Access tradeoffs vs. social preferences | Upper Missouri River Breaks National Monument

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ACCESS TRADEOFFS VS. SOCIAL PREFERENCES: UPPER MISSOURI RIVER BREAKS NATIONAL MONUMENT

by
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Presented in partial fulfillment of the requirements for the degree of
Masters of Science in Recreation Management
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Access Tradeoffs vs. Social Preferences: Upper Missouri River Breaks National Monument

Chairperson: Neil Moisey

Previous research has established the value visitors place on an uncrowded outdoor recreation social setting, but has often failed to assess what visitors are willing to tradeoff to achieve that preferred setting. This study will expand upon previous tradeoff research to examine a campsite social setting and what tradeoffs, in the form of management access restrictions, that visitors are willing to accept to achieve those preferences. The use of multiple explanatory variables will be used in a logistic regression model. The data that the models provide shows visitors are generally willing to make a tradeoff to achieve their desired uncrowded social setting. Of the four management tradeoffs tested, visitors were willing to accept a fee, a permit, and a group size restriction. This gives managers valuable information when trying to protect the social setting that visitors have said are important to them.
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Chapter 1 - INTRODUCTION

Public land managers are faced with the ever difficult task of managing for increased use on public lands. Increased use has caused impacts that have been generally been perceived by visitors and managers as negative effects to ecological systems and social conditions. The publics’ perceptions of these impacts have often differed with the managers’ perception of impacts. Campsite impacts are one area where these differing perceptions are evident. Campsite impacts have received a considerable amount of attention from researchers, but much of the research has focused on the ecological impacts to campsites. Several studies examining visitor preferences have shown social attributes are of greater concern to visitors than ecological impacts (Schindler and Shelby, 1992; Lawson and Manning, 2001b; Lucas, Cole, and Stankey, 1985). Because of the importance visitors place on the social attributes of a campsite setting (Lucas et al., 1985; and Shelby and Shindler, 1992), it is most pertinent to use the social setting to further assess the tradeoffs visitors are willing to make.

The majority of recreation impact literature, and specifically campsite impacts, has measured visitor preferences as an “unconstrained preference,” because visitors are not asked to consider potential tradeoffs (Freimund, Dalenberg, and Manning, 2004; Lawson and Manning, 2001, Lawson and Manning, 2001b). Historically visitors were asked their preferences based on ecological, social, and other conditions, but were not asked to consider what restrictions they would be willing to accept to achieve those desired conditions. Lawson and Manning (2002) state that, wilderness experiences are composed of social conditions, resource conditions, and management conditions. Since
these conditions are dependent on each other, a change in one condition affects the other conditions. Because of this relationship, managing public lands involves potential tradeoffs that affect resource and social conditions. For example social and resource impacts could be minimized if managers implemented camping permits that restricted access. But the question is: Would the public support such management actions in order achieve certain desired conditions? Management is forced to balance access and crowding, but are limited on the information they possess on the tradeoffs visitors are willing to accept (Lawson, Kiely, and Manning, 2003).

Studying tradeoffs is crucial to understanding visitor preferences, because by forcing visitors to consider a tradeoff to achieve what is desired, preferences could be altered (Manning, Valliere, Wang, and Jacobi and Schreyer, 1999; Lawson and Manning, 2001; 2002; 2001b; Lawson, Kiely, and Manning, 2003). When faced with the idea of a tradeoff, visitors’ preferences are slightly more tolerant of higher crowding, but they still place a high value on limited encounters.

Freimund et al. (2004) use ecological conditions to assess visitor tradeoffs, but they take the idea of understanding visitors’ preferences one step further. They sought to understand what visitors’ preferences were, and what was influencing those preferences. Freimund et al. use values as the explanatory variable that will help give insight into why visitors’ are more or less willing to accept a permit. The results show that visitors were willing to accept a small chance of receiving a permit to obtain the more pristine setting. There is a gap in the way tradeoffs have been measured that has not fully addressed the social settings with multiple management tradeoffs and multiple explanatory variables. Tradeoffs have not been used to explore campsite social settings.
There is a gap in the way tradeoffs have been measured that has not fully addressed the social settings with multiple management tradeoffs and multiple explanatory variables. Tradeoffs have not been used to explore campsite social settings that are thought to be the most important to visitors. This research will address this gap by assessing visitors’ preferences for a social setting in relation to four management tradeoffs. Also several independent variables, including values and place attachment will be used to explain visitors’ tradeoff preferences. Understanding how more than one management restriction impacts visitors’ tradeoffs will allow for a deeper understanding of what visitors are willing to tradeoff and what restrictions are unacceptable. Also, furthering our ability to explain tradeoff preferences is vital to truly understanding visitors’ tradeoffs. By examining tradeoffs in relation to a campsite social setting, using multiple management restrictions, with multiple explanatory variables, a more thorough understanding of tradeoffs can be assessed.

*Problem Statement*

Research demonstrates the importance visitors place on the social setting of recreation setting. It is assumed these visitors will also place similar importance on having an uncrowded campsite setting in this study. Understanding what they are willing to tradeoff to achieve that uncrowded setting is what this study seeks to answer.

*Sub Questions*

1. Will visitors accept certain tradeoffs that seek to protect their desired social setting?
2. Will there be a threshold at which these tradeoffs will not be favored over greater user freedom?

3. Will values, place attachment, and demographic data such as “education,” “group type,” and where visitors “live,” act as good predictors for visitors’ tradeoff preferences, and in what way will these variables influence the models?

_Hypotheses_

The problem statement and the sub questions will be answered using a logistic regression analysis that will include the use of certain variables to help explain the visitors’ tradeoff preferences. The variables are outlined below and the theory behind the inclusion of these variables and how they will influence the model will discussed in the methods chapters.

**Hypothesis 1:** The hypothesized fee model will show the level of fee, place attachment, values, group type, education, and Montana resident variables to be significant predictors of visitors’ willingness to make a tradeoff.

**Hypothesis 2:** The permit model will show the level of permit, place attachment, values, group type, education, and Montana resident variables to be significant predictors of visitors’ willingness to make a tradeoff.

**Hypothesis 3:** The group size model will show the group size level, place attachment, values, group type, where visitors lived, and Montana resident variables to be significant predictors of visitors’ willingness to make a tradeoff.
**Hypothesis 4:** The launch date model will show the launch date restriction, place attachment, values, group type, where visitors lived, number of visits, and Montana resident variables to be significant predictors of visitors’ willingness to make a tradeoff.
Chapter 2 - REVIEW OF RELEVANT LITERATURE

This chapter will lay out the conceptual foundation behind the use of tradeoffs as a guiding principle of this research. First, understanding how impacts have previously been studied and the use of carrying capacity in research, will give insight into why using the social setting to measure tradeoffs is most appropriate. Next, a review of the relevant literature on tradeoffs will explore how tradeoffs have been previously studied and why this study will effectively fill a gap in the research. The theory behind how the study will be conducted will be examined next. This study will use visual research methods to assess visitors crowding preferences, and therefore this part of the chapter will review this methodology. The next section will explore the theory behind assessing visitors’ willingness to pay or accept as a way to measure tradeoffs. Finally, the research underlying why values and place attachment are appropriate ways to understand visitors’ tradeoff preferences will be argued. This chapter will explore these issues in order to support the reasons of why a visual research method that examines the social setting, tradeoffs with multiple management restrictions, and multiple explanatory variables is appropriate.
Background

Indicators and standards of quality were developed because of increased use on public lands. When planning for use on public lands managers were faced with difficult decisions, such as determining how much impact was too much. Indicators and standards have filled this role by providing guidelines to evaluate social and environmental impacts. Management frameworks, such as Limits of Acceptable Change (LAC) (Stankey et al., 1985), Visitor Experience and Resource Protection (VERP) (National Park Service, 1997), Visitor Impact Management (VIM) (Graefe, Vaske, Kuss, 1990), Quality Upgrading and Learning (QUAL) (Chilman, Foster, and Everson, 1990), and Carrying
Capacity Assessment Process (CCAP) (Shelby and Heberlein, 1986), all incorporate the use of standards to guide management decisions.

Manning, Valliere, Wang, Jacobi (1999b) defines indicators of quality as “measurable variables that help define the quality of the recreation experience” (p.122). Manning et al. (1999b) make the distinction between indicators and standards by clarifying that “indicators of quality are specific, measurable variables that define the quality of the visitor experience, and standards of quality define the minimum acceptable condition of indicator variables” (p.97). Standards have become increasingly used in natural resource management as managers try to formulate a level of acceptance for impacts, that will enable them to tell managers when that level has been reached, and that action is required (Shelby, Stankey, and Shindler, 1992). Standards have become widely used but as Shelby et al. (1992) states, they are not a solution to all problems. They are based on information gathered by researchers and the standards are only as good as this information. Also standards can be misused or lead to a rigid approach to management that is to narrowly focused on standards (Shelby et al., 1992). Despite the criticisms, standards can play an important role in determining the desired future conditions and the effectiveness of management actions to achieve those conditions (Manning and Freimund, 2004).

The management frameworks mentioned above all deal with the important consideration of how standards are developed. Setting standards has historically relied on a “variety of sources, including legal and administrative mandates, agency policy, historic precedent, expert judgments, interest-group politics, and public opinion” (Manning et al.,
Public opinion, especially visitor opinion, is increasingly important as the gap between managers and visitor’s perceptions of impacts becomes more apparent.

Managers tend to make decisions for users based on what they believe users preferences are. Without a true understanding of the different perceptions of managers and visitors there is great potential for dissatisfaction from both parties. Martin, McCool and Lucas (1989) found visitors and managers differed in their assessment of tree damage, fire rings, and bare ground for wilderness campsites. Visitors were more sensitive to tree damage, and fire rings, while managers found bare ground more unacceptable than visitors. Peterson (1974) found there were significant differences between managers and visitors on what each believed was the proper use of the Boundary Waters Canoe Area. These differences, in part, come from the managers’ constant contact with an area and their tendency to see the area in small scale incremental changes (Dvorak, 2004). Marion and Lime (1986) suggest that visitors perceive an area in a much broader sense that incorporates all the recreation options of an area. Visitors rarely return to an area frequently enough to notice changes over time (Marion and Lime, 1986).

By understanding how campsites are perceived by visitors, managers are able to incorporate this as one factor in determining how these areas should be managed. Visitor perceptions of campsites is an area that has received significant attention by researchers. Brunson and Shelby (1990) found visitors require different levels of campsite attributes. Most important were level ground, shade, and water. These types of attributes are referred to as necessity attributes. Experience attributes, such as scenic beauty and solitude, can contribute and enhance a high quality camping experience (Brunson and Shelby 1990, and Lucas, Cole and Stankey, 1985). The final attributes that visitors seek
in campsites are amenity attributes. These attributes are considered extras that can provide a higher appeal when choosing between two similar campsites (Brunson and Shelby 1990). Ecological impacts such as bare ground were considered amenity attributes that was found acceptable in moderate amounts, but unacceptable in large amounts (Shelby, Vaske, and Harris, 1988).

Shelby and Shindler (1992) studied different stakeholder groups’ perceptions of campsite impacts, such as bare ground and fire rings. Shelby, Vaske, and Harris (1988), hypothesized that ecological impacts such as bare ground and fire rings helped identify campsites, and Shelby and Shindler (1992) found that users actually prefer fire rings and moderate amounts of bare ground, because they help identify campsites. Hammitt and Cole (1987), and Heberlein and Dunwiddie (1979), concur with similar findings that visitors routinely select campsites with significant ecological damage, even when sites are available with less damage. Cole and Benedict (1983) suggest that visitors’ may not perceive sites with considerable damage as unsuitable. Hillery, Naccarrow, Griffin, and Syme (2001) concluded similar results by finding that tourists could not distinguish between sites with considerably more use and environmental impacts than previously visited sites.

Schindler and Shelby’s (1992) findings support the above studies that visitors do not place a high value on ecological factors of campsites, but discovered social attributes, such as being screened from others, out of sight/sound of others, good distance from the trail, and no evidence of litter, were more important to visitors. The social attributes listed above all were rated as “important” or “very important,” while ecological attributes were only rated as “somewhat important” (Schindler and Shelby 1992). Signs of human use at
campsites was discovered by Lawson and Manning (2001b) to be the most important aspect of a campsite. The visitors further responded that limited encounters with other groups and being out of sight and sound of other people were important factors when visiting wild areas. Lucas et al. (1985) found similar results that specified limited encounters as especially important quality of campsites, and that satisfaction declines as encounters increased. This literature suggests that visitor studies play a vital role in management because managers view impacts differently, but researchers and managers have continued to study ecological impacts despite visitors disregard for these impacts. Visitor concerns over campsite impacts lie with the social conditions of the sites, and therefore tradeoff research focusing on social conditions is most warranted.

**Carrying Capacity**

The idea that social impacts can affect recreation experiences is based in part on the social carrying capacity literature. Manning (2001) describes social carrying capacity as “how much visitor use can be accommodated in a park or other outdoor recreation area without diminishing the quality of the recreation experience” (p.21). Carrying capacity was developed in the fields of wildlife and range management, where it refers to the number of species that subsist on a given piece of land. The concept of carrying capacity crossed over into the recreation field, because of its appeal in studying use and crowding. The initial use of carry capacity was in relation to increased visitors and their relation to greater environmental problems (Manning et al., 1996). Carrying capacity in this context proved to be limited as it did not incorporate the relationship between increased use and the quality of the recreation experience. As use increased there were increased impacts to
the environmental resource, but also impacts in the quality of the visitor experience (Wagar, 1964). There is now an extensive base of literature on the social aspects of carrying capacity and its important relationship to recreation (Chilman, 1993; Graefe, Vaske, and Kuss, 1984; Kuss, Graefe, and Vaske, 1990; Lime and Stankey, 1971; Shelby and Heberlein, 1984; Stankey, 1973).

Four categories based on the notion of visitor carrying capacity were identified by Goldsmith (1974) to further explore the idea of recreation carrying capacity in relation to the visitor experience: physical, ecological, economic, and perceptual. He defined the perceptual category as the level of use a resource can sustain before there is a decline in the visitors’ recreational experience. The issue of carrying capacity has been further studied and broken into descriptive and evaluative components (Shelby and Heberlein 1984, 1986). The descriptive component would focus on factual scientific data, such as level of visitor use and perceived crowding. The evaluative component would focus on more subjective matters such as what level of crowding is acceptable. The carrying capacity literature has not been successful in fully addressing the evaluative component of carrying capacity, because it has not addressed the issue of the tradeoffs between competing issues, such as access versus restrictions.

**Tradeoffs**

In past studies visitors have not been forced to explicitly consider the idea of a personal tradeoff when stating their preferences, but Manning, Valliere, Wang, and Jacobi (1999) suggest that preferences for what is acceptable might be altered when the idea of a tradeoff is considered. Manning et al. (1999b) proved this point when he studied
social carrying capacity on the carriage roads of Acadia National Park. When the question was posed: “what is the maximum number of visitors that should be allowed on the roads before managers restrict use,” visitors opinions substantially increased from what they previously thought was an “acceptable” maximum number of visitors. Visitors were more willing to accept higher levels of crowding when forced to make a tradeoff between access and restriction (Manning et al., 1999b). Lawson and Manning (2001, 2002) found visitors support management tradeoffs in order to achieve a certain desired condition. Lawson and Manning (2001) used stated preferences, which are those visitor responses that are ranked under hypothetical circumstances (Crouch and Louviere, 2004), to assess visitors judgments on access vs. restriction tradeoffs at Delicate Arch in Arches National Park. Indifference curve analysis was then used to plot the change in respondents preference for management restrictions as the number of visitors increased. Three groups of people were identified; solitude oriented, tradeoff oriented, and access oriented. Close to half (48.8%) of the respondents fell in the solitude oriented group, indicating they would be willing to accept substantial restrictions to be ensured of a crowd free experience if they did access Delicate Arch. There were only 20% of visitors that who fell into the access oriented group that would be willing to tolerate large crowds for less restrictions on access. This highlights the importance of considering tradeoffs when studying visitor preferences. Lawson and Manning (2001b) again used a stated preference model to understand Denali National Park visitors’ preferences toward tradeoff versus access. In both studies by Lawson and Manning (2001, 2001b) written descriptions were used to provide the hypothetical situation where a tradeoff was involved. However, Lawson and Manning (2001b) incorporated the use of a specific
management restriction, chance of getting a permit, as opposed to just generally limiting
visitation. The permit was used as the vehicle that would limit visitation. In a
hypothetical scenario model of solitude versus access, visitors preferred solitude over
access by a 3 to 1 margin. Visitors in this study preferred permits to restrict access and
ensure solitude opposed to more freedom to access the park. This indicates the level of
importance visitors place on the resource and quality of the experience (Lawson and
Manning, 2001b).

