Frameworks for Defining and Managing the Wilderness Experience

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Abstract—A large and growing body of research on outdoor recreation and the wilderness experience has been conducted over the nearly 50 years since passage of the Wilderness Act of 1964. A number of conceptual and empirical frameworks have emerged from this body of knowledge that can be used to help define and manage the wilderness experience. First, wilderness experiences can be understood as behavior that is driven by visitor motivations and potential benefits. For example, some wilderness visitors backpack in remote areas because they seek solitude and associated benefits. Second, wilderness recreation activities and settings can be instrumental in facilitating satisfaction of visitor motivations and benefits. Following the above example, opportunities for hiking in wilderness settings that are remote and lightly used are most likely to satisfy the motivation of solitude and lead to associated benefits. Third, wilderness settings/opportunities can be defined by a three-fold framework, including resource, social, and managerial conditions. Examples include, respectively, soil and vegetation impacts at campsites, the number of groups encountered along trails, and the level and type of facility development. Fourth, definition of the quality of the wilderness experience has evolved from global measures of visitor satisfaction to include measures of the degree to which wilderness recreation opportunities provide the experiences for which they are designed and managed, and the extent to which the system of wilderness recreation opportunities meets the inherently diverse needs of society. This leads to multiple definitions of the quality of the wilderness experience based on scale: the visitor, the manager, and society at large. Fifth, wilderness recreation should be guided by management objectives, and these objectives should be stated in empirical terms of indicators and standards that specify the "limits of acceptable change" for wilderness recreation settings and opportunities. For example, providing opportunities for solitude is a reasonable management objective for many wilderness areas, the number of groups met per day on trails may be a good indicator of solitude, and a maximum of five groups encountered per day on trails may be a good standard that specifies the limits of acceptable change. Sixth, formulation of indicators and standards/limits of acceptable change should be informed by social norms of wilderness visitors and other stakeholders. The sample indicators and standards suggested above are drawn from normative studies of wilderness recreation. Seventh, indicators and standards that define wilderness recreation opportunities can be configured in alternative combinations to help guide provision of a spectrum of wilderness opportunities and experiences designed to meet the diverse needs of society. This approach adapts and applies the conceptual foundation underlying the Recreation Opportunity Spectrum. These conceptual and empirical frameworks can be integrated and applied to help guide definition and management of wilderness experiences, and this is illustrated in a series of propositions, conceptual models and diagrams. Alternative interpretations of research on outdoor recreation and the wilderness experience are also discussed. It is concluded that research on outdoor recreation offers theoretical and empirical foundations for defining and managing the wilderness experience, but that this will require exercise of management judgment and a continuing program of research.

Introduction

A large and growing body of social science research on outdoor recreation, including the wilderness experience, has been conducted over the nearly 50 years since passage of the Wilderness Act in 1964. The "wilderness experience" has been found to be a diverse and complex phenomenon. However, several conceptual and empirical frameworks have emerged from the scientific and professional literature that can be used to help define and manage the wilderness experience (McCool and others 2007; Manning 2011). For the purposes of this paper, a framework is a set of organizing principles, a conceptual model, an empirical method, and/or a process that brings order and understanding to an inherently complex phenomenon. Frameworks don't answer questions or solve problems directly, but they offer a structured approach that can be used to enhance understanding and guide informed management.

The frameworks discussed in this paper address motivations for visiting wilderness areas, the relationships between wilderness settings and the visitor experience, a three-fold framework of wilderness recreation, definitions of the quality of the wilderness experience, the use of management objectives and associated indicators and standards, the limits of acceptable change, normative standards for guiding management of the wilderness experience, and application of the Recreation Opportunity Spectrum to wilderness management. This paper outlines these conceptual and empirical frameworks and suggests how they can be integrated and applied to guide wilderness management. Alternative interpretations of outdoor recreation research and the wilderness experience are also discussed.

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Conceptual and Empirical Frameworks

Motivations and Benefits

Early empirical research in outdoor recreation was primarily descriptive, focusing on the activities and socioeconomic and cultural characteristics of visitors, and their attitudes and preferences about management. But even as this descriptive foundation of information was being built, there were early signs of a deeper, more analytical interest in outdoor recreation, specifically the question of why people visit outdoor recreation areas, including wilderness.

Illustrative of this early interest in motivations for outdoor recreation was a study of fishing in the Quetico-Superior Area, MN (Bultena and Taves 1961). Observing that fishers returning to camp with empty creels were not necessarily dissatisfied with their experience, the authors hypothesized that there must be multiple motives involved in outdoor recreation. Tentative support for this hypothesis was found in an exploratory element of this study, which asked visitors to the area to rate the importance of seventeen potential motivations for their visits. While many visitors were certainly interested in catching fish, many respondents also reported that they thought of their trips as a means of escaping familiar routines and the cares associated with living in an urbanized society, along with other diverse motivations. An analogous study of hunting proposed a "multiple satisfactions approach" to this recreation activity, expanding measures of satisfaction from the traditional count of game bagged to include more varied motivations and dimensions of satisfaction (Hendee 1974). Early studies of camping and wilderness were also suggestive of multiple motivations in outdoor recreation (Stone and Taves 1958; Wildland Research Center 1962; LaPage 1967; Catton 1969; Shafer and Mietz 1969).

Beginning in the early 1970s, Driver and associates began building a conceptual foundation for the study of motivations in outdoor recreation (Driver and Tocher 1970; Driver 1975; Driver and Brown 1975; Driver 1976; Driver and Bassett 1977; Driver and Brown 1978; Haas and others 1980; Driver and Rosenthal 1982; Driver 1985; Schreyer and Driver 1989). Empirical approaches to testing these concepts were also developed and have received wide application. The conceptual foundation of this work began with a fundamental look at the nature of recreation, noting that the traditional view of recreation is based on activities—fishing, swimming, camping, and so on (Driver and Tocher 1970). While this "activity approach" has been useful for a variety of descriptive purposes, it leaves unaddressed a number of potentially important issues:

> Why is the recreationist participating in the activity? What other activities might have been selected if the opportunities existed? What satisfactions or rewards are received from the activity? How can the quality of the experience be enhanced? (Driver and Tocher 1970:10).

To better answer these questions, a "behavioral approach" was proposed whereby recreation is defined as "an experience that results from recreational engagements" (Driver and Tocher 1970). This approach is based on psychological theory which suggests that most human behavior is goal-oriented or aimed at some need or satisfaction (Crandall 1980). Perhaps the most widely recognized expression of this theory is Maslow's (1943) hierarchy of human needs beginning with the most basic requirements for physiological sustenance and ranging through more aesthetic concerns. The work of Driver and associates is based more directly on expectancy theory developed in social psychology, which suggests that people engage in activities in specific settings to realize psychological outcomes that are known, expected, and valued (Atkinson and Birch 1972; Fishbein and Ajzen 1974). Thus, people select and participate in recreation activities to meet certain goals or satisfy certain needs. In this context, recreation activities are as much a means to an end as an end in themselves.

The behavioral approach to recreation has been expanded to recognize four levels or hierarchies of outdoor recreation as illustrated in Table 1 (Driver and Brown 1978, Haas and others 1980). Level 1 represents demands for activities themselves and has been the traditional focus of much recreation research and management. Level 2 represents the settings in which activities take place. An activity such as camping, for example, can be undertaken in a variety of environmental, social, and managerial settings, each representing different recreation opportunities. Level 2 demands do not exist in and of themselves; people participate in activities in different settings to fulfill motivations as represented by level 3 demands. These motivations are desired psychological outcomes. Examples include enjoyment of the out-of-doors, developing and applying skills, strengthening family ties, learning, getting exercise, exploring, reflecting on personal values, temporarily escaping a variety of adverse stimuli at home or at work, and taking risks. Typically, more than one motivation is sought and realized from recreation participation. Finally, Level 4 demands refer to the ultimate or higher-order benefits that can flow from satisfying experiences derived from recreation participation. These benefits may be personal, social, economic, and/or environmental. However, these higher order benefits are somewhat abstract and are challenging to measure and associate directly with recreation participation. For this reason, empirical study of the behavioral approach to recreation has focused primarily on Level 3 demands and motivations.

