

## **Respondent Self-Assessment of Research on Crowding Norms in Outdoor Recreation**

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This study explores the validity of measuring crowding norms in outdoor recreation through the use of respondent self-assessment techniques. Review of the literature on crowding norms, and the related topic of contingent valuation, suggests a number of theoretical and methodological issues that can influence validity. Based on this literature review, measures of respondent self-assessment of crowding norms research are developed and applied at multiple sites within three national parks. Study findings suggest that most respondents are confident in their ability to understand and answer questions on crowding norms, and support the use of such data by park managers. Few differences in crowding norms were found between respondents who were confident in their answers and those who were less confident. These findings, along with findings from other, related studies, offer some support for the validity of measures of crowding norms in outdoor recreation, and suggest research approaches to maximize validity.

**KEYWORDS:** *Crowding; crowding norms; validity; national parks*

### **Introduction**

Indicators and standards of quality have emerged as integral elements of contemporary frameworks in park and outdoor recreation management. Indicators of quality are measurable, manageable variables that help define the quality of the visitor experience. Standards of quality define the minimum acceptable condition of indicator variables. Once indicators and standards of quality are formulated, indicator variables can be monitored and management action taken to ensure that standards of quality are maintained. Indicators and standards of quality play a central role in contemporary park and outdoor recreation management frameworks such as Limits of Acceptable Change (LAC) (Stankey et al., 1985), Visitor Impact Management

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The studies reported in this paper were partially funded by the U.S. National Park Service and the McIntire-Stennis Forestry Research Program. The authors gratefully acknowledge the contributions of several people in the studies reported in this paper. David Lime, University of Minnesota, Wayne Freimund, University of Montana, and Karen McKinlay-Jones, Arches National Park, participated in the study at Arches National Park. William Stewart, University of Illinois, David Cole, Aldo Leopold Wilderness Research Institute, Jonathan Taylor, U.S. Geological Survey, and Martha Lee, Northern Arizona University, participated in the study at Grand Canyon National Park.

(VIM) (Graefe et al., 1990), and Visitor Experience and Resource Protection (VERP) (National Park Service, 1997).

One of the most problematic issues in this contemporary approach to park and outdoor recreation management has been setting standards of quality. Such standards may be based on a variety of sources, including legal and administrative mandates, agency policy, historic precedent, expert judgment, interest group politics, and public opinion, especially that derived from outdoor recreation visitors. This latter source has special appeal because it involves those most directly interested in and affected by park and outdoor recreation management policy.

Research on visitor-based standards of quality increasingly has focused on personal and social norms. Developed in the fields of sociology and social psychology, norms have attracted considerable attention as a theoretical construct and empirical framework in outdoor recreation research and management. In particular, normative theory has special application to setting standards of quality for the recreation experience. As applied in outdoor recreation, norms are generally defined as standards that individuals and groups use for evaluating behavior and social and environmental conditions (Vaske et al., 1986; Shelby & Vaske, 1991; Donnelly et al., 1992). If visitors have normative standards concerning relevant aspects of recreation experiences, then such norms can be measured and used as a basis for formulating standards of quality.

Application of visitor-based standards of quality in outdoor recreation is described in Shelby and Heberlein (1986), Vaske et al. (1986), Shelby et al. (1996), and Manning (1999a and b). These applications have relied heavily upon the work of Jackson (1965), who developed a methodology—return-potential curves—to measure norms. Using these methods, the personal norms of individuals can be aggregated to test for the existence of social norms or the degree to which norms are shared across groups. Normative research in outdoor recreation has focused largely on the issue of crowding (e.g., Shelby, 1981; Heberlein et al., 1986; Whitaker & Shelby, 1988; Patterson & Hammitt, 1990; Williams, et al., 1991; Vaske, et al., 1996; Manning et al., 1996a; Manning et al., 1996b; Manning, 1997; Manning et al., 1998a; Jacobi & Manning, 1999), but has addressed other social and resource conditions, including ecological impacts at wilderness campsites (Shelby et al., 1988) and along trails (Manning et al., 1996b), wildlife management practices (Vaske & Donnelly, 1988), and minimum stream flows (Shelby & Whittaker, 1995).

