Developing Social Standards for Wilderness Encounters in Mount Rainier National Park: Manager-Defined Versus Visitor-Defined Standards

Kristopher J. Lah

Abstract—This research compared the differences found between manager-defined and visitor-defined social standards for wilderness encounters in Mount Rainier National Park. Social standards in recreation areas of public land are defined by what is acceptable to the public, in addition to the area's management. Social standards for the encounter indicator in Mount Rainier's General Management Plan are based on current use at the Park and research performed in other wilderness areas. It was hypothesized that these standards are not representative of user's level of acceptability. This hypothesis was supported through analysis of responses given by visitors on a short survey, who indicated acceptable encounter levels below the manager-defined standards.

Wilderness, as defined by the Wilderness Act of 1964, is to offer the public "outstanding opportunities for solitude or a primitive or unconfined type of recreation" (P.L. 88-577). The Wilderness Act requires managers to preserve the ecological components and opportunities for solitude. One social dimension of wilderness is the level of human use that an area can accommodate before the wilderness experience is diminished. This level of use is referred to as an area's visitor carrying capacity (Hendee and others 1990).

The National Parks and Recreation Act of 1978 required each Park's General Management Plan (GMP) to include "identification of and implementation commitments for visitor carrying capacities for all areas of the unit" (P.L. 95-625). Effectiveness of the visitor carrying capacity concept depends on how well the social components of an area are understood. The new planning method, the Visitor Experience and Resource Protection (VERP) framework, defines social carrying capacity as "the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions that complement the purpose of the park units and their management objectives" (National Park Service 1993). Since carrying capacity decisions are value-laden, public involvement is critical in the VERP planning process. Public opinion helps define important values in a park, allowing managers to ascertain acceptable and unacceptable visitor conditions, and determine appropriate management actions and limitations (National Park Service 1997).

Background

VERP and Social Carrying Capacity

VERP is a planning method which has evolved from two other frameworks that place management focus on conditions rather than numbers: The Limits of Acceptable Change (LAC), used by the Forest Service in wilderness planning and Visitor Impact Management (VIM), developed by the National Parks and Conservation Association. LAC is a planning process in which the amount of change to be allowed is definitively expressed by quantitative standards, the management actions needed to prevent further change are ascertained, and methods for monitoring and evaluating management strategies are instituted (Stankey and others 1985). VIM involves a description of the association between two specific situations, the impacts associated with these situations and an assessment that evaluates the acceptability of various impacts (Graefe and others 1990).

VERP's nine-step procedure (table 1) is very similar to that of LAC. However, VERP is not limited to wilderness and backcountry planning, which has usually been the case of LAC. In addition, the first seven steps in the VERP framework fulfill the requirements in a general park plan. However, some older GMP's may require an independent Visitor Use Management Plan if they have not previously addressed

Table 1—Nine elements of VERP.

Element 1	Assemble an interdisciplinary project team
Element 2	Develop a public linvolvement strategy
Element 3	Develop statements of park purpose, significance, and primary interpretive themes; identify planning mandates and constraints
Element 4	Analyze park resources and the existing visitor use
Element 5	Describe a potential range of visitor experiences and resource conditions (potential management zones)
Element 6	Allocate the potential zones to specific locations within the park (prescriptive management zoning)
Element 7	Select indicators and specify standards for each zone; Develop a monitoring plan
Element 8	Monitor resource and social indicators
Element 9	Take management action

National Park Service 1997.

Kristopher J. Lah is a Ph.D. Student, Washington State University, 601 NW Bryant, Pullman WA 99163 U.S.A., e-mail: klah@wsunix.wsu.edu

the issue of carrying capacity. This is significant in the Mount Rainier project because the GMP is being written in conjunction with VERP.

While the last two steps of VERP are not essential to the GMP revision process, they play an integral role in park management. These steps are under annual evaluation and are a prescription for monitoring the conditions of the area. Step seven of the VERP framework is to select quality indicators and specify associated standards for each zone. Understanding the characteristics of quality indicators and standards and the role they play is imperative in comprehending the purpose of this research.

Social Indicators and Standards

Indicators are specific, measurable impact variables that reflect the overall conditions of a park. Social indicators measure visitor impacts on other park visitors experiences (National Park Service 1997). Often, the number of indicators selected in a plan is limited, so selection of indicators is critical. Merigliano (1990) offers useful criteria for selecting the best indicators.

While Watson and others (1990) have developed a list of indicators often used in the U.S. Forest Service, it is unknown if they are appropriate for developing monitoring programs in wilderness areas of the National Park Service because they have not been tested. It has been suggested that deciding what impacts matter most can be identified in several ways. While consulting the literature and using managerial judgment are effective methods, public input should also be included in developing indicators (Merigliano 1990; National Park Service 1997; Whittaker 1992). Because social indicators are value laden, all parties that might be affected by impacts should have the opportunity to play a part in their development.