A large group of studies on recreation motivations is based directly on the conceptual and empirical work of Driver and associates as described above. To test their conceptual formulations of a behavioral approach to recreation, these researchers have developed and refined a wide-ranging list of potential recreation motivations, along with a series of corresponding scale items representing potential motivations for participating in a designated recreation activity. Scale item measurements are usually then reduced through cluster analysis to "domains" representing more generalized categories of motivations. This research approach can be especially useful to outdoor recreation managers because of its direct focus on outdoor recreation activities and its standardization as a result of extensive empirical testing. The motivation scales have been developed and refined through dozens of empirical studies, and tests have generally

Table 1—Four levels or hierarchies of demand for outdoor recreation. (Adapted from Haas and others 1980.)

Level	Example 1	Example 2
1. Activities	Wilderness hiking	Family picnicking
2. Settings		
A. Environmental setting	Rugged terrain	Grass fields
B. Social setting	Few people	No boisterous teenagers
C. Managerial setting	No restrictions	Picnic tables
3. Motivations	Risk taking ChallengeChange of pace Physical exercise	In-group affiliation
4. Benefits		
A. Personal	Enhanced self-esteem	Enhanced personal health
B. Social	Lower crime rate	Family solidarity
C. Economic	Lower health care costs	Increased work production
D. Environmental	Increased commitment to conservation	Higher quality environment

confirmed both the reliability and validity of the motivation scales (Rosenthal and others 1982; Manfredo and others 1996).

The first generation of these studies was applied to a variety of recreation activities, but published results focused primarily on fishing (Knopf and others 1973; Driver and Knopf 1976; Driver and Cooksey 1977) and river users (Roggenbuck and Schreyer 1977; Schreyer and Roggenbuck 1978; Graefe and others 1981; Knopf and Lime 1984). Several motivational domains of recreationists have been isolated in these studies, and differences in motivations were found between selected "types" of recreationists. Trout fishers, for instance, were found to rate the motivation of "affiliation" substantially lower than did lake and bank fishers.

Recreation motivation scales were included in a series of nationwide studies investigating a broad spectrum of recreational uses of rivers (Knopf and Lime 1984). Resulting data illustrate the potential management implications of this research approach. Table 2 presents two examples. The first compares responses of river floaters on two rivers to seven motivations. Floaters on both rivers rated "view scenery" and "peace and calm" very highly, but differed substantially on other motivations. Floaters on the Delta River placed much more emphasis on learning, developing skills, exercise, escaping crowds, and being alone than did their counterparts on the Salt River. Though floaters on both rivers desired "peace and calm," they apparently define it in different ways. The implications of these findings translate directly into river management objectives, particularly with respect to appropriate use levels.

The second example in Table 2 illustrates that even floaters on the same river can differ substantially on motivations. Both first-time and repeat visitors to the Rio Grande River, NM, rated "view scenery," "peace and calm," and "learn new things"

Table 2—Motivations for river floating. (Adapted from Knopf and Lime 1984.)

			Rio Grande River	
	Delta River	Salt River	First-time visitors	Repeat visitors
	Percentage of respondents			
View scenery	97	77	88	94
Peace and calm	85	73	62	82
Learn new things	80	50	78	73
Develop skills	78	34	48	76
Escape crowds	76	30	52	82
Exercise	64	48	34	65
Be alone	28	8	6	22

highly. But there were substantial differences between the two groups of floaters on the other four motivations, indicating that repeat visitors were substantially more sensitive to and intolerant of high use levels and associated impacts. Unless this is taken into account in river management, many repeat visitors are likely to be dissatisfied and perhaps eventually displaced. The study concludes that data of this kind illustrate the advantage of managing for outdoor recreation experiences rather than activities:

> "It is clear that repeat visitors on the Rio Grande are looking for different experiences than first-time visitors. It is also clear that Delta River visitors differ in orientation from Salt River visitors. Yet, all four populations are participating in the same recreation activity, river floating. From an activity perspective, they would be viewed as essentially equivalent and not differing in resource requirements. But from an experience perspective, they would be viewed as distinct recreation populations with separate requirements" (Knopf and Lime 1984:15).

Studies of the motivations of recreationists have become an important part of the scientific and professional literature on outdoor recreation, including wilderness, and have been applied to a diverse array of recreation activities, settings, and issues. Examples include rafting and other river uses (Fluker and Turner 2000; Vagias and others 2006), biking (Skar and others 2008), national forests (Graefe and others 2000; Hendricks and others 2004), tourism/ecotourism (Holden and Sparrowhawk 2002; Yoon and Uysal 2005), temporal changes in motivations (White and Pennington-Gray 2002; Schramm and Gerard 2004; Legare and Haider 2008), the relationship between motivations and experience/skill level (Todd and others 2002; Todd and others 2003; Meisel and Cottrell 2004), place attachment/involvement (Kyle and others 2004a; Kyle and others 2006), and race/ethnicity (Hunt and Ditton 2001).

All of these studies were able to identify several groups of respondents with distinctive recreation motivations. Moreover, there were often relationships between the various types of recreationists identified and other characteristics of respondents. For example, motivations of a nationwide sample of river users were found to vary with experience level of respondents (Williams and others 1990) and by type and size of user group (Heywood 1987). Motivations of state park visitors were related to visitor expenditures (McCool and Reilly 1993). And motivations of mountain climbers were related to experience level of respondents (Ewert 1994).

A second generation of studies has added another methodological step to identify types of recreationists based on motive structure. After appropriate motive domains have been isolated as described above, a further clustering procedure is used to identify groups of respondents having relatively similar patterns of response to the motive domains. In this way, groups or "market segments" of recreationists sharing similar motivations are identified.

A study of wilderness visitors is illustrative of these second-generation studies (Brown and Haas 1980). This study involved a survey of visitors to the Rawah Wilderness Area, CO. Initial cluster analysis identified eight motivational domains important across the sample as shown in Table 3. Respondents were then grouped through a second clustering procedure according to their scores on the eight motivational domains. Five basic "types" of visitors were thus identified. The study describes each visitor type and suggests ways in which this kind of information might be incorporated in wilderness management. For example, visitor types 1 and 2 both place moderate to strong emphasis on seven of the eight motivational domains, but differ on the eighth, Meeting/Observing Other People. Type 1 visitors (19% of the sample) rated this domain as slightly adding to satisfaction, while type 2 visitors (10% of the sample) rated this domain as moderately detracting from satisfaction. These findings suggest that two wilderness zones might be created serving somewhat different objectives and visitors. Both zones would be managed to serve the first seven motivations described (Closeness to Nature, Escape Pressure, and so on), but with different use and contact levels allowed.

The behavioral approach to understanding recreation was illustrated in Table 1. This model identifies four levels or hierarchies associated with recreation. The empirical research described above has focused primarily on Level 3 or motivations. However, conceptual and empirical work has explored Level 4 as well, the ultimate or higher-order benefits of recreation that flow to individuals and society at large. This body of work and its application is generally termed "benefits-based management" (BBM), and BBM is the operational component of the broader paradigm, Beneficial Outcomes Approach to Leisure (BOAL) which is a conceptual expression of the behavioral approach to recreation as described above (Driver 2008). These approaches have been extended to broader leisure and amenity-related concerns under the rubric of Outcomes Focused Management (OFM) and Outcomes Focused Paragon (OFP), respectively (Driver 2008).

Benefits potentially associated with recreation are broadly defined (Driver 1990; Driver 1996; Driver 2008). First, the fundamental concept of benefits can include attainment of a desired condition, an improved condition, and/or prevention of an unwanted condition. Second, benefits can be seen as accruing to individuals, society at large, the economy, and the environment (Driver and others 1991; Stein and Lee 1995). Personal benefits might include advances in physical and mental health and personal growth and development. Social benefits might include strengthening of family relationships, enhanced community pride, and reduction of social deviance and dysfunction. Economic benefits might include increased productivity, reduced health costs, and local economic growth. Environmental benefits might include reduced pollution levels, protection of endangered species, and critical wildlife habitat. Benefits associated with recreation are sometimes seen as linked through a "benefit chain of causality" (Driver 2008). For example, the physical and psychological benefits accruing to individuals can result in a healthier society, a more productive economy, and a greater commitment to environmental protection. However, relatively little is known about such potential relationships.

Table 3—Five types of visitors to the Rawah Wilderness Area, CO. (Adapted from Brown and Haas 1980.)