Research on crowding norms has raised a number of theoretical and methodological issues. Moreover, research in other, related fields of study, such as contingent valuation, can be applied to measurement of crowding norms (Manning et al., 1999a). This collective body of literature contributes to testing the validity of research on crowding norms and exploring the effectiveness of alternative measurement techniques. The objectives of this paper are twofold. First, research on theoretical and methodological issues related to measurement of crowding norms is reviewed and synthesized. Sec-

ond, respondent self-assessment of crowding norms measurement is explored as an approach to testing the validity of this research approach.

### Theoretical and Methodological Issues in Crowding Norm Research

A growing body of literature in outdoor recreation is exploring a range of theoretical and methodological issues associated with measuring crowding norms. Moreover, scientific literature in other fields of study can also be examined for potential application to measuring crowding norms in outdoor recreation. For example, a substantial scientific literature has been developed on contingent valuation, a research approach to estimating the economic value of non-market goods and services. Research on contingent valuation and normative standards of crowding in outdoor recreation share several basic theoretical and methodological similarities (Manning et al., 1999a). From a broad conceptual standpoint, both contingent valuation and crowding norm research are concerned with gathering information about peoples' preferences with respect to the provision of various resources (e.g., the economic value of visiting a national park, or the acceptable number of other park visitors). From a similarly broad methodological standpoint, both areas of study rely primarily on survey research (i.e., they elicit from a sample of respondents a dollar value of visiting a park, or the acceptability of encountering selected numbers of other park visitors). The literature in each of these areas of research can be potentially useful to the other by identifying relevant theoretical and methodological issues and describing associated study findings. Review of these two bodies of literature suggests a number of theoretical and methodological issues that can help inform measurement of crowding norms in outdoor recreation and contribute to assessing its validity.

#### *Do Crowding Norms Exist?*

The existence of crowding norms and the validity of their measurement are obviously fundamental issues. Within the contingent valuation literature, these issues have been characterized by alternative philosophies—a philosophy of “articulated values” versus a philosophy of “basic values” (Fischhoff, 1991). The former suggests that survey respondents have relatively well-developed economic values for a host of possible goods and services, and that these values can be drawn upon and articulated given appropriate strategies of question formulation. The latter philosophy suggests that respondents have informed economic values on only a relatively small set of issues of immediate importance, and that answers to at least some willingness to pay questions may simply be made up at the time the questions are asked. The contingent valuation literature further implies that the issue of validity is complex, and that findings from theoretical and methodological studies can inform contingent valuation research to help maximize its validity.

Research has also begun to address the issue of whether survey questions about normative standards can be asked and answered meaningfully. First,

the theoretical foundation of norms has been reexamined (Shelby & Vaske, 1991; Heywood, 1996a, 1996b; Manning et al., 1996a). As noted earlier, normative theory has been borrowed from the disciplines of sociology and social psychology. Within these disciplines, norms are characterized by several distinguishing features, including the fact that they are obligatory, they are enforced by sanctions, they guide behavior, and they are shared by social groups. Application of normative theory to research in outdoor recreation has adopted a more expansive view of norms suggesting that (1) recreation often involves emerging norms for which a strong sense of obligation and sanction has yet to fully evolve; (2) recreation-related norms can apply to social and resource conditions as well as behavior because such conditions are often a function of individual behavior; (3) recreation-related norms often regulate collective rather than individual behavior, and (4) research has documented some degree of consensus regarding a number of recreation-related norms (Shelby & Vaske, 1991).

Second, empirical findings of normative studies in outdoor recreation are suggestive of the extent to which norms may exist. Many studies have found that most visitors to recreation areas are able to respond to questions designed to measure crowding and related norms and that, as noted earlier, these studies have addressed a variety of social and resource conditions. The extent to which there is agreement or consensus about such norms is less certain (see, for example, Roggenbuck et al., 1991; Shelby & Vaske, 1991; Williams et al., 1991). While there are a number of ways to measure consensus, there is no broad agreement about the degree of consensus needed to establish normative standards. Moreover, the degree of consensus is affected by a number of intervening variables.

Third, research has begun to address the validity of reported crowding norms by testing the degree to which such norms correspond with respondent behavior and/or evaluation of recreation conditions. This issue is sometimes referred to as "norm congruence". While study findings are not uniform, they generally suggest a relatively high degree of norm congruence (Patterson & Hammitt, 1990; Williams et al., 1991; Hammitt & Rutlin, 1995; Lewis et al., 1996; Manning et al., 1996a; Manning et al., 1996c). For example, respondents who report encountering more groups of hikers than their personal norm tend to report higher levels of perceived crowding than do respondents who report seeing fewer groups of hikers than their personal norms. In addition, those respondents who report encountering more groups of hikers than their personal norm are more likely to report adopting some action to avoid such encounters.