A concern that was recognized in the first public meetings held for Mount Rainier's GMP was that wilderness solitude is diminishing. As Twight and his colleagues (1981) have suggested solitude is a function of intimacy, where intimacy is defined as the opportunity to be "alone with others" in a close shared experience. A variable that has been recognized as a good indicator of solitude is the number of visual encounters with other groups (Merigliano 1990; Potter and Manning 1984; Roggenbuck and others 1993).

Social standards in recreation management refer to levels of impact that are defined as acceptable to visitors, and they can be established for impact variables or indicators (Whittaker and Shelby 1992). An important component of wilderness planning approaches, we have learned, is assigning standards based on input from the public. Public involvement in the VERP planning process is important because value-weighted decisions have to be made (National Park Service 1997). Standards enable managers to be proactive rather than reactive in preserving quality recreation experiences into the future. Standards may start out as value judgments, but if their design is based on scientific research, they become defensible. A good standard should be quantifiable, time-bounded, attainable and output-oriented (Whittaker and Shelby 1992). To ensure that standards can be measured and maintained, a good standard must be a numerical value. Indicators often start out as purely qualitative, but become measurable when a

quantitative standard is assigned to it. The time-bounded characteristic is a counterpart to the quantifiable characteristic. With a time frame, the standard becomes more precise. A standard that is too difficult to accomplish, however, may be undesirable and frustrating. Standards should be attainable. An output-oriented standard focuses on the desired condition to be met rather than the way the standard is met. It focuses on the acceptable impact level, not on the tools used to keep impacts from exceeding standards.

Planning at Mount Rainier National Park

This research was conducted in the designated wilderness of Mount Rainier National Park. Visitation to the Park has drastically increased over the past few decades. In 1974, the annual number of visitors to the Park was 1.5 million; by 1994, it had exceeded 2.3 million (Mount Rainier National Park 1996). Wilderness use increased 69% between 1989 and 1994, with the strong majority of use being from day hikers (Mount Rainier National Park 1996). As early as 1973, Park management recognized the negative effects of increased use in the backcountry and implemented a Backcountry Use and Operations Plan. The 1973 plan outlined methods for managing the increased use which included establishing limits on party size in the backcountry (National Park Service 1989-92). The 1989-92 Wilderness Management Plan for the Park lists the history of attempts to handle the changes in use between 1974 and 1992.

In 1994, planners at the Denver Service Center and managers at Mount Rainier National Park began revising their GMP. They utilized the VERP framework to revise the Park's GMP and the Wilderness Management Plan (Samora personal communication).

Park planners first met in October 1994 and formulated the Park's statement of purpose and significance. This statement guides the VERP planning process. Fourteen of the Park's social, biological, cultural and historical attributes were recognized as significant. These significant resources helped to determine the purpose of Mount Rainier as a national park. The purpose of the wilderness portion of the Park was to "maintain wilderness values and provide for wilderness experiences" (Mount Rainier National Park 1995). Two unique values of wilderness are that they are untrammeled natural areas and provide an opportunity for solitude (PL 88 577). Maintaining these values are therefore recognized as an obligation of the National Park Service.

The public joined the planning process in November 1994, when public meetings were held in several towns in Washington State. Six issues were presented at each public meeting for the public's consideration and input. One issue, "wilderness resources and use", is particularly relevant to this research (Mount Rainier National Park 1995).

Planners used information collected at the public meetings to develop a range of three summer management alternatives: (1) Improve access to many parts of the park; (2) provide additional opportunities for recreation; (3) increase opportunities for solitude. Management zones were described to represent combinations of these alternatives. Each management zone has standards for the amount of use allowed. Alternative management approaches designed to

increase visitor access would be employed in management zones that allow a higher number of users.

A newsletter sent to the public in March of 1997 explained the objectives and details of each alternative. The public was asked to comment on all three alternatives and select one. The planners then compiled the responses and selected a preferred alternative. With the selection of a preferred alternative, the planners were able to move through another step in the planning process by mapping out the desired future condition. The Park then began the process of writing an Environmental Impact Statement for the selected alternative.

Management Zones and Corresponding Standards

Encounters have been used as an indicator in many recent planning studies when solitude was an issue (Hall and Shelby 1996; Lewis and others 1996; Patterson and Hammitt 1990). The indicators that have been developed by the planning team to monitor solitude in the wilderness areas of Mount Rainier are encounters per day and encounters per hour (based on an eight-hour day). Encounters are defined as "the number of people outside an individual's group that are met during periods of peak use (peak hours of peak days of peak months)" (Mount Rainier National Park 1997). The level at which encounters become unacceptable is determined by assigning an appropriate standard to it.

