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# The Relationship between Amount of Visitor Use and Social Impacts

## CONTRIBUTING PAPER

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**STEWART ALLEN**  
**SOCIOECONOMIC SPECIALIST, BUREAU OF LAND MANAGEMENT**

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### **Introduction.**

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A July 2016 opinion article in the Bend Bulletin for central Oregon describes an all-too-common occurrence: “The scene at many Wilderness trailheads on the Cascade Lakes Highway on any given weekend can feel more like visiting a festival than entering a forest.” Use of the term “festival” clearly suggests that the social impacts present are not viewed as appropriate for a wilderness trailhead setting.

To better understand the nature and extent of the problem, we need to ask a few more questions. Are the trailheads the only places that are crowded? Are there enough trails to quickly disperse users, so solitude—one of the goals of wilderness management—is achievable a few minutes down the trail? Does the congestion only occur on weekends, while ample opportunities for solitude exist during the week, or before and after the peak summer season? Is it the behavior of other visitors or the number of other visitors present that makes it feel more like a festival? And does the person describing the atmosphere as a festival have stricter standards than most other visitors?

These are the types of questions that research on social impacts, defined as how direct or indirect contact with other visitors affects visitors’ experiences, has addressed over the past few decades. This paper explores the nature of social impacts, how researchers have measured them, and how federal land managers have responded to the research results. By summarizing the relevant research, we gain insight into the relationship between the amount of use and social impacts. This relationship is not linear and depends on many factors, some outside the control of managers. The following sections address the role of social conditions and impacts in visitor settings and then focus on research on crowding and conflict, the role of social norms, and managerial application of the research.





*Artist painting mountain views.*

## **The Role of Social Conditions in the Visitor Experience.**

One effect of visitor use and increased use, as described by David Cole, is environmental. The impact of visitors on landscape naturalness and resources is a major consideration in places such as wilderness areas, national parks, wild and scenic rivers, forests, and other protected areas where resource protection is mandated.

The other type of effect is social; the quality of visitors' experiences is at risk if people feel crowded or otherwise negatively affected by other users present. Social conditions have always been recognized as a key component of visitor quality. The "Visitor Use Management Framework" includes information about providing a diversity of settings using the Recreation Opportunity Spectrum (Clark and Stankey 1979) as a way to develop desired conditions, including desired social conditions. The combination of characteristics present at a particular setting describes the types of opportunities for experiences that are facilitated. One of the six characteristics used to describe recreation settings is the level and type of social interaction, which varies across the spectrum: low levels of interaction are considered appropriate and expected in primitive settings, while high levels of interaction may be acceptable in more modern or developed settings. Social conditions affect visitors' abilities to achieve expected and desired consequences of their participation, which in turn produce a variety of benefits (Driver 1976).

Much research has focused on the relationship between the amount of visitor use and the resulting social impacts, leading one to assume that amount of use is the critical variable in predicting social impacts. This assumption generated extensive research on social carrying capacity, defined as "the level of use beyond which social impacts such as crowding and conflict exceed acceptable levels specified by evaluative standards" (Needham et al. 2013).

However, the relationship between amount of visitor use and social impacts is not straightforward. Visitors' perceptions of crowding and other negative social impacts are more likely to increase as use increases, but the relationship is mediated by many variables. Amount of use is only one of many social variables that influences the quality of visitor experiences (Cole and Stankey 1997). Direct and indirect contact includes awareness of others' presence through sound, sight, or smell—or from environmental impacts left by previous visitors (Manning 1999). This can happen even if the impact is temporary and subtle; a resident of a remote Alaska village once lamented that seeing footsteps in the sand along a river had damaged her feeling of solitude.

Many researchers have distinguished between descriptive components and prescriptive components of visitor capacity (Manning et al. 2005). The descriptive



*Sunday shuttle line at Zion on a busy holiday weekend.*

components evaluate indicators by measuring the relationship between the number of visitors and the number of encounters or the relationship between the level of use and perceptions of crowding. The prescriptive components address thresholds—what level of social impact to the quality of the visitor experience is acceptable? To identify visitor capacity requires consideration of both components.