Fourth, some studies of crowding norms (e.g., Roggenbuck et al., 1991; Hall & Shelby, 1996) have incorporated a "no vote" response option, following the literature in contingent valuation (Fischhoff, 1991; Arrow et al., 1993). This option allows respondents to indicate that the number of other visitors encountered may be important, but that they can not specify a maximum number of encounters acceptable. This allows respondents who do not have well-informed opinions to so indicate. Initial studies have found that a mi-

nority of respondents select this option, suggesting that most respondents feel they can offer informed answers (Hall & Shelby, 1996). The advisability of incorporating a "no vote" option is not universally acknowledged. One study suggests that respondents who choose this option are similar to those who report a norm, and that this response option may simply be an easy way for some respondents to avoid a potentially burdensome question (Hall & Shelby, 1996).

### *How Should Crowding Norms Be Measured?*

As noted above, the validity of both contingent valuation and normative standards research can be affected, at least to some degree, by the measurement approaches adopted. For example, research suggests that the "evaluative dimension" used can affect estimates of both willingness to pay and crowding norms. Contingent valuation studies can use either "willingness to pay" for provision of a nonmarket good or service, or "willingness to accept" compensation for withdrawing that good or service. Research suggests that the latter evaluative dimension can result in substantially higher estimates of willingness to pay (Hanneman, 1991; Boyce et al., 1992; Adamowite et al., 1993; Arrow et al., 1993; Freeman, 1993; Morrison, 1997).

Research on normative standards has recently begun to address this issue. The traditional evaluative measure in normative research has been "acceptability." However, the use of other evaluative measures is possible, including preference, tolerance, and the more purely normative notion of what conditions *should* be. Initial tests of measuring preference, tolerance, and attitudes about what should be suggest that they result in estimates of crowding norms that differ significantly from those measured by asking about acceptability (Shelby & Whittaker, 1995; Manning et al., 1999b). While all of the evaluative measures can be useful, normative theory suggests that the notion of "should" may be especially useful for management purposes as it more explicitly introduces tradeoffs between crowding (or lack thereof) and other potentially important attributes of outdoor recreation, such as maintaining public access. This is in keeping with recommendations that contingent valuation studies include explicit information about the potential implications of respondent answers (Arrow et al., 1993). For example, contingent valuation studies should include a reminder to respondents that they have a limited budget, and that electing to spend money for the good under study means a reduction in other kinds of goods that can be purchased.

Both contingent valuation and crowding norms research have addressed the issue of how information should be provided to respondents. Research in contingent valuation has focused primarily on the amount of information provided to respondents on the good or service under study, and suggests that this issue can affect willingness to pay estimates (Rowe et al., 1980; Bergstrom et al., 1990; Ajzen et al., 1996). The role of information in crowding norms research has been explored in the context of examining narrative

versus visual approaches to resource description. Traditionally, the resource under study is described to respondents in a brief narrative. For example, respondents may be asked to consider a situation in which they are hiking a wilderness trail and encounter selected numbers of other groups at a scenic attraction. Alternatively, respondents could be presented with a picture or visual simulation of the situation (Hof et al., 1994; Manning et al., 1995; Manning et al. 1996a; Manning et al., 1996b). Initial research on this issue suggests that visual presentations of normative scenarios may result in higher and possibly more valid crowding norms (Manning et al., 1999b). In these cases, respondents may cognitively "process" some people in the visual representation at a subconscious level because they are perceived to be "like" the respondent and therefore do not substantially contribute to perceived crowding. In contrast, narrative descriptions call explicit attention to all other visitors "encountered."

Question format might also influence both contingent valuation and crowding norms research. A dominant issue in contingent valuation concerns the use of open ended (direct question) or dichotomous choice ("yes" or "no") question formats. In open-ended questions, respondents are asked to state a maximum dollar amount they would be willing to pay for a hypothetical scenario. In dichotomous choice (close-ended) questions, respondents are told how much each individual would have to pay if the hypothetical scenario is adopted and then asked to vote "yes" or "no". The dichotomous choice method is so named because only two responses ("yes" and "no") are available (Arrow et al., 1993). Several studies have examined the willingness to pay values obtained using both open-ended and dichotomous choice formats (e.g., Randall et al., 1983; Loomis, 1990; Kealy & Turner, 1993; Loomis et al., 1997). While there is no clear consensus among researchers about which question format is more valid, several studies suggest that close-ended questions may yield higher willingness to pay values than open-ended questions, and a national panel has recommended use of the dichotomous choice question format as a more conservative estimate of willingness to pay (Arrow et al., 1993).

