as they do, experience less conflict than hikers that think horseback riders are different from themselves on these measures. The remaining significant variables were ranked as follows: "perceived similar socio-economic status", "wilderness involvement", "site experience", and "general wilderness experience".

The statistical significance of the model indicates that the predictor variables have some merit in "explaining" the conflict between hikers and horseback riders in the Mount Rogers High Country. The model's ability to determine whether or not a hiker will experience conflict was found to be 17% better than by chance prediction alone.

Research Implications

Two previous studies closely parallel this examination of conflict between hikers and horseback riders in the Mount Rogers High Country of Virginia. Watson, Williams, and Daigle's (1991) study of conflict between hikers and mountain bike riders and Watson, Niccolucci, and Williams' (1993) research of conflict between hikers and horseback riders are both similar to this study in approaches to and measurements of conflict. The extent and asymmetrical nature of conflict found in this study is comparable to the conflict between hikers and mountain bike riders in the Rattlesnake National Recreation Area (Watson, Williams and Daigle, 1991) As with this study, Watson et al. (1991) also found that perceived similarity measures did help "explain" some of the conflict. They found that visitors experiencing conflict were more likely to perceive others as different from themselves. Another similarity with this study is that Watson et al. (1991) found that most attachment measures did not significantly contribute to understanding the conflict. Only one attachment measure, place dependence, helped explain some of the variation in group membership. In fact, as with this study, the difference in attachment levels were the opposite from that which was expected. Watson et al. (1991) revealed that bicycle riders reported greater place dependence than did the hikers in their study, while the

hikers were the most likely to report conflict. These results are counter to the expected relationship of the higher the place attachment, the higher the probability of conflict. However, their results were similar to this study in that the horseback riders in this study were also more attached to the area but experienced less conflict than the less attached hikers. It should be noted that despite the close parallel of these two studies, some differences in operationalizing of terms and measurement do exist and therefore any comparisons should be made with care.

The second study that closely parallels this research was conducted by Watson, Niccolucci and Williams (1993). Their study examined conflict between hikers and horseback riders in three wilderness areas. The extent and nature of conflict reported by Watson et al. (1993) was almost identical to the conflict between hikers and horseback riders in the Mount Rogers High Country. They found 4% of stock users reporting conflict, while 44% of hikers reported conflict. However, the Mount Rogers study results differed from Watson et al. (1993) in some of the relationships reported between conflict and the predictor variables. Watson et al. (1993) were testing three different models or ways of assessing conflict in three different wilderness areas. Within this study they found that the relationship between conflict and the potential predictor variables

varied across the three areas as well as depending on which model of conflict was being tested. For example, in the John Muir Wilderness the most important predictor variable was determined to be the "activity-associated status" variable. Under the same model the "importance of solitude to activity enjoyment" variable was the most important in the Sequoia-Kings Canyon National Park Wilderness, and in the Charles C. Deam Wilderness the "degree of tolerance for the other user group" variable was the most significant.

The goal interference model of conflict tested by Watson et al. (1993) combined all three wildernesses into one discriminant model. In this model the "degree of tolerance for the other group" was the most important in the model. Even with the variation in the results within Watson, Niccolucci and Williams' (1993) study, it is clear that their results do differ in many aspects from the results of this study. For example, in the seven discriminant analyses conducted by Watson et al. (1993) the highest ranking received by the "perceptions of similarities between groups" variable was fifth. In the Mount Rogers study this variable was the most important in the model. Comparisons of other predictor variables is not as clear cut. For instance, the importance of "place attachment" variables in Watson et al. (1993) study varies across wildernesses and across conflict models tested. Within the

enjoy/dislike measure of conflict model, "place attachment" was measured as one possible predictor factor in the John Muir Wilderness and in the Charles C. Deam Wilderness. In both cases this factor was significant (ranked fourth and third respectively in group discrimination). However, in the Sequoia-Kings Canyon National Park Wilderness "place attachment" was assessed using the two factors: "place identity" and "place dependence". "Place identity" was significant in the model, but the "place dependence" variable was not.

Watson et al. (1993) concluded that the relationships between the measures of conflict and the set of potential predictors varied across the three areas. However, they did conclude that the following variables, in combination, seemed to have the greatest power to predict how someone will describe a specific encounter on a particular trip. These variables were extent of belief that horses are appropriate in wilderness, degree of status attributed to horse users, strength of relationship with wilderness, and value placed on solitude. When comparing these variables to this study's model, the results again appear to be different. The only variable that is significant in this study and included in the variables deemed "important" by Watson et al (1993) is a measure of "strength of relationship with the wilderness". It should be noted that

Watson et al. (1993) did not include "place attachment" as one of the five most important variables.

Despite the similarities between this study and those of Watson, Niccolucci and Williams (1993) and Watson Williams and Daigle (1991), drawing conclusions regarding any differences or similarities is difficult at best and meaningless and deceiving at worst. For example, in all three studies, conflict itself is operationalized differently. In addition, the predictors of conflict used in each were different. On the other hand, perhaps the differences between this and past studys results is due, as Watson et al. (1993) suggested, to the various site-specific influences involved. Maybe the users of Mount Rogers are simply different from those in other geographical areas. Without identical studies in different areas, it is impossible to draw conclusions about these issues.

This study points to the need for further theory development and consistency of measures of conflict variables. Which model of conflict is the most reliable and valid? Does that model change depending on the site and the user groups involved? Does the model change based on how conflict itself is operationalized? If so, which definition of conflict is the most accurate? most valid? most reliable?

