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**MOUNT RAINIER NATIONAL PARK
1993 SPRAY PARK VISITOR SURVEY**

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Technical Report NPS/CCSOUW/NRTR-98-04
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PREFACE

This document reports the results from a survey of visitors to the Spray Park area of Mount Rainier National Park in 1993.

The questionnaires used in the study are included in Appendices A, B and C. Before proceeding with the report, readers should review these questionnaires. The response rates for different sets of items vary because of differential response rates across the three questionnaires. This fact has statistical implications which are discussed in the body of the report.

The last question on the mail questionnaire used in this study offered respondents an opportunity to write comments about anything relevant to their trip to Mt. Rainier. These comments have been transcribed and are presented here as Appendix D. Readers are encouraged to read through these comments which provide a qualitative description of visitors' reactions which quantitative measures do not capture.

It is anticipated that this report will be used primarily as a reference document and therefore, depending on each reader's objective, this report may be used in very different ways. For example, readers who are seeking only an overview of the project would refer to *Section II. Survey Highlights*. Readers not familiar with statistical analysis of survey data are encouraged to refer to Appendix E, "How to Use This Report."

I. INTRODUCTION

The 1993 Mount Rainier National Park Spray Park Visitor Survey (SPVS) was administered by the Cooperative Park Studies Unit (CPSU) at the College of Forest Resources, University of Washington. The study was proposed and funded by Mount Rainier National Park (MORA).

This is the first survey at Mount Rainier National Park that has specifically targeted dayhikers, and is also the first survey of visitors to this entrance of MORA. The survey objectives included the following: (1) to identify demographic characteristics of park visitors; (2) to identify Spray Park trip characteristics; (3) to identify motivations for visits to the Spray Park area of Mount Rainier; (4) to discern the level of trip satisfaction; (5) to determine visitor usage of trails, social way trails, and scenic viewpoints; (6) to assess visitor expectations and preferences for encountering other people in Spray Park; (7) to determine visitor perceptions of management priorities for Spray Park and the future of Mount Rainier National Park; and (8) to use hypothetical scenarios to develop encounter preference curves and assess their usefulness as quantitative expressions of social carrying capacity in planning models such as LAC or VERP.

Spray Park was selected as the site of data collection because it is a good example of an area of MORA legally designated as wilderness but commonly visited by large numbers of day-hikers. The majority of the research and policy development concerning wilderness has previously focused on more stereotypic users such as overnight backpackers. Faced with increases in wilderness day-hiking at many sites throughout MORA, and with projections that demand for such use would continue to

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grow, managers felt the need for increased information about the use of areas such as Spray Park for day-hiking.

Survey Design and Questionnaire Development

One of the most unusual and interesting characteristics of the SPVS is its multiple-questionnaire design. Visitors were contacted three times—at the entry point to Spray Park, upon exit from Spray Park, and within a few weeks of their trip via mail questionnaire. There were specific reasons for each questionnaire and for the timing regarding which contacts were made.

The use of the entry point questionnaire was motivated primarily by an interest in the expectations and preferences that visitors bring to Spray Park. In post-trip questionnaires it is difficult for visitors to accurately recall the expectations and preferences they held prior to their experience. Therefore, it was important to contact visitors prior to their entry into Spray Park.

The survey was also concerned with visitors' evaluations of their experiences in Spray Park. Such evaluations could have been solicited in a mail questionnaire, but an on-site questionnaire was used to avoid potential inaccuracy in visitors' memories for specific aspects of their experience. For example, in a mail questionnaire that arrived more than a week after their trip to Spray Park, visitors might have been able to state that other visitors had detracted from their experience, but have been unable to recall what behavior (if any) on the part of the other visitors had bothered them.

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Finally, the use of the mail questionnaire for the final set of questions was motivated primarily by a concern that an undue burden would be placed on visitors during their trip if any more questions were asked than those that were necessary to ask on-site. Thus, while the exit questionnaire focused almost entirely on evaluations of the conditions just experienced, the mail questionnaire focused on visitor evaluations of hypothetical conditions and on visitor characteristics associated with their hiking experience.

Both the survey design and the questionnaires themselves (Appendices A, B, and C) were produced by the CPSU in cooperation with the MORA staff. Initial meetings were held in the fall of 1991 to establish project objectives. Input from park staff was essential in ensuring that the questionnaires addressed management needs. Additional input on the questionnaire design was also solicited from Dr. Robert Manning, a University of Vermont social scientist with extensive experience in the design and administration of similar surveys. A pretest was conducted in the summer of 1992. After final changes based on the pretest process were made, the draft questionnaires were sent to the Office of Management and Budget for review and approval.

Sampling and Visitor Contact Procedures

The population to which statistical generalization is intended in the SPVS is all people over age 15 who visited the Spray Park area of Mount Rainier National Park from July 18, 1993 to September 18, 1993. The study design called for visitor contacts to be made by CPSU survey workers at the major entrance to Spray Park where the meadow

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opens shortly after the trail crosses Spray Creek. As hikers approached the short boardwalk found at that point, they were approached by a survey worker who was self-identified as a University of Washington employee conducting a survey for the NPS. Every hiker over the age of 15 was asked to fill out a questionnaire. After completing the entrance questionnaire, hikers were told that there would also be a short exit questionnaire for them to complete upon their exit and were thanked for their contribution to the project.¹ Compliance with the request to complete the initial survey was over 90%.

Upon leaving Spray Park (i.e., passing the survey site), individuals were greeted by the survey worker and asked to complete an on-site exit questionnaire concerning their experiences in Spray Park. Hikers who were hesitant to fill out the exit questionnaire were encouraged to do so because, "the data from the entrance survey will be of very limited use without the exit survey." Hikers who refused to fill out the questionnaire were thanked for their time. Almost 80% of all hikers who filled out entrance questionnaires also filled out exit questionnaires. The 20% who did not complete the exit questionnaire included not only refusals, but also some hikers who left Spray Park via alternate routes or who left after the survey worker left the site (see the discussion of non-response below).

Sampling of visitors was conducted based on a scheme in which an equal number of days representing weekends and weekdays were sampled (for sampling purposes, Labor Day was considered a weekend day). Although this scheme produced a sample in which

¹ For the first few weeks of data collection, hikers were also asked if they planned to exit Spray Park by returning past the survey area. Visitors who planned to exit via other routes were given exit questionnaires and asked to complete them when they left Spray Park and leave the completed questionnaires in orange plastic file boxes placed near the Knapsack Pass trail and near the Wonder and trail at the upper end of Spray Park (the two most common alternate exit points). Due to practical problems, this provision for data collection was unsuccessful with consequences that are discussed below.

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weekend visitors were overrepresented, it was deemed appropriate because the periods of peak visitation were of primary concern and because the sample size was sufficiently large to adequately describe the underrepresented weekday visitors. Throughout this report, situations are noted in which weekend and weekday visitors differ significantly.

A mail questionnaire was then administered that primarily assessed individuals responses to varying numbers of encounters with other visitors. Details of the mail survey are discussed below.

Mail Questionnaire Administration

Every respondent who provided their name and address on the entrance questionnaire was sent a mail questionnaire three to six weeks after their initial contact. Of the 1,076 respondents to the entrance questionnaires, 820 indicated a willingness to participate in the mail survey by including their full address. Thus, refusals to participate in the mail survey reduced the sample by 24%, a rate considerably higher than that previously found in similar surveys at MORA. A tentative explanation for this high refusal rate is that the amount of information solicited on the entrance and exit questionnaires, and the placement of the survey worker in the natural environment where subjects were already engaged in their recreation experience, lead to decreased visitor cooperation. In the mail survey instructions, respondents were instructed to complete the questionnaire and return it by mail in postage-paid envelopes that were provided:

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As a follow-up, all respondents were sent a thank-you/reminder letter about ten days after they received the questionnaire. Non-respondents received a second reminder letter and an additional copy of the questionnaire. A third letter was sent to those who did not respond to the second reminder.

Of the 820 questionnaires that were originally mailed out, 26 had bad addresses leaving a total of 794. A total of 587 were returned, resulting in a response rate for the SPVS of approximately 74%. Of the 587, we were able to match 553 with fully completed entrance questionnaires and 549 with fully completed entrance and exit questionnaires.

Limitations

The SPVS has several general limitations that should be kept in mind in interpreting the data. (1) In all surveys it is assumed that respondents provided accurate and honest answers to the questions asked. (2) The data represents visitor attitudes and opinions at a particular point in time, and changes can occur at any time. (3) Generalization is possible to Mount Rainier National Park Spray Park visitors only.

In addition, there are other limitations noted in the body of the report that are due to the manner in which individual questions were interpreted.

Finally, there are other limitations that revolve around the issue of non-response. That is, there is a possible bias in the sample due to differences between the hikers who completed the questionnaires and those who didn't. This project entailed three different questionnaires: an on-site entrance questionnaire, an on-site exit questionnaire, and a mail

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questionnaire. Ideally, a respondent would have completed all three questionnaires. However, as completion rates varied across surveys, it is necessary to determine whether the smaller sample due to non-response is still representative of the general sample. For example, is the sample of individuals who completed both the entrance and exit questionnaires representative of the sample of individuals who completed the entrance questionnaire?

Representativeness or potential non-response bias was assessed using Chi-square tests for independence which compared whether the response rates for the two samples were independent of a particular visitor characteristic. Using a .05 significance level, a significant Chi-square indicates that response rates are related to a particular visitor characteristic. For example, older hikers are often found to be more likely to complete questionnaires than are younger hikers. One of the major problems of utilizing Chi-square tests arises when one or more subgroups defined by the variables being tested (e.g., older hikers who did not fill out questionnaires) is very small. In such situations the Chi-square test is biased towards significance and thus the results must be interpreted cautiously. The visitor characteristics used in assessing representativeness in this analysis were gender, age, residence location based on zip code, party size, and planned route of leaving Spray Park.

Because three questionnaires were used, there were three subsamples, each of whose representativeness was determined in comparison to a larger sample. The three subsamples were (1) respondents who completed the entrance and exit questionnaires, (2)

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respondents who completed the entrance and mail questionnaires, and (3) respondents who completed all three questionnaires.

The first set of analyses investigated whether visitors who completed the entrance and exit questionnaires were representative of all visitors who completed the entrance questionnaire. A total of 1076 entrance questionnaires were completed. Approximately 79% (848) of those who completed an entrance questionnaire also completed an exit questionnaire.² For the visitor characteristics listed above, statistically significant differences in response rates were found only for party size and for planned route of leaving Spray Park. The lack of independence for party size is suspect due to the low numbers of non-respondents in large parties and an examination of response rates as party sizes increased revealed no consistent pattern, adding to the suspicion that the significant Chi-square result is spurious. Thus, misrepresentation of different party sizes is not considered likely enough or large enough to significantly affect the representativeness of the sample.³

The lack of independence for planned route of leaving Spray Park is primarily due to relatively low response rates for respondents who left Spray Park by means other than the Spray Park Trail to Mowich Lake. Thus, visitors who completed both the entrance and exit

² In the course of data collection, very few (less than 20) exit questionnaires were completed by visitors who had not already filled out entrance questionnaires. Although some visitors do leave Spray Park by passing the survey site after entering via other routes their representation in the sample was so small that they were excluded in order to simplify the analysis and presentation of data

³ This finding is deemed unimportant because the difference in party size between respondents and non-respondents is small, is of suspect validity, and will be associated with even smaller differences in other variables. This last point results because party size estimates are of secondary interest in this survey, and the effect of the non-response bias shown by the party size discrepancy would only be important if it was very strongly associated with some other variable that was of primary interest in the survey results (e.g., judgments of crowding). Given that such strong relationships are rare, any change in the survey conclusions due to non-response bias are extremely unlikely.

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questionnaires were more likely to have left Spray Park by the Trail to Mowich Lake than visitors who completed the entrance questionnaire only. The effect of this difference on the total sample is anticipated to be relatively small, as the percentage of total respondents who exited by another means was only 7%.

The second set of analyses investigated whether visitors who completed the entrance and mail questionnaires were representative of all visitors who completed the entrance questionnaire. Of the 1076 who completed the entrance questionnaire, 553 (51%) completed the mail survey. The Chi-square analyses resulted in statistically significant differences in response rates for gender, age, residence location, party size, and planned route of leaving Spray Park.

First, the lack of independence for gender is primarily due to low response rates for those individuals who did not specify on the entrance questionnaire their gender (0.2%) compared to females (52.1%) and males (47.7%). A Chi-square analysis excluding unspecified gender, showed no significant differences in response between males and females. Thus, it appears that hikers who did not specify their sex were also less likely to complete the mail questionnaire—a finding with no particular limiting implications for this report.

Second, the lack of independence for age is due to differentially lower response rates among respondents under age 30 (46%) and differentially higher expected response rates among respondents over age 55 (64%). Response differences by age are very common in this type of survey. Similar differentials have been observed in previous

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surveys at MORA and are not generally seen as large enough to significantly affect the representativeness of the sample.⁴

Third, the lack of independence for residence is suspect due to the low expected frequencies of respondents for the California and Not Given categories. Elimination of the Not Given category resulted in a nonsignificant Chi-square suggesting either that individuals who do not provide their zip code are less likely to complete the mail survey, or that the low expected frequency of the cell was biasing the Chi-square significance test.

Fourth, an examination of response rates across cells revealed that no systematic pattern was driving the observed lack of independence between party size and completion rates of the mail and entrance questionnaires compared to the entrance questionnaire only.⁵ As in the previous non-response analysis, misrepresentation of different party sizes is not considered likely enough or large enough to significantly affect the representativeness of the sample.

Finally, the lack of independence for planned route of leaving Spray Park was primarily due to differentially lower response rates for respondents planning to leave Spray Park by a means other than the main trail from Mowich Lake. Once again, the overwhelming majority of visitors do leave via the main trail and this bias is therefore unlikely to have any large effect. In sum, respondents who answered only the entrance

⁴ Age estimates are of relatively little interest in this survey and the effect of the non-response bias shown by the age discrepancy in response would only be important if it was very strongly associated with some other variable that was of primary interest in the survey results (e.g., judgments of crowding). Given that such strong relationships are rare, any change in the survey conclusions due to non-response bias as shown by the age discrepancy are extremely unlikely.

⁵ The respective response rates for the various party sizes were: 1 - 56%; 2 - 57%; 3 - 51%; 4 - 37%; 5 - 42%; 6 - 50%; 7 - 44%; 8 or more - 50%.

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questionnaire were more likely not to specify their gender or zip code, to be under age 25, and to leave Spray Park by a route other than the main trail from Mowich Lake.

The third set of analyses investigated whether visitors who completed all three questionnaires were representative of those visitors who completed both the entrance and exit questionnaires. Of the 848 visitors who completed both the entrance and exit questionnaires, 549 (64.7%) also completed the mail questionnaire. Chi-square analyses resulted in statistically significant differences in response rates for gender, age, residence location by zip code, and party size. Once again, these findings are unlikely to indicate a non-response bias that could affect the substantive conclusions of the survey. The lack of independence for gender appears to be due to the lower than expected response rate for visitors not designating their gender. Removal of the "unspecified" category resulted in a non-significant Chi-square indicating no differences in response rates between men and women. The lack of independence for age is due to three factors: (1) respondents who did not indicate their age were less likely to complete the mail survey, (2) differentially lower response rates for respondents under age 25, and (3) differentially higher response rates for respondents over age 55. The lack of independence due to residence location was suspect due to lower than expected frequencies. Examination of the cells indicated no systematic pattern, however, visitors who did not include their zip code had lower response rates than those who did. A Chi-square analyses excluding the "missing" category was non-significant suggesting that the lack of independence was due to the "missing" category.

However, as the expected frequency for "missing and responded to all three questionnaires" was lower than expected, it may be that these lower than expected

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frequencies were inflating the Chi-square test and that the differential response rates in the "missing" category were not driving the lack of independence. Finally, the lack of independence for party size is suspect due to lower than expected frequencies. However, examination of the cells indicated no systematic pattern. In conclusion, respondents who completed just the entrance and exit questionnaires were less likely to provide demographic information (gender, age, or zip code) on the entrance questionnaire, and more likely to be under age 25 than respondents who completed all three questionnaires.

These Chi-square analyses investigating representativeness do suggest that the non-respondents vary systematically from respondents on some of the variables tested. Although none of them are sufficiently large or reliable to generally invalidate the survey, caution should still be used when interpreting analyses. Observed differences between respondents and non-respondents on the variables examined suggest that other systematic differences which cannot be assessed may also exist. When variables for which differences have been observed are used for cross-tabulation with other variables, it is not clear whether some observed differences are due to different response rates or to true differences on that variable. For example, if we cross-tabulated age with self-reported likelihood of returning to Spray Park and found that older hikers were slightly less but more significantly likely to return, we would be unsure if this difference would indicate a relationship between likelihood of returning and age, or likelihood of returning and response to the questionnaire.⁶ Despite these important limitations based on non-response, the practical significance of non-response for this data set appears to be

⁶ Non-response bias can only account for differences that would disappear if all the non-respondents were restored to the sample and all responded in the same way. Thus, when large differences are observed in cross-tabulations, they are unlikely to result entirely from non-response.

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minimal. This point is illustrated by the results of the most common correction for sample bias, weighting the sample. When sampling bias is known and can be quantified, the data can be assigned weights so as to correct for the relative over or under-representation of particular groups. However, such weighting often has very little effect on the general conclusions that are supported by the data. Later in this report we discuss the over-representation of weekend visitors and the results of several analyses using weights to correct for this sampling bias. The weight necessary to correct the weekday sample (2.5) was larger than any weight that would be necessary to account for the non-response biases that were detected. Still, for all the analyses, the weighted data had no effect on the general conclusions that could be drawn from the data.

Accuracy of the Sample

Subject to the limitations stated previously, the authors generally believe that the data are representative of the Mount Rainier National Park visitors to the Spray Park area during the time of the survey. This confidence is based on the large sample sizes, the small differences in response rates observed for different types of visitors, and the fact that deviations from the sampling plan were relatively minor. Therefore, the data should be highly relevant to many park management decisions and planning efforts.

The major deviation in the sample away from representativeness is the previously noted over-representation of weekend visitors (recall that an equal number of weekday and

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weekend days were sampled). Analyses looking for differences between weekend and weekday visitors were conducted and instances where differences were detected are discussed in the results below. If no differences are noted, analyses showed no significant differences. The major instances in which weekend and weekday visitation differs is understandably in nearly all the questions related to crowding. For those questions, results from the weekend and weekday subsamples are presented separately.

For the purposes of this report, the oversampling of weekend visitors can be seen as an advantage in that it provides added statistical power in describing the characteristics and reactions of visitors who experienced Spray Park under the high visitor density conditions with which management is most concerned. Because in many cases weekend and weekday visitors differed, it is important to separate their responses in statistical analysis.

Assuming a random sample and questions of yes/no type in which the true occurrences of these values in the population are 50%/50%, the data from the smallest sample in this survey (the respondents completing the entrance, exit, and mail questionnaires) can be generalized to the population of Spray Park visitors with a 95% assurance that the obtained or observed percentages to any item will vary by no more than $\pm 4.2\%$. For the largest sample, respondents to the entrance questionnaire, the same confidence interval is $\pm 3.0\%$.

II. SURVEY HIGHLIGHTS

To gain a full understanding of the SPVS and its results it is necessary to thoroughly review the current report. Nonetheless, this section presents some highlighted results gleaned from the data analysis and the conclusions that they support.

II. Survey Highlights

TABLE 2.1: TABLE OF FIGURES IN SECTION II

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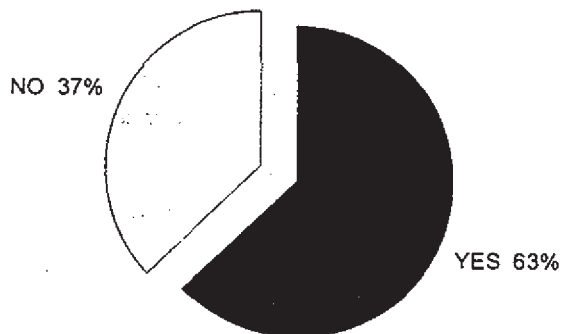
II. Survey Highlights

Spray Park Visitors Are Different than the General Population of Visitors to MORA

The characteristics of respondents to the SPVS reflect the fact that the survey contact was made at a point where visitors had hiked more than a mile from the parking lot. At an average age of 37, SPVS respondents were significantly younger than the average age of 44 years that was observed in the general sample of MORA visitors collected for the 1990 MORA General Visitor Survey. Also, only 17% of parties surveyed in the SPVS included children under age 16, whereas 31% of parties in the general sample included children.

Only 11% of the respondents to the SPVS were first time visitors to MORA—a much smaller proportion than the 41% of first time visitors in the general sample of MORA visitors. Although nearly 90% of the SPVS respondents had previously visited MORA, figure 2.1 shows that 63% were first time visitors to Spray Park.

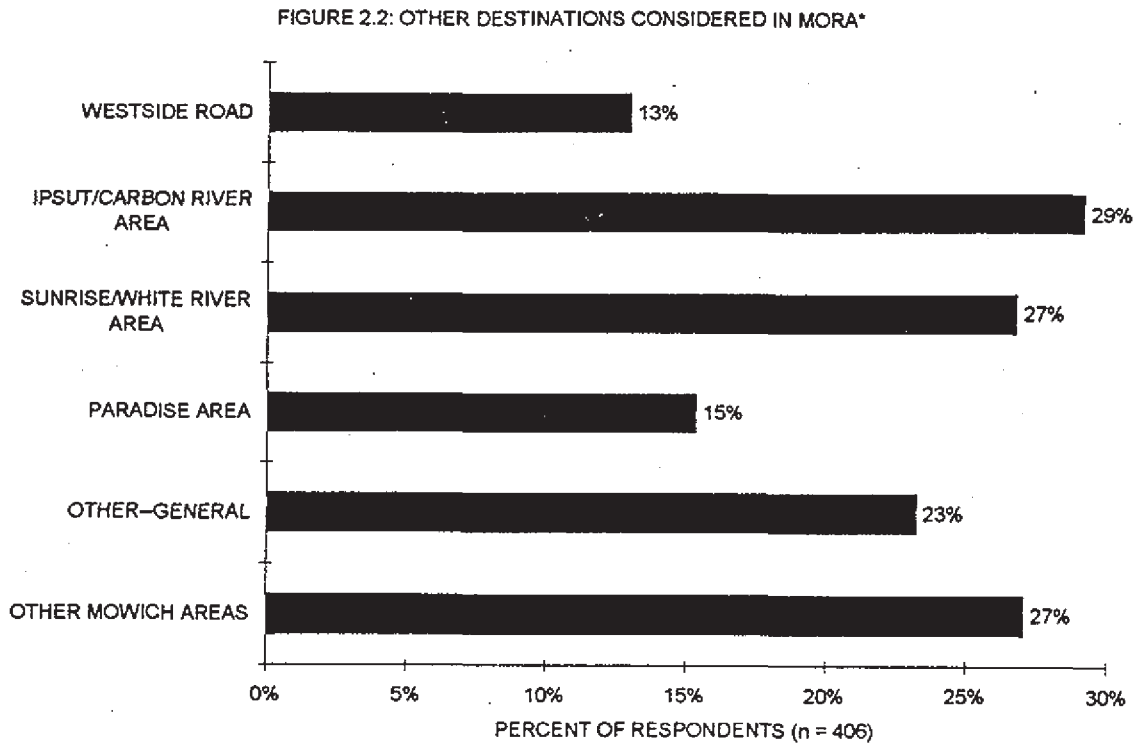
FIGURE 2.1:
FIRST TIME VISITOR TO SPRAY PARK



n=1070

II. Survey Highlights

Respondents to the SPVS may be more representative of visitors to the Northern areas of MORA than of MORA visitors in general. Figure 2.2 shows that the other destinations most commonly considered by SPVS respondents when planning their trip were in the Ipsut/Carbon River area, in other areas near Mowich Lake, and in the Sunrise/White River area.



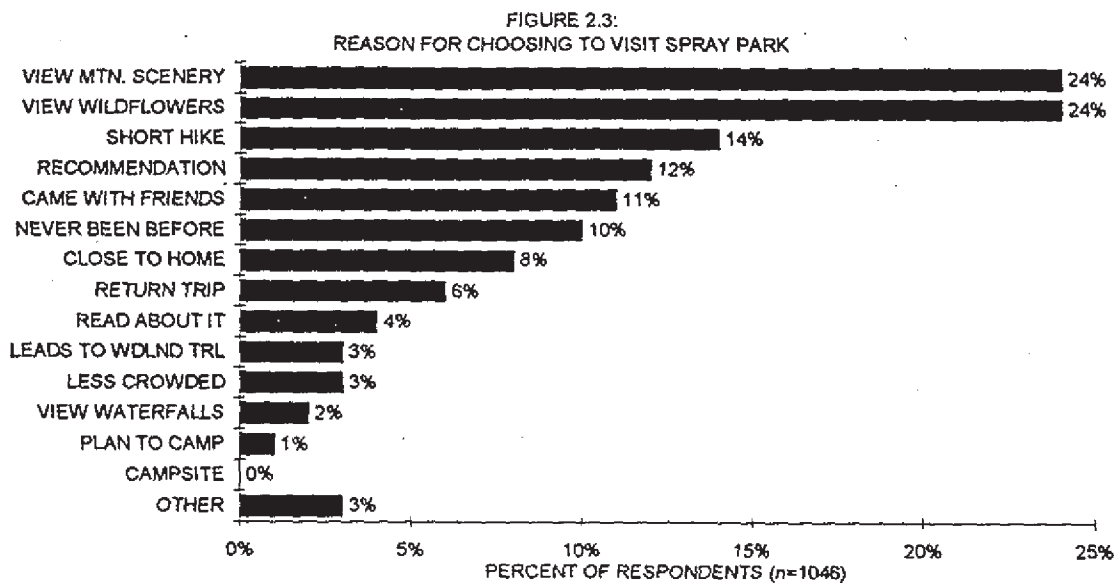
* Percentages total more than 100% because some respondents listed more than one destination.

II. Survey Highlights

The Dominant Activity of Spray Park Visitors is Short Day-Hiking

Only 9% of SPVS respondents planned to camp overnight during the hike when they were contacted and only 2% planned to camp in Spray Park; thus, the vast majority (91%) of visitors to Spray Park are day-hikers.

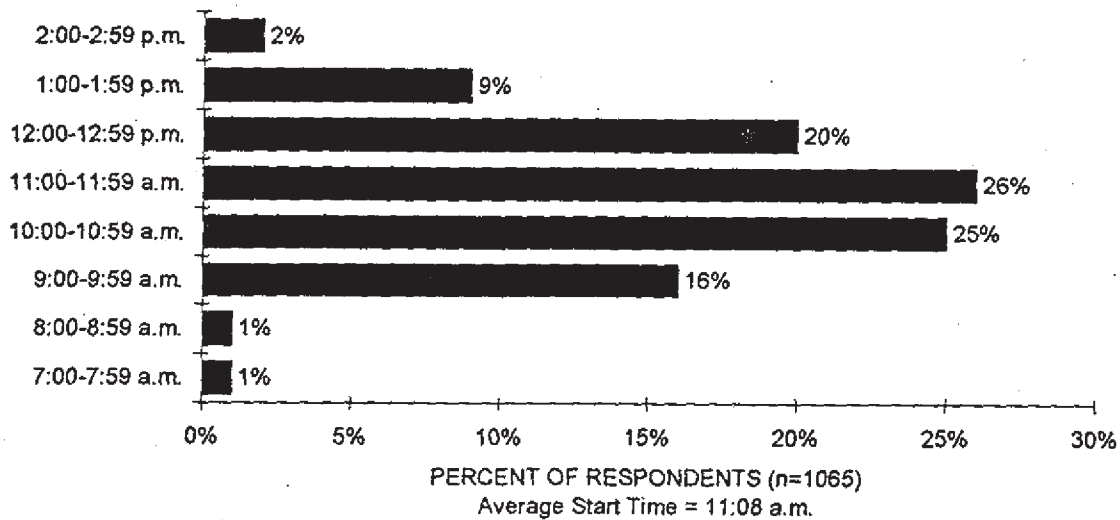
Apparently, one of the major attractions of Spray Park is that it offers an opportunity to visit a beautiful sub-alpine meadow after a relatively short hike. Figure 2.3 shows that the short nature of the hike was the third most common reason given for choosing to visit Spray Park.



II. Survey Highlights

The attraction to Spray Park as a short hike may be due in part to the relatively late times at which respondents started their hikes. Figure 2.4 shows the distribution of starting times, with the average start time at 11:08 a.m..

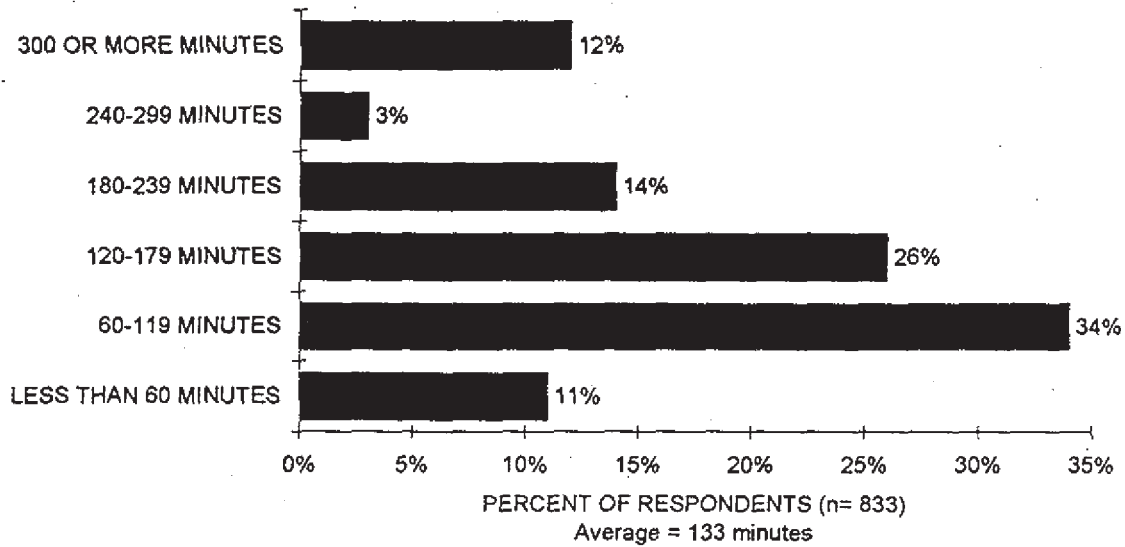
FIGURE 2.4: START TIME OF HIKE TO SPRAY PARK



Also consistent with the late start times are the relatively short times that respondents spent in Spray Park. As shown in figure 2.5, 70% of respondents spent less than three hours in Spray Park. Even including the 12% of respondents who spent more than five hours in Spray Park, the average stay was only 2 hours and 13 minutes.

II. Survey Highlights

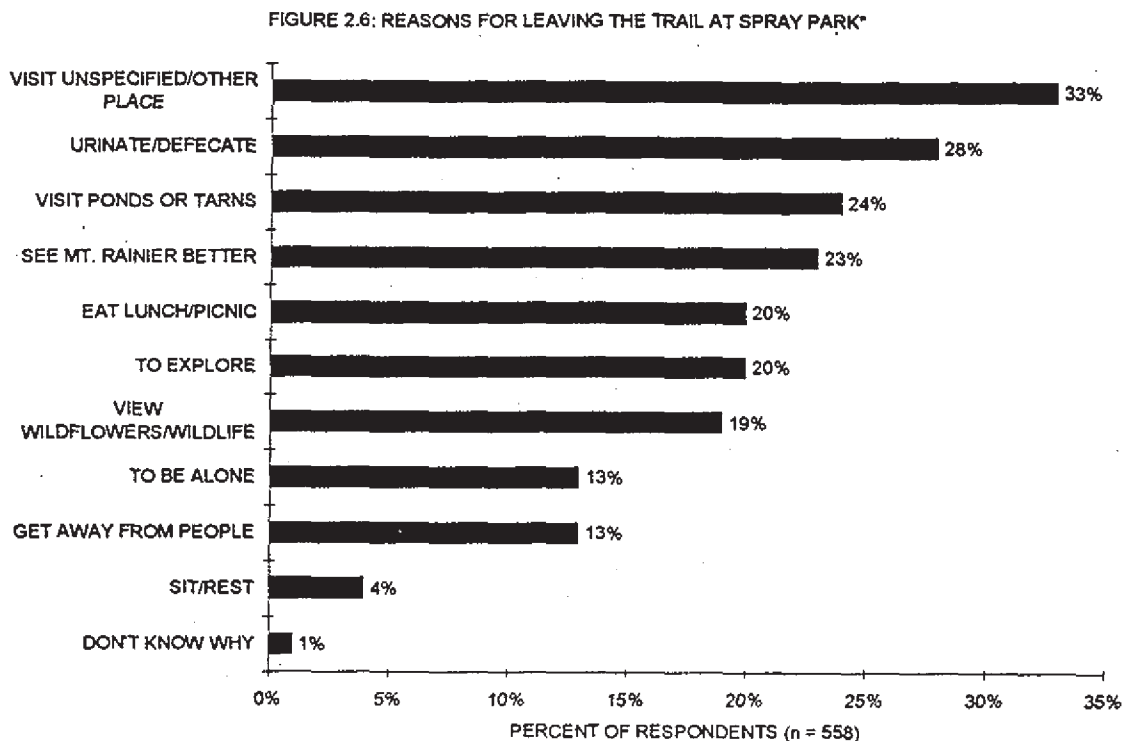
FIGURE 2.5: TIME SPENT IN SPRAY PARK



The preponderance of first-time visitors and brief duration of the average visit in Spray Park limits the opportunities for management to modify visitor behavior through information or education. When used in Spray Park, such interventions would need to be effective after only a brief exposure. On the other hand, if Spray Park policies and regulations are consistent with those present in other areas of MORA, then many visitors will have previous exposure to such regulations because most are not first time visitors to MORA.

II. Survey Highlights

Although the majority of SPVS respondents spent a relatively brief time in Spray Park, most of them (67%) left the official trail at least once. Figure 2.6 shows the reasons why visitors left the trail.



* Includes only the 67% who reported leaving the trail.

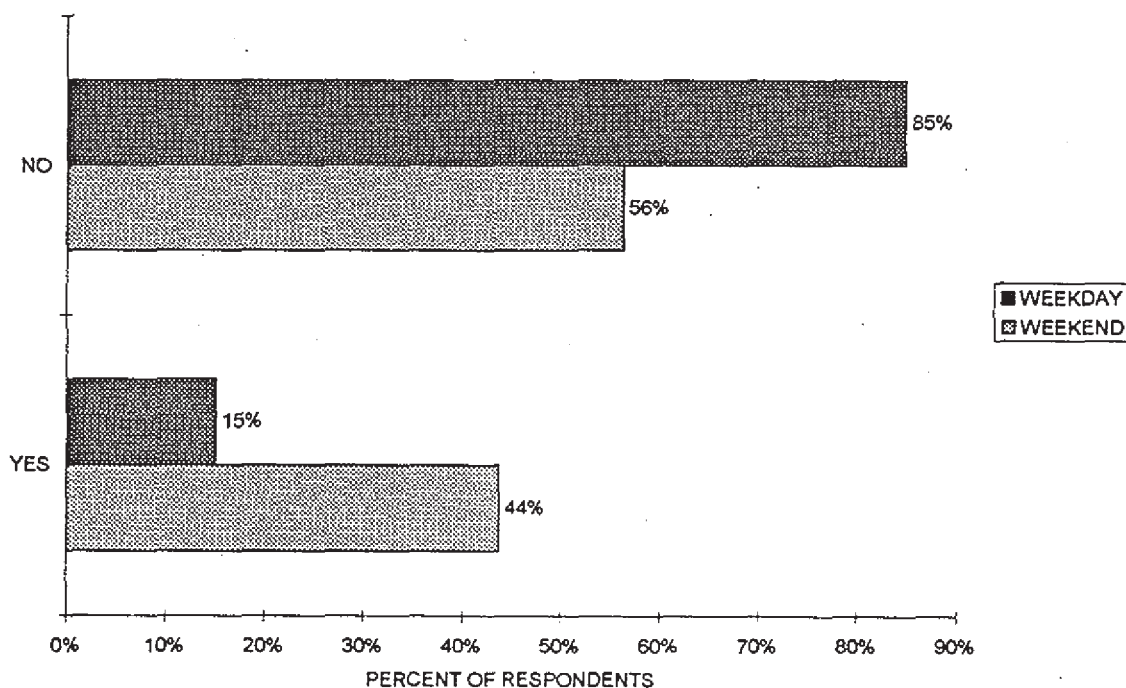
If all the respondents who selected either "TO BE ALONE" or "GET AWAY FROM PEOPLE" are combined, we find that 21% of respondents who left the trail said they did so because of the presence of other people. This suggests that visitor density affects visitor behavior and is likely to spread visitor impacts across a larger portion of Spray Park.

