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What to Do About Crowding and Solitude in Parks and Wilderness? A Reply to Stewart and Cole

Robert E. Manning
School of Natural Resources
University of Vermont

Recent research by Stewart and Cole (2001) adds evidence that the number of encounters among park and wilderness visitors is negatively, but weakly-to-moderately related to visitor satisfaction. However, their conclusions—1) that there is little empirical evidence to support limits on park and wilderness use, and 2) surveys of park and wilderness visitors contribute little or nothing to resolving the issue of use limits—warrant further consideration. Reliance on global measures of visitor satisfaction is fraught with methodological and managerial problems. Consequently, quality in outdoor recreation might better be defined through a management-by-objectives approach, one that, in the case of parks and wilderness, might include consideration of the social, cultural and legal importance of solitude and concern over crowding-related impacts. Moreover, research on visitor evaluations of crowding and other impacts of recreation, especially as it addresses potential tradeoffs among multiple desirable attributes of park and wilderness experiences, can help inform management policy regarding the appropriateness of use limits. Stewart and Cole admonish us to be cautious about limiting use of parks and wilderness, and this is good advice. But we should be equally cautious about not limiting use when its social and resource impacts diminish qualities important to visitors and threaten objectives for which at least some park and wilderness areas probably should be managed.

KEYWORDS: *Crowding, solitude, parks, wilderness.*

Introduction

In a recent paper in this journal, Stewart and Cole (2001) report on a study of backpackers in Grand Canyon National Park that found a generally weak-to-moderate negative relationship between number of people/groups encountered and overall quality of the recreation experience. Their study is thus the most recent in a relatively long line of studies to reach a similar conclusion. However, Stewart and Cole go on to suggest a number of research and management implications that warrant further consideration.

The study design employed by Stewart and Cole is sophisticated in that it uses a diary survey format, attempts to measure multiple variables in an expanded crowding model (including number of groups encountered, per-

Address correspondence to: Robert E. Manning, Recreation Management Program, School of Natural Resources, University of Vermont, Burlington, VT 05405. Phone: (802) 656-2684. Fax: (802) 656-2623. Email: rmanning@nature.snr.uvm.edu.

ceived crowding, solitude/privacy desired and achieved, and overall satisfaction with the recreation experience) (Manning, 1985; 1999), and allows comparisons between respondents in relatively high and low use areas of the park. In this way, the study adds insight into the relatively complex issues of crowding and solitude. However, the study has a number of potential shortcomings that suggest it is not yet the definitive statement on these longstanding and important issues, and that the authors may therefore be premature in 1) dismissing encounters and crowding/solitude as potentially appropriate rationales for limiting use of parks and wilderness, and 2) discounting the potential usefulness of surveys of park and wilderness visitors as an appropriate research method to study and address these issues.

Quality in Outdoor Recreation

Stewart and Cole's study relies heavily on the concept and measures of overall visitor satisfaction. The paper implies that overall satisfaction of visitors is the appropriate measure upon which to base park and wilderness management. (This assumption is more explicit in their statement that "the weak relationship between density and quality [as measured by overall satisfaction] . . . indicates that there is little empirical justification for limiting use.") And since encounters with other groups, perceived crowding, and lack of solitude/privacy generally do not detract substantively from overall satisfaction, these issues do not present adequate reason to consider use limitations (so the authors argue). However, there are a number of problems with using overall satisfaction as a research and management criterion. Overall satisfaction is so broad and coarse a measure that changes in recreation opportunities potentially important to visitors may simply not register in a substantive way. Nearly universally high measures of satisfaction in outdoor recreation are suggestive of this problem (e.g., Bevins, 1992; Brewer & Gillespie, 1967; Burns et al., 1998; Dwyer, 1993; ORRRC, 1962; Vaske et al., 1982). [And, in fact, Stewart and Cole also report high levels of visitor satisfaction and generally low variance.] This issue is compounded by 1) the potentially overwhelming character of natural and/or cultural features in many national parks and wilderness areas which may simply "overpower" most other variables that could influence visitor satisfaction, and 2) the fact that recreation activities are generally self-selected thereby contributing to the likelihood of finding relatively and uniformly high levels of visitor satisfaction. A dependent variable (like overall satisfaction) that tends to be highly skewed and exhibit low variance is unlikely to be highly correlated with *any* independent variable. Does this mean that park and wilderness experiences should go unmanaged? Even when visitors express confidence in their judgments of the acceptability of various impacts of recreation use? Recent studies in several national parks, for example, suggest that visitors are relatively confident in their ability to answer questions that ask them to evaluate alternative levels of use and associated impacts, and that most visitors agree that park and wilderness management agencies "should manage

visitor use levels based on the kind of information collected" in the types of studies Stewart and Cole suggest have such little value (Manning et al., 2001). While these finding are clearly not definitive, they continue to add credence to the validity and potential usefulness of research on crowding and related norms.