Management Implications

The most valuable findings for management are that conflict does exist among hikers and horseback riders in the Mount Rogers High Country, the relationship is essentially one-way, and the most important variables among those studied to "explain" conflict are the "perceived similarity" variables. While only 3% of horseback riders reported conflict toward hikers, the 36% of hikers experiencing conflict toward horseback riders seems to be a problem. This conflict should not be ignored. In addition, horseback riders' high attachment to the Mount Rogers High Country means they cannot simply be relocated to another area.

While any conflict in a recreation area should a concern for managers, it should also be noted that the hikers that reported conflict are in the minority. In fact, despite 36% of the hikers reporting conflict, an average of 80% of the hikers indicated that they were extremely to very satisfied with their visit. Any management actions should be considered with caution. Inappropriate management actions could actually result in increasing the conflict level. After all, the majority of visitors reported no conflict and any management actions taken will also affect them.

Examination of the individual index measures of conflict also provides some useful insight into possible

managerial strategies to alleviate some of the reported conflict. Twenty-six percent of hikers indicated conflict with horses due to seeing too many of them. This suggests that the conflict for these individuals may be addressed by providing the opportunity for them to recreate in an area free of horse use. Zoning, restricting use and the use of a permit system are all methods that would help reduce contacts among visitors. Hammitt (1988) suggested zoning through the use of the Recreation Opportunity Spectrum (ROS), while Hass. Driver, Brown and Lucas (1987) others have indicated Limits of Acceptable Change (LAC) as a method to separate user groups. Regardless of the approach used, providing a place in the recreation area where horse use is forbidden should help alleviate some of the conflict that hikers reported was due to too many encounters with horses. However, it should be noted that in the Mount Rogers High Country, there are several trails on which horse use is forbidden. Therefore, simply informing the hikers about the availability of horse-free trails may begin to solve the problem.

The second index measure of conflict, based on a visitor's enjoyment being impaired by the behavior of another visitor, also indicates possible management strategies to alleviate conflict. About 20% of hikers reported that their enjoyment had been impaired by the

behavior of another visitor, and about half (48%) of these indicated horseback riders as the group that interfered. This suggests that managers can alleviate conflict for about 10% of all hikers by addressing the behavior of horseback riders. Some of the most common problem behaviors reported were horse manure on the trails, horse related trail damage, odors, alcohol use by horseback riders, trash left by horseback riders and stream contamination. Although educational strategies could address some of the problem behaviors i.e., alcohol use and littering, it is not very effective on unavoidable impacts, such as manure on the trails.

Resource impacts are the third conflict index measure. Approximately one-fourth of the hikers indicated that they saw resource impacts and that horseback riders were responsible for those impacts. These reported impacts were mainly trail damage and manure on the trails. Aside from limiting, restricting or zoning horse use, complaints of manure are difficult to address. Trail damage problems, however, are often linked to horse use when in fact they are frequently due to poor trail location and/or maintenance. Managerial efforts to maintain adequate trail conditions may help alleviate some of this conflict.

Perhaps the strongest implication for management from this study is the need for visitor education. This study

found that hikers that perceive horseback riders as having similar values about the High Country as they do, perceive less conflict than hikers that think horseback riders are different from themselves on these measures. This being the case, steps should be taken to assess the actual condition of similarity between hikers and horseback riders in the Mount Rogers High Country. If hikers and horseback riders are in fact more similar than they perceive themselves to be, informing both groups of their similarities may help reduce feelings of conflict. If the perceptions of dissimilarity are found to be correct, another light-handed effort that might reduce conflict would be to encourage and foster positive interaction among the two groups. Joint trail maintenance efforts are one such method managers can use to help break down barriers and stereotypes and to build understanding, cooperation and good will between user types.

LITERATURE CITED

Adelman, B. J., Heberlein, T.A. & Bonnicksen, T. M. 1982. Social psychological explanations for the persistence of a conflict between paddling canoeists and motorcraft users in the Boundary Waters Canoe Area. Leisure Sciences, 5(1): 45-61.

Brown, M. T., and Tinsley, E. A. 1983. Discriminant Analysis. Journal of Leisure Research, 15(4):290-309.

Bryan, H. 1977. Leisure Value Systems and recreational specialization: The case of trout fishermen. Journal of Leisure Research, 9(3): 174-187.

Bryan, H. 1979. Conflict in the Great Outdoors: Toward understanding and managing for diverse sportsmen preferences. Sociological Studies, No.4.

Bury, R.L., Holland, S. M. & McEwen, D. N. 1983. Analyzing recreational conflict: Understanding why conflict occurs is requisite to managing that conflict. Journal of Soil And Water Conservation, Sep.-Oct.: 401-403.

Cole, D. N., Petersen, M. E. & Lucas, R. E. 1987. Managing wilderness recreation use: common problems and potential solutions. USDA Forest Service, Intermountain Forest and Range Experiment Station, Gen. Tech. Report, Ogden, UT: INT-230. 60pp.

Driver, B. L. & Bassett, J. R. 1975. Defining conflicts among river users: A case study of Michigan's Au Sable River.Naturalist, 26(2): 19-23.

Graefe, A. R., Kuss, F. R. & Vaske, J. J. 1990. Visitor Impact Management: The planning framework. Washington, D. C.:National Parks and Conservation Association, 106pp.