Lawson, Kiely, and Manning (2003) studied tradeoffs in Isle Royal National, MI
by identifying several management restrictions that would limit or disperse use. These
included building new campsites, instituting a fixed itinerary system, spreading more use
to the slow season, and a permit system. They used basic variables to explain the models,
including group size and trip length. When the management options were pitched as
stated preferences, visitors preferred the status quo and permit quota alternatives. Both of
these alternatives would not require a fixed itinerary system. In the status quo alternative,
permit numbers were kept the same but in the permit quota alternative visitors chose to
decrease the chance of getting a permit in order to increase the chance of a solitude
experience. Lawson et al. (2003) found incorporating tradeoffs to be an sound research
tool to help managers “identify effective management actions with relatively low “costs”
to visitors and avoid those that are less effective or that come at a relatively high “cost” to
visitors” (p.79).

These studies attempted to determine what visitors’ preferences were when faced
with a tradeoff. Freimund et al. (2004) take the idea of understanding visitors preferences
a step further. They seek to understand what their preferences are, and what is influencing
preferences are, and what is influencing those preferences. They use Borrie, Freimund, Davenport (2002) value scale in an effort to understand visitor’s support or opposition to a permit system. A highly eroded trail versus a less used trail was used to measure visitors’ choices for ecological impacts. Choices were assessed using visual research methods that forced visitors to choose which picture they preferred. The percent chance of obtaining a permit was the management tradeoff, and it was found visitors were willing to accept a small chance of receiving a permit to obtain the more pristine setting.

By concentrating on social impacts in relation to management tradeoffs, managers have the ability to forecast how these impacts are perceived by visitors and if they are willing to accept tradeoffs to ensure a certain quality of experience. This information can be immensely important to managers who are faced with difficult decisions about where public support lies in terms of managing for increased use and increased negative social impacts (Lawson and Manning, 2002).

**Visual Research Methods and Crowding**

The use of visual research methods is now playing an important role in recreation research. Much of the appeal of this method comes from the visual methods ability to isolate certain aspects of a setting while systematically varying the type and level of impact the researcher wishes to study (Martin et al., 1989). The use of visual research methods has been used widely and effectively to help assess preferences, and will therefore be used in this study.

Martin et al., (1989) used artistic renderings of varying levels of campsite impacts, including bare ground, tree damage, and fire ring impacts, to determine if there
was difference between managers and visitors opinions on campsite impacts. Heywood (1993) explored visitors’ norms in a wildland urban interface using pen and ink drawings of varying levels of visitor use. Shelby and Shindler (1992) further advanced the use of visual methods by using photographs and written descriptions to help focus the survey participants on the impact of interest. The impacts they showed in the photographs represented varying degrees of bare ground and fire ring impacts in an effort to determine different interest groups acceptability of these impacts. Photograph evaluations matched on-site evaluations 90% of the time (Shelby and Shindler, 1992), agreeing with other studies that found visual methods to be highly reliable and of consistent validity (Brown et al., 1988; Kellomaki and Savolainen, 1984; Manning, Freimund, Lime, and Pitt, 1996; Manning et al. 1999; Manning and Freimund, 2004; Shelby and Harris, 1985; Shuttleworth, 1980; Stewart, Middleton, Downton, and Ely, 1984). Brown et al. (1988) further promoted the benefits of visual research methods as a cost effective way to represent an area accurately without having to transport visitors to the scene. It was a more accurate portal of conditions than a verbal description, and a way to allow “carefully controlled comparisons among alternative conditions” (p.40).

Recent visual research methods has progressed to incorporate the use of computer edited slides, photographs, and videos (Nassauer, 1990; Lime, 1990; Chenoweth, 1990; Pitt, 1990; Vining and Orland, 1989; Manning et al. 1996). Nassauer (1990) and Chenoweth (1990) have named this technique Image Capture Technology (ICT). This technology allows the researcher to manipulate the image digitally to display a certain resource or social qualities that currently don’t exist, but could exist from the result of certain management actions. It can also help control extraneous landscape variables in
order to highlight the desired condition, and illustrate a very realistic interpretation of a resource (Chenoweth, 1990; Lime, 1990; Manning and Freimund, 2004; Nassauer, 1990; Pitt, 1990).

The potential of the technology discussed above began to be used in various outdoor recreation related contexts. Manning et al. (1999b) used digitally enhanced photographs to represent a spectrum of crowding conditions along carriage roads in Acadia National Park. The goal was to understand visitors’ preferences and acceptance for crowding, in order to establish a standard of quality for crowding. A series of 19 photographs were manipulated to show varying numbers of bikers and hikers along the exact same road. This proved to be an accurate way to measure crowding preferences. Manning et al. (1996) used digitally manipulated images of Delicate Arch, Arches National Park to better understand crowding norms at front country sites. Visual research methods, in this type of crowded front-country setting, were more successful than previous written, self-reported studies, or self-reported preferred encounters (Patterson and Hammit, 1990; Roggenbuck, Williams, Bang, and Dean, 1991; Shelby and Vaske, 1991; Vaske, Graefe, Shelby, Heberlein, 1986). For these reasons Manning et al (1996) used photographic representation of crowding in order to get a more accurate response. By representing the setting in a picture, visitors were able to get a realistic interpretation of how 0 or 108 (the number of people in the least and most crowded photographs) people at a site actually appears. In the 16 photographs the only aspect that changed was the number and the placement of the visitors. One hundred and eight was chosen as the maximum number to represent 30% more visitors than the current estimated maximum number of visitors. Visitors were proportionally placed in the photograph in the
foreground, mid-ground, and background. This visual methods technique was shown as more effective, than the written or self-reported methods of allowing visitors to make a judgment on their preference for crowding in a social setting. This method is especially suited to crowded front country settings because visitors are unable to provide to researchers the accurate number encounters that they experienced (Manning et al., 1996).

The crowding literature has shown that crowding is affected by several variables including the “characteristics of respondents, the characteristics of visitors encountered, and the situational or environmental variables encountered” (Manning and Freimund, 2004, p.566). Patterson and Hammit (1990) discovered similar results that the impact of solitude on visitors is dependent on a number of extraneous factors, such as behavior of those encountered. This is the reason visitors can not make accurate predictions of an acceptable number of visitors based solely on number of encounters. Visual research methods provide an opportunity to represent all of these factors and focus the visitors’ attention on a certain variable, such as crowding. Particularly important in understanding crowding is the characteristics of the visitors encountered. There is ample evidence that shows the impact the characteristics of the visitor has on crowding preferences. “Factors found important include the type and size of the group, visitor behavior, and the degree to which groups are perceived to be alike” (Manning and Freimund, 2004, p.566). Several studies have examined competing user groups and found different levels of crowding standards. Lucas (1964) examined non-motorized versus motorized boats, Stankey (1973, 1980) looked at hikers versus horseback riders, and Lime (1972) and Stankey (1973) surveyed small groups versus large groups. The latter groups in each of the instances above proved to have a greater impact on perceived crowding than the alternate group.
The most important factor in influencing that notion of crowding is often the other group’s behavior, including noncompliance with rules and rowdy behavior (Driver and Bassett, 1975; Titre and Mills, 1982; West, 1982).

Finally, much research has emphasized the importance of the social group and the interaction with other similar groups in outdoor recreation activities (Buchanan, Christnesen, Burge, 1981; Cheek, 1971; Dottavio, O’Leary, and Koth, 1980; Field and O’Leary, 1973). This research suggests that solitude is not as simple as just being alone, because recreation activities often involve family, friends, and other similar groups (Manning and Freimund, 2004). Twight, Smith and Wassinger (1981) and Hammit (1982) further the notion that solitude is often not about being alone, but about interacting with fellow group members without disturbance. This disturbance often comes from different groups. Visitors tend not to regard interaction with other groups that are perceived as alike as disturbances. The quality of the experience is often closely linked with the ability of the visitor to overlook other visitors that they believe to be similar in nature (Lee, 1972, 1975, 1977). Manning et al. (1999b) shows the ability of visual methods to be differentiated by the visitor based on activity, by representing two competing user groups (hikers and bikers) in photographs. They found that depending on what type of activity that was represented bikers and hikers preferred differing levels of crowding. Hikers were more willing to accept higher levels of crowding in pictures that displayed only hikers, as opposed to pictures that displayed only bikers. These studies above help explain why visual research can give a more accurate depiction of crowding. Visual research is more affective than other methods of assessing crowding and at presenting an image that visitors can interpret as similar to their group or not.
“Respondents are able to examine a visual portrayal of use conditions, including at least some relevant characteristics of those encountered (e.g., recreation activity, mode of travel, size of group)” (Manning and Freimund, 2004, p. 567). Visual research is a valid and robust method for assessing visitor preferences. Using this method will be able to give a thorough consistent response to visitors’ acceptability for campsite crowding.

**Contingent Valuation**

Contingent valuation (CV) is the dominant theory to estimate people’s willingness to pay or willingness to accept in hypothetical markets (Carson, 2000). Contingent valuation (CV), through extensive use, has proved to be a powerful tool to measure non-market amenities and inform policy makers. This distinction, between willingness to accept and willingness to pay, is that willingness to accept is appropriately used when a respondent is being asked to voluntarily relinquish a right. CV has been used for a variety of applications from air and water quality, public education, health care, garbage services, outdoor recreation, green electricity (Nomura and Akai, 2004), endangered species, and wilderness protection (Carson, 2000). Daniel, Brown, King, Richards, and Stewart, (1989), used CV to assess scenic beauty through visual methods, in relation to the value of the camping experience. Freimund et al., (2004) used a CV method to assess visitors’ willingness to accept a permit for improved ecological conditions at Zion National Park.

CV has been shown to be a valid research method, but it has received criticism for philosophical and technical reasons. The philosophical arguments against CV is whether it has the ability to measure “passive-use or existence values” (Carson, 2000, p.1414). Passive use or existence values refer to a consumer gaining value from an item that they
Passive use or existence values refer to a consumer gaining value from an item that they cannot physically use or consume. This occurs for items such as wilderness or solitude. Inclusion of the passive use values in economic terms is based on Krutilla’s (1967) work that showed people held values for natural areas just to know they existed. Without the use of passive use values, there would be no economic value for goods such as air quality or solitude (Carson, 2000).

The technical criticisms are derived from certain anomalies in individual CV studies. Failure to satisfy certain tests of validity on CV studies has led some to question whether the CV method is flawed. These concerns led to extensive studies to explore the validity of the CV method. (The reviews found the CV method to be a reliable way to determine WTP and WTA, including passive use values). Guidelines were suggested to reduce the variance of methods for performing CV studies. These guidelines include using in person surveys, binary discrete choice questions, careful description of the choices and tradeoffs that are involved, and further tests of validity (Arrow et al. 1993 from Carson, 2000). By following these guidelines, CV is an effective research method (Carson, 2000).

**Values**

“Values have been called a critical foundation for decision-making” (Myers and Close, 1998, p. 293), and therefore they are increasingly being used as a way to “help environmental managers understand the range of perspectives they should expect among the public as well as identify possible shared values they can build upon in forging consensus” (Proctor, 1998, p.348).
Historically, natural resource management has been grounded in a factual scientific approach that emphasized economic commodities. Forest managers sought to maximize commodities such as timber and grazing in a way that was grounded in expert management. This left a lot out of the equation, such as values (More, Averill, and Stevens, 1996). Gollege and Stimson (1997) define values as “enduring beliefs” (p.197). They are more general than attitudes, but more stable. They are considered the foundation of which attitudes, beliefs, and opinions are formed (Yankelovich, 1991). Information on visitor attitudes toward forest management has been studied by a number of people (Stankey, 1973; 1980; Manfredo, Fishbein, Haas, Watson, 1990; Kennedy, Dombach, Koch, 1998; Borrie et al., 2002). Since values are the underlying structure of attitudes and a more “enduring belief,” it is important to continue to study values. Values will explain visitors’ attitudes and therefore be a better predictor of acceptance of management actions than attitudes (Manning and Valliere, 1996; Manning Valliere, Minteer, 1999).

An effort was made in the United States to incorporate multiple values into decision making. Policy makers began to recognize that many people were valuing public lands for more than their resource commodities. This lead to legislation, such as the National Environmental Policy Act that acknowledges multiple human values and seeks input from the public with regard to decision making. The Multiple Use and Sustained Yield Act of 1960 also tried to incorporate a shift in management practices based on public values (Kearney and Bradley, 1998).

More et al. (1996) explains the difference in how the expert driven approach and a new paradigm focused on values differs. This research says the difference in fact and values is that, “facts are objective—they refer to the object and are considered to be
independent of any particular observer. Values, conversely, are subjective in that they specify unique relationships between a particular person or group (the subject) and a particular object” (p.400). Given the belief that factual science based solutions are no longer sufficient in many circumstances to answer natural resource concerns, incorporating the dimension of values gives a more complete scope of the issue (More et al. 1996). Kearney and Bradley (1998) believe that successful forest management must incorporate the use of values. Kennedy, et al. (1998) state that public land managers are becoming more of “social value brokers” than resource managers, and this trend will likely continue in the future (p.18).

Values have been studied in a variety of ways and this study will continue one line of this research by studying values as broad societal values. This approach gets at the deep “enduring belief” in which values are believed to be rooted. This approach to studying values has been found to accurately predict some environmental attitudes and behaviors (Stern, Dietz, and Guagnano, 1998).

The review of the national park literature, specifically the work of Henneberger (1996) was used by Borrie, et al. (2002) to develop 24 value items. Although this study was conducted in a national monument, rather a national park, many of the values between the places are likely to cross over. Borrie et al. (2002) argues that national parks values are more broad than the national parks organic act of 1916 mandate to conserve the scenery, natural and historic objects, wildlife, and provide for use and enjoyment (U.S.C., title 16, sec. 1). Park values are broader and include spread to include “spirituality, social restraint, intrinsic worth, beauty, recreation”, and the protector of all things wild (Borrie et al. 2002, p.42). America’s national monuments can also be thought
of in this light. Many people feel the same reverence for the Upper Missouri River and the monument that protects it.

Values “act as general guiding principles in life, and as such are likely guideposts for action” when forming attitudes about environmental conditions (Stern et al. 1995, p. 1615). Because of the influence that values have on forming attitudes, understanding human values is central to being able to examine respondents support for the variety of tradeoffs that are posed in the current survey. Recent values studies have shown that values are used as a way to guide attitudes about natural resource management. The conclusions based on Freimund et al. (2004) agreed with the conclusion from Borrie et al. (2002) that showed values to be an accurate predictor of support or opposition to certain management actions. People that answered highly on natural values questions such as, “this place is valued as a wildlife sanctuary” and “a place for threatened and endangered species,” were more willing than others to accept a permit to protect the resource. Visitors with strong recreational and tourism values, that included variables such as “a social place” and “a tourist destination”, were somewhat less willing to accept a permit to ensure a more pristine setting. For these reasons, values are used in the current study to act as a predictor of tradeoff preferences.

**Place Attachment**

The place attachment scale developed by Williams and Vaske (2003) will be used to continue examining the meaning behind visitors willingness to accept management tradeoffs. The idea of place attachment originates in a variety of disciplines. Sociology (Grieder and Garkovich, 1994), anthropology (Gupta and Ferguson, 1997), human
geography (Relph, 1976, 1997; Tuan, 1977, 1980), and environmental psychology (Brown, 1987; Altman and Low, 1992) have all used a form of place attachment to understand the relationships of place and humans. Place attachment or sense of place in the field of environmental psychology relates to a place forming a positive bond to a person (Williams and Patterson, 1999). Tuan (1977) explained place attachment by saying “what begins as undifferentiated space becomes place as we get to know it better” (p.6). The place attachment literature has identified two primary dimensions of place; place dependence and place identity (Williams, Patterson, Roggenbuck, and Watson, 1992; Williams and Vaske, 2003).