	Motivational Domain[b]									
Type	Number of respondents	% [a] of sample	Relationship with nature	Escape pressures	Autonomy	Achievement	Reflection on personal values	Sharing/ recollection	Risk taking	Meeting/observing other people
1	50	19	Most strongly added	Most strongly added	Strongly added	Strongly added	Strongly added	Strongly added	Slightly added	Slightly added
2	27	10	Most strongly added	Strongly added	Strongly added	Strongly added	Strongly added	Moderately added	Slightly added	Moderately detracted
3	44	17	Strongly added	Strongly added	Moderately added	Strongly added	Moderately added	Strongly added	Neither	Slightly added
4	53	20	Strongly added	Strongly added	Strongly added	Moderately added	Moderately added	Slightly added	Slightly added	Neither
5	60	23	Moderately added	Moderately added	Moderately added	Slightly added	Slightly added	Slightly added	Neither	Neither

[a] Thirty respondents (11 percent of the sample) were identified as unique in the sense that they were not grouped with any of the five types. This was primarily a function of missing data for these respondents rather than their true uniqueness.

[b] Respondents were asked to state the importance of these motivations to their satisfaction

The objective of benefits-based management is to allow managers to more directly measure and facilitate benefits associated with recreation participation (Allen 1996; Allen and McGovern 1997). Managers are encouraged to specify the benefits they wish to provide, design facilities and services to facilitate these benefits, and measure the extent to which benefits have been realized. Among other things, this requires an understanding of the potential relationships among the four levels of recreation as outlined in Table 1. In other words, what benefits are associated with fulfillment of recreation motivations, and how are motivations, in turn, related to recreation activities and the settings in which they occur? Initial empirical studies are suggestive of such relationships (Tarrant and others 1994; Borrie and Roggenbuck 1995; Stein and Lee 1995; Tarrant 1996) and a useful series of 18 case studies has been compiled by Driver (2008). However, this issue is complex and study findings are not definitive. Research on this issue is described more fully in the next section of this paper and is addressed again in a later section on the Recreation Opportunity Spectrum (ROS), a framework for addressing the structural relationships comprising recreation experiences.

Linking Activities, Settings, Motivations, and Benefits

The previous section on motivations and benefits suggested that recreation can be understood within the behavioral approach or model. This model outlined a basic structure under which recreationists participate in selected activities in specific settings to fulfill motivations that in turn lead to benefits. Under this model, managers might be able to provide recreation opportunities (comprised of alternative activities and settings) designed to fulfill certain motivations and produce related benefits. ROS, described in a later section of this paper, suggests a series of relationships among these factors and begins to provide a formal structure within which this model can be made operational.

Some of the linkages among activities, settings, motivations, and benefits appear intuitively obvious. Opportunities for contact with the natural environment, for example, are likely to be enhanced through limited development of the setting. Opportunities for solitude might be enhanced in relatively low use areas. And opportunities for challenge and risk-taking should be greater in areas providing only low-standard trails and few other improvements. But these are only generalities, and knowledge about such relationships can be enhanced through empirical testing.

A number of studies have begun searching for these relationships. An early study of visitors to three western wilderness areas examined both motivations and physical setting preferences (Haas and others 1979). Respondents reacted to a series of scaled items for both motivations and physical setting attributes, and these response sets were cluster analyzed following the procedures developed by Driver and associates described in the preceding section. Several domains for both motivations and setting attributes were identified, but no attempt was made to relate the two. A second study of visitors to the Glenwood Springs Resource Area, CO, attempted to go a step further (Brown and Ross 1982). Multiple regression analysis was used to explore for relationships between motivations and settings, and a number of such relationships were found. The statistical significance of these relationships was generally enhanced when the sample was grouped according to activity. In other words, people sharing the same activity had more uniform relationships between motivations and setting preferences than all recreationists considered together.

Several studies have included more thorough tests of these relationships. One study surveyed visitors to three wilderness areas, asking respondents to rate a number of motivation, setting attribute, and management action scale items (Manfredo 1983). Each set of scale items was cluster analyzed, and five of the motivation clusters were selected for further object cluster analysis, isolating three visitor types based on similar motivation ratings. Type 1 visitors were labeled High Risk/Achievement Group, type 2 visitors were labeled Low Risk/Social Interaction Group, and type 3 visitors, who represented the largest proportion of visitors (60% of the sample) and tended to be less distinctive in their motivation ratings, were labeled Norm Group. The three types of visitors were then examined to see whether there were significant differences among them in activities engaged in and preferences for setting attributes and management actions. A number of differences were found. Though there were no differences among the three groups with regard to the four activities having the highest participation rates and the one activity with a very low participation rate, there were differences for the two activities with moderate participation rates. In addition, there were statistically significant differences among the three types of visitors on seven of the setting attribute clusters and four of the management action clusters. Though the magnitude of the differences was generally not large, the sample was relatively homogeneous—all respondents were wilderness visitors. A more diverse respondent group may have yielded greater levels of statistical significance.

A second study surveyed visitors to the Cohutta Wilderness, GA/TN and the Okefenokee Wilderness, GA (Shafer and Hammitt 1995). Visitors were asked to rate the importance of five motivations for wilderness recreation; the importance of selected resource, social, and managerial conditions in wilderness; and the extent to which visitors adopted selected behaviors to direct or control the recreation experience. A number of significant correlations were found suggesting that visitors who rated selected motivations as important tended to associate certain wilderness settings with those motivations, and often behaved in ways designed to maximize attainment of those motivations. For example, visitors who rated the "unconfined" nature of wilderness experiences as highly important tended to use wilderness areas where fewer management restrictions were present.

Several other studies have explored the relationships among selected elements of the behavioral model. Most have found what might best be described as "modest" relationships. These include relationships between the activities in which respondents participated and the type of resource selected within an

Australian national park (Collins and Hodge 1984), activities and motivations of Delaware state park visitors (Confer and others 1997), and setting attributes and type of resource selected by anglers in Colorado (Harris and others 1985). However, a study of visitors to five protected areas in Costa Rica found little relation between motivations of visitors and setting preferences (Wallace and Smith 1997).

Two studies have taken a "wilderness perceptual mapping" (WPM) approach to test the assumed relationships in ROS, a framework constructed on assumed relationships among recreation activities, settings, and experiences. A study in New Zealand measured judgments about the desirability of related activities, facilities, and experiences among visitors to 19 wilderness areas (Kliskey 1998). Resulting data were used to create four classes of wilderness recreation based on the notion of "wilderness purism" (Stankey 1973; Kliskey 1998). These four classes of wilderness were mapped and compared to conventional ROS maps. The analysis concluded that "a significant association was obtained between the WPM and ROS mapping", and this suggests ROS generally captures and incorporates the activities and settings that recreationists feel are appropriate for a range of wilderness-related experiences (Kliskey 1998:86). A similar research approach was taken in a study of the San Juan National Forest, CO and this study also found a close relationship between perceived wilderness conditions and ROS mapping (Flanagan and Anderson 2008). For example, 96 percent of lands perceived as "wilderness" by "strong wilderness purists" were all included in the "primitive" land classification of ROS.

The research reviewed in this section offers some support for the conceptual foundations of motivations and benefits, ROS, benefits-based management, and related frameworks. However, definitive relationships among the elements comprising these frameworks are far from clear (McCool and others 1985). It may be unrealistic to expect to find such highly structured relationships. It seems reasonable, for example, to expect that some motivations for recreation might be fulfilled through multiple activities and/or settings (McCool 1978). For instance, the motivation to experience nature might be fulfilled through mountain biking as well as hiking, and might be found, at least to some degree, in a city park as well as a national park. Indeed, some motivations, as well as benefits, may be nearly universal. Moreover, the empirical relationships assumed in ROS and related frameworks may be partially masked by limited choices that often confront recreationists and by peoples' inherent adaptability. The emotional and symbolic meanings that recreationists may assign to some recreation areas may confound the relationships assumed to underlie ROS. Finally, the dynamic character of some recreation activities (such as, hiking) can extend across multiple ROS classes and this can confound the types of studies described above.