Gramann, J. H. & Burdge, R. J. 1981. The effect of recreation goals on conflict perception: the case of water skiers and fishermen. Journal of Leisure Research, 13(1): 15-27.

Haas, Glenn E., Driver, B.L., Brown, P.J., and Lucas, R.G. 1987. Wilderness management zoning. Journal of

Forestry. 85(12): 17-21.

Hammitt, W. E. 1988. The spectrum of conflict in outdoor recreation. In A. H. Watson (Compiler) Outdoor Recreation Benchmark: 1988 Proceedings of the National Outdoor Recreation Forum, (Gen, Tech. Report SE-52). 11pp. Tampa,FL: USDA Forest Service, Southeast Forest Experiment Station.

Hammitt, W. E., and Cole, D. N. 1987. Wildland Recreation. Wiley, New York.

Hammitt, W. E., Knauf, L. R. & Noe, F. P. 1989. A comparison of user versus researcher determined level of past experience on recreation preference. Journal of Leisure Research, 21(2): 202-213.

Hendee, J., Stankey, G., and Lucas, R. 1990. Wilderness Management. North American Press, Colorado.

Ivy, M. I., Stewart, W. P. & Lue, C. 1992. Exploring the role of tolerance in recreational conflict. Journal of Leisure Research, 24(4): 348-360.

Jackson, G. R. & Wong, A. G. 1982. Perceived conflict between urban cross-country skiers and snowmobilers in Alberta.Journal of Leisure Research, 14(1): 47-62.

Jacob, G. R. 1977. Conflict in outdoor recreation-the search for understanding. Utah Tourism and Recreation Review, 6(4):1-5.

Jacob, G. R., and Schreyer, R. 1980. Conflict in outdoor recreation: a theoretical perspective. Journal of Leisure Research, 12:368-380.

Knopp, T. B. & Tyger, J. B. 1973. The study of conflict in recreational land use: Snowmobiling versus ski-touring. Journal of Leisure Research, 5(3): 6-17.

Kuss, F. R., Graefe, A. R. & Vaske, J. J. 1990. Visitor Impact Management: A Review of Research. Washington, D. C.:National Parks and Conservation Association, 256pp.

Lucas, R. C. 1964. The Recreational Capacity of the Quentico-Superior Area (Research Paper, LS-15). St. Paul, MI: USDA Forest Service , Lake States Forest Service Experiment Station.

Moore, R. L. (in press). Conflicts on multiple use trails: synthesis of the literature and state of the practice. Presented to the Federal Highway Administration and National Recreational Trails Advisory Committee. Dept. of Parks, Recreation, and Tourism Management. North Carolina State University. 80pp.

Morrison, D. G. 1974. Discriminant analysis. In R. Ferber (Ed.), Handbook of Marketing Research, New York: McGraw-Hill.

Noe, F.P., Hull, R. B. & Wellman, J. D. 1982. Normative response and norm activation among ORV users within a seashore environment. Leisure Sciences, 5(2): 127-142.

Noe, F. P., Wellman, J. D. & Buhyoff, G. 1982. Perceptions of conflict between off-road vehicle and non off-road vehicle users in a leisure setting. Journal of Environmental Systems, 11(3): 223-233.

Norusis, M. J. 1990. Spss Base System User's Guide. Spss.

Owens, P. L. 1977. Recreational conflict: the interaction of Norfolk Broads coarse anglers and boat users. In J. Alabaster (ed.), Recreational Freshwater Fisheries: Their Conservation, Management and Development. Stevenage: Water Research Centre. 136-152.

Owens, P. 1985. Conflict as a social interaction process in environmental and behavior research: the example of Leisure and Recreation research. Journal of Environmental Psychology, 5:243-259.

Saremba, J. & Gill, A. 1991. Value conflicts in mountain park settings. Annals of Tourism Research, 18: 455-472.

Schreyer, R., Lime, D. W. & Williams, D. R. 1984. Characterizing the influence of past experience on recreation behavior. Journal of Leisure Research, 16: 34-51.

Stankey, G. H. 1973. Visitor perception of wilderness recreation carrying capacity. (Research Paper INT-142) Ogden, UT: USDA Forest Service. Intermountain Forest and Range Experiment Station.

Tatsuoka, M. 1970. Discriminant analysis: The study of group differences. Champaign, Ill.: The Institute for

Personality and Ability Testing.

Todd, S. L. & Graefe, A. R. 1989. Level of Experience and Perception of Conflict Among Canoeists on the Delaware River. In T. More, M. Donelly, A. Graefe, & J. Vaske (Eds.), Proceedings of the 1989 Northeastern Recreation Research Symposium (Gen. Tech. Report NE-132) (pp.147-156). Broomall, PA: USDA Forest Service, Northeastern Forest Experiment Station.

Watson, A. E., Niccolucci, M. J., and Williams, D. R. 1993. Hikers and recreational stock users: predicting and managing recreation conflicts in three wildernesses. USDA Forest Service. Intermountain Forest and Range Experiment Station. INT-468. Ogden, UT.

Watson, A. E., Williams, D. R., and Daigle, J. J. 1991. Sources of conflict between hikers and mountain bike riders in the Rattlesnake NRA. Journal of Park and Recreation Administration, 9(3): 58-71.

Wellman, J. D. 1987. Wildland Recreation Policy. Wiley, New York.

Williams, D. R. 1993. Conflict in the Great Outdoors. Parks and Recreation, September: 28-35, 122.

