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Articles

Enhancing the Interpretation of Stated Choice Analysis Through the Application of a Verbal Protocol Assessment

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A stated choice survey was employed to evaluate the relative importance of resource, social, and management attributes by asking visitors to select preferred configurations of these attributes. A verbal protocol assessment was added to consider how respondents interpret and respond to stated choice questions applied to hikers of a popular trail at Acadia National Park. Results suggest that visitors are sensitive to changes in public access to the trail and its ecological conditions, with level of encounters least important. Verbal protocol results identified considerations made by respondents that provide insight to their evaluations of alternative recreation setting configurations. These insights help clarify issues important to visitors that stated choice results on their own do not provide.

KEYWORDS: *Recreation impact management, trade-off analysis, verbal protocol, stated choice, Acadia National Park.*

Introduction

The focus on understanding and defining appropriate management for recreation settings revolves around a three-element concept that includes social conditions (e.g., visitor encounters), resource conditions (e.g., trail erosion), and management conditions (e.g., type and extent of site management) (Manning, 1999b). These conditions are interrelated—an alteration in one variable can influence the others, resulting in the need to make trade-offs (Lawson & Manning, 2001). For example, biophysical impacts from rec-

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reational activities can be minimized through site management techniques such as artificial surfacing, channeling use and facility development. However, the visual obtrusiveness of such site management techniques can reduce the perceived naturalness of an area. Use limitation is an alternative strategy for minimizing recreational impacts that avoids the visual intrusion of "hardened" sites and developed facilities. However, reduction of use levels will result in fewer people being able to enjoy the resource.

Recreation research has relied on various types of visitor attitudes surveys and methods as one way to help understand the public's perceptions of what constitutes appropriate management. Often, studies of visitors' attitudes have asked respondents to rate a series of setting attributes that were considered to be important to the recreation experience (Roggenbuck, Williams, & Watson, 1993), or focused on evaluating the appropriate condition of a single attribute (Manning, 1999a). Within these studies, respondents are not typically asked to explicitly and simultaneously consider preferences among related and competing conditions that affect management decisions. Consequently, results of these studies provide measures of the *absolute* rather than *relative* importance to study participants of the setting attributes being evaluated. Since researchers tend to select attributes that are commonly considered important (e.g., amount of use, public access, environmental impacts), measures of absolute importance may be subject to a ceiling effect, in which all attributes are found to be important to respondents (Oh, 2001). As a result, measures of absolute importance may provide managers with limited insight into how respondents would prefer them to prioritize attributes when preferred conditions cannot be provided for all attributes simultaneously. For example, absolute importance measures tend to suggest that visitors prefer fewer encounters with other groups and unlimited public access (Manning, 1999a), yet these findings are limited in their ability to help managers judge which of these preferred conditions respondents would rather "protect" when it is not possible to have both simultaneously.

More recently, there have been several types of research methods that attempt to examine relative importance measures for various recreation setting attributes, including the importance/performance approach and stated choice methods. This paper focuses on the stated choice method, which has been used to take a more integrative approach to recreation research by examining visitor preferences concerning alternative combinations of social, resource and related management conditions of the recreation setting (Lawson & Manning, 2001, 2002, 2003). Stated choice study results provide quantitative estimates of the relative importance visitors place on various attributes of the recreation setting and the extent to which they support alternative management practices designed to optimize tradeoffs related to recreation management. While stated preference studies produce findings that help assist recreation management decision-making, the quantitative results provide limited insight into the considerations underlying respondents' preferences for the setting combinations evaluated. For example, what are the various value-oriented interpretations and considerations being made by re-

spondents in their evaluation of the study attributes? Are respondents conscious of and thoughtful about the tradeoffs associated with balancing recreation provision and resource protection mandates common to many parks, forests and wilderness areas?

This study builds on existing research by using a qualitative research method, verbal protocol analysis, in conjunction with a stated choice survey in the Jordan Pond area at Acadia National Park to examine how respondents interpret stated choice questions and on what basis they make their choices. Study participants were asked to evaluate pairs of hypothetical recreation settings by indicating which set of social, resource, and management conditions they would prefer in the area they had just visited. A verbal protocol assessment was applied to a sample of the stated choice survey respondents from Jordan Pond, located on Mount Desert Island. Verbal protocol respondents were asked to verbalize everything they were thinking as they considered the stated choice questions and formulated answers. The verbalizations were recorded and reviewed for emerging themes regarding the various considerations made by respondents while formulating their responses to the stated choice questions.

The objective of this study was to explore the value-oriented interpretations and considerations related to respondents' preferences for social, resource and management conditions presented in the stated choice survey. Through a better understanding of how individuals interpreted and responded to stated choice questions, there is some context within which to analyze and present the quantitative data resulting from stated choice research.

Research on Tradeoffs among Recreation Setting Conditions

Many studies that examine social, resource and management conditions independently conclude that future management decisions should examine the relationship of these components of recreation settings. For example, the obtrusiveness of site manipulation must be carefully weighed against the obtrusiveness of site impacts and other means of solving problems (Hammitt & Cole, 1998). Identifying and understanding current user groups' preferences for resource, social and management conditions is improved by an understanding of the tradeoffs required to achieve these conditions. For example, visitors might prefer unimpeded access, but want to avoid high levels of crowding and conflict while recreating in natural settings that lack unnecessary developments. Such optimum levels for each of these conditions are not generally achievable, making tradeoffs necessary. It is useful to place the evaluation of visitor preferences for different desired conditions and related management strategies in the context of these tradeoffs.