Three-fold Framework of Wilderness Recreation

An early focus of research on outdoor recreation, and wilderness use in particular, examined the topic of carrying capacity, or the amount and type of recreation that can be accommodated without unacceptable impacts. Concern about this topic was largely a function of the rapid growth in outdoor recreation during the Post-World War II period (DeVoto 1953; Clawson 1959). The first rigorous application of carrying capacity to outdoor recreation was conducted in the early 1960s (Wagar 1964). Perhaps the major contribution of this conceptual analysis was the expansion of carrying capacity from its dominant emphasis on ecological impacts of outdoor recreation to a dual focus including social or experiential considerations:

> "The study reported here was initiated with the view that the carrying capacity of recreation lands could be determined primarily in terms of ecology and the deterioration of areas. However, it soon became obvious that the resource-oriented point of view must be augmented by consideration of human values" (Wagar 1964: Preface).

The author's point was that as more people visit an outdoor recreation area, the quality of the recreation experience is degraded as well as the natural environment. Thus, carrying capacity was expanded to include consideration of the social environment as well as the natural environment. The effects of increasing use on recreation quality were illustrated by Wagar by means of hypothetical relationships between increasing use level and visitor satisfaction.

Wagar's original conceptual analysis hinted at a third element of carrying capacity, and this was described more explicitly in a subsequent paper (Wagar 1968). In this paper, it was suggested that carrying capacity might vary according to the amount and type of management activity. For example, the durability of natural resources might be increased through practices such as fertilizing and irrigating vegetation, and periodic rest and rotation of impact sites. Similarly, the quality of the recreation experience might be maintained or even enhanced in the face of increasing use by means of more even distribution of visitors, appropriate rules and regulations, provision of additional visitor facilities, and educational programs designed to encourage desirable user behavior. Thus, carrying capacity, as applied to outdoor recreation, was expanded to a three-dimensional concept by the addition of management considerations.

This three-dimensional view of carrying capacity has been extended to outdoor recreation and wilderness use more broadly and suggests that recreation opportunities are comprised of these three components—the condition of natural/cultural resources, the type of social/experiential conditions, and the type and level of management intervention (Manning 2011). All three of these of these components can be of importance to visitors and should receive explicit attention from managers.

Definitions of Wilderness Quality

As in most other areas of life, "quality" has been the underlying goal of those involved in outdoor recreation and wilderness more specifically. Managers want to provide high-quality outdoor recreation opportunities, and visitors want to have high-quality outdoor recreation experiences. Researchers want to understand what contributes to and detracts from high-quality

outdoor recreation experiences. As a consequence, the concept of quality is contained, explicitly or implicitly, in the goals and policies governing most outdoor recreation areas and is an underlying objective of most of the social science research on outdoor recreation and wilderness use. But how is quality defined and measured?

Beginning with the influential studies of the Outdoor Recreation Resources Review Commission (ORRRC) studies in the late 1950s and early 1960s, quality in outdoor recreation has conventionally been defined in terms of visitor satisfaction. Satisfaction as a measure of quality in outdoor recreation has been suggested throughout the literature and over time. The focus on satisfaction arises out of the need for some evaluative communication between visitors and managers. Because use of public parks and wilderness is traditionally free or priced at a nominal level, managers generally lack the clear feedback mechanism available in the private sector in the form of "price signals" (that is, if the quality of a product or service is low, consumers will refrain from purchasing and the price will drop, but if quality is high, consumption and price will rise). Most managers recognize the potential usefulness of visitor opinions and evaluations, within the constraints of resource and management factors, in meeting the quality objectives of outdoor recreation areas. In fact, the Government Performance and Results Act (GPRA) of 1993 requires federal land management agencies such as the National Park Service and U.S. Forest Service to assess and report measures of productivity, and customer (visitor) satisfaction has been a primary component of this program (University of Idaho 2008; Absher 1998; Graefe and others 2001).

The dominant conceptual basis for defining and measuring satisfaction in outdoor recreation has been rooted in expectancy theory (or the expectancy disconfirmation paradigm as used in broader consumer research) (Vroom 1964; Fishbein and Ajzen 1975; Mackay and Crompton 1990; Burns and others 2003; Tian-Cole and Crompton 2003; Brunke and Hunt 2007). Expectancy theory suggests that participants engage in recreation activities with the expectation that this will fulfill selected needs, motivations, or other desired states. The congruence between expectations and outcomes is seen to ultimately define satisfaction. This conceptual base is clearly reflected in an early and often cited definition of satisfaction in recreation as "a function of the degree of congruence between aspirations and the perceived reality of experiences" (Bultena and Klessig 1969:349).

Measurement of satisfaction (and quality), however, has proven to be more complex than anticipated (La Page 1963; Propst and Lime 1982; La Page 1983; Williams 1989). Several conceptual and methodological issues contribute to this complexity. First, general or overall measures of satisfaction may be too broad to be fully useful to either managers or researchers. Satisfaction is a multidimensional concept, affected by a number of potential variables (such as, environmental conditions, use level, facility development, weather), some under the control of managers and many not. Measures of overall satisfaction may not be sensitive enough to detect changes in the variables of interest to managers and researchers. This issue has been illustrated in a number of wide-ranging studies that have found overall satisfaction to be influenced by elements of the resource, social, and managerial environments (Dorfman 1979; Foster and Jackson 1979; Beard and Ragheb 1980; Connelly 1987; Rollins and Chambers 1990; Williams et al. 1991; Herrick and McDonald 1992; Floyd 1997). Multiple-item scales have been developed to measure alternative dimensions of satisfaction, and these have proven more useful than global, single-item measures (Graefe and Fedler 1986; Rollins and Chambers 1990; Vaske and others 1991).

Second, satisfaction is a relative concept that can be mediated by visitor characteristics and other variables. One of the most commonly occurring themes in the outdoor recreation literature is that visitors to outdoor recreation areas often differ in ways that fundamentally affect the perceived quality of recreation opportunities, and ultimately, satisfaction. Visitors have varying socioeconomic characteristics, alternative cultural backgrounds, varying levels of experience, and a range of attitudes, motivations, and norms. While objective elements of recreation opportunities (such as, type of facilities provided, use level) can be important in influencing satisfaction, they are filtered by subjective interpretations of individual visitors (Graefe and Fedler 1986).

A closely related issue addresses the concept of quality in outdoor recreation and its relationship to satisfaction (Baker and Crompton 2000). Quality might most appropriately be defined as a measure of the recreation opportunity provided (its naturalness, the number and type of facilities, and so on), while satisfaction is a more emotional state that is driven at least in part by quality, but might also be affected by other issues (weather, social group interactions, etc.) that are not under direct control by managers.

A third issue suggests that emphasis on visitor satisfaction may ultimately lead to diminished quality or at least a level of quality as defined by a low common denominator. The relative nature of satisfaction as described above suggests that some visitors may be more sensitive than others to environmental, social, and managerial impacts of increasing use levels. If such visitors are "displaced" by those who are less sensitive to recreation-related impacts, then visitor satisfaction (at least as measured in conventional on-site visitor surveys) may remain high despite a substantive change in the type or quality of recreation opportunities (Dustin and McAvoy 1982). A number of studies have documented spatial and temporal displacement of outdoor recreation visitors (Clark and others 1971; Stankey 1980; Hammitt and Patterson 1991; Manning and Valliere 2001; Fleishman and others 2007; Hall and Cole 2007).

Fourth, most studies have found very high levels of satisfaction among visitors to a variety of park, outdoor recreation, and wilderness areas (Brewer and Gillespie 1967; LaPage and Bevins 1981; Greenleaf and others 1984; Applegate and Clark 1987; Rollins and Chambers 1990; Vaske et al. 1991; Dwyer 1993; Jacobson 2001). For example, GPRA-related findings for the U.S. National Park system indicate that 94% of the over 20,000 visitors sampled at 313 national parks in 2008 were satisfied with their outdoor recreation experience (University

of Idaho 2008). This may be related to the broad and relative nature of satisfaction as described above. However, it should not be surprising as recreation experiences, by definition, are self-selected by visitors. This suggests that most visitors would choose recreation opportunities that are in keeping with their tastes and preferences. Despite the underlying reasons, uniformly high levels of satisfaction are of only limited usefulness to recreation managers and researchers interested in understanding relationships between outdoor recreation opportunities and experiences.