Williams, D. R., & Roggenbuck, J. W. 1989. Measuring Place Attachment: Some Preliminary Results. Paper presented at the Symposium on Leisure Research, National Recreation and Parks Association Congress, San Antonio, TX, October 22-27, 1989.

Appendix A-On-site interview

Mount Rogers High Country On-Site Interview 1992

For the Research Technician:

1. Group ID Number: _____
2. Interviewer: _____
3. Date: _____
4. Time: _____:_____ (24 hour clock)

5. Location (Circle one):

1 Pine Mountain Road to Scales
2 Rocky Hollow Trail (High Tree Rock Trail)
3 Shapiro Trail
4 VA Highland Trail (on 603)
5 Appalachian Trail (at Fox Creek)
6 Old Orchard Trail
7 Lewis Fork Trail
8 Mt. Rogers Trail (Grindstone & Rt. 603)
9 Upper Grassy Branch Trail
10 Lower Grassy Branch Trail
11 Appalachian Trail (at Elk Garden)
12 VA Highlands Trail (at Elk Garden)
13 Helton Creek/Sugar Maple Trail
14 Massie Gap (AT & VA Highlands Trail)
15 Scales trail from the Park
16 Little Wilson Creek Trail

---

1. What is the type of user group? (Check one)

_____ Day Hiker
_____ Backpacker (overnight user)
_____ Horse user - Day use only
_____ Horse user - Overnight
_____ Hunter
_____ Other; please describe:
_____

2. How would you describe your group? (Check one)

_____ Family only
_____ Friends only
_____ Family and friends
_____ Organized club or school group
_____ Alone
_____ Other; please describe:
_____

3. How many people are in your group, including yourself? _____

4. About how many miles did you drive from home to come to the Mount Rogers National Recreation Area?

   _____

5. Please show me your route through the Mount Rogers High Country on the attached map for this visit. On this map, please indicate:

   a. your entrance point to the High Country (mark with an X)
   b. your route through the area (trace with a solid line)
   c. your camping spots or intended camping spots (mark with an O)
   d. your exit point (mark with an 8)

Map

6. Are you now entering or leaving the Mount Rogers High Country? _____ entering
   _____ leaving

   a. If leaving, "when did you enter?" (Make sure the respondent answers about his visit to the high country, not this trip to the Mount Rogers NRA.)

   Month _____ Day _____ Year _____ Time _____:_____ (24 hr.)

   b. If entering, "when do you anticipate leaving?" (Make sure the respondent answers about this visit to the high country, not this trip to the Mount Rogers NRA.)

   Month _____ Day _____ Year _____ Time _____:_____ (24 hr.)

7. We would like to send a questionnaire to your home to get information on your use, enjoyment, and management preferences for the Mount Rogers High Country. Could we do that? The Forest Service is trying to protect the High Country and also provide the best possible recreational experiences. To do this, they need your help. (Collect up to four names and addresses.)

Name	Address (Street, City, State, Zip)
1. _____	_____
	_____
	_____ Zip: _____

2. _____ _____

_____

_____ Zip: _____

3. _____ _____

_____

_____ Zip: _____

4. _____ _____

_____

_____ Zip: _____

Introductory Statement

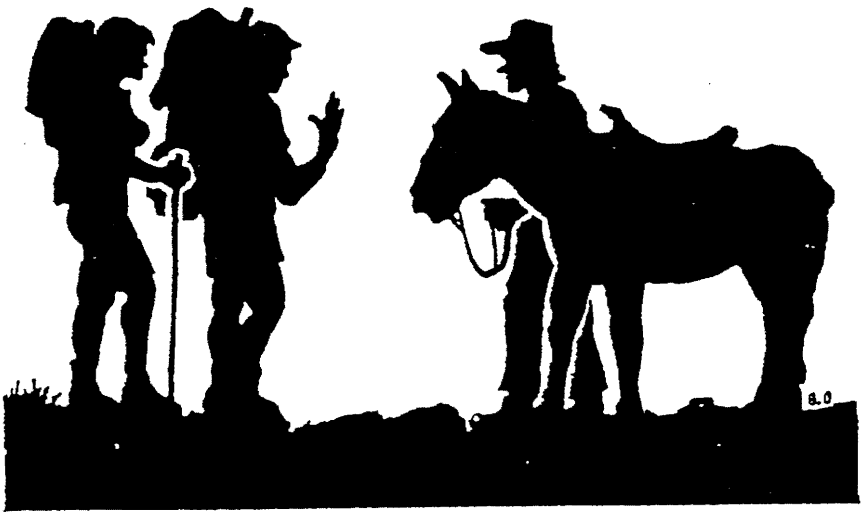
Interviewer will introduce himself/herself and explain that he/she would like to talk to the group for a few minutes. He/she will explain that the Forest Service is conducting a study of Mount Rogers High Country visitors to find out who is visiting the area and to learn more about the types of experiences that visitors are expecting and getting on their trips. The interviewer will get permission from the group to ask a few questions. After agreement is obtained, the interviewer will make the following statement to the group:

> "This survey is voluntary. While you are not required to respond, your cooperation is needed to make the survey results comprehensive, accurate, and timely. You may be assured that in the analysis and publication of the results, your answers will not be connected with you individually."