The stated choice method is one approach for integrating the evaluation of social, resource and management conditions by examining the relative importance of these factors from the visitor's perspective (Green, Tull, & Albaum, 1988). Stated choice analysis provides a means to collect visitor

attitude information to assist the selection of management actions, and to inform efforts of defining desired conditions during management planning. By presenting for evaluation the social, resource and management conditions of recreation settings simultaneously, the stated choice method is holistic and contextual (Lawson & Manning, 2002).

Recent applications of stated choice analysis to outdoor recreation include a study of visitors' preferences concerning resource, social and management conditions of the wilderness setting in Denali National Park (Lawson and Manning, 2002). Of the attributes presented to respondents, the study found that resource conditions, specifically, signs of human use at campsites, was the most significant setting attribute related to overnight wilderness visitors' preferences for recreation settings. The study also found that wilderness visitors support some level of management over where visitors may camp and a certain degree of use limitation. The authors suggest, "Visitors may realize that without certain management restrictions, the resource and social setting attributes of the Denali wilderness are likely to deteriorate beyond acceptable conditions" (p. 305). Another stated choice study examined the effects of changes in mountain bike trail characteristics and introduction of access fees to biker preference on trail selection (Morey, Buchanan, & Waldman, 2002). Results indicated that the presence of single-track trails is a highly influential consideration for trail site selection. Results also indicated "significant numbers of bikers would be willing to pay an access fee for improved conditions, but the amount would depend on the number of substitute sites and the trail characteristics and fees at those sites" (Morey et al., 2002, p. 420). Two other studies used stated choice modeling to examine the impact of user fees at public recreation sites (Anderson & Louviere, 1993; Louviere, Louviere, Anderson, & Woodworth, 1986). Both studies demonstrated that the negative impacts of fees on people's preferences for a recreation site might, in some cases, be offset by changes in other attributes of the recreation site.

This study uses stated choice to assess public preferences for alternative trail management prescriptions at Jordan Pond in Acadia National Park. This information could be helpful to planners and managers when considering management strategies for the Jordan Pond trail system to achieve desired resource conditions and visitor experiences.

The Verbal Protocol Method

The verbal protocol method asks respondents to verbalize any and all thoughts on their mind as they answer questions or undertake some other requested task. In this study, respondents were asked to say out loud everything they were thinking as they considered each stated choice question and formulated an answer. The verbal protocol method emphasizes collection of information that is found in respondents' short-term memory, during the actual decision-making, also referred to as concurrent protocols. It has been suggested that when a respondent is asked about how a decision was made

after the fact, as done with retrospective protocols, there is much less information in the short-term or working memory (Ericsson & Simon, 1993). The verbal protocol method is best applied to evaluating the thought process during unfamiliar and complex tasks than more familiar and simplistic tasks because the response pattern is not already learned (Svenson, 1989). This description would generally fit most stated choice survey procedures.

Verbal protocol assessments have been used in multiple ways to study thought processes related to decision making. Further, these studies have been applied to environmental policy issues such as the study of responses to contingent valuation questions (McClelland, Schulze, Lazo, Waldman, Doyle, Elliot, et al., 1992; Schkade & Payne, 1994). Verbal protocol analysis has also been used to evaluate recreation management issues, such as recreation site preferences (Manning, Morrissey, & Lawson, 2005; Vining & Fishwick, 1991). There has, however, been limited application of verbal protocol in conjunction with stated choice experiments (Schlapfer, Schmitt, & Roschewitz, 2004).

The purpose for including the verbal protocol assessment in this study is to examine the *basis* for the relative importance of the stated choice attributes, particularly what respondents considered in determining their responses to the choice questions. Are participants responding to the specific attributes of the public good being tested or are other considerations taking part in the final choice (Schkade & Payne, 1994)? For example, in the stated choice questions in this study, respondents were asked to evaluate recreation setting profiles that included varying levels of development on the trail (e.g., stepping stones, bog bridging, gravel). When considering the proposals for level of development on the trail, are respondents considering the management implications of development treatments in terms of maintenance costs for the park, or are the aesthetics of the various development treatments the main considerations, or is it something else that is influencing their preferences for the proposals? Information on respondents' value-oriented interpretations and considerations made in response to the stated choice study may provide managers with more insight into what issues are important to verbal protocol participants than the stated choice results provide on their own. Furthermore, the qualitative insights gained through the verbal protocols provide context within which to analyze and present the quantitative data resulting from stated choice research.

Study Area and Methods

Acadia National Park

Established as Lafayette National Park in 1919 and renamed Acadia National Park in 1929, this National Park Service (NPS) unit was the first national park east of the Mississippi River. Today, the National Park Service manages approximately 36,000 acres of Atlantic Coast shoreline, mountains, mixed hardwood and spruce/fir forest, lakes, and offshore islands. Acadia hosts over three million visitors a year, and primary recreation activities in-

clude hiking, bicycling, camping, touring, picnicking, photography and nature observation.

Jordan Pond (JP) is a popular highly-accessible scenic feature located on Mount Desert Island. This site was selected as representative of popular frontcountry settings in the park (i.e., high use and high levels of development). The trails around JP are highly developed, including the use of gravel, culverts and bridging. Adjacent to the trails around JP is the Jordan Pond House, a full-service dining establishment.