A final issue concerns methodological aspects of measuring visitor satisfaction. It was noted above that multiple-item measures of satisfaction have proven more useful than general, single-item measures. However, no standardized measures have been developed and advanced. Moreover, concern has also been raised about when such measures should be administered. In the broadest sense, recreation experiences are dynamic and evolve over time. Research suggests that satisfaction and other evaluative measures also change and evolve over the duration of the experience (Hull and others 1992, Stewart and Hull 1992). However, it is unclear as to what is the most appropriate time to administer measures of satisfaction—during the experience, immediately after, or at some later period.

An alternative approach to defining and measuring quality in outdoor recreation builds on the concept of visitor satisfaction, but links it to the inherent diversity of outdoor recreation. Diversity in outdoor recreation has been a recurring theme in the literature in regard to recreation activities, socioeconomic and cultural characteristics of visitors, attitudes about management, preferences for services and facilities, sensitivity to crowding and conflict, experience level, degree of specialization and place attachment, and motivations for recreation participation. Diversity in tastes for outdoor recreation is found equally in studies of developed campgrounds and investigations of wilderness hikers. For example, an early study concluded that "wilderness visitors are not in any sense a uniform or homogeneous population… Represented among wilderness visitors are value systems that cover a wide and often conflicting range" (Stankey 1972:92).

Research points out that not only are there differences in taste among people, but that people's tastes change over time as well. A study in the Pacific Northwest found that the type of camping chosen (wilderness camping, automobile camping, or some combination of the two) was strongly related to changes in stage of the family life cycle (Burch 1966). A nationwide panel study of campers found similar relationships between camping activity and family life cycle (LaPage 1973). Based on these relationships, it has been suggested that "The forest camping system is like an omnibus—the seats are often full but often occupied by different persons as they adjust to the flow of time" (Burch 1966).

Diversity is also evident when the "averaging issue" in outdoor recreation is recognized. A classic paper titled "The Average Camper Who Doesn't Exist" emphasized that statistical averages sometimes obscure diversity in research data and can create a model of reality that no visitors actually fit (Shafer 1969). The potential problem of relying too heavily on averages has been elaborated as it might apply to camping (Wagar 1963, 1966; Lime 1974). Studies show that some campers prefer very elaborate facilities for comfort and convenience, while others prefer simple, rustic facilities. Moreover, there is a wide range of opinion between these extremes. Providing a single, uniform type of camping opportunity—near the midpoint of the range based on averages, indeed at any point along the range—will leave many campers, quite possibly even the majority, less than fully satisfied. However, by offering a range of possibilities, more campers' preferences can be met.

Diversity as a measure of quality in outdoor recreation has also been rationalized in economic terms using an example of a hypothetical undeveloped recreation area (Wagar 1974). If the area were to be used for wilderness recreation, it might support 3,000 recreation visitors each year. If intensively developed, it might support 300,000 recreation visitors. But the decision between these two alternatives should take into account the issue of scarcity. If developed recreation opportunities are relatively plentiful and wilderness recreation scarce, society may place more value on creating additional wilderness recreation opportunities even though they will accommodate fewer visitors. This is in keeping with the economic theory of marginal utility: the more we have of some good or service, the less value is placed on each additional unit.

Diversity has also been rationalized in political terms (Burch 1974). It can be argued that without broad political support, parks, wilderness, and other outdoor recreation areas are not likely to be maintained by society at large, and that this support is not likely to be forthcoming if outdoor recreation areas do not serve the needs of a broad spectrum of the population. Therefore, managers should strive to serve this diversity and not necessarily adhere too closely to the preferences or tastes of any one group or type of visitor.

Difficulty in distinguishing between quality and type of recreation opportunities has been a persistent problem for both outdoor recreation visitors and managers. It is common to subjectively associate certain types of recreation opportunities with high quality. Those whose recreation tastes are oriented toward the remote and primitive, for example, may consider wilderness recreation to be of high quality and automobile-accessible campgrounds as something less. But high quality can and should be found among all types of recreation opportunities.

Research on visitor satisfaction and diversity can be synthesized to develop a clearer and more useful understanding of quality in outdoor recreation (Wagar 1966). The concept of quality might best be expressed in different ways as it is applied in alternative contexts or at different scales. At the level of the individual participant, satisfaction is an appropriate measure of quality, though satisfaction for selected components of the experience (for example, environmental conditions, use level/crowding, number and type of facilities) is more useful than global or overall measures. Such measures of satisfaction address the degree to which a park or outdoor recreation activity or area meets the needs of the visitor.

Quality can also be defined in the context of management. Given the diversity in public tastes for outdoor recreation, a

park (or site within a park) could be managed for many types of outdoor recreation (a developed campground, a wilderness campsite). Thoughtful consideration should be given to the most appropriate type of opportunity to be provided, and this decision should be expressed in terms of management objectives and associated empirical measures (this approach to management is described more fully in a later section of this paper). Quality is then defined and measured as the degree to which recreation opportunities meet the objectives for which they are designed and managed. This approach to defining quality and guiding management avoids the problem of displacement of visitors as described above and the related process of unintended incremental change in recreation opportunities possible when quality is defined simply in terms of visitor satisfaction.

Finally, quality in outdoor recreation can be defined at a broad societal level as provision of a diverse system of outdoor recreation opportunities. Given broad and diverse tastes in outdoor recreation, a comparably diverse system of outdoor recreation opportunities should be provided. Each opportunity within this system should be managed for a defined set of objectives as determined by inherent capabilities of natural and cultural resources, assessment of the demand and supply of recreation opportunities, and the mandate and capacity of management agencies.

Management Objectives, Indicators and Standards, and the "Limits of Acceptable Change"

As noted earlier in this paper, the issue of carrying capacity has attracted intensive focus as a research and management concept in outdoor recreation, and especially in wilderness use. A principal challenge in defining and managing carrying capacity lies in determining how much impact or change should be allowed within each of the three components that make up outdoor recreation opportunities: environmental and cultural resources, the type and quality of the recreation experience, and the extent and type of management actions. Recent analyses have suggested that these issues are not only at the heart of carrying capacity, but must be addressed in the broader context of sound park, outdoor recreation, and wilderness planning and management (Manning 2011; Whittaker and others 2011; Graefe and others 2011).

The growing research base on outdoor recreation indicates that increasing recreation use often causes impact or change. This is clear with regard to environmental resources (Cole 1987; Hammitt and Cole 1998; Kuss and others 1990; Leung and Marion 2000). An early study in the Boundary Waters Canoe Area, MN, for example, found that an average of 80% of ground cover vegetation was destroyed at campsites in a single season, even under relatively light levels of use (Frissell and Duncan 1965). Research also suggests that increasing recreation use can impact the social or experiential component of outdoor recreation through crowding and conflict, as well as the management component of outdoor recreation through the need to implement more intensive management practices (Manning 2011). Despite increasing knowledge about outdoor recreation use and resulting impacts, the critical question remains: how much impact or change should be allowed?

This issue is often referred to as the "limits of acceptable change" (Frissell and Stankey 1972, Stankey and others 1985). Some change in the recreation environment is inevitable, but sooner or later the amount, nature, or type of change may become unacceptable. But what determines the limits of acceptable change? This issue is illustrated graphically in Figure 1. In this figure, a hypothetical relationship between visitor use and impacts to the environmental, social, and management components of outdoor recreation is shown. This relationship suggests that increasing recreation use causes increasing impacts in the form of damage to fragile soils and vegetation, crowding and conflicting uses, and more direct and intensive recreation management actions. However, it is not clear from this relationship at what point these impacts have become unacceptable. X1 and X2 represent alternative levels of visitor use that result in corresponding increases in impact as defined by points Y1 and Y2, respectively. But which of these points—Y1 or Y2, or some other point along the vertical axis—represent the maximum amount of impact that is acceptable?

To emphasize and further clarify this issue, some studies have suggested distinguishing between descriptive and prescriptive components of outdoor recreation management (Shelby and Heberlein 1984, 1986). The descriptive component focuses on factual, objective data such as those that define the relationship in Figure 1. For example, what is the relationship between the amount of visitor use and perceived crowding? The prescriptive component of outdoor recreation management concerns the seemingly more subjective issue of how much impact or change in the recreation environment is acceptable. For example, what level of perceived crowding should be allowed?