II. Survey Highlights

Weekdays and Weekends in Spray Park Offer Different Experiences

Weekend visitors are more likely to feel crowded. Figure 2.7 shows that when respondents were asked if they had felt crowded by the number of other people at any time during their visit to Spray Park, 44% of weekend visitors said yes whereas only 15% of weekday visitors said they felt crowded in that way.

FIGURE 2.7: DID YOU FEEL CROWDED BY THE NUMBER OF OTHER PEOPLE?



Consistent with the crowding responses, 37% of weekend respondents said the number of other people they encountered was somewhat or much more than they expected, a percentage more than twice as high as that among weekday respondents (18%). Also consistent was the finding that 70% of weekend respondents reported that

II. Survey Highlights

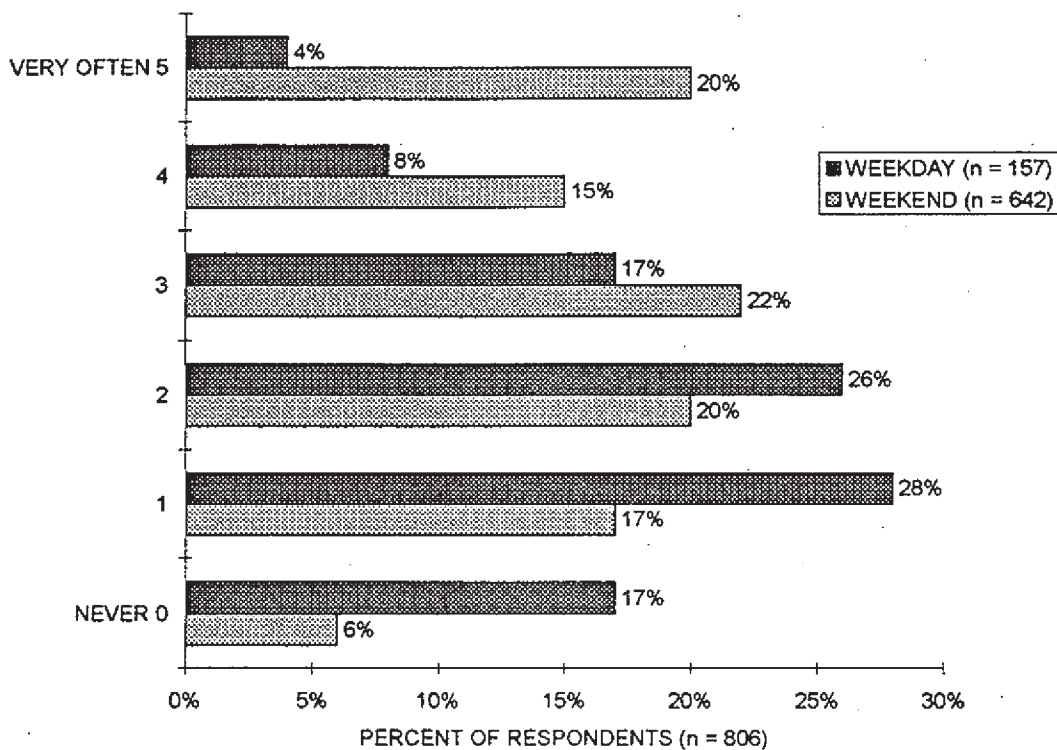
the presence of other people decreased their trip satisfaction, but that only 47% of weekday respondents reported such decreases.

Not only was crowding due to the number of other people more common on weekends, weekend respondents were also more likely to feel crowded due to the behavior of other visitors. Almost twice as many weekend respondents reported feeling crowded due to others' behavior (19%) than did weekday visitors (10%). The most common behavior reported to cause feelings of crowding was human noise such as loud talking or laughter--44% of those crowded by behavior reported that noise caused the feeling.

II. Survey Highlights

Consistent with the crowding due to behavior, respondents felt that human noise was considerably more prevalent in Spray Park on weekends than on weekdays (see figure 2.8). Only 6% of weekend visitors reported that they never heard voices, compared to 17% for weekday visitors. Among the respondents who heard voices, weekend visitors also reported that they heard them more often.

FIGURE 2.8: OBSERVED VOICES (WEEKEND VS. WEEKDAY)



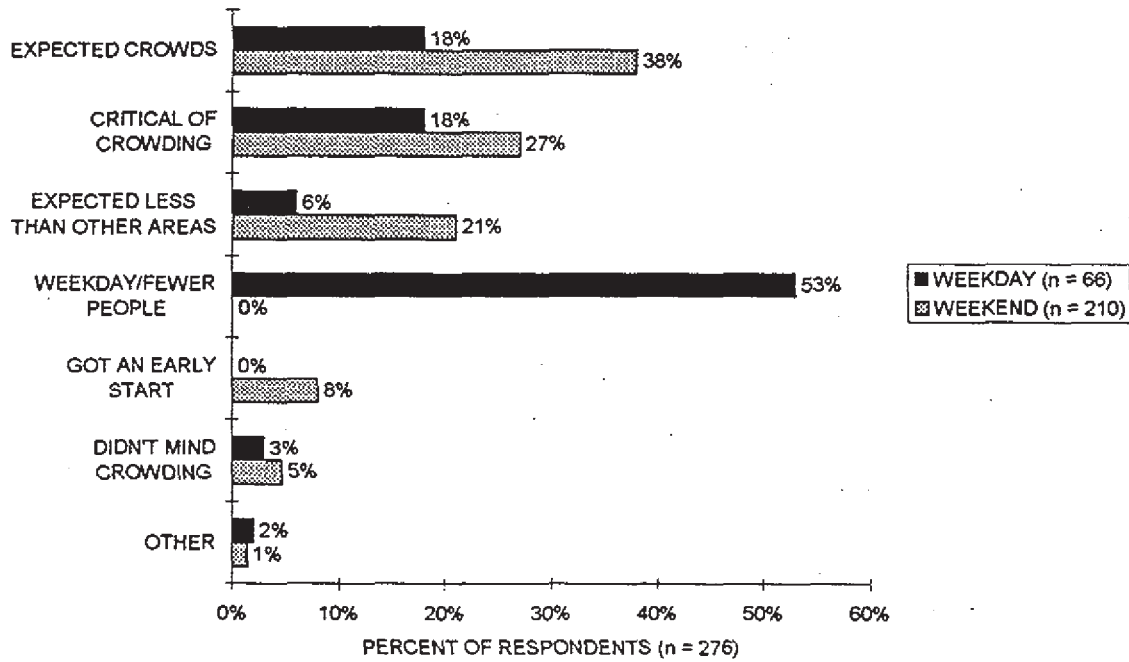
II. Survey Highlights

Although respondents rated weekday conditions as more crowded than weekend conditions, only about 30% of both weekend and weekday SPVS respondents said that when planning their trip they considered the number of other visitors they were likely to encounter. Among the minority who made such considerations, the explanations given by weekday and weekend respondents differed. Figure 2.9 shows that more than half (53%) of the weekday visitors who considered others in planning stated that such consideration motivated them to visit on a weekday. Similarly, 8% of weekend visitors said their consideration of other visitors lead them to get an early start. Together, these figures suggest that only 19% of all the visitors who considered the presence of others modified their plans to avoid times when Spray Park has its highest visitor density. Even more striking, when respondents who did not consider the number of other visitors in their planning are included, the data show that only 5% of respondents modified their plans to avoid crowding in Spray Park. Apparently there are very few SPVS respondents who are aware of the number of other visitors they will encounter, and who consider that prospect to be sufficiently negative that they plan their visits to avoid busy times. In fact, there are nearly as many respondents who said they visited Spray Park because they expected to encounter fewer visitors than would be present in other areas (the third set of bars in figure 2.9 translate into 17% of those who considered others in planning and 4% of all respondents). Most of these respondents even visited on weekends. These findings underscore the differences in the experiences expected by different visitors to Spray Park—a few visit on “uncrowded”

II. Survey Highlights

weekdays in order to avoid "crowded" weekends, and a few others visit on "uncrowded" weekends in order to avoid other areas that are "crowded".

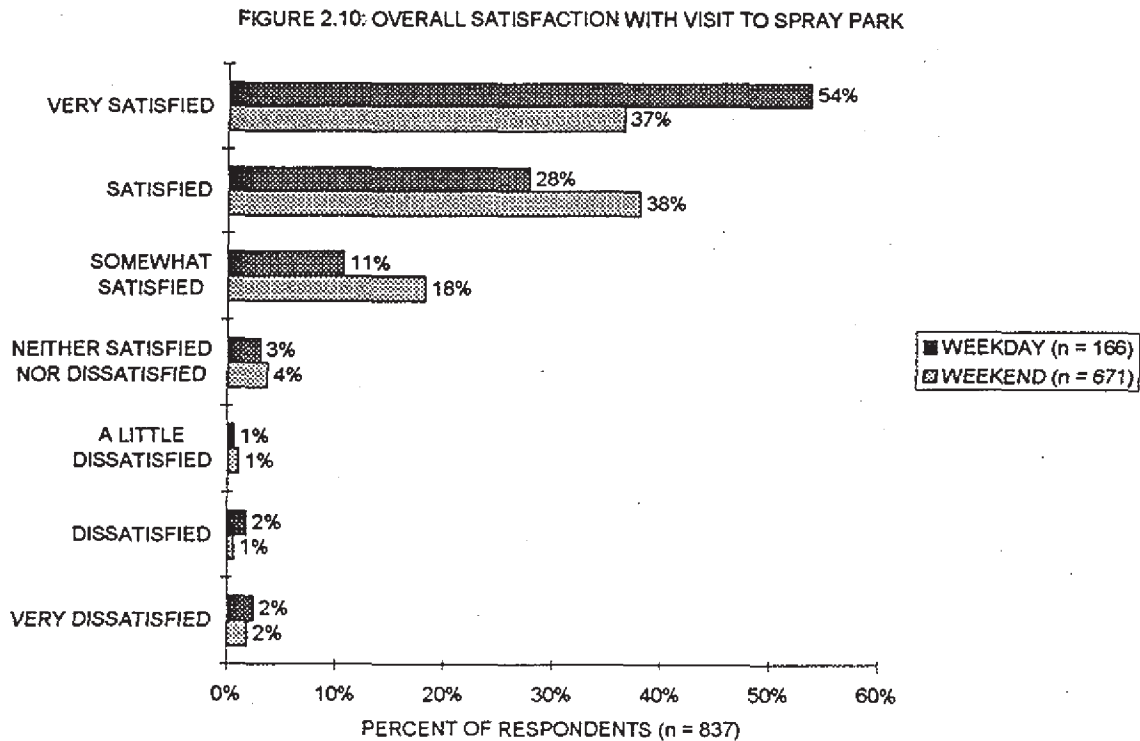
FIGURE 2.9: EXPLANATIONS FOR CONSIDERING THE NUMBER OF OTHER POTENTIAL VISITORS*



* Includes only the 30% of the respondents who considered the number of other visitors when planning their trip.

II. Survey Highlights

Weekend visitors display slightly lower trip satisfaction. Almost all respondents reported some level of satisfaction with their trip overall (92% for both weekend and weekday visitors. See figure 2.10). However, weekend visitors were less likely to report that they were very satisfied than were weekday visitors (37% vs. 54%, respectively).



The observations that weekday visitors had higher levels of satisfaction and that weekdays also had lower levels of visitor density is consistent with the hypothesis that satisfaction is decreased as visitor density increases. However, other explanations could account for both observations. For example, many weekend visitors may have jobs that constrain leisure activities such as hiking to the weekends and they may

II. Survey Highlights

therefore be forced to venture out in less than ideal weather conditions leading to sub-maximal satisfaction. In contrast, weekday visitors might have flexible schedules with many opportunities to go hiking—allowing them to select only those times when conditions are nearly perfect and satisfaction is maximized. Many other explanations could also be proposed. Further research would be necessary to narrow the range of possible explanations and only a true experiment would serve to firmly establish a causal relationship between visitor density and satisfaction.

Weekend visitors are more likely to state that Spray Park shows evidence of unacceptable damage due to human activity. When asked if they saw any evidence that Spray Park is being unacceptably damaged by human activity, 52% of weekend respondents said yes, compared to 39% of weekday respondents. It is not clear what types of observations lead to judgments that unacceptable impacts were present. However, in the next question of the exit questionnaire, visitors were asked how often they observed nine different types of human impact, ranging from trampled vegetation to jet noise. Only one of the impacts, human voices, was observed more often by weekend respondents than by those contacted on weekdays. An analysis described in section VIII of this report found that the reported presence of voices could account for most of the difference between weekday and weekend responses concerning the presence of unacceptable damage. When the effect of voices was removed, weekend versus weekday did not have a statistically significant effect on whether or not respondents reported that they saw unacceptable damage.

II. Survey Highlights

Visitor Density is Important but Not the Dominant Factor in Determining Experience Quality in Spray Park

Perhaps the strongest evidence for the importance of visitor density in determining experience quality is the previously mentioned finding that 70% of weekend respondents and 47% of weekday respondents reported that the presence of other visitors detracted from their enjoyment while in Spray Park. Also supporting the importance of visitor density was the finding that whether or not respondents believed that Spray Park showed evidence of unacceptable human impact could be predicted by the degree to which they reported hearing other visitors' voices. Finally, when asked if there were actions that management could take to preserve or increase the quality of their trips to Spray Park, 9% of all weekend respondents (18% of those who suggested actions) and 5% of all weekday respondents (11% of those who suggested actions) suggested that management limit the number of visitors in Spray Park.

It is difficult to interpret the data concerning overall trip satisfaction as supporting the importance or unimportance of visitor density. It is not even certain that the difference in the satisfaction ratings of weekend and weekday respondents was due to visitor density. Even if it was, the effect was primarily caused by a difference in the number of respondents who used the maximum satisfaction level of the scale (i.e., VERY SATISFIED). The percentages of respondents reporting dissatisfaction was the same in both groups and was very small. Still, past studies of MORA visitors have generally found very high levels of overall trip satisfaction with very little variability in

II. Survey Highlights

the ratings. The fact that any effect was observed and that it was consistent with differences in visitor density is somewhat surprising.

The strongest evidence that visitor density is not the dominant factor in experience quality is the finding that only 30% of respondents said that they considered the number of other visitors when they planned their trip to Spray Park. Even more convincing, only 5% of respondents said they had tailored their plans to avoid crowding. Considered as a whole, all the findings concerning the negative impact of visitor density on the quality of trip experiences suggest that for the persons visiting Spray Park during the SPVS, the presence of other visitors was an important aspect of trip quality, but was not the dominant factor that they considered when planning or evaluating their trip.

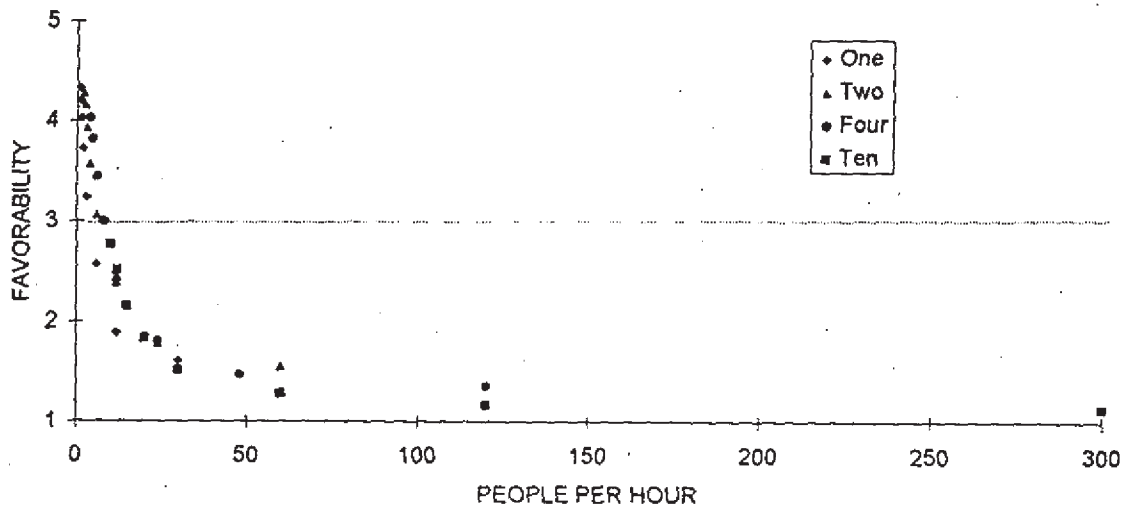
Preference Curves Based on Hypothetical Encounter Evaluations are Poor Measures For Use in Spray Park Social Carrying Capacity Decisions

One of the primary goals of the SPVS was to measure the relationship between visitor density and the quality of visitor experiences in Spray Park. A method of measuring this relationship commonly used in the process of setting social carrying capacity for wilderness areas was adopted for use in Spray Park. This method, using preference curves based on visitors' evaluations of hypothetical scenarios, has not been widely used in day-hiking areas with visitor density at the levels common in Spray Park. Thus, the SPVS and the analysis of the data it collected focused considerable attention on the validity of the method in this application (Section IX of this report is largely devoted to discussion of this issue.)

II. Survey Highlights

The initial analysis of the hypothetical encounter evaluation data was encouraging. When the average favorability ratings for the scenarios were plotted against the number of encounters per hour represented by each scenario, an extremely consistent nonlinear relationship was observed (see figure 2.11). The correlation between the average favorability ratings and the log encounters per hour was 0.917. Respondents clearly considered more encounters to be less favorable, with large decreases in favorability in the range from one to ten encounters per hour and smaller decreases thereafter.

FIGURE 2.11: RESPONSE TO MEETING ___ PEOPLE PER HOUR
by DIFFERENT PARTY SIZES



The consistency of the relationship between visitor density and favorability shown in figure 2.11 suggest that the preference curve data are valid measures of social carrying capacity. However, further analyses of the SPVS data are not nearly so

II. Survey Highlights

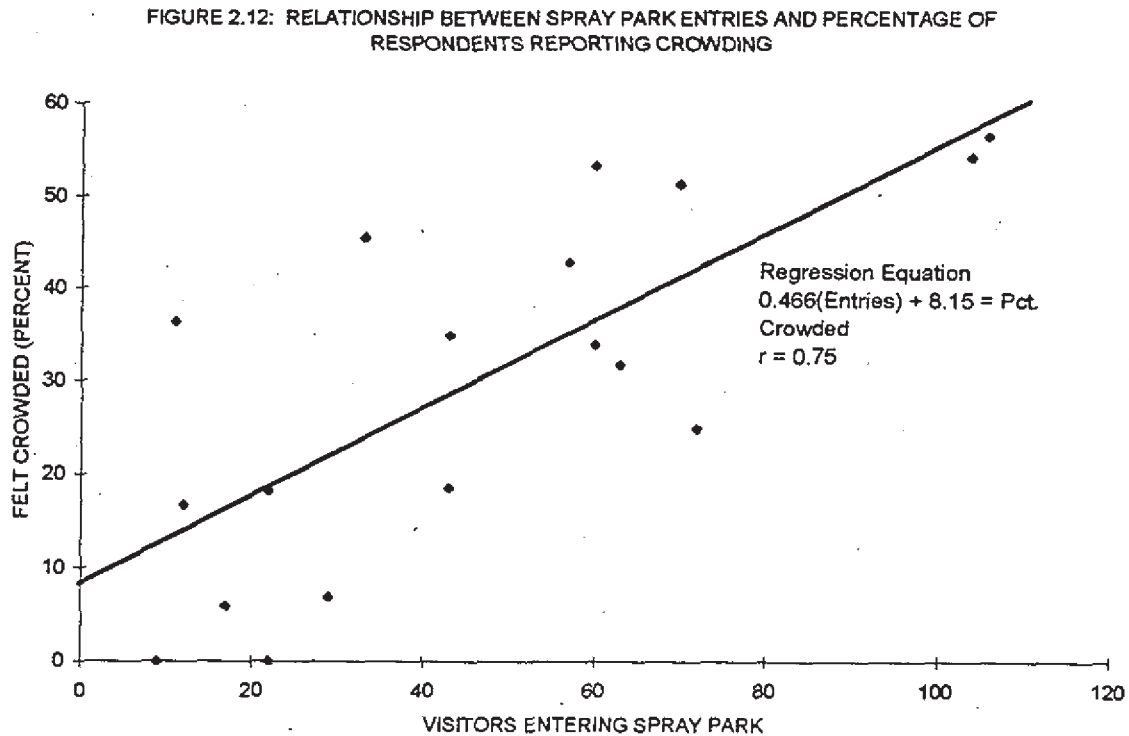
encouraging. The analyses primarily responsible for the conclusion that the preference curves are a poor measure for use in setting social carrying capacity were those showing that not even small subgroups of respondents agreed to any substantial degree in their evaluations of the hypothetical scenarios. Although the form of the relationship between favorability and visitor density was very similar across respondents, the level of favorability assigned to any particular number of encounters per hour varied greatly and in ways that could not be readily explained. Even for respondents who were in the same party, the intraclass correlation between the number of encounters per hour that the first and second party members rated as neutral in favorability was only 0.13. The lack of agreement in favorability ratings, even among members of the same party, is completely inconsistent with an assumption that the preference curves represent a social norm held by visitors concerning the number of appropriate encounters. Such an assumption is fundamental in order to use the preference curves in the way they were originally intended—as measures of visitor norms concerning appropriate levels of visitor density in Spray Park.

The Relationship Between Visitor Density And The Quality Of Visitor Experiences In Spray Park Can Be Measured by Means Other than the Preference Curves

Given the conclusion that the preference curves are a poor measure for use in setting social carrying capacity in Spray Park, an alternate measure was calculated based upon the percentage of visitors who reported that they felt crowded due to the number of other visitors in Spray Park. This alternate measure, called the crowding prediction equation, predicted the percentage of Spray Park visitors who would report

II. Survey Highlights

feeling crowded based on the number of visitors entering Spray Park. Figure 2.12 shows the crowding prediction equation and the data points from which it was calculated.



The crowding prediction equation does not define a specific logical point at which managers should set limits on visitor density, and the unit of analysis used in its production (interview day) yields only 19 data points as a basis for its calculation. However, the two measures it relies upon (visitor entries and percent of respondents reporting crowding) are closely related to actual conditions and management concerns; the relationship between them is strong ($r=0.75$) and other analyses of the SPVS data are consistent with the validity of their relationship as a measure of social carrying capacity.

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The crowding prediction equation should not stand alone as the sole justification for setting a social carrying capacity. However, it is a valid measure that can be considered when managers weigh the available information and make policy decisions that can be theoretically and practically justified.

II. Survey Highlights

III. VISITOR PROFILE

As mentioned previously, three questionnaires were used to collect the data presented in this report, and the number of respondents varied for each questionnaire. In the charts that follow, the number of respondents (n) represented by the data is reported at the bottom of the chart. For questions asked on the entrance questionnaire, the maximum number of respondents is 1076. For questions asked on the exit questionnaire, the maximum number of respondents is 848, and a total of 553 respondents completed the mail questionnaire. Thus, whenever a chart reports data for more than 848 respondents, it can be assumed that it concerns data collected in the entrance questionnaire. When the reported n is between 553 and 848, the chart data originate from the exit questionnaire, and when the reported n is smaller than 553 the data originate from the mail questionnaire. The only time that this rule does not hold is when a chart reports data for a subset of respondents (c.f., figure 3.9 backcountry areas of MORA visited by respondents who had reported visiting such areas.) In those cases a footnote to the chart will describe the subsample included in the chart.

Missing data for up to 10% of respondents to a particular question are generally not considered to be a major threat to the interpretation of that question. Throughout this report, few questions had more than 10% missing data. Exceptions are noted in the text.

TABLE 3.1: TABLE OF FIGURES IN SECTION III

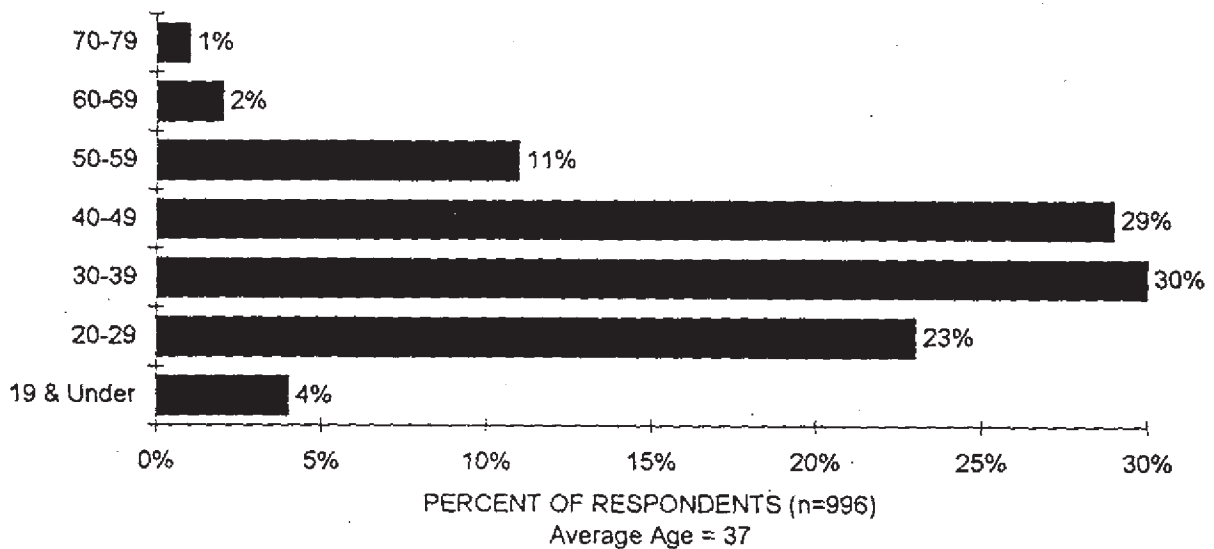
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III. Visitor Profile

Age and Gender

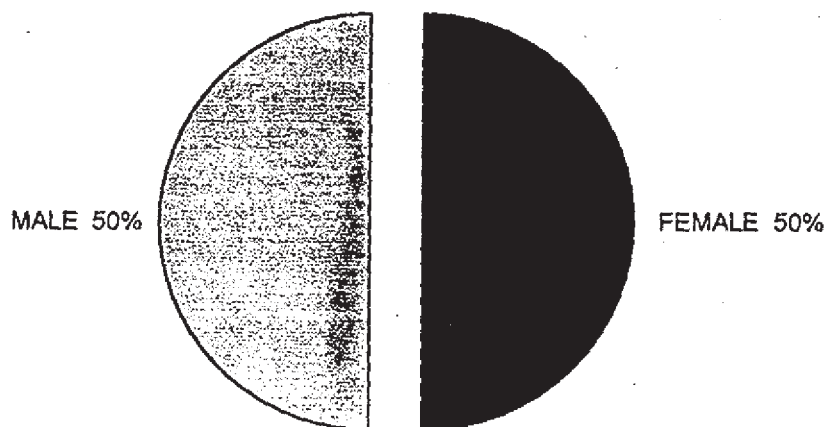
The average age of the sampled Spay Park visitors was approximately 37 years. Ages ranged from 13 to 79 years. Figure 3.1 shows that visitors 29 years of age and under accounted for 27% of the sample, those between 30 and 39 years of age comprised 30% of the sample, 29% of visitors sampled were 40 to 49 years of age, 11% of those sampled were between 50 and 59 years of age, and 3% of visitors sampled were 60 years of age or older. Based on the analysis of non-response discussed earlier, age of respondents is one of the characteristics most likely to be affected by non-response bias. However, because these data were collected in the entrance questionnaire which very few visitors refused to complete, it is unlikely that such bias had an important effect. The sample of visitors consisted of 50% males, 50% females (see figure 3.2).

FIGURE 3.1:
AGE OF SPRAY PARK SURVEY RESPONDENTS



III. Visitor Profile

FIGURE 3.2
GENDER DISTRIBUTION OF SPRAY PARK SURVEY RESPONDENTS



n=1027

Visitors to Spray Park, on average, were younger than general visitors to MORA¹ (means of 37 years and 43.5 years, respectively). This lower average age represents a lower maximum age (79 versus 88) at Spray Park as well as a larger percentage of Spray Park visitors being from age 20 to age 49 than in the general visitor survey (82% versus 63%). The relatively higher percentage of older adults in the population of general MORA visitors as compared to Spray Park visitors is consistent with the increased ease of accessibility to other parts of the park. A visit to Spray Park demands a level of physical fitness that older adults may find difficult to meet.

Although men and women equally visited Spray Park, slightly more men (53%) than women (47%) were general visitors to MORA.

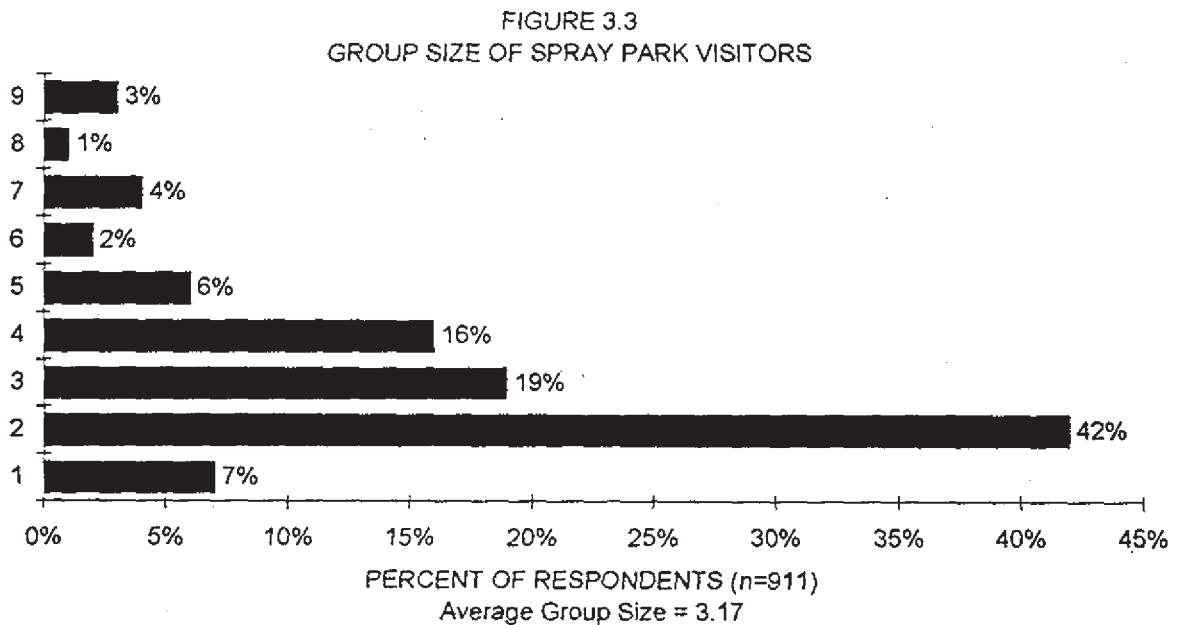
¹ All comparisons to MORA general visitors are made using data from the 1990 MORA General Visitor Survey (Technical Report, University of Washington Cooperative Park Studies Unit.) This survey described "general" MORA visitors by sampling at all major MORA entrances on a year-round basis.

III. Visitor Profile

Size and Composition of Group

Figure 3.3 shows that the most frequent group size for Spray Park visitors was two (42%); the next most common group size, three, comprised 19% of those surveyed; closely followed by a group size of four, accounting for 16% of visitors. Approximately 7% of the visitors were alone and about 10% were in groups of six or more people.

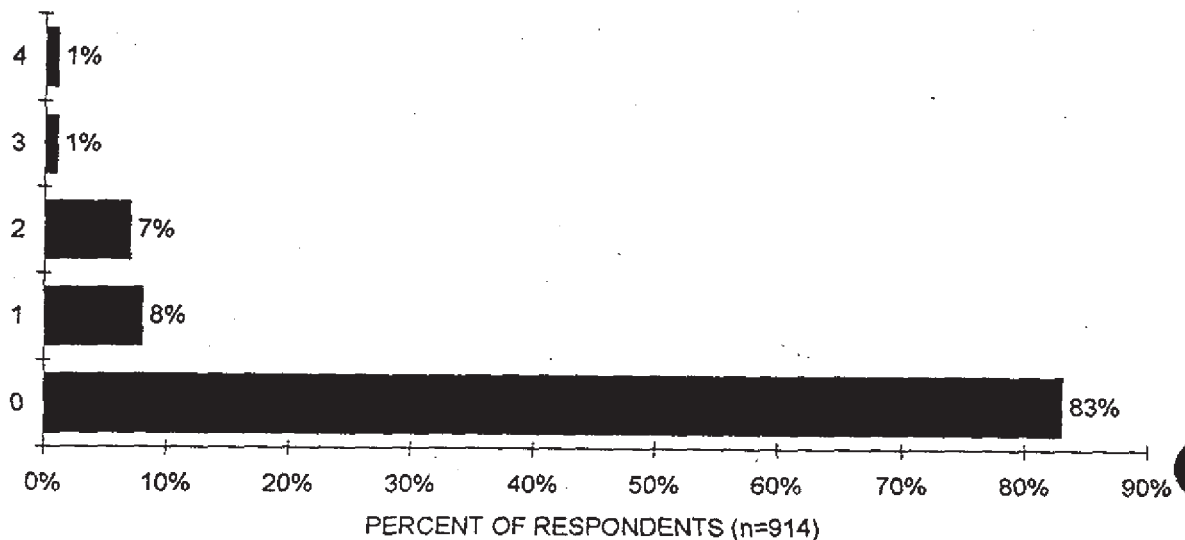
On weekends, groups were slightly larger than on weekdays (3.2 vs. 2.8 persons, respectively; $t(909)=2.69$, $p=.007$). Weighting the sample to correct for overrepresentation of weekend visitors would change the average group size only slightly, from 3.17 to 3.10 persons. The distribution of group sizes would be almost identical, with no size changing by more than 2%.



III. Visitor Profile

A total of 17% of visitors' groups included children 15 years of age or younger. Groups with one child present comprised 8% of all visitors, 7% had two children present and 2% had three or more children (see figure 3.4).

FIGURE 3.4
NUMBER OF CHILDREN UNDER AGE 16 IN PARTY



On average, parties of weekend visitors included more children than did parties of weekday visitors (0.29 kids per party vs. 0.18 kids per party; $t(298)=2.23$, $p=.047$). Weighting the sample to correct for over-representation of weekend visitors would change the average number of kids only slightly, from 0.269 to 0.252 persons. The distribution of numbers of children would be almost identical, with no number of children changing by more than 1%. The relatively high level of missing data for group size and number of children (15%, see figures 3.3 and 3.4) occurred because these data were recorded by the interviewer and not self-reported. During

III. Visitor Profile

busy periods, the interviewer had difficulty distributing and collecting questionnaires while simultaneously recording the data.

Visitors to Spray Park did not differ from general visitors to MORA in their average group size ($M=3.17$ and $M=3.18$, respectively). Additionally, the two distributions were comparable in shape. While negligible, the only difference noted was that general visitors to MORA had groups of size 10 to size 12 (0.6% of respondents) where as the largest group size surveyed at Spray Park was size 9.

Although no differences in group size were noted, fewer parties to Spray Park (17%) had children under age 16 than general visitors to MORA (31%). Two percent of parties to Spray Park compared to 7% of parties of general visitors to MORA had more than two children under age 16. The largest number of children under age 16 reported in a party at Spray Park was four, whereas the largest number of children under age 16 reported in a party of general visitors to MORA was six. Fewer children under age 16 at Spray Park may again reflect the physical demands of a visit to Spray Park which may be too much for younger children. Additionally, parents may find it too taxing to monitor the children's behavior when more than one or two children under age 16 are present.