Selection of Stated Choice Attributes and Levels

An initial step in the process of developing the stated choice questionnaire was identifying a set of social, resource and management setting attributes and corresponding levels for each attribute. As summarized by Manning (1999b), research has already been conducted to identify ecological, social and management attributes that contribute to or detract from the nature of recreation experiences. Based on a review of scientific literature, park documents, and recent park visitor surveys, numerous attributes were considered in defining the social, resource and management conditions of the JP setting profiles. Four attributes were selected that were considered to be managerially relevant and likely to be important to visitors. The social setting is represented by encounters with other visitors; the resource setting is represented by the condition of designated trails in terms of widening as a result of muddiness; and the management setting is represented by levels of public access and levels of trail development. Four levels were provided for each attribute, representing the range of conditions likely to be encountered in the study area. These levels were based on discussions with other researchers and park staff (see Table 1).

Stated Choice Experimental Design

Since each attribute was assigned four levels, a full factorial design would have produced a total of 4^4 (256) hypothetical recreation settings for respondents to evaluate. This large number of settings was too many choice sets for a survey participant to consider, therefore, a fractional factorial design was used to produce an orthogonal subset of site descriptions. The experimental design combined the four recreation setting attributes at varying levels to result in 32 paired comparisons blocked into four questionnaire versions. Each questionnaire version included eight pairwise comparisons. An example of a typical Acadia recreation setting comparison is presented in Figure 1. In each paired comparison question, respondents were asked to indicate whether they preferred Recreation Setting A or Recreation Setting B.

It should be noted that the experimental design used in this study allows for estimation of a main effects-only model, which requires the assumption that all interaction effects among the attributes are not significantly different than zero. While this is a limitation of the study, it is common practice to

TABLE 1
Acadia Recreation Setting Attributes and Levels used in the Stated Choice Survey

Social Conditions
Level of Encounters
1 Visitors encounter no other groups during a hike.
2 Visitors encounter up to 5 other groups during a hike.
3 Visitors encounter up to 10 other groups during a hike.
4 Visitors encounter up to 20 other groups during a hike.

Resource Conditions
*Ecological Condition of Official Trail**
1 Trails show no signs of widening or secondary trails.
2 Visitor use on trails with wet soils has caused a slight amount of trail widening.
3 Visitor use on trails with wet soils has caused a moderate amount of trail widening.
4 Visitor use on trails with wet soils has caused extensive trail widening and formation of secondary trails around wet areas.

Management Conditions
Public Access
1 The number of people allowed to hike in this area is not limited.
2 The number of people allowed to hike in this area is limited—around 75-80% of interested visitors are able to gain access.
3 The number of people allowed to hike in this area is limited—about half of interested visitors are able to gain access.
4 The number of people allowed to hike in this area is limited—around 25-30% of interested visitors are able to gain access.

*Trail Management**
1 There are no management-constructed features along trails (e.g., stepping stones, wood planking, gravel).
2 Stepping stones are placed along sections of trails.
3 Wood planking is placed on sections of trails.
4 Gravel is placed on sections of trails.

*Portrayed in the survey with these narrative statements, as well as photos.

estimate main effects-only stated preference models, in part to avoid the respondent burden associated with designs that allow for estimation of interaction effects. Another explanation for the common use of main effects-only models is that even in cases where interaction effects are estimated in linear models and found to be statistically significant, they typically account for relatively little of the explained variance (Louviere, Hensher, & Swait, 2000). Thus, while the main effects only stated choice model estimated in this study is subject to omitted variable bias, it is expected that this bias is minimal and that little variance would be explained by the omitted interaction effects.

Survey Administration

Questionnaires were administered to randomly selected JP visitors on eight randomly selected days from July 1 through August 15, 2002, generally

Recreation Setting A	Recreation Setting B
The number of people allowed to hike in this area is not limited.	The number of people allowed to hike in this area is limited - around 25-30% of interested visitors are able to gain access.
Visitors encounter up to 5 other groups during a hike.	Visitors encounter up to 5 other groups during a hike.
Visitor use on trails with wet soils has caused extensive trail widening and formation of secondary trails around wet areas. (See photo below)	Trails show no signs of widening or secondary trails. (See photo below)
There are no management-constructed features along trails (e.g., stepping stones, wood planking, gravel). (See photo below)	Wood planking is placed on sections of trails. (See photo below)

Figure 1. Example recreation setting comparison used in the stated choice survey.

between 10 am to 6 pm on weekends and weekdays. Potential respondents were randomly selected individuals from randomly selected groups of visitors that were hiking the trail around Jordan Pond. The stated choice survey was conducted using self-administered questionnaires, with a trained survey administrator onsite to answer questions. Within the stated choice questionnaire, respondents were presented with a series of eight pairs of alternative settings defined by four attributes. For each pair, respondents were asked to choose the setting alternative they preferred. A small number of questions were included at the end of the questionnaire to gather information about visitor characteristics, visitors' trip experiences, and visitors' assessments of the stated choice questions.