### **Crowding and Conflict.**

Visitor capacity is defined as the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established. Although it is not quite this simple, the impact of the amounts of visitor use can be thought of as crowding, while the impact of the types of visitor use can be thought of in terms of conflict.

Crowding, one type of social impact that has been extensively studied, is a value judgment that the density of visitors or number of encounters with others is too great (Vaske and Shelby 2008). While crowding is certainly related to the amount of use—specifically to the number of others present at the recreation setting—numbers alone do not predict whether people will feel crowded. The number of people in a recreation setting is simply a measurement and, as such, has no psychological or experiential meaning, whereas crowding is a subjective and negative judgment about a given amount of visitor use (Manning 1999). Crowding is therefore considered a normative concept that a visitor perceives when the level of use increases to a point at which one's experience is being negatively affected—their norm for direct or indirect encounters with others has been exceeded.

Because crowding is subjectively experienced, the number of reported contacts with others is typically more highly correlated with satisfaction than is the actual number of users in a recreation setting at one time. Graefe and others (1984), in a review of 20 years of research on visitor crowding and capacity, concluded that it is difficult to predict visitor satisfaction from either the number of actual contacts or from density calculations. Tarrant and others (1997) found that preferred number of encounters is a better predictor of perceptions of crowding than the estimated actual number of encounters. Therefore, managers need to know about user preferences and perceptions of crowding as well as actual social conditions at the site.

Researchers have established that perceptions of crowding depend on characteristics that can be grouped into three categories (Manning 1999). The first is personal characteristics of visitors, such as visitor motivations, expectations of crowding, and level and type of past experience. For example, people seeking solitude as part of the experience are more likely to be negatively affected if they encounter other people; they feel crowded at lower use levels than do other visitors. As another example, visitors that have more experience in a setting are likely to be more sensitive to higher use levels (Manning 1999).

The second set of characteristics affecting perceptions of crowding is the characteristics of other visitors encountered, such as mode of travel, behavior, and perceived similarity (Manning 1999). In general, if groups encountered are perceived as similar to one's own group, and little conscious attention is required to deal with them, then those encounters are less likely to negatively affect visitors' experiences or to exceed their norms for crowding, even for those seeking solitude as part of the experience. However, groups that are different or viewed as disruptive (such as exhibiting loud or counternormative behavior) can contribute to feelings of being crowded. This can also lead to conflicts aside from the perception of crowding.



*A crowded boat launch.*

The third category involves situational variables such as the type of recreation setting, location within the setting, site design features, and signs of impact left by other visitors (Manning 1999). For example, visitors to wilderness areas are more sensitive to crowding at campsites than on trails and more sensitive when they are farther away from the trailhead. People can feel crowded even with few others present if site conditions

such as facilities or screening between campsites is perceived as inadequate.

Given that crowding is subjectively experienced, it is not surprising that a common research method is simply to ask visitors the extent to which they feel crowded. Vaske and Shelby (2008) reviewed 181 studies conducted over a 30-year period that used a 9-point scale (with one end of the scale labeled "Not at all crowded" and the other end "Extremely crowded"). The results were then correlated with other information collected such as visitor characteristics, motivations, evaluations of site characteristics, and past experiences, as well as with site characteristics such as level of use present. The researchers concluded that the 9-point scale was not a substitute for information about use levels, impacts, and evaluative thresholds but was a simple method to gain insight about visitor perceptions of conditions at given sites and times.

Researchers have also fared well using visual portrayals (photographs) or simulations of use levels at a site and asking visitors questions about the acceptability or unacceptability of the numbers present. This allows researchers to systematically

vary the number or type of visitors present at one time. Visual approaches may work better in high-density situations than numerical approaches such as asking visitors about numbers of encounters (Manning 1999). This does not mean that we want to manage only for visual impact when establishing capacity; direct visual encounters are only one type of social impact.