Appendix B-Questionnaire

MOUNT ROGERS HIGH COUNTRY VISITOR SURVEY

(Lewis Fork Wilderness, Little Wilson Creek Wilderness, the Crest Zone)



Virginia Tech

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Department of Forestry
Blacksburg, VA

Jefferson National Forest
USDA Forest Service
Roanoke, VA

OMB # 0596-0108 Exp. 5/31/93

We appreciate your help on the completion of this questionnaire. Your efforts will help the Forest Service manage and protect the Mount Rogers High Country.

Your Use of the Mount Rogers High Country

* All of the following questions refer to the visit you made to the Mount Rogers High Country, including Lewis Fork Wilderness, Little Wilson Creek Wilderness, or the Crest Zone, on _____, 1992.

The questions refer only to your visit to the high country away from roads.

1. How many people were in your group on this trip in the Mount Rogers High Country, including yourself? _____

2. What type of visitor were you? (Check one)
   ( ) Day hiker
   ( ) Backpacker–overnight hiker in backcountry
   ( ) Horse user–day use only
   ( ) Horse user–stayed overnight in backcountry
   ( ) Hunter
   ( ) Other; please specify _____

3. On this visit, did your group stay overnight in the High Country (the backcountry away from roads)?
   ( ) Yes. If yes, how many nights? _____
   ( ) No. If no, how many hours did you spend in the High Country? _____

4. Was this your first trip into the Mount Rogers High Country?
   ( ) Yes. If yes, go to Question 5.
   ( ) No. If no, please answer a, b, and c below.
   a. How many times have you travelled away from roads and into the Mount Rogers High Country before this trip? _____ times
   b. How many years ago did you first travel into the Mount Rogers High Country? _____ years
   c. How many times have you travelled into the Mount Rogers High Country in the last 12 months? (Don't count this trip.) _____ times

5. Please indicate your overall feelings about the quality of your visit to the Mount Rogers High Country (the backcountry away from roads).

( )	( )	( )	( )	( )	( )	( )
Extremely satisfied	Very satisfied	Somewhat satisfied	Neutral	Somewhat dissatisfied	Very dissatisfied	Extremely dissatisfied

What was there about this trip that made you feel this way?

_____

_____

Your Activities in the Mount Rogers High Country

6. We are interested in knowing what activities you participated in during this visit to the Mount Rogers High Country and how important each activity was to your decision to make this trip. Remember, we are talking about your visit to the high country away from the road. Please check one of the three responses after each activity.

	This Activity was a Major Reason for Going on This Trip	Participated, But not a Major Reason for Going on This Trip	Did not Participate in This Activity
Fishing	( )	( )	( )
Hunting	( )	( )	( )
Camping	( )	( )	( )
Hiking on trails	( )	( )	( )
Hiking off trails	( )	( )	( )
Horseback riding	( )	( )	( )
Nature study (bird watching, identifying wildflowers, rock study)	( )	( )	( )
Photography	( )	( )	( )
Swimming	( )	( )	( )
Talking to individuals in other groups	( )	( )	( )
Spending time all alone	( )	( )	( )
Spending time in camp (relaxing, performing camp chores)	( )	( )	( )
Collecting berries or mushrooms	( )	( )	( )
Scouting places to hunt	( )	( )	( )
Other, please specify:_____	( )	( )	( )

7. On this trip into the High Country, did you purposely leave the trail to travel through places without trails?
   ( ) No. If no, go to Question 8.
   ( ) Yes. If yes, please answer a and b below.
   a. About how many miles did you travel while away from the trail? _____ miles
   b. How many nights did you camp in a trailless area? (An answer of zero is perfectly acceptable.) _____ nights

8. Do you prefer using a wood fire or a camp stove for cooking in the backcountry? (Check one)
   ( ) Wood fire ( ) Camp stove

Your Horse Use in the Mount Rogers High Country

9. (For horse users only; if you did not use horses on the trip when we contacted you, skip on to Question 10). Tell us how frequently you do the following:

	Never	Sometimes	Usually	Always
a. Carry feed for the horse when I visit the Mount Rogers High Country (away from roads)	( )	( )	( )	( )
b. Camp with my horse in the Mount Rogers High Country	( )	( )	( )	( )
c. Leave the trails with my horse in the High Country	( )	( )	( )	( )
d. Water my horse in springs in the High Country	( )	( )	( )	( )
e. Water my horse in streams in the High Country	( )	( )	( )	( )
f. Tie my horse to trees when I camp in the High Country	( )	( )	( )	( )
g. Tie my horse to trees during brief stops during my day visits to the High Country	( )	( )	( )	( )
h. Hobble my horse during visits to the High Country	( )	( )	( )	( )
i. Tie my horse to a hitch line strung between two large trees when I camp in the High Country	( )	( )	( )	( )
j. Visit the High Country in large horse parties (more than six horses)	( )	( )	( )	( )
k. Take horses into the campsite in the High Country (the campsite is the area where the tent and firering are located)	( )	( )	( )	( )

Your Attachment to the Mount Rogers High Country

10. Please indicate the extent to which each statement below describes your general feelings about the Mount Rogers High Country.
(Check the box that best describes your general feeling about each statement.)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This place says a lot about who I am	( )	( )	( )	( )	( )
I would prefer to spend more time here if I could	( )	( )	( )	( )	( )
I wouldn't substitute any other area for doing the type of things I do here	( )	( )	( )	( )	( )
I am very attached to this area	( )	( )	( )	( )	( )
No other area can compare to this one	( )	( )	( )	( )	( )
The things I do here I would enjoy just as much at another site	( )	( )	( )	( )	( )
I think a lot about coming here	( )	( )	( )	( )	( )
I get more satisfaction out of visiting this area than from visiting any other	( )	( )	( )	( )	( )
This area is the best place for what I like to do	( )	( )	( )	( )	( )
I use this area to help define and express who I am inside	( )	( )	( )	( )	( )

Your Knowledge of Wilderness

11. Are you aware that the U.S. Congress establishes wilderness areas on national forests?
(Check one)
( ) Yes, I was aware of that.
( ) I knew there were wilderness areas, but I didn't know that the U.S. Congress establishes them.
( ) No, I didn't know that.