The National Park Service during Mount Rainier's VERP planing process developed wilderness standards for the indicators "encounters per hour "and" encounters per day. The plan divided the Park into six different management zones, which would allow different levels of encounters. Standards for encounters are part of each zone's definition. Therefore, there should be differences in what users in each zone think is acceptable. Table 2 displays the standards for encounters per hour and encounters per day that have been assigned to each zone.

The Park developed standards for encounters per day in two ways. The standards for the Pristine and Primitive zones were produced by a review of a study conducted in the Eagle Cap Wilderness (Hall and Shelby 1994). Standards in the remaining zones (Semi-primitive, Moderate Use Climbing, Transition and High Use Climbing) for "encounters per hour" and "encounters per day" are based on management's knowledge of the current use levels from trail counters and Park records (Samora personal communication). While the planning team allocated six wilderness zones, research was only conducted in the Semi-primitive, Moderate Use Climbing, Transition and High Use Climbing zones because of concerns of displacement of visitors in these zones and financial limitations.

While the indicators (encounters per day and encounters per hour) are based on knowledge gained from public meetings, development of the standards lack public input. As discussed above, public involvement is important, especially when decisions on subjective topics like solitude and visitor carrying capacity are being made. Because the public was not involved in the development of these standards, it is not known if they represent levels that are acceptable to visitors of Mount Rainier. In fact, concerns are raised when one reads the most recently written planning document's information on encounters and the Park's current standards. For example, the Park's 1989-92 Wilderness Management Plan list of the "most heavily used trails during 1992" indicates that the encounter levels for these trails ranged from 21 to 49 (National Park Service 1989-92). The standards for the Semi-primitive, Moderate Use Climbing, Transition and High Use Climbing Zones (60 and 100) are well above even the most heavily used trails in 1992. If the Park standards of 60 and 100 are based on current use, is this recognizable increase acceptable to visitors? Is this increased level a level that visitors would like to have maintained?

Research Question and Hypotheses

Recognizing the methodological shortcomings in the way the Park standards were developed, the following question was proposed to guide this study: Do wilderness users at Mount Rainier National Park share the same levels of acceptability for encounters per hour and encounters per day as suggested by the social standards developed by planners for four different management zones (Semi-primitive, High Use Climbing, Transition and Moderate Use Climbing)? This research question lead to the following hypotheses:

Hypothesis 1: Wilderness users at Mount Rainier National Park will express different preferred and acceptable levels for encounters per hour and encounters per day than the current social standards developed by the planning team for four different management zones of the Park.

Hypothesis 1a: Wilderness users at Mount Rainier National Park will express a significantly different (p-value less than or equal to 0.05) acceptable level for encounters per day than the current Park standards developed by the planning team.

Hypothesis 1b: The majority of wilderness users at Mount Rainier National Park will express different preferred levels for encounters per hour than suggested by the social standards developed by planners for four different management zones of the Park.

Table 2—Summer Wilderness Zones. Encounters per hour and encounters per day.

Indicator	Pristine	Primitive	Semi-primitive	Moderate Use Climbing	Transition	High Use Climbing
Encounters per hour	0	<3	<7.5	<7.5	<12.5	<12.5
Encounters per day	0	<25	<60	<60	<100	<100

Standards apply to "peak hours" of "peak days" of "peak months." One day = eight hours.

Hypothesis 1c: The majority of wilderness users at Mount Rainier National Park will express responses for highest number of encounters per hour that are not equivalent to the current Park standards developed by the planning team for four different management zones of the Park.

Both preferred and acceptable levels for encounters were intentionally expressed in the hypothesis and studied. Standards are often based on what is acceptable; however, the word acceptable conveys a degree of tolerance. While acceptable means that a condition is tolerable, prefer means "desirable" (Random House 1988). Therefore, if the individual visitor's experience at the Park is of interest to park personnel, then maybe we should also research what individuals prefer.

The significance of management zones in providing opportunities for solitude is also important in the success of the plan. However, due to the problems in developing the standards, it is unknown if visitors to these zones have different levels of acceptability for encounters. In light of the lack of scientific evidence to suggest that there should be a difference in standards for encounters among the zones, hypothesis 2 was also proposed.

Hypothesis 2: Analysis of reported levels of acceptable number of encounters per day from the four management zones will result in no significant difference among the zones.

Hypothesis 2a: Analysis of reported levels of acceptable number of encounters per day from the four management zones will result in no significant difference (p-value < 0.008) among the zones.