Place Dependence is an attachment that is associated with how well a person’s needs are satisfied by the place, and how well that place compares to other places that might satisfy similar needs (Stokols and Shumaker, 1981; Williams and Roggenbuck, 1989). In the minds of the visitor the place must provide a certain type of high quality resource that the visitor desires. The place is evaluated in terms of its functional characteristics such as how well the area performs against other areas where these activities can be participated in (Williams and Vaske, 2003). “Place dependence… is an ongoing relationship with a particular setting.” (Williams and Vaske, 2003, p.831).

Place identity is an emotional attachment to a place, and is associated with an individual’s personal and symbolic relationship to a place (Proshansky, 1978; Williams and Vaske, 2003; Williams and Roggenbuck, 1989). Emotional ties to a place may be based on past visits with family or friends, or on a more symbolic and abstract level, such as the symbol of the national parks as a part of U.S. heritage. These ties reveal that place
can form individual, group, or societal ties, that do not necessarily even associate with the physical characteristics of a place (Williams et al. 1992).

Studying place attachment will give the researcher insight into visitors’ preferences on public lands (Bricker and Kerstetter, 2000; Williams et al 1992). Kyle et al. (2003) took this a step further by showing a strong correlation between visitors’ scores on place identity and place dependence scales and their support for management actions. Visitors with high place identity scores were shown to correlate with a support for environmental protection. They were more willing to support expenditures directed at restoration and preservation. Visitors with high place dependence in the same study were shown to support expenditures that would develop and expand facilities. Vaske and Korbin (2001) found place identity to be a strong positive predictor of visitors’ support for environmentally responsible behavior. Kyle, Graefe, Manning, and Bacon (2004) found similar results that visitors along the Appalachian Trail with high place identity scores were more critical of environmental and social conditions along the trail. This was in contrast to visitors with place dependent scores that were more lenient in their opinions of social and environmental conditions. Place attachment is a way to further understand visitors’ feelings about an area, and has shown the ability to gain insight into visitors support for management actions and proposals on public land.

Summary

The research has shown a need to continue visitor studies that examine social impacts in regards to a campsite setting. Social conditions have been shown to have a significant impact on visitor experience, but most of the literature examines these
conditions in the form on “unconstrained preference.” This is because visitors are not forced to consider what tradeoffs they would be willing to make to achieve their preferred social setting. Current literature has begun to examine visitor tradeoffs in terms of ecological and social conditions.

This study will seek to build on these studies by examining tradeoffs in terms of social conditions outside of a natural park setting with multiple management restrictions. This study will investigate more explanatory variables in order to give a deeper understanding of visitors’ decision to make a tradeoff. Demographic questions, place attachment, and values will be used to accomplish this. These are affective tools to understand visitor decision making. This study will also force visitors to consider multiple tradeoffs when evaluating social conditions. This is the next logical step to a deeper understanding of visitors’ social preferences and what they are willing to tradeoff to achieve those preferences.

Chapter 3 - METHODS

This chapter will first explain the study location, the questionnaire design, and the implementation of the survey. Then the chapter will layout how the data was cleaned and what analyses were used to produce the results. Finally, a more detailed discussion will then follow to understand what hypothesized variables were used in the analysis, at what significance these were assessed, and how the goodness of fit was used in the analysis.
Study Location

The Upper Missouri River Breaks National Monument (UMRBNM) is located between Fort Benton and US Highway 191 in North Central Montana (Monahan and Biggs, 2001). The center piece of the 377,346 acre monument is the Wild and Scenic Missouri River, which winds its way 149 miles through biological, scientific, historic, wildlife, geological, and cultural resources. The Bureau of Land Management (BLM) manages the monument, except for the state and private lands that are intermingled throughout the monument (www.mt.blm.gov/ldo/um/um_general.html). Much of the reason the river has been protected as wild and scenic is because of the historical significance of the area. The area is home to many Native American habitation sites, old homesteads, steamboat landings, the Nez Perce trail, and the Lewis and Clark trail. (Monahan and Biggs, 2001). The mouth of Cow Creek is central to the history of the Nez Perce Indians struggle with the U.S. government. This site is the location of the last battle that was fought with the Nez Perce Indians in 1877. They were soon thereafter apprehended in their attempt to flee to Canada to avoid being moved from their homeland to a reservation. This area is now part of the Nez Perce National Historic Trail (Josephy, 1965). The entire stretch of the river is part of the Lewis and Clark trail and most of the river remains similar to the striking topography that Lewis and Clark witnessed in their epic journey to the Pacific in 1805 (Monahan and Biggs, 2001).
The UMRBNM is generally accessed by recreation users in three sections (Fort Benton-Coal Banks Landing, Coal Banks Landing-Judith Landing, Judith Landing-James Kipp Landing). Coal Banks to Judith Landing is the most frequently used area, but use levels along all sections are steadily rising, making social impacts a greater concern. Social impacts are of special concern at Eagle Creek campsite, because it is the most frequented site with over 1,800 overnight stays in 2001 (Missouri River Visitor Survey, 2001).

Visitors were sampled at Eagle Creek campsite, because it is a major destination point. Eagle Creek is a backcountry campsite that is only publicly accessed from the river. Over 94% of visitors in 2001 and over 85% in 2004 participated in canoeing, making this by the most popular means of accessing the river campsites (Missouri River Visitor Survey, 2001, 2004). The majority of visitors access the river from Coal Banks...
landing and travel the 14.5 miles to Eagle Creek as their first overnight stop. This allowed the surveyor to capture the majority of visitors in this portion of the river. Visitors at their campsites are a captive audience affording them time to carefully answer the survey. Sampling at the campsite was also chosen as these visitors represent the most informed visitor, because they are on-site and understand first hand what conditions they prefer.

**Questionnaire Design**

The first section of the questionnaire addresses visitors’ preferences for a campsite social setting, and their willingness to accept management actions in the form of a tradeoff. These questions first assessed what campsite social setting visitors prefer. The literature has shown preferences to differ from acceptability. There is no evidence to suggest which is more valid, but that answers significantly differ based on which of these two the researcher is seeking. Manning et al., (1999) found that visitors’ tolerance for what is an acceptable level of crowding was more than 4 times more than what people preferred. By assessing preferences the results are more likely to indicate a less crowded campsite setting (Manning et al. 1999).

Visitors’ social preferences were assessed by showing visitors two pictures of the Eagle Creek campsite. Because of the ability of visual research methods to present a more accurate representation of social conditions, the survey incorporated the use of visual methods rather than a self-reported or verbal description (Brown, et al., 1988; Manning and Freimund, 2004). A photograph was chosen that faced upstream and was wide enough to capture the span of the Eagle Creek campsite. Manning et al. (2002) examined the methodological effects of having two opposite angle photographs
representing the same range of visitors. In this study half the respondents viewed the photograph that was looking up a trail and half viewed the photograph looking down trail. The results indicated virtually no difference in respondents crowding standards. This provides confidence that respondents were not being biased by the angle of the picture in the current study (Manning and Freimund, 2004).

In the current study 2 pictures are shown to visitors. The first picture (A) shows Eagle Creek with a lone canoe and only 2 people on a bank in the foreground. This picture represents attributes of Eagle Creek that Schindler and Shelby (1992) describe as important features to visitors campsite experience. Picture B then displayed a much more crowded setting with 30-40 people, 10-12 canoes and numerous tents lining the upper bank. Because only 2 pictures are used this limits the amount of influence that various placements of visitors can have. Visitors’ responses were to a crowded setting and an uncrowded setting and therefore avoids the variance between the placement of visitors that would bias respondents answers.

These pictures were based on a real photograph of Eagle Creek that was then manipulated to represent two opposite social settings. Although these settings were opposites, they are not the extreme ends of the spectrum. During busy times at Eagle Creek campsite there can have more than 100 campers spread along the banks, and it is not uncommon during this same time period to have zero to only a few people camping at this site. Both pictures are presented with exactly the same backdrop and the only variance is the number of people, tents, and canoes. This was done in order to limit the bias that could be associated with visitors responding to other factors in the picture that are not related to crowding. These factors could include anything from greener grass to a
sunnier day. In order to ensure the only aspect in each picture that was different was the level of crowding, Adobe Photoshop was used to manipulate the images.

After visitors’ preference for a campsite social setting was determined, the next phase of the questionnaire sought to understand what visitors were willing to tradeoff, in terms of management restrictions, to have their desired setting. These levels of acceptance were constrained by the hypothetical management restrictions of a fee, a permit system, limiting group size, and controlling days of river launch access. Including a fee constraint in the study was based on the Missouri River Survey Results (2001, 2002, 2004) which indicated a favorable response for a fee system. Including limiting group size and controlling days of river launch access is based on management strategies that are being considered by the BLM river managers. In the river management plan the preferred alternative at this stage in the draft is to limit groups larger than 20 to launch on the least busy days of the week, which are Wednesday, Thursday, or Friday. This would apply to Coal Banks Landing and Judith Landing from June 15- August 1. Also, groups larger than 30 would have to apply for a special use permit from the BLM. This alternative is being considered as a way to spread out large groups during the busiest times (Resource Management Plan for the Upper Missouri River Breaks National Monument, in review). For this reason it is relevant to examine these issues. Permits are included as a restriction partly because they have been used in past studies (Freimund et al., 2004), and partly to test if permits are a controversial management option (Behan, 1972, 1976; Hendee and Lucas, 1974).

The management restrictions, controlling launch access and visitor permits were asked in terms of the percentage chance of receiving the desired site or percentage chance
of getting a permit to access the river. The percentage chance in these two management alternatives varied from 15%, 30%, 60%, and 85%. These percentages were originally at 10%, 30%, 60%, and 90%, but after pre-testing these levels it was found that almost all visitors were willing to accept a 90% chance and almost none were accepting a 10% chance. Based on the desire to find a range of thresholds at which visitors’ answers would vary, these percentages were changed to how they now appear above. The launch date and permit questions are shown below.

- To get your desired launch date would you be willing to accept a [ ] chance of you and your group getting the site you chose above.  □ Yes  □ No

- If you were ensured of obtaining a site such as the one you choose above would you be willing to accept [ ] chance of getting a permit for you and your group to access the river? (If no permit is obtained then you can reapply at a later date). □ Yes  □ No

The fee amount and group size limitations were also pre-tested and based on these results were increased. Originally fees were set at $5.00, $10.00, $15.00, and $20.00, but this amount was shown to be below the threshold that visitors were willing to pay. Previous visitor data from UMRBNM indicates a high average income which partially explains the willingness to accept the lower fee amounts. Data gathered concerning visitors’ income showed that in 2001 42% of visitors surveyed made over $70,000. In 2002 the figure was 43% and rose to 48% in 2004 (no data was collected for 2003). Based on this information fee amounts were raised to $10, $20, $30, and $40. Group size restrictions were also raised from the pre-test amount. The threshold visitors were willing
to accept was not reached by the original group size of 2, 4, 6, and 8 and was increased to 4, 8, 12, and 16. The fee and group size questions are shown below.

- If you were ensured of obtaining a site such as the one you choose above, and considering your previous expenses for your river trip, would you be willing to accept a trip fee, charged per person, of $40?  □ Yes  □ No

- If you were ensured of obtaining a site such as the one you choose above would you be willing to accept a mandatory regulation prohibiting groups larger than 4?  □ Yes  □ No

The level of restriction for each management action varied in each survey, and participants were only asked one of the levels for each management action. Environmental research exploring visitors’ willingness to pay has shown the original item that visitors are asked can influence the visitors’ end value that they are willing to accept (Rowe, D’Arge, & Brookshire. 1980; Thayer. 1981). For this reason each survey was designed to have one action with the best option, one with the worst option, and the other two with one of the two levels in between. This will help limit a negative or positive bias that could be associated with having all the management levels as very restrictive or access oriented. The order that the questions were asked also varied in each survey. This was done to try and limit a negative bias towards a specific question. If visitors felt very strongly towards a specific question that appeared first the author did not want that bias to influence how they might answer the next management questions. Varying these parts of the survey created 16 different versions of the survey.

The remainder of the survey was devoted to gathering information that would help explain visitors’ willingness to accept management tradeoffs. Basic demographic questions were used including age, “education,” previous visits, gender, state of
residence, “group type,” and what size town they spent most of their life in. Previous visits were incorporated into the study to determine if prior experience helped play a role in visitor preferences. The state of origin was incorporated into the survey to determine if there was geographic variability in the sample, specifically between Montana residents and non-Montana residents. The size of the place the visitor spent most of their life was important because the potential differences that might exist for a social preference between those people that are from a “large city” and those from a smaller area, such as “a farm” or “rural or small town.” Understanding the type of group that the visitors were from was important to see if people that were camping in bigger group types influenced their opinion on what an acceptable social condition was.

Place attachment questions based on Williams and Vaske (2003) were then asked to understand visitors’ attachment to the UMRBNM. Williams and Roggenbuck (1989) and Williams et al. (1992) identified 61 potential place attachment questions. Williams and Vaske (2003) used 12 place questions that have shown good internal consistency over the course of several studies (6 place identity and 6 place dependent). These same questions were used in 8 point likert type scale, with each question alternating from a place dependent to a place identity question. In previous studies in the UMRBNM, visitors were shown to have a high level of place attachment, and this variable was therefore included in the survey based on the research that shows place attachment is a good predictor of support for management actions.

Visitors’ were then asked values question based on the Borrie et al., (2002) values scale that was developed to measure perceived park values in Yellowstone National Park. This study found significant differences in support for management according to the
value orientation of the visitor. Freimund et al. (2004) also used this value scale in an effort to explain visitor’s willingness to accept a tradeoff. This scale will also use a likert type scale ranging from 1 (strongly disagree) to 8 (strongly agree).

**Survey Implementation**

This survey was conducted at Eagle Creek campsite in 4 trips spanning the dates July 12-16, 23-26, August 7-10, and 18-22. The dates for these trips were designed to incorporate an equal number of weekdays and weekends in order to minimize any bias that would occur from having only participants that visit during certain times of the week. The survey participants consisted of overnight campers age 16 and up with a sample size of 271. There were 6 respondents that answered despite being below 16 and these surveys were later eliminated leaving 265 surveys.

Visitors were approached at their campsites by the surveyor, and asked to complete the self-administered questionnaire. There were a small percentage (under 10%) of the total population who declined or the surveyor was unable to question. This happened when visitors left before they could be questioned or said to come back later but were ultimately unavailable. The surveyor camped at Eagle Creek campsite and was therefore very successful in obtaining a high response rate.

Upon agreeing to complete the survey, two pictures representing an opposite social setting were passed around to the participants in order to allow everyone time to judge their preferred social setting. The version of the survey the first visitor received was randomly chosen and each person after that received the next version of the survey. The survey took between 5 and 20 minutes to complete. All visitors were overnight
The survey took between 5 and 20 minutes to complete. All visitors were overnight campers and all but the two large groups that came on a commercial trip by pontoon boat and a couple of smaller groups in power boats, either traveled by canoes or kayaks.

Data Cleaning

The data was first cleaned by removing surveys with participants below the age of 16, and removing surveys with over one missing variable (this represents 8% of total place questions) for the place attachment question and over three missing variables (this represents 11% of total values questions) for the values questions. This led to the removal of 25 surveys. Five were thrown out because of missing place questions and 20 because of missing values questions. This left a total of 231 surveys. The thresholds for the number of missing variables that would be kept were chosen because they were closest to 10% of the place and values questions. Means were used to replace the variables that were still missing, and in order to get an accurate representation of using the mean it was reasoned that no more than 10% of the variables should be missing. This allowed the other 10 variables in the place questions and the 24 values questions to establish the mean of the missing variables (Hair, Anderson, Tatham, and Black, 1998; Tabachnick and Fidell, 2001). Histograms of the values questions and the place questions showed a low variability of how people were answering these questions. Also, all the values that were replaced possessed low standard deviations, most were below one. This again showed that the variability of these answers was small, and that using the means would give an accurate representation of the missing variables. Some of the “education” and “group
type” categories were also combined to provide for better interpretation in the logistic regression.