12. Before we sent you this survey, did you know that the Mount Rogers High Country contained two wilderness areas established by Congress?
(Check one)
( ) Yes
( ) No
( ) I wasn't sure.

13. People vary in their opinions about what uses and activities are appropriate in congressionally declared wilderness areas. Please indicate the extent to which you feel the following are appropriate in congressionally declared wilderness on national forests:

	Very appropriate	Somewhat appropriate	Neither appropriate nor inappropriate	Somewhat inappropriate	Very inappropriate
Timber harvesting	( )	( )	( )	( )	( )
Grazing	( )	( )	( )	( )	( )
Hunting	( )	( )	( )	( )	( )
Backpacking	( )	( )	( )	( )	( )
Rustic cabins for recreationists	( )	( )	( )	( )	( )
Mountain biking	( )	( )	( )	( )	( )
Motorized off-road vehicles	( )	( )	( )	( )	( )
4-wheel driving on primitive roads	( )	( )	( )	( )	( )
Use of chain saws to clear trails	( )	( )	( )	( )	( )
Fishing	( )	( )	( )	( )	( )
Stocking streams with fish	( )	( )	( )	( )	( )
Using herbicides to kill noxious weeds	( )	( )	( )	( )	( )
Removing pests like snakes	( )	( )	( )	( )	( )
Providing wells with pumps for drinking water	( )	( )	( )	( )	( )
Providing restrooms with showers	( )	( )	( )	( )	( )
Presence of nonnative wild animals	( )	( )	( )	( )	( )

Your Past Experience and Involvement with Wilderness

14. Have you ever travelled into a wilderness area before this trip?
( ) No. If no, please go to Question 17.
( ) Yes. If yes, how many years ago did you first visit a wilderness area? _____years

15. How many other wilderness areas have you visited?
( ) 1-2 other areas
( ) 3-5 other areas
( ) 6-10 other areas
( ) Over 10 other areas

16. Since you first visited a wilderness area, about how often have you gone on wilderness trips?
(Check one)
( ) More than 10 trips per year
( ) 6 to 10 times per year
( ) 2 to 5 times per year
( ) About once per year
( ) About 1 trip every 2 years
( ) Typically go into wilderness areas less than once every 2 years

17. We would like to know your general feelings about wilderness. Please indicate the extent to which each statement below describes your feelings.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I get greater satisfaction out of visiting wilderness than other recreation places	( )	( )	( )	( )	( )
I find that a lot of my life is organized around wilderness use	( )	( )	( )	( )	( )
One of the major reasons I now live where I do is that it has opportunities for visiting wilderness	( )	( )	( )	( )	( )
I feel like wilderness is a part of me	( )	( )	( )	( )	( )
I seldom take time to visit wilderness areas	( )	( )	( )	( )	( )
I go to the Mount Rogers High Country primarily to visit its wilderness areas	( )	( )	( )	( )	( )

Your Opinions About Current Amount and Type of Use

18. Please estimate the following for your visit to the Mount Rogers High Country (consider Day 1 to be the day you entered the High Country; day users will only complete column 1):

		Day 1	Day 2	Day 3	Day 4 and beyond
a.	The number of hikers you saw				
b.	The number of groups of more than 6 people traveling together that you saw				
c.	The number of groups with horses that you saw				
d.	The number of groups that camped within sight or sound of your campsite				

19. How do you feel about the number of the following types of visitors you saw during your stay in the Mount Rogers High Country?

	Would like to see a lot more	Would like to see a few more	Saw neither too many nor too few	Saw a few too many	Saw far too many
Hikers	( )	( )	( )	( )	( )
Horseback riders	( )	( )	( )	( )	( )
Groups camped within sight or sound	( )	( )	( )	( )	( )

20. Please indicate the highest number of encounters with the following types of users you would accept <u>per day</u> on your visit to the Mount Rogers High Country before the trip would no longer provide the kind of experience you prefer.

A. The number of hikers I see <u>per day</u> (Check 1 or 2 below):

1. ( ) Makes no difference to me how many hikers I see.
2. ( ) Does make a difference to me how many hikers I see.
   How many hikers would be acceptable per day? (Mark a or b below.)
   a. Would accept _____ hikers per day.
   b. ( ) Number of hikers makes a difference to me, but I don't feel I can suggest an acceptable number.

B. The number of horseback riders I see <u>per day</u> (Check 1 or 2 below):

1. ( ) Makes no difference to me how many horseback riders I see.
2. ( ) Does make a difference to me how many horseback riders I see.
   How many riders would be acceptable per day? (Mark a or b below.)
   a. Would accept _____ riders per day.
   b. ( ) Number of horseback riders makes a difference to me, but I don't feel I can suggest an acceptable number.