A randomly selected subset of study participants was asked to participate in the verbal protocol assessment while completing the stated choice survey. The verbal protocol was administered to selected study participants by reading a brief instructional statement explaining the think aloud procedure. The instructions were as follows:

> In this section we would like to tape record your responses to a series of questions concerning your visit to this section of Acadia today. All of your answers are strictly confidential and the tape recording of your responses will be destroyed at the end of the study. **Please tell the survey administrator if you are willing to participate in the taped interview.** Please follow along on the questionnaire as I read you the instructions for the questionnaire.
>
> In this section of the questionnaire, we are interested in finding out what you think about when you answer questions concerning your visit to this area of Acadia today. In order to do this I am going to ask you to THINK ALOUD as you formulate an answer to each of the remaining questions. What I mean by think aloud is that I want you to tell me EVERYTHING you are thinking from the time you first see each question until you give an answer. I would like you to talk aloud CONSTANTLY from the time you begin this section of the questionnaire until you have given your answer to the final question in this section of the questionnaire. *Please note which question you are responding to as you move through the survey.*
>
> Please say whatever you are thinking even if you think it is not relevant to the question. I don't want you to try to plan out what to say or try to explain to me what you are saying. If you are silent for any long period of time I will remind you to talk. Do you understand what I want you to do?

Respondents were then asked to think aloud as they provided answers to two warm-up questions designed to make the respondent comfortable with the verbal protocol procedure. After completing the warm-up questions, respondents were instructed to continue thinking aloud as they responded to the remainder of the stated choice questionnaire. Following established procedures for obtaining verbal protocols (Ericsson & Simon, 1993), the interviewer minimized interactions with the respondent, only prompting the respondent to keep talking if they stopped verbalizing for more than a few minutes. In order to ensure the think-aloud process did not appear to be more important than the questionnaire itself, the interviewers used only neutral verbal prompts (e.g., "please remember to think aloud") if the respondent stopped talking. The verbal protocols were tape-recorded (with consent) and transcribed verbatim.

A total of 203 stated choice surveys were completed over eight survey days at JP, resulting in a 67% response rate. Fifteen verbal protocol assessments were also completed. The close proximity of the Jordan Pond House restaurant influenced participation to some degree. When asked to participate in the survey, some respondents refused and stated they were on a tight time schedule due to reservations for the restaurant.

Data Analysis—Stated Choice

Analysis of the stated choice responses is based on a model of discrete choice behavior referred to as random utility theory (Hanemann, 1984; McFadden, 1974). According to random utility theory, the attributes of alternatives relevant to a given choice are evaluated in terms of the utility they

provide the respondent. Further, the utilities associated with each of the attributes are combined into an overall utility (i.e., desirability) for each alternative, after which the alternative with the highest overall utility is selected (Lindberg, Dellaert, & Romer Rassing, 1999). Therefore, the parameters of the stated choice model, which are estimated using logistic regression and maximum likelihood methods, represent the relative importance of the corresponding attributes to the overall desirability of a given recreation setting (for a more detailed description of the theoretical and analytical framework of stated choice analysis, see McFadden (1974) and Opaluch, Swallow, Weaver, Wessells, & Wichelns (1993), respectively).

Verbal Protocol Assessment

All verbal protocols were recorded in their entirety on audiotape and later transcribed. Analysis of the verbal protocol data included use of the constant comparative method. This method involves the grouping of data on a similar dimension. The dimension is given a name that becomes a category or theme (Merriam, 1998, p. 159). The categories logically emerge from the passages of data rather than being predetermined (Seidman, 1998, p. 101). The categories or themes should reflect the purpose of the research and be developed with the research question in mind (Merriam, p. 160; Ericsson & Simon, 1993, p. 101). The verbal protocol transcripts in this study were reviewed for dominant themes that reflected comments on preferences for protecting park resources and experiences and maintaining reasonable public access. The final list of themes or categories allowed the discussion to be meaningfully organized, interpreted, and presented.

In this study, the construction of themes or categories began with reading one verbal protocol transcript and scribing notes and observations in the margins of the transcripts. The notes and observations were then sorted into categories that appeared to be logically related. The second transcript was then read using the same method, keeping in mind the categories that were identified in the first transcript. The notes and observations from the second transcript were compared with the first to identify similar and new categories. The categories were then merged into a master list of concepts (for more information on the constant comparative method, see Merriam (1998, pp. 159-166)). This method was continued for the remaining verbal protocol transcripts. The transcripts were then read several more times to confirm the emerging themes and identify that the list of categories was exhaustive (all data that were important and relevant could be placed in a category) and mutually exclusive (a unit of data could only fit in one category). The iterative lists of emerging themes and associated data were peer reviewed to ensure the themes were logically emerging from the verbal protocol data. The excerpts of comments in the results section provide further authentication of results. Each excerpt of data presented in the results section includes a date and a unique identifier (e.g., Respondent A) that links the information to the individual respondent and the date of the verbal protocol

assessment. The final list of themes that were used in the coding of transcripts is reported in Table 2.

Results

The coefficients of the stated choice model for the setting attributes, resulting from the 203 stated choice surveys, along with their standard errors, Chi-Square values and p-values are presented in Table 3. All of the coefficients are significantly different than zero at greater than 1% level. The coefficient estimates provide insight into the relative importance JP visitors place on the setting attributes included in the study. In particular, attributes with "large" negative or positive coefficients are expected to be more important in determining respondents' evaluations of alternative setting scenarios for the JP area. The results suggest respondents are particularly sensitive to proposed restrictions on public access to hiking trails at JP and to negative impacts on the ecological conditions of the trail. Furthermore, the coefficient on Trail Management 1 suggests that trails with no site management or hardening (e.g., stepping stones or wood planks) would be considered inappropriate for JP. The coefficient on Level of Encounters suggests that as the number of encounters with other groups increases, the hypothetical setting scenario becomes less acceptable for JP, but that the importance of trail encounters is relatively low compared to ecological conditions, trail management techniques and the amount of public access provided. It should be noted that some respondents may have chosen what might seem to be unlikely scenarios as preferred scenarios (e.g., highly restricted access, high encounter rates, the highest level of impacts to ecological conditions on the trail, and no to minimal development). The extent to which an "un-