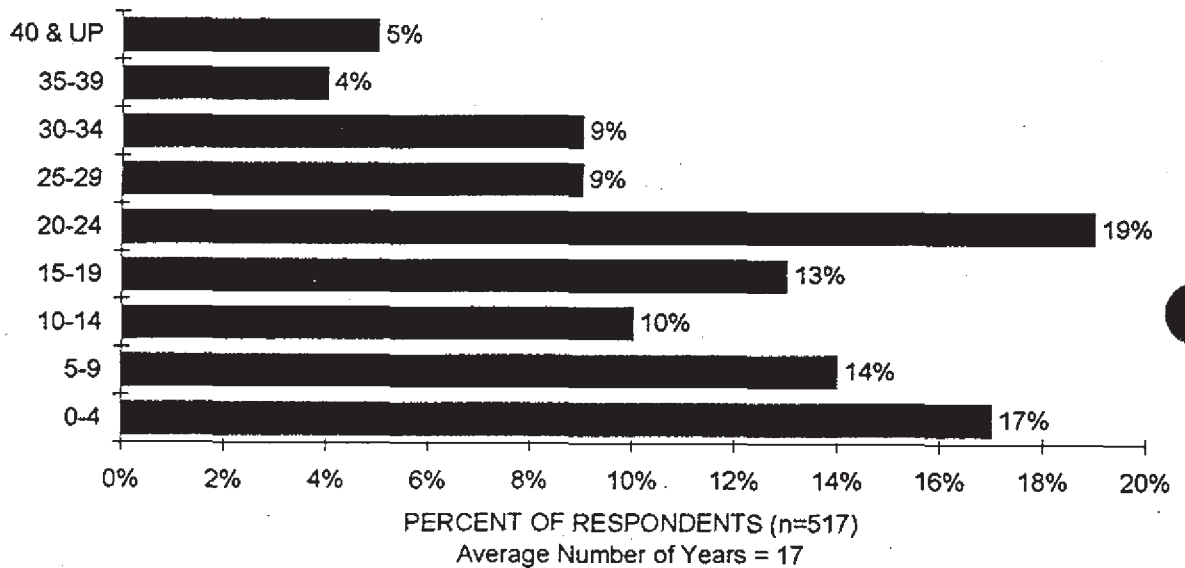
Hiking Experience

Spray Park visitors averaged 17 years of hiking experience, however, experience varied widely. Figure 3.5 shows that respondents were fairly evenly

III. Visitor Profile

distributed in overall hiking experience across categories ranging from 0-4 years through 20-24 years. Smaller numbers of respondents reported 25 or more years of hiking experience with 9% reporting 25-29 years of experience and 5% with 40 or more years of experience.

FIGURE 3.5:
YEARS OF HIKING EXPERIENCE

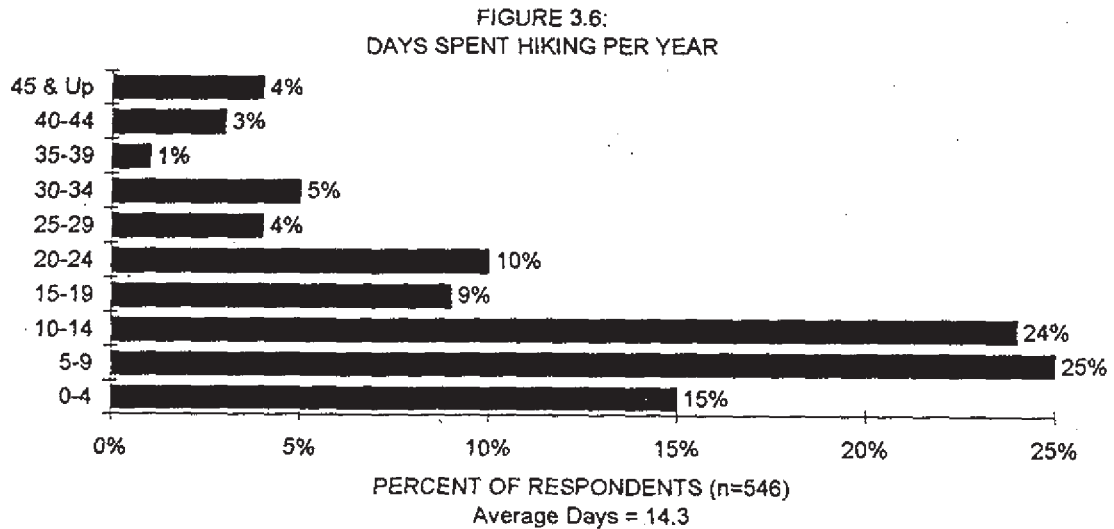


A majority of respondents (64%) spent 14 or fewer days a year hiking. Most respondents hiked five to nine (25%) or 10 to 14 (24%) days a year while 8% hiked 35 or more days a year (see figure 3.6).

Respondents hiking on weekdays spent more days a year hiking than did weekend respondents (16.9 days per year vs. 13.5 days per year; $t(165)=2.21$, $p=.028$). Weighting the sample to correct for overrepresentation of weekend visitors

III. Visitor Profile

would change the average days spent hiking only slightly, from 14.27 to 14.93. The distribution of numbers of days spent hiking would be almost identical, with the frequencies in no category changing by more than 1%.



The above visitor profile data suggest that Spray Park attracts a wide variety of hikers in terms of experience and commitment to hiking. This pattern is consistent with the physical features and layout of Spray Park which allows one to plan a hike that can range from easy to more difficult. Hence, Spray Park is used by a heterogeneous group of hikers.

Spray Park visitors do, however, differ from general visitors to MORA in that they are both younger and less likely to be accompanied by children. These findings are consistent with the relatively strenuous hike necessary to reach

III. Visitor Profile

Spray Park—a feat not required of general visitors who often drive to view scenery as their dominant activity.

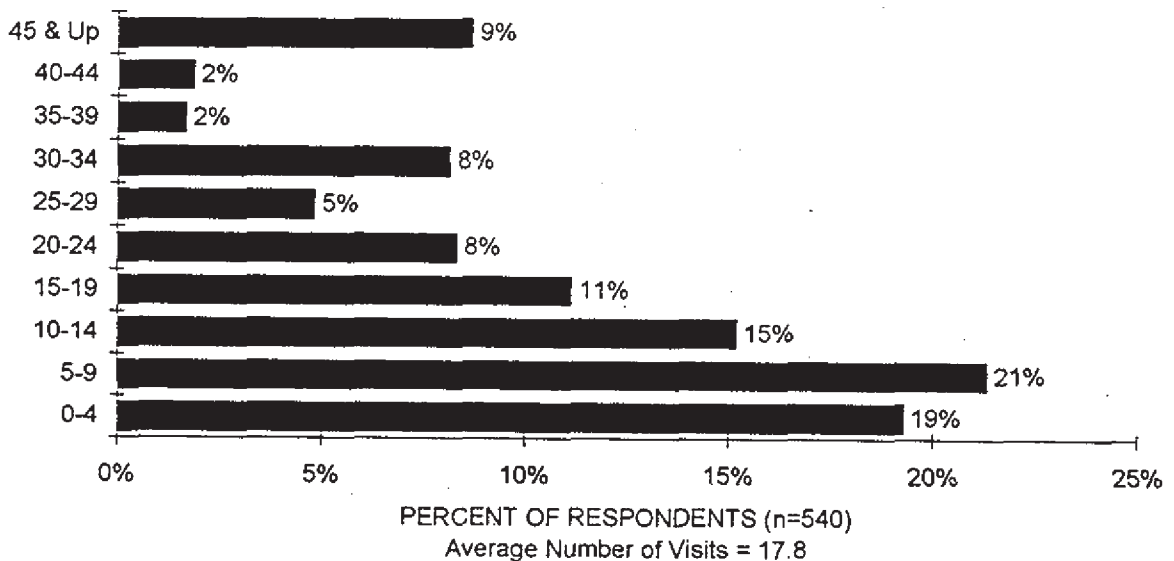
III. Visitor Profile

Visits to Wilderness Areas

In question Q-2 of the mail questionnaire, "wilderness" was not explicitly defined and therefore wilderness may have been interpreted to mean different things. Some respondents may have defined wilderness consistent with Congress' official designation of wilderness areas while others may have used a layperson's or common definition of wilderness. Thus, in this question, wilderness encompasses all possible interpretations and is not limited to Congress' official designation.

Figure 3.7 shows that in the past three years, over half of the respondents (56%) made 14 or fewer visits to a wilderness area. Although only 13% of respondents made 35 or more visits to a wilderness area, 9% of these individuals made at least 45 trips. The average number of visits for all respondents was 17.8.

FIGURE 3.7:
VISITS TO A WILDERNESS AREA IN THE PAST THREE YEARS*



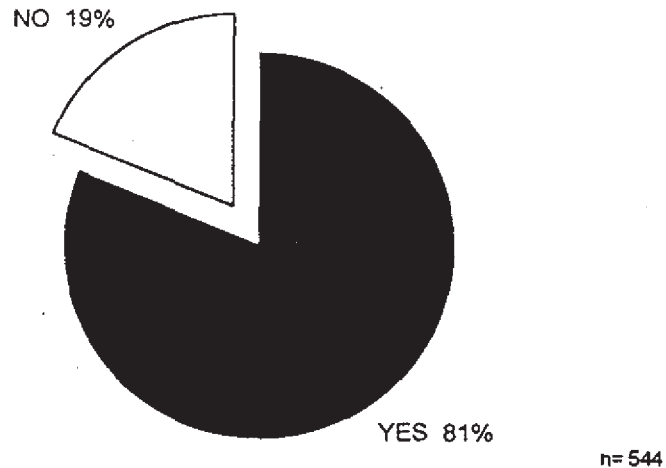
* "Wilderness" was not explicitly defined for the respondents.

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While the ambiguity of "wilderness" makes interpretation difficult, it is clear that Spray Park is visited by individuals with a wide range of use of wilderness areas in the past three years.

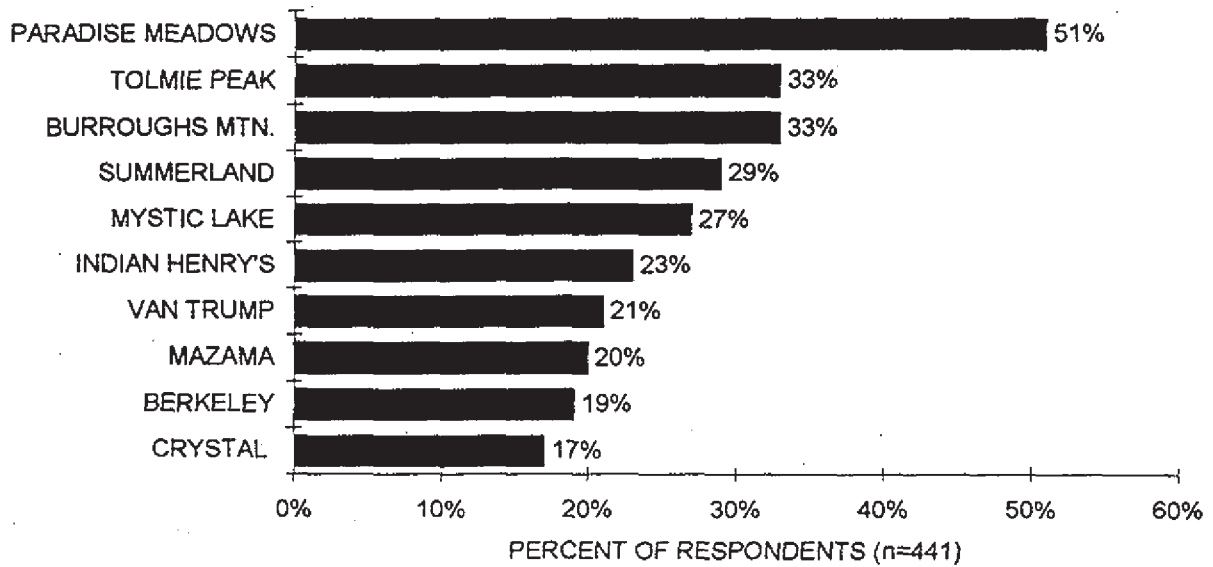
Figure 3.8 shows that the majority of respondents (81%) had visited another backcountry area at Mount Rainier National Park. Approximately half (51%) of these respondents reported visiting areas in Paradise Meadows while a third (33%) reported visiting Burroughs Mountain and Tolmie Peak (see figure 3.9). Twenty-nine percent of respondents reported going to Summerland and 27% to Mystic Lake. The remaining areas were visited by 17-23% of respondents.

FIGURE 3.8:
PRIOR VISITS TO OTHER BACKCOUNTRY AREAS OF MORA



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FIGURE 3.9:
OTHER BACKCOUNTRY AREAS VISITED BY SPRAY PARK VISITORS*



* Includes only the 81% of the respondents who reported visiting backcountry areas of MORA other than Spray Park

Paradise Meadows is not officially designated as backcountry. To get a more accurate percentage of respondents who visited officially designated backcountry areas, respondents who listed Paradise Meadows as their only backcountry designation in prior visits to MORA were reclassified as not having previously visited another backcountry area at MORA. A total of 37 respondents were reclassified giving a revised total of 74% who had visited another backcountry area.

III. Visitor Profile

Place of Residence

Table 3.2 displays Spray Park visitors' origins. Spray Park visitors were primarily from the greater Seattle-Tacoma metropolitan area. Only 5% came from outside the state of Washington.

The origins of weekday visitors were significantly different from weekend visitors, with weekday visitors less likely to come from Seattle, Tacoma, other Pierce County, and Lewis County residences ($X^2(1)=7.95$, $p=.0048$). Weighting the sample to correct for over-representation of weekend visitors would have almost no effect on the distribution of visitor origins, with the frequencies in no category changing by more than 1%.

TABLE 3.2 ORIGIN OF SPRAY PARK VISITORS

<u>Residence</u>	<u>Percent of Spray Park visitors</u>
Washington	
Seattle	37%
Bellevue	4%
Other King County	22%
Tacoma	11%
Other Pierce County	9%
Lewis County	5%
Other Washington	<u>7%</u>
	95%
California	1%
Other U.S.	<u>4%</u>
	100%

IV. TRIP CHARACTERISTICS

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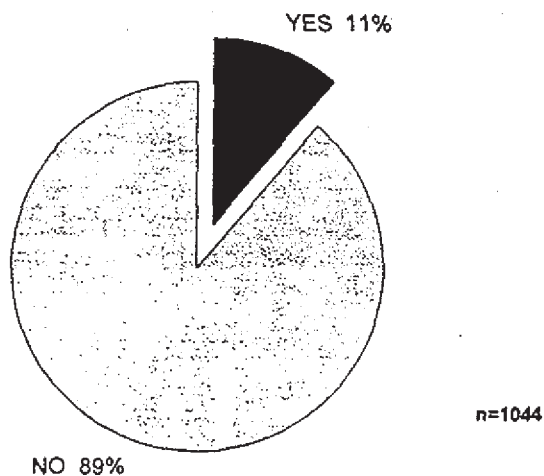
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Prior Visitation to Mount Rainier National Park

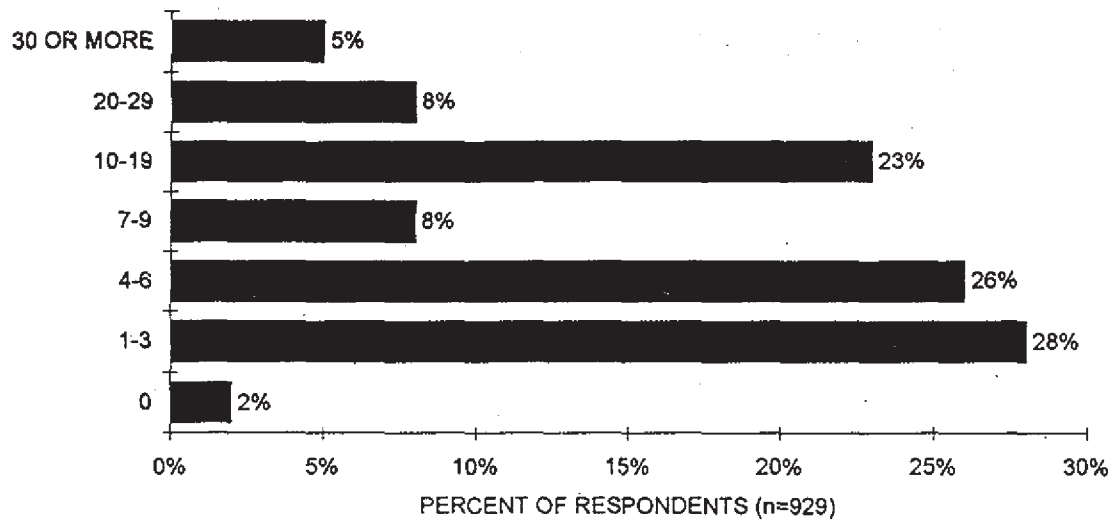
This trip to Spray Park constituted the first trip to MORA for 11% of respondents (see figure 4.1). Figure 4.2 shows that of those respondents who had visited MORA prior to this trip, 54% had made between one and six visits in the last three years. The average number of trips to MORA in the prior three years was 9.5 trips. Thus, individuals who visit Spray Park have usually been to MORA at least once, although their visitation rates to MORA vary considerably.

FIGURE 4.1:
FIRST VISIT TO MORA



IV. Trip Characteristics

FIGURE 4.2
NUMBER OF VISITS TO MORA IN PAST THREE YEARS*



* Includes only the 89% of the respondents who had previously visited MORA.

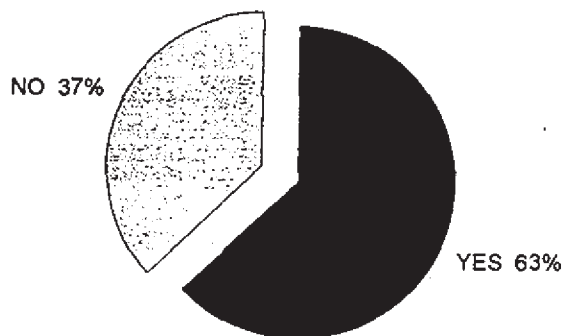
First time visitors to MORA were a considerably smaller percentage of visitors to Spray Park (11%) than of general visitors to MORA (41%.) Many first time visitors to Mount Rainier come to see the mountain and go to a visitor center, and thus would be more likely to visit Paradise or Sunrise than Spray Park. Additionally, Spray Park is located in a remote part of the park away from the primary entrances and therefore requires specific knowledge to access.

IV. Trip Characteristics

Prior Visitation to Spray Park

A majority of respondents (63%) were first time visitors to Spray Park (see figure 4.3). Figure 4.4 shows that of those individuals who had visited Spray Park prior to this trip, 77% had made between one and three trips over the past three years while 8% had not been to Spray Park during the past three years. Across all respondents, the average number of trips over the past three years was 2.3 trips.

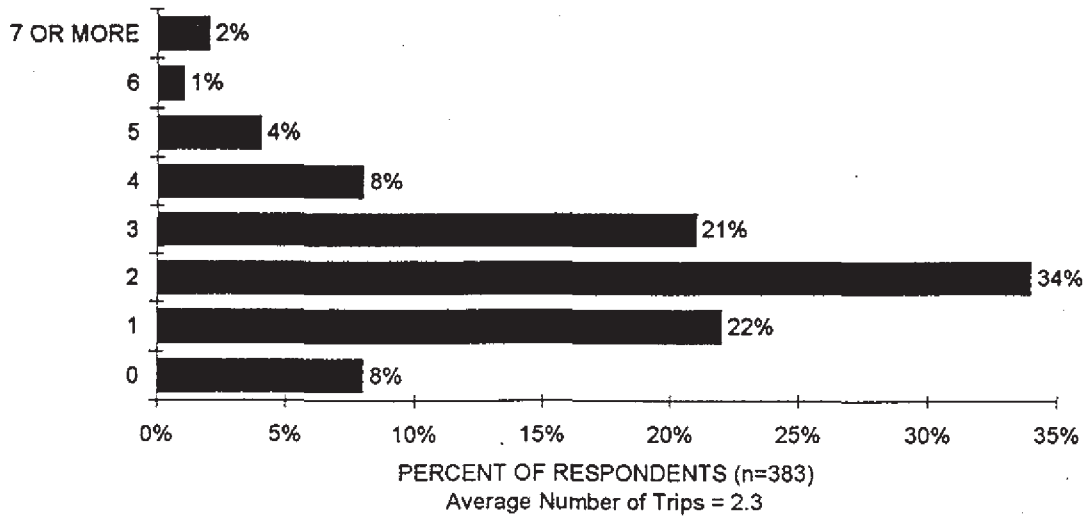
FIGURE 4.3:
FIRST TIME VISITOR TO SPRAY PARK



n=1070

IV. Trip Characteristics

FIGURE 4.4:
TRIPS TO SPRAY PARK IN PAST 3 YEARS*



* Includes only the 37% of visitors who had previously visited Spray Park

Visitation to Spray Park appears to be characterized by a group who are first time visitors to Spray Park but not to MORA, and by a slightly smaller group of individuals who are repeat visitors to Spray Park. Relatively few of these returning visitors (15%) on average visit Spray Park more than once a year.

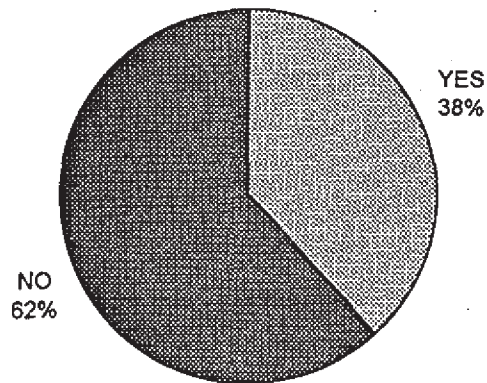
Other Destinations Considered

When planning this trip, 38% of visitors considered other destinations within Mount Rainier National Park before deciding to visit Spray Park (see figure 4.5). Figure 4.6 shows

IV. Trip Characteristics

that the three primary alternative destinations were Ipsut/Carbon River (11%), Sunrise/White River (10%), and other destinations accessed from Mowich Lake (10%). These primary alternative destinations are all located on the north side of the park suggesting some underlying common dimensions such as accessibility from point of origination, view of the mountain from the north, or avoidance of congestion associated with the more popular entrances.

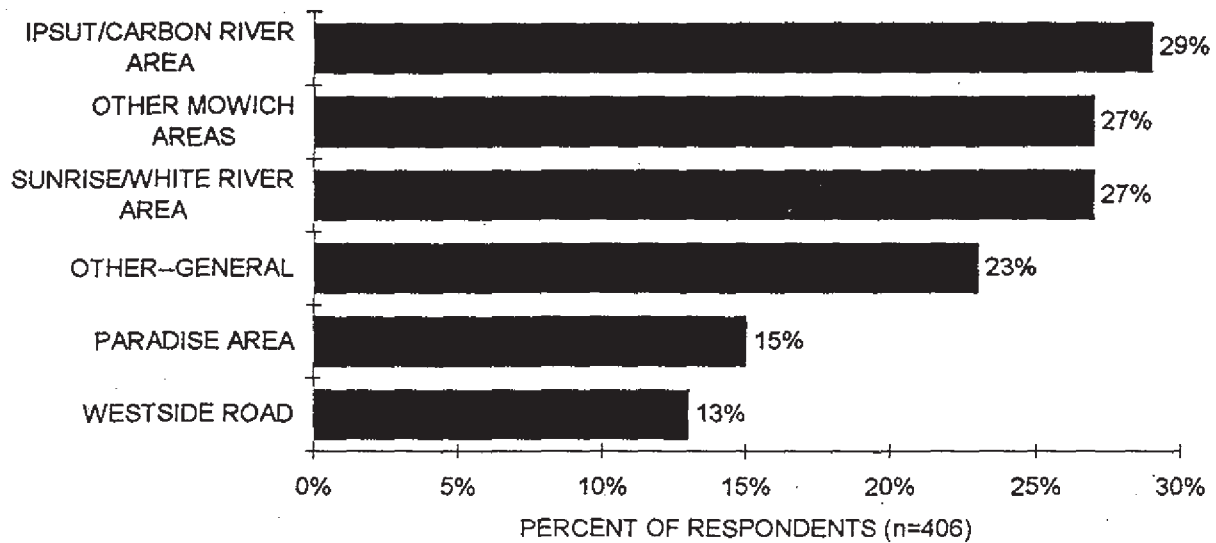
FIGURE 4.5: CONSIDERED OTHER DESTINATIONS IN MORA



n=1072

IV. Trip Characteristics

FIGURE 4.6. OTHER DESTINATIONS CONSIDERED IN MORA*



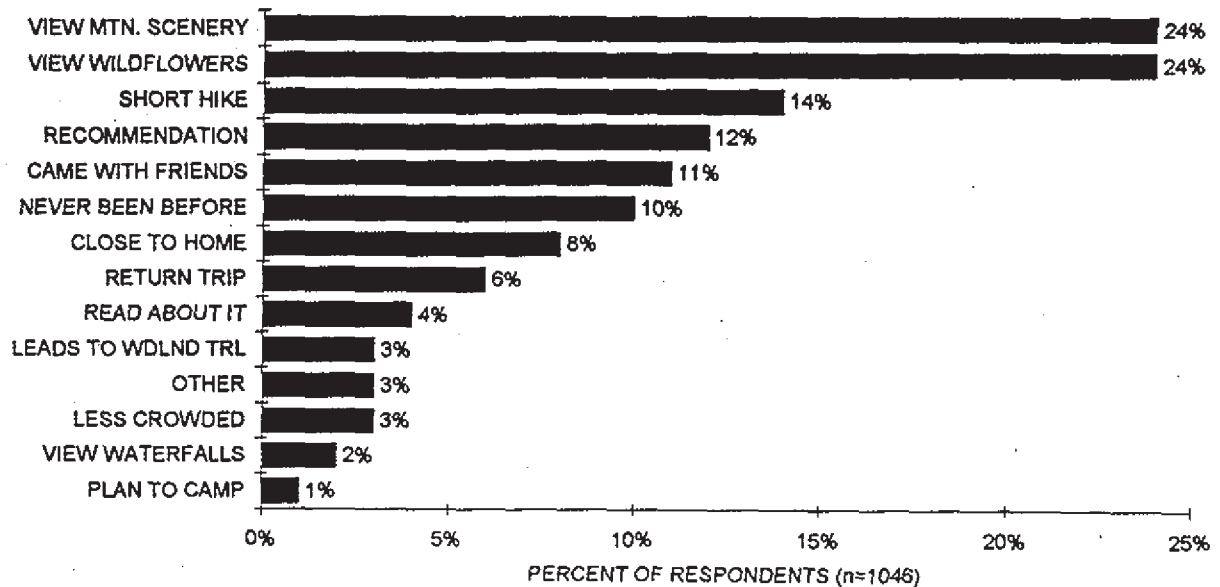
* Includes only the 38% of visitors who considered other destinations within MORA before deciding to visit Spray Park. Percentages total more than 100% because some respondents listed two other destinations.

Reasons for Selecting Spray Park

Figure 4.7 shows that the reasons most frequently given by respondents for deciding to visit Spray Park were to view the mountain scenery and to view wildflowers. The next most frequent reasons were short hike/easy family outing, recommendation, came with friends, and never been before.

IV. Trip Characteristics

FIGURE 4.7:
REASON FOR CHOOSING TO VISIT SPRAY PARK



Approximately 16% of respondents listed two reasons for selecting Spray Park. The most common combination was viewing mountain scenery and short hike/easy family outing (4% of total.) No other combination was given by more than 15 individuals (1% of total) and thus will not be detailed here.

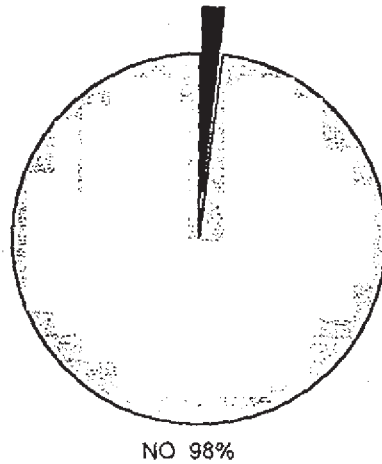
Although the most common reasons respondents listed for visiting Spray Park are very similar to those listed by visitors to other areas of MORA, the similarity can not be taken as evidence that the Spray Park experience is equivalent to that offered in those other areas. A question directly asking respondents to make such relative comparisons would be necessary to support any such conclusions.

Very few respondents reported planning to camp in Spray Park (2%) which is consistent with park policy for numbers of parties per night allowed to camp in the zone

IV. Trip Characteristics

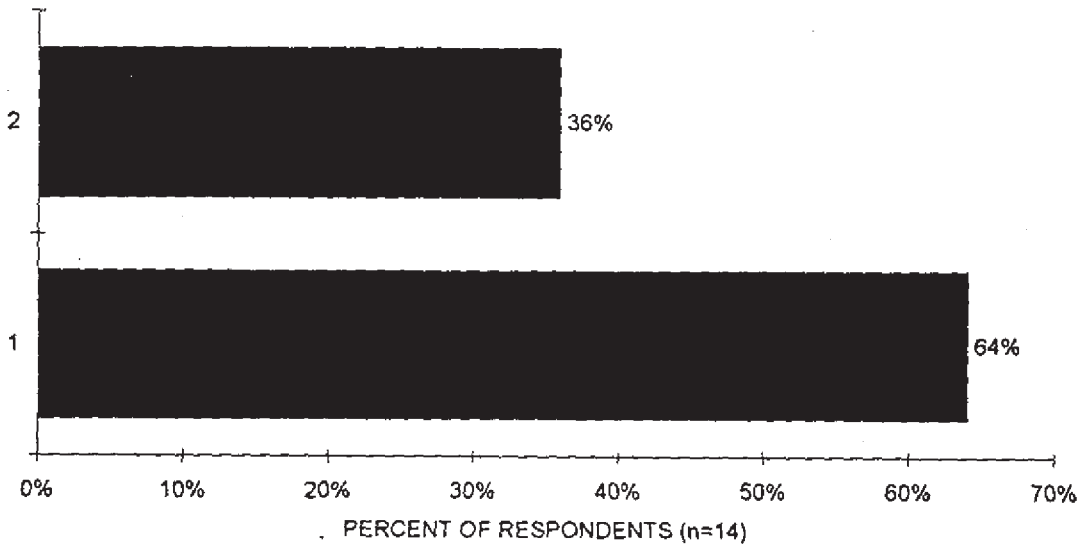
(see figure 4.8.) Figure 4.9 shows that of those respondents planning to camp, 64% planned to camp one night while 36% planned to camp two nights.

FIGURE 4.8:
VISITORS PLANNING TO CAMP IN SPRAY PARK
YES 2%



n=1070

FIGURE 4.9:
NUMBER OF NIGHTS CAMPING IN SPRAY PARK*

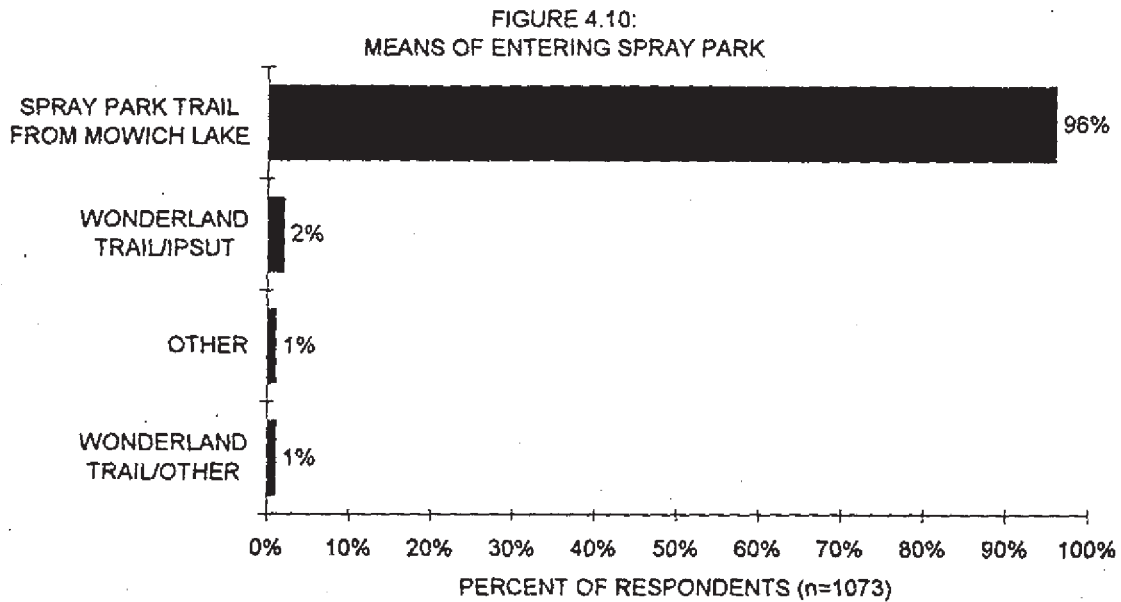


* Includes only the 2% of visitors planning to camp in Spray Park.

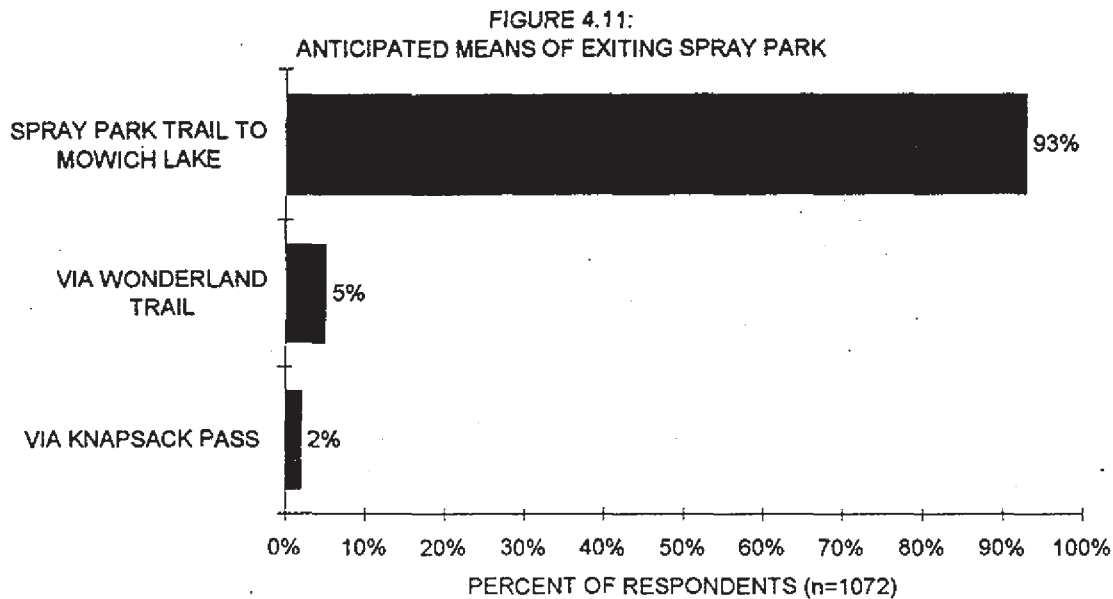
IV. Trip Characteristics

Entering and Leaving Spray Park

As shown in figure 4.10, virtually all of the respondents (96%) started hiking to Spray Park at the Mowich Lake trailhead of the main trail to Spray Park. Similarly, figure 4.11 shows that 93% of respondents planned to return using the same trail. The remaining individuals planned to leave Spray Park using the Wonderland Trail (5%) or Knapsack Pass Trail (2%).



IV. Trip Characteristics



Weekend visitors were less likely to return from their hike via the Spray Park trail than were weekday visitors (91% vs. 98%, $X^2(1)=10.2$, $p=.0014$). Weighting the sample to correct for overrepresentation of weekend visitors would change the observed percentage of visitors returning via the Spray Park trail from 93% to 94% with a corresponding decrease of 1% in returns via the Wonderland trail.

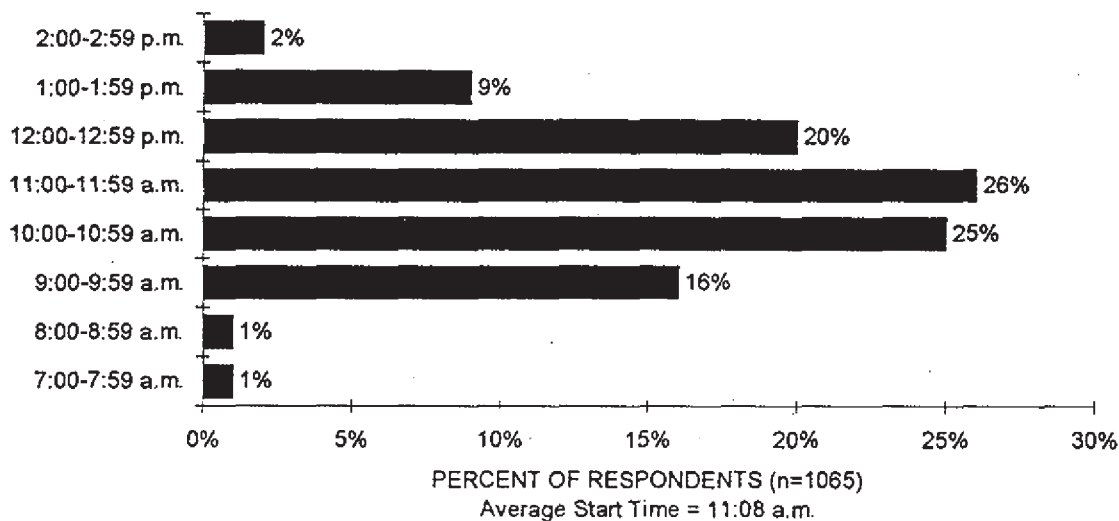
Hiking Times

The average time respondents started hiking to Spray Park was 11:08 a.m. Although figure 4.12 shows that individuals started as early as 6:00 a.m. and as late as 3:00 p.m., the majority (71%) started between 10:00 a.m. and 12:59 p.m.