Methods _____

Study Area

To test the hypotheses, data were collected with a self-administered survey. Two locations were selected to administer the survey in each of the four zones studied, for a total of eight survey sites. Survey sites were selected with assistance from Park managers Barbara Samora (natural resource manager) and Steve Winslow (head climbing ranger).

Survey sites in the Semi-primitive, Moderate Use Climbing and Transition zones were based on the same criteria. These zones are located in more than one area of the Park and they share the same standards for encounters. Therefore, there should be agreement among visitors within each zone, irrespective of the zone's location. To test whether agreement is confounded by location, sites with the same zone definition were selected in different sections of the Park. In addition, the survey sites within these zones were consistently positioned one half mile into each zone.

Survey site locations for the High Use Climbing zone were selected based on a different criterion than the other zones. Unlike the other zones that are each located in at least two areas of the Park, this zone is located in a single extensive snowfield. The expansiveness of the High Use Climbing zone allows the visitor to use the entire snowfield rather than a single route or trail, as is the case with the other zones. However, the user's ability to use the whole snowfield made it difficult to select survey sites within it. Therefore, survey sites had to be located at places in the zone that are known to attract visitors (rest areas, water sources, scenic vistas, etc.). In cooperation with head climbing ranger Steve Winslow, locations that attract visitors were identified.

Sampling

Standards for encounters are based on periods of "peak use (peak hours, of peak days, of peak months)" (Mount Rainier National Park 1996). Therefore, the field research was conducted during times that have been recognized as peak use. First, an eight-week period during July and August of 1997 was selected and broken down into two-week blocks. Because visitation to the Park during weekdays is much lower than on "peak days" of the week (Vande Kamp and others 1996a), Friday, Saturday and Sunday were selected primarily as field days. Finally, in addition to having peak days of the week, some of these zones also had peak hours during those days. Hours were selected as either morning, 8:00 to 12:00, or afternoon, 12:00 to 4:00. This method in scheduling was found to agree with the standards that the survey is designed to test and develop because they are defined by these peak periods (Mount Rainier National Park 1997).

To avoid response contamination visitors were approached and asked to complete a survey no more than every 10 minutes over the four-hour survey period. With four field days spent at each survey site, the total possible number of respondents for each survey site could have been a maximum of 96 respondents over the field season. This method therefore, defines the sample frame for this study as visitors to the wilderness areas of Mount Rainier National Park between July 7 to August 31 on selected days during selected periods of the day.

When visitors were approached, they were greeted and read a verbal consent script. The script asked visitors for their voluntary participation in completing a survey. The visitors were then told why the survey was being conducted and approximately how long it would take to fill out. This script served as an effective method to confront visitors and introduce the survey.

Survey

The hypotheses for this study pertain to the standards developed by the planning team for encounters per hour and encounters per day. The hypotheses and standards were tested by means of a short self-administered survey for four management zones (Semi-primitive, Moderate Use Climbing, Transition and High Use Climbing). As noted above, the Semi-primitive and Moderate Use Climbing zones share the same standards, as do the Transition and High Use Climbing zones. Therefore, only two survey instruments (one for each set of standards) were required. The two instruments only differed in questions that specifically related to the standard levels.

Results

Encounters Per Day

Hypothesis 1a—Wilderness users at Mount Rainier National Park will express a significantly different (p-value less than or equal to 0.05) acceptable level for encounters per day than the current Park standards developed by the planning team.

To test hypothesis 1a, one sample t-tests were conducted on reported levels of acceptable number of encounters per day against their corresponding Park standard. Because one sample t-tests assume a normal distribution, each of these samples was further evaluated by applying the Kolmogorov-Smirnov test of normality. The Kolmogorov-Smirnov determines whether the sample can reasonably be thought to have come from a population with the theoretical distribution, in this case a normal distribution. To further test these samples against their corresponding standard, the Wilcoxon signed ranks test was conducted on each sample. The Wilcoxon signed rank test ranks the difference between matched pairs, giving more weight to a pair that shows a large difference.

Results of the one sample t-tests for individual zones indicate a significant difference (p-value <0.05) between the mean of all of the samples and their corresponding Park standard, as displayed in table 3. Results of the Kolmogorov-Smirnov test suggest that the samples for the Semi-primitive and Moderate Use Climbing zones are normally distributed while the samples for the Transition (0.05) and High Use Climbing (0.012) zones are questionable to skewed. However, the Transition zone's sample size is considered large enough (n >30), under the Central Limit Theorem, to allow use of the t-test. Results of the Wilcoxon signed ranks test show a significant difference between the responses for acceptable level of encounters per day and the standards for all of the zones. These tests therefore support hypothesis 1a; responses for acceptable level of encounters per day were found to be significantly lower than the current Park standards for all of the zones.