The assumption when designing the survey was that the vast majority of people would pick picture A (the uncrowded social setting). This is based on the campsite social setting literature that states visitors prefer an uncrowded wilderness social setting (Lucas et al., 1985; Schindler and Shelby, 1992). This was true as only 19 of 271 (7%) people chose picture B as their preferred setting. The questionnaire went on to ask the participants if they were ensured of obtaining a site such as the one they chose above, would they accept certain management restrictions. In this way the study was designed to determine what tradeoffs, in the form of management restrictions, visitors were willing to make to achieve their desired social setting. The visitors that picked picture B would have no need to establish restrictions to limit visitors because they preferred the more crowded setting. Based on the design of the study to further assess what the vast majority of the people that desire an uncrowded social setting are willing to tradeoff, the people that picked picture B were eliminated.

**Analysis**

Contingent valuation (CV) is an economic tool that has been used to measure tradeoffs for non-market goods (Daniel, et al., 1989), such as value placed on a desired campsite social condition. This study employed the most commonly used CV method based on a dichotomous choice (yes/no), to determine if respondents are willing to make a tradeoff (Carson, 2000). Using dichotomous choice questions allowed the researcher to analyze the data with logistic regression. Logistic regression is the standard form of
regression analysis for dichotomous data. Logistic regression, like linear regression, seeks to explain the relationships between dependent variables and one or more explanatory or independent variables. The difference between linear regression and logistic regression is the use of dichotomous choice questions as the dependent variable. The power of regression, in this case logistic regression, is its ability to interpret the individual impact of several independent variables. In logistic regression this is referred to as multiple logistic regression (Homer and Lemeshow, 2000). Multiple logistic regression will be used to understand how independent variables (level of restriction, values, place attachment, etc) influence respondents’ choices. (Bowker, Cordell, Johnson, 1999).

Following the example of CV, a monetary price was used to assess if visitors were willing to accept a trip fee. The probability of receiving a permit, probability of getting ones’ desired site based on launch date, and group size levels are substituted for a monetary value. This substitution still allows the researchers to follow the CV literature to model the data.

**Factor Analysis**

In order to explore the underlying structure, the correlation between variables, and to reduce the 12 place attachment and 27 values, a principal component factor analysis was performed using the statistical program SPSS 10.0. A varimax rotation and extracting eigenvalues over one was implemented (Johnson, 1998; Tabachnick and Fidell, 1989; Stevens, 1986). A principal component approach is the most common form of factor analysis and is used as more of a confirmatory analysis when there is some
belief as to what factors exist. The varimax rotation has become very common in factor analysis because it increases the ability to interpret the results (Stevens, 1986). Instead of giving equal weight to each variable, varimax rotation gives “more weight to the variables having the larger communalities and less weight to the variables that have small communalities,” or more or less weight to those variables that have more or less in common with the other variables (Johnson, 1998, p. 174). Extracting eigenvalues greater than one is based on the Kaiser (1960) research that says to have high reliability or internal consistency eigenvalues must be greater than one. Several studies have shown this method to be accurate especially when the number of variables are small (10 to 15) or moderate (20-30) and the percent of variance explained was greater than 70%, which in both instances apply to this study. Factors that did not load on any variables higher than .6 were thrown out. Stevens (1986) and Tabachnick and Fidell (1989) suggest a freedom toward dealing with what level factors loadings will be interpreted. This freedom should incorporate their belief that a good analysis is one that makes sense and can be interpreted (Tabachnick and Fidell, 2001). Comrey (1973) suggest there is a continuum of quality based on the size of the loading. Loadings of .71 and above are considered excellent, .63 very good, .55 good, .45 fair, and .32 poor. A cutoff of .6 was chosen based on the quality that Comrey (1973) claims a .6 loading possesses, and the ability to interpret the factors that loaded at this level.

A set of factor groups was established by throwing out variables that did not load on any factor above .6, and by keeping all factor groups that the scree plot indicated. The scree plot was judged by retaining the number of factors that were plotted in the sharp decent before the plot levels out (Stevens, 1986). The factor scores were calculated in
SPSS by adding the variables and dividing by the number of variables in each factor. A reliability analysis was also run and factor that did possess a Cronbach’s alpha above .6 were eliminated (Manfredo, Driver and Tarrant, 1996). Based on the methods above, 4 factor groups were established for the values questions and 1 factor group was established for the place questions.

**Variables in Hypothesized Models and the predicted influence on the models**

After a set of factor groups based on the additive scores was established a reliability analysis was used to ensure the cohesiveness of the factor groups. Logitistic regression in SPSS and Shazam software was then used to model how the level of the management actions, the demographics of the visitor, the place attachment, and values questions influenced visitors’ willingness to make a tradeoff. A hypothesized logistic regression model for each of the four management actions was first established based on the literature and previous studies of the area.

The next section will discuss why certain variables were included in the models and how these variables are hypothesized to influence visitors’ tradeoff preferences. All of the models included the level of management restriction in the hypothesized model. This is based on the belief that as restrictions increase visitors are less willing to prefer such restrictions. The management restrictions fee, permit, group size restriction, and restricting launch date all included the variables; place attachment, all four values, “group type,” and Montana resident (MT resident). Place attachment has been shown to be a strong predictor of pro-environmental attitudes and acceptance of management restrictions (Kyle et al., 2003; Kyle et al., 2004; Vaske and Korbin, 2001). Place
attachment was included in the hypothesized model, because it was thought this would increase the predictive ability of the model and the researcher felt a higher level of place attachment would indicate acceptance of management restrictions. The previous literature review explains the potential of using values as a predictive tool for decision making. Values have the enduring ability to predict attitudes and therefore values were included in the models. The factored values scales will be discussed in the results, but the theory behind how they will influence the models will be discussed now. The four values consist of HISTORIC, ENVIRONMENTAL, SOCIAL, and SOCIAL EQUITY. People with historic and environmental values will be more likely to accept management restrictions to protect the historic and environmental qualities of the area. Visitors with social and social equity values will be less likely to accept these same restrictions because they will not desire to limit visitation, because it could decrease the social opportunities of the area.

**Table 1** Independent Variables in Hypothesized Models

<table>
<thead>
<tr>
<th>Management Tradeoffs</th>
<th>Permit</th>
<th>Fee</th>
<th>Group</th>
<th>Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place Attachment</td>
<td>Place</td>
<td>Place</td>
<td>Place</td>
<td>Place</td>
</tr>
<tr>
<td>All 4 Values</td>
<td>All 4</td>
<td>All 4</td>
<td>All 4</td>
<td>All 4</td>
</tr>
<tr>
<td>Group Type</td>
<td>Group</td>
<td>Group</td>
<td>Group</td>
<td>Group</td>
</tr>
<tr>
<td>Education MT Resident</td>
<td>Education</td>
<td>Education</td>
<td>Lived most of life</td>
<td>MT Resident</td>
</tr>
<tr>
<td></td>
<td>MT Resident</td>
<td></td>
<td></td>
<td>Visits</td>
</tr>
</tbody>
</table>
Lime (1972), Stankey (1973), and Lucas (1964), all studied the effects different groups had on each other, and found differing group had a substantial impact on each other. This literature displays the importance of understanding the type of group and its influence on other visitors. Groups that are considered different have a disproportionate impact on visitors, and therefore “group type” was included in all of the models mentioned above. It was thought a portion of the influence “group type” possesses comes from the size of the group. The theory behind how these group types will influence the models will be discussed next. Those in the group “family and friends” are generally thought to be in smaller groups they are therefore more willing to accept restrictions because in each case the restriction would have less of an impact. “Commercial,” “organized club or group”, “school group and other” groups are hypothesized to generally oppose all restrictions because of the greater impact to these generally bigger groups. Paying a fee, obtaining a permit, cutting the group size, or making plans for an alternate launch date would have a much greater impact to these bigger groups. The one exception to the hypothesis that group types different from “family and friends” will oppose restrictions is “commercial” visitors. This is because in almost all circumstances these groups are already paying a fee, and therefore are more accepting to the idea.

“Education” was included in the fee and permit models. The inclusion of “education” in the fee model is based on the research that shows higher levels of education lead to higher levels of income (Gregorio and Lee, 1999), and therefore these people would be more willing to pay to protect the social setting they desire. The use of “education” in the permit model is based on the belief that higher levels of education will
be better able to make the connection between a permit and protecting the uncrowded social setting they chose.

Burger (1998) shows location of residence to be a valid predictor of recreation activity. Bowker et al. (1999) found several different levels of support for user fees based on geographic location. The variable Montana (MT) resident was used in the models for these reasons. Specifically it was hypothesized that being a MT resident would have a negative impact on accepting a fee and permit. This is based on the idea that Montanans are generally opposed to many government restrictions. Also, a fee would hit Montanans the hardest because the state has a proportionally lower average income compared to the remainder of the country, and because they are thought to visit the area more frequently. This would mean a fee for each visit. MT residents were thought to have a positive impact on willingness to accept a group and launch restrictions. The rural nature of Montana lends to the belief that Montanans would in general prefer a less crowded social setting and would limit group size. Having a restricted launch date would in theory have less impact on Montanans because of their closer proximity to the area. They would therefore be more able to adapt to this change. The model for Group size and launch date also incorporated the independent variable where visitors had lived most of their life ("farm," "small city," "big city," etc.). This was reasoned that visitors from a more rural background would be more willing to accept a group size restriction. The variables age and gender were not thought to have a significant impact and therefore were not included in any models.

The launch date restriction was framed by asking visitors if they wanted their desired launch date, visitors would have to accept a chance that they would not get the
preferred site they chose. The implication in this question is that visitors could pick another launch date if they did not want to risk getting the site that was not preferred. The variable number of visits to the area was included in the model for launch date restriction, because it was reasoned that visitors who have made frequent trips to the UMRBNM would be more willing to accept an alternative launch date. These visitors have come to the area numerous times and accepting an alternate launch date would not be as likely to impact their decisions. White, Hall, and Farrell (2001) found that visitors with prior experience to a place will have more accurate expectations and may therefore have a more accurate depiction of what the social setting will be like and how they think that should be managed. Also, in this launch date model, Montana residents are included because of the research that suggests its predictive power discussed previously, and because of the belief that Montana residents would be more willing to accept alternative launch dates. This would potentially mean fewer hassles to them than an out-of-state visitor.

**Significant Variables**

The significance of the variables in the hypothesized models is based on an error level of .05. The significance levels are based on the Wald statistic. The Wald statistic is a two sided test that is calculated based on a comparison of coefficients and the standard error (SE) with a chi squared distribution, and one degree of freedom. The sample size in this study is large enough to feel comfortable using the Wald test, despite the warning from Menard (1995) that the Wald can inflate the SE on large coefficients and thus lower the significance level. This study will use the Wald test that is provided by SPSS.
**Stepwise Logistic Regression**

A stepwise logistic regression was used to determine the best statistical fit model. Although there is a hypothesis of what variables will fit best in each of the four models, this study is an exploratory study. Because of this there is no way to be certain what variables are the most appropriate to use. There is no specific literature for example that explains what independent variables are good predictors of whether people will accept launch restrictions. For this reason the use of a stepwise logistic regression procedure, that is based entirely on statistical values, was used to determine a model for this sample. Stepwise has been criticized because it bases the entry or removal of variables solely on statistical criteria. It is argued that minor differences in the statistics can have a large impact on the final results (Tabachnick and Fidell, 2001). Despite the criticism of a stepwise procedure it can be very affective analysis tool. The stepwise procedure is a screening mechanism that assesses the importance of specific variables based on the statistical significance of the coefficient. This significance is based on a likelihood ration test with the alpha set at .20. This level alpha is recommended above .05 because research has shown in a stepwise procedure .05 often fails to identify important variables. An alpha of from .15 to .25 has been recommended as a way to include important variables. A level in the middle of this recommendation was chosen as a way to include the variables that are significant, but try to limit inclusion of questionable variables. For this reason .20 was chosen as the significance level (Hosmer and Lemeshow, 2000). These alpha levels are generally specific to a stepwise procedure because of the mechanics that are involved in running the stepwise. The stepwise logistic regression was performed in SPSS by following the theory that emphasized including all the variables in the original
model (Tabachnick and Fidell, 2001). For this reason backward stepwise logistic regression was used as opposed to forward stepwise. A backward stepwise logistic regression starts out with all the variables in the model and removes those variables that are not determined to be statistically significant.

These hypothesized and the stepwise models for each of the four dependent variables were then be compared to see which one is the best fit. This was accomplished by comparing the goodness of fit statistics, the variables in the models, and the likelihood ratio test between the hypothesized and stepwise models.

**Goodness of Fit**

The models were then evaluated for their goodness of fit. The goodness of fit is how well the model fits the logistic curve. This was assessed by how successful the model is predicting, the McFadden $R^2$, the likelihood ratio test, and the Hosmer Lemeshow test. The prediction success of the model is found in the classification table. The $R^2$ value that is presented is the McFadden $R^2$. This $R^2$ is a pseudo $R^2$ because the data set is dichotomous. The likelihood ratio test is a test between the constant model for each of the hypothesized and stepwise models. This indicates goodness of fit by determining if the other model is an improvement from the constant only model. The Hosmer Lemeshow test is a way to test if the data fits the logistic curve. If it does fit the model this indicates a certain goodness of fit.
**Marginal Effects**

The predicted probability of visitors accepting the management restriction was calculated next. The predicted probability is the predicted chance of each individual accepting the management restrictions. This probability was calculated for each model. The predicted probability is calculated based on differing characteristics for each individual. The marginal effects were also calculated. The marginal affects allow the researcher to isolate and interpret the effect of changing a certain variable. This allows the researcher to know what affect increasing a certain variable will have. For example, a one unit increase in fee decreases visitors’ chances of accepting a fee. The marginal effects at the mean will be reported from Shazam. The marginal effects at the mean are calculated by holding all the other variables as their mean. The marginal effect is related to the logistic curve.

**Figure 3  Logistic Curve**

Those visitors that are on the tails of the curve are less affected by the change the marginal effect represent, but the marginal effect for those visitors in the middle of the curve can have a large impact. For example, a fee increase of $1 for someone on the top
or bottom of the curve is unlikely to influence their chance of acceptance substantially, because there is already a very low or high chance of them accepting a fee. However, a fee increase of $1 for someone in the middle of the curve could cause a large increase in the chance of acceptance, because they are on the border of accepting or rejecting the restriction. In order to understand the threshold at which visitors were willing to accept a restriction the median was examined. The median gives the researcher what level are 50% of the people above and below. This can be assumed to be the threshold at which this sample of visitors was willing to accept. The median was calculated based on the coefficients of the hypothesized model.
Chapter 4 - RESULTS

The hypotheses posed in chapter one, along with the hypotheses on how the variables would influence the models were analyzed in order to give further insight into what models and variables are the best predictors of visitors willingness to make a tradeoff. This chapter will first examine some of the descriptive statistics of the data, then the results of the factor analysis, and finally the logistic regression analysis will be presented. This analysis will be presented to provide further information into the relationships between visitors' social preferences and the willingness to make a tradeoff, in order to answer the questions in the problem statement.

Descriptive Statistics

A central part of the survey was gathering demographic data that could help give further insight into visitors’ willingness to accept certain management restrictions. This information is presented below to be better understand the sample characteristics.

The data on residency showed the sample had a higher percent of non-resident visitors than MT residents. Forty-seven percent of people from this sample were from out of state compared to 39% from MT. The high number of missing variables on this question was caused by visitors missing the residency question in the survey. This survey was later altered to make this question easier to read.
Fifty-six percent of visitors were males.

The vast majority of visitors from this sample had never visited the UMRBNM before-69% were there for the first time. There were a few people, such as guides who had
visited quite frequently. One person estimated they visited 300 times. This skewed the mean slightly and therefore the median was also reported.

**Figure 6  # of visits**

![Bar chart showing the number of visits](image)

Age varied widely in the survey from 16 to 78, but most visitors fell in the middle with the average age being 45. There were also 5 missing answers for this survey.
Figure 7  Age

The group types below are dominated by the group “family and friends.” The “school or other” category represents the smallest group, with only 21 people claiming this group. The other visitors are split between “organized club or group” and “commercial group.”
Visitors in this sample of data were highly educated. Thirty-three percent of the visitors reported having at least a graduate degree. Seventy percent of the sample had at least a 4 year college degree.
The majority of the population were from a medium sized city defined to be between 50,000-1 million. Another large percent of the people were from a "small city" (27%).