IV. Trip Characteristics

Weekday visitors started their hikes later in the day than did weekend visitors ($X^2(6)=18.43$, $p=.0052$, with times before 8:00 and after 2:00 grouped). For example, 41% of weekday visitors started hiking after 12:00, compared to 29% of weekend visitors. Nonetheless, weighting the sample to correct for over-representation of weekend visitors would have almost no effect on the distribution of start times. The percentage of respondents starting between 10:00 and 10:59 increased by 2% but no other category changed by more than 1%.

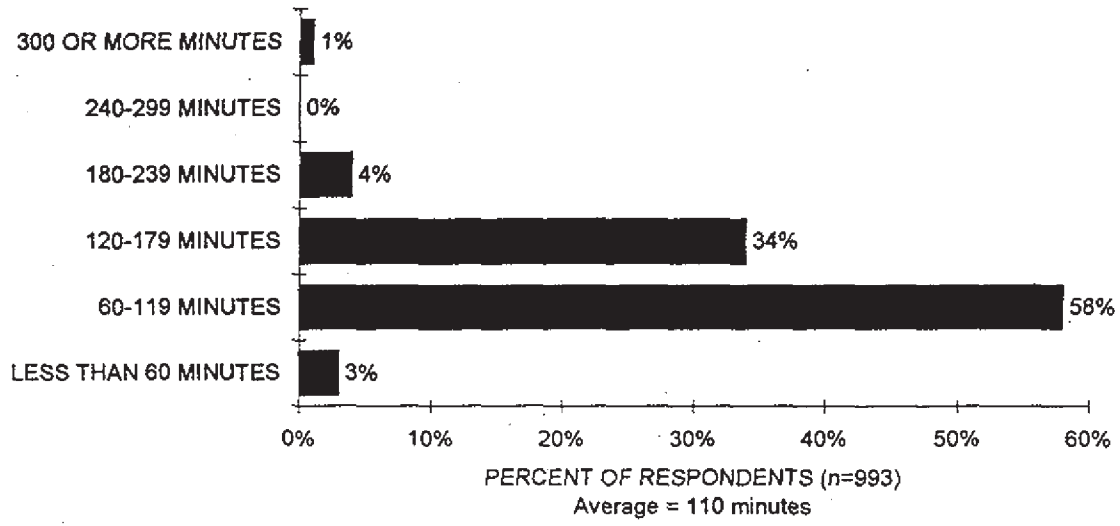
FIGURE 4.12. START TIME OF HIKE TO SPRAY PARK



The hike from the parking lot to Spray Park (at the survey site) took respondents, on average, one hour and 50 minutes. Most people (92%) took between one and three hours to hike to Spray Park (See figure 4.13).

IV. Trip Characteristics

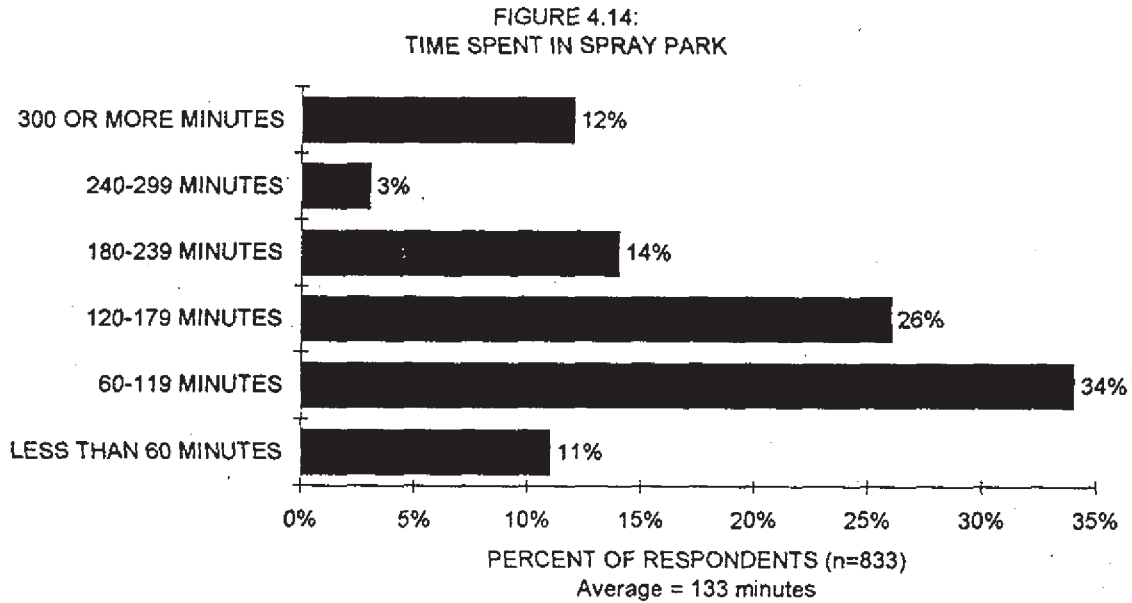
FIGURE 4.13:
HIKING TIME TO SPRAY PARK



IV. Trip Characteristics

Time Spent in Spray Park

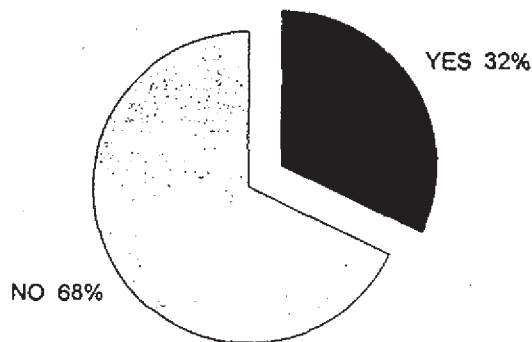
Figure 4.14 shows that the average amount of time spent in Spray Park was two hours and 13 minutes. Sixty percent of respondents stayed one to three hours in Spray Park. While 12% of respondents spent five hours or more in Spray Park, 11% of respondents stayed less than one hour.



Planned Destinations

Figure 4.15 shows that the majority of respondents (68%) had not planned to visit specific areas in Spray Park. Of those who had particular areas in mind, the most frequently listed destination was Upper Spray Park (67%) followed by Lower Spray Park (41%). Considerably fewer planned to visit Mt. Pleasant (12%), Knapsack Pass (10%) or Hessong Rock (6%) see figure 4.16.

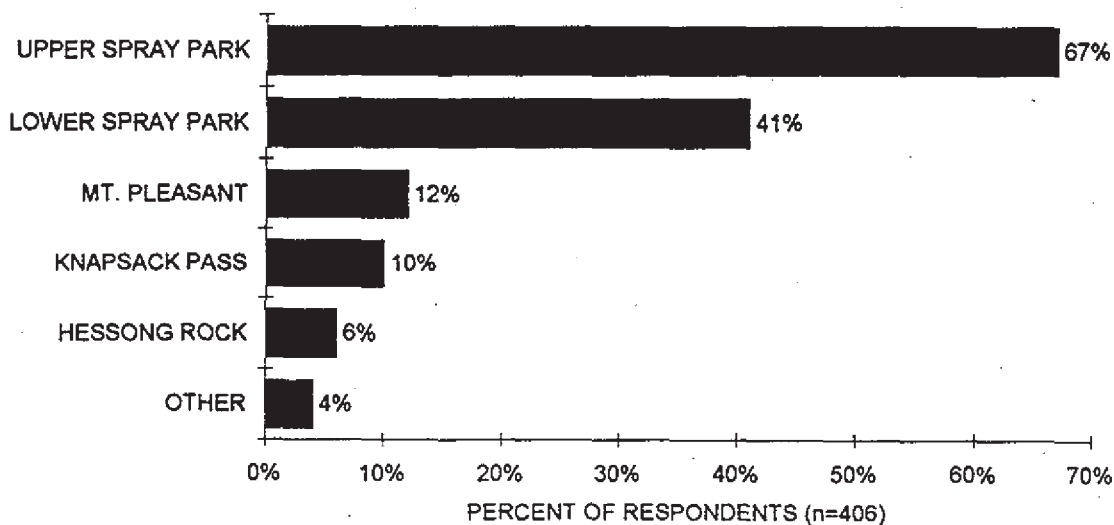
FIGURE 4.15:
PLANNED TO VISIT SPECIFIC AREAS OF SPRAY PARK



n = 1061

IV. Trip Characteristics

FIGURE 4.16:
AREAS PLANNED TO VISIT WITHIN SPRAY PARK*



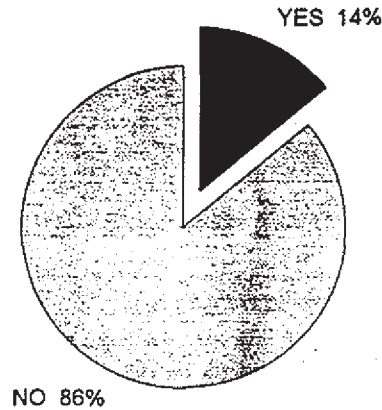
* Includes only the 32% of respondents who had planned specific areas to visit in Spray Park.

Figure 4.17 shows that only 14% of respondents were traveling through Spray Park to reach a destination outside of Spray Park. These respondents indicated Seattle Park was the most common (42%) of such destinations. Observation Rock (28%) was also frequently listed (see figure 4.18).

Weekday visitors were less likely to be seeking a destination outside Spray Park than were weekend visitors (9% vs. 15%, $X^2(1)=5.45$, $p=.02$). Weighting the sample to correct for over-representation of weekend visitors would change the observed percentage of visitors seeking destinations outside Spray Park from 14% to 13%.

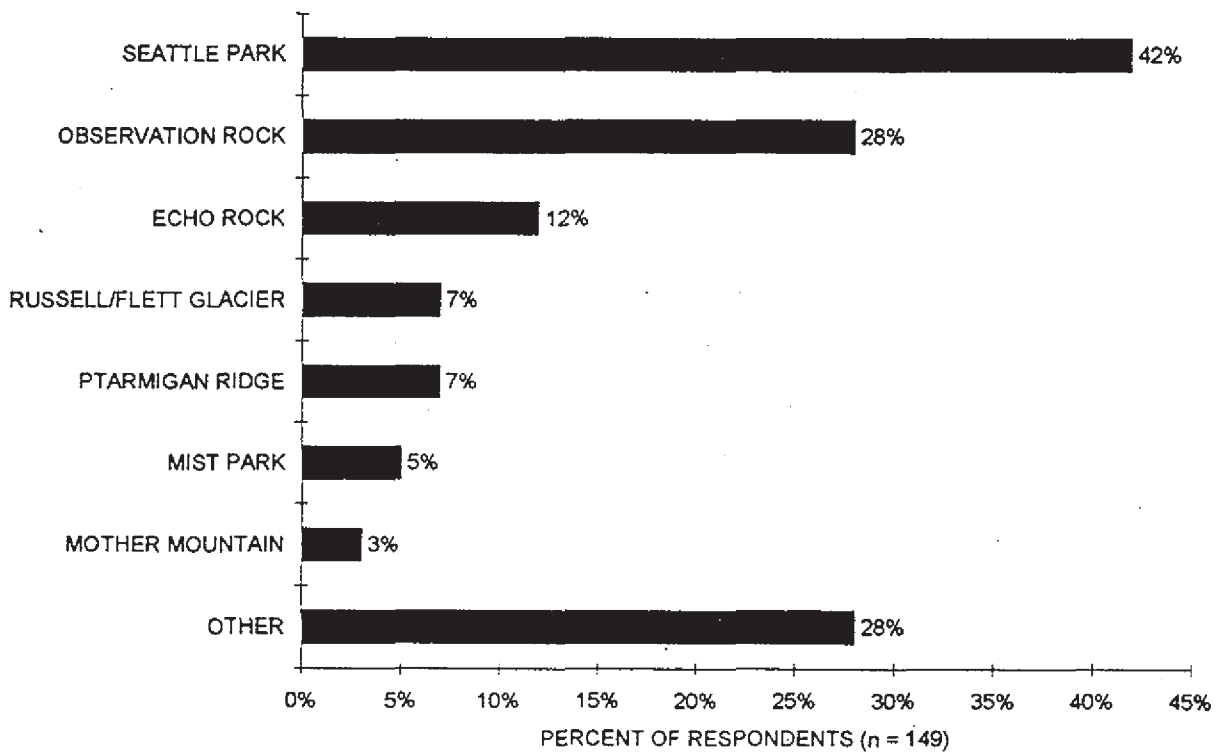
IV. Trip Characteristics

FIGURE 4.17:
DESTINATION ACCESSED BY TRAVELING THROUGH SPRAY PARK



n=1054

FIGURE 4.18: DESTINATIONS ACCESSED VIA SPRAY PARK*



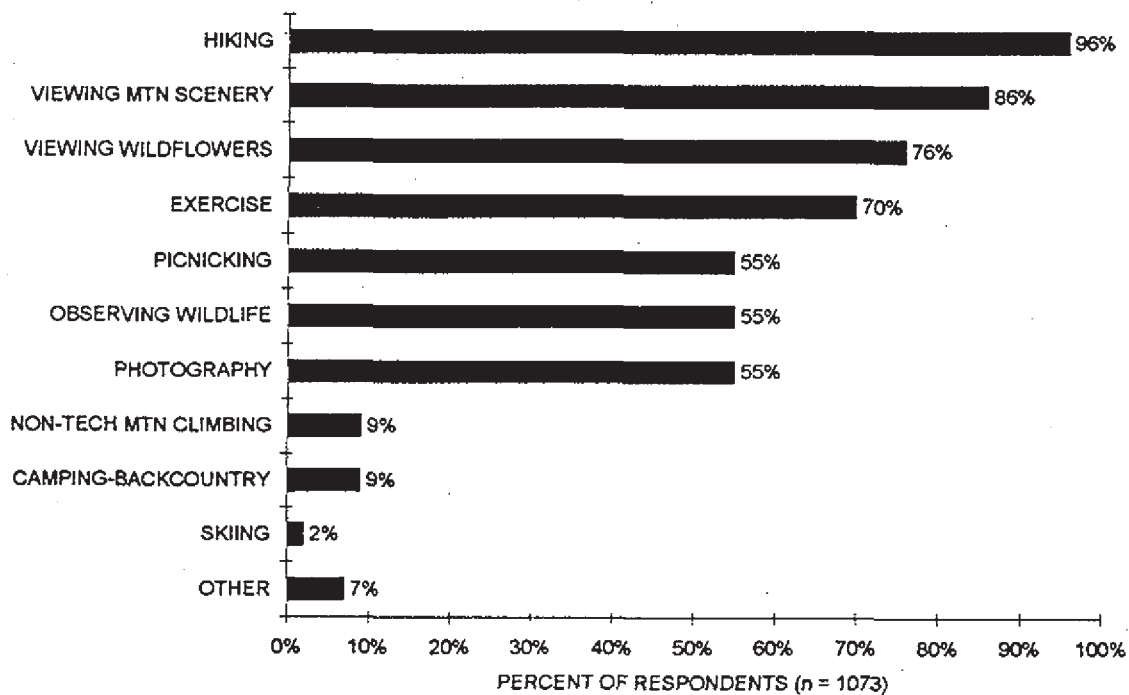
* Includes only the 14% of respondents traveling through Spray Park to reach a destination outside of Spray Park.

IV. Trip Characteristics

Planned Recreational Activities

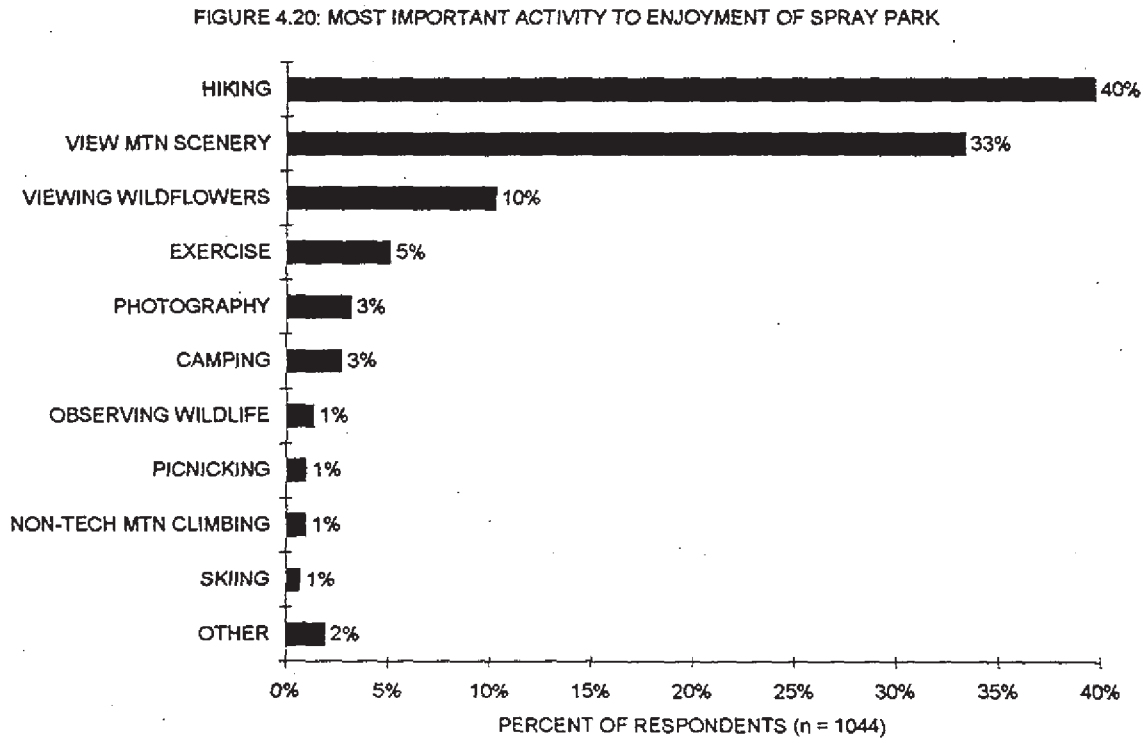
During their visit to Spray Park, respondents most frequently planned recreation activity was hiking (96%). Other frequently planned activities included viewing mountain scenery (86%), viewing wildflowers (76%), exercising (70%), picnicking (55%), observing wildlife (55%), and photography (55%) see figure 4.19. Note that although figure 4.8 showed that only 2% of respondents planned to camp in Spray Park, figure 4.19 shows that 9% of respondents planned to do backcountry camping. Two points can be made concerning this observation--first, that it clearly shows a preponderance of day-hikers among visitors to Spray Park, and second, that of those backpackers who do enter Spray Park, less than 25% plan to camp in that area.

FIGURE 4.19: RECREATION ACTIVITIES PLANNED FOR THIS TRIP



IV. Trip Characteristics

Figure 4.20 shows that for 40% of respondents, hiking was the most important planned activity. Viewing mountain scenery was the most important planned activity for 33% of respondents while 10% of respondents indicated that viewing wildflowers was the most important activity.



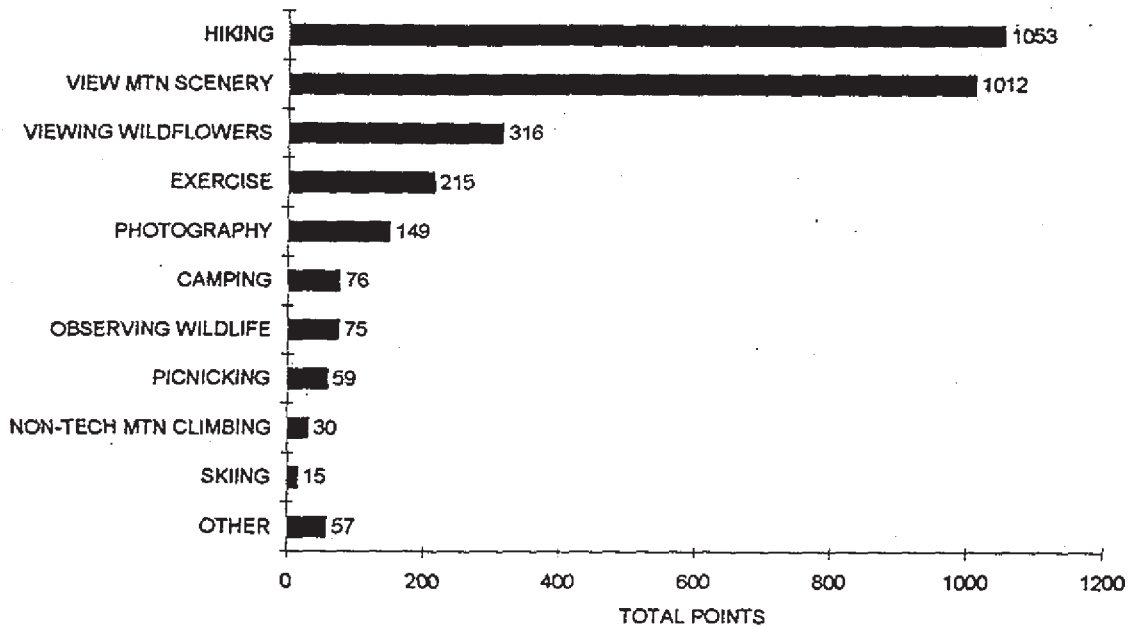
Respondents also indicated their second most important activity¹. This ranking can be combined with the most important rankings by assigning a score of "2" each time an activity is listed as most important and "1" when an activity is listed as second most important. Scores for each activity are then summed across all respondents and are shown in figure 4.21. Based on this scoring system, hiking was the most important activity (1053 points) followed closely by viewing mountain scenery (1012 points). The remaining

¹ The frequency distribution of second-most important activities was nearly identical to figure 4.20 and thus is not reproduced here.

IV. Trip Characteristics

activities were considerably less important with viewing wildflowers being ranked third (316 points), exercise fourth (215 points) and photography fifth (149 points).

FIGURE 4.21:
COMBINED SCORES OF FIRST AND SECOND MOST IMPORTANT PLANNED ACTIVITIES TO
ENJOYMENT OF SPRAY PARK



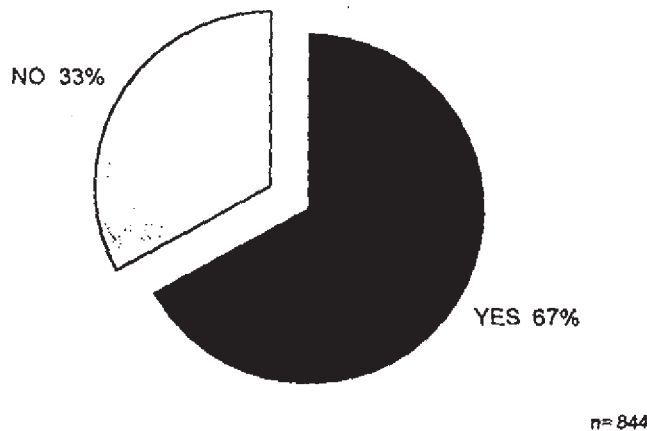
Hiking and viewing mountain scenery was the most common combination of important activities (32%) reported by respondents. Viewing mountain scenery and viewing wildflowers was the second most common combination (14%).

IV. Trip Characteristics

Leaving the Trail in Spray Park

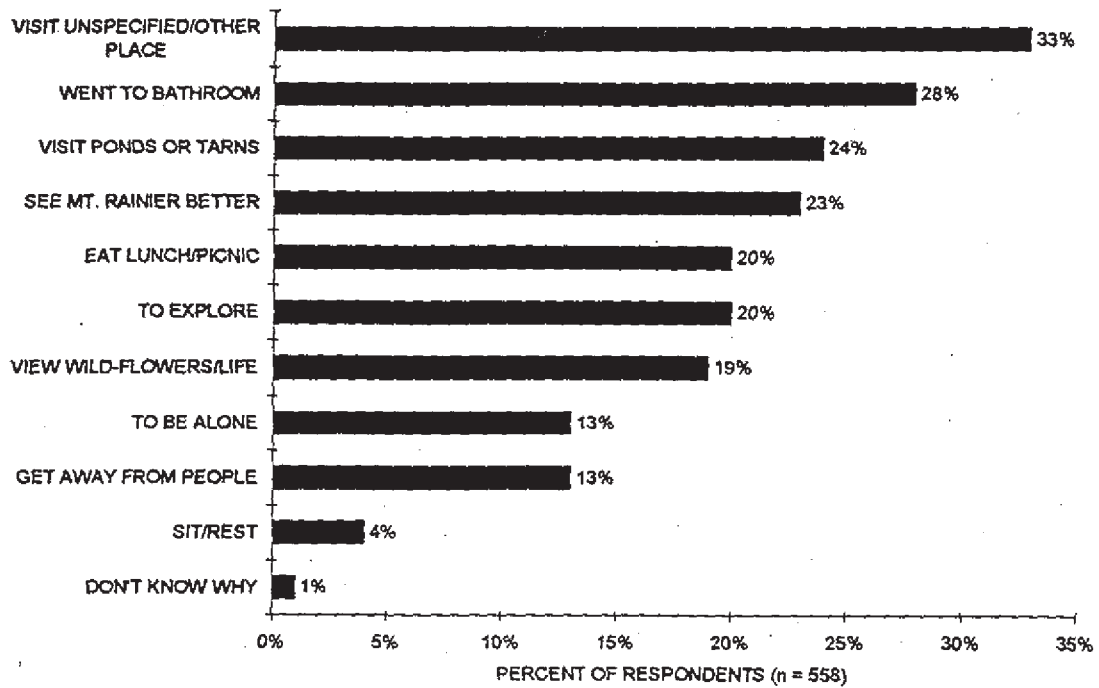
Two-thirds of respondents reported leaving the trail (see figure 4.22). The most frequent reason given by respondents (see figure 4.23) was to visit an unspecified place not accessible from the trail (33%). Similar reasons were to visit ponds or tarns (24%), see Mount Rainier better (23%), and view wild-flowers and wildlife (19%). The second most frequent reason given by respondents was to urinate or defecate (28%). Crowding related reasons given were to be alone (13%) and to get away from people (13%.) If we combine all respondents who selected either of these last two reasons, we find that 21% of respondents who left the trail did so because of the presence of other people, and that they constituted 14% of the complete sample.

FIGURE 4.22:
PERCENT OF RESPONDENTS WHO LEFT TRAIL AT ANY TIME



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FIGURE 4.23: REASONS FOR LEAVING THE TRAIL AT SPRAY PARK*



* Includes only the 67% of respondents who reported leaving the trail.

In the course of conducting the SPVS, it was possible for data collection supervisors to collect some additional observational data of visitor behavior in Spray Park. Visitor characteristics and activities associated with off-trail hiking were some of the focal points of these observations. Appendix F is a draft description of the observational data collected in the SPVS. Although this data collection and analysis was not a priority in the SPVS, and the data collection procedures were not as rigorous as those associated with the questionnaire data, the conclusions described in Appendix F are nonetheless interesting and valuable as a means of fleshing out the description of visitation in Spray Park.

V. CROWDING: ACTUAL EXPERIENCE

The data presented in this section were collected in the entrance and exit questionnaires that were completed in Spray Park. Some caution should be maintained in evaluating the data from the exit questionnaire. From our analysis of non-response (see Section I) we know that the respondents to the exit questionnaire differ from those who completed the entrance questionnaire in several ways, and they may also differ in ways that we could not detect. Thus, non-response bias may have a small affect on the data collected and we should be wary of conclusions based on less than approximately 5% of respondents. Nevertheless, these questionnaires were completed by large numbers of visitors (1076 entrance and 848 exit questionnaires) and a high degree of confidence can be placed on the accuracy of most of the conclusions formed on the basis of these data.

For the data presented in this section, the days when respondents visited Spray Park, either weekdays or weekends, generally had significant effects. Accordingly, much of the data are described separately for weekend and weekday visitors. When data are reported for the entire sample, weekend and weekday visitors did not differ significantly.

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FIGURE 5.8: DID YOU FEEL CROWDED BY THE NUMBER OF OTHER PEOPLE?..... 88

FIGURE 5.9: DEGREE TO WHICH NUMBER OF PEOPLE MADE RESPONDENT FEEL CROWDED 89

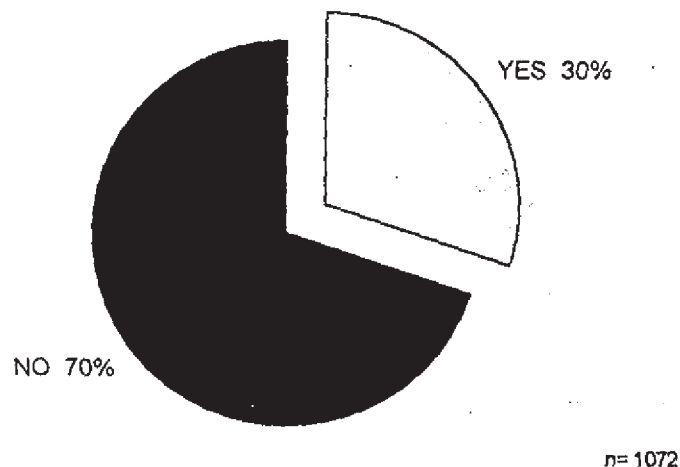
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FIGURE 5.11: BEHAVIOR THAT CAUSED VISITOR TO FEEL CROWDED 91

Considered Other Potential Visitors to Spray Park when Planning Trip

Across the weekday and weekend samples, only 30% of respondents considered the number of other potential visitors at Spray Park when planning their trips (see figure 5.1). Respondents who had previously visited Spray Park were significantly more likely to consider the number of other visitors than were first-time visitors ($X^2(1) = 4.88, p = .027$) but the difference in percentages was not large (34% for repeat visitors vs. 27% for first-timers).

FIGURE 5.1:
CONSIDERED NUMBER OF OTHER VISITORS WHEN PLANNING TRIP TO SPRAY PARK

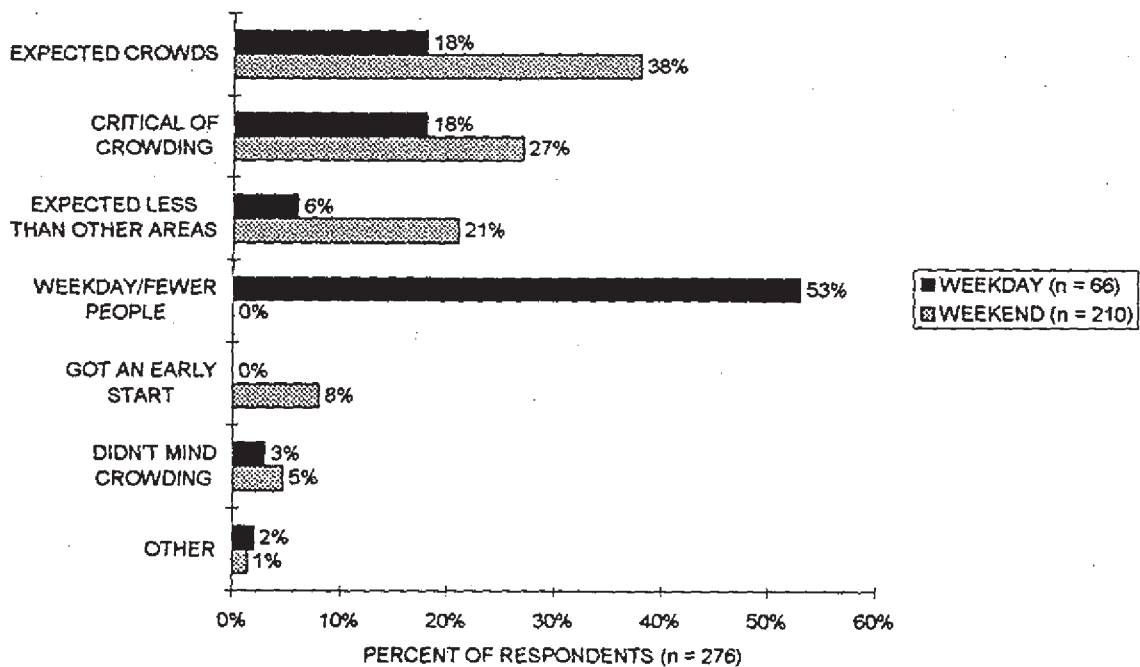


Although equal percentages of weekday and weekend visitors considered the number of other potential visitors when planning their trip, figure 5.2 shows that the explanations for such consideration varied by day of the week. Most strikingly, 53% of weekday visitors who considered the number of other visitors said they visited during

V. Crowding: Actual Experience

the week to avoid large numbers of people. In contrast, the most common explanation among weekend visitors who considered the number of other visitors was that they expected crowds (38%), and another quarter of weekend visitors made statements critical of crowding (27%). Similar statements about crowding were also made by many of the weekday visitors with 18% saying that they expected crowds and 18% making statements critical of crowding. A small number of both weekday and weekend visitors explained their consideration of other visitors by saying that they didn't mind crowding (3% and 5%, respectively).

FIGURE 5.2: EXPLANATION FOR CONSIDERING THE NUMBER OF OTHER POTENTIAL VISITORS*



* Includes only the 30% of respondents who considered the number of other potential visitors when planning their trips.

Number of Parties Seen

The interpretation of the data in figure 5.3 and 5.4 is complicated by possible confusion among respondents concerning the meaning of the term "party." In the entrance questionnaire, respondents were simply asked, "Before entering the Spray Park area, how many parties do you remember seeing at each of the following locations?" It is not clear how many respondents interpreted this question as referring to groups versus individuals. Thus, the averages reported probably represent a combination of answers given in different units and should not be interpreted as accurate estimates of either the absolute number of parties or individuals encountered.

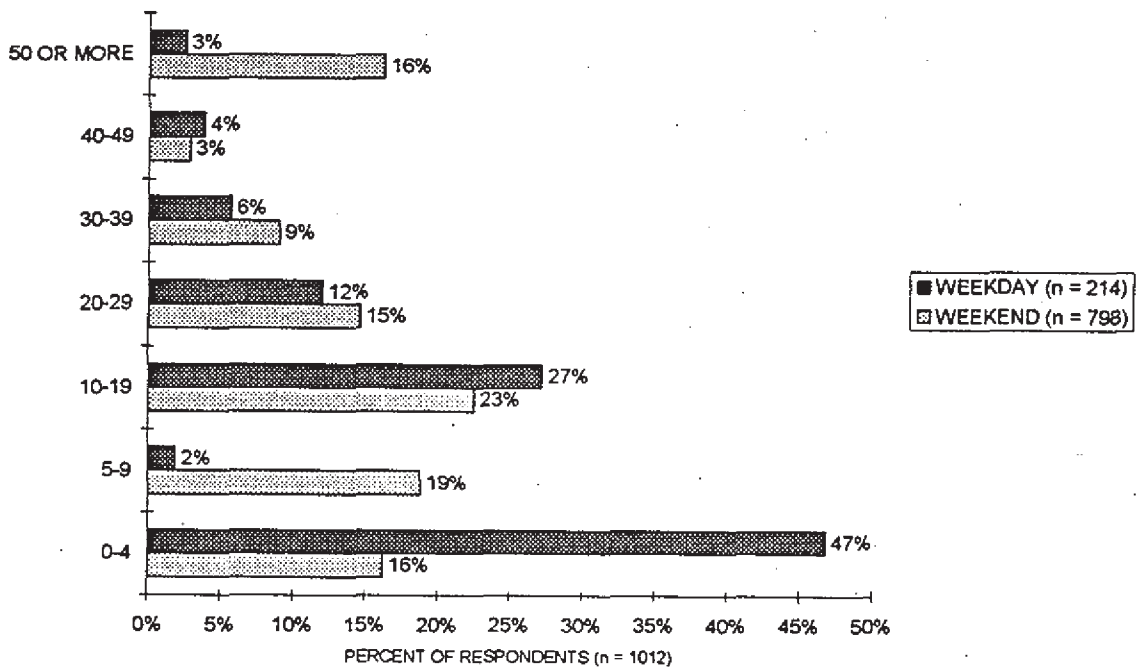
The data remain useful and are presented here because they show consistent differences in the data collected for weekday and weekend respondents. There is no reason to believe that the possible confusion should affect these differences or should cast any doubt on their accuracy as measures of relative differences in the conditions perceived by weekday and weekend visitors.

V. Crowding: Actual Experience

Weekends: Figure 5.3 shows that the majority (58%) of respondents visiting on weekends reported seeing fewer than 20 parties at the trailhead parking area. However, 16% of respondents reporting seeing 50 or more parties. On average, respondents reported seeing 22.4 parties at the trailhead parking area.

Weekdays: Figure 5.3 shows that almost three-quarters (74%) of respondents visiting on weekdays reported seeing fewer than 10 parties at the trailhead parking area. Only 14% of respondents reporting seeing 20 or more parties. On average, respondents reported seeing 9.2 parties at the trailhead parking area.