Photographs or simulations are well suited to asking visitors about several different types of thresholds that are useful to managers. These include asking visitors to select a photograph that best represents the people-at-one-time (PAOT) condition they experienced on the day of their visit, the PAOT they prefer to experience, the maximum PAOT the agency should allow before restricting visitor use, and the PAOT that is so unacceptable that they would no longer visit the area. This represents a range of thresholds that could be implemented, assuming that PAOT is established as an indicator of visitor satisfaction (Manning 2007).

Crowding has been studied at a variety of recreation settings, with different lessons to be learned in each. Forest and river planners and researchers may not be familiar with the many studies of beaches around the world, where visitors concentrate along desirable, accessible shorelines, so crowding can be an issue (De Ruyck et al. 1997; Jurado et al. 2009). Use of beaches, similar to the use of other recreation settings, tends to be distributed unevenly rather than uniformly; visitors are concentrated near main access points, facilities, lifeguard towers, and surf breaks or prime snorkeling locations. The small and defined space of a beach allows researchers to count the actual number of visitors present and then ask visitors about their perceptions of crowding.

Researchers have found that visitors who go to the beach for a social experience prefer developed beaches with crowds and activity, while those who seek nature experiences prefer undeveloped beaches with natural beauty and fewer visitors (De Ruyck et al. 1997). The social motivation naturally leads to a social norm for which higher levels of encounters are acceptable. In places where expectations of seeing many other visitors is high or when enjoyment of the experience does not depend on the number of others seen or perceptions of crowding, then use levels may not be a big management issue, as is the case at Kailua Beach Park on the windward side of Oahu (Needham et al. 2008). Even if users reported feeling crowded and encountered more visitors than they felt was acceptable, they were still satisfied with their visit. These results illustrate the importance of considering social norms in the context of visitor motivations, desired experiences, and outcomes, as well as the ability of visitors to cope with conditions encountered.

Conflict has more to do with the types of use present at a site, rather than numbers of visitors at a site. Conflict has generally been defined as occurring when a visitor or group's goal or expectation is not met, or is diminished, due to the behavior of another visitor or group (Jacob and Schreyer 1980). By this definition, crowding is a type of conflict. Researchers have distinguished between interpersonal conflict that occurs onsite and social values conflict, which can occur when visitors have different norms or values regardless of whether they come into contact with each other (Vaske et al. 1995).



*Snowmobiles and bison share the trail.*

Much of the conflict research has focused on conflicts between motorized and nonmotorized recreation participants such as canoeists and motor boaters, skiers and snowmobilers, and off-highway vehicle and non-off-highway vehicle users, but conflicts also have been studied between skiers and snowboarders, hikers and mountain bikers, and other users who share a recreation setting (Graefe and Thapa

2004). As outdoor recreation technology progresses, we can expect to see more conflicts, such as those involving fat tire biking and cross-country skiing or users of electric mountain bikes and other trail or road users. Conflicts can also be present among participants in the same activity, such as when river floaters compete for campsites with other groups or when hikers come upon litter left by other hikers.

Thus, onsite conflicts do not depend on the number of other visitors present but on the ways in which they are behaving, how they are perceived, and whether their behavior is detracting from the experience. Like crowding, conflicts are influenced by social norms, so it is worth taking a closer look at how researchers have studied norms and the implications for recreation managers.

### **Research on Social Norms.**

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Because crowding and conflict are subjectively perceived, managers depend in part on the perceptions of visitors to determine when social conditions at a recreation setting lead to unacceptable social impacts. Individual visitors have their own opinions on social conditions, including amount of use, that are acceptable or unacceptable. But recreation managers are less concerned with each individual evaluation than with group norms and how visitors collectively evaluate social conditions.