C. The number of groups that camp within sight or sound of my campsite per night. (Check 1 or 2 below):

1. ( ) Makes no difference to me how many groups camp near my campsite.
2. ( ) Does make a difference to me how many groups camp near my campsite.
   How many groups would be acceptable per night? (Mark a or b below.)
   a. Would accept _____ groups camped near my campsite per night.
   b. ( ) Number of groups camped near my campsite makes a difference to me, but I don't feel I can suggest an acceptable number.

Your Perception of Conflicts Between User Groups

21. Did the behavior of any other individual or group interfere with your enjoyment of the Mount Rogers High Country on this visit?
( ) No. Go to Question 22.
( ) Yes. If yes, please indicate what type of group interfered with your enjoyment of the High Country.
( ) Hikers
( ) Horseback riders
( ) Other, please describe_____

Please describe the behavior that interfered with the enjoyment of your visit._____

_____

_____

22. Did you notice any resource impacts to the High Country environment that you believe were caused by recreationists?
( ) No. Go to Question 23.
( ) Yes. If yes, please answer a and b below.

a. Please describe the resource impact to the High Country environment that you noticed:_____

_____

_____

b. Please describe the type of user group that you believe caused the impact.
( ) Hikers
( ) Horseback riders
( ) Other, please specify _____
( ) Don't know

23. This question deals with your perception of similarities and differences between hikers and horse users in Mount Rogers High Country. Remember, we are only asking for your opinion. There are no right or wrong answers.

a. When compared to hikers, do horseback riders focus more or less of their attention on the following:

	Much more than hikers	Somewhat more than hikers	About the same	Somewhat less than hikers	Much less than hikers
1. The activity they are engaged in	( )	( )	( )	( )	( )
2. The wilderness environment	( )	( )	( )	( )	( )
3. Their companions	( )	( )	( )	( )	( )
4. The wildlife	( )	( )	( )	( )	( )
5. The scenic views	( )	( )	( )	( )	( )

b. Horseback riders and hikers are similar in the following ways:

	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
1. They live in similar types of places	( )	( )	( )	( )	( )
2. They have similar lifestyles	( )	( )	( )	( )	( )
3. They have similar types of jobs	( )	( )	( )	( )	( )
4. They have similar levels of education	( )	( )	( )	( )	( )
5. They are about the same age	( )	( )	( )	( )	( )
6. They have about the same income	( )	( )	( )	( )	( )
7. They grew up in similar types of places	( )	( )	( )	( )	( )
8. They travel about the same distance to the area	( )	( )	( )	( )	( )
9. They come to the High Country for similar reasons	( )	( )	( )	( )	( )
10. They have similar feelings about the values of the High Country	( )	( )	( )	( )	( )

Your Perception of Problems in the Mount Rogers High Country

24. The following set of items are problems you may have run into on your visit to the Mount Rogers High Country (the backcountry away from roads). Please indicate how much of a problem each item was for you by placing a mark in one of the spaces provided next to each item.

	No Problem At All	A Small Problem	A Moderate Problem	A Big Problem	Don't Know
Possible Trail Problems					
1) Trails poorly maintained	( )	( )	( )	( )	( )
2) Trails poorly marked (too few signs or blazes)	( )	( )	( )	( )	( )
3) Too many trails	( )	( )	( )	( )	( )
4) Trail erosion	( )	( )	( )	( )	( )
5) Horse manure on trails	( )	( )	( )	( )	( )
Possible Resource Problems					
1) Polluted streams	( )	( )	( )	( )	( )
2) Not enough wildlife	( )	( )	( )	( )	( )
3) Streambank erosion	( )	( )	( )	( )	( )
4) Grazing by livestock	( )	( )	( )	( )	( )
5) Grazing by horses and ponies	( )	( )	( )	( )	( )
6) Tree damage from human activities	( )	( )	( )	( )	( )
Possible People Problems					
1) Litter	( )	( )	( )	( )	( )
2) Theft of personal property	( )	( )	( )	( )	( )
3) Inadequate disposal of human body wastes	( )	( )	( )	( )	( )
4) Vandalism	( )	( )	( )	( )	( )
5) Pets off leash	( )	( )	( )	( )	( )
6) Off-road motorized vehicles in the wilderness areas	( )	( )	( )	( )	( )
7) Rowdy or noisy people	( )	( )	( )	( )	( )
8) The number of large groups	( )	( )	( )	( )	( )
9) Too many people in area as a whole	( )	( )	( )	( )	( )
10) Too many people at certain places in the area	( )	( )	( )	( )	( )

27. Do you feel that controls are needed on the number of people using the Mount Rogers High Country?
(Check one)
( ) Yes, controls are needed to lower the current level of use.
( ) Yes, controls are needed now to hold use at about the current level.
( ) No controls are needed now, but should be imposed in the future if and when overuse occurs.
( ) No, there should be no controls now or in the future on the number of people using the High Country.

28. If use of the area becomes too heavy and controls are necessary, how would you feel about each of the following management actions?
(Check the box that shows how much you support or oppose each action.)

	Strongly Support	Somewhat Support	Neither Support nor Oppose	Somewhat Oppose	Strongly Oppose
a) Limit overall use of the area by a permit system	( )	( )	( )	( )	( )
b) Limit the maximum number of hikers per group allowed in the High Country	( )	( )	( )	( )	( )
What should be the maximum number of people per group? _____					
c) Limit the maximum number of horses per group allowed in the High Country	( )	( )	( )	( )	( )
What should be the maximum number of horses per group?_____					
d) Achieve better spacing and distribution among groups using the High Country by:					
1) providing better information on when and where heavy use is occurring	( )	( )	( )	( )	( )
2) developing more trails in the area	( )	( )	( )	( )	( )
3) assigning each party to a campsite each night	( )	( )	( )	( )	( )
e) Concentrating overnight use on just a few campsites	( )	( )	( )	( )	( )
f) Limit use during wet seasons	( )	( )	( )	( )	( )

Finally, in order to make comparisons among the many kinds of visitors to backcountry areas, we would like some general information about you. All information is confidential and will not be identified with your name.