FIGURE 5.3: NUMBER OF PARTIES SEEN AT TRAILHEAD PARKING

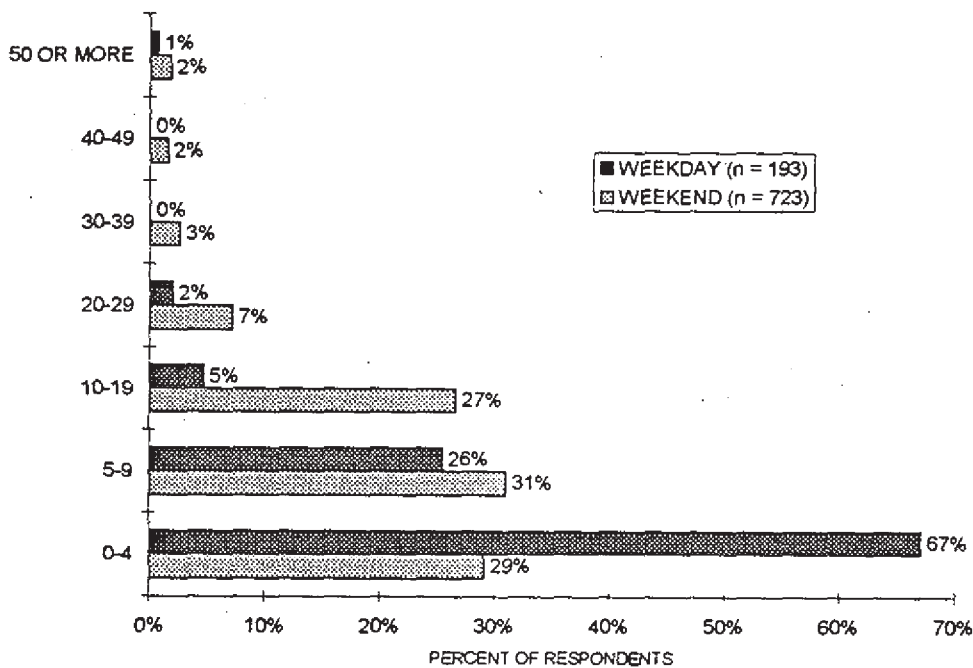


V. Crowding: Actual Experience

Weekends: Figure 5.4 shows that while hiking on the trail to Spray Park, respondents visiting on weekends saw an average of 9.9 parties. For that section of trail, 60% of respondents reported seeing nine or fewer parties and only 6% reported seeing 30 or more parties.

Weekdays: Figure 5.4 shows that while hiking on the trail to Spray Park, respondents visiting on weekdays saw an average of 4.3 parties. For that section of trail, 93% of respondents reported seeing nine or fewer parties and only 3% reported seeing 20 or more parties.

FIGURE 5.4: NUMBER OF PARTIES SEEN ON TRAIL TO SPRAY PARK



Although the data in figure 5.5 and 5.6 show some responses that are consistent with an interpretation of the term "parties" as referring to individuals (i.e., several

V. Crowding: Actual Experience

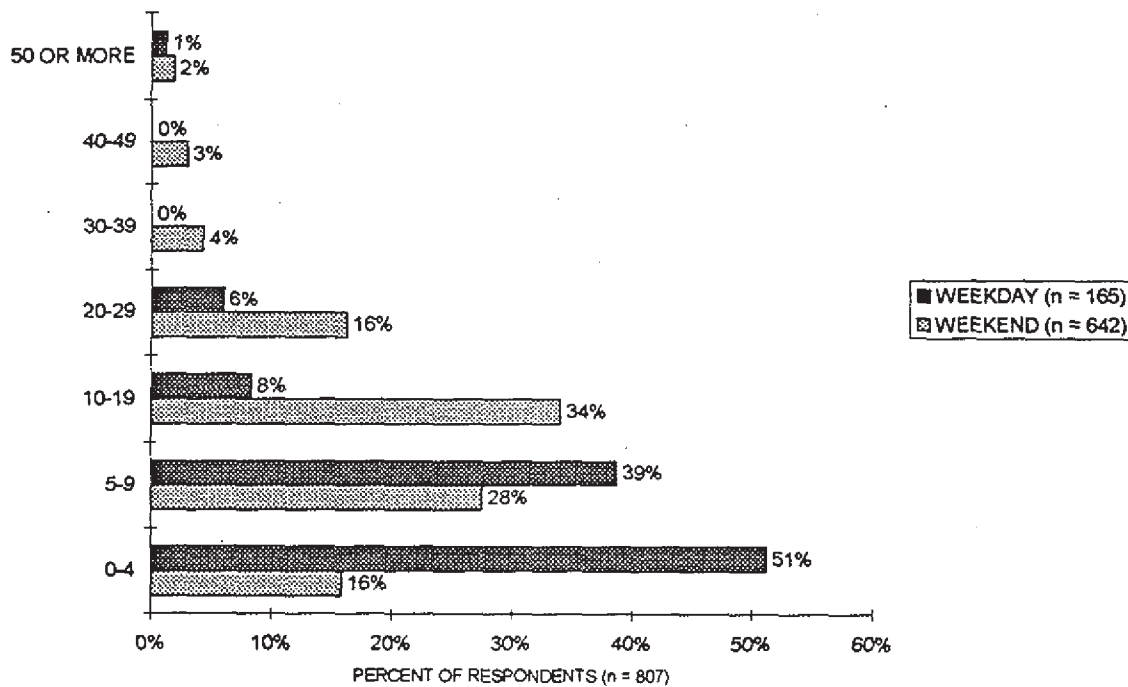
respondents reported encountering more than 50 parties on the trail), such confusion is much less likely in these data than in the data reported in figure 5.3 and 5.4. Question 3 from the exit questionnaire which was used to gather the data below asked respondents, "How many groups of people (parties) do you remember seeing in Spray Park? 'Seeing' refers to meeting people on the trail and sighting people in the distance, off-trail." The specificity of this question is sufficient to support the argument that the averages reported represent respondents' perceptions of the absolute number of parties they encountered. The degree to which these *perceived* encounters correspond to the *actual* number of encounters they experienced can not be assessed using the data available.

V. Crowding: Actual Experience

Weekends: Figure 5.5 shows that once in Spray Park less than half (44%) of respondents visiting on weekends reported meeting nine or fewer parties on the trail and 7% of respondents reported meeting 30 or more parties. The average number of parties met was 12.2 parties.

Weekdays: Figure 5.5 shows that once in Spray Park over half (51%) of respondents visiting on weekdays reported meeting four or fewer parties on the trail, and only 10% of respondents reported meeting 10 or more parties. The average number of parties met on the trail in Spray Park was 5.7 parties.

FIGURE 5.5: NUMBER OF PARTIES SEEN ON TRAIL IN SPRAY PARK

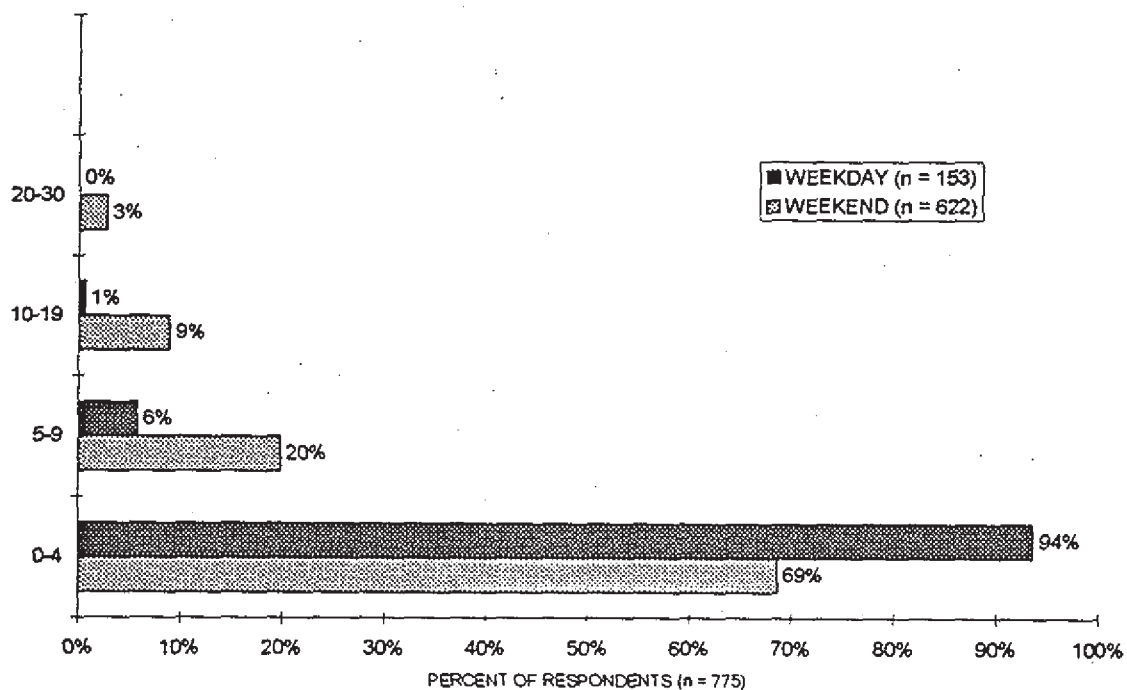


V. Crowding: Actual Experience

Weekends: Figure 5.6 shows that while in Spray Park respondents visiting on weekends reported on average seeing 4.1 parties who were off the trail. The majority (69%) of respondents reported seeing four or fewer parties when off the trail in Spray Park, and no one reported seeing more than 29 parties.

Weekdays: Figure 5.6 shows that while in Spray Park respondents visiting on weekdays reported on average seeing only 1.7 parties who were off the trail. Almost all (93%) of respondents reported seeing four or fewer parties when off the trail in Spray Park and no one reported seeing more than 19 parties.

FIGURE 5.6: NUMBER OF PARTIES SEEN WHILE OFF THE TRAIL IN SPRAY PARK



Weekday visitors reported 47% as many on-trail encounters as weekend visitors (5.7 vs. 12.2) and reported seeing 41% as many parties off-trail (1.7 vs. 4.1). Thus, we would expect the number of visitors on an average weekday to be between 41% and

V. Crowding: Actual Experience

47% of the number present on an average weekend. Based on the number of interviews conducted, weekday visitation was 33% as high as weekend visitation (26 vs. 78 visitors per day). The difference between visitation and perceived encounters can be explained in three ways, any or all of which could apply to the SPVS: (1) the number of parties encountered by each visitor may not increase in a simple linear manner with the number of visitors present in Spray Park, (2) respondents who encounter larger numbers of parties may be more likely to underestimate the number of encounters than those who encounter fewer parties, or (3) respondents who encounter small numbers of parties may be more likely to overestimate the number of encounters than those who encounter more parties. Whatever the reason for the discrepancy, the data suggest that perceived numbers of encounters can not be assumed to be directly related to objective measures of visitor density.

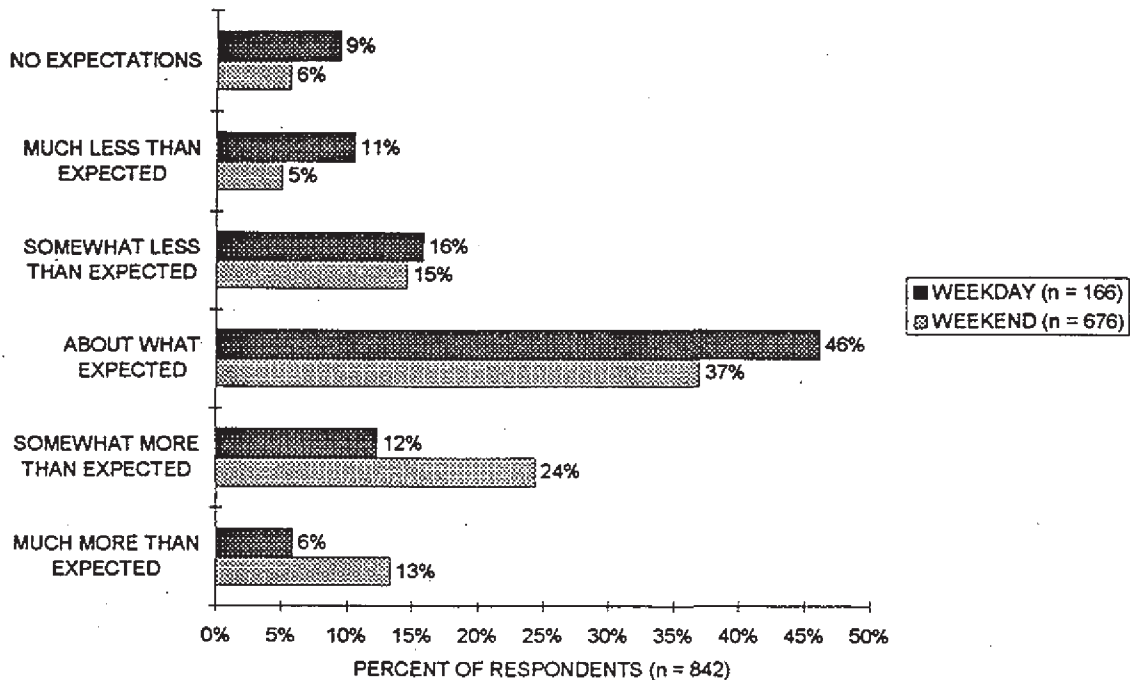
Expectations Versus Number of Hikers Seen

Weekends. Figure 5.7 shows that the majority of respondents visiting on weekends (57%) reported seeing fewer or about as many hikers as they expected to see in Spray Park. Thirteen percent of respondents reported seeing many more hikers than expected while 24% of respondents reported seeing somewhat more than they expected. Only 6% of respondents reported having no expectations.

Weekdays. Figure 5.7 shows that on weekdays, almost three-quarters of respondents (73%) reported seeing fewer or about as many hikers as they expected to see in Spray Park. Six percent of respondents reported seeing many more hikers than expected while 12% of respondents reported seeing somewhat more than they expected. About 9% of respondents reported having no expectations.

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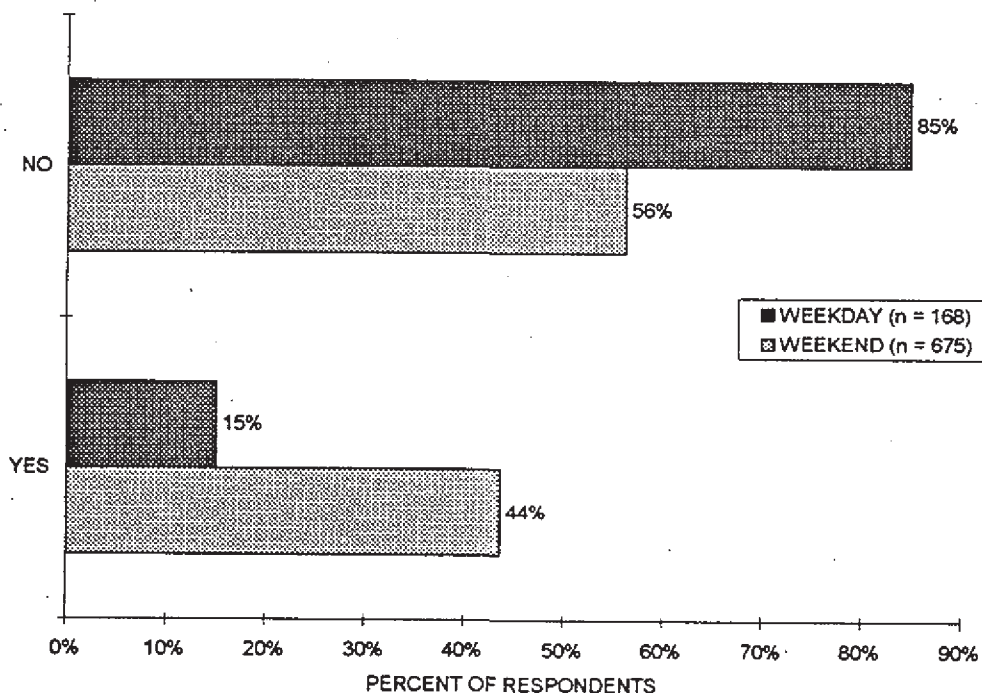
FIGURE 5.7: NUMBER OF PEOPLE SEEN VERSUS NUMBER OF PEOPLE EXPECTED TO SEE



Number of Other Visitors and Perceptions of Crowding

Question 6 on the exit questionnaire asked, "At any time during your visit to Spray Park did the number of people cause you to feel 'crowded'?" Figure 5.8 shows that for respondents who visited on weekends, a total of 44% circled "YES" and reported that at some time during their visit, the number of other visitors present had made them feel crowded. This was much higher than the 15% of weekday respondents who reported such crowding. Weighting the sample to correct for over-representation of weekend visitors yields an estimate that about one-third (33%) of all Spray Park visitors feel crowded due to the number of other visitors.

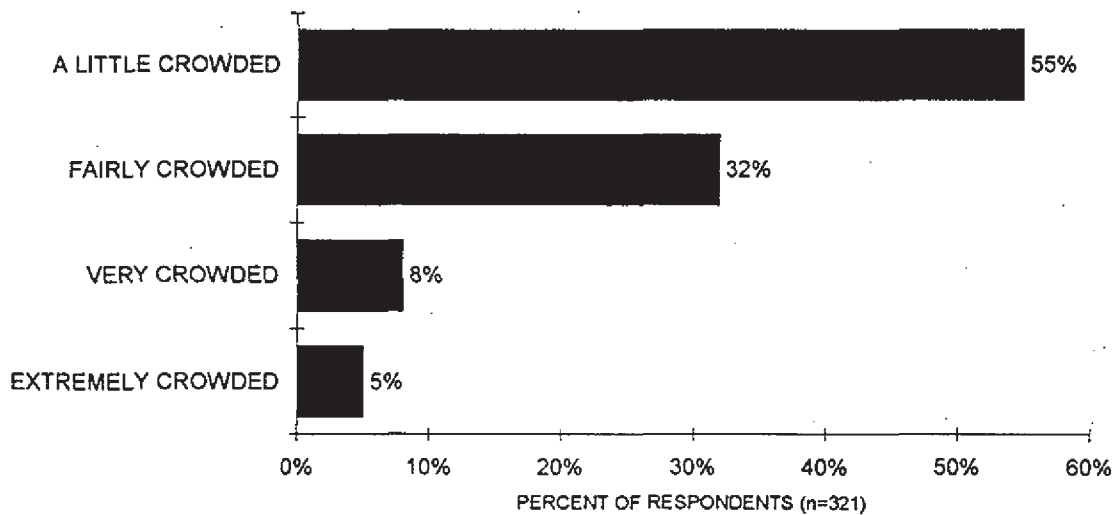
FIGURE 5.8: DID YOU FEEL CROWDED BY THE NUMBER OF OTHER PEOPLE?



V. Crowding: Actual Experience

Of those who felt crowded, figure 5.9 shows that most (87%) reported feeling a little to fairly crowded while 8% reported being very crowded and 5% extremely crowded. The degree of crowding was not different for weekdays versus weekends.

FIGURE 5.9: DEGREE TO WHICH NUMBER OF PEOPLE MADE RESPONDENT FEEL CROWDED*



* Includes only the 38% of the respondents who reported feeling crowded due to the number of people in Spray Park.

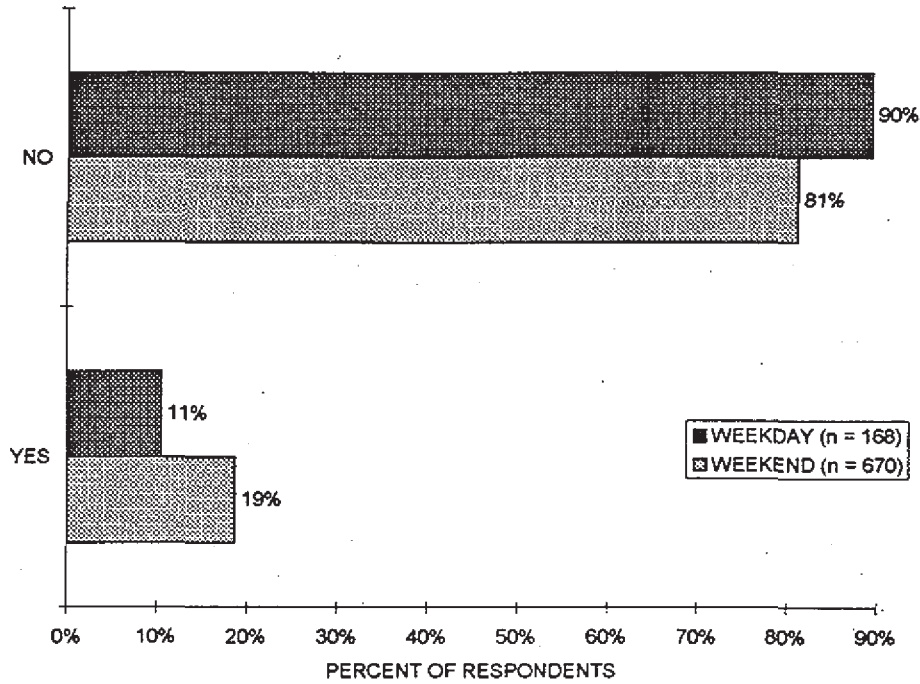
Other Visitors' Behavior and Perceptions of Crowding

Question 8 on the exit questionnaire asked, "At any time during your visit to Spray Park did a person's or party's behavior cause you to feel 'crowded'?" Figure 5.10 shows that for respondents who visited on weekends, a total of 19% circled "YES" and reported feeling crowded due to a person's or party's behavior. This was a higher percentage than the 11% of weekday respondents who reported crowding. Weighting the

V. Crowding: Actual Experience

sample to correct for over-representation of weekend visitors yields an estimate that 16% of all Spray Park visitors feel crowded due to a person's or party's behavior.

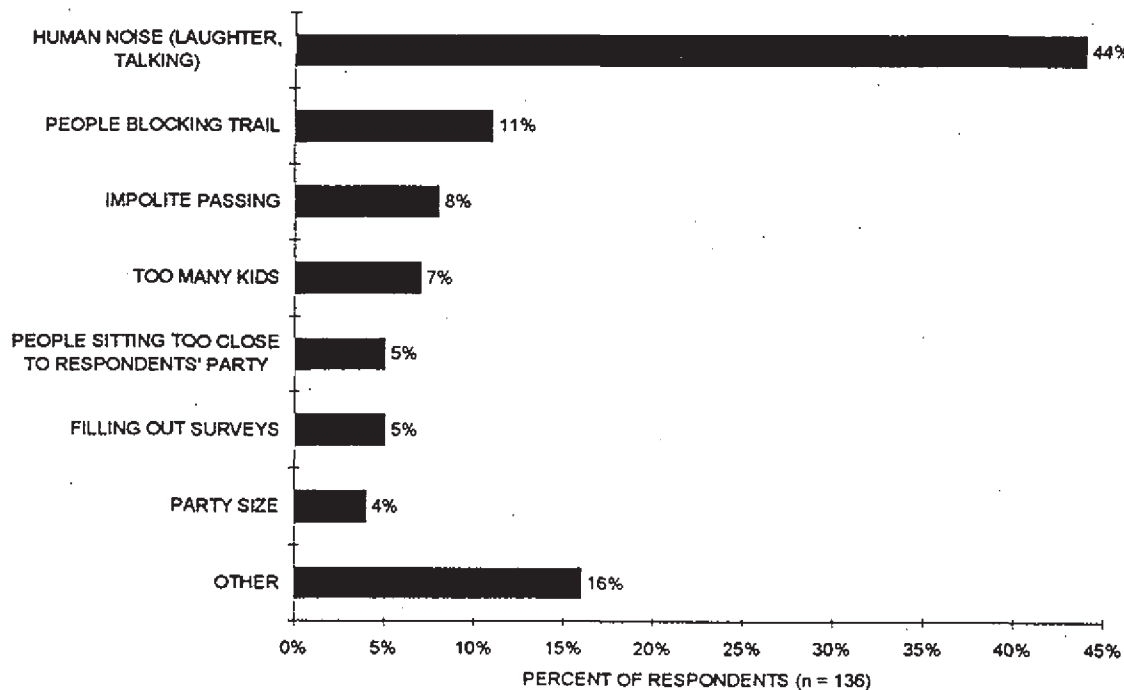
FIGURE 5.10: DID YOU FEEL CROWDED DUE TO OTHERS' BEHAVIOR?



V. Crowding: Actual Experience

Of those who felt crowded due to others' behavior, figure 5.11 shows that most (81%) reported feeling a little to fairly crowded while 11% reported being very crowded and 8% extremely crowded. The most frequent behavior reported to cause feelings of crowdedness was human noise (44%). Other behaviors resulting in feelings of crowding were fairly equally distributed among remaining respondents (see figure 5.12). Neither the degree of crowding nor behaviors causing crowding were different for weekdays versus weekends.

FIGURE 5.11: BEHAVIOR THAT CAUSED VISITOR TO FEEL CROWDED*



* Includes only the 17% of the respondents who reported feeling crowded due to a person's or party's behavior.

The general conclusion supported by the data presented in this section are that weekend respondents to Spray Park report many more encounters with other visitors and are more likely to report feeling crowded by those encounters than weekday

V. Crowding: Actual Experience

respondents. Almost half (44%) of weekend respondents reported feeling crowded due to the number of other visitors and 37% of them said the number of encounters was more than they expected. On the other hand, crowding did not appear to be a dominant factor in visitor experiences. Only 30% of respondents indicated that when making their decision to visit Spray Park they considered the number of other visitors they were likely to encounter, and over half of those respondents who felt crowded by the number of other visitors circled the lowest response alternative offered and reported that they felt only "a little crowded." On weekends, visitor density clearly has effects on visitor experience, but the importance of those effects relative to other determinants of satisfaction is not known.

VI. CROWDING: HYPOTHETICAL SCENARIOS

Rather than asking about the conditions each respondent actually experienced in Spray Park, the questions used to collect the data reported in this section asked respondents to imagine different levels of visitor density and to rate how favorable their response to those conditions would be. Thus, respondents were evaluating hypothetical scenarios as indicated in the title above. The use of these types of questions has a long history in researching, investigating and developing the concept of social carrying capacity. Section IX presents a detailed discussion of social carrying capacity and the usefulness of the data collected in these hypothetical scenario questions in the process of setting such a capacity for Spray Park. In contrast, this section is intended only to provide a simple description of the responses elicited.

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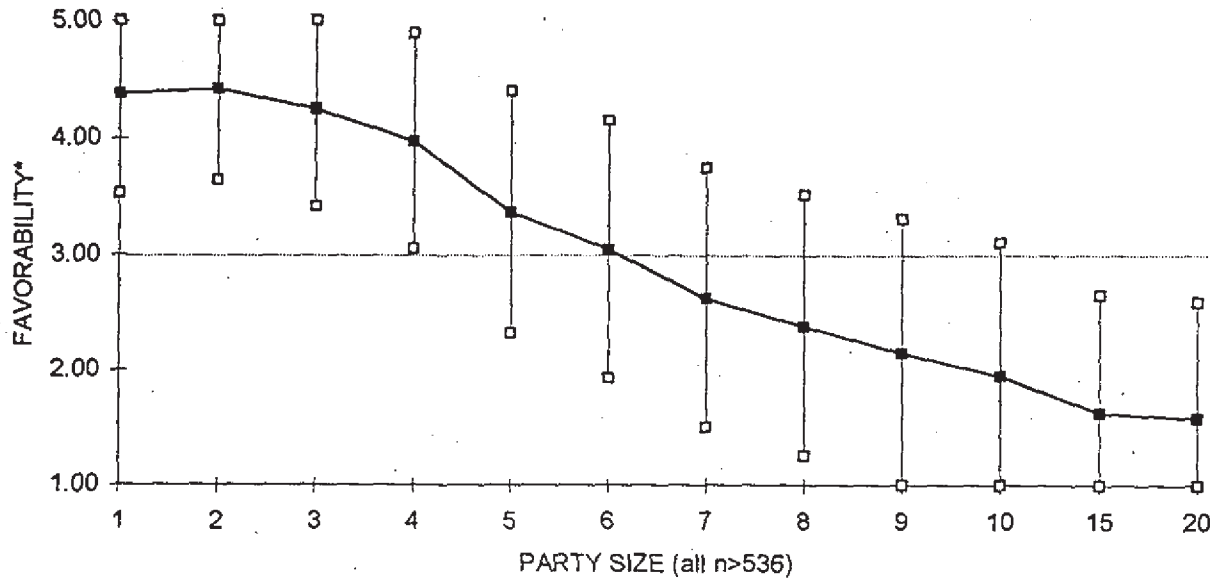
Meeting a Single Party of Size __ Every Hour

In Question 5 of the mail questionnaire, respondents were asked to indicate how favorably they would respond if, during one-hour periods of hiking, they met single parties of various sizes. The party sizes in question started at one person, increased by increments of one person up to a party size of ten people, and then increased by increments of five people up to a party size of twenty people. Figure 6.1 below is a graph of the average favorability rating for each party size. The vertical bars correspond to \pm one standard deviation, and thus, the range defined by the bars includes about 64% of respondents.

The mean favorability response goes from slightly more favorable than "somewhat favorable" with parties of sizes one and two and decreases steadily down to somewhat less favorable than "somewhat unfavorable" at meeting a single party of size 15 or size 20 in one hour. A party of size six is where the mean favorability response equals "neither favorable nor unfavorable." Thus, meeting parties of less than six are perceived on average with some degree of favorability, while parties of more than six people are perceived on average with some degree of unfavorability.

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FIGURE 6.1: RESPONSE TO MEETING A SINGLE PARTY OF SIZE ___ EVERY HOUR

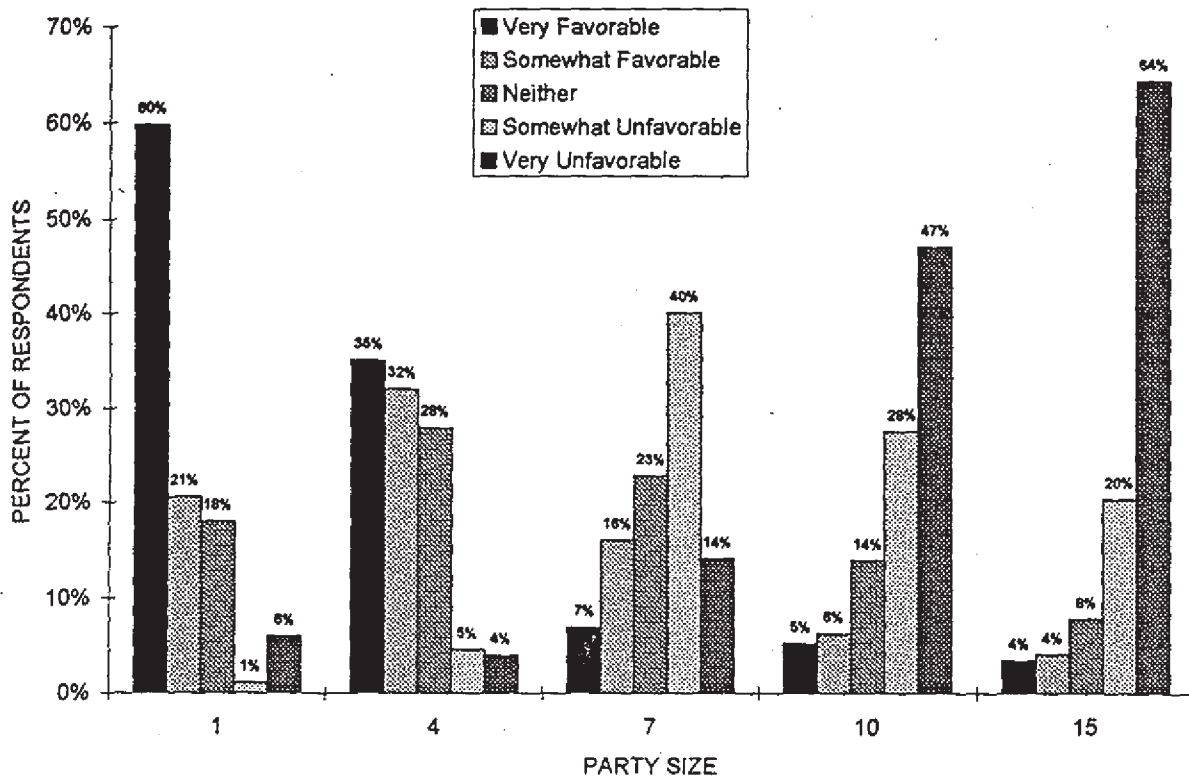


* Favorability was rated using a 5 point scale where 5 = Very Favorable, 4 = Somewhat Favorable, 3 = Neither Favorable nor Unfavorable, 2 = Somewhat Unfavorable, and 1 = Very Unfavorable.

The standard deviations shown in figure 6.1 enclose a relatively wide range of responses. For example, when party size equals six the range including 64% of respondents extended from about slightly below "somewhat unfavorable" (1.93) to a little more favorable than "somewhat favorable" (4.15). The actual distribution of favorability ratings underlying some of the mean data shown in figure 6.1 are illustrated in figure 6.2.

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FIGURE 6.2: DISTRIBUTION OF RESPONSES TO MEETING PARTIES OF VARIOUS SIZE



Although the standard deviations are large, figure 6.2 shows that general qualitative conclusions about party sizes are readily supported by the data. For example, 85% of respondents said that meeting a party of 15 persons per hour was very or somewhat unfavorable, indicating a high level of agreement that parties of 15 produce unfavorable conditions. In contrast, for parties of seven, about 54% of respondents said they would react unfavorably, 23% said they would react favorably, and 23% used the neutral midpoint of the favorability scale.

VI. Crowding: Hypothetical Scenarios

Meeting a Single Person Every __ Minutes and Meeting a Party of Two Every __ Minutes

In Question 6 of the mail questionnaire, respondents were asked to indicate how favorably they would respond to meeting a single person every n minutes where n equaled 2, 5 and 10 minutes, and then increased by increments of 10 minutes up to 60 minutes. Figure 6.3 below is a graph of the average favorability rating for meeting a single person every n minutes. The bars correspond to \pm one standard deviation and thus, the range defined by the bars includes 64% of respondents. In Questions 7 through 9, respondents were asked a comparable set of questions that differed only in the number of people in the party they would encounter every n minutes. Specifically, they were asked about meeting parties of two, four and ten people every n minutes.

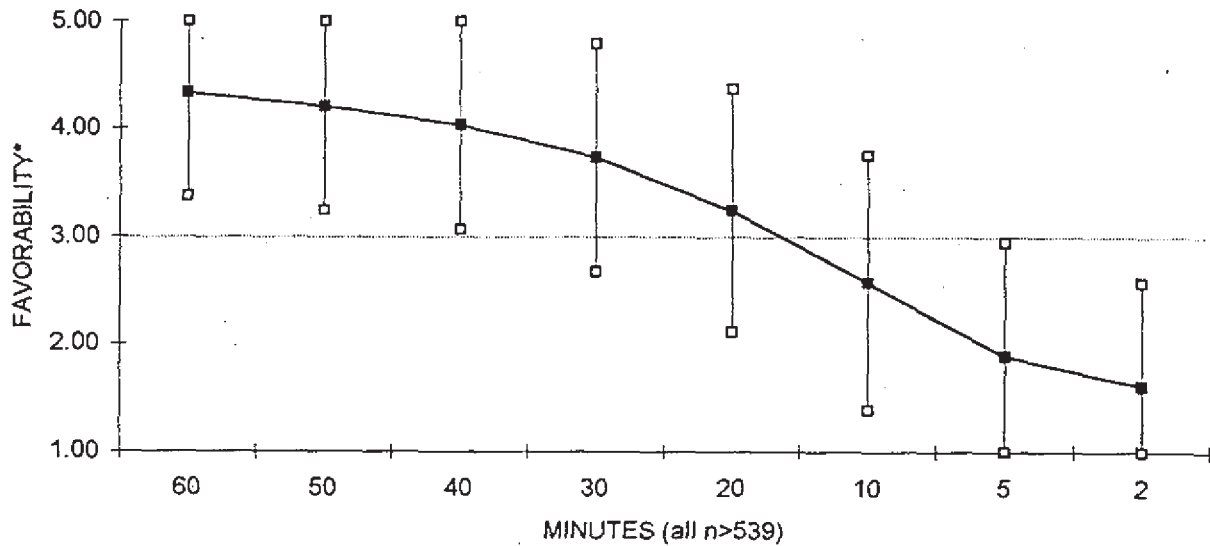
In paired samples t -tests, responses to meeting a single person (figure 6.3) are significantly more favorable than responses to meeting two people (figure 6.4) for every time interval shorter than 40 minutes (i.e., at six of the eight time intervals presented.) However, the size of the sample produces a degree of statistical power sufficient to detect extremely small differences in mean responses. In practical terms, the relation between frequency of encounters and favorability in the two graphs is extremely similar, and thus, the following discussion describes both figures 6.3 and 6.4.

The mean favorability response goes from slightly more favorable than "somewhat favorable" for meeting a single person or party of two every 60 minutes and decreases steadily down to somewhat less favorable than "somewhat unfavorable" at meeting a single person or party of two every two minutes. Every 20 minutes is where the mean favorability

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response equals "neither favorable nor unfavorable." Thus, meeting a single person or party of two more than every 20 minutes is perceived on average with some degree of favorability, while encounters less than every 20 minutes are perceived on average with some degree of unfavorability.