An analogous issue in the crowding norms literature concerns "long"—sometimes called the "repetitive item format" (Shelby, 1981; Vaske et al., 1982)—versus a "short" question format. Early applications of crowding norms research employed the long question format by asking respondents to evaluate a range of use density conditions. For example, studies might have asked respondents to evaluate the acceptability of seeing 0, 5, 10, 15, and 20 other groups per day while hiking a trail. To reduce respondent burden, it has become common to employ a short, open-ended version of questions where respondents are asked to simply state the maximum number of other groups of visitors they feel is acceptable to see along a trail per day. Only one study has explored the comparability of these two question formats (Manning et al., 1997; Manning et al., 1999b). The long or close-ended question format was found to yield somewhat higher norms than the short or open-ended question format.

"Starting point bias" is a more technical, methodological issue concerning the degree to which an initial value proposed in a study may ultimately influence willingness to pay or crowding norms. Starting point bias is an issue in the case of contingent valuation studies that use multiple-bounded dichotomous choice questions. The respondent is asked to indicate with a "yes" or "no" response, whether they would be willing to pay a proposed dollar amount for the resource under study. The next question poses a higher dollar value for those individuals who selected a "yes" response to the previous question, and a lower dollar value to those individuals who responded "no." Starting point bias is a concern if the initial dollar amount proposed affects the magnitude of willingness to pay estimated in the study (e.g., higher starting bids result in higher willingness to pay values than lower starting bids). Several studies have explored this issue, but findings are inconclusive (Rowe et al., 1980; Thayer, 1981; Desvousges et al., 1983).

Only one study has addressed the issue of starting point bias in crowding norms research (Manning et al., 1998). Hikers at Grand Canyon National Park were asked to evaluate a series of six photographs showing a range of visitor use levels along a trail. Half the sample was shown the photographs in increasing order of use and the other half of the sample was shown the photographs in decreasing order of use. No statistically significant difference in crowding norms was found between the two subsamples, suggesting that starting point bias may not be an important issue in measuring crowding norms in outdoor recreation.

#### *How Well Do Measures of Crowding Norms Work?*

Given the theoretical and methodological issues described above, how well do measures of crowding norms work? The literature on contingent valuation and crowding norms described above begins to answer this important question. For example, the degree to which survey respondents behave in relation to reported crowding norms is suggestive of the validity of crowding norms measures. A recent approach to addressing this question has been developed and explored in the contingent valuation literature, and focuses on how respondents assess their confidence in the informed nature of their responses. Initial research suggests that most respondents are reasonably confident in the validity of their answers. Schkade and Payne (1994), for example, conducted a verbal protocol analysis, allowing respondents to self-assess how they answered a series of contingent valuation questions. While 20 percent of respondents reported they merely guessed, most felt that they had carefully weighed the value of the resource under study and that they had considered their personal budget constraints before answering.

No research has been conducted on this issue in the context of measuring crowding norms in outdoor recreation. Thus, a primary objective of this study is to explore the self-assessment of respondents toward measures of crowding norms. Specific issues include understanding of study questions, the realistic nature of study questions, confidence in answers offered, and

the degree to which respondents feel that study findings should be incorporated into outdoor recreation management policy.