TABLE 2
List of Themes Related to Choice and Associated Visitor Meaning of the JP Setting

Themes related to reasoning for choice (*considerations made during decision process*)

- Respondents considered the management implications of one or more of the setting attributes (e.g. cost, replacement frequency, feasibility, impact to resources, impact to visitor experience. . .) as part of their selection of a setting alternative
- Respondents considered visitor safety and/or accessibility related to one or more of the setting attributes in their selection of a setting alternative
- Respondents considered conditions of the area just visited—either how the setting choice is similar, or whether setting attributes are necessary based on current conditions of the area.
- Respondents considered the aesthetic value of one or more of the setting attributes as part of their selection of a setting alternative
- Respondents considered the type of experience sought and how the setting attributes related to achieving that experience as part of the evaluation of the alternative settings.
- Respondents considered the availability of other opportunities in the park and the relation of those opportunities to the alternative settings in the survey

TABLE 3
Coefficient Estimates from the Stated Choice Survey for Recreation Setting Attributes

Variable	DF	**Jordan Pond** Coefficient Estimate	Standard Error	Chi-Square	p-value
Public Access	1	−0.360	0.036	100.233	**<0.001**
Level of Encounters	1	−0.132	0.036	13.714	**<0.001**
Ecological Condition 1	1	0.470	0.065	52.852	**<0.001**
Ecological Condition 2	1	0.220	0.069	10.178	**0.001**
Ecological Condition 3	1	−0.279	0.064	18.948	**<0.001**
Ecological Condition 4*		−0.411	—	—	—
Trail Management 1	1	−0.478	0.070	46.254	**<0.001**
Trail Management 2	1	0.194	0.066	8.730	**0.003**
Trail Management 3	1	0.327	0.067	23.890	**<0.001**
Trail Management 4*		−0.043	—	—	—

*Coefficients for the excluded level of the attribute were not estimated by the statistical model, but rather were calculated as the negative sum of the coefficients on the other three levels of the corresponding attribute.

likely choice pattern" occurred in this study is unknown, and there may be some degree of bias if it happened frequently.

The stated choice model was used to estimate respondents' preferences for optimizing tradeoffs among the various attributes of the recreation setting. For example, the model was used to examine how respondents' would prefer to balance the level of public access and the number of encounters visitors have with other groups. The results of this analysis are presented in Figure 2. The points along the x-axis represent decreasing encounters among visitors with increasing restrictions on public access and the values along the y-axis representing estimates of the probability that respondents would support the corresponding level of public access and encounters. The results of the analysis suggest the differences in respondents' support for a recreation setting with no access restrictions and high levels of encounters to a setting with higher levels of access restrictions and lower levels of encounters. As noted previously, respondents at JP prefer no restrictions on access and low levels of encounters with other visitors. However, the insight gained from analyzing respondents' preferences for the alternatives presented in Figure 2 suggests that they would be willing to accept higher encounter rates if it meant there would be fewer restrictions on access to the area. This analysis is based on the assumption that reducing access to the area would influence the level of encounters between visitors.

Figure 3 presents estimates generated from the stated choice model of respondents' preferences concerning tradeoffs among ecological impacts to a typical JP hiking trail and alternative levels of development on the trail designed to minimize ecological impacts on the trail. This hypothetical sce-

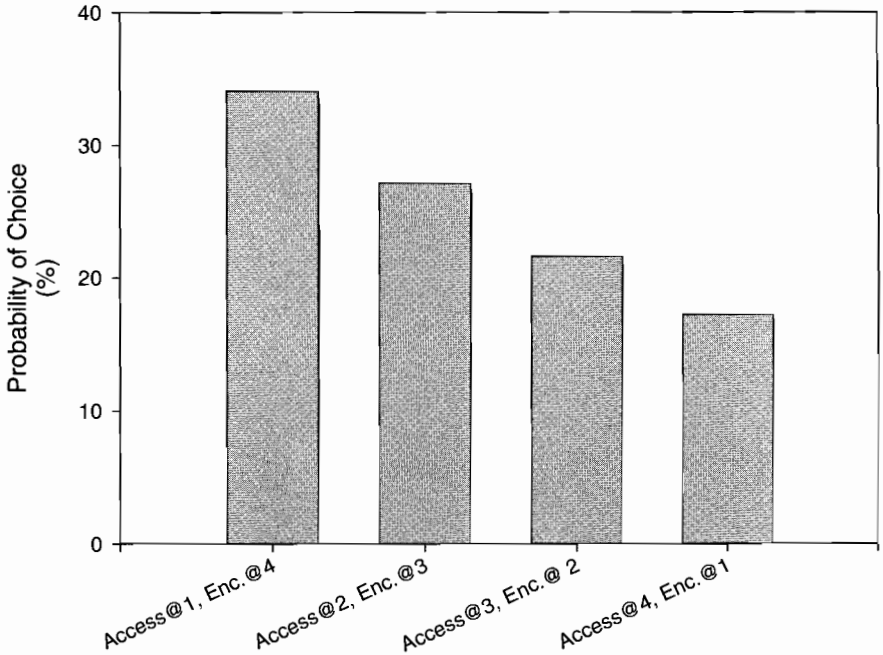

Figure 2. Visitor preferences for scenarios demonstrating decreasing encounters with increasing access restrictions at Jordan Pond.

nario is based on the assumption that increasing levels of trail development will reduce the ecological impacts to the trail. As noted previously, the stated choice model estimates that respondents at JP would prefer no resource impacts on trails and moderate levels of site management. The results of the analysis presented in Figure 3 suggest that respondents would prefer more trail development (e.g., gravel and wood planking) to minimize or eliminate ecological impacts to trails. Because respondents preferred wood planking to gravel when holding all attributes constant, there is a slight decline in preference for gravel in the scenario test. Based on the verbal protocol analysis and anecdotal information, respondents seem to like the gravel that is currently placed on half of the JP trail, but do not wish to see that type of development along the entire trail, which may have influenced the lower ranking of gravel in the stated choice questions.