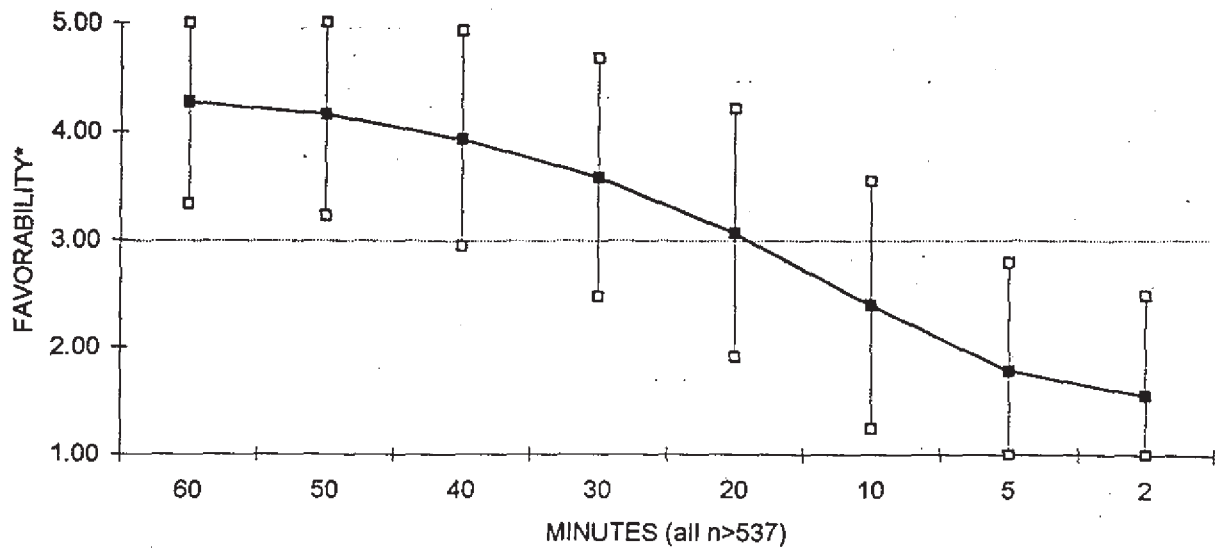
FIGURE 6.3: RESPONSE TO MEETING A SINGLE PERSON EVERY ____ MINUTES



* Favorability was rated using a 5 point scale where 5 = Very Favorable, 4 = Somewhat Favorable, 3 = Neither Favorable nor Unfavorable, 2 = Somewhat Unfavorable, and 1 = Very Unfavorable.

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FIGURE 6.4: RESPONSE TO MEETING A PARTY OF TWO EVERY ____ MINUTES

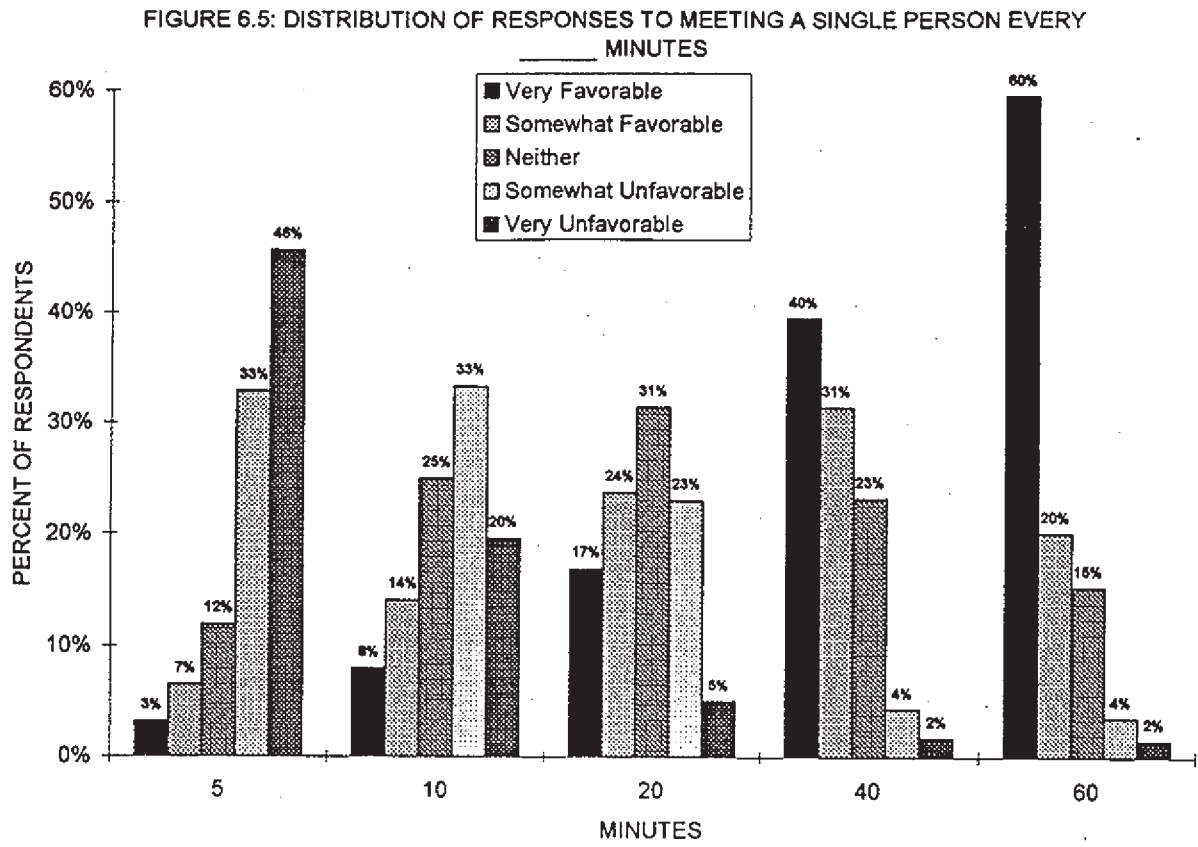


* Favorability was rated using a 5 point scale where 5 = Very Favorable, 4 = Somewhat Favorable, 3 = Neither Favorable nor Unfavorable, 2 = Somewhat Unfavorable, and 1 = Very Unfavorable.

The standard deviations enclose a relatively wide range of responses. For example, when minutes equals 20, the range including 64% of respondents extended from approximately "somewhat unfavorable" (single person: 2.11, party of two: 1.91) to slightly above "somewhat favorable" (single person: 4.37, party of two: 4.21.) The actual distribution of favorability ratings underlying some of the mean data shown in figures 6.3 and 6.4 are illustrated in figures 6.5 and 6.6. Although the standard deviations are large, figures 6.5 and 6.6 show that general qualitative conclusions about frequencies of encounters are readily supported by the data. For example, 79% of respondents said that meeting a single person every five minutes was very or somewhat unfavorable, indicating a high level of agreement about the unfavorable effect of such a frequency of encounters. In contrast, when asked about meeting parties of two people every 20 minutes, about 34% of

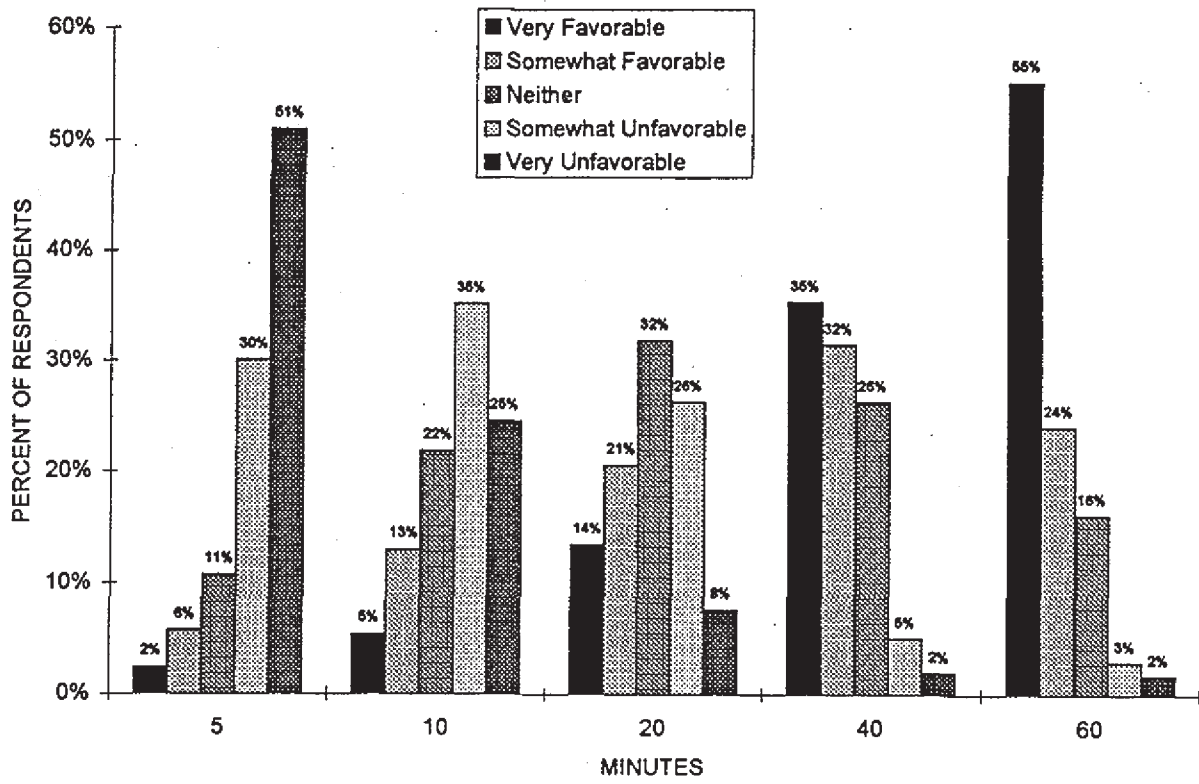
VI. Crowding: Hypothetical Scenarios

respondents said they would react unfavorably, 34% said they would react favorably, and 32% used the neutral midpoint of the favorability scale.



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FIGURE 6.6: DISTRIBUTION OF RESPONSES TO MEETING A PARTY OF TWO EVERY MINUTES

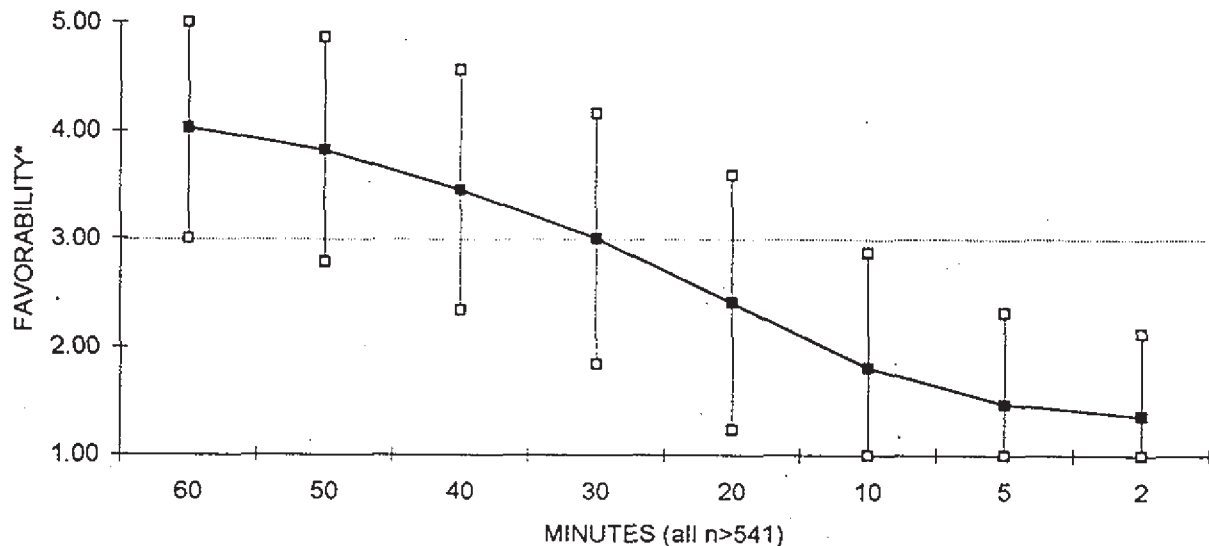


VI. Crowding: Hypothetical Scenarios

Meeting a Party of Four Every __ Minutes

In figure 6.7, the mean favorability response goes from "somewhat favorable" for meeting a party of four every 60 minutes, and decreases steadily down to midway between "somewhat unfavorable" and "very unfavorable" at meeting a party of four every two minutes. Every 30 minutes is where the mean favorability response equals "neither favorable nor unfavorable." Thus, meeting a party of four more than every 30 minutes is perceived on average with some degree of favorability, while encounters less than every 30 minutes are perceived on average with some degree of unfavorability.

FIGURE 6.7: RESPONSE TO MEETING A PARTY OF FOUR EVERY ____ MINUTES



* Favorability was rated using a 5 point scale where 5 = Very Favorable, 4 = Somewhat Favorable, 3 = Neither Favorable nor Unfavorable, 2 = Somewhat Unfavorable, and 1 = Very Unfavorable.

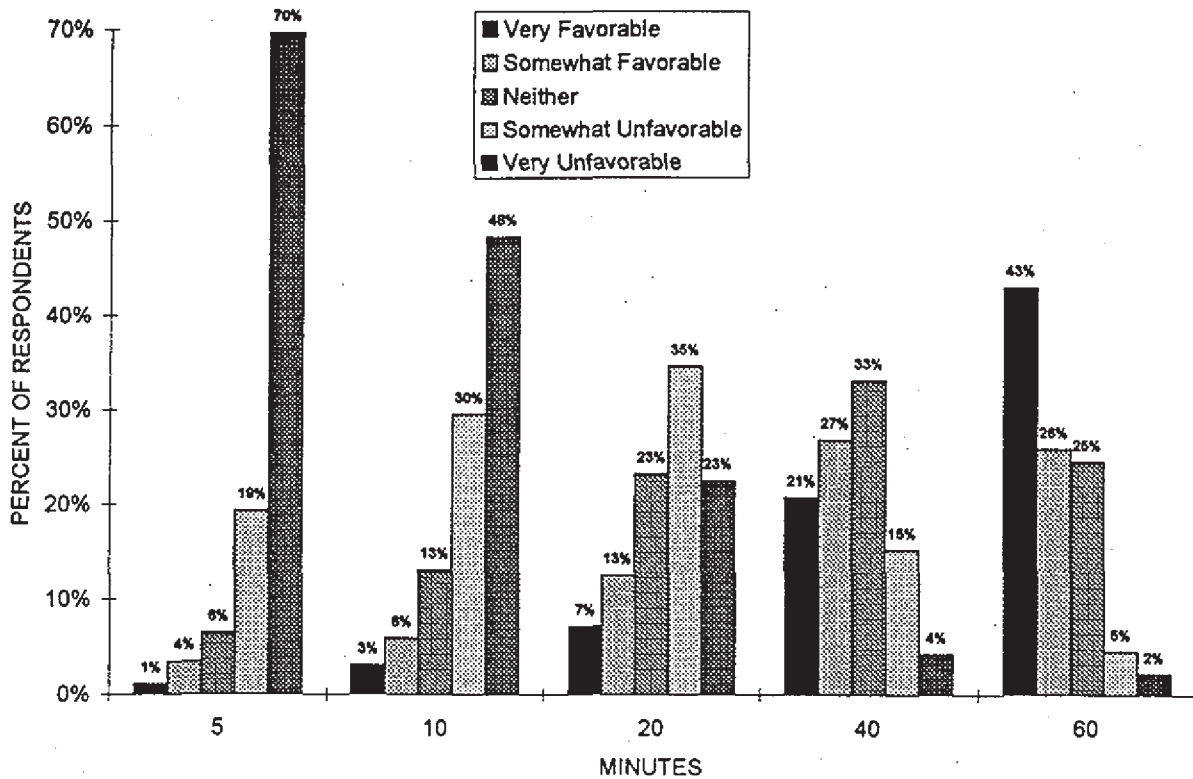
As in the previous preference curves, the standard deviations enclose a relatively wide range of responses. For example, when minutes equals 30, the range including 64%

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of respondents extended from slightly below "somewhat unfavorable" (1.84) to slightly above "somewhat favorable" (4.16.) The actual distribution of favorability ratings underlying some of the mean data shown in figure 6.7 are illustrated in figure 6.8. Although the standard deviations are large, figure 6.8 shows that general qualitative conclusions about frequencies of encounters are readily supported by the data. For example, 89% of respondents said that meeting a party of four every five minutes was very or somewhat unfavorable, indicating a high level of agreement about the unfavorable effect of such a frequency of encounters. In contrast, when asked about meeting parties of 4 people every 20 minutes, about 19% of respondents said they would react unfavorably, 48% said they would react favorably, and 33% used the neutral midpoint of the favorability scale.

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FIGURE 6.8: DISTRIBUTION OF RESPONSES TO MEETING A PARTY OF FOUR EVERY _____ MINUTES



Meeting a Party of Ten Every ___ Minutes

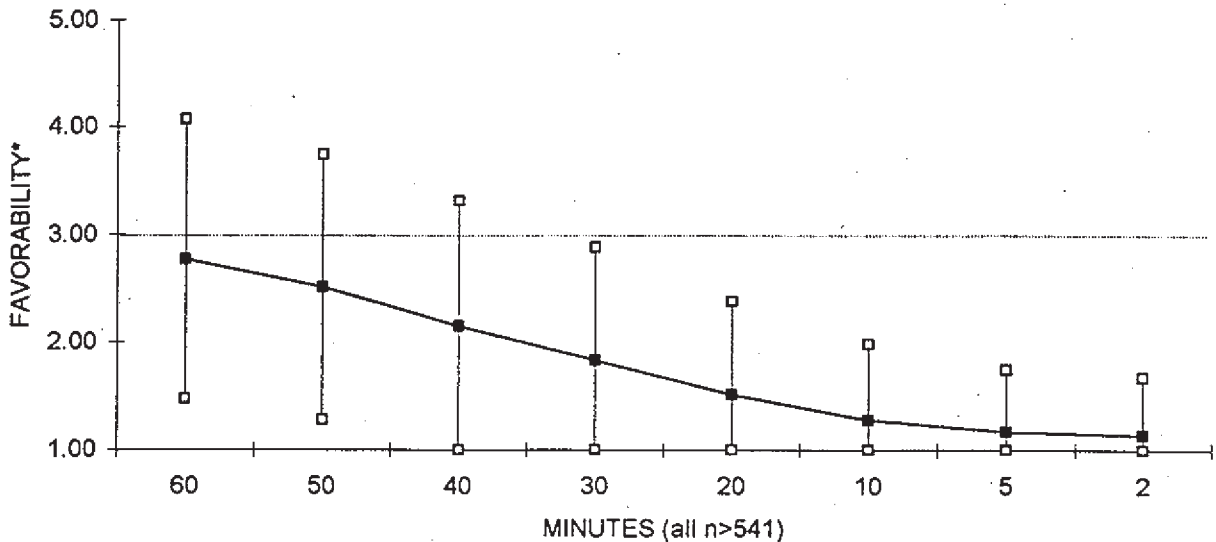
In figure 6.9, the mean favorability response goes from slightly below "neither favorable nor unfavorable" for meeting a party of ten every 60 minutes and decreases steadily down to "very unfavorable" at meeting a party of ten every five or two minutes. Thus, meeting a party of ten every 60 minutes or less is perceived on average with some degree of unfavorability.

The standard deviations enclose a relatively wide range of responses, although the range narrows as the mean favorability ratings approach "very unfavorable" (1.0) due to a floor effect. When the response range is not restricted, variability is comparable to that

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seen in earlier graphs. For example, when minutes equals 60, the interval including 64% of respondents extended from about midway between "somewhat unfavorable" and "very unfavorable" (1.47) to about "somewhat favorable" (4.07).

FIGURE 6.9. RESPONSE TO MEETING A PARTY OF TEN EVERY ____ MINUTES



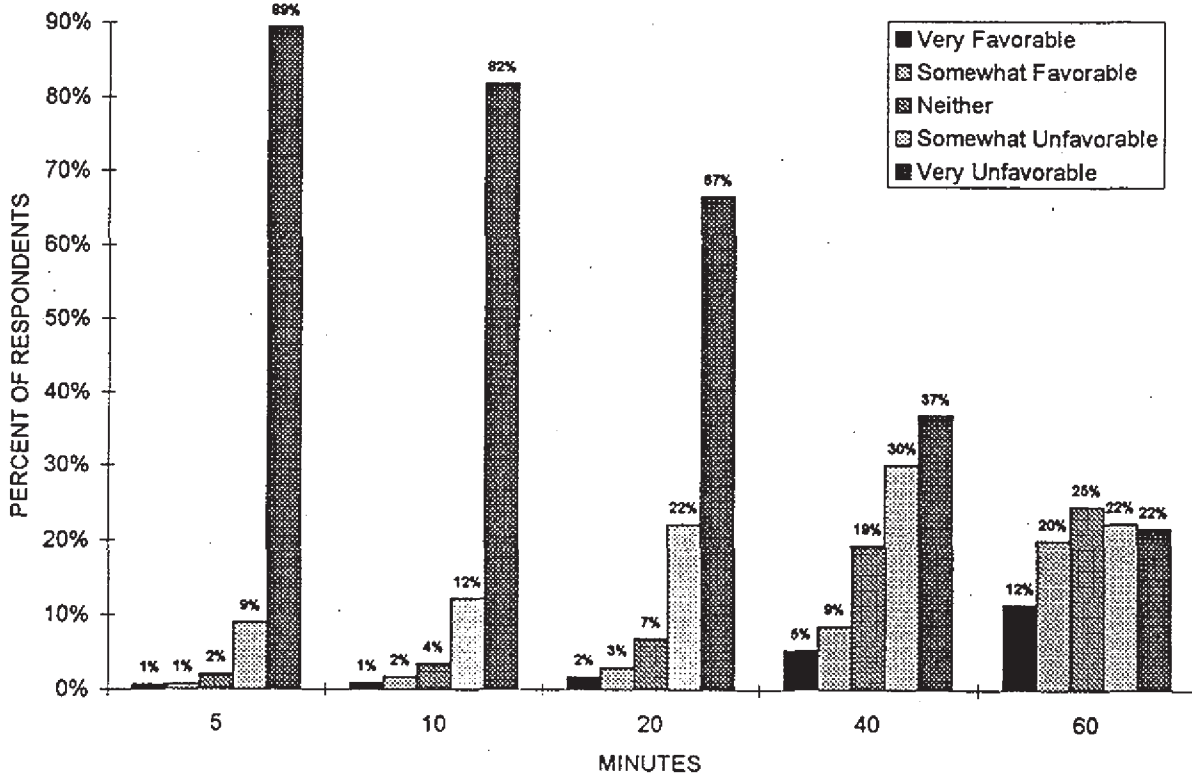
* Favorability was rated using a 5 point scale where 5 = Very Favorable, 4 = Somewhat Favorable, 3 = Neither Favorable nor Unfavorable, 2 = Somewhat Unfavorable, and 1 = Very Unfavorable.

The standard deviations enclose a relatively wide range of responses, although the range narrows as the mean favorability ratings approach "very unfavorable" (1.0) due to a floor effect. When the response range is not restricted, variability is comparable to that seen in earlier graphs. For example, when minutes equals 60, the interval including 64% of respondents extended from about midway between "somewhat unfavorable" and "very unfavorable" (1.47) to about "somewhat favorable" (4.07). The actual distribution of favorability ratings underlying some of the mean data shown in figure 6.9 are illustrated in figure 6.10. Although the standard deviations are large, figure 6.10 shows that general

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qualitative conclusions about frequencies of encounters are readily supported by the data. For example, 89% of respondents said that meeting a party of ten every twenty minutes was very or somewhat unfavorable, indicating a high level of agreement about the unfavorable effect of such a frequency of encounters. Although meeting a party of ten even once an hour prompted 44% of respondents to say they would react unfavorably, 32% said they would react favorably, and 24% used the neutral midpoint of the favorability scale.

FIGURE 6.10: DISTRIBUTION OF RESPONSES TO MEETING OF TEN EVERY _____ MINUTES



The general conclusion repeated throughout the presentation of the data in this section is that respondents strongly agree on the favorability ratings of very large and very small numbers of encounters per hour, but there is little consensus concerning the favorability of conditions described by a relatively wide variety of encounters that fall in

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the lower-to-middle range of encounters per hour described in the questions. For example, figure 6.5 shows a wide range of favorability ratings for meeting one person every 20 minutes, and figure 6.8 shows a slightly more negative but similarly broad range of favorability ratings for meeting a party of four every 20 minutes. The fact that these conditions describe 3 and 12 encounters per hour makes them very different in terms of their implications for visitor density. At the same time, it is clear that respondents did not agree on their favorability or unfavorability. We shall see in Section IX that this lack of consensus is problematic for the use of these data in the process of setting social carrying capacity.

VII. VISITOR SATISFACTION

As in Section V. *Crowding: Actual Experience*, the data presented in this section are generally affected by the days when respondents visited Spray Park—either weekdays or weekends. Accordingly, much of the data are described separately for weekend and weekday visitors. When data are reported for the entire sample, weekend and weekday visitors did not differ significantly.

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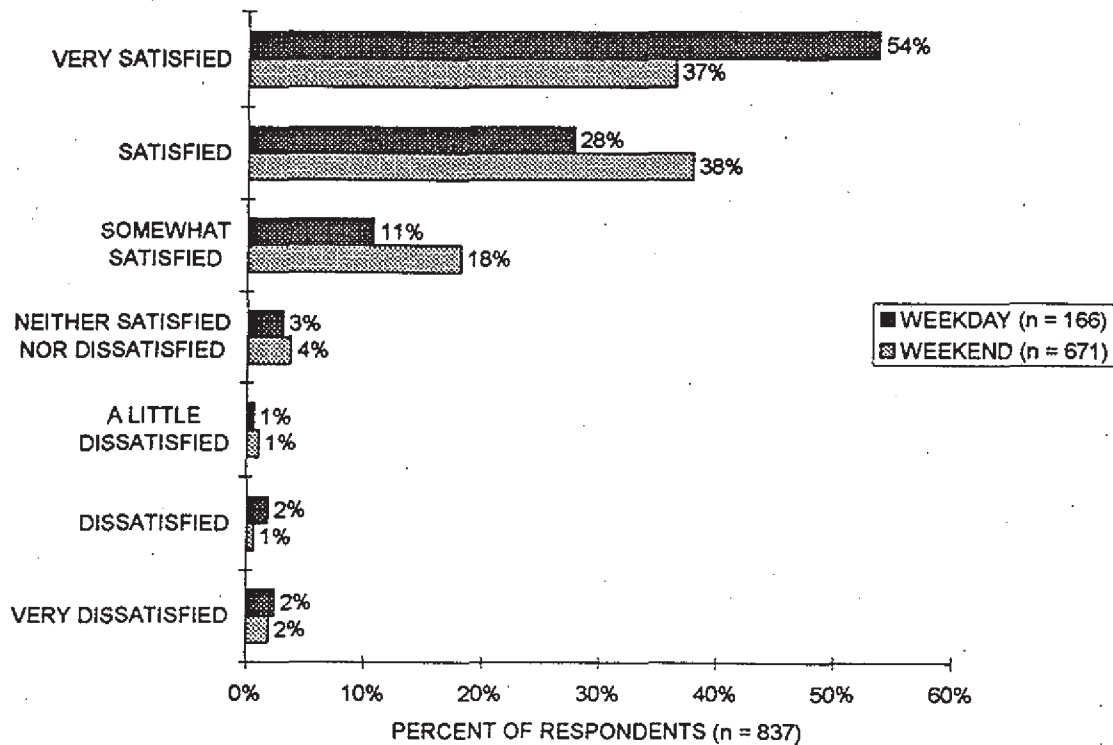
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Overall Satisfaction With Spray Park Visit

Visitors rated satisfaction with their trip to Spray Park on a seven point scale ranging from "very dissatisfied" to "very satisfied" with the mid-point labeled "neither." The vast majority of all respondents (93% on weekends and 92% on weekdays) indicated some level of satisfaction with their trip (see figure 7.1). Over half (54%) of respondents who visited on weekdays rated themselves as "very satisfied," compared to 37% of respondents who visited on weekends. Few respondents (3% regardless of day visiting) were neither satisfied nor dissatisfied with their trip. Dissatisfaction levels were also very similar on weekends and weekdays with 4% and 5% respectively indicating some level of dissatisfaction with their trip, and 2% in both groups being very dissatisfied.

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FIGURE 7.1: OVERALL SATISFACTION WITH VISIT TO SPRAY PARK



The observations that weekday visitors had higher levels of satisfaction and that weekdays also had lower levels of visitor density is consistent with the hypothesis that satisfaction is decreased as visitor density increases. However, other explanations could account for both observations. For example, many weekend visitors may have jobs that constrain their leisure activities (such as hiking) to the weekends and they may therefore be forced to venture out in less than ideal weather conditions that lead to submaximal satisfaction. In contrast, weekday visitors might have flexible schedules with many opportunities to go hiking, allowing them to select only those times when conditions are nearly perfect and satisfaction is maximized. Many other explanations could also be proposed. Further research would be necessary to narrow the range of

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possible explanations, and only a true experiment would serve to firmly establish a causal relationship between visitor density and satisfaction.

Effect of Other Visitors on Trip Satisfaction

Question 12 in the exit questionnaire asked the degree to which the presence of other people increased satisfaction with the trip experience. Similarly, question 13 asked about decreases in satisfaction due to the presence of others.¹ In both questions, the definition of "other people" was ambiguous in that it could have included or excluded members of each respondent's party. This ambiguity made it impossible to interpret the data from question 12 in a useful way. Thus, the data concerning increases in satisfaction due to the presence of others are not presented. However, the data from question 13 concerning decreases in satisfaction are presented in figure 7.2. The ambiguity of the question leaves open the possibility that some of the decreases noted by respondents were due to interactions within their own parties, but the relative differences in the data for weekday and weekend visitors are unlikely to have resulted from the ambiguity of the question.

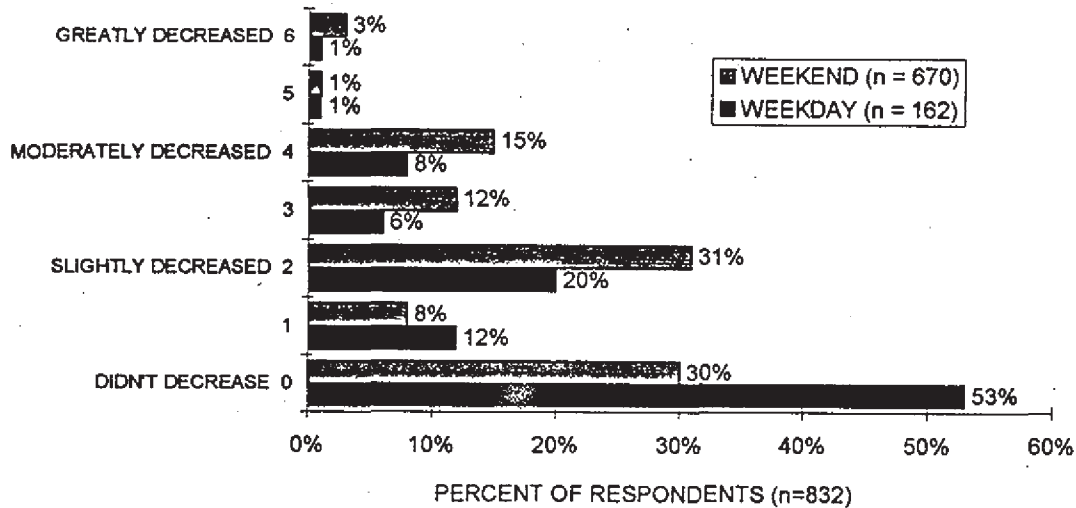
Figure 7.2 shows that about half (47%) of respondents who visited on weekdays indicated that the presence of other people decreased their trip satisfaction, whereas 70% of those visiting on weekends indicated decreases. Most of the respondents in the weekday and weekend samples indicated a slight to moderate decrease in trip satisfaction

¹ The intention in asking both questions was to avoid the assumption that other visitors detract from all visitors' experiences.

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(46% and 67%, respectively). However, 3% of weekend visitors reported that their trip satisfaction was greatly decreased, while 1% of weekday visitors reported such great decreases.

FIGURE 7.2: PRESENCE OF PEOPLE DECREASED TRIP SATISFACTION



As in the overall satisfaction data (figure 7.1), the data for decreases in satisfaction (figure 7.2) are consistent with the fact that a negative impact of visitor density is greater on weekends. Once again, these data can be explained by alternate hypotheses. However, the fact that the responses to both questions show similar patterns and that the data in figure 7.2 deal directly with self-reported decreases in satisfaction due to the presence of others adds considerable credence to the hypothesis that high visitor density on weekends decreases the satisfaction of the visitors who are present.

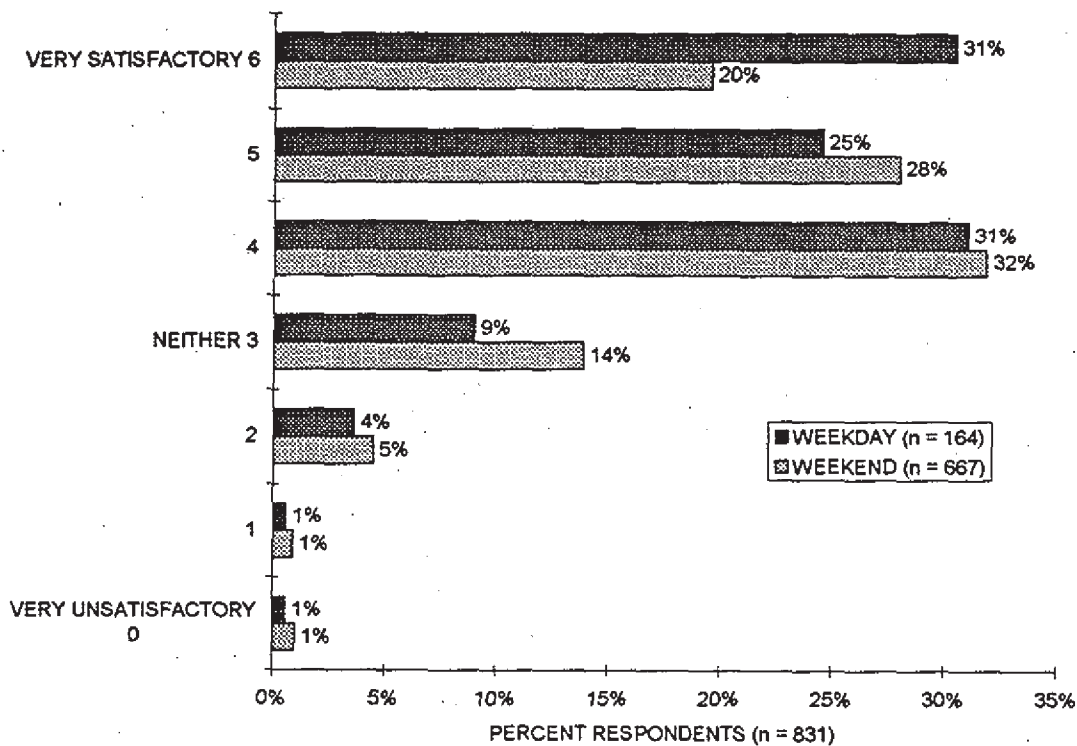
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Satisfaction with Spray Park Trip Compared to Other Hiking & Backcountry Trips

Respondents were asked to indicate how this trip to Spray Park compared with other hiking/backcountry trips taken. They responded on a seven point scale ranging from "very unsatisfactory" to "very satisfactory" with the mid-point labeled "neither." Figure 7.3 shows that most respondents who visited on both weekends or weekdays indicated some level of satisfaction with this trip compared to other hiking/backcountry trips (80% and 86%, respectively). Weekday visitors were more likely to give their experience the highest satisfaction rating (31% vs. 20% "Very Satisfactory.") Indications of some level of dissatisfaction were similar for weekday (5%) and weekend (6%) visitors, with only 1% of each group being very dissatisfied. This pattern was similar to that of overall satisfaction as reported in figure 7.1.

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FIGURE 7.3: SATISFACTION OF SPRAY PARK TRIP COMPARED WITH OTHER BACK COUNTRY TRIPS



Effect of Current Experience on Future Visits to Spray Park

Three-quarters of all respondents reported that their current experience at Spray Park would affect whether they would visit Spray Park in the future (see figure 7.4). Of these individuals, figure 7.5 shows that 94% indicated that the likelihood of a future visit was increased by the visit with 43% reporting a future visit extremely likely. The current visit only reduced the likelihood of future visits for 6% of respondents with no one reporting that a future visit would be extremely unlikely.