**Figure 10  Where Visitors Lived**

![Where Visitors Lived Chart]

The chart below is a summary table of descriptive statistics previously discussed.

**Table 2  Summary of Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Missing</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td># of visits</td>
<td>229.00</td>
<td>2.00</td>
<td>0.00</td>
<td>300.00</td>
<td>4.07</td>
<td>21.29</td>
</tr>
<tr>
<td>MT Resident</td>
<td>198.00</td>
<td>33.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>Age</td>
<td>226.00</td>
<td>5.00</td>
<td>16.00</td>
<td>78.00</td>
<td>45.27</td>
<td>16.21</td>
</tr>
<tr>
<td>Gender</td>
<td>231.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Group Type</td>
<td>226.00</td>
<td>5.00</td>
<td>1.00</td>
<td>4.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Education</td>
<td>231.00</td>
<td>0.00</td>
<td>1.00</td>
<td>5.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Lived</td>
<td>224.00</td>
<td>7.00</td>
<td>1.00</td>
<td>6.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Data Reduction

Values

Factor analysis was performed in SPSS 10.0 to test the underlying structure of the variables and present a more manageable data set in order to perform the logistic regression analysis. Following the methods outlined in chapter three, six factors were originally extracted based on the 27 values questions. The variables that did not load above .6 on any factors were then removed to observe the effect this would have on the overall scale. The variables “a place for all living things to exist,” “a place for wildness,” “scientific research and monitoring,” “a place for use and enjoyment of the people,” “a place to be free from society and its regulations,” “a site to renew your sense of well being,” “a family or individual tradition,” “a sacred place,” and “a reserve of natural resources for future use,” did not load on any factor above .6. These variables were removed based on the criteria established by Comrey (1973). The analysis was then run again and the variable, “an economic resource” did not load above .6 on any variable. This variable is exhibiting a weak correlation with all variables and was therefore dropped from further analysis. After running the analysis again five factors were established. A reliability analysis using Cronbach’s Alpha was run on the five factors to assess internal consistency. Cronbach’s alpha is a reliability measure that ranges from 0-1, with a higher measure indicating a more internally consistent factor. The last factor that is composed of “a place everyone should see, and a place to develop skills and ability” scored a very low .48 Cronbach’s alpha (see table 3). Because this alpha was below .6 this variable was removed and the factor analysis was run again (Manfredo, Driver and Tarrant, 1996).
Table 3  Reliability of Deleted Factor

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should See</td>
<td>6.45</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td>Develop Skill</td>
<td>5.34</td>
<td>1.65</td>
<td>.48</td>
</tr>
</tbody>
</table>

This left the four factors scales that are presented in table 4. The first factor is named HISTORICAL. This is because the variable “historical resource” is the strongest loading at .822 and the other variables support the notion of the area as a historic resource that should be protected. The second factor scale is named ENVIRONMENTAL based on the variables that are included. This factor outlines a clear theme of environmental protection from “protector of threatened and endangered species” to “education about nature.” The next factor represents several aspects of a social setting and was therefore named SOCIAL. The last factor value is composed of the social equity questions “people of all classes and environmentally healthy place.” It was therefore name SOCIAL EQUITY.
Table 4 Values Factor Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic resource</td>
<td>.819</td>
</tr>
<tr>
<td>Scenic beauty</td>
<td>.750</td>
</tr>
<tr>
<td>Display of natural curiosities</td>
<td>.706</td>
</tr>
<tr>
<td>Symbol of America’s identity</td>
<td>.695</td>
</tr>
<tr>
<td>Without commercial development</td>
<td>.673</td>
</tr>
<tr>
<td>Wildlife sanctuary</td>
<td>.858</td>
</tr>
<tr>
<td>Protector of threatened and endangered species</td>
<td>.857</td>
</tr>
<tr>
<td>Education about nature</td>
<td>.782</td>
</tr>
<tr>
<td>Protection for fish and wildlife habitat</td>
<td>.678</td>
</tr>
<tr>
<td>All society to interact</td>
<td>.816</td>
</tr>
<tr>
<td>Social place</td>
<td>.796</td>
</tr>
<tr>
<td>Tourist destination</td>
<td>.698</td>
</tr>
<tr>
<td>Recreational activities</td>
<td>.609</td>
</tr>
<tr>
<td>People of all classes</td>
<td>.799</td>
</tr>
<tr>
<td>Environmentally healthy place</td>
<td>.734</td>
</tr>
</tbody>
</table>

| Variance Explained                             | 18.99 18.59 15.98 9.68 |
| Crobach’s Alpha                                | .81 .85 .74 .63 |

A reliability analysis was then run again to again assess the fit of each of the factors. The reliability of all the factors performed well. The HISTORIC and ENVIRONMENTAL values showed a very high reliability of .81 and .85. The SOCIAL factor continued to show a high reliability at .74. Finally, the SOCIAL EQUITY factor was consistent above the .6 mark at .63. This variable only contains two variables, and
can therefore provide some explanation for the lower alpha. Carmines and Zeller (1979) explain that a higher number of variables will raise the alpha. Therefore, a .63 alpha with only two variables is thought of as a good reliability.

Place

The place questions were also analyzed using SPSS 10.0 factor analysis and ultimately only one factor was established based on the 12 place questions. The original SPSS analysis factored the place question into two factors, with the variables “the things I do here I would enjoy just as much in a similar spot” being the lone variable in the second factor. This factor is considered a trivial variable. A trivial variable is one that loads on only one factor and is generally considered uncorrelated with all other variables and for this reason should be excluded from being its own factor (Johnson, 1998). A reliability test was run using all the variables in one factor, and this showed that by removing “the things I do here I would enjoy just as much in a similar spot” the reliability would improve for the whole factor. Based on these two issues this variable was removed and the factor analysis was run again leaving only one factor, that has a very high reliability of .928.

This differs from the literature that found two distinct factors for place attachment, place identity and place dependence. However, the goal of this study was not to determine if and how these differing components of place would affect visitors’ willingness to make a tradeoff, but to understand if place attachment as a whole influenced visitor tradeoffs and if so in what direction. Therefore, the place attachment
will have one factor that consists of all the variables minus “the things I do here I would enjoy just as much in a similar spot.”
Logistic Regression

Two models were developed for each of the four management restrictions. The logistic regression analysis for each management restriction was conducted using people’s willingness to accept the management restrictions (yes/no) as the dependent variable. Several independent variables that are based on the literature and the author’s own theory about what variables will make accurate predictors, were included in the models. In the next model the same dependent variables are used, but a much larger set of independent variables are entered into a backward stepwise logistic regression. The results of these models are also presented for each management restriction. The hypothesized model will be presented first and then the stepwise model will be presented. These models will be examined to understand if visitors are willing to make a tradeoff
and to understand how the independent variables interact in each model. These models were estimated using SPSS version 10.0 and Shazam statistical software.

**Fee**

**Hypothesized Fee Model**

The hypothesized fee model included fee amount, MT resident, place attachment, the four values factors, the visitors’ “group type,” and their level of “education.” The McFadden $R^2$ is reported as one measure of goodness of fit. A good fit based on the McFadden $R^2$ is .1-.3 and an excellent fit is from .3-.5 (Lattin et al. 2003). The McFadden $R^2$ for this model is .17 indicating a good, but not excellent fit for the model. The classification table is another estimator of goodness of fit. The table compares the predicted values of the regression with the actual values that the model observed, in order to give the percent the model is observing correctly. The classification table for this model is predicting 56% of the people who said no correctly and 84% of the people who said they would accept a fee. The total the model correctly predicts is high at 73%.

However, Kennedy (1985) claims a better estimator of the models’ prediction success is based on the classification table prediction success measured against the naive model. The naive model is how well the constant only model predicts the data. For this model the naive model is predicting 53% of the visitors answers correctly and the classification prediction improves this to 73%, indicating a good improvement over the naive model.
Table 6  Fee Classification Table

<table>
<thead>
<tr>
<th>Predicted No Correctly</th>
<th>Predicted Yes Correctly</th>
<th>Total Responses</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>75</td>
<td>56.0</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>114</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>Overall Percent Correct</td>
<td></td>
<td></td>
<td>73.0</td>
</tr>
<tr>
<td>Naive Model Prediction</td>
<td></td>
<td></td>
<td>52.7</td>
</tr>
</tbody>
</table>

The Hosmer and Lemeshow test gives another goodness of fit statistic. This statistic calculates the observed versus the predicted to test the assumption that the data fits the logistic curve. Non-significance indicates there is no significant difference between the observed and predicted frequencies and the model is a good fit (Hosmer and Lemeshow, 2000). This model was not significant, indicating a good fit. The final goodness of fit test that was used is based on the likelihood ratio test that in this case will compare the constant model to the hypothesized model. This test shows a significant difference for this model, indicating the hypothesized model is a significant improvement over the model that contains only the constant ($LR\text{ diff}=44.739$, $\chi^2\text{ crit.}= 23.68$).

A further analysis of the model examined the individual variables in an effort to understand how they fit the model, and what they predict. The significance of each variable in the hypothesized model will be based on an error level of .05. Table 7 shows the hypothesized model and the significant variables.
Table 7 Hypothesized Fee Model

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fee Amount</td>
<td>-.028</td>
<td>.015</td>
<td>3.592</td>
<td>.058</td>
</tr>
<tr>
<td>Place</td>
<td>-.214</td>
<td>.128</td>
<td>2.823</td>
<td>.093</td>
</tr>
<tr>
<td>Historic</td>
<td>.230</td>
<td>.225</td>
<td>1.048</td>
<td>.306</td>
</tr>
<tr>
<td>Environmental</td>
<td>.097</td>
<td>.168</td>
<td>.332</td>
<td>.565</td>
</tr>
<tr>
<td>Social</td>
<td>-.231</td>
<td>.136</td>
<td>2.895</td>
<td>.089</td>
</tr>
<tr>
<td>Social Equity</td>
<td>.011</td>
<td>.160</td>
<td>.005</td>
<td>.944</td>
</tr>
<tr>
<td>Group Type 1 (constant - Family and Friends)</td>
<td>8.332</td>
<td></td>
<td></td>
<td>.040</td>
</tr>
<tr>
<td>Group Type 2 (organized club or group)</td>
<td>-.532</td>
<td>.452</td>
<td>1.384</td>
<td>.239</td>
</tr>
<tr>
<td>Group Type 3 (Commercial group)</td>
<td>.423</td>
<td>.498</td>
<td>.722</td>
<td>.396</td>
</tr>
<tr>
<td>Group Type 4 (school and other)</td>
<td>-1.403</td>
<td>.605</td>
<td>5.380</td>
<td>.020</td>
</tr>
<tr>
<td>Education (constant - high school grad or GED)</td>
<td>14.915</td>
<td></td>
<td></td>
<td>.005</td>
</tr>
<tr>
<td>Education 2 (some college)</td>
<td>-.298</td>
<td>.587</td>
<td>.258</td>
<td>.612</td>
</tr>
<tr>
<td>Education 3 (4 year college degree)</td>
<td>1.680</td>
<td>.610</td>
<td>7.597</td>
<td>.006</td>
</tr>
<tr>
<td>Education 4 (Some graduate school)</td>
<td>.869</td>
<td>.613</td>
<td>2.012</td>
<td>.156</td>
</tr>
<tr>
<td>Education 5 (Graduate degree)</td>
<td>1.071</td>
<td>.551</td>
<td>3.786</td>
<td>.052</td>
</tr>
<tr>
<td>MT Resident</td>
<td>-.973</td>
<td>.376</td>
<td>6.686</td>
<td>.010</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>-.087</td>
<td>1.667</td>
<td>.003</td>
<td>.958</td>
</tr>
</tbody>
</table>

The categorical variables in table 6 are “education,” “group type,” and MT resident. SPSS logistic regression allows an easy way to analyze these variables by specifying them as categorical, which then allows the researcher to use the first or last category as a reference point to measure against the other categories. In this study “education” and “group type” used the first category (“high school graduate or GED” and “family and friends”) as the reference point and the other categorical variables (MT resident, gender, and lived) used the last category as the reference variable. The last category for MT is resident, gender is female, and the “lived” last category is big city. The constant for each categorical variable represents all the variables held at their means.

Fee is the most obvious missing significant variable in this model. By examining how an increase in fee changes peoples willing to accept a fee this can better explained.

For example, an increase in fee of $10 only decreased the chance visitors were willing to accept a fee by five percentage points. This suggests that from the levels that were asked
($10-$40), the amount of the fee was not important. The median for fee in this model was $37.70, indicating that 50% of the people were willing to pay more than $37.70 for a fee to achieve their desired social setting. The fee amount was only asked up to $40, which shows that the willingness to pay threshold was not reached. Although fee was significant, there are other variables that were much more potent predictors than the fee amount.

Several “education” variables proved to be significantly different from the base case, high school degree. A four year college degree and a graduate degree were significantly different than those with a high school degree. The base for “education” and “group type” proved to be significantly different from other “education” and “group type” variables taken as a whole. Also, people that marked the “group type” “school group and other” were also significantly different than the base group, “family and friends.” The type of people that are represented by the “group type” “other” varies widely. These people were from work groups, guides, boy scouts, BLM rangers, government groups, and other groups that did not consider themselves part of the previous choices.

This information illustrates what variables are significant, but further insight allows further understanding of how these variables influence the visitors’ willingness for a tradeoff. The coefficients of the model indicate the direction the variable influences visitors’ tradeoffs. A negative coefficient means the visitor is less likely to accept a fee, and a positive coefficient has the opposite effect. The previous example of a fee increase shows the influence the coefficients and the marginal effects have on visitors’ willingness to accept a fee. The marginal effect can also be presented for categorical variables to
understand how groups differ. In this model those with a graduate degree are 25 percentage points more likely to support a fee restriction than those with a high school degree.

**Figure 11** Marginal Effects for Fee Hypothesized Model

**Figure 12** Categorical Marginal Effects for Fee Hypothesized Model

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*Ed, GT, MT resident change is a change from the base case. Gender base case is males, ED base is high school degree, GT base is family and friends, and MT res. base case is non resident.

*ED=Education: ED1(base case not shown)=high school degree, ED2=Some college, ED3=Four year college degree, ED4=Some graduate school, ED5=Graduate degree.

*GT=Group Type: GT1(base case not shown)=family and friends, GT2=Organized group, GT3=Commercial group, GT4=school or other.
As previously mentioned the “group type” “school group and other”, compared with the base case “group type” “family and friends” is significant, and it is also a strong predictor of visitors that are unwilling to accept a fee. These people were 32 percentage points less likely to accept a fee than the base case. People in the “group type,” “organized club or group,” were also less likely to support a fee.

**Figure 13  Group Type vs. Acceptance of Fee Restriction**

“Education” also appears to be a strong predictor of willingness to pay for a fee. Compared to the lowest educated visitors each higher educated group was more likely to accept a fee, except the group that had some college. However, the strength of association is not consistent. Visitors with a college degree were more willing to pay than those with some graduate school or a graduate degree. Visitors with a “graduate degree,” “some graduate school,” and a “four year college degree” were significant and sparked a big change in willingness to pay. These visitors were 25 and 39 percentage points more likely to pay for a fee than “high school graduates.” Despite the slight inconsistencies, education, in general, appears to be a good predictor and supports the hypothesis that
those with more education are more willing to pay a fee. The hypothesis about Montana residents being significant was also supported as was the hypothesis about the influence they would have. They were 22 percentage points less likely to accept a fee than nonresidents.