### Study Methods

Following the verbal protocol analysis developed by Schkade and Payne (1994) to evaluate contingent valuation research, a respondent self-assessment instrument was developed to evaluate measurement of crowding norms in outdoor recreation. A battery of statements was developed to measure respondent self-assessment of crowding norm research (Table 1). These statements addressed respondent understanding of survey questions, the extent to which the photographs used in the studies realistically represented trail and attraction site use conditions, the degree of confidence respondents had in their answers to crowding norms questions, and the extent to which respondents thought study findings should be incorporated into management policy. The battery of statements was presented at the conclusion of crowding norms questionnaires administered in three national parks: Grand Canyon, Arches, and Yosemite (Manning et al., 1998; Lime et al., 1998; Manning et al., 2000a). Respondents were asked to indicate the extent to which they agreed or disagreed with each statement using a five-point Likert-type response scale. The study at Grand Canyon was administered as an on-site interview, while the studies at Arches and Yosemite were conducted using onsite self-administered questionnaires. In all cases, representative samples of visitors were obtained. The study at Grand Canyon was conducted in the summer of 1997 with a total sample size of 874 day hikers on several rim, corridor, and threshold trails. The study at Arches was conducted in the summer of 1997 with a sample size of 792 hikers to Delicate Arch. The study at Yosemite was conducted in the summers of 1998 and 1999 with a total sample size of 1744 visitors to several trails and attraction sites in Yosemite Valley. All studies used a series of photographs showing a range of visitor use levels to measure crowding norms and these series of photographs were specific to the sites studied in each park. Sample photographs for all three study parks are shown in Figure 1.

### Study Findings

Table 1 presents descriptive findings for each of the six items comprising the respondent self-assessment battery of questions. "Agree" and "strongly agree" responses are collapsed into one response category for ease of presentation, as are "disagree" and "strongly disagree" responses, and data are presented by park. Nearly all respondents at all three parks (Yosemite = 96%; Grand Canyon = 99%; Arches = 90%) agreed that they understood the questions that were asked. Similarly, the vast majority of respondents (Yosemite = 89%; Grand Canyon = 90%; Arches = 82%) agreed that the photographs used in the studies realistically represented different levels of use at the study sites. A majority or plurality of respondents reported that



*TABLE 1*  
*Respondent Self-Assessment Battery of Questions and Percentage Responses*

Self Assessment Statement	Parks								
	Yosemite			Grand Canyon			Arches		
	Strongly Agree/ Agree	Neutral	Disagree/ Strongly Disagree	Strongly Agree/ Agree	Neutral	Disagree/ Strongly Disagree	Strongly Agree/ Agree	Neutral	Disagree/ Strongly Disagree
I understood the questions that were asked	96	3	1	99	1	0	91	6	4
The photographs realistically represent different levels of use at this area <sup>1</sup>	89	8	3	92	4	4	82	10	6
I was confused by the questions that asked me to choose between the photographs	5	7	88	5	4	91	—	—	—
It was very difficult to rate the acceptability of the photographs <sup>2</sup>	18	13	69	10	14	76	24	24	52
The answers I gave to these questions accurately represent my feelings about acceptable use levels on the trail I hiked <sup>3</sup>	94	4	2	97	2	1	89	6	5
The NPS should manage visitor use levels based on the kind of information collected in studies like these <sup>4</sup>	62	22	16	81	13	6	73	20	7

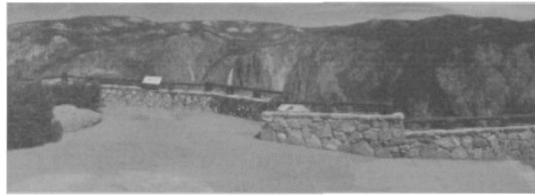
<sup>1</sup>The statement at Arches read “The photographs are a good way to represent different number of people at the Arch.”

<sup>2</sup>The statement at Arches read “ It was difficult to rate the acceptability of the photographs.”

<sup>3</sup>The statement at Arches read “The answers I gave to these questions accurately represent my feelings about the acceptable number of people at the Arch.”

<sup>4</sup>The statement at Arches read “The NPS should consider information collected in this study in deciding how to manage the number of people at the Arch.”

—Question not asked at Arches National Park



a. Yosemite National Park – Glacier Point



b. Grand Canyon National Park – Corridor Trail



c. Arches National Park – Delicate Arch

*Figure 1.* Representative study photography

they were not confused by the questions that asked them to choose the photograph that represented the highest acceptable number of visitors (Yosemite = 88%; Grand Canyon = 91%), and that it was not difficult to rate the acceptability of the photographs (Yosemite = 69%; Grand Canyon = 78%; Arches = 46%). The vast majority of respondents (Yosemite = 94%; Grand Canyon = 97%; Arches = 88%) agreed that their answers to the crowding norms questions accurately represented their feelings about acceptable use levels at the study sites. Finally, a strong majority of respondents (Yosemite = 62%; Grand Canyon = 79%; Arches = 72%) agreed that the National Park Service should manage visitor use levels based on the type of information collected in these kinds of studies. These findings suggest that most respondents understood the questions about crowding norms, felt the photographs realistically represented a range of use levels, did not have undue difficulty rating the acceptability of the photographs, felt their answers accurately reflected their feelings about acceptable visitor use levels, and supported the use of such data by the National Park Service in making management judgements about appropriate visitor use levels.