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FIGURE 7.4: PERCENT OF RESPONDENTS WHOSE FUTURE VISITS WILL BE AFFECTED BY CURRENT TRIP

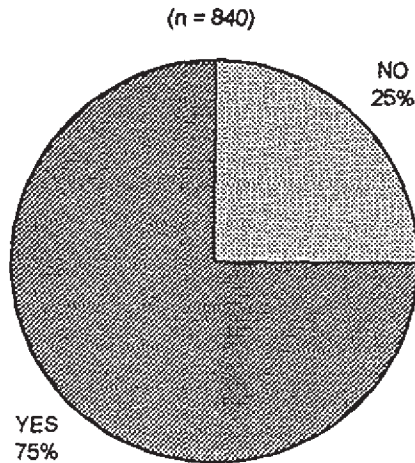
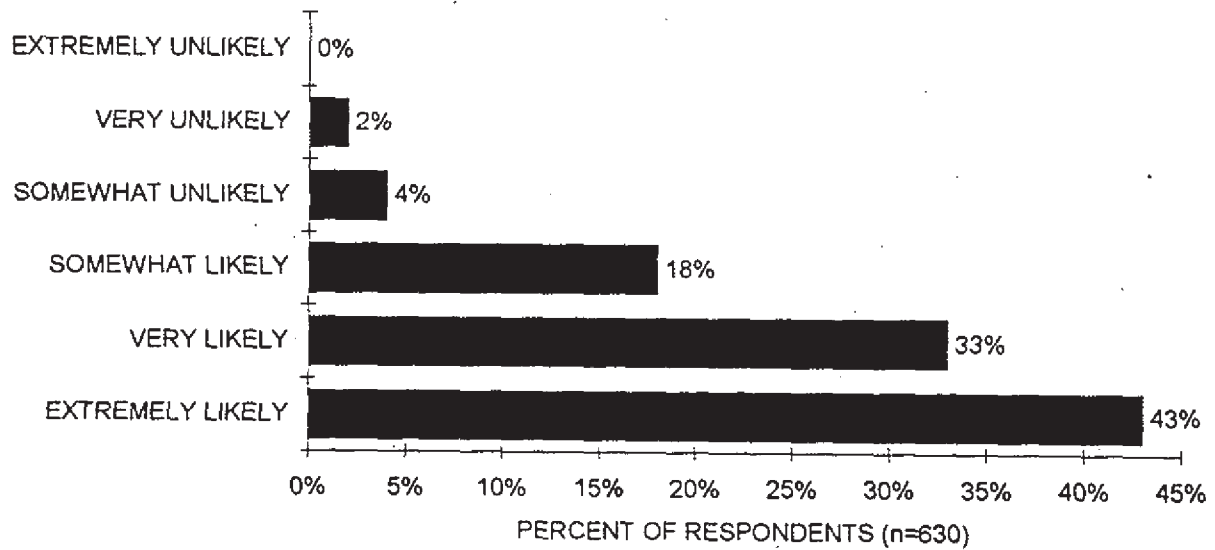


FIGURE 7.5: LIKELIHOOD OF FUTURE VISITS TO SPRAY PARK BASED ON CURRENT VISIT*



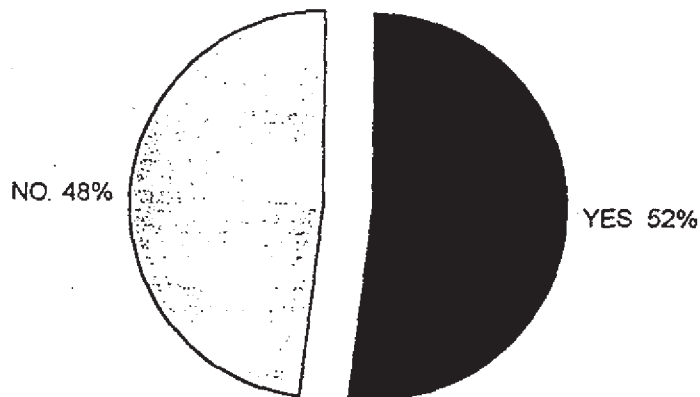
* Includes only the 75% of respondents who reported that their current experience will affect future visits to Spray Park.

VII. Visitor Satisfaction

Management Actions that Would Increase Quality of Future Trips to Spray Park

Slightly over half (52%) of respondents replied that management could take actions that would preserve or increase the quality of trips to Spray Park (see figure 7.6). Figure 7.7 shows that the most frequently stated action management could take was to improve the existing trails at Spray Park (35% of respondents). Other related types of improvements noted included creation of new and better trails (3%), better signs (14%), and bathrooms (4%). People related improvements including limiting the number of people (17%), and ecological education including etiquette (4%).

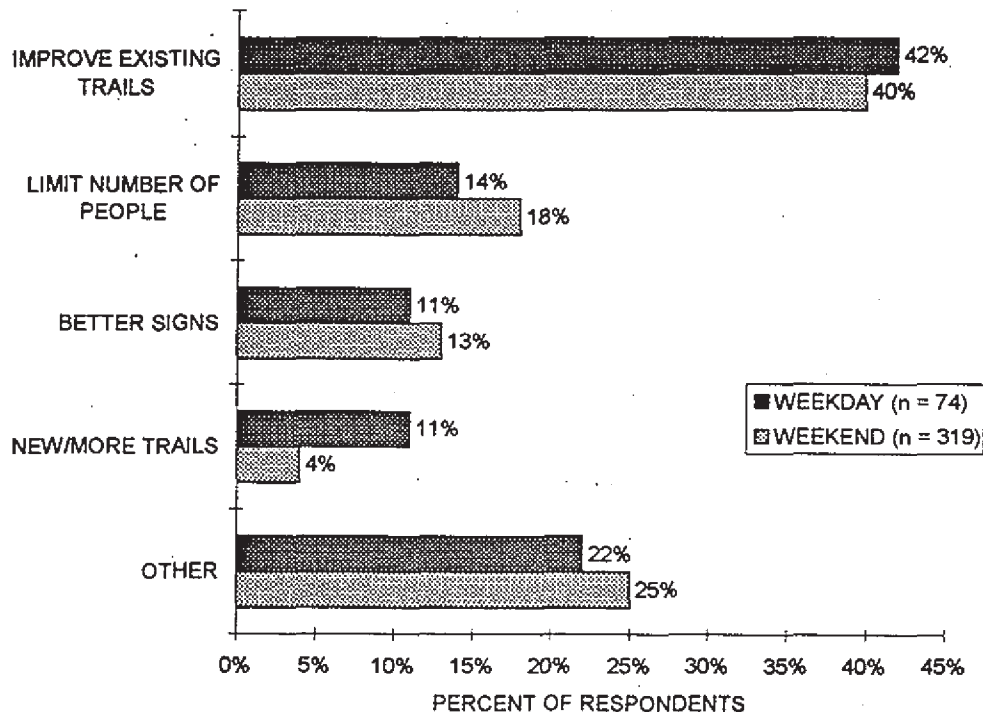
FIGURE 7.6. CAN MANAGEMENT TAKE ACTIONS THAT WOULD PRESERVE OR INCREASE THE QUALITY OF YOUR SPRAY PARK TRIP?



n= 787

VII. Visitor Satisfaction

FIGURE 7.7: ACTIONS MANAGEMENT COULD TAKE TO INCREASE THE QUALITY OF SPRAY PARK*



* Includes only responses from the 52% of respondents that indicated management could take actions to increase the quality of trips to Spray Park.

Together, the measures of satisfaction suggest that respondents enjoyed their trips to Spray Park and wish to return. Weekday visitors generally had higher satisfaction than those that visited on weekends, suggesting that the higher visitor density on weekends had a negative affect on weekend experiences. However, these data do not rule out alternate explanations that can also explain the differences in satisfaction.

The suggestion that differences in satisfaction are due to differences in visitor density is appealing largely because it is consistent with the view that visitors hold strong norms concerning appropriate numbers of encounters in areas such as Spray

VII. Visitor Satisfaction

Park, and that experiencing a number of encounters greater than that norm decreases satisfaction. However, this explanation relies on several assumptions, some of which may not be valid. For example, it appears obvious that satisfaction ratings should be strongly determined by the conditions experienced by a visitor to Spray Park. Yet, a sophisticated analysis of the data collected in the SPVS (see Appendix G) found that the dominant factors in determining satisfaction were several personality traits the visitors brought to the experience, rather than their perceptions of the trip itself. This finding suggests that great care must be taken in using visitor satisfaction as a criterion for setting or evaluating social carrying capacity. The visitor experience provided in a recreation environment (including the number of other visitors present) does not have a simple direct effect on visitor satisfaction.

VIII. NEGATIVE EFFECTS OF HUMANS ON SPRAY PARK

The responses presented in this section were collected from a large number of visitors (848) and were gathered from visitors at the very point where they were leaving Spray Park. Thus, the responses offer a high degree of statistical power and should be free of any recall biases that might be present if the data were collected using mail questionnaires.

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Observation of Effects of Humans on Spray Park

Question 1 of the exit questionnaire asked visitors if they saw any evidence that Spray Park was being unacceptably affected by human activity. Figure 8.1 shows that about half (49%) of respondents reported seeing evidence of unacceptable damage. Respondents who had reported in the entrance questionnaire that they had expected to see negative effects observed more negative effects (234/394) than those respondents who had not expected to see negative effects (124/409), $X^2(1) = 68.71$, $p = .001$. However, the type of negative effects observed by respondents did not depend on respondents' expectations of seeing any effects (see figure 8.3).

Weekend visitors were more likely to report unacceptable damage than weekday visitors (52% vs. 39%, $X^2(1) = 7.95$, $p = .005$). Weighting the sample to correct for over-representation of weekend visitors would change the observed percentage of visitors reporting unacceptable damage from 49% to 47%.

VIII. Negative Effects Of Humans On Spray Park

FIGURE 8.1:
EVIDENCE THAT SPRAY PARK IS BEING UNACCEPTABLY AFFECTED BY HUMAN
ACTIVITY

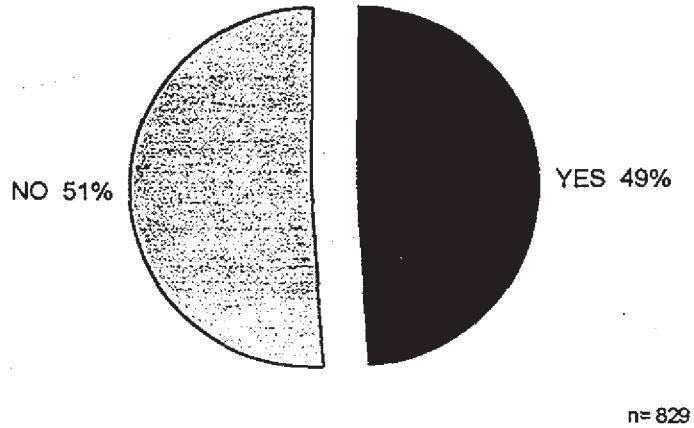
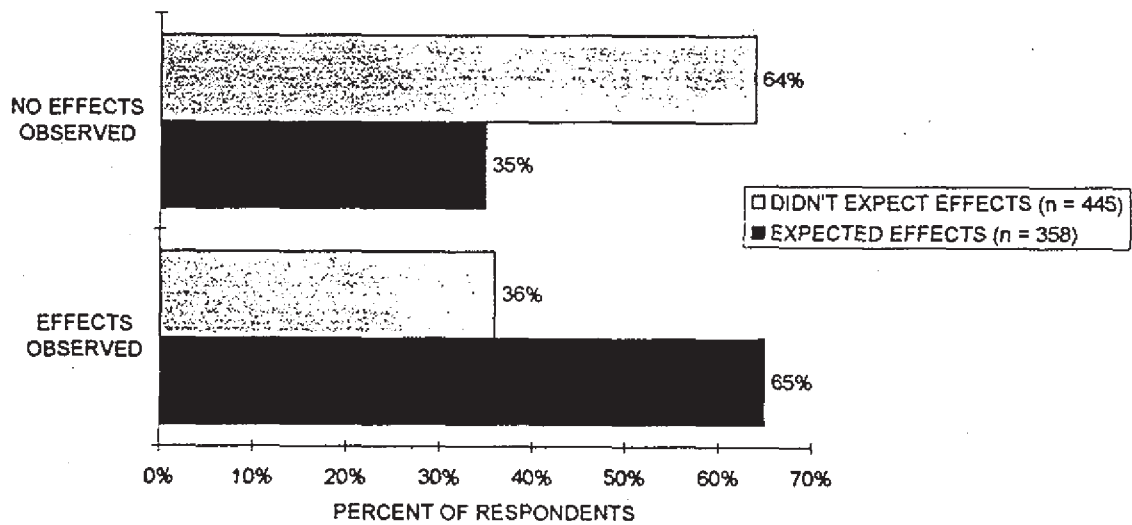
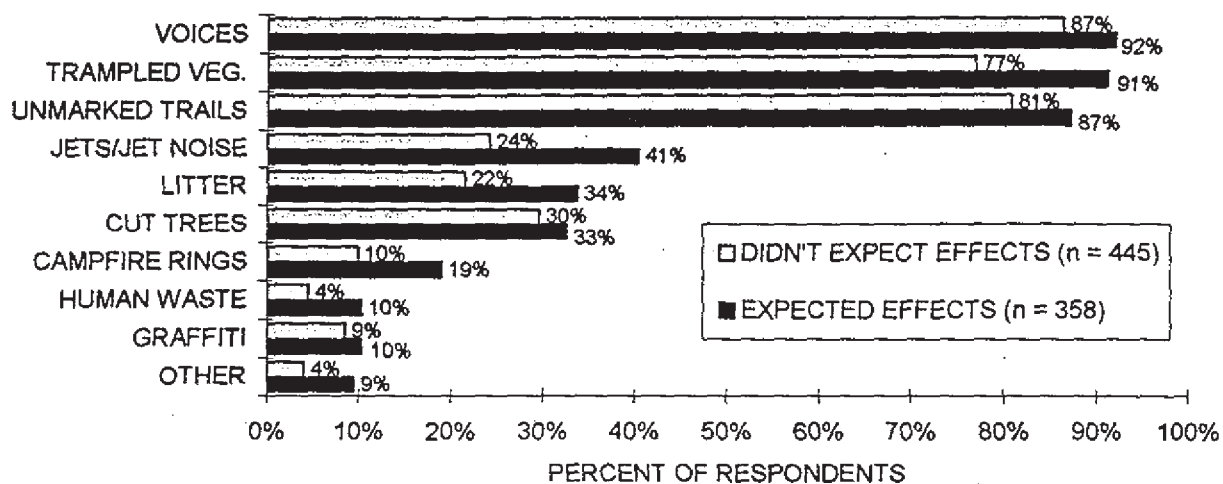


FIGURE 8.2: NEGATIVE EFFECTS OF HUMANS IN SPRAY PARK:
EXPECTATIONS BY EFFECTS OBSERVED



VIII. Negative Effects Of Humans On Spray Park

FIGURE 8.3: NEGATIVE EFFECTS OF HUMANS IN SPRAY PARK: EXPECTATIONS BY TYPE OF OBSERVED EFFECT



Effects Observed

As shown in figure 8.4, the three most frequently reported effects of human activity are voices (738 of 806 respondents), unmarked social trails (696 of 809 respondents), and trampled vegetation (693 of 818 respondents).

FIGURE 8.4: OBSERVED AFFECTS OF HUMAN ACTIVITY IN SPRAY PARK

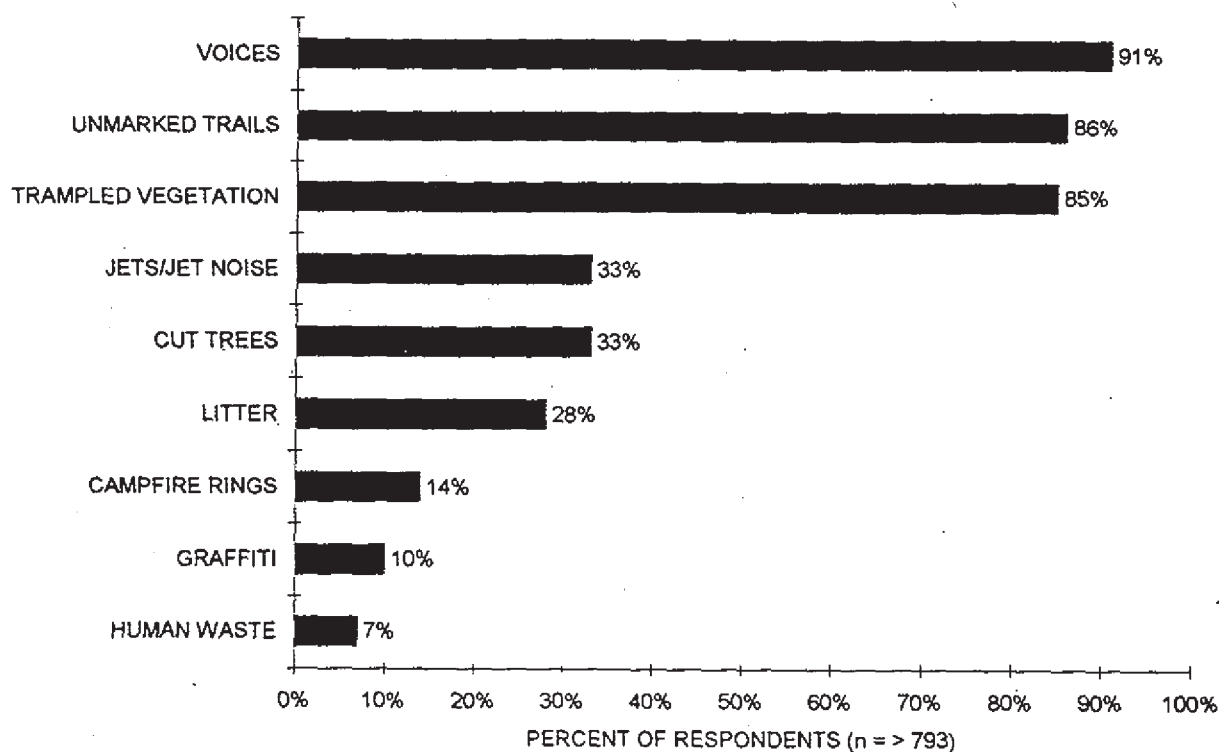
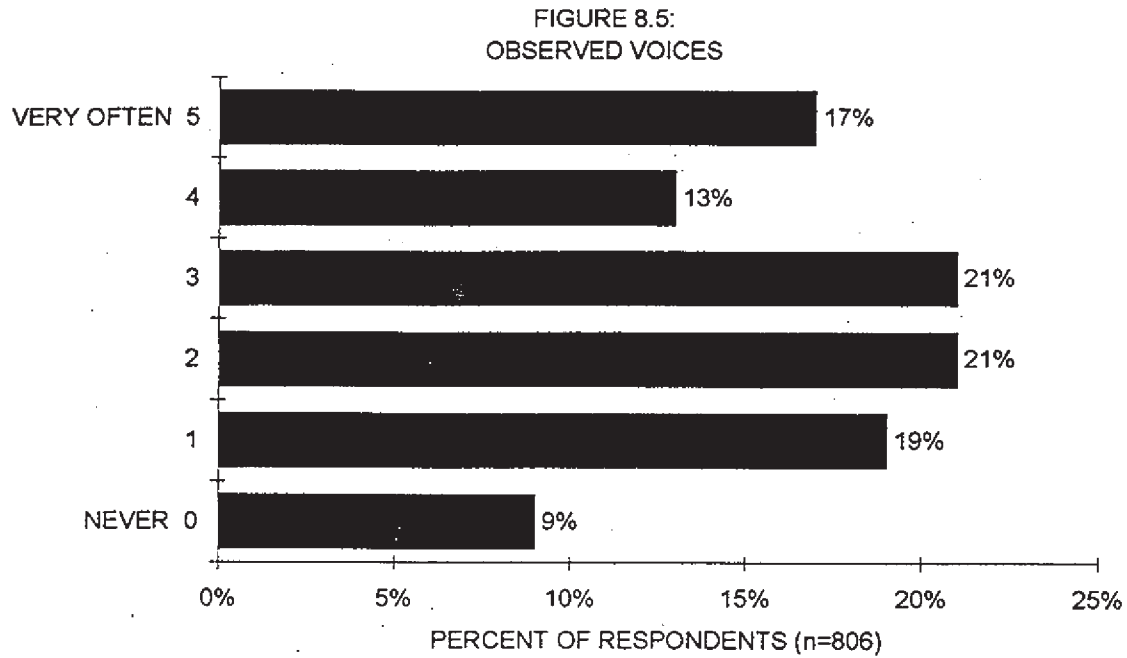
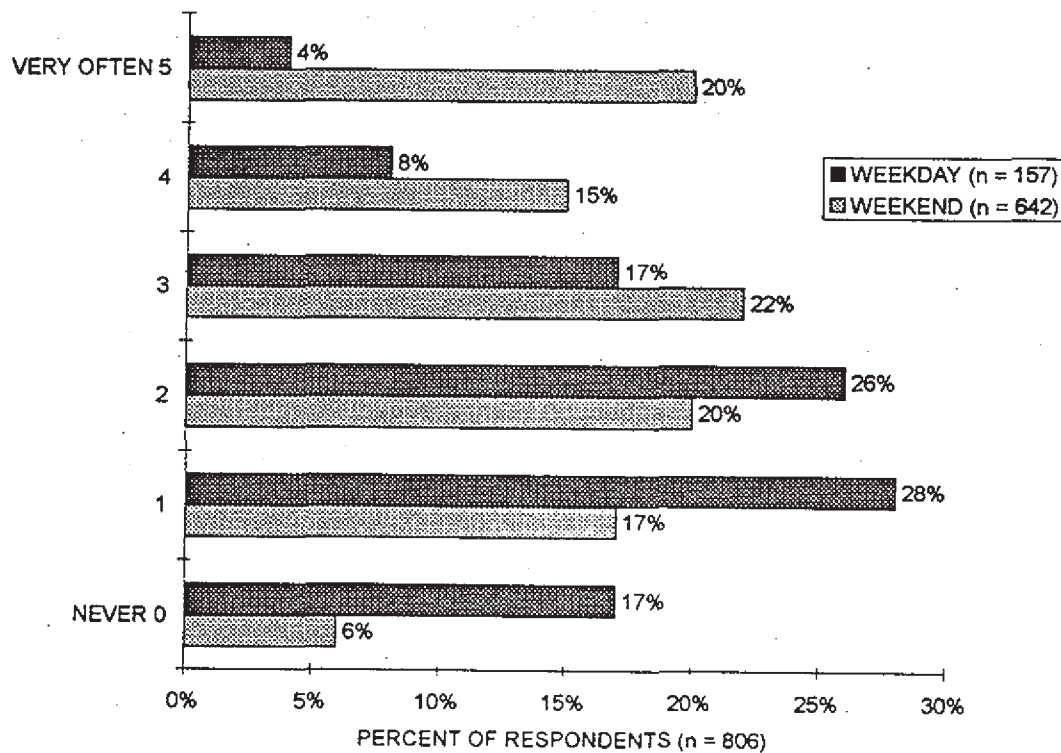


Figure 8.5 shows that only 9% of respondents reported never hearing the voices of other visitors. The remaining respondents were fairly evenly distributed from "1" to "5" on the frequency of observation scale (0 = never, 5 = very often).



Of the nine effects of human activity asked about in the questionnaire, only the presence of voices differed for weekday and weekend visitors. Figure 8.6 shows the different distribution of responses. Weekend visitors were less likely to report that they heard no voices ($X^2(1) = 17.0, p < .001$) and among respondents who heard voices, weekend visitors reported that they heard them more often ($t(220.4)=6.88, p < .001$).

FIGURE 8.6: OBSERVED VOICES (WEEKEND VS. WEEKDAY)



Given that weekend respondents were more likely to report unacceptable impacts to Spray Park and were also more likely to report hearing other visitors' voices, it appears that the presence of other visitors (as indicated by their voices) makes people more likely to consider Spray Park unacceptably damaged. On the other hand, there may be some difference between weekend and weekday visitors, other than the

VIII. Negative Effects Of Humans On Spray Park

conditions they experience, that is responsible for the difference in judgments of unacceptable damage. In order to test this hypothesis, a logistic regression was performed in which the likelihood that respondents would consider Spray Park to be unacceptably damaged by human activity was predicted by how often the respondent reported hearing other visitors' voices, and by whether the respondent visited on a weekend versus weekday. Frequency of hearing others' voices was found to be a statistically significant predictor. A X^2 analysis of observed ratings of unacceptable damage versus those predicted by the regression equation showed a strong relationship ($X^2(1) = 35.2, p < .001$). When weekend versus weekday was then added to the regression equation, it failed to have a significant predictive effect ($X^2(1) = 3.3, p = .069$). This analysis shows that there is no significant effect of weekend versus weekday on ratings of unacceptable damage except that which can be accounted for by the frequency of observing voices.

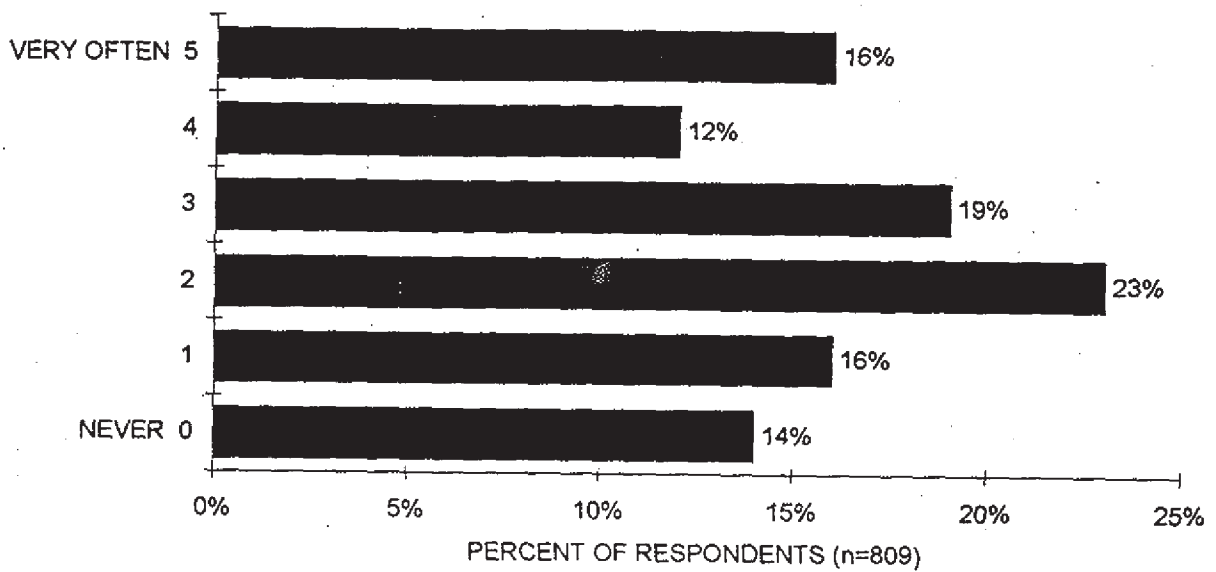
The finding that the frequency of observing voices predicted whether respondents considered Spray Park to be unacceptably damaged by human activity does not mean that voices caused the ratings. It is equally possible that respondents who were predisposed to hear other visitors were also likely to consider Spray Park unacceptably damaged, or that the presence of voices was correlated with some other factor in the environment that made respondents more likely to make ratings of unacceptable damage. Further research would be necessary before visitor noise could be considered more than a likely suspect as the actual reason why weekend visitors

VIII. Negative Effects Of Humans On Spray Park

were more likely to consider Spray Park to be unacceptably damaged by human activity.

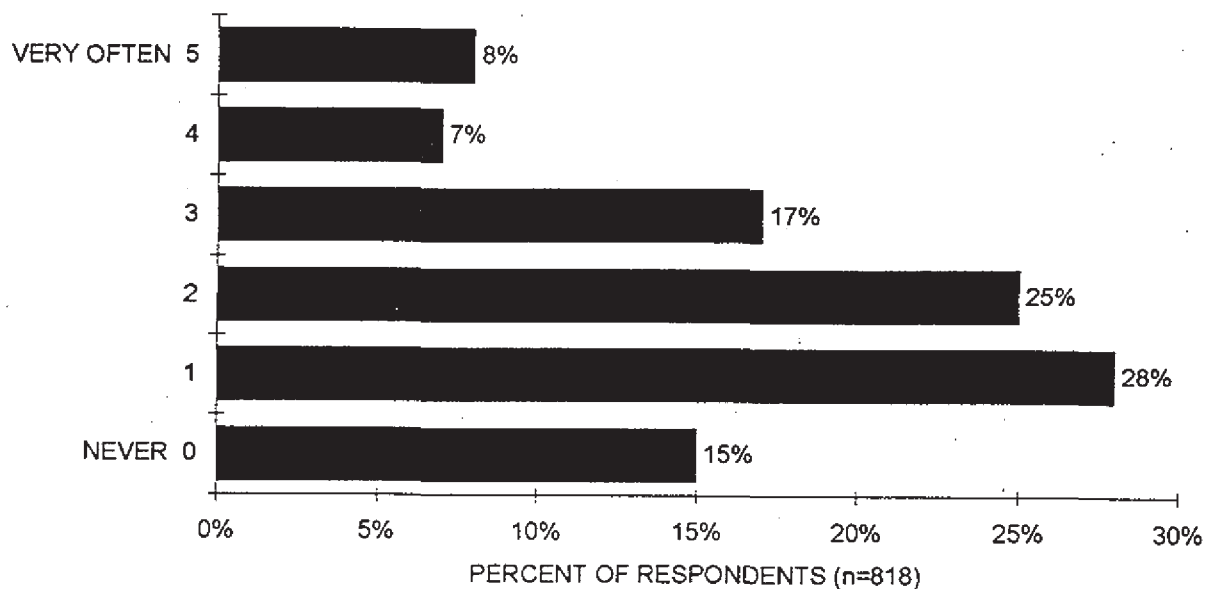
Figure 8.7 shows that 14% of respondents said that they never observed unmarked (social) trails. Again, respondents were fairly evenly distributed across the remaining levels of observation with the mode (23% of respondents) being at level "2" (0 = never, 5 = very often).

FIGURE 8.7: OBSERVED UNMARKED TRAILS



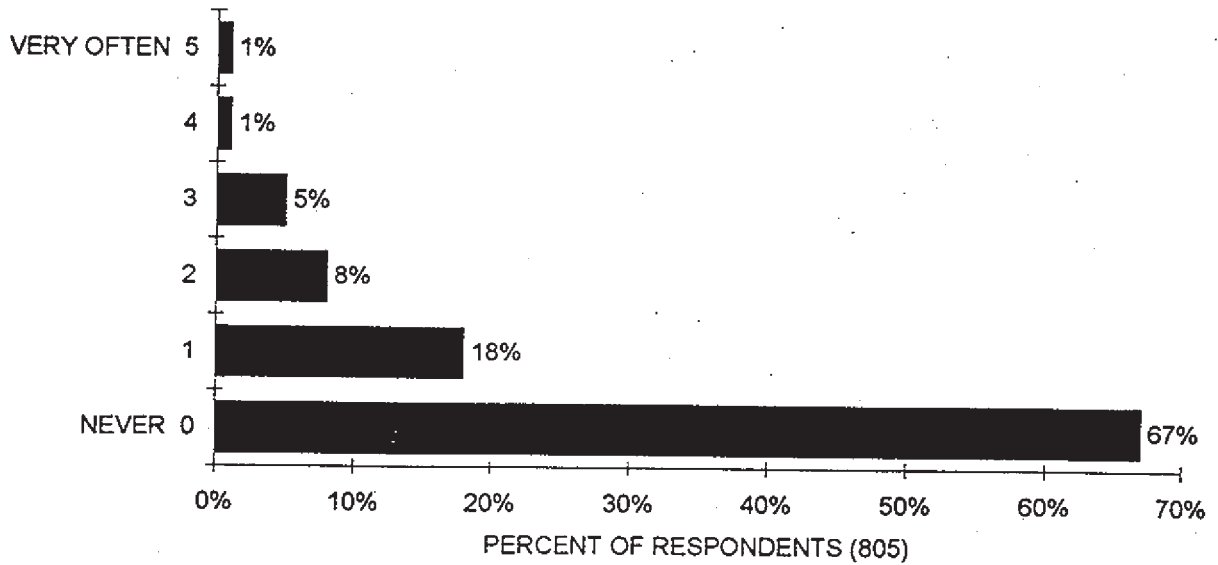
Fifteen percent of respondents reported that they did not observe trampled vegetation. Figure 8.8 shows that the distribution of respondents across the remaining categories is skewed such that the majority of respondents report low levels of observation (28% indicated a level of "1" and 25% indicated a level of "2" where 0 = never and 5 = very often) and only 8% reporting observing trampled vegetation very often.

FIGURE 8.8: OBSERVED TRAMPLED VEGETATION



Two-thirds (67% of 805 respondents) reported that they never observed jets and/or jet noise. Figure 8.9 shows that an additional 10% of the respondents reported observing jets/jet noise at the lowest frequency level on the scale.

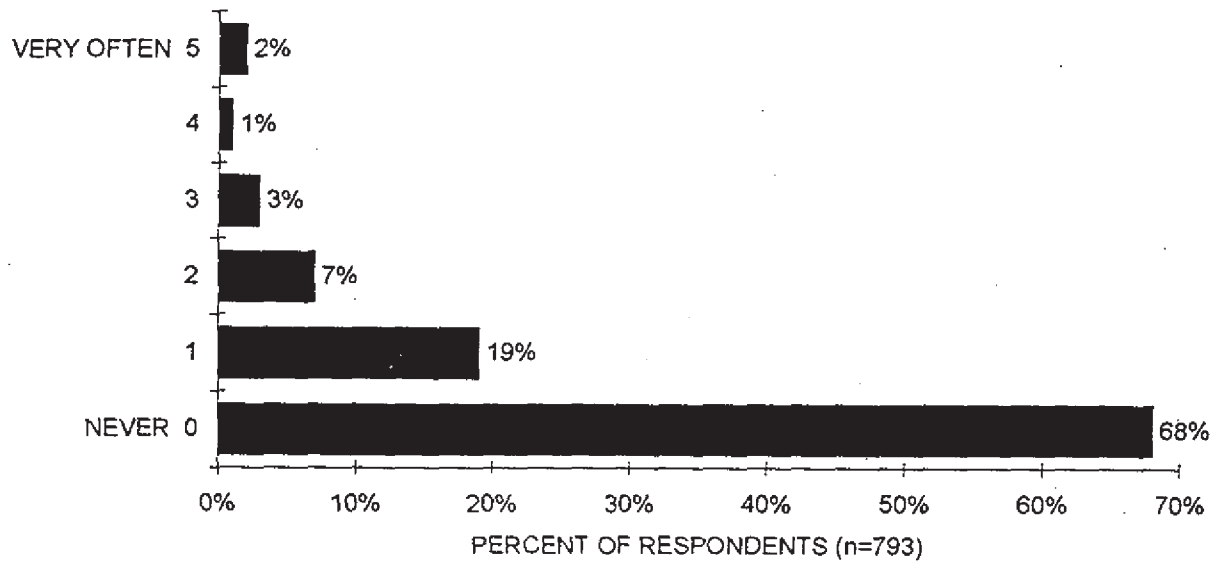
FIGURE 8.9: OBSERVED JETS/JET NOISE



VIII. Negative Effects Of Humans On Spray Park

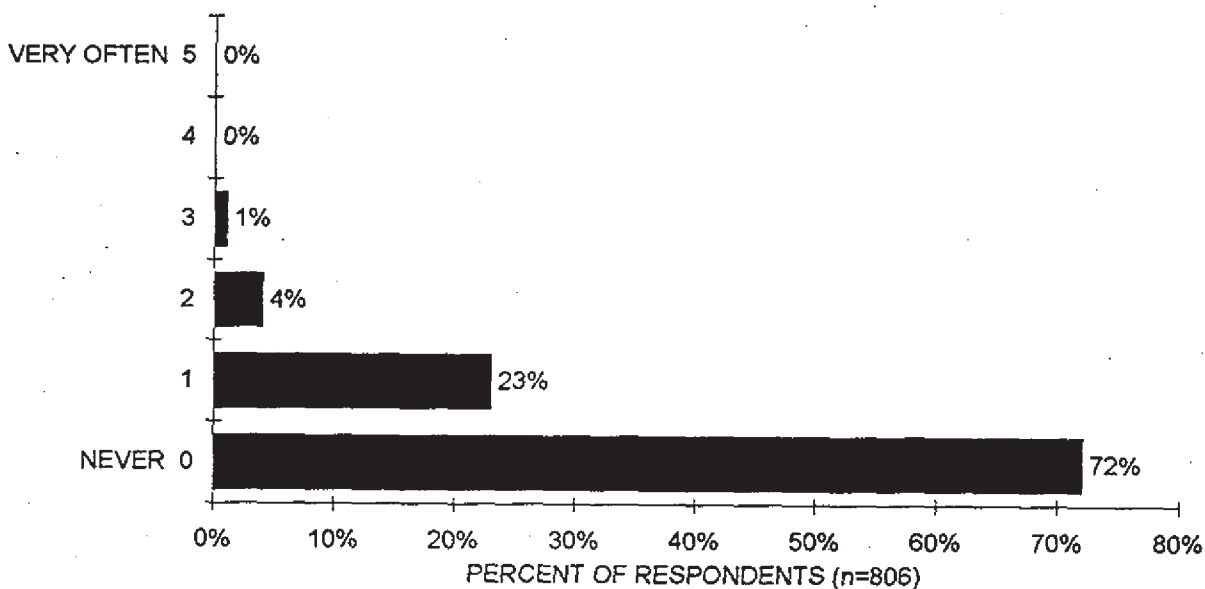
Nearly 70% of respondents reported that they never observed cut trees in Spray Park (see figure 8.10). A further 19% of respondents reported observing cut trees at the lowest frequency level on the scale. Extensive trail rehabilitation was taking place in Spray Park at the time of the survey. Some of the cut trees reported may have been cut as part of the official trail work.