Encounters Per Hour

Hypothesis 1b (Preferred Levels)—The majority of wilderness users at Mount Rainier National Park will express different preferred levels for encounters per hour than suggested by the social standards developed by planners for four different management zones of the Park.

Standards for encounters per hour (Hypothesis 1b) were tested by data collected for preferred levels that respondents selected from a five-point scale. The five-point scale tested the corresponding standard by making it the third or middle level. The levels before the standard were incrementally lower than the standard, where as those above the standard were incrementally higher. For example, preferred levels for the Semi-primitive and Moderate Use Climbing zones were 3 or less, 5, 7 (standard), 9, over 9 and preferred levels for the Transition and High Use Climbing zones translate to 4 or less, 8, 12 (standard), 16, over 16. Percentages and medians of the five-point scale responses were analyzed for the samples collected in each zone.

Results of descriptive analysis of responses for preferred levels of encounters per hour reveal that the majority of users in the Semi-primitive, Moderate Use Climbing and Transition zones prefer levels for encounters per hour below the corresponding Park standard. As reported in table 4, at least 50 percent (median) responded at the second value or below the Park standard, for all of the zones except the High Use Climbing zone. Therefore, the null hypothesis is rejected for all of the zones except for the High Use Climbing zone. In fact, the median is reached at the third value for the High Use Climbing zone, which would suggest that respondents from this sample might prefer per hour encounter levels similar to the Park standard.

Hypothesis 1c (Highest Levels)—The majority of wilderness users at Mount Rainier National Park will express responses for highest number of encounters per hour that are not equivalent to the current Park standards developed by the planning team for four different management zones of the Park.

Asking respondents the highest levels of encounters per hour (Hypothesis 1c) they would be willing to see also tested the standards. Responses were selected from the same five-point scale used for the preferred levels. Percentages and medians were calculated to analyze the data collected from the five-point scale responses.

Results of this analysis reveal that the Semi-primitive and High Use Climbing zones had a majority of users that responded above their corresponding standard. While the majority of respondents in the Moderate Use Climbing and Transition zones answered at the third level, their corresponding standard for encounters per hour (table 5), none of the zones had a majority that expressed the highest number of people below the park standard. The null hypothesis is therefore supported in the Moderate Use Climbing and Transition zones, but not the Semi-primitive and High Use Climbing zones.

Table 3—Results of one sample t-test and tests of normality for each zone.

Zones	Sample size	Mean	Park standard	One sample t-test	Wilcoxon signed rank	Distribution of sample
Semi-primitive	23	13.7	60	0.00	0.000	0.107
Moderate Use Climbing	13	28.9	60	0.006	0.022	0.113
Transition	38	22.0	100	0.00	0.003	0.05
High Use Climbing	20	49.9	100	0.00	0.000	0.012

Significance differences for one sample t-tests and Wilcoxon signed ranks test set at p-value -0.05. Normal distribution of samples determined by values greater than 0.05.

Table 4—Percentages for each preferred encounter level per hour and the median response for each zone.

Zone	First level	Second level	Third-level standard	Fourth level	Fifth level	Median reached at	Cumulative at second level
Semi-primitive	34.8%	42.4%	15.2%	3.0%	4.5%	2nd level	77.3%
Moderate Use Climbing	46.2%	12.8%	12.8%	20.5%	7.7%	2nd level	59.0%
Transition	40.7%	30.2%	12.8%	8.1%	8.1%	2nd level	70.9%
High Use Climbing	16.0%	28.4%	22.2%	12.3%	21.0%	3rd level	44.4%

Median—level at which majority was reached. Cumulative—percentage of respondents who responded at second level or below. Values for the Semi-primitive and Moderate Use Climbing Zones translate to 3 or less, 5, 7, 9, over 9. Levels for the Transition and High Use Climbing Zones translate to 4 or less, 8, 12, 16, over 16.

Comparison of Zones

Hypothesis 2a—Analysis of reported levels of acceptable number of encounters per day from the four management zones will result in no significant difference (p-value < 0.008) among the zones.

Conducting two independent-sample t-tests and the non-parametric Mann-Whitney test compared responses given for acceptable number of encounters per day for each zone. These two methods test the differences between two samples on one variable and are therefore appropriate for testing hypothesis 2a. While the other tests in this study are considered significant if the p-value is less than 0.05, the significance levels for these tests are adjusted for multiple tests. The Dunn's multiple comparison test also known as the Bonferroni procedure was used to avoid a type one error. Application of this procedure translated into dividing the p-value (0.05) by the number of tests (0.05/6) for an adjusted significance level of 0.008 (Kirk 1995).