Study data were also analyzed to determine if there were statistically significant differences in crowding norms between respondents who were confident in their answers and those who were less confident. Results of this analysis are shown in Tables 2 through 4 and report the crowding norms (people at one time, or PAOT) for both groups of respondents. Table 2 presents data on Glacier Point, one of the five study sites in Yosemite National Park, Table 3 presents data on the corridor trails, one of three types of trails studied in Grand Canyon National Park, and Table 4 presents data on Delicate Arch, one of three study sites in Arches National Park. Data on Glacier Point, the corridor trails, and Delicate Arch are representative of other study sites in their respective parks.

For each of the six statements included in the battery of respondent self-assessment questions, respondents were divided into two groups—those who were confident in their answers and those who were less confident. The first group included respondents who reported they “agreed” or “strongly agreed” with items that were worded positively (e.g., “I understood the questions that were asked”) and those who reported they “disagreed” or “strongly disagreed” with items that were worded negatively (e.g., “I was confused by the questions that asked me to choose between the photographs”). The second group included those who reported that they were neutral or “agreed/strongly agreed” or “disagreed/strongly disagreed”, as appropriate. These two groups were compared on the four measures of crowding norms—preference, acceptability, tolerance/displacement and management action—used in the three parks studied (Manning et al., 1999b). The preference norm asked respondents to select the photograph that best represented the number of visitors that they would prefer to see at the study site. The acceptability norm asked respondents to select the photograph that best represented the highest number of visitors that would be acceptable to see at

TABLE 2  
*Crowding Norms (PAOT) by Respondent Self-assessment Findings for Glacier Point, Yosemite National Park*

Self-Assessment Statements	Subsample	Preference	Acceptability	Management Action	Tolerance/ Displacement
I understood the questions that were asked	Disagree/Neutral <sup>1</sup>	19.3	31.5	65.3*	65.3
	Agree	19.3	34.2	49.0	61.1
The photographs realistically represent different levels of use in this area	Disagree/Neutral <sup>1</sup>	17.6	33.1	50.5	62.6
	Agree	19.5	34.1	49.0	61.1
I was confused by the questions that asked me to choose between the photographs	Disagree <sup>1</sup>	19.4	34.2	49.3	61.1
	Agree/Neutral	19.1	33.1	47.3	63.7
It was very difficult to rate the acceptability of the photographs	Disagree	19.9	34.5	49.2	60.5
	Agree/Neutral	17.9	33.0	49.0	63.5
The answers I gave to these questions accurately represent my feelings about acceptable use levels on the trail I hiked	Disagree/Neutral <sup>1</sup>	29.4	28.0	44	64.0
	Agree	19.0	34.3	49.2	61.2
The NPS should manage visitor use levels based on the kind of information collected in studies like this	Disagree/Neutral	20.2	36.0	52.8	61.2
	Agree	18.9	33.2	47.8	61.2

<sup>1</sup>Sample size less than 30

\*significant at  $p < .05$  level

**TABLE 3**  
*Crowding Norms (PAOT) by Respondent Self-assessment Findings for Delicate Arch, Arches National Park*

Self-Assessment Statements	Subsample	Preference	Acceptability	Management Action	Tolerance/ Displacement
I understood the questions that were asked	Disagree/Neutral <sup>1</sup>	12.2*	24.8	37.6	54.5
	Agree	8.6	23.8	33.1	47.6
The photographs realistically represent different levels of use in this area	Disagree/Neutral	11.0*	26.6*	30.7	48.5
		8.4	23.2	34.0	48.2
I was confused by the questions that asked me to choose between the photographs	Disagree	—	—	—	—
	Agree/Neutral	—	—	—	—
It was very difficult to rate the acceptability of the photographs	Disagree	8.5	23.4	33.2	47.3
	Agree/Neutral	9.2	24.0	33.6	49.0
The answers I gave to these questions accurately represent my feelings about acceptable use levels on the trail I hiked	Disagree/Neutral	11.2*	22.8	32.9	53.4
	Agree	8.6	24.0	33.4	47.6
The NPS should manage visitor use levels based on the kind of information collected in studies like this	Disagree/Neutral	10.3*	26.1*	33.6	51.9
	Agree	8.5	23.0	33.4	47.0