Analysis of the verbal protocol transcripts indicated that the responses to the stated choice questions seem to be constructed from a variety of considerations (see Table 2). In other words, respondents had various value-oriented interpretations of the setting attributes that contributed to their reasons for preferring certain configurations of the study attributes better than others. For example, one respondent approved of trail development

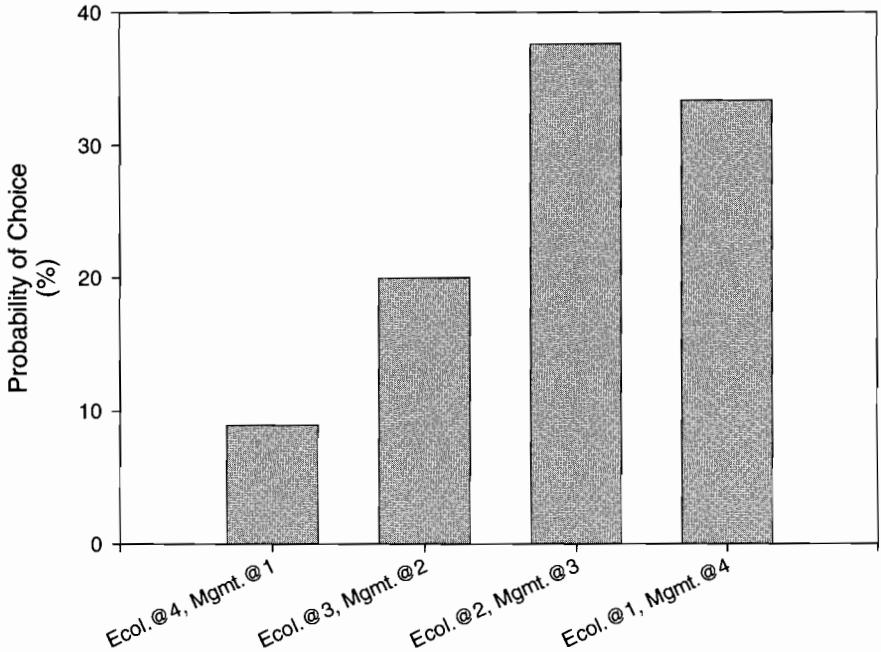

Figure 3. Visitor preferences for scenarios demonstrating improving ecological conditions with increasing development at Jordan Pond.

treatments to concentrate foot traffic and reduce resource impacts, while another approved of trail development treatments to increase accessibility of the trail system to those with mobility impairments. Examples of these two different interpretations are from respondents X and J, respectively:

> Proper *management helps save* the trail. . .otherwise, eventually, they start making shortcuts that go everywhere. (7/26/02, Respondent X)

> I don't agree that there should be no management-constructed features along the trails because *for some people that are not really nimble, it is difficult to get across puddles.* (7/13/02, Respondent J)

These two responses to different levels of trail development around Jordan Pond resulted in similar stated choice preferences, yet they are based on different value interpretations.

The verbal protocol assessment may provide additional insight into respondents' perceptions of the setting scenarios illustrated in Figures 2 and 3. For example, one of the most frequently mentioned considerations made by respondents in the verbal protocol assessment was the relation of the hypothetical setting scenarios to the current conditions at JP (see third bullet in Table 2). At least five of the verbal protocol respondents noted that they did not feel that current conditions at JP were "crowded," in terms of num-

bers of encounters on trails, and they did not anticipate that to be a problem in the near future. This consideration may have influenced respondents' preferences concerning varying combinations of encounter rates and restrictions on visitor access to the site presented in the stated choice scenarios. In short, some of the verbal protocol respondents may have been focusing less on the encounter rates proposed in the stated choice survey and more on current conditions, when evaluating the restricted access scenarios in the survey. If the respondents did not feel that encounter rates were likely to be a problem at JP, they might not have felt that any of the scenarios with access restrictions would be acceptable in the future. The following three excerpts from the verbal protocol highlight the consideration made by five respondents in relation to current conditions on the trails at JP:

> As it is today, I would prefer A. . .people allowed to hike are not limited so that when you arrive here you wouldn't be disappointed, and also *today is a beautiful summer day and there doesn't seem to be too many people. . .you are not passing person after person and that seems all right.* (7/13/02, Respondent A)

> *I think we are here at the height of tourist season and we didn't encounter that many people.* . .I would say limiting the number is something we all agree we would like to see not happen. (7/26/02, Respondent X)

> *While we have been sitting here talking, there has been one group go by. . .while I was taking the test there was one group. . .certainly that is not a very limiting factor.* . .I think if everyone at Jordan Pond restaurant right now decided to hike you'd have a little traffic congestion, but I don't think that is going to happen. (7/12/02, Respondent B)