Moreover, the literature suggests that visitor satisfaction is a multidimensional concept that is influenced by a potentially broad array of elements of the resource, social and managerial environments (e.g., Beard & Ragheb, 1980; Burns et al., 1998; Connelly, 1987; Dorfman, 1979; Floyd, 1997; Foster & Jackson, 1979; Williams et al., 1991). Consequently, multiple-item scales of visitor satisfaction have been explored as an alternative to more simplistic, global, single-item measures (Ditton et al., 1981; Ditton et al., 1982; Graefe & Fedler, 1986; Rollins & Chambers, 1990; Vaske et al., 1991). However, the multiple-item scale adopted by Stewart and Cole may not fully meet this spirit. While the scale is comprised of five items, all of the items are actually single-item measures that are largely permutations of the same global notion: overall satisfaction ("I thoroughly enjoyed today", "I cannot imagine a better place to be than in this backcountry", "My trip here is well worth the cost", "I do not want to have any more days like this one", "I was disappointed with some aspects of today"). A stronger, multiple-item scale might have addressed selected, substantive elements or dimensions of the visitor experience, including resource, social, and managerial components.

Finally, overall satisfaction is a relative, subjective concept. For example, the same type of recreation opportunity might be judged as very satisfying to one visitor and substantially less satisfying to another visitor. Aside from the methodological problems associated with this issue, this raises longstanding concern over the potential problem of coping behaviors and their research and management implications. If some visitors are sensitive to crowding, and if use levels are allowed to rise, then some sensitive visitors may be displaced to alternative locations and/or times, and may be replaced by visitors less sensitive to crowding. (A number of studies in outdoor recreation have documented substantive levels of spatial and temporal displacement and other forms of cognitive and behavioral coping (e.g., Anderson & Brown, 1984; Hammitt & Patterson, 1991; Manning & Valliere, 2001; Robertson & Regula, 1994; Vaske et al., 1980). From a research perspective, this suggests that a reason for lack of stronger relationships among use level/encounters, crowding, and overall satisfaction is that visitors who are sensitive to use levels/encounters and crowding have been displaced or have adopted other coping mechanisms. From a management perspective, this suggests that relying on relative, subjective measures such as overall satisfaction may

[1]However, even early research on crowding-related norms did not ignore the relative importance of crowding to visitors. For example, distance of the crowding-related norm curve above and below the neutral point of the evaluative scale—sometimes called norm "salience" or "intensity"—is a measure of the relative importance visitors place on crowding (Shelby & Heberlein 1986; Vaske et al. 1986; Manning 1999).

lead to the disappearance of certain types of outdoor recreation opportunities, even though there is demand for them. The sub-samples of respondents that Stewart and Cole identify as being especially sensitive to use levels/encounters suggest that, without use limits or other related management actions, these visitors may soon be forced to adopt such coping mechanisms.

The problems with overall satisfaction outlined above have led to a new approach to defining quality in outdoor recreation, as well as several, related frameworks for planning and managing parks and wilderness. Given the potential issues outlined above, quality in outdoor recreation might best be defined not through measures of overall visitor satisfaction, but as the degree to which outdoor recreation opportunities meet the objectives for which they are planned and managed. In this way, parks and wilderness would be managed for explicitly defined objectives and opportunities, not by simply monitoring overall visitor satisfaction which may lead to a process of "creeping incrementalism". This approach to defining quality in outdoor recreation has given rise to several, related frameworks for planning and managing parks and wilderness, including Limits of Acceptable Change (LAC) (Stankey et al., 1985), Visitor Impact Management (VIM) (Graefe et al., 1990), and Visitor Experience and Resource Protection (VERP) (Manning, 2001b; National Park Service, 1997;). In these frameworks, recreation opportunities are defined and managed on the basis of management objectives that are ultimately quantified through indicators and standards of quality. Indicators of quality are objective, measurable, manageable variables that help quantify management objectives and define the type of recreation opportunity to be provided. Standards of quality define the minimum acceptable condition of indicator variables. Quality in outdoor recreation is measured and maintained by monitoring indicator variables and adopting management practices to ensure that standards of quality are not violated. For at least some park and wilderness areas, solitude may be an appropriate management objective, number of groups encountered along trails and at campsites, along with other objective crowding/solitude-related variables, may be appropriate indicators of quality, and surveys of park and wilderness visitors may be a useful approach to formulating associated standards of quality.