The scientific and professional literature in outdoor recreation suggests that answers to prescriptive questions can be found through formulation of management objectives and associated indicators and standards (Frissell and Stankey 1972; Brown 1977; Lime 1979; Stankey and others 1985;

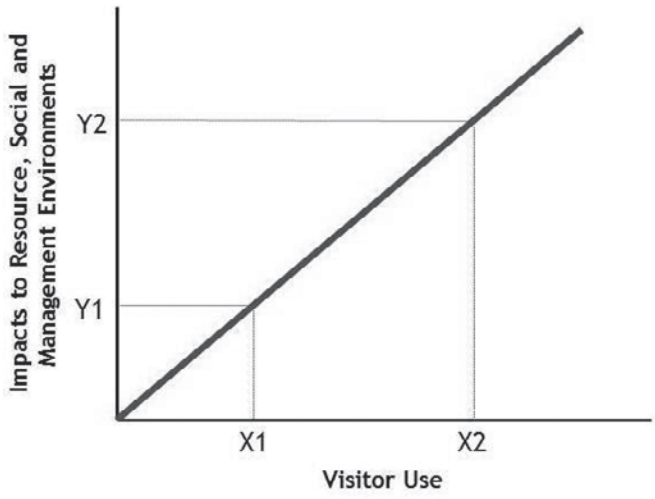

Figure 1—Hypothetical relationship between visitor use and impact to the recreation environment. (From Manning and Lime 1996.)

Stankey and Manning 1986; Graefe et al. 1990; Manning 2001; McCool and Lime 2001; Cole and others 2005; Manning 2007; Manning, 2009; Manning 2011). Management objectives are sometimes called "desired conditions". This approach to recreation management focuses on defining the type of park and outdoor recreation conditions to be provided. Management objectives are broad, narrative statements defining the type of park and outdoor recreation conditions to be provided and maintained, including the condition of natural and cultural resources, the type of recreation experience, and the type and intensity of management actions. Indicators are more specific, measurable variables reflecting the essence or meaning of management objectives. They are quantifiable proxies or empirical measures of management objectives. Indicators may include elements of the resource, social, and management environments that are important in determining the quality of the visitor experience. Standards define the minimum acceptable condition of indicator variables or the limits of acceptable change.

An example may help illuminate these ideas and terms. Review of the Wilderness Act of 1964 suggests that areas contained in the National Wilderness Preservation System are to be managed to provide "opportunities for solitude". Thus, providing opportunities for solitude is an appropriate management objective or desired condition for most wilderness areas. Moreover, research on wilderness use suggests that the number of other visitors encountered along trails and at campsites is important in defining solitude for wilderness visitors (Manning 2011). Thus, trail and camp encounters are potentially good indicators for the management objective of solitude. Research also suggests that wilderness visitors may have normative standards about how many trail and camp encounters can be experienced before opportunities for solitude decline to an unacceptable degree or violate the limits of acceptable change. (Normative standards are discussed more fully in the next section of this paper.) For example, a number of studies suggest that many wilderness visitors find it unacceptable to encounter more than three-to-five other groups per day along trails (Manning 2011). Thus, a maximum of five encounters per day with other groups along trails may be a good standard for managing wilderness solitude and defines the limits of acceptable change.

Formulation of management objectives and associated indicators and standards of quality can be informed by empirical research, historical precedent, analysis of relevant legislation and associated policy, interest group politics, and other sources. Management objectives, indicators and standards, and limits of acceptable change have been incorporated into several contemporary frameworks for planning and managing wilderness and outdoor recreation more broadly. Prominent examples include the Limits of Acceptable Change (Stankey and others 1985; McCool and Cole 1997) and Visitor Experience and Resource Protection (National Park Service 1997; Manning 2001).

Normative Standards

Developed in the disciplines of sociology and social-psychology, normative theory and related empirical methods have attracted substantial attention as an organizing concept in outdoor recreation research and management (Heberlein 1977; Shelby and Heberlein 1986; Vaske and others 1986; Vaske and others 1993; Shelby and others 1996; Manning and others 1999; Manning 2007; Manning 2011). Much of this literature has been organized around the work of Jackson (1965), which developed a methodology for measuring norms. Adapting these methods to outdoor recreation, visitors and other stakeholders can be asked to evaluate alternative levels of potential impacts caused by increasing recreation use. For example, visitors might be asked to rate the acceptability of encountering increasing numbers of recreation groups while hiking along trails. Resulting data would measure the personal crowding norm of each respondent. These data can then be aggregated to test for social crowding norms, or the degree to which norms are shared across groups.

Social norms can be illustrated graphically, as shown in Figure 2. Using hypothetical data associated with the example

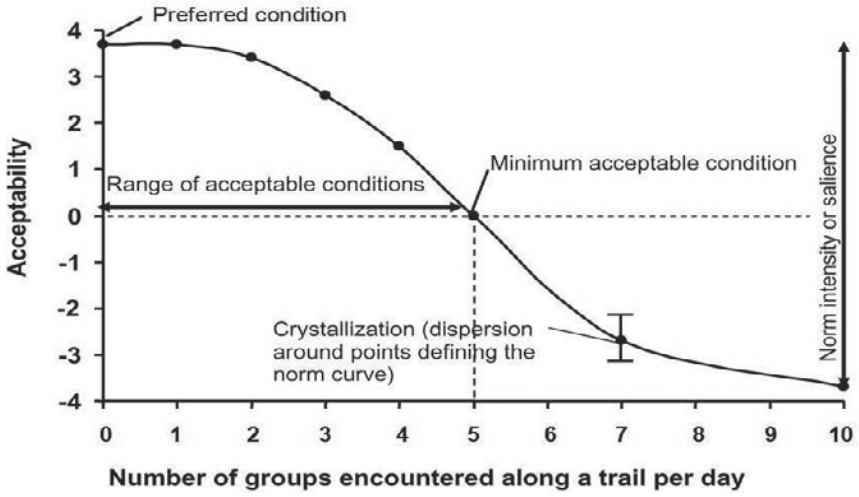

Figure 2—Hypothetical social norm curve.

described previously, this graph plots average (mean or median) acceptability ratings for encountering increasing numbers of visitor groups along trails. Data for this type of analysis might be derived from a survey of wilderness hikers. The line plotted in this illustration is sometimes called an "encounter" or "contact preference" curve (when applied to crowding-related variables), or might be called an "impact acceptability" curve more generally, or simply a "norm curve."

Norm curves like that illustrated in Figure 2 have several potentially important features or characteristics. First, all points along the curve above the neutral line of the evaluation scale—the point on the vertical axis where aggregate evaluation ratings fall from the acceptable into the unacceptable range—define the range of conditions acceptable to a majority of visitors. All of the conditions represented in this range are judged to meet some level of acceptability by about half of all respondents. The "optimum condition" is defined by the highest point on the norm curve. This is the condition that, absent other considerations, received the highest rating of acceptability from the sample as a whole. The "minimum acceptable condition" is defined as the point at which the norm curve crosses the neutral point of the evaluation scale. This is the point at which aggregate ratings fall out of the acceptable range and into the unacceptable range. Norm "intensity,"—the strength of respondents' feelings about the importance of a potential indicator—is suggested by the distance of the norm curve above and below the neutral line of the evaluation scale. The greater this distance, the more strongly respondents feel about the indicator or the condition being measured. High measures of norm intensity suggest that a variable may be a good indicator because respondents feel it is important in defining the quality of the recreation experience. "Crystallization" of the norm concerns the amount of agreement or consensus about the norm. It is usually measured by standard deviations or other measures of variance around the points that describe the norm curve. The less variance or dispersion of data around those points, the more consensus there is about norms.

Research has measured normative standards for a variety of indicators that address the resource, social, and managerial components of outdoor recreation opportunities, and this information has been compiled in several sources (Manning 2011). In these studies, most respondents are able to report norms for most indicators included in the study and normative standards are reported most often and are most highly crystallized in wilderness or backcountry areas.

Recreation Opportunity Spectrum (ROS)

The discussion of quality in outdoor recreation in an earlier section of this paper noted that many studies have documented diverse tastes in outdoor recreation, and that a corresponding diversity of recreation opportunities is warranted. Designing diversity into outdoor recreation requires a systems-oriented approach to planning and management. It would be difficult for a single recreation or wilderness area, regardless of size, to provide a full spectrum of visitor opportunities. Examining each recreation area in isolation will usually lead to management decisions favoring the majority or plurality of potential visitors. While this is justified in many cases, this process will ultimately result in an entire system of recreation areas designed for the "average" visitor while neglecting a desirable element of diversity. Instead, each recreation area should be evaluated as part of a larger system of areas, each contributing as best it can to serve the diverse needs of the public. In this way, low density and other minority recreation opportunities can be justified (Wagar 1974). It has been suggested that this systems approach be applied on a broad, regional basis or on a landscape level; this way management can best ensure "a diverse resource base capable of providing a variety of satisfactions" (Stankey 1974).