Research suggests that visitors and other stakeholders often have norms or standards about the resource and social conditions acceptable in a setting and that those norms can be used, along with other information, to identify indicators and thresholds of quality. Norms in park and outdoor recreation settings are standards used by individuals (and which can be aggregated to identify social norms) to evaluate behavior and social and environmental conditions (Shelby and Vaske 1991). Norms for social encounters and the point at which social impacts result vary by setting, timing of use, and many other factors. For example, fly fishers on some streams have a norm not to fish a hole if someone else is already there (Allen 1987). Capacity is then essentially established by the number of fishing holes available on a stretch of river and the amount of time anglers tend to spend at each. Conflicts can result when a new fisher who is not familiar with the norm attempts to fish an already occupied fishing hole. On other rivers, such as sections of Alaska's Russian

River when the salmon are running, norms (and capacities) become extremely lenient, as anglers are willing to accept fishing nearly shoulder to shoulder in order to catch a big king salmon. The high use levels are not preferred, but they are tolerated because anglers are aware of the high demand for and limited supply of the opportunity.

A good example of how researchers have studied social norms to help them identify visitor capacity is research conducted at Brooks Camp, a famous bear viewing area on the Brooks River in Katmai National Park in Alaska (Whittaker 1997). In one study, visitors were asked to specify the acceptable number of visitors at one time (i.e., not an upper limit or visitor capacity) on each of two bear viewing platforms. The platforms differed in design, and one was four times larger than the other. Most viewers could specify their norms and agreed on some capacities, so a social norm did exist. Visitors during the lower use September season had higher levels of agreement on acceptable numbers, indicating a stronger social norm, and had lower acceptable use levels. People using the smaller platform also had lower acceptable use levels.

However, a surprising finding was that the differences in norms for the two platforms, although statistically significant, were not large given the size and design differences between them. Whittaker (1997) concluded that there were upper limits for platform capacities, regardless of their size and design. Not surprisingly, factors such as distance between viewers, levels of noise, interference with tripods or telephoto lenses, and other types of behaviors influenced ratings of acceptability. Whittaker concluded that the social dynamics of large groups were not compatible with quality viewing experiences. This is a setting where the number of people at one time was a relevant indicator of recreational quality and where social norms were able to be determined. The management implication is that, from a social impact perspective, it is probably better to have more smaller platforms than fewer larger ones.

It is easy to see how the previous crowding research can be analyzed to determine social norms. For example, researchers can look at the level of agreement among a group of visitors to a site using the 9-point crowding scale. Subgroups of visitors can be analyzed separately to assess whether their means are statistically higher or lower than the scores of other visitors, to see whether the subgroups have different norms for crowding. Other questions can help determine whether differences observed are related to demographic differences, activity participation, style or length of participation in an activity, experience at the site, season or timing of use, or other factors.

Needham and others (2013) examined the congruence among encounters, norms, and satisfaction with six types of facilities and the actual number of these facilities at Oahu beaches. The majority of users recalled encountering fewer of each facility than the number they believed should be at each site. They also reported to be less satisfied with facilities. However, researchers found that there were actually enough of most facility types to meet the norms; the visitors simply had not encountered or

remembered them. The lesson is twofold; visitor norms are truly subjective, and in such cases, managers should consider appropriate ways of informing people about existing facilities.

### **Applications of Social Impact Research.**

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Managers have used the results of research on crowding and other social impacts to contribute to decisions about visitor capacity. One lesson learned is that it is more appropriate to ask "what are acceptable resource and social conditions" than to simply ask "how much use is too much." This places the emphasis on management goals and desired social and environmental conditions. That said, an indicator for many types of recreation settings involves numerical variables, such as the number of groups other visitors encounter on the trail, or the number of visitors present at an attraction site, or the number of campsites one must pass by because they are occupied by another group.

Research and experience have demonstrated that managers do not always need to establish a visitor capacity to provide quality recreation experiences. Some areas have mandates to identify visitor capacity, but even in those cases, decisions can be made on how rigorously those estimates need to be developed, especially initially. Monitoring satisfaction, site conditions, and other outcome variables is one tool managers use to identify how well existing measures are working and if management changes should include addressing visitor capacity.