Tradeoffs in Outdoor Recreation

Stewart and Cole raise the important issue of potential tradeoffs between solitude and public access to parks and wilderness. Both solitude and access are generally seen as desirable attributes of park and wilderness opportunities, but they may inherently conflict: high levels of solitude suggest that relatively few visitors might be allowed access to parks and wilderness, and vice versa. Stewart and Cole note that research on crowding-related norms of park and wilderness visitors has conventionally been conducted in the context of "unconstrained preferences"; that is, visitors have been asked to evaluate alternative use levels (e.g., number of encounters, people-at-one-time, waiting times, ability to camp out of sight and sound of others) without

considering the potential costs of such judgments on maintaining desired access to parks and wilderness. While this criticism may have some validity as it applies to a first generation of normative research, progress is being made on this issue in more recent research. For example, the study my colleagues and I conducted at Acadia National Park (Manning et al., 1999) asked visitors to evaluate a range of use levels using a variety of "evaluative dimensions." One of these questions (what we called the "management action" dimension) asked visitors: "Which photograph shows the highest pattern of visitor use that the *National Park Service should allow* on this section of the carriage roads? In other words, at what point should visitors be restricted from using the carriage roads?"

The purpose of this question was to more explicitly introduce the issue of tradeoffs between solitude and access. As Stewart and Cole would likely have hypothesized, the crowding norms found in this question were higher than those found using conventional, unconstrained questions. We also asked visitors to judge alternative levels of use using the evaluative dimensions of "preference" (what visitors would prefer) and "absolute tolerance" (the point at which respondents would no longer visit the park). Study findings provide a rich source of empirical information that offers multiple insights into how visitors evaluate alternative use levels and that might help inform management judgments about acceptable levels of use and, ultimately, the appropriateness of use restrictions.

More recent research has begun to explore alternative theoretical and methodological approaches to quantifying the tradeoffs between solitude and access, as well as other inherent tradeoffs in outdoor recreation (Manning, 2001a; Manning & Lawson, 2002). For example, a study of visitors to Delicate Arch in Arches National Park used indifference curve analysis (from the discipline of economics) to focus explicit attention on the tradeoffs between solitude (measured as the number of people-at-one-time (PAOT) at Delicate Arch) and access (measured as the percentage chance of receiving a permit to hike to Delicate Arch) (Lawson & Manning, 2000; Manning, 2001a; Manning & Lawson, 2002; Lawson & Manning, 2001). Visitors were asked a series of "paired comparison" questions that contrasted alternative combinations of solitude and access. For example, respondents might have been asked if they would favor 1) seeing up to 100 PAOT at the arch and having a 100 percent chance of receiving a permit or 2) seeing up to 50 PAOT at the arch and having a 50 percent chance of receiving a permit. Perhaps contrary to what Stewart and Cole might have hypothesized, a majority of visitors reported that they would prefer to give up some of their current level of access to ensure that current levels of solitude are not violated. [A similar study, conducted with Stewart and Cole, was administered to private boaters on the Colorado River through Grand Canyon National Park using several measures of use levels/encounters and length of time needed to obtain a permit.]

While indifference curve analysis might provide useful insights into this and related issues, it is inherently limited to bivariate approaches. However,

stated choice modeling and conjoint analysis can be applied to analyze tradeoffs in a multivariate context (Green & Srinivasan, 1978; Louviere & Timmermans, 1990). In a recent study conducted at Denali National Park, overnight wilderness visitors were asked to express their preferences for alternative pairs of wilderness experiences (Lawson & Manning, 2001a; Lawson & Manning, 2002). Each wilderness experience was comprised of six attributes: 1) number of other groups encountered per day while hiking, 2) opportunity to camp out of sight and sound of other groups, 3) extent and character of hiking trails, 4) signs of human use at campsites, 5) regulation of camping, and 6) chance of receiving an overnight backcountry permit. Three levels of each attribute were used to construct the alternative wilderness experiences. For example, number of other groups encountered per day while hiking was described as either 0, 2 or 4. Data analysis indicates which attributes are most important to respondents and may even suggest "threshold" levels or standards of quality for each attribute. Study findings identified lack of campsite impacts as the most important attribute to wilderness visitors at Denali. However, crowding/solitude-related variables comprise the second most important tier of wilderness attributes or indicators of quality. Access-related attributes were least important to respondents. In other words, visitors to the Denali wilderness prefer to give up some access to the wilderness to ensure that certain resource and social conditions (including solitude) are protected.