**Figure 14 Education vs. Acceptance of Fee Restriction**
By examining the change in the predicted probabilities as the level of fee is altered, a level that will highly supported by visitors could be implemented. This change in represented in the Figure 16. The figure again shows that a change in fee does not have a large impact on the acceptance of a fee restriction. Almost any level of fee will be supported by at least 50% of the people.
Stepwise Fee Model

The next section will discuss the stepwise fee model. The McFadden $R^2$, classification table of percent correct versus the naive model, Hosmer and Lemeshow, and the log likelihood test between the constant and stepwise will again be used to assess the goodness of fit of the model. The McFadden $R^2$ for the final best fit model is .18, indicating a good fit. The model was successful at predicting 84% of the people who said yes to paying a fee. It predicted 54% of people that said no to a fee for a total prediction success of 72%. This model improved the predictive success of the naive model by 12% (60% to 72%). The Hosmer and Lemeshow test shows the data fits the logistic curve indicating a good fit. The likelihood ratio test shows a significant difference from the constant only model, a further indication of a good fit (LR diff=41.988, $\chi^2$ crit.= 16.92).
The stepwise procedure determined which variables are significant. This alpha is different than the alpha used to determine significant variables in the hypothesized model (this is explained previously in the methods chapter). The variables left in the model are MT resident, gender, “group type,” and “education.” The most notable missing variable from the hypothesized model is again the fee amount. The stepwise model also does not find the amount significant. The statistics in this model support fee being excluded, because when fee was removed from the model, there was only a slight drop in the Cox and Snell $R^2$, Nagelkerke $R^2$, and the predictive success. These two $R^2$ calculations can be interpreted much like the McFadden $R^2$. The Cox and Snell $R^2$ was calculated in such a way that it cannot produce a score of one. The Nagelkerke $R^2$ recalculates the Cox and Snell $R^2$ in such a way that it has more of a potential to reach one. For this reason Nagelkerke $R^2$ is usually greater than Cox and Snell $R^2$ (Tabachnick and Fidell, 2001). In both circumstances the calculation of $R^2$ is very similar to the McFadden $R^2$. All are based on a comparison of the log likelihood for the full and the log likelihood for the limited model. When the fee variable was removed, both $R^2$ dropped by less than .01 and the predictive success dropped by less than half a percent each. The natural assumption that the amount of fee would highly influence willingness to pay proved to be false when fee was measured from $10-$40.
Table 10  Stepwise Logistic Regression Fee Model

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT resident</td>
<td>-1.336</td>
<td>.377</td>
<td>12.591</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.790</td>
<td>.362</td>
<td>4.769</td>
<td>.029</td>
</tr>
<tr>
<td>Group Type 1 (constant- Family and Friends)</td>
<td></td>
<td></td>
<td>11.345</td>
<td>.010</td>
</tr>
<tr>
<td>Group Type 2 (organized club or group)</td>
<td>-0.610</td>
<td>.455</td>
<td>1.796</td>
<td>.180</td>
</tr>
<tr>
<td>Group Type 3 (commercial tour)</td>
<td>.506</td>
<td>.524</td>
<td>.935</td>
<td>.334</td>
</tr>
<tr>
<td>Group Type 4 (school and other)</td>
<td>-1.623</td>
<td>.597</td>
<td>7.388</td>
<td>.007</td>
</tr>
<tr>
<td>Education 1 (high school graduate or GED)</td>
<td></td>
<td></td>
<td>13.377</td>
<td>.010</td>
</tr>
<tr>
<td>Education 2 (Some college)</td>
<td>-0.212</td>
<td>.592</td>
<td>.129</td>
<td>.720</td>
</tr>
<tr>
<td>Education 3 (4 year college degree)</td>
<td>1.636</td>
<td>.598</td>
<td>7.488</td>
<td>.006</td>
</tr>
<tr>
<td>Education 4 (Some grad. school)</td>
<td>.833</td>
<td>.620</td>
<td>1.807</td>
<td>.179</td>
</tr>
<tr>
<td>Education 5 (Graduate degree)</td>
<td>1.036</td>
<td>.546</td>
<td>3.605</td>
<td>.058</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.330</td>
<td>.504</td>
<td>.429</td>
<td>.512</td>
</tr>
</tbody>
</table>

The variables that overlap between the hypothesized model and the best fit model show the same affect on willingness to pay. Being a MT resident decreased visitors’ chance of accepting a fee. People in “school groups and other,” along with “organized clubs”, caused a decrease in respondents’ chance of accepting a fee by 16 and 40 percentage points. A higher level of education was significant and again indicative of more support for a fee in all instances except visitors with “some college.” Gender was a differing variable from the hypothesized model, and this variable showed females were 14 percentage points less likely to support a fee.
It is also important to understand how many people were actually willing to pay the fee as a tradeoff for a satisfactory social condition. As both models show fee is not a significant predictor of acceptance. The lack of concern about the amount of the fee led many people to accept the fee tradeoff. Sixty-three percent of visitors were willing to make a tradeoff by paying a fee for their ideal social condition. Asking a raised fee amount would be a further test that could better illustrate if visitors truly don’t care about the fee amount or if their threshold for willingness to pay was not captured in the fee amounts that were asked. A further discussion behind visitors’ tradeoff preferences for fee and the other restrictions will be examined in the next chapter.
Permit

Hypothesized Permit Acceptance Model

The hypothesized model for permit contained the same variables as the fee model; the percent chance of getting a permit, place attachment, all factor values, MT resident, “group type,” and “education.” The model shows a similar goodness of fit, but the permit model performed differently in terms of the significant variables. The McFadden $R^2$ is .15, which falls in the range considered good, but on the lower end of this range. The model accurately predicts 60% of those that refuse a permit and 77% of visitors who were willing to accept a permit, for a total success of 69%. The increase from the naive model (53% to 69%) is large and indicates that the hypothesized variables are having a large improvement on predictive success of the model, compared to the constant only model. The Hosmer and Lemeshow test also shows the data fits the logistic curve indicating a good fit. The likelihood ratio test between the constant only model and the hypothesized model shows a significant difference, indicating this model is an improvement from the constant only model (LR diff=39.082, $\chi^2$ crit.=23.68).

Table 11  Hypothesized Permit Classification Table

<table>
<thead>
<tr>
<th>Predicted No Correctly</th>
<th>Predicted Yes Correctly</th>
<th>Total Responses</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>53</td>
<td>76</td>
<td>89</td>
</tr>
<tr>
<td>Overall Percent Correct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naive Model Prediction</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The model is also examined to determine if a permit were to be implemented at what level would the data justify setting that restriction. Figure 18 below shows that any
chance of getting a permit over 50%, will have greater than 50% of visitors’ support. The exact median for this model is at 48.1%. When this is increased to a 70% chance of getting a permit, over 60% of the visitors support the permit restriction. This provides valuable information to managers that will later be discussed in the management implications section.

Figure 18  Acceptance of Permit

The percent chance of getting a permit is obviously an important predictor towards accepting a permit system, but there are other variables that are playing a more important role in predicting acceptability of a permit. In this instance place attachment is a significant predictor, but is predicting the opposite of what was hypothesized. It was thought that those with greater place attachment would be more willing to accept a permit in order to protect the setting. The opposite proved to be true as those with more place attachment were less willing to accept a permit. An increase in place attachment by one unit showed a drop in support for a permit system by eight percentage points. An increase in the percent chance of getting a permit by 15 percentage points only raised the chance
visitors would accept a permit by six percentage points, making level of place attachment a more potent predictor.

Table 12  Hypothesized Permit Model

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permit</td>
<td>.020</td>
<td>.007</td>
<td>9.551</td>
<td>.002</td>
</tr>
<tr>
<td>Place</td>
<td>-.327</td>
<td>.127</td>
<td>6.651</td>
<td>.010</td>
</tr>
<tr>
<td>Historic</td>
<td>.283</td>
<td>.229</td>
<td>1.531</td>
<td>.216</td>
</tr>
<tr>
<td>Environment</td>
<td>.258</td>
<td>.170</td>
<td>2.300</td>
<td>.129</td>
</tr>
<tr>
<td>Social</td>
<td>-.176</td>
<td>.129</td>
<td>1.855</td>
<td>.173</td>
</tr>
<tr>
<td>Social Equity</td>
<td>-.151</td>
<td>.166</td>
<td>.829</td>
<td>.362</td>
</tr>
<tr>
<td>Group Type 1 (constant- Family and Friends)</td>
<td>6.214</td>
<td>6.102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Type 2 (organized club or group)</td>
<td>-.535</td>
<td>.427</td>
<td>1.571</td>
<td>.210</td>
</tr>
<tr>
<td>Group Type 3 (commercial tour)</td>
<td>-.122</td>
<td>.462</td>
<td>.069</td>
<td>.792</td>
</tr>
<tr>
<td>Group Type 4 (school and other)</td>
<td>-1.472</td>
<td>.635</td>
<td>5.371</td>
<td>.020</td>
</tr>
<tr>
<td>Education 1 (constant- high school grad or GED)</td>
<td>7.689</td>
<td>.104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education 2 (some college)</td>
<td>-1.199</td>
<td>.603</td>
<td>3.959</td>
<td>.047</td>
</tr>
<tr>
<td>Education 3 (4 year college degree)</td>
<td>-.213</td>
<td>.569</td>
<td>.140</td>
<td>.708</td>
</tr>
<tr>
<td>Education 4 (Some graduate school)</td>
<td>.042</td>
<td>.599</td>
<td>.005</td>
<td>.944</td>
</tr>
<tr>
<td>Education 5 (Graduate degree)</td>
<td>.241</td>
<td>.528</td>
<td>.208</td>
<td>.648</td>
</tr>
<tr>
<td>MT Resident</td>
<td>-.161</td>
<td>.366</td>
<td>.192</td>
<td>.661</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>-.620</td>
<td>1.630</td>
<td>.145</td>
<td>.704</td>
</tr>
</tbody>
</table>

Figure 19  Marginal Effects for Permit Hypothesized Model

Impact of Marginal Effects

<table>
<thead>
<tr>
<th>% chance of accepting a permit</th>
<th>% PERMIT</th>
<th>PLACE</th>
<th>HISTORIC</th>
<th>ENVIRON</th>
<th>SOCIAL</th>
<th>SOCIALJU</th>
<th>MTRESIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>% PERMIT</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>PLACE</td>
<td>64%</td>
<td>53%</td>
<td>45%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>HISTORIC</td>
<td>53%</td>
<td>53%</td>
<td>60%</td>
<td>59%</td>
<td>59%</td>
<td>59%</td>
<td>59%</td>
</tr>
<tr>
<td>ENVIRON</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>SOCIALJU</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
<tr>
<td>MTRESIDE</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Increase is a one unit increase.
The group type variable for permit showed a similar pattern as it did in the fee variable, but found that only the group “school and other” was significant. These visitors were 37 percentage points less likely to accept a permit than those in the base group “family and friends.”
Those with the highest levels of education also proved to be a predictor for increase support for permits, but the only significant education variable was those with “some college.” The education variables does not show a predictive consistency and only one of the five levels of “education” is significant, and it is assumed this variable in this model is not a valid predictor. The stepwise best fit model will now be examined to understand what variables this model shows are effective predictors of acceptance of a permit.

**Stepwise Permit Acceptance Model**

The stepwise model shows a slight increase in the cohesiveness of the model compared to the hypothesized model. The $R^2$ value is good with the McFadden $R^2$ of .2. Despite the improved $R^2$ of the model, the percent the model is predicting correctly and
the change from the naive model is the same as the hypothesized model. The stepwise model predicts 63% of people who refused a permit, 75% of those who accepted, and a total predictive success of 69%. The model also improves the naive model by 16%. The Hosmer and Lemeshow test shows the data fits the logistic curve indicating a good fit. The likelihood ratio test is also significant, indicating this model is also an improvement from the constant model (LR diff=50.2, $\chi^2$ crit.=19.67).

Table 13 Stepwise Permit Classification Table

<table>
<thead>
<tr>
<th></th>
<th>Predicted No Correctly</th>
<th>Predicted Yes Correctly</th>
<th>Total Responses</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>53</td>
<td>84</td>
<td>63.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>95</td>
<td>74.7</td>
<td></td>
</tr>
<tr>
<td>Overall Percent Correct</td>
<td></td>
<td></td>
<td>69.3</td>
<td></td>
</tr>
<tr>
<td>Naive Model Prediction</td>
<td></td>
<td></td>
<td>52.5</td>
<td></td>
</tr>
</tbody>
</table>

The variables between this model and the hypothesized model differ greatly. The variable, "lived," is added to the stepwise model along with the number of visits. Group type, place attachment, MT resident, and all the values factors, except environmental are removed. Since the models predict with the same success, removing these variables caused little predictive power to be lost or that predictive power was replaced by the "lived" variable.

The inclusion of the variable "lived" differed from the hypothesized model and despite those people who live on "a farm" being slightly less tolerant of a permit, each less urban area was more likely to support a permit than those from a "large city." Visitors from a "town" (1,000-5,000) were 47% more likely to support a permit than those from a "large city." There was even a sharp contrast in visitors from a "medium
city” and those from a “large city.” Visitors from a “medium city” are 36% more likely to accept a permit than those from a “large city.”

**Figure 22  Lived vs. Permit %**

![Graph showing Lived vs. Permit %](image)

**Table 14  Stepwise Logistic Regression Permit Model**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visits</td>
<td>-.211</td>
<td>.082</td>
<td>6.662</td>
<td>.010</td>
</tr>
<tr>
<td>Group Type 1</td>
<td></td>
<td></td>
<td>9.524</td>
<td>.023</td>
</tr>
<tr>
<td>Group Type 2</td>
<td>-1.054</td>
<td>.461</td>
<td>5.228</td>
<td>.022</td>
</tr>
<tr>
<td>Group Type 3</td>
<td>.079</td>
<td>.496</td>
<td>.026</td>
<td>.873</td>
</tr>
<tr>
<td>Group Type 4</td>
<td>-1.492</td>
<td>.671</td>
<td>4.944</td>
<td>.026</td>
</tr>
<tr>
<td>Lived 1</td>
<td></td>
<td></td>
<td>14.931</td>
<td>.011</td>
</tr>
<tr>
<td>Lived 2</td>
<td>-.111</td>
<td>1.011</td>
<td>.012</td>
<td>.913</td>
</tr>
<tr>
<td>Lived 3</td>
<td>1.029</td>
<td>.770</td>
<td>1.783</td>
<td>.182</td>
</tr>
<tr>
<td>Lived 4</td>
<td>2.046</td>
<td>.822</td>
<td>6.192</td>
<td>.013</td>
</tr>
<tr>
<td>Lived 5</td>
<td>.429</td>
<td>.507</td>
<td>.717</td>
<td>.397</td>
</tr>
<tr>
<td>Lived 6</td>
<td>1.632</td>
<td>.527</td>
<td>9.577</td>
<td>.002</td>
</tr>
<tr>
<td>Environment</td>
<td>.283</td>
<td>.152</td>
<td>3.438</td>
<td>.064</td>
</tr>
<tr>
<td>Permit</td>
<td>.020</td>
<td>.007</td>
<td>7.781</td>
<td>.005</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>-2.854</td>
<td>1.213</td>
<td>5.533</td>
<td>.019</td>
</tr>
</tbody>
</table>
The number of visits to the UMRBNM was also a significant predictor for those willing to accept a permit. By increasing the number of visits by five, visitors were 18% less likely to support a permit system. The ENVIRONMENTAL value that was retained in this model shows that by increasing the ENVIRONMENTAL score by one unit, visitors were seven percent points more likely to support a permit. People with strong environmental values are shown to value the environment, and therefore are more willing to accept restrictions to protect the social impacts to the area.

**Figure 23 Stepwise Permit Impact of Marginal Effect**

![Image of a bar chart showing the impact of marginal effect on the probability of accepting a permit. The chart includes bars for PERMIT, ENVIRON, and VISITS, with predicted probabilities before and after an increase.](image-url)
Figure 24  Stepwise Permit Impact of Categorical Marginal Effect

The two permit models show a similar goodness of fit. Also, the changes that are made to the model could be insignificant. The real predictors could be that the variables that cross over between the models, and the “lived” and “education” variables that are interchanged between the models, predict with equal success and, therefore, either one is appropriate.
Group Size Restriction

Hypothesized Group Size Restriction Model

The hypothesized model for “group type” is presented below. It includes the variables: group size restriction, MT resident, “group type,” place attachment, all values factors, and where visitors lived. The level of cohesion for this model will again be determined from the good McFadden $R^2$ of .2 and the good predictive success (73%). The predictive success is much higher than the success of the naïve model (.56%). The likelihood ratio test is significant and therefore shows an improvement from the constant only model ($LR\ diff=51.797, \chi^2\ crit.=25.00$). The Hosmer and Lemeshow test shows the data does not fit this a logistic curve. Because the data for the hypothesized model does not fit the logistic curve interpreting the results does not hold statistical significance.