29. Do you belong to any of the following? (Check all that apply)
( ) Hiking club or organization
( ) Horse club or organization
( ) Sportsmen or outdoor recreation clubs (like rod and gun club)
( ) Other conservation organization (like Audubon Society or Sierra Club)

30. Your age? _____ years

31. Gender. Please check one.
( ) Female ( ) Male

32. What is your ethnic origin?
Check one.
( ) White ( ) Hispanic ( ) Native American
( ) Black ( ) Asian ( ) Other

33. What is the highest level of education you have attained? (Circle one number)

Elementary School	High School	College
8 or less	9 10 11 12	13 14 15 16 more than 16

34. In which of the following kinds of places did you spend the most time while growing up (to age 18)? Please mark only one answer.
( ) On a farm or ranch
( ) In the country but not on a farm or ranch
( ) In a small town (2,500 or fewer people)
( ) In a town or small city (between 2,500 and 25,000 people)
( ) In a city (between 25,000 and 100,000 people)
( ) In a suburb of a large city
( ) In a large city (over 100,000 people)

35. In what type of community do you now live?
( ) On a farm or ranch
( ) In the country but not on a farm or ranch
( ) In a small town (2,500 or fewer people)
( ) In a town or small city (between 2,500 and 25,000 people)
( ) In a city (between 25,000 and 100,000 people)
( ) In a suburb of a large city
( ) In a large city (over 100,000 people)

36. Are you presently (Check one):
( ) Employed
( ) Temporarily laid off
( ) Unemployed
( ) Retired
( ) Full-time homemaker
( ) Student

37. If you are employed, what is your occupation?

Title:_____

Kind of Work:_____

Kind of Company or Business:_____

38. Which of the following best describes your annual household income before taxes?

( ) less than $ 5,000	( ) $25,000 to $ 34,999
( ) $ 5,000 to $ 9,999	( ) $35,000 to $ 49,999
( ) $10,000 to $14,999	( ) $50,000 to $ 74,999
( ) $15,000 to $19,999	( ) $75,000 to $100,000
( ) $20,000 to $24,999	( ) over $100,000

39. If you would like to receive a summary of the results of this survey, please write your name and address on the back of the return envelope.

Please make any further comments on this page of the questionnaire.

Thank you for your help!

Appendix C-First cover letter

November 1992

Dear Mount Rogers High Country User:

Last summer we talked to you at one of the trailheads that lead into the Mount Rogers High Country, and asked you to participate in a Forest Service study of backcountry use and users. The study seeks information on your experiences, perceptions of problems, and preferences for management. The Forest Service will use this information to improve management and better protect the unique resources of the High Country and the quality of your experiences.

During the summer, we contacted more than 1200 recreationists, and 68% have returned their questionnaire. However, we have not heard from you. To assure the scientific validity of our findings, we would like a response rate of at least 70%. Thus, we need your help.

Your participation in the survey is vital. Please complete the questionnaire and return it to us in the enclosed postage-paid envelope.

We appreciate your help.

Sincerely,

Joseph W. Roggenbuck
Associate Professor of
Forest Recreation

:clb

enc.

Appendix D-Postcard

Dear Mount Rogers High Country Visitor:

Your participation in the Mount Rogers High Country study is very important. If you have not already returned the questionnaire you received recently, we would appreciate your doing so as soon as possible.

I thank you for your cooperation.

Sincerely,

Joseph W. Roggenbuck
Associate Professor of
Forest Recreation

Appendix E-Second cover letter

Dear Mount Rogers National Recreation Area Visitor,

During your recent visit to the Mount Rogers National Recreation Area, we contacted you and asked you to complete a survey form on your use and enjoyment of the area. You were randomly selected for this study, and your participation in it is essential if the results are to be useful in guiding further planning and management decisions.

As a Mount Rogers visitor, you may be affected by the increasing recreational use and by management actions taken by the Forest Service. This study is an opportunity to express your personal experiences and feelings as a user.

As of today, we have not received your completed questionnaire. We hope that it is in the mail or that you will take the time to complete the enclosed copy. Remember, individuals who complete and return the questionnaire will be entered in a random lottery drawing for a $50.00 U.S. savings bond. The winner will be notified by mail in November, 1993.

We greatly appreciate your help with this study.

Sincerely,

Daniel R. Williams
Assistant Professor of Forest Recreation

enc.

VITA

Carolyn Widner completed her Bachelor of Arts degree in Geography at Emory and Henry College in Emory, Virginia. Carolyn recently completed her Master of Science degree in Forestry, specializing in outdoor recreation at Virginia Polytechnic Institute and State University. During her MS program in the Department of Forestry at Virginia Tech she studied the human dimensions and ecological impacts of recreation use of National Parks and Wilderness Areas. Her Master's thesis addressed conflict among hikers and horseback riders in the Mount Rogers National Recreation Area of Virginia. She received her Master of Science degree in Forest Recreation in 1994. Currently she is pursuing doctoral studies in Forest Recreation at the Department of Forestry, VPI&SU.