<sup>1</sup>Sample size less than 30

—question not asked at Arches National Park

\*significant at  $p < .05$  level

TABLE 4  
*Crowding Norms (PAOT) by Respondent Self-assessment Findings for Corridor Trails, Grand Canyon National Park*

Self-Assessment Statements	Subsample	Preference	Acceptability	Management Action	Tolerance/ Displacement
I understood the questions that were asked	Disagree/Neutral <sup>1</sup>	1.0	4.0	7.7	9.7
	Agree	1.9	5.0	7.4	11.6
The photographs realistically represent different levels of use in this area	Disagree/Neutral	1.5	5.2	7.5	11.9
	Agree	2.0	5.0	7.4	11.5
I was confused by the questions that asked me to choose between the photographs	Disagree	1.9	5.0	7.4	11.5
	Agree/Neural <sup>1</sup>	1.8	4.9	7.0	11.9
It was very difficult to rate the acceptability of the photographs	Disagree	1.9	5.0	7.3	11.5
	Agree/Neutral	1.9	4.9	7.5	11.6
The answers I gave to these questions accurately represent my feelings about acceptable use levels on the trail I hiked	Disagree/Neutral <sup>1</sup>	1.0	5.2	7.6	14.2*
	Agree	1.9	5.0	7.4	11.5
The NPS should manage visitor use levels based on the kind of information collected in studies like this	Disagree/Neutral	1.7	5.3	8.4	11.6
	Agree	2.0	4.9	7.2	11.5

<sup>1</sup>Sample size less than 30

\*significant at  $p < .05$  level

the study site. The tolerance/displacement norm asked respondents to select the photograph that best represented the highest number of visitors that could be tolerated before the respondent would no longer visit the study site. The management action norm asked visitors to select the photograph that best represented the highest number of visitors that the National Park Service should allow to use the study site.

Study findings indicate that there were very few statistically significant differences in crowding norms between respondents who were confident in their answers and those who were less confident. Even when there was a statistically significant difference, the difference was relatively small and may not be substantively important. These findings suggest that measures of crowding norms may be relatively robust. That is, even respondents who are not confident in their answers tend to report crowding norms that are within the same range as those who are confident.

### Conclusions and Implications

As research on crowding norms in outdoor recreation proceeds, it is increasingly important that the validity of this research be assessed. This importance is underscored as data from measures of crowding norms are incorporated into the planning and management of parks and outdoor recreation areas. For example, recent management plans for several national parks have been developed based at least partially on studies of crowding norms (National Park Service, 1995; Jacobi & Manning, 1997; Manning, 2001).

Assessment of crowding norm research can be based on studies applied directly to this issue, but can also draw upon similar research in related fields of study. For example, conceptual and methodological similarities between crowding norms research and research on contingent valuation suggest that findings from each of these fields of study can help inform the other (Manning et al., 1999a). Research in contingent valuation has developed measures of respondent self-assessment as a test of validity, and this research approach can be adapted to measurement of crowding norms.

The research reported in this paper developed and applied a battery of questions to measure respondent self-assessment of studies designed to measure crowding norms in outdoor recreation. These measures of respondent self-assessment were applied at several study sites in three national parks. Study findings indicate that most respondents 1) understood the questions designed to measure crowding norms, 2) felt the photographs used in the studies realistically represented a range of use densities at the study sites, 3) were confident in their ability to report crowding norms, and 4) felt the National Park Service should use such data in formulating park management policy. Moreover, the minority of respondents who were not as confident in their answers to study questions reported crowding norms that were not significantly different from other respondents. These findings, along with findings from other, related research, offer some support for the validity of mea-

asures of crowding norms in outdoor recreation. Moreover, measures of crowding norms appear to be relatively "robust", in that respondents who were less confident in their ability to understand and answer study questions reported crowding norms similar to respondents who were more confident in their ability to understand and answer such questions.