Stepwise Group Size Restriction Model

The McFadden $R^2$ for the is .15, and the correct classification of the model is slightly higher at 71%. This percent correct is also improved by 14% over the naïve model. The Hosmer and Lemeshow test shows the data fits this logistic curve, and the likelihood ratio test shows a significant difference from the constant only model ($LR\ diff=36.394, \chi^2=7.81$). This indicates an improvement from the constant only model and a good fit.

This model shows a simpler model than previous models. The group size restriction, social value, and age are the only variables contained in this model. The group size restriction is highly significant and the marginal effects show that increasing group
size causes a dramatic increase in visitors’ willingness to accept a group size restriction. An increase in group size by four increases the chance of accepting the restriction by 16 percentage points, and an increase in group size by eight increases the chance of accepting a permit by 31 percentage points. Examining the change in the -2 log likelihood if the variable for group size restriction is removed further shows the significant of this variable. Removing this variable would lower the -2 log likelihood by 29, which is determined to be a significant difference by the likelihood ratio test.

Table 17  Classification Table

<table>
<thead>
<tr>
<th></th>
<th>Predicted No Correctly</th>
<th>Predicted Yes Correctly</th>
<th>Total Responses</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>79</td>
<td>103</td>
<td>63.3</td>
</tr>
<tr>
<td>Overall Percent Correct</td>
<td></td>
<td>79</td>
<td>103</td>
<td>76.7</td>
</tr>
</tbody>
</table>

The negative coefficient for age and visits show that as age increases, visitors are less likely to accept a group restriction. The SOCIAL value is a significant predictor of less support for management restrictions. By increasing the social value by one unit figure 25 below shows that visitors are 6 percent points less likely to accept a group size restriction. The lack of support by those with high social values is explained by the fact these people value the area for its social opportunities. Therefore they do not wish to impose any restrictions that would limit the social opportunities of the area.
Table 18  Stepwise Logistic Regression for Group Size

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.022</td>
<td>.011</td>
<td>4.514</td>
<td>.034</td>
</tr>
<tr>
<td>Social</td>
<td>-.269</td>
<td>.127</td>
<td>4.500</td>
<td>.034</td>
</tr>
<tr>
<td>Group</td>
<td>.212</td>
<td>.043</td>
<td>24.692</td>
<td>.000</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>.631</td>
<td>.903</td>
<td>488</td>
<td>.485</td>
</tr>
</tbody>
</table>

Figure 25  Marginal Effects for Group Stepwise Model

Overall 57% of the sample supported a group size restriction, but understanding how differing the level of the group size restriction is important for management considerations. Figure 26 below shows the median for a group size limit is 11, and by further increasing this level to 16 would mean 73% of visitors would support a group size restriction. There is clearly support for a group size restriction that will depend of the level of restriction. This will be further discussed in the management implications.
Figure 26  Acceptance of Group Size Restriction

![Bar chart showing the acceptance of group size restriction. The x-axis represents group size restriction (4, 8, 12, 16), and the y-axis represents the percentage chance of accepting a group size restriction. The data points are 0%, 0%, 0.64%, and 0.73% respectively.]
Launch Date Restriction

Hypothesized and Stepwise Launch Date Models

The launch question asked visitors, if in order to get their desired launch date, would they be willing to accept a certain percent chance of getting the site they chose. This question was framed opposite of how the previous questions were framed and therefore presented some confusion with respondents. There were many questions from respondents and from the models it appears there was confusion in how people answered. The variables that appear very consistent in the other models are reversed in several instances in this model. Place attachment and the SOCIAL value show a positive affect regarding visitors’ acceptance of a launch date restriction and the HISTORIC value shows a negative affect. The “lived” variable is also contradictory to the other models; it shows a consistent pattern that visitors from less urban areas are less willing to accept a launch date restriction. There are a few variables that are still consistent with the other models, such as environment, social equity, and MT resident. This information, along with the confusion visitors expressed led the researcher to believe there was indeed a confusion surrounding the question, and this skewed the results. Because the lack of confidence in the data for this model, the hypothesized and stepwise model will be presented below, but no interpretation will follow.
### Table 19  Hypothesized Launch Model

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch</td>
<td>.045</td>
<td>.007</td>
<td>38.769</td>
<td>.000</td>
</tr>
<tr>
<td>Place</td>
<td>.141</td>
<td>.141</td>
<td>.998</td>
<td>.318</td>
</tr>
<tr>
<td>Historic</td>
<td>-.309</td>
<td>.232</td>
<td>1.774</td>
<td>.183</td>
</tr>
<tr>
<td>Environment</td>
<td>.091</td>
<td>.180</td>
<td>.257</td>
<td>.612</td>
</tr>
<tr>
<td>Social</td>
<td>.028</td>
<td>.137</td>
<td>.042</td>
<td>.838</td>
</tr>
<tr>
<td>Social Equity</td>
<td>-.038</td>
<td>.179</td>
<td>.045</td>
<td>.832</td>
</tr>
<tr>
<td>Group Type (constant- Family and Friends)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Type (school and other)</td>
<td>-.375</td>
<td>.683</td>
<td>.301</td>
<td>.583</td>
</tr>
<tr>
<td>Group Type (commercial tour)</td>
<td>-.613</td>
<td>.505</td>
<td>1.473</td>
<td>.225</td>
</tr>
<tr>
<td>Group Type (organized club or group)</td>
<td>-.729</td>
<td>.475</td>
<td>2.357</td>
<td>.125</td>
</tr>
<tr>
<td>Lived (constant- large city over 1 million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lived 1 (On a farm)</td>
<td>-1.197</td>
<td>1.028</td>
<td>1.355</td>
<td>.244</td>
</tr>
<tr>
<td>Lived 2 (Rural or small town-under 1,000 population)</td>
<td>-1.064</td>
<td>.778</td>
<td>1.870</td>
<td>.172</td>
</tr>
<tr>
<td>Lived 3 (Town- 1,000-5,000 population)</td>
<td>-.771</td>
<td>.803</td>
<td>.922</td>
<td>.337</td>
</tr>
<tr>
<td>Lived 4 (Small city- 5,001-50,000 population)</td>
<td>-.804</td>
<td>.550</td>
<td>2.140</td>
<td>.143</td>
</tr>
<tr>
<td>Lived 5 (Medium city-50,000-1 million population)</td>
<td>-.585</td>
<td>.535</td>
<td>1.197</td>
<td>.274</td>
</tr>
<tr>
<td># of Visits</td>
<td>-.015</td>
<td>.015</td>
<td>.977</td>
<td>.323</td>
</tr>
<tr>
<td>MT Resident</td>
<td>-.284</td>
<td>.387</td>
<td>.539</td>
<td>.463</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>.040</td>
<td>1.813</td>
<td>.000</td>
<td>.982</td>
</tr>
</tbody>
</table>

### Table 20  Stepwise Logistic Regression Launch Model

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch</td>
<td>.043</td>
<td>.007</td>
<td>38.613</td>
<td>.000</td>
</tr>
<tr>
<td>Age</td>
<td>-.021</td>
<td>.011</td>
<td>3.635</td>
<td>.057</td>
</tr>
<tr>
<td># of Visits</td>
<td>-.016</td>
<td>.013</td>
<td>1.561</td>
<td>.212</td>
</tr>
<tr>
<td>Constant for full model</td>
<td>-.858</td>
<td>.578</td>
<td>2.204</td>
<td>.138</td>
</tr>
</tbody>
</table>

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Chapter 5 – SUMMARY and DISCUSSION

Summary

The previous chapters have laid out the problem statement and sub-questions along with the hypotheses this study sought to answer. The literature review justified the need for this research and the methods that are used. The literature review, along with the results, show the importance of the campsite social setting and visitors’ general willingness to make a tradeoff to achieve the uncrowded setting they desired. The results present this information through the use of four management restrictions with a hypothesized and stepwise model for each. The literature and theory behind the hypothesized models provided several valuable models that helped answer the problem statement: what are visitors willing to tradeoff to achieve the uncrowded social setting they desire? The problems with the data in the launch model prevented the hypothesis from being interpreted, but the other three models show a fairly consistent interaction and predictive success of the independent variables that will be discussed and summarized in the discussion section below.

This chapter will further use the information in the results chapter to answer the broader sub-questions posed in the problem statement. In answering question three, the hypotheses will also be further answered by examining which variables were significant and how they influenced the models. Next the implications for future management will be discussed, the limitations of this study, and finally the potential for future research.
Discussion

1. Will visitors accept certain tradeoffs that seek to protect their desired social setting?

Overall, visitors accepted all the management restrictions, but the case for implementing a fee is the strongest. Overall 63% of sample answered favorably to accepting a fee. The median acceptable fee was $37.70 per person, indicating that visitors are not only willing to pay a fee but possibly an even higher fee than this survey posed. This high median can be partially explained by commercial visitors’ willingness to pay. They are already paying a fee and in most cases much higher than the top fee in this survey of $40 per person. Therefore, in most cases, they are accepting of this top fee. Overall the models showed a willingness to accept any fee level that was offered. This is shown very clearly in figure 16.

The permit restriction presented a slightly less accepted model. Overall 56% of sample were willing to accept a permit, and the median percent for accepting a permit was 48%. This shows that a majority of the people will support a permit restriction even if the chance of receiving a permit is about 50%. The marginal effect of “permit” does not show that changing the percent chance of getting a permit will have a large impact on visitors’ acceptance. However, with the median being so low, there is an opportunity for a large improvement in the chance of getting a permit. Raising the chance of getting a permit to 70% would mean 61% of visitors would support this restriction. Even at the lowest level of 10%, 32% of visitors would support having a permit.
Overall 57% of the sample were willing to accept a group size restriction. This is still not an overwhelming majority of people, but when examined in terms of how raising the group size level affects acceptance, this management restriction has the potential to be implemented and accepted. The group size restriction varied from 4 to 16, and the median was 11, indicating that a majority of the visitors are willing to accept a group size restriction even at a fairly restrictive level. Raising this level to the 16 would gain the support of 73% of the visitors, but lowering this restriction to the lowest level of four would only have the support of only 18% of visitors. This gives good insight for the managers of UMRBNM who are considering a group size restriction. When support is so evenly divided for backing the management restriction, understanding how manipulating the restriction level would build support is very important. The level of the group size restriction is even more important than the fee and permit levels. Levels of acceptance vary considerable depending on the level of restriction, but by increasing the group size level there is the opportunity for a large majority of support. More specific recommendations for implementing a group size restriction are discussed the next section on management implications.

2. Will there be a threshold at which these tradeoffs will not be favored over greater user freedom?

The thresholds can be examined in terms of the median level for each management action. These thresholds are discussed above. The median for “permit” is around 50%, indicating that people are willing to risk getting a permit to protect the social resource. The group size median of 11 also indicates visitors are willing to accept a
fairly restrictive group size limit to protect the social setting. For fee, the high median of ($37.70) indicates visitors are willing to pay a large amount to achieve the social setting they desire. This fee was for each individual person, which make the cost even greater depending on the size of the group. This further indicates a strong willingness to pay. Based on the marginal effects for each management action, it can be assumed that all of these management actions would be favored if the desired level of restriction was reached. There is a direct relationship between the level of the restriction and the willingness to accept the restriction. The marginal effects help understand how an adjustment in the restriction level manipulates support. By examining this change in support, a threshold that is favored by a large majority can be established. Although fee is clearly the most supported management restriction visitors are willing to tradeoff for their desired social setting, all of the interpreted management restrictions were supported by over half of the visitors. By changing the restrictions on these actions they all would be accepted by a large majority of visitors. There is a threshold for each variable that is represented by the median. These thresholds can be interpreted as the upper limit that these management actions would be supported, because if they were to be raised any higher, less than half the visitors would support them.

3. Will values, place attachment, and demographic data such as “education,” “group type,” and where visitors “lived,” act as good predictors for visitors’ tradeoff preferences, and in what way will these variables influence the models?

Values were not significant in almost all the models that were tested and therefore these are not thought to be as good of a predictor for management support as the literature
suggested. The only models that showed any values as significant was the stepwise permit model and the stepwise group model. The stepwise permit model showed the ENVIRONMENTAL value as significant, and that those with strong ENVIRONMENTAL values were more likely to accept a permit. It was hypothesized based on the variables that were contained in the ENVIRONMENTAL value that there would be a clear concern for protecting the social impacts of the area. This concern was evident in this model as visitors with these values were accepting of the management restrictions in order to preserve the social setting of the area. The stepwise group model shows the SOCIAL value as significant, and represents an opposite pattern as the ENVIRONMENTAL value. Those with strong SOCIAL values are less likely to support a group size restriction. Again, people with the SOCIAL value were most concerned with the UMRBNM as a social area that would provide ready access. These two outcomes support the hypotheses that about how these values would influence the models. People with SOCIAL value were clearly most concerned with the having the area represent a social area available to all people. This runs counter to the management restrictions that sought to regulate use. For this reason, these people were against support for these management restrictions. Overall values were not significant and are therefore not thought of as good predictors for management support.

The hypothesis concerning the effect of place attachment was not supported. Place attachment was only significant in the hypothesized permit model and this variable showed visitors with high place attachment were less willing to accept the management restrictions in all models. People with high place attachment represented a certain segment of the sample that was unwilling to support management restrictions. Overall,
these people are rural people from MT who frequently visit the area. Fifty-three percent of MT residents responded high on the place attachment questions, whereas only 29% of nonresidents responded the same way. The use of a bivariate correlation test showed visitors who were place attached also correlated significantly with the “lived” variable, “on a farm.” The permit stepwise model found all “lived” variables different from those in a “large city” were more likely to accept a permit, except those from “a farm.” In general, the models show that MT resident and people with a higher number of visits, were less in favor of the management restrictions. This combination of characteristics is a strong indication of visitors who are unwilling to accept a tradeoff.

It was hypothesized that the lived variable would be significant and those from less urban areas were thought to be more willing to accept group size and launch date restriction. It was thought these visitors would be more likely to accept a restriction to protect the uncrowded social setting to which they are accustomed. This was true in the stepwise permit model.

Montana residents were hypothesized to have a varying impact depending on the model. For the fee, group, and permit models it was thought MT residents would be significant and less willing to accept restrictions, and for launch more willing. Montana residents in all instances were less willing to accept the restriction, but was only significant in the fee models. It was thought that those from MT would be less likely to accept a fee because of the lower national average wage that MT workers receive. This proved to be true However, it appears there is more than proximity and income that is influencing these decisions. Montana residents are part of a group of people that have historically not favored regulations. This segment of people appears in this study and is
unwilling to accept any of the restrictions perhaps due to increased regulation. This group consists of the same people as the place attachment group. They are MT residents, rural, place attached, and have frequently visited the area. Being associated with this group trumps other factors that are thought to support management restrictions.

“Education” was hypothesized to be a significant predictor in the models fee and permit. The hypothesis behind education’s influence on permit had more to do with a vague connection that the researcher assumed existed between reasoning power and accepting the restriction. It was reasoned the more educated visitors were, the better they were able to connect a permit with protecting the social setting they desired. This connection did not materialize in the permit model or in any of the stepwise models. In the hypothesized permit model only the group “some college” was significant and two groups with more education were less willing to accept the restriction than the base group of “high school graduates.” This variable did not show up in the permit best fit model which further questions how potent of a predictor it was. The “education” variable was more effective in the fee model. Most education categories were significant. The theory behind why this variable was included in this model was more straight forward, based on the correlation between higher education and higher income. It has been previously shown that visitors to the URBNM have high income levels (Missouri River Visitor Survey, 2001, 2002, 2004) and therefore “education” was only asked as a form of proxy variable for income. In both the hypothesized and stepwise models “education” was significant, with 5 of the 10 categories being significant. It also showed a fairly consistent predictive pattern, because those with higher education were more willing to accept a fee. With this in mind and the fact that “education” was not included in any of the stepwise
models, besides fee, it is determined that “education” was not a very potent predictor of the management actions, other than fee.

The “group type” variable predicted visitors’ willingness to accept a tradeoff with general consistency and significance. In every model, at least one of the “group type” variables was a significant predictor and also predicted as they were hypothesized. The fee and permit stepwise models both included “group type.” In the fee stepwise model, visitors in the “organized group” and “school and other” were significant and less likely to support paying a fee. The hypothesized fee model showed those from the “school or other” group were significant and were less likely to accept a fee. This supports the direction these variables were predicted to influence willingness to make a tradeoff. Groups different from “family and friends” are generally larger groups and would therefore suffer the most by paying a fee. There was no question that specifically asked group size, but from observation it is known these groups were generally much larger than groups composed of “family and friends.” It is safe to assume a fee charged individually would be widely opposed by larger groups, and the data from the hypothesized fee and the stepwise fee model back up this hypothesis.