Results from these tests indicate that there are only significant differences between two sets of zones: the Semi-primitive/High Use Climbing zones and the Transition/High Use Climbing zones. Table 5 shows that the tests fail to reject the null hypothesis in four of the six comparisons. These results are logical when viewing the means column in table 6; Semi-primitive = 13.65; Moderate Use Climbing = 28.85;

Transition = 22.00; High Use Climbing = 49.85. Hypothesis 2a is therefore supported in four of the six zone comparisons.

Discussion and Recommendations

The results of the survey described in this paper were useful in developing an understanding of visitor attitudes about encounters with other visitors. Users' perceptions were quantified successfully to make informed and defensible decisions on the adequacy of the Park's standards. Because the standards are assigned to specific areas of the Park it was important to conduct the survey in the field. This method allowed respondents to react to the environmental and social conditions of the zone in which the standards will be employed.

Applying three statistical methods, which served to substantiate results from small samples (n < 30), tested the results for acceptable encounters per day. The data collected on this variable suggest that there are significant differences between the Park standards and acceptable levels reported in all four of the zones. Therefore, hypothesis 1 is supported in regard to encounters per day. Wilderness users at Mount Rainier National Park did express acceptable levels for encounters per day different from the park standards developed by the planning team for four different

Table 5—Percentages for each highest encounter level and the median response for each zone.

Zone	First level	Second level	Third level	Fourth level	Fifth level	Median	Cumulative
Semi-primitive	6.1%	10.6%	19.7%	42.4%	21.2%	4th level	36.4%
Moderate Use Climbing	17.9%	17.9%	20.5%	23.1%	20.5%	3rd level	56.4%
Transition	10.5%	15.1%	25.6%	20.9%	27.9%	3rd level	51.2%
High Use Climbing	6.2%	13.6%	19.8%	24.7%	35.8%	4th level	39.5%

Median—level at which majority was reached. Cumulative—percentage of respondents who responded at or below the third level. Levels for the Semi-primitive and Moderate Use Climbing Zones translate to 3 or less, 5, 7, 9, over 9. Levels for the Transition and High Use Climbing Zones translate to 4 or less, 8, 12, 16, and over 16 among the zones.

Table 6—Results of comparison of zones for acceptable number of encounters per day.

Tests	SP/MUC	SP/Tran	SP/HUC	MUC/Tran	MUC/HUC	Tran/HUC
Significance in difference	0.139	0.073	0.000	0.427	0.116	0.006
Mann Whitney significance	0.336	0.393	0.000	0.931	0.048	0.001

Significant differences values less than 0.008. SP = Semi-primitive; MUC = Moderate Use Climbing; Tran = Transition; HUC = High Use Climbing.

management zones of the Park. These findings are further supported by the results to a question about whether visitors' enjoyment would be enhanced by seeing fewer visitors then the park's standard would allow.

The majority of wilderness users either strongly agreed or agreed with the statement that: "Seeing fewer than 60 or 100 (each zones corresponding standard) people per day…would make their visit to Mount Rainier more enjoyable," (table 7). This suggests that respondents may prefer encounters below the park standards, which coincides with the mean level calculated from numeric responses for acceptable encounters per hour. Not only were acceptable encounter levels significantly different, they were also significantly lower than the Park standards.

Hypothesis 1 was also supported in reference to preferred encounters per hour for the samples collected in all the zones, except for the High Use Climbing zone. In fact, the majority of respondents in the Semi-primitive, Moderate Use Climbing and Transition zones revealed that they would prefer levels below the Park standard. The majority of users in the High Use Climbing zone selected responses for preferred encounters per hour at or below the Park standard that was being tested. However, recent adjustments to the Park standards actually raised the standard rather than lowered it. These adjustments made in the spring of 1998 (Samora personal communication) as shown in table 8, raised the encounter levels per day and per hour in the Moderate Use Climbing and High Use Climbing zones. The Moderate Use Climbing zone's standards were raised from 60 encounters per day to 75 (7.5 encounters per hour to 9). The High Use Climbing zone's standards were raised from 100 encounters per hour to 150 (12.5 encounters per hour to 19) (Samora personal communication). These adjustments are contrary to the results found through scientific inquiry and have not been explained to the public. The results in this study suggest that any adjustments to the standards should be to lower the levels. Table 8 also displays the suggested adjustment to the standards for all of the zones based on the research done in this study.