Recognition of the need for diversity has led to a number of suggested classification or zoning systems for recreation areas. However, the most highly developed and widely used approach is ROS. ROS is a conceptual framework for measuring and managing diversity in outdoor recreation opportunities. A range of levels of attributes (or "indicators" and "standards" as used in an earlier section of this paper) that define recreation experiences are combined in alternative configurations to describe diverse recreation opportunities.

ROS has been formalized and translated into management guidelines. The relationships among indicators and standards that combine to define recreation opportunities have been arranged in configurations that suggest relatively standard categories of opportunities. Moreover, the system has been adopted by several park, wilderness, and outdoor recreation management agencies, including the U.S. Forest Service and the Bureau of Land Management (Buist and Hoots 1982; Driver and others 1987). ROS was developed simultaneously by two groups of researchers: Clark and Stankey (1979a) and Brown, Driver, and associates (Driver and Brown 1978). The approaches are quite similar, but some important differences also exist.

Both approaches to ROS recognize the four-fold hierarchical framework of demands for recreation as described in an earlier section of this paper—activities, settings, motivations, and benefits—and the focus of both approaches is on Level 2 demands, settings. Brown, Driver, and associates take a more empirically oriented approach to ROS, seeking to link settings to the motivations or psychological outcomes they fulfill. This is a natural extension of their work on motivations for recreation as outlined above.

Clark and Stankey (1979a) take a more applied approach. They note that as knowledge of linkages between recreation settings and psychological outcomes improves, so will the efficacy of meeting visitor demands. But in the meantime, managers should emphasize the provision of diversity in recreation settings based on the assumption that a corresponding diversity of experiences will be produced.

ROS has been adapted and applied to several more specific types of outdoor recreation areas and uses, including wilderness (Flanagan and Anderson 2008). For example, there is a Wilderness Recreation Opportunity Spectrum (WROS) that is based on a series of physical-biological, social, and managerial indicators and standards that combine to form four classes of

wilderness recreation opportunities labeled Transition, Semi-primitive, Primitive, and Pristine as shown in Table 4.

ROS is a conceptual or organizing framework for understanding and managing recreation opportunities. It explicitly recognizes that experiences derived from recreation activities are related to the settings in which they occur, and that settings in turn are a function of resource, social, and managerial factors. By describing ranges of these factors (or alternative standards), ROS illustrates the potential diversity of recreation opportunities. The underlying rationale for ROS is sometimes referred to as "experience-based setting management" (Manfredo 1983; Floyd and Gramann 1997).

ROS can be used in several ways, perhaps most importantly as an allocation and planning tool. Taking into account demands for recreation opportunities and their relative abundance, ROS can help guide allocation decisions so that each recreation area contributes to the diversity desirable in a complete system of recreation opportunities. Moreover, once an appropriate opportunity type has been chosen, ROS can help define specific management objectives for each setting attribute. Using noise as an example, Clark and Stankey (1979b) illustrate how ROS can be helpful in formulating an appropriate management objective and ensuring that limits of acceptable change or standards are not violated. The ROS concept has been adopted as an integral part of frameworks designed to address carrying capacity as discussed earlier (Stankey and others 1985; National Park Service 1997). The specific setting attributes or indicators used in ROS can also be useful in designing and conducting inventories of recreation opportunities (Kliskey 1998). ROS also provides an explicit framework within which consequences of alternative management actions can be evaluated. ROS also provides a means of matching desired visitor experiences with available opportunities. ROS provides relatively specific descriptions of available recreation opportunities, and this can help visitors more readily identify those opportunities most likely to meet their desired experiences. This can also reduce potential conflict between incompatible recreation activities (Daniels and Krannich 1990). If recreation areas are consistently managed for defined types of opportunities that are made known to the public, this is likely to have substantial benefits to both visitors and managers (Jubenville and Becker 1983). Visitors are more likely to be satisfied with the opportunities they select, and managers are less likely to have to resort to regulatory measures designed to control inappropriate visitor use.

Discussion

The frameworks described above enhance understanding of the wilderness experience and can be integrated to help guide wilderness management. Figure 3 presents an integration of these frameworks in a single conceptual model accompanied with an example of their application. As figure 3 suggests, visitors to wilderness are driven by an array of motivations, for example seeking solitude. These motivations lead visitors to select recreation activities and settings that are most likely to fulfill these motivations, hiking in the wilderness for example. Recreation settings are defined by resource (few social trails), social (few encounters with other groups along trails), and managerial (low standard trail) characteristics. If visitors are successful in fulfilling their motivations, then they are likely to be satisfied and associated benefits of recreation may accrue, perhaps a sense of peace in our example. Wilderness managers play an important role in this process by formulating management objectives for wilderness areas (such as, opportunities for solitude), and translating these objectives into indicators (number of groups per day encountered along trails) and standards that represent the limits of acceptable change (no more than five groups per day encountered along trails). Standards

Table 4—Wilderness Recreation Opportunity Spectrum. (From Arthur Carhart National Wilderness Training Center n.d.)

	Wilderness Recreation Opportunities			
Indicators	**Transition**	**Semi-Primitive**	**Primitive**	**Pristine**
Vegetation loss & bare, compacted mineral soil at campsites (sq. feet)	1,000	625	400	225
Number of trees with roots exposed, or percent (whichever is less)	10 50%	6 25%	4 25%	0 0%
Encounters—80% probability—maximum number of encounters per day when traveling—primary use season	10-20 Generally 10, but up to 20 on a case by case basis.	10	7	1
Party size—people & stock combined	12	12	12 Encourage 6 or less people, 0 stock	12
Campsites visible when occupied	3	2	1	0
Dead woody debris available for firewood	Appears to be natural levels compared to adjacent similar areas			

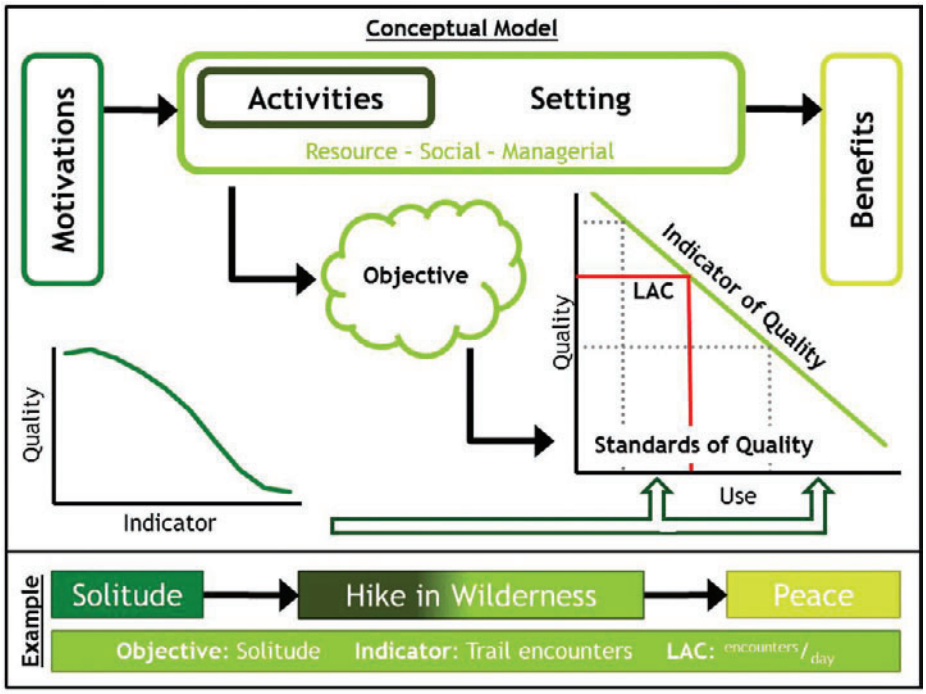

Figure 3—Conceptual model to integrate frameworks for defining and managing wilderness experience.

or limits of acceptable change are informed by the wilderness recreation norms of visitors and other stakeholders, along with other types of information such as resource scarcity and sensitivity, law and policy, and available funding and staffing.