“Group type” in the hypothesized permit model showed the group “school and others” was significant and less likely to accept a permit. The stepwise permit model showed all “group type” variables were significant, except commercial visitors, and they were less willing to accept a permit than the base group “family and friends.” This follows the previous reasoning that because of the size of their groups these groups would be hit hardest by a permit. Obtaining a permit for a small group of “family and friends” is a much smaller burden than obtaining a permit for a large organized group of boy scouts.
Group types different from “family and friends” were also less likely to support a group size restriction. This restriction would again affect these groups the most, because most of these groups were larger than the sized used in the survey. Despite the fact that these people chose and uncrowded social setting most of these groups enjoy their time on the river with their large groups and therefore see no problem with the larger groups they are traveling with. There is therefore no need to limit group size.

The gender and age variables were not hypothesized to be significant in predicting support for tradeoffs, but when analyzed with the fee stepwise model, the gender variable was significant and showed men being less likely to accept a fee than women. This relationship will need further study to understand the reason behind genders influence. This is the only model where this variable showed up, but in this circumstance this variable is significant and seems to work as a good predictor for willingness to pay a fee. In the group stepwise model, age also appears significant. As age increases visitors were less willing to accept the restrictions. The explanation behind the influence of age is also an area that could benefit from further research.

Overall, the demographic data appears to provide meaningful insight into visitors’ tradeoff preferences. Place attachment was only significant in one model but it appears to be part of a larger context of information that is influencing visitors. The “education” variable was not a very successful predictor beyond the fee models. “Lived” showed predictive power in the stepwise permit model. This variable is again tied to a certain group of people who are unwilling to accept any restrictions. These people are very rural, MT residents, high place attachment, and have visited the area frequently. This subset of
people seems to be highly opposed to accepting restrictions. Although not hypothesized to impact acceptability, age and gender showed influence in a couple of models.

**Management Implications**

The information previously presented will now be discussed in terms of implications to managers. This sample of people was highly educated and were largely from out of state. While over half of the respondents supported each restriction they preferred a fee above all other forms of management restrictions that would ensure a desired social setting. The one hesitation the researcher has in fully suggesting a fee is that the study was not designed to be interpreted across all areas of the UMRBNM. There was a certain subset of people that the study captured who were unwilling to accept any restrictions. Whether these people are a small minority, as they were presented in this study or they represent a group of people that were not captured by surveying only at Eagle Creek, needs to be the subject of future research. Understanding how much the local people use the resource and what impact a fee would have on this population would be an important concern before implementing a fee. Since this area is generally busy with out of state visitors it is possible that local people do not often camp in this section of the river and therefore could be underrepresented. Another option is to only charge a fee for accessing the Coal Banks Landing to Judith Landing section of the river. This section is the most frequently visited and having a fee here would spread out use to other areas of the river and provide the means to protect the social setting on this section of river. The other areas of the river receive much less use than this section where the sample was taken and by spreading users to these areas, it could balance the use throughout all
sections of the river. There is the possibility that these sections could lose some of the appeal that is associated with the opportunity for solitude. Careful monitoring would be needed to ensure that use levels do not increase to a point where the opportunity for solitude is lost, on all sections of the river. These fee options could cause a large increase in revenue and give the resources necessary to protect the social setting through education, campsite design, and possible further developed campsite options. There are some negative impacts associated with user fees including double tax for public lands, exclusion of lower incomes, using user fees as a justification for under funding public lands, and managing public lands for profit instead of previous agency mandates.

Martin’s (1999) list of concerns about user fees is a more complete list that contains other viable issues associated with user fees. User fees have been shown to be a very controversial management strategy and should be considered with great caution before implementation (Bengston, 2002; Martin, 1999). Also the use of user fees would not directly address the social impacts of the area. They could be successful at indirectly addressing the social impacts, but other management options should first be considered because of these concerns.

A group size restriction also possesses the potential to be accepted as a way to protect the social conditions of the area. This option could have a more direct affect on reducing crowding and therefore should be considered as a better option than a fee to preserve the social setting. There is still some concern that the same number of visitors would access the river, but break into smaller groups. The implementation of this option would have to be done very effectively to ensure this did not happen.
Although over only 57% of the sample responded favorably to a group size restriction, manipulating the size of the group caused a fairly large impact in visitors’ chance of accepting the restriction. The majority of the dissent for this restriction lies in the size of the group. Therefore, the protest against this restriction could be largely silenced by slightly raising the group level. The median group size of 11 when raised to 16 would have the support of close to ¾ of the visitors in this survey. The consideration for limiting the size of groups should start at 14, because this level would have a large backing from over 60% of the visitors. Limiting groups to no more than 14 could have a substantial impact on commercial and organized groups, because these groups are generally larger groups. A combined management strategy, such as the one that the BLM is currently considering, to limit larger groups to certain less busy days of the week, has the potential to be highly successful. Also another option would be to force visitors, over a certain size, to launch on one of the other sections of river. This could provide for an improved social setting. Smaller groups would have more potential to avoid these larger groups on the other two sections of river, because the number of visitors overall is less. Because this management option possesses some of the same potential for problems as implementing a fee on the middle section of the river, use should be monitored to ensure visitation does not increase on other parts of the river to the point where these sections lose the chance for solitude.

The permit restriction is also a restriction that could be implemented with success, and has the ability to ensure a certain social setting. Raising the chance of receiving a permit did not cause a very significant change, but visitors were willing to accept less than a 50% chance of receiving a permit. This indicates the social setting is important
enough that they are willing to forgo access to the river. Since visitors are willing to accept such a low chance of getting a permit (48%), raising this chance to 70% percent would increase acceptance to over 60%, making this a management action that has the potential to be implemented successfully. Whether it is possible to give applicants a 70% chance of receiving a permit would depend on the amount of visitors that apply, but if it was possible this is a level of restriction that visitors would support. Another option is to apply a permit to the middle section of the river. This could have the same impacts as implementing a fee or group size limit on this section, and should monitored in the same way.

The fee and group size restrictions possess the greatest potential for support from the public and by implementing one or both they could potentially greatly increase the chance of protecting the social setting of the UMRBNM. The permit restriction is also supported and is another way to protect the social setting. A permit would provide the most direct influence towards protecting the social impacts of the area. The support of these restrictions and the level at which visitors support these restriction again makes a strong case for the protection of the social setting, but other concerns such as fairness, equity, and efficiency should be considered. The fee restriction has the most support, but the other concerns associated with a user fee and the direct impact to the protection of the social setting make this strategy less appealing than a group size restriction or a permit system. A group size of 14 or greater is highly supported by visitors and also possesses a great potential to directly address the protection of the social setting. Allowing larger groups, such as commercial and organized groups, access the river, but on less busy days of the week, would limit the disproportionate impact this restriction would have on these
groups. A permit system would also directly address the concerns of protecting the social setting by limiting use on the river to a certain number, but a permit system is probably not the most effective means to limit use. This is because it affects all the users of the river. It would ensure a certain social setting, but would cause a much greater impact than group size limit. A group size restriction would have no impact on a majority of the visitors that travel in groups smaller than 14, and if implemented correctly would still provide for protection of the social setting of area.

**Limitations**

One limitation of this study arises from not being able to analyze the management actions in combination with each other. In logistic regression, the dependent variable is the visitors’ response to accept or reject the management tradeoff. For this reason, the different models (fee, permit, etc) cannot be combined to understand how they interact together. This method will only allow for indirect comparisons between each management action. This is a drawback to this analysis technique, but logistic regression is a proven analysis technique that allows for deep understanding of each model. If a strategy of comparing the management restrictions were implemented the wording of the current questionnaire would also need to be altered. The current questionnaire only asks visitors to consider their willingness to accept one tradeoff at a time to achieve their desired social setting. A future study would need to assess these management actions in combination with each other.

Also, this study only sought to measure visitors preferences for crowding and what they would tradeoff to achieve those preferences. The dimensions listed below are
alternative measures of crowding that could have yielded different crowding results: "Acceptability" (the maximum level of impact respondents judged acceptable), "management action" (the maximum level of impact respondents felt the managers should allow before limiting visitor use), and "displacement" (the level of impact that would keep respondents from visiting the park again) (Manning et al., 1999). Preferences have proven to be an accurate predictor in determining a high quality recreation experience, but it is important to understand the differences and what preferences actually measure.

This study was not designed to be generalized to all visitors of the UMRBNM. It was designed to understand what visitors at Eagle Creek campsite were willing to tradeoff to achieve their desired social setting. Applying this data to a broader population should be done with caution. Because most visitors that travel this section of river stop at Eagle Creek these results are a good representative sample of visitors that travel the river from Coal Banks to Judith Landing.

Management decisions on public land is an area that requires a great amount of input. The input from visitor surveys is a very valuable addition in the equation that is required to determine future management direction. However, this only one of a variety of issues that agencies must focus on when deciding upon management actions. Managers must consider “legal mandates, agency policy, stakeholder dialogue processes, and analyses of regional supply and demand” (Stewart and Cole, 2003).
Need for Future Research

The need for future research includes expanding the reach of this current study. This study is limited to only a small sample of people that visited the area. Before there is a widespread implementation of the suggested management restrictions, more research on a broader sample of visitors should be considered. Because of the wide ranging impact implementing these restrictions could cause a larger population of river users should be sought. For example, a fee restriction on the section of the river that was sampled would disperse use to all areas of the monument. This would affect people in the entire monument and this sample of visitors only included Eagle Creek campers.

The next logical step in this line of research is to include more and different management restrictions and also expand the use of explanatory independent variables. The management actions that were chosen for this survey were specific to the area of study, but many of these actions are being considered in other natural resource areas. The use of fees and permits are widely used by recreation managers, and therefore including these in further research could yield a greater understanding about tradeoffs in relation to these variables. Although fees were supported in this study, there is again a lot of controversy that surrounds the use of fees, which would lend more credence to future study that concentrates on tradeoffs with a greater potential to be implemented successfully. The inclusion of values as an explanatory variable in future research is also recommended. Understanding what competing values exist in visitors is a valuable tool to managers. Managers of UMRBNM can now further explore the interaction of the
preservation versus the anthropocentric values that this study showed existed on the river. Another line of explanatory variables that would help further define and examine visitors that are against all management restrictions is also recommended. Understanding this population and what drives their anti-restriction preferences could help managers when trying to implement access restrictions. Being able to better identify this population and what types of people make up this group would also be a very beneficial when trying to implement management restrictions. This would allow managers to try to better work with these people when trying to implement restrictions. Understanding how other management actions are accepted along with understanding what are other good predictors will allow further insight into the idea of visitor tradeoffs. The tradeoff research to this point has generally focused on national park settings, but broadening the research to other areas (such as national monuments, recreation areas, national forests, etc.) would give a greater understanding of the theory of visitor tradeoffs in relation to a social setting. The literature on national park values explains that national parks may have defining sets of values (Borrie et al. 2002). This study made the case that the UMRBNM possessed many of these similar qualities, and the results of values analysis showed this as an accurate assessment. But understanding if visitors in other type areas that are assigned different value sets would be willing to make the same tradeoffs is a valuable next step to this research. This would help managers what type of cross over values possess between different public lands.

The use of logistic regression is a very effective analysis tool, but using another method that would allow the researcher to analyze multiple dependent variables in order to understand their interaction with each other, and would provide very meaningful
information. This would allow the researcher to understand not only how willing visitors are to accept a fee, but to understand how a fee and group size restriction would be accepted together. The combination of management strategies is what the BLM for the UMRBNM is currently considering, and is how most agencies seek to manage for increased use. Therefore, this type of research could be implemented to directly study visitors’ preferences for a set of management strategies.

Future research could also refocus on the issue of a launch date restriction. Rewording this question and further looking at this analysis could clear up whether the confusion with this question was from the wording or some other unforeseen issue associated with restricting visitors launch date. Another potential for future research, is to reproduce this study and examine one of the other measures of crowding listed above. These results would help further understand tradeoffs and if they should be measured at their visitors’ preferences, acceptability or measure of crowding.
Works Cited


*Missouri River Visitor Survey, 2002* College of Forestry and Conservation. University of Montana


Appendix A

1. This set of questions seeks to evaluate your willingness to accept management restrictions in order to achieve a desired social setting in your campsite.
   * All management actions are independent of one another. For example group size has no relation to trip fee.

2. Please indicate which of the two pictures you prefer. (check one)
   
   Picture A _________  Picture B _______

3. If you were ensured of obtaining a site such as the one you choose above would you be willing to accept a mandatory regulation prohibiting groups larger than 4? □ Yes □ No

4. If you were ensured of obtaining a site such as the one you choose above, and considering your previous expenses for your river trip, would you be willing to accept a trip fee, charged per person, of $30? □ Yes □ No

5. To get your desired launch date would you be willing to accept a 65% of you and your group getting site you chose above. □ Yes □ No

6. If you were ensured of obtaining a site such as the one you choose above would you be willing to accept 15% chance of getting a permit for you and your group to access the river? (If no permit is obtained then you can reapply at a later date). □ Yes □ No

7. Next we would like to understand how you feel about your place attachment to the Upper Missouri River Breaks National Monument.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8</td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
</tbody>
</table>

   I feel this place is a part of me.
   I get more satisfaction out of visiting this place than any other.
   This place means a lot to me.
   Doing what I do here is more important to me than doing it in any other place.
   This place is very special to me.
   This place is the best place for what I like to do.
   I identify strongly with this place.
   No other place can compare to this place.
   I am very attached to this place.
   I wouldn't substitute any other area for doing the types of things I do at this place.
   Visiting this place says a lot about who I am.
   The things I do at this place, I would enjoy just as much at a similar spot.

8. How many times have you visited the Upper Missouri River Breaks National Monument? ________ Visits or □ This is my first time

9. What is your zip code? ____________

10. What is your age? ____________

11. What is your gender? □ Male □ Female

12. Which of the following best describes you and your group?
   A. Family
   B. Friends
   C. Family and Friends
   D. Organized club or group
   E. Commercial tour group
   F. School group
   G. Other (specify) ________
13. What is the highest level of education you have obtained?
   A. Less than high school
   B. High school graduate or GED
   C. Some college
   D. Four year college degree
   E. Some graduate school
   F. Graduate degree- M.S., Ph. D., etc (specify) ________________

14. Where have you lived most of your life? Specify one.
   A. On a farm
   B. Rural or small town (under 1,000 population)
   C. Town (1,000-5,000 population)
   D. Small city (5,001-50,000 population)
   E. Medium city (50,000-1 million population)
   F. Large city (over 1 million population)

15. Finally we are interested in understanding your opinions about the values of the Upper Missouri River Breaks National Monument. Please indicate each of the following to the overall value of the Upper Missouri River Breaks National Monument (1 being very unimportant and 8 being very important).

I believe the Wild and Scenic Missouri River is particularly important as:

<table>
<thead>
<tr>
<th>Value</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A wildlife sanctuary</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place for education about nature</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place to develop my skills and abilities</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A protector of threatened and endangered species</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A sacred place</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>An economic resource</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A family or individual tradition</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place everyone should see at least once in their lives</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place without most types of commercial development</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A display of natural curiosities</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A historic resource</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A symbol of America’s identity</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place for the use and enjoyment of the people</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A social place</td>
<td>1 2 3 4 5 6 7 8</td>
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</tr>
<tr>
<td>A site to renew your sense of person well being</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place of scenic beauty</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
<tr>
<td>A place to be free from society and its regulations</td>
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<td></td>
</tr>
<tr>
<td>A reserve of natural resources for future use</td>
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</tr>
<tr>
<td>A tourist destination</td>
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</tr>
<tr>
<td>A place for scientific research and monitoring</td>
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</tr>
<tr>
<td>A place for recreational activities</td>
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</tr>
<tr>
<td>A place for wilderness</td>
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<td></td>
</tr>
<tr>
<td>A place for all living things to exist</td>
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<td></td>
</tr>
<tr>
<td>Protection for fish and wildlife habitat</td>
<td>1 2 3 4 5 6 7 8</td>
<td></td>
</tr>
</tbody>
</table>