What to Do About Crowding and Solitude?

Stewart and Cole conclude their paper with a discussion of the implications of their (and others) research for decisions about use limits. Some of the thoughts they present warrant additional consideration and may lead to alternative interpretations and conclusions. They begin by stating that the generally weak relationship between use level and overall satisfaction "is a highly significant finding because it indicates that there is little empirical justification for limiting use." However this ignores the contemporary approach to park and wilderness management (outlined above) that stresses formulation of management objectives for recreation opportunities as opposed to reliance on subjective, global measures of overall visitor satisfaction. Moreover, crowding and solitude are traditional and appropriate management objectives for many parks and wilderness areas. The notion of solitude is deeply engrained in the historical and cultural evolution of national parks and wilderness in the U.S. and is even codified in the legislation creating many parks and the National Wilderness Preservation System (Hendee et al., 1990; Nash, 2001; Runte, 1997). [The Wilderness Act, for example, defines wilderness areas as offering "outstanding opportunities for solitude."] If and when use levels begin to substantively degrade opportunities for solitude (as Stewart and Cole's data suggest they might), then use limits may very well be justified.

Stewart and Cole state they are skeptical of limiting use in parks and wilderness, and that this skepticism is based on lack of a strong relationship

between encounters (and presumably other manifestations of use levels) and overall satisfaction. But as their study shows, encounters are more strongly related to perceived crowding and solitude. If solitude is an appropriate objective for recreation opportunities provided by at least some parks and wilderness areas, then encounters (and use levels) may ultimately have to be limited (or otherwise managed). Thus, the potential justifications for limiting/managing use include 1) the cultural centrality of solitude/crowding in parks and wilderness, 2) the legal/policy mandates for providing opportunities for solitude in parks and wilderness, 3) the relationship between use levels/encounters and solitude/crowding, and 4) the fact that encounters (and other manifestations of use level) meet criteria for good indicators of quality (Manning, 1999; Merigliano, 1990; National Park Service, 1997; Schomaker, 1984; Stankey et al., 1985; Whittaker & Shelby, 1992). With regard to this last point, encounters and related measures of use levels 1) are often important in defining the quality of park and wilderness experiences (as expressed by visitors and/or as dictated in organic legislation), 2) can be objectively measured, 3) are related to solitude/crowding, 4) are manageable, and 5) are potentially synthetic or integrative (that is, they may be indicators of multiple management objectives, including other types of social impacts, resource impacts, and stress on management). All these reasons may help explain why there has been the longstanding and continuing interest in use levels, encounters, crowding, and solitude that Stewart and Cole note.

Some researchers may argue that solitude/crowding is influenced by variables in addition to use levels/encounters, and thus use levels/encounters are inadequate measures of solitude/crowding. While the premise of this argument is correct, the conclusion may not be. Thanks to research like that conducted by Stewart and Cole, we know quite a bit about the relatively complex issue of crowding in parks and wilderness (Manning, 1985; Manning et al., 2000). For example, perceived crowding is related to use levels, but can also be influenced by other variables such as 1) types of visitors encountered, 2) behavior of visitors encountered, and 3) location of encounters. In some cases, these variables can be incorporated into research and, ultimately, management. For example, the studies my colleagues and I conducted at Acadia National Park (noted above) used photographs to represent a range of use levels along the carriage roads (a system of multiple use trails) (Jacobi & Manning, 1999; Manning, 1999; Manning et al., 1998; Manning et al., 2000). The research design included not only alternative numbers of visitors, but alternative combinations of types of visitors (hikers and bikers). Study findings indicate the relative contribution of both number and type of users on visitor judgments of acceptable conditions, and this type of information can be used to help formulate associated standards of quality and inform judgments about appropriate levels and types of use. [In this study, the number of visitors was found to be more important than type of visitor (Manning et al., 2000).] The research at Acadia also attempted to address behavior of visitors by identifying "problem behaviors" of both hikers and bikers and exploring empirical approaches to developing standards of quality for these behaviors (Jacobi & Manning, 1999). At Acadia, park management has for-

mulated standards of quality for both number of visitors and selected problem behaviors, and regularly monitors these indicator variables (Jacobi & Manning, 1997). However, in some cases, variables that may influence perceived crowding may simply not be manageable (or may not feasibly be managed). For example, the location of encounters (e.g., near a trailhead or farther along the trail) may be important to visitors, but may simply not be feasible to manage. Scientists are good at ferreting out the detail and nuance associated with complex issues, but managers are stuck with managing what they can.