Table 5 adds elements of diversity and quality to this model. Following the discussion above, visitors select wilderness recreation activities and settings based on motivations and the satisfaction and potential benefits to be attained. Managers formulate objectives for sites and areas that are expressed in empirical terms as indicators and standards/limits of acceptable change. Indicators and standards can be combined in alternative ways to facilitate a range of wilderness settings or

Table 5—Integrated framework to manage for diverse, high quality wilderness opportunities.

Scale	Measure of Quality	Framework Element	Example Wilderness Opportunities		
Visitor	Visitor satisfaction	Motivation	Physical challenge	Time with friends & family	Immersion with nature
		Activity	Trail Running	Camping	Backpacking
		Setting	Trail network	Scenic landscape	Remote backcountry
		Benefit	Competency & esteem	In-group cohesion	Connection & knowledge
Manager/ Unit	Maintain standard/ LAC	Objective	Facilitate access to backcountry	Minimize visitor conflicts	Minimal human intrusion
		Indicator	Trail mileage & maintenance	Campsite sharing	% time aircraft audible
		Standards Or LAC	≥ 80% of trails open at any time	No groups must share campsites	≤ 10% of the time
Society/ Landscape	Diverse spectrum of opportunities	ROS	Transition	Primitive	Pristine

opportunities, in this case labeled "transition", "primitive", and "pristine." Measures of quality can be applied at three levels. For visitors, quality is the satisfaction associated with fulfilling motivations and attaining benefits. For managers of a wilderness area or site, quality is defined as maintaining the standards that have been formulated (or not violating the limits of acceptable change). For society at large (or a system of wilderness areas at the landscape level), quality is provision of a spectrum of wilderness opportunities designed to meet the needs of a diverse population.

The conceptual and empirical frameworks reviewed and synthesized in this paper should not be interpreted too literally, nor should the knowledge derived from the long-term program of research on outdoor recreation and the wilderness experience be overstated. For example, many studies have found only modest relationships among variables such as motivations, activities, settings, and benefits. Study hypotheses are sometimes not supported, and it is hard to synthesize and generalize cross-sectional studies rooted in a variety of places and times. Perhaps more importantly, there are alternative interpretations of recreation and wilderness research. In particular, some of the frameworks advanced in this paper have been critiqued as more highly structured, linear, and mechanistic than warranted, sometimes being labeled a "production process", the "commodity metaphor", and "experienced-based setting management" to emphasize their structured approach (Williams and others 1992, Patterson and others 1998; Pierskalla and Lee 1998; Stewart 1998; Stewart and Cole, 1999; Borrie and Roggenbuck 2001; Borrie and others 2001; More 2002a, b; More and Kuentzel 2000). To suggest that selected recreation activities and wilderness settings will unerringly lead to satisfaction of corresponding motivations and attainment of known benefits would be an overstatement. Some researchers have advanced alternative interpretations which have been variously labeled as "process-based", "transactive", "dynamic, emergent, and multi-phasic", and "situated freedom" to emphasize less highly structured relationships. This critique includes several dimensions.

First, the behavioral interpretation of recreation that underlies some of the frameworks described in this paper is built on expectancy theory which assumes that human behavior is goal-oriented and that choices about recreation activities and areas are made in rational ways (Pierskalla and Lee 1998; More and Kuentzel 2000; More 2002a). However, such decisions are often made without full information by recreation participants, and the psychology underlying such decisions may be complex and influenced by emotion as well as intellect. For example, several studies have found that "mood" can be an important influence in recreation experiences (Hull et al 1992; Stewart 1992; Hull and Michael 1995, Hull and others 1996). Moreover, "sense of place", "place attachment", and related emotional connections between recreationists and park and wilderness areas can strongly influence recreation choices, behaviors, and attitudes. This issue has become an important part of the professional and scientific literature on outdoor recreation (Williams and others 1992; Warzecha and Lime 2001, Kyle and others 2004 a, b, c; Smaldone and others 2005).

Recent research has also suggested that recreation experiences can be highly dynamic and that this can confound analyses and application of the conventional behavioral approach to recreation (McIntyre and Roggenbuck 1998; Patterson and others 1998; Pierskala and Lee 1998; Stewart 1998; Borrie and Roggenbuck 2001; Breejen 2007). For example, a study of canoeists in the Juniper Prairie Wilderness, FL used qualitative interviews to explore the character of the wilderness experience (Patterson and others 1998). Many respondents reported that "challenge" was an important component of the experience, but challenge was interpreted in both positive and negative ways depending upon characteristics of participants and specifics of the experience. While challenge is a potentially important motivation for outdoor recreation in the context of the conventional behavioral approach to recreation, it may have alternative meanings and implications across places, times, and participants. The authors advance the idea that recreation opportunities (that is, activities, settings) might be most appropriately interpreted and characterized by the notion of "situated freedom" which they describe as

> "structure in the environment that sets boundaries on what can be perceived or experienced, but that within those boundaries recreationists are free to experience the world in highly individual, unique, and variable ways. Under these conditions, the nature of experience is seen as emergent rather than predictable" (Patterson and others 1998:425-426.).

A related study employed an "experience sampling method" to examine recreation experiences at the Okefenokee Wilderness, GA (Borrie and Roggenbuck 2001). Respondents were asked to report the character of their wilderness experience at randomly-assigned intervals throughout their trips, and findings suggest that the experience often varied significantly along dimensions of both space and time. For example, respondents reported greater focus on the environment and on introspection during the "exit" phase of the experience compared to the "entry" phase, and less focus on others/social acceptance during the "immersion" phase. The authors conclude that recreation experiences can be characterized as "dynamic, emergent, and multi-phasic", and this may introduce a level of complexity to the assumptions underlying conventional behavioral interpretations of recreation.

A final critique notes that strong, empirically defined relationships among recreation activities, settings, motivations, and benefits have yet to emerge (McCool 1978; McCool and others 1985; More and Kuentzel 2000; More 2002 a,b). Studies reviewed earlier in this paper offer more mixed findings on this topic.

As in many of these types of scientific and professional discussions, the "truth" probably lies somewhere in the broad middle ground of the two extremes of this issue. Human behavior is complex and adaptable, but is not random. Managers can help facilitate psychological and other outcomes for wilderness visitors, but cannot dictate such ends. However, it seems hard to deny that we have learned a lot about outdoor recreation and the wilderness experience over the past several decades and that this knowledge can be integrated and synthesized

into a series of organizational frameworks that can support informed decision-making about defining and managing the wilderness experience. Ultimately, this will require exercise of some element of management judgment. And, of course, more research is needed!

Conclusion

A substantive body of research on outdoor recreation has emerged over the past several decades and this work has important implications for defining and managing the wilderness experience. The conceptual and empirical frameworks described in this paper lead to the following series of propositions:

1. Wilderness experiences can be understood as behavior that is driven by visitor motivations and potential benefits.
2. Wilderness recreation activities and settings can be instrumental in facilitating satisfaction of visitor motivations and benefits.
3. Wilderness settings/opportunities can be defined by a three-fold framework, including resource, social and managerial conditions.
4. Definition of the quality of the wilderness experience has evolved from global measures of visitor satisfaction to include measures of the degree to which wilderness recreation opportunities provide the experiences for which they are designed and managed, and the extent to which the system of wilderness opportunities meets the inherently diverse needs of society.
5. Wilderness recreation should be guided by management objectives, and these objectives should be stated in empirical terms of indicators and standards that specify the limits of acceptable change.
6. Formulation of indicators and standards/limits of acceptable change should be informed by social norms of wilderness visitors and other stakeholders, as well as other relevant sources of information.
7. Indicators and standards that define wilderness recreation opportunities can be configured in alternative combinations to help guide provision of a spectrum of wilderness opportunities and experiences designed to meet the diverse needs of society.

The frameworks and associated propositions that have emerged from the scientific and professional literature can be used to provide some order and understanding to the inherently complex topic of the wilderness experience. While there is some debate over the degree to which these frameworks can be interpreted and applied in a literal way, they can provide conceptual and empirical guidance in defining and managing the wilderness experience.

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