The equation that was formulated to make these suggested adjustments for each zone is: the (mean of acceptable encounters per day) + (preferred encounters per hour * 8) + (highest encounters per hour willing * 8)/3. This formula takes into account the calculated mean for acceptable encounters per day and preferred and highest encounters per hour selected by the respondents in each of the zones and develops an average from them. The preferred and highest levels were multiplied by eight because the standards for encounters per hour are based on an eight-hour day.

In addition, responses for acceptable encounters per day were found to be significantly different ($p < 0.05$) in only two of the six zone comparisons. Not only do these results support hypothesis 2, they also suggest that there should not be drastic differences in the standards. Therefore, it was logical to attempt to make the standards, suggested in table 9, closer in the zones that were not found to be significantly different. In light of the statistical analysis conducted for this research, visitors in the High Use Climbing zone are the most tolerant of encounters. So the suggested standards for the High Use Climbing zone are the highest of all the zones researched.

Conclusions

The main purpose of this study was to determine if visitor-defined standards are different then manager-defined standards for wilderness encounters. While planning teams may often find that it is difficult to function on limited budgets, the VERP process outlines the need for standards based on visitor's level of acceptability. As noted earlier, the park experienced a large increase in visitation since the 1989-92 Wilderness Management Plan was completed, however the manager-defined standards were based on this increase or

Table 7—Percentages for levels of agreement with seeing fewer than the Park standard would make visit more enjoyable.

Zone	Strongly agree	Agree	Unsure	Disagree	Strongly agree
Semi-primitive	34.8	47.0	7.6	7.6	3.0
Moderate Use climbing	35.9	35.9	5.1	15.4	7.7
Transition	37.2	34.9	10.5	11.6	5.8
High Use Climbing	22.2	39.5	9.9	17.3	11.1

Table 8—Author's suggested standards based on acceptable, preferred and highest encounter levels indicated by respondents.

Zone	Encounters per day		Encounters per hour	
	Original/adjusted standard	Author's suggested standard	Original/adjusted standard	Author's suggested standard
Semi-primitive	60/60	42	7.5/7.5	5.25
Moderate Use Climbing	60/75	42	7.5/9.0	5.25
Transition	100/100	60	12.5/12.5	7.5
High Use Climbing	100/150	92	12.5/19	11.5

Suggested standards for each zone = the mean of acceptable encounters per day + (preferred encounters per hour * 8) + highest encounters per hour * 8)/3.

current use without knowing if the increase was acceptable to visitors. One important issue that has been learned from this study is that scientific inquiry is needed when defining social standards and should be included, as called for in VERP, in the planning process.

Perhaps the largest limitation in this study was the small sample size. The lone researcher was not able to research all of the wilderness zones and was limited to two survey sites. Each of the survey sites could only be sampled four times throughout the eight-week period. A more complete data collection process would have allowed data to be collected at each site once a week. This would have resulted in larger samples, which would have allowed for comparison of sites within the same zone. Future research should allow for such comparison because it is important that a zone have a consistent meaning, even if it is located in different regions of the Park. In addition, further research should be conducted as the plan is employed to develop an understanding of visitors' reactions to the standards. Future research should become part of the ongoing monitoring that is part of the VERP framework.

References_____

Bury, R. L. 1976. Recreation Carrying Capacity-Hypothesis or Reality? Parks and Recreation.11 (1):23-25

Flathead National Forest. 1985. Statement for the LAC task force meeting, June 8, by Arnold Bolle. Plan. File 2320, Flathead National Forest, Kalispell, MT.

Graefe, A. R.; Kruss,F. R.; Vaske, J. J. 1990. Visitor Impact Management, v2, The Planning Framework. The National Parks and Conservation Association. Washington, D.C.

Hall, T.; Shelby, B. 1994. Eagle Cap Wilderness: Recreational use and impacts. Wallowa-Whitman National Forest Report. pp. 1-5.

Hall, T.; Shelby, B. 1996. Who cares about encounters? Differences between those with and without norms. Leisure Sciences. 18(1): 7-22.

Hendee, J. C.; Stankey, G. H.; Lucas, R. C. 1990. Wilderness Management. North American Press; Golden, Colorado. pp. 142 and 546.

Kirk, R. E. 1995. Multiple comparison tests. In Brace-Thompson, Jim. and Taflinger, Marianne, ed. Experimental design: Procedures for the behavioral sciences. Brooks/Cole Publishing; Pacific Grove, California. pp. 137-138.

Lewis, M. A.; Lime, D. W.; Anderson, D. H. 1996. Paddle canoeists, encounter norms in Minnesota's boundary waters canoe area wilderness. Leisure Sciences. 18(2): 143-160.

Merigliano, L. L. 1990. Indicators to monitor the wilderness recreation experience. In Lime, David W., ed. Managing Americas enduring wilderness resource. Managing America's enduring wilderness resource conference:proceedings; Minneapolis, MN: University of Minnesota.156-162.