As an alternative to the crowding norms research that Stewart and Cole critique, they advocate regional analyses of the supply and demand for alternative recreation opportunities as the appropriate way to determine when and where use limits may be justified: ". . . we should look to the regional context of recreational opportunities for justification of use limits, not the preference of current on-site users." Unfortunately, they do not elaborate on the how this research would be conducted, nor how it might be used in management decision-making. Their recommendation dismisses research on crowding-related and other norms of current on-site visitors, as well as related research described above. It may be more realistic and productive to think that there might be value in both of these basic research approaches (regional analyses of recreation demand and supply, and surveys of on-site visitors), that both have advantages and disadvantages, and that they might actually be complimentary. In fact, my colleagues and I have recently published comparative crowding-related normative data from a series of studies on visitors to several parks and rivers in the Colorado Plateau region, illustrating how such data might be useful in regional park and wilderness planning (Warzecha et al., 2001).

Near the end of their paper, Stewart and Cole introduce some less than favorable observations about research (and researchers) involved with studies on crowding and related norms of park and wilderness visitors. The authors suggest that "Less careful interpretations have led to accusations that scientists have ignored empirical data and excluded the values of certain clienteles in an attempt to protect the values of more 'personally compatible social strata'." [Earlier in their paper, interpretation of this research by scientists and managers is characterized as "irresponsible and dishonest".] While these thoughts are attributed to others, they do little to elevate the professional discussion and debate about the important topic of use limits in parks and wilderness. Research (and researchers) should be as objective as possible, and I see little evidence that this is not the case in research on crowding and solitude in parks and wilderness. Perhaps Stewart and Cole are alluding to the fact that findings from studies on crowding-related norms of park and wilderness visitors should be accompanied by statements about the potential limitations of such data, and that other types of information (e.g., resource fragility, legal and policy mandates, historic precedent, interest group politics, regional context, opinions of people who may not visit parks and wil-

derness) should also be considered in management decisions about appropriate park and wilderness use levels. [My colleagues and friends, Stewart and Cole, are good about reminding me of this during our shared hikes, river trips, and other park and wilderness experiences, and they are right!] Nevertheless, this does not necessarily discount (nor certainly dismiss) the potential value of crowding-related norms of park and wilderness visitors.

In their Discussion section, Stewart and Cole write that their research "does not mean that feeling crowded is unimportant and that limiting use is inappropriate", but that their findings suggest "that managers should be cautious about implementing [use limits]." I agree! And in this spirit it seems reasonable to engage park and wilderness visitors to help evaluate the importance of solitude/crowding and acceptable use levels, especially when these judgments are rendered in a larger context of their inherent tradeoffs with other park and wilderness experience attributes, including reasonable public access. However, elsewhere in their paper, Stewart and Cole state that "user-based empirical research is of limited utility in grappling with [use limits]" and that "we should. . .not [look to] the preference of current on-site users" in dealing with this issue. I disagree! Empirical research on park and wilderness visitors may not be fully sufficient, but is certainly desirable and may be necessary.

Finally, Stewart and Cole's cautionary tone is appropriate to the important topics of more fully understanding park and wilderness experiences and managing appropriate use levels. However, there are two dimensions of such caution, much like there is both Type I and Type II error associated with statistical analysis. Following this analogy, Stewart and Cole are driven by Type I error—concern about limiting park and wilderness use for reasons of crowding and solitude when these reasons may not be as important as other considerations such as public access. However, Type II error—not limiting park and wilderness use when such use may substantively diminish the quality of visitor experiences and/or the objectives for which parks and wilderness are managed—could be equally costly. The number of park and wilderness areas that limit overall public use is relatively small. Even fewer limit use in a way that is informed by empirical research on park and wilderness visitors. This suggests that *more* research on visitor-based evaluations of crowding, solitude and related issues—not less—may be warranted.

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