However, the issue of validity is complex and can be assessed in multiple ways (Nunnally, 1978; Carmines & Zeller, 1979). In its most generic sense, the concept of validity refers to the degree to which an instrument does what it is intended to do, or measures what it purports to measure. To what degree do measures of crowding norms in outdoor recreation provide valid estimates of maximum use levels of parks and related areas that are consistent with maintaining visitor experiences of high (or at least acceptable) quality? Several approaches to assessing validity may be appropriate to answering this question.

A conventional approach to assessing validity applies the concept of "content" validity. Content validity is primarily concerned with the adequacy with which a specified domain of content is sampled or included in the measurement instrument. The content validity of crowding norms might be assessed in at least two ways. First, as noted earlier in this paper, the concept of norms is characterized by several theoretical principles, including that they are shared by social groups and that they guide behavior. Measures of crowding norms in outdoor recreation are designed to aggregate personal norms to test for social norms or the degree to which there is some consensus regarding appropriate use levels. Moreover, measures of crowding norms have begun to adopt a more explicit element of the maximum use levels for which parks and related areas *should be* managed, thus guiding the behavior of management agencies and ultimately, park visitors. (Manning et al., 1999b; Lawson & Manning, in press; Manning, in press). The degree to which measures of crowding norms incorporate principles of the substantive content underlying normative theory enhances the content validity of such measures.

"Face" validity is a second approach to assessing content validity, and refers to the extent to which an instrument "looks like" it measures what it is intended to measure. Findings from the studies described in this paper might contribute to assessing face validity in two ways. First, study data indicate that most park visitors (survey respondents) have substantial confidence in the measures of crowding norms used in these studies: they understood the questions, thought the photographs realistically represented alternative use levels, had confidence in their answers, and supported use of study data in park management policy. Second, study findings are logical and consistent across the three study parks. For example, the four evaluative dimensions incorporated into the study questions—preference, acceptability, management action, and tolerance—estimate a range of crowding norms that are consistent with logical expectations and that are consistent across study parks.

A second conventional approach to assessing validity applies the concept of "predictive" or "criterion" validity. This approach to validity examines the



correlation between findings derived from a study instrument and some important form of behavior that is external to the instrument, the latter referred to as the criterion. The issue of norm congruence, as described earlier in this paper, may offer a test of the predictive validity of crowding norms measures. Several studies have found that respondents who encounter more people than their personal norms in parks and related areas also report higher levels of perceived crowding and more overt behavior designed to reduce the number of encounters.

A third conventional approach to assessing validity applies the concept of "construct" validity. This approach to validity examines the degree to which multiple variables which comprise a theoretical construct are represented in instruments designed to measure that construct. Measures of crowding norms are ultimately aimed at the theoretical construct of crowding. Normative interpretation of crowding in outdoor recreation has generally recognized three broad types of variables as defining perceived crowding: 1) characteristics of respondents (e.g., recreation activity in which the respondent is engaged), 2) characteristics of those encountered (e.g., recreation activity in which others encountered are engaged), and 3) situational variables (e.g., location in which encounters occur) (Manning, 1986). Recent studies of crowding norms in outdoor recreation have begun to incorporate all three types of these variables. For example, a study of trail users at Acadia National Park, Maine measured crowding norms for two types of trail users (hikers and bikers), for encountering two types of trail users (hikers and bikers), and for two types of trails (high-use trails and low-use trails) (Manning et al., 2000b). Inclusion of multiple variables or dimensions of the theoretical construct of crowding into measures of crowding norms can be seen to enhance the power and resolution of such measures as well as contributing to their construct validity.

The concept of validity is clearly complex, and might most approximately be described as an objective to which research should aspire rather than end to be reached. In the words of Nunnally (1978, p. 87), "Validity is usually a matter of degree rather than an all-or-none property, and validation is an unending process." Validity can be assessed using theoretical, empirical, and common sense approaches. Findings from the studies described in this paper, along with related studies reported in the scientific literature, tend to support the validity of measures of crowding norms in outdoor recreation. Perhaps more importantly, this growing body of research is suggestive of conceptual and methodological approaches that can enhance the validity of such studies. For example, measures of crowding norms should probably include a strong normative notion of the use level that management should not exceed, should explicitly address potential tradeoffs between crowding and other attributes of recreation experiences such as public access, should consider the use of visual information where use levels are relatively high, and should incorporate a measure of respondent self-assessment of study questions and responses. Research designed to assess and enhance the valid-

ity of measures of crowding norms has both scientific and substantive benefits and warrants continued attention.

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