Manning and others (2005) present a case study of how research has been used to inform social (and resource) visitor capacity at Boston Harbor Islands. When managers realized that resource and social impacts were posing risk to the quality of visitors' experiences, they worked with researchers to conduct two visitor surveys. The first was used to identify indicators of quality of the visitor experience: the number of people at one time at selected attraction sites, the number of groups encountered per hour while hiking, environmental impact present at trails and campsites, amount of litter and graffiti, and amount and quality of information about the park. The second survey was used to measure visitors' normative thresholds of quality for the indicators. The National Park Service and Boston Harbor Islands Partnership used this information to zone the park lands into six categories, each with management objectives, indicators, and thresholds of quality for both natural and social conditions, thereby providing a range of visitor opportunities. Monitoring ensures that thresholds of quality are maintained and management actions can be taken if a standard is at risk of being exceeded. Note that this management approach addresses not just the amount of use but the type of use; zoning would also be expected to reduce conflicts among recreation visitors.

This is not an atypical management scenario, in that both resource and social impacts are considered in management, and level of use plays a role in the type of social impact present but is not the only concern. For example, it only takes one person to litter or one person to tag a wall with graffiti. The level of tagging may not increase in a linear fashion as visitation increases. Factors such as the



presence of existing litter, signifying its social acceptability (i.e., social norm), may have a greater impact on subsequent levels of littering than the number of visitors (Cialdini et al. 1990).

Once managers realize that there may be social problems associated with visitor use levels, the solution seems simple at first; if the problem is too many visitors, then limit the number. However, what David Cole says about biophysical impacts applies to social impacts: “If the goal is to limit or reduce impact, there are likely to be more effective ways to accomplish this goal than limiting use.” Visitor capacity is just one tool in the manager’s box to reduce human-caused social (and other human-caused) impacts in recreation settings, and often the most controversial action, especially when visitor use is already established (McCool 2001).

Charging or increasing a use or entry fee is also a way of limiting use, although this raises environmental justice issues such as displacement of low-income visitors (Lamborn et al. 2017). Increasing entry fees and reducing use could also have economic effects. Studying proposed National Park Service entry fee increases, Sage and others (2017) found that the increase could cause Yellowstone National Park’s gateway communities to lose \$3.4 million annually from visitors buying 7-day passes. The strongest drop in visits was expected to come from people who live in the Yellowstone region, since the proposed fee increase was larger for them relative to their overall total trip costs.

Recreation managers often try to achieve goals using less obtrusive measures first. Management strategies to reduce social impacts include many potential management actions: limiting the impacts of visitors on other visitors through noise limits and vegetative screening; distributing use; managing physical access and infrastructure; providing shuttle or transportation systems; changing staffing levels; assigning campsites; regulating the number of guides, outfitters, or transporters in an area; or prohibiting some forms of travel. If the issue is recreational conflict, zoning to separate the conflicting uses is a common strategy, although it may not be effective unless use patterns are well known and enough separation between activities is possible given site characteristics.

Managers also can provide information on use patterns to visitors and potential visitors to shape more realistic expectations. Researchers studying crowding on the Nantahala River recommended that managers communicate with river users, and rafters in particular, regarding behavior and expectations for crowding: “Based on our findings, changing boaters’ preferences for encounters with rafts (in particular) and at the rapids would probably be an effective approach for reducing perceived crowding levels” (Tarrant et al. 1997).

If identifying visitor capacity is necessary (legally required or needed to meet desired conditions), there are many considerations regarding social impacts. On many rivers in the Western United States, use limits have been implemented through lottery-based permit systems, guaranteeing a low number of encounters and reducing campsite competition. The U.S. Forest Service takes additional measures on the

Middle Fork of the Salmon River such as assigning campsites to eliminate campsite competition. These measures also have downsides; having designated campsites each night reduces the freedom associated with running a wild and scenic river, and the lottery greatly reduces availability of the opportunity. For example, on the Middle Fork, the ratio of permits to applications varies from 1:20 to 1:60 depending on the timing of the desired permit. Many people may never get the chance to float the river unless they are lucky or can afford it and have the inclination to go down the river with a commercial outfitter. If adequate flow levels are present, use will likely increase in the shoulder seasons, perhaps causing crowding in those seasons as well. Managers then must decide whether to accept those social impacts in return for unlimited access, to extend the peak season, or to take other actions depending on the specific problems.