Also noted in Table 2, a related consideration made by two different respondents was the availability of other opportunities within or outside the park for settings that had lower encounter rates and more opportunities for solitary hiking and contemplation. The following verbal protocol excerpts illustrate the value-oriented interpretations of the stated choice questions these respondents made:

> I would say I strongly prefer setting B. . .especially after just having walked around a little piece of this trail. . .setting B looks just like what they have set up. . .I think that works pretty well. . .it would allow more people to easily do it. . .*20 other groups in a three mile hike is really not all that awful, compared to almost any other place you might be. . .if you want something more isolated, you can go climb a mountain. . .this is an easy trail, you have to expect more people on it.* (7/11/02, Respondent B)

> So I would say that I moderately prefer B because I still don't like encountering 10 other groups during a hike. . .that is quite a lot. . .although once again, I guess it's ok *because there are other places in the park where you don't have to encounter any people, so I would say I strongly agree B.* . .I think *this particular area should be made very user friendly because of the Jordan Pond House. . .the refreshments are available, it is very pretty, it is a very easy walk.* (7/13/02, Respondent J)

These respondents appeared to identify the purpose of the trail system at JP as being a main attraction of the park, a focal point that demonstrates the

beauty of Acadia National Park for the widest range of visitors, and complements the activities of the Jordan Pond House, a developed area that offers a fairly formal and structured dining experience. As the excerpts from their verbal protocols illustrate, these respondents suggested that the JP area is not necessarily intended for solitary and primitive hiking opportunities and that other areas in the park and region can be sought out for that type of experience, if so desired. This value-oriented interpretation of the purpose of JP relative to other places in the park might explain, in part, why the study results suggest current visitors prefer fewer restrictions on access and more development along the JP trails.

The verbal protocol data may provide insight into why some stated choice respondents preferred different levels of development on the JP trails. For example, the verbal protocol data suggest that the increased accessibility of trails to a diversity of visitors is an important consideration in respondents' support for trail development (see second bullet in Table 2). Five respondents mentioned this consideration when evaluating alternative levels of trail development in the stated choice scenarios. The following three excerpts from the verbal protocol transcripts demonstrate respondents' preference for more intensively developed trails to improve the accessibility of the area:

> In fact, I think that having nicely graveled trails will *allow people with wheelchairs to see parts of this trail.* (7/11/02, Respondent B)

> So now as an aging person, I have been coming here for years and years. . .stepping stones are wonderful and I would gladly leap over all the stepping stones, and as I age and the *population is aging, planks are so much more safety oriented,* there is *less opportunity for twisting an ankle or slipping.* (7/12/02, Respondent K)

> I would like to see more wild area, but *I do understand the need for people to be able to access this area and especially those with limited abilities.* (7/12/02, Respondent Q)

The review of the verbatim transcripts from the verbal protocol analysis further confirmed the verbal protocol participants were able to consider the attributes of the recreation settings presented to them, as well as articulate preferences for those attributes that were based on a variety of considerations, beyond pure conjecture. There were no protocols that demonstrated that people misunderstood or could not complete the requested task. In addition, there were numerous protocols suggesting that respondents struggled with making a choice because many of the attributes were important to them. The following are two protocols that demonstrate the level of contemplation over the setting scenarios in the stated choice survey:

> Although in setting A I would prefer to encounter fewer groups, such as the 5 encounters in setting A during a hike; overall, I feel setting B would be better. I would like most people to be able to use [the trail] if they wish and that there is some maintenance and upkeep, but it is more rustic. It leaves hiking to those that truly want to hike. (7/12/02, Respondent Q)

> I would obviously prefer a trail looking like this, than one with a puddle. . .what's not preferable about that. . .oh but then I'd encounter 20 other groups rather than 10 so. . .do I care more about the trail's condition or seeing other people. . .I guess I would prefer B. (7/27/02, Respondent M)

As the first excerpt demonstrates, respondent Q was contemplating the tradeoffs between restricting access to keep encounter rates low and having less restricted access to make the area available to all those that want to hike. The respondent appeared to favor unrestricted access in lieu of lower encounters, acknowledging the possible tradeoff between the setting attributes and their preference for keeping the JP trails highly accessible. The second excerpt illustrates that respondent M was struggling with whether the number of encounters with other visitors or the amount of ecological impact to the trail was of greater significance. In this instance, the respondent chose scenario B, preferring to trade-off the resource condition of the trail for an improved social setting with less encounters. These verbal protocol data demonstrate that at least some respondents spent time contemplating the attributes in the stated choice study in terms of tradeoffs, which helps confirm that respondents found the study attributes salient and that they selected those attributes that were *most* important to them.

Discussion

The stated choice model developed in this study allows managers to gain some understanding of the relative importance of social, resource and management attributes of the trails in the JP area of Acadia National Park. Furthermore, the stated choice model can be used to estimate the relative desirability of different configurations of the JP trail attributes considered in the study. In this way, the stated choice results can help managers anticipate current visitors' support for various trail management alternatives for the JP area when attempting to resolve specific problems or determine long-term desired conditions. On particularly difficult or controversial issues, this information about current JP visitors' preferences for trail management alternatives may make the decision-making process for managers more defensible and less tumultuous (Lawson & Manning, 2002).