Mount Rainier National Park. 1995. An update on the general management plan (news letter). Denver Service Center, Denver CO.

Mount Rainier National Park. 1996. Briefing Statement General Management Plan. Department of the Interior, Document. Mount Rainier National Park, Washington.

Mount Rainier National Park. 1997. Progress report on the general management plan (newsletter). Denver Service Center, Denver, CO.

Mount Rainier National Park <http://www.nps.gov.mora/> 2 January 1997. (Accessed 4 Feburary1997).

National Park Service. 1989-92. Wilderness Management Plan. As prepared by Barbara Samora, Mount Rainier National Park. Ashford, WA.

National Park Service. 1993. Special Report. VERP: A Process for Addressing Visitor Carrying Capacity in the National Park System. (Working draft.) Denver Service Center, Denver, CO.

National Park Service 1997. VERP: A Summary of the Visitor Experience and Resource Protection (VERP) Framework. Denver Service Center, Denver, CO.

Patterson, M. E.; Hammitt, W. E. 1990. Backcountry encounter norms, actual reported encounters, and their relationship to wilderness solitude. Journal of Leisure Research. 22(3): 259-275.

P.L. 88-577. 1964. The Wilderness Act of 1964. United States Congress.

P.L. 95-625. 1978. The National Parks and Recreation Act. United States Congress

Potter, F. I.; Manning, R. E. 1984. Application of the wilderness travel simulation model to the Appalachian Trail in Vermont. Environmental Management. 8(6):543-550.

Random House. 1988. The Random House College Dictionary: Revised Edition. By Random House Incorporated. New York, NY.

Roggenbuck, J. W.; Williams D. R.; Watson, A. E. 1993. Defining acceptable conditions in wilderness. Environmental Management. 17(2):187-197.

Samora, B., Natural Resource Manager, National Park Service, Mount Rainier National Park, Ashford, WA.

Stankey G. H.; Cole, D. N.; Lucas, R. C.; Peterson, M. E.; Frissell, S. S.; Washburene, R. F. 1985. Limits of acceptable change (LAC): System for wilderness planning. Gen. Tech. Rep. INT-176. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, 37 p.

Stokes, G. L. 1990. The evolution of wilderness management: The Bob Marshall Wilderness Complex. Journal of Forestry. 88 (10) 15-20.

Twight, B. W.; Smith, K. L.; Wissiner, G. H. 1981. Privacy and camping: Closeness to the self vs. closeness to others. Leisure Sciences. 4 (4): 427 - 441.

Vande Kamp, M. E.; Johnson, D. R.; Kucera, A.; Young, Y. 1996a. Describing and estimating the system of visitor distribution in Mount Rainier National Park. DRAFT.

Vande Kamp, M. E.; Johnson, D. R.; Kucera, A.; Young, Y. 1996b. Mount Rainier National Park 1993 Spray Park visitor survey. DRAFT.

Washburne, R. F.1982. Wilderness Recreation and Carrying Capacity: Are Numbers Necessary? Journal of Forestry. 80(Nov): 726-728

Watson, A.; Zahrobsky, J; Olsen, N. 1990. A Summary List of Indicators of Natural Conditions. Wilderness Management Research Unit Intermountain Research Station. Missoula, MT.

Whittaker, D. 1992. Selecting indicators: Which impacts matter more? In B. Shelby, G. Stankey, & B. Schindler., eds. Defining wilderness quality: The role of standards in wilderness management - A workshop proceedings. Gen. Tech. Rep. PNW-GTR-305. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 67 p.

Whittaker, D.; Shelby, B. 1988. Types of norms for recreation impacts: Extending the social norms concept. Journal of Leisure Research. 21 (4) 261-273.

Whittaker, D.; Shelby, B. 1992. Developing good standards: Criteria, characteristics and sources. In: B. Shelby, G. Stankey, & B. Schindler., eds. Defining wilderness quality: The role of standards in wilderness management - A workshop proceedings. Gen. Tech. Rep. PNW-GTR-305. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 67 p.

Williams, D. R.; Roggenbuck, J. W.; Bange, S. 1991. The effect of norm-encounter congruence on crowding perceptions, satisfaction and behavior in river recreation settings. Journal of Leisure Research. 23 (3) 170-188.

Young, M.; Williams, D. R.; Roggenbuck, J. W. 1991. The role of involvement in identifying users' preferences for social standards in the Cohutta Wilderness. In: Hope D., ed. Southeastern Recreational Research conference: proceedings; 1990. Gen. Tech. Rep. SE-GTR-67. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 184 p.