There is also the issue of how to quantify and monitor visitor capacity. Assuming that information on social norms exists, and that the number of people at one time has been determined to be a good indicator of recreation quality, one could establish a threshold, such as 30 or fewer people at one time are at an attraction site 90 percent of the time (Wang et al. 2001). Defining the threshold this way allows the desired limit to be exceeded 10 percent of the time, which is realistic if you know the standard will be exceeded on holiday weekends and other popular times. Still, how to avoid exceeding the standard can be difficult. Capacity decisions should also take into account the regional supply of and demand for similar opportunities (Allen and Collins 2002) to better understand cumulative effects.

Of course, there are many challenges revealed in the multitude of studies. Visitors may be better able to define what constitutes unacceptable conditions than what conditions are acceptable (Shindler et al. 2004). Norms can vary by location within a recreation setting, timing, mode of use, activity participation, and other factors. Wang and others (2001) believed it feasible to develop a park-wide model of visitor use and develop relationships between total park use, measured in number of vehicles per day, and the condition of indicator variables, such as people at one time, at attraction sites within the park. However, this requires a very thorough understanding of visitor use patterns, a certain stability in how visitors use the site, and a robust and expensive monitoring system.

A larger issue is that visitors can adapt to social impacts over time, or they can leave the setting and be replaced by users more tolerant of greater visitation levels and social impacts. In either case, the thresholds can change, creating a new baseline for visitor capacity (Schuster et al. 2006). Managers can accept this or not, and at some point environmental impacts may become more relevant than social impacts. While this "experience creep" may be acceptable in some recreation settings, it should not be widespread.

## Conclusions.

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Level of use is not necessarily the most important management concern, nor is limiting use the best way to respond. The state of the art of visitor use management and our knowledge of the relationship between use levels and social impacts has surpassed the language present in some statutes and policies, in which the focus was on visitor capacity as a primary tool. Less obtrusive actions may address crowding and conflict problems, as well as environmental impacts.

Regular monitoring of visitor evaluations and overall satisfaction or acceptability of specific kinds of experiences is essential whether or not visitor capacity is used as a management tool. On the other hand, managers may not need extensive research findings to know they have a problem with social impacts. Managers can address the problem without setting specific objectives, indicators, or thresholds. Some agencies or specific management areas may not have the resources to conduct extensive research and monitoring efforts needed to identify visitor capacity. One planner described mandatory visitor use of a bus system that effectively limited use in a national park, for both social and biophysical reasons, as less controversial because it was implemented when use levels were low—suggesting it would be more challenging and controversial to implement a similar system at this time. It may not have solved all the problems, but it dealt with a number of them in one fell swoop.

Visitors also have options for coping with recreation settings that are crowded or where other conflicts are present, and visitors can behave in ways that minimize undesirable contacts with other visitors. For example, if visitors have flexible schedules, they can visit recreation areas when they are less crowded—on weekdays, shoulder seasons, during poor weather conditions, or at less busy times of the day. However, between work and school schedules and other commitments, many visitors do not have this flexibility. Visitors can also choose to visit less popular settings, or they can adapt by adjusting their own thresholds for what social conditions are acceptable. Note that these strategies reflect that visitors have been displaced from their normal, and perhaps preferred, use of the setting. Displacement is traditionally defined as when visitors cease using a recreation site because of sensitivity to crowding or other impacts, yet displacement can also occur due to sensitivity to increasing regulation (Hall and Cole 2000). Managers can provide information to help visitors make decisions about when and how to visit, but ultimately they must find ways to set goals and objectives that maintain a range of desired recreation experiences and benefits, a challenging task when there are seemingly infinite numbers of people seeking to share a finite space.

Let us return to the challenge of a festival atmosphere on weekends at wilderness trailheads along the Cascade Lakes Highway. We now know that there is no standard formula, no magic capacity number above which all visitors will perceive that the site is a festival and below which it is not. Yet we know what questions to ask regarding what the festival atmosphere means, whether it is acceptable, and possible ways of addressing the problem in the context of other social and physical impact issues.

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