The results of the stated choice study indicated that when faced with tradeoffs inherent in public land management, respondents place a higher level of importance on some of the attributes presented in the study than others. The findings suggest that current JP visitors are likely to accept high levels of encounters with other visitors to protect opportunities to access the area. In addition, the results suggest that current visitors generally would accept, and in fact might prefer, trail development treatments such as wood planking and gravel. In short, the results of the stated choice study suggest that current visitors to JP, a more developed, highly visited area of Acadia National Park, generally prefer a more developed trail system with lower numbers of people, but are willing to accept higher levels of encounters on

trails in tradeoff for freedom to visit these areas without restrictions. From this information, planners and managers may better understand how JP visitors prefer the setting attributes considered in this study, and select management strategies that would reflect these preferences to the extent possible.

The information resulting from the verbal protocol assessment helps provide context and insight for interpreting the stated choice results. The verbal protocol data provide evidence that verbal protocol respondents' preferences for the study attributes were influenced by a variety of value-oriented considerations. Information about verbal protocol respondents' considerations and interpretations of the stated choice questions may provide more insight into what issues are important to current visitors regarding trail management in the JP area than the stated choice results alone. In addition, the information from the verbal protocol assessment may also give insight into user-based meanings of the JP area. This information could be useful during the planning process to help evaluate the acceptability of the social, resource and management conditions of the trails in the JP area and further articulate the desired character of the area. For instance, as noted above, the stated choice results suggest that current visitors generally would accept, and in fact might prefer, trail development treatments such as wood planking and gravel.. The verbal protocol results identified several reasons why some visitors prefer more developed trails at JP, including protecting resources, enhancing visitor safety, and improving the accessibility of the trails for a wide range of visitors. Also, based on excerpts from the verbal protocols, several respondents suggested that current conditions during the high use season were not "crowded," and that the purpose of the place was for "higher levels of use" since it is a main attraction in the park. Thus, these respondents did not consider restrictions on access to be necessary or appropriate now or in the future. Similarly, some verbal protocol respondents noted that there were other places in the park that provided more solitary hiking opportunities, suggesting that the JP area did not need to be managed for this type of opportunity. These findings suggest that these visitors would support continued protection of a range of recreation settings that provide diverse recreation opportunities in Acadia National Park.

The considerations respondents made while answering the stated choice questions would also be helpful to managers when considering the relative advantages of alternative management strategies. For instance, the safety and accessibility concerns of some verbal protocol respondents related to levels of development on the trails may provide a sufficient rationale for maintaining a more developed trail in the JP area. Many of the verbal protocol respondents noted that trail development, such as the use of gravel, would allow visitors with mobility impairments to see and enjoy this icon feature of the park. When working with the public, managers could address this concern for universal access in relation to any proposed management actions. Further, study participants' generally strong objection to any reductions in

access opportunities suggests that managers may want to consider more indirect methods of managing visitor use levels and patterns at JP, if it becomes necessary, such as visitor education or altering the timing of mass transportation to the site.

The verbal protocol also confirmed that respondents contemplated their choices in the stated choice study by verbally weighing the pros and cons of the attributes, suggesting that the attributes considered in this study were generally relevant to study participants. Further, the verbal protocol data helped confirm that at least some of the respondents were considering the attributes in terms of optimizing tradeoffs and that their decisions were based on the relative importance of each of the attributes.

There are five concerns with the implementation of this study that should be considered as suggestions for future research. First, the method of implementing public access restrictions may need to be defined in future stated choice surveys, because the method of implementing restrictions could affect visitor preferences for the concept of access restrictions. For example, one method of restricting public access is through the use of monetary fees. Some respondents may be opposed to fees for a variety of reasons, some of which may not directly relate to the effect of fees on restricting access. Second, a limitation of this and any application of stated choice modeling is that some respondents may use non-compensatory or lexicographic decision-making, in which one or more attributes are "singled-out" as the sole basis for judging alternative profiles (Bates, 1998; Wildert, 1998). For example, some respondents in our study might have always selected the profile with the greatest degree of public access, regardless of the conditions of any of the other attributes. In such a case, our stated choice model may underestimate the importance of the "singled-out" attribute for the respondent with non-compensatory preferences. Future research combining stated choice and verbal protocol methodologies could be designed to examine the extent to which stated choice respondents use non-compensatory decision-making. Third, the stated choice model used in this study assumed a single model for a homogeneous population. Consideration of market segmentation is outside the scope of this paper, but future research combining stated choice and verbal protocol methodologies could be designed to examine the extent to which there are various segments/populations based on factors such as gender, level of experience, type of experience sought, and evaluations of existing conditions. Fourth, the sampling approach to this study may have produced some bias by allowing frequent JP visitors to have a greater chance of being sampled than less frequent visitors. Finally, it is recommended that the stated choice method be used in combination with less structured public input methods. Based on anecdotal information collected by the author, it seems that some visitors, especially those that are frequent repeat visitors, felt the need for a more open forum to express their preferences for management of the area. Because the stated choice method presents close-ended questions, it would have been helpful to include open-

ended questions or an interview format to allow respondents who were not administered the verbal protocol to express other feelings and place meanings associated with management of JP.

Conclusion

Stated choice can be used as one of many valuable tools in gaining a richer vocabulary on desired conditions and management alternatives for particular areas in a park (Manning, 2003). The verbal protocol method used in this study helped provide additional insights on visitor preferences that may be useful during planning and management. Other qualitative research tools such as focus groups, interviews and open-ended questions would also likely strengthen the results of the stated choice method and provide richer insights into the planning process. With multiple and diverse data collection methods it is easier to identify patterns or consensus for the major issues and related solutions to public land planning and management.

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