FIGURE 8.10: OBSERVED CUT TREES



Almost three-fourths (72%) of respondents reported that they never observed litter. Figure 8.11 shows that only 5% of respondents reported seeing litter at a frequency greater than the lowest level on the scale.

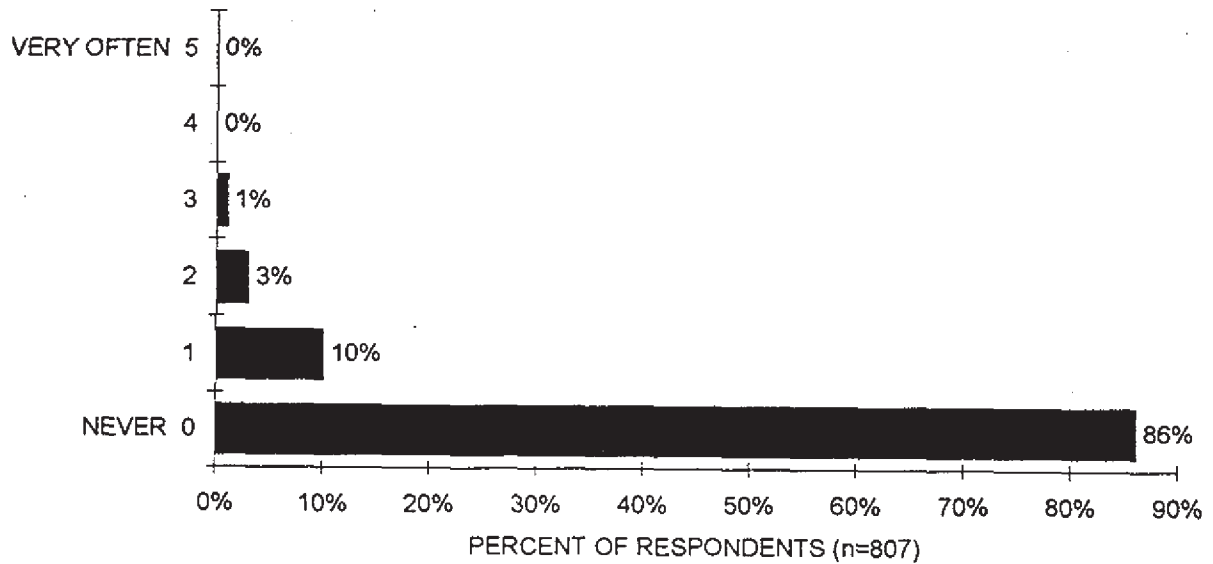
FIGURE 8.11: OBSERVED LITTER



VIII. Negative Effects Of Humans On Spray Park

Figure 8.12 shows that only 14% of respondents reported observing any campfire rings in Spray Park. Only 4% of respondents reported that campfire rings were more frequent than the lowest frequency level on the scale.

FIGURE 8.12: OBSERVED CAMPFIRE RINGS



VIII. Negative Effects Of Humans On Spray Park

Only 10% of respondents reported seeing graffiti in Spray Park (figure 8.13), and only 4% of respondents reported that campfire rings were more frequent than the lowest frequency level on the scale. Based on comments from the visitors and interviewer observations, many of the reports of graffiti referred to blue arrows that had been spray-painted on several rocks near the trail in Spray Park, apparently to serve as trail markers.

FIGURE 8.13: OBSERVED GRAFFITI

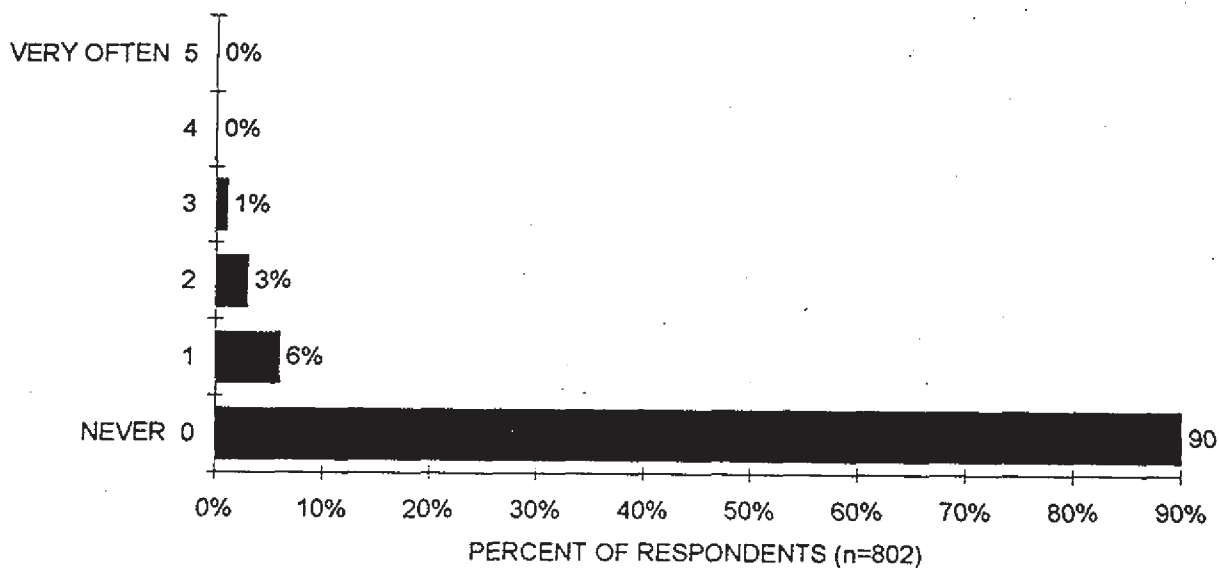
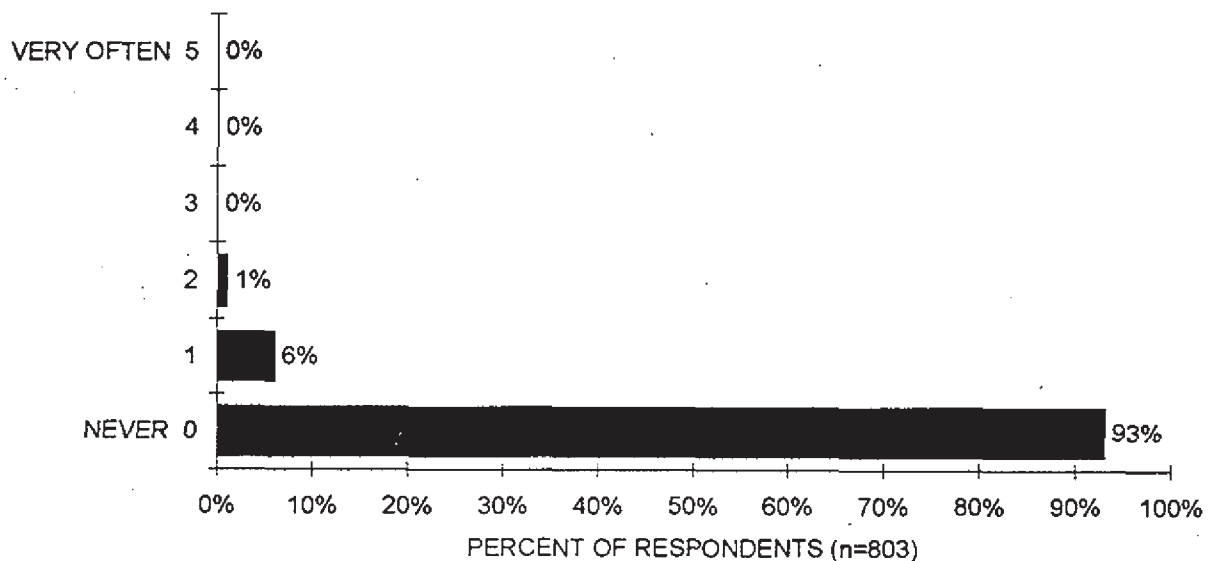


Figure 8.14 shows that 93% of respondents reported that they never saw human waste in Spray Park while 6% of respondents reported observing it at the lowest frequency of the scale.

FIGURE 8.14: OBSERVED HUMAN WASTE



The only other effect of human activity noted by more than a few respondents was trail erosion. A total of 39 respondents (5%) wrote-in trail erosion as another effect they observed.

Due to the scale used in question 2 of the exit questionnaire, it is not possible to infer the absolute frequency levels at which respondents observed each of the different effects of human activity. Nonetheless, we can examine the percentages of respondents who did not observe each effect at all, and can also compare the relative frequencies with which each was observed. Based on such comparisons, it is clear

VIII. Negative Effects Of Humans On Spray Park

that the most common effect observed was the presence of voices. This effect stands apart from most of the others in that it is of brief duration, and does not endure beyond the time when other visitors are present, and is more frequently observed on weekends than on weekdays. It is also an effect that could conceivably be reduced by visitor education.

The data reported in figure 8.1 establish that nearly half of visitors to Spray Park (more than half on weekends) report that the area is being unacceptably affected by human activity. Although it is not clear how respondents defined "unacceptable," it is clear that many respondents notice the impact of other visitors on the environment.

IX. ASSESSMENT OF SOCIAL CARRYING CAPACITY IN SPRAY PARK

The concept of carrying capacity has a long history in wilderness planning and management, but has recently become increasingly pertinent in a broader park management context (Manning, Johnson, and Vande Kamp, 1996). The National Park and Recreation Act of 1978 (Public Law 95-625) mandates that NPS management plans include consideration of visitor carrying capacity.

At its simplest level, the carrying capacity of a park or other recreation environment has been conceptualized as the amount and type of visitor use that can be appropriately accommodated in that area.¹ Although many sources of information should be combined in the process of making carrying capacity decisions, considerable recent attention has focused on social research describing the relationship between the number of visitors present (i.e., visitor density) and negative impacts on the quality of the recreation experience that is available to all visitors. This section discusses attempts to measure the relationship between visitor density and experience quality in Spray Park. The major topics discussed in this section are introduced briefly below, and later each is considered in detail.

Evaluations of encounters. Much of the prior research concerning visitor density and experience quality in Wilderness areas has described visitor density in terms of the number of encounters respondents have with other visitors. The evaluation of such encounters has generally been measured by asking survey respondents to make

¹ Planning frameworks such as LAC and VERP incorporate an acknowledgment that focusing entirely on the question "How many visitors is too many?" has negative effects on the effectiveness of planning, and instead focus on defining social standards describing acceptable conditions. However, these planning frameworks use social survey data in ways similar to the earlier social carrying capacity frameworks. References to *social carrying capacity* in this document can generally be replaced with *social standards* and remain valid.

IX. Assessment Of Social Carrying Capacity

evaluative judgments concerning a hypothetical number of encounters. A review of such survey questions (Donnelly, Vaske, and Shelby, 1992) found that they have been asked in many ways. However, in all of the questions reviewed, visitors were asked to make some form of evaluation (such as preference, acceptability, tolerance, appropriateness, or consistency with Wilderness experience) for various numbers of encounters.² When aggregated across respondents, answers to these questions can be used to estimate the number of encounters at which various proportions of respondents give a negative evaluation. The data from such studies can be thought of as encounter evaluations.

Researchers have generally summarized visitors' reactions to various numbers of encounters by producing graphical representations called impact acceptability curves or encounter preference curves; this report has followed this convention (see *Section VI: Crowding: Hypothetical Scenarios* for examples of preference curves for Spray Park visitors). The first detailed discussion of this section describes the general patterns observed in the encounter preference curves representing the encounter evaluations collected for Spray Park.

The normative model. Interpretation of encounter evaluations (as well as much of the motivation for their continued use) has been driven by a normative model (see Shelby, Vaske, and Donnelly, 1996). In its original form, the normative model specifies that visitors to a natural area will have, through social processes, developed shared conceptions of the appropriate conditions that should be experienced in that area, and that these shared

² Although the definition of what constitutes an encounter has usually been left to respondents, the minimum level of contact generally acknowledged is that the other party must be in view.

IX. Assessment Of Social Carrying Capacity

prescriptions of social conditions are called norms. Much of the appeal of the normative model derives from the assumption that these norms can be identified and used as part of the basis for formulating social carrying capacity.

Based on the normative model, researchers have assumed that encounter evaluations are measures of social norms and have interpreted encounter preference curves as graphical representations of those norms. In other words, the curves are thought to describe the shared standards "that individuals use for evaluating behavior, activities, environments" in outdoor recreation settings (Shelby, Vaske, and Donnelly, 1996).

Several researchers have begun to question whether encounter evaluations are truly measuring social norms.³ One of the primary challenges to the norm model has been evidence that encounter evaluations do not show a level of consensus consistent with the norm model (cf. Hall and Shelby, 1996; Roggenbuck, Williams, Bange, and Dean, 1991). In the second detailed discussion presented below, we examine the level of consensus present in the encounter evaluations reported by Spray Park visitors and discuss the implications of the results for appropriate interpretation of the encounter evaluation data.

The question of validity. Whether or not encounter evaluations measure social norms, they must be valid indicators of visitors' reactions to actual encounters if they are to be useful in setting social carrying capacity. Because encounter evaluations for Spray Park (and in most previous research) were collected using hypothetical scenarios, it is possible that respondents may have simply created a response on a spur-of-the-moment basis --

³ The norm model has been challenged because the measures seldom include normative terms such as "should", "ought", or "must", and because there is little evidence that social sanctions are used to preserve appropriate conditions. These inconsistencies are discussed by Heywood (1996) but are not developed in this report.

IX. Assessment Of Social Carrying Capacity

such responses may not predict their reactions when confronted with the actual social conditions described. The third discussion presented below examines the validity of the encounter evaluation data for Spray Park.

Relating encounter evaluations to management policy. If evaluations of encounters with other visitors are to be used in specifying the social carrying capacity of Spray Park, it will be necessary to measure visitors' encounters to determine if they are consistent with that carrying capacity. Such measurement will need to be repeated at periodic intervals as a means of monitoring social conditions and seeing that they are maintained. Thus, it is critical that measures of encounters (be they direct or indirect) be made accurately and efficiently. The fourth discussion presented below focuses on issues associated with the measurement of encounters in Spray Park and the translation of such measures into management policy.

An alternate method of relating visitor density to visitor experience. Although discussion to this point has focused on encounter evaluations as the method of relating visitor density to the quality of visitor experiences, other methods are possible. Accordingly, we describe the relationship between the number of visitors entering Spray Park and the percentage of visitors who report feeling crowded due to the number of other visitors. The fifth discussion focuses on the relative merits of this measure as a source of information in the process of setting social carrying capacity in Spray Park.

Recommendations for the process of setting social carrying capacity in Spray Park. Measures of visitors' reactions to visitor density are only one of many sources of information that are relevant to social carrying capacity decisions. This final discussion

IX. Assessment Of Social Carrying Capacity

focuses on the larger process of setting Spray Park's social carrying capacity and makes recommendations aimed at improving the success of that process.

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Evaluations Of Encounters With Other Visitors In Spray Park

Mean data across respondents. Responses to a series of five multi-part questions on the mail questionnaire (see Figure 9.1 for an example) were used to generate hypothetical encounter preference curves. These curves generally showed decreasing favorability as the number of encounters increased. In fact, the pattern of favorability ratings is remarkably consistent throughout the data. Figure 9.2 shows the average favorability ratings when the hypothetical scenarios are described in terms of the number of encounters per hour (encounters/hr).

IX. Assessment Of Social Carrying Capacity

FIGURE 9.1. EXAMPLE QUESTIONNAIRE ITEM USED TO GENERATE PREFERENCE CURVES.

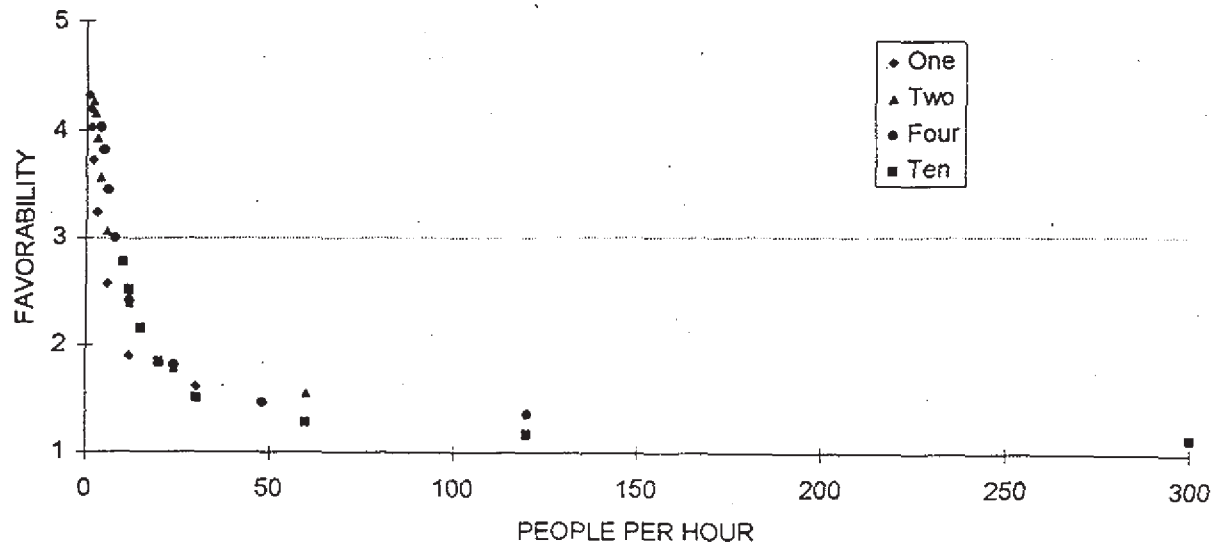
Q-8 Again, imagine that for an hour, you have been hiking through the meadows of Spray Park on the Wonderland Trail in view of Mt. Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a party of four every 60 minutes? How would you respond to encountering a party of four every 2 minutes? For each time interval listed below, we would like you to imagine seeing a party of two at that interval while hiking along the Wonderland Trail and indicating how you would respond. (*Please circle a response for each TIME listed in the left column*)

RATE HOW YOU WOULD RESPOND TO MEETING A PARTY OF FOUR EVERY _____ MINUTES.

Meeting a Party of Four Every	Very Favorable	Somewhat Favorable	Neither Favorable nor Unfavorable	Somewhat Unfavorable	Very Unfavorable
2 Minutes	Very Favorable	Somewhat Favorable	Neither Favorable nor Unfavorable	Somewhat Unfavorable	Very Unfavorable
5 Minutes	Very Favorable	Somewhat Favorable	Neither Favorable nor Unfavorable	Somewhat Unfavorable	Very Unfavorable
10 Minutes	Very Favorable	Somewhat Favorable	Neither Favorable nor Unfavorable	Somewhat Unfavorable	Very Unfavorable
(Shortened here to save space, the actual question also asked about intervals of 20, 30, 40, and 50 minutes)					
60 Minutes	Very Favorable	Somewhat Favorable	Neither Favorable nor Unfavorable	Somewhat Unfavorable	Very Unfavorable

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FIGURE 9.2: RESPONSE TO MEETING ___ PEOPLE PER HOUR
by DIFFERENT PARTY SIZES



A curvilinear relationship between encounters per hour and favorability is apparent in the figure and is confirmed by statistical analysis. The correlation between favorability ratings and log encounters per hour is 0.917.⁴ Thus, 84% of the variability in the mean favorability ratings can be explained by the number of encounters per hour. Although each of these data points represent the average of many responses and therefore exclude much of the variability associated with individual observations, the strength of this relationship is remarkable, strongly supporting the hypothesis that the relationship between visitor density and favorability is consistent in form.

Effects of party size. During the design of the SPVS it was hypothesized that the relationship between visitor density and favorability may be moderated by the size of the parties that are encountered. For example, meeting five people, one at a time, might be

⁴ Log encounters/hr is a mathematical function used to change the scale of encounters/hr, and thereby make the relationship of encounters/hr and favorability ratings more linear. Log X is equivalent to the exponent for 10 necessary to produce X. In mathematical terms, if $\text{Log } X = Y$ then $10^Y = X$.

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more or less favorable than meeting five people in a single party. To test this hypothesis, the hypothetical scenarios asked respondents to rate the favorability of encounters with parties of size one, two, four, and ten. The addition of party size to a regression analysis already including encounters/hr yielded an increase of only 1.2% (from 84.2% to 85.4%) in the explained variability of the favorability ratings. This was a marginally significant difference ($p=.08$) but practically of no importance. We consequently concluded that party size (up to ten people) had no important independent effect on favorability in the hypothetical ratings.

To the extent that reactions to the hypothetical scenarios are valid indicators of visitor reactions to actual conditions (a questionable assumption discussed in greater detail later in this section), this finding suggests that management action to limit party size at levels below ten would have almost no effect on visitors' experiences (as long as it did not indirectly decrease the total number of visitors encountered). Even if the statistical power of the test were increased to the point that the party size effect proved to be statistically reliable, the small magnitude of the effect on visitor experiences suggests that it would be ineffective as a means of improving visitor experiences.

Encounters and favorability at the individual level. The relationship between encounters/hr and favorability ratings observed in the mean data (Figure 9.2) was a result of consistent relationships between those variables in the data from individual respondents. Regression analyses were used to create an equation for each respondent measuring the relationship between favorability ratings and encounters/hr (transformed as log encounter/hr). Eighty percent of respondents had correlations higher than .721. These

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high correlations indicate that most individuals provide consistent responses that follow the same curvilinear pattern shown in Figure 9.2. That is, rather than representing an amalgamation of many different curves that vary from person to person, Figure 9.2 represents the dominant form of the relationship between encounters and favorability ratings for all individual respondents.

Despite the above observation that there was clearly a dominant pattern of responses, it was still possible that some respondents might have responded differently than was predicted by the curvilinear relationship shown in Figure 9.2. Two such response patterns were identified. The first pattern was exhibited by persons whose individual regression lines fell on the negative end of the favorability scale for all the hypothetical scenarios presented, including those describing one encounter per hour. This pattern may have indicated a valid sentiment (that respondents felt that even one encounter was unfavorable) or may have been the result of a "response set" in which all negative responses were selected with little thought about the question content. About 7.5% of the sample exhibited this negative response set. The second pattern was exhibited by persons whose individual regression lines fell entirely on the positive end of the scale, even for the scenario describing 300 encounters per hour. As with the negative pattern, a response set may have accounted for some of these data. About 2.5% of the sample exhibited the positive response set. The remaining respondents had individual regression equations indicating that their responses moved from favorable to unfavorable at some point between one and 300 encounters per hour. Thus, for 90% of the sample, there was a negative

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relationship between visitor density and favorability such that some number of encounters between one and 300 per hour was judged to be unfavorable.

In summary, the pattern of the mean data, the lack of an effect for party size, and the patterns of response within the data from individual respondents all show that in the encounter evaluation data from the SPVS, there is a consistent negative relationship between levels of visitor density (as described in hypothetical scenarios) and favorability.

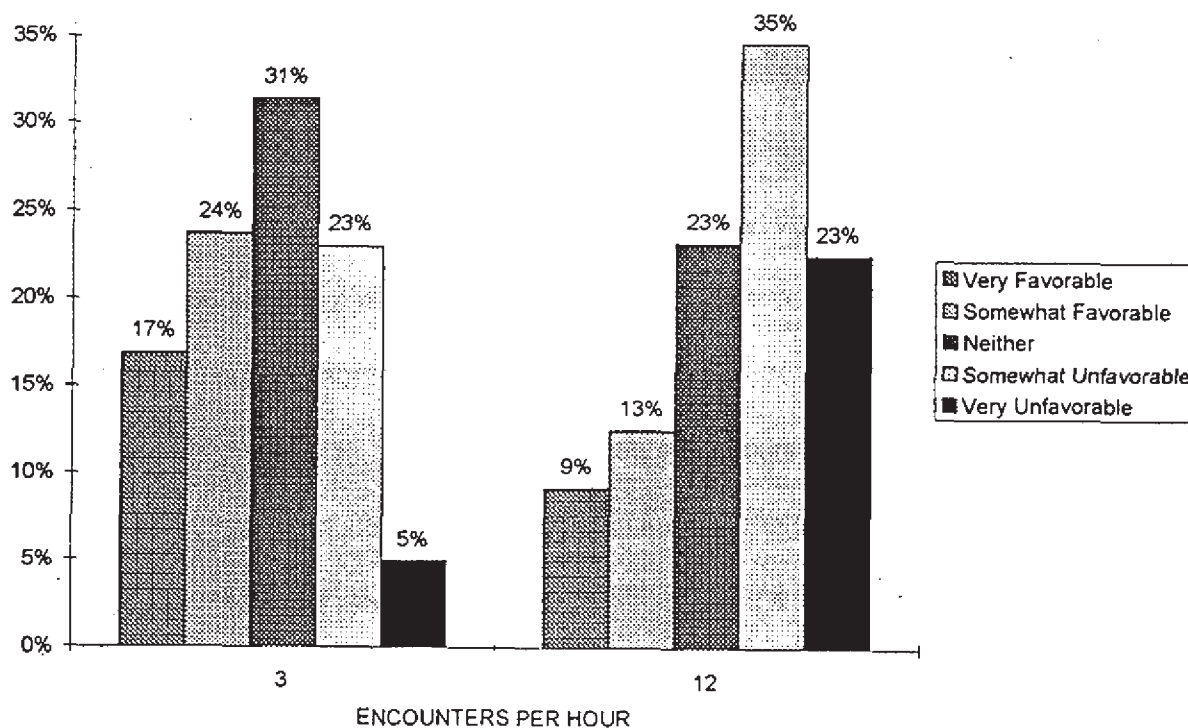
Did The Encounter Evaluations Measure Social Norms Concerning Visitor Density In Spray Park?

Although the negative relationship between visitor density and favorability in the encounter evaluations was consistent, it does not necessarily follow that visitors agreed about a specific number of encounters that create an unfavorable experience. The use of hypothetical scenarios and preference curve methodology is derived from a normative model that assumes that park visitors (or at least some subgroups of them) share standards that lead to consistent evaluations of encounters with other visitors. The hypothetical scenario questions represent an attempt to measure norms for visitor density among Spray Park users, and, at first glance, this attempt appears to be quite successful (disregarding, for the moment, the question of construct validity that is addressed later). Respondents exhibit strong consistency in the pattern of their responses, and the volume of data collected, both in terms of number of respondents and number of responses collected from each respondent allows considerable precision in defining the average relationship

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between encounters and favorability. Upon deeper inspection, however, the assumption that the encounter evaluations measure an encounter norm that describes precise standards for visitor density is called into question. The preference curves and underlying frequency distributions in Figures 6.1 to 6.10 showed that there is considerable agreement among respondents concerning extremely small and extremely large numbers of encounters, but that favorability ratings are distributed across much of the scale for a wide range of encounters. For example, Figure 9.3 shows the percentage of respondents circling each favorability response for three encounters per hour and 12 encounters per hour. Note that 12 encounters per hour represents four times the visitor density of three encounters per hour, but that 28% of respondents rated three encounters as unfavorable and 22% rated 12 encounters as favorable.

FIGURE 9.3: FREQUENCIES OF FAVORABILITY RESPONSES FOR 3 AND 12 ENCOUNTERS PER HOUR



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A common interpretation of such preference curve data that exhibit substantial variation (i.e., the Spray Park encounter evaluations presently under consideration) is that several user groups who have different encounter norms may be combined in the sample. To test this hypothesis we first used a statistical analysis to characterize the relationship of encounters/hr to favorability for each respondent. Essentially, we used regression analysis to calculate a preference curve for each respondent. We then used these individual preference curves to search for evidence that groups of visitors with different preference curves had been combined in our sample.

The computation of regression equations representing individual preference curves was briefly described above under the subheading, *Encounters and favorability at the individual level*. A pattern noted at that time was that about 10% of respondents had preference curves that were either completely favorable or completely unfavorable for all numbers of encounters presented. It is possible that these patterns of response could represent statistical outliers and have a substantial effect on the variability of the preference curve data.⁵ To test this possibility, all such respondents were temporarily removed from the sample and the preference curves for the remaining 90% of the sample were examined. One of the simplest and most useful ways to characterize the individual preference curves is to determine the number of encounters per hour at the point when the curve drops from favorable to unfavorable (i.e., the intercept with the neutral point of the favorability scale). For the 90% subsample, the average number of encounters per hour at the neutral point

⁵ Outliers are subjects that have extreme values. They are important because they can lead to misleading interpretations of statistical measure of central tendency such as the mean.

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was 6.5, but the standard deviation of this neutral point intercept was large, indicating that only about 65% of the sample crossed the neutral point between 2.5 and 16 encounters per hour. Clearly, there remained evidence that multiple encounter norms may have been present in the sample.

In an attempt to account for this variability, 12 variables were selected from the survey as possibly defining populations with differing encounter norms. Table 9.2 lists the 12 variables that were tested. Profile analysis (Tabachnik and Fidell, 1989) was again used to test for population differences defined by these variables. This analysis tests for evidence that two curves, each of which is defined by several points, are different in either of two ways: (1) one curve is, on average, higher or lower than the other, and (2) whether the two curves are parallel.

Table 9.2: Variables tested to see if they define populations with different encounter norms.

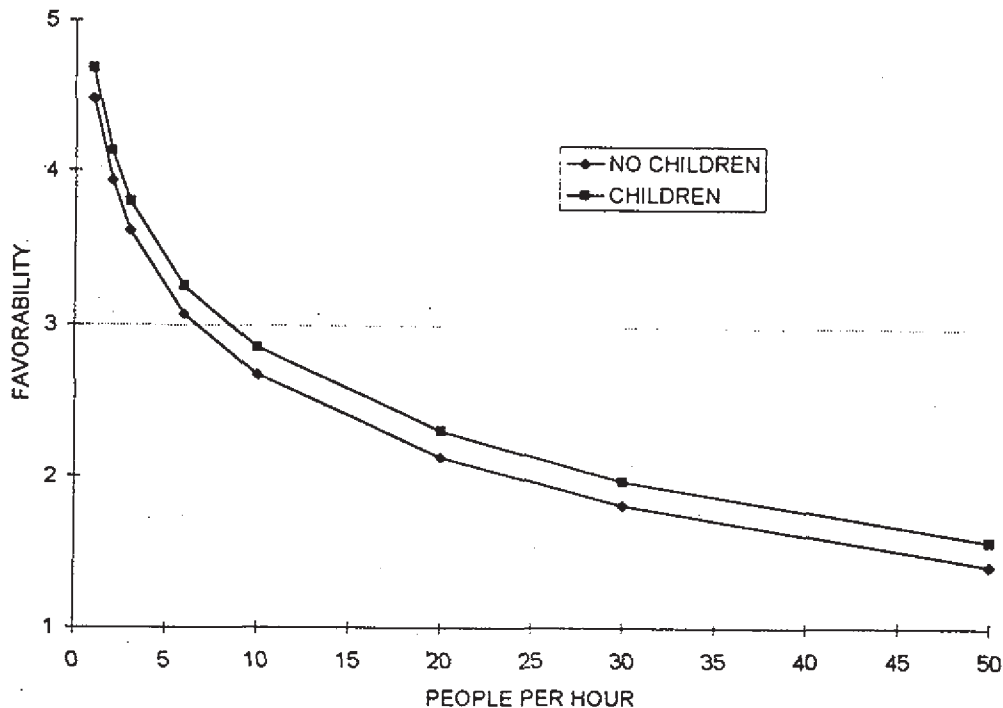
1. Weekend vs. Weekday respondents
2. Respondents in parties with children under 16 years old vs. no children
3. Respondents with expectations for number of other visitors in Spray Park vs. no expectations
4. Respondents with more or fewer years of hiking experience (median split)
5. Respondents with more or fewer visits to wilderness areas in last three years (median split)
6. Respondents who average more or fewer hiking days per year (median split)
7. Respondents with more or fewer trips to MORA in last three years (median split)
8. Respondents with more or fewer trips to Spray Park in last three years (median split)
9. Respondents who had visited other MORA "backcountry" areas vs. not visited
10. First time visitors to MORA vs. not first time
11. First time visitors to Spray Park vs. not first time
12. Respondents who considered number of other visitors likely to be present in Spray Park vs. those not considering

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Of the 12 variables shown in Table 9.2, only two showed statistically significant differences in the individual preference curves with two more showing marginally significant differences. The first, and strongest difference was found between parties with and without children.

Figure 9.4 shows the preference curves for each of these two groups. The respondents from parties with children gave significantly higher favorability ratings than those with no children ($F(405,1)=4.28$; $p = .039$). However, the variability within each group remains large with 65% of the curves for parties with children crossing the neutral point on the favorability scale between 3.2 and 20.4 encounters per hour and 65% of those without children crossing between 2.4 and 16.0.

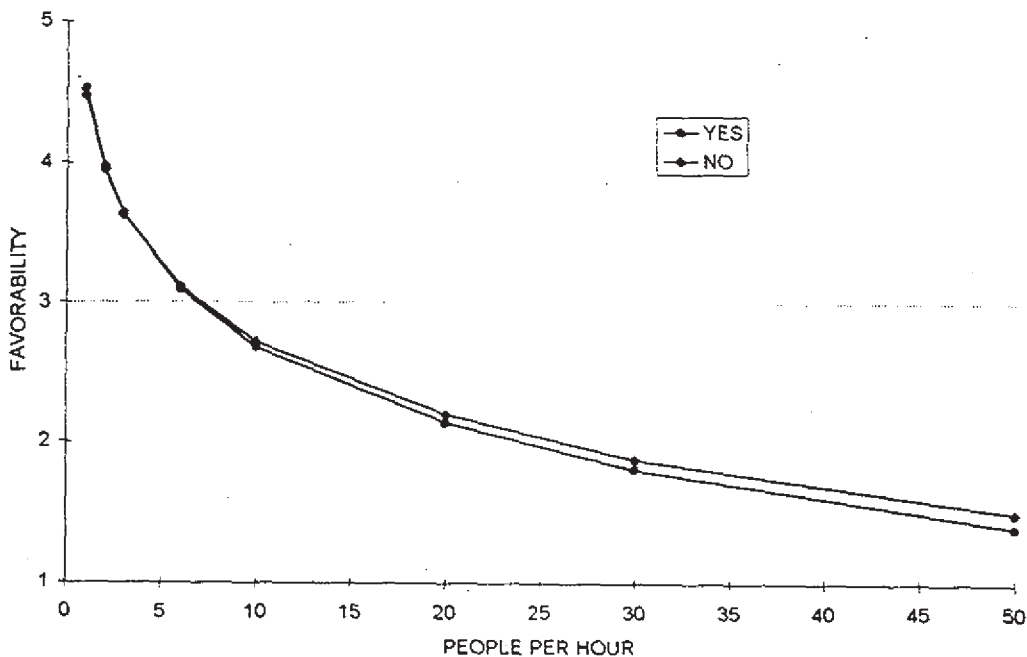
FIGURE 9.4: RESPONSE TO MEETING _____ PEOPLE PER HOUR
by PARTY INCLUDING CHILDREN UNDER 16



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The second significant difference in preference curves was between respondents who reported having visited other backcountry areas of MORA and those who had not made such visits. The curves were not significantly higher or lower in average favorability, but the slopes of the curves were significantly different ($F(483,1)=8.85$; $p = .003$) with respondents who had previously visited MORA showing a greater decrease in favorability as encounters increase than respondents who had not made such visits (see Figure 9.5). Splitting the sample based on previous visits to MORA backcountry did little to reduce the variability in preference curves for each subsample. About 65% of the curves for respondents who had previous backcountry visits crossed the neutral point on the favorability scale between 2.6 and 15.9 encounters per hour and 65% of the curves for those with no previous visits crossed between 2.5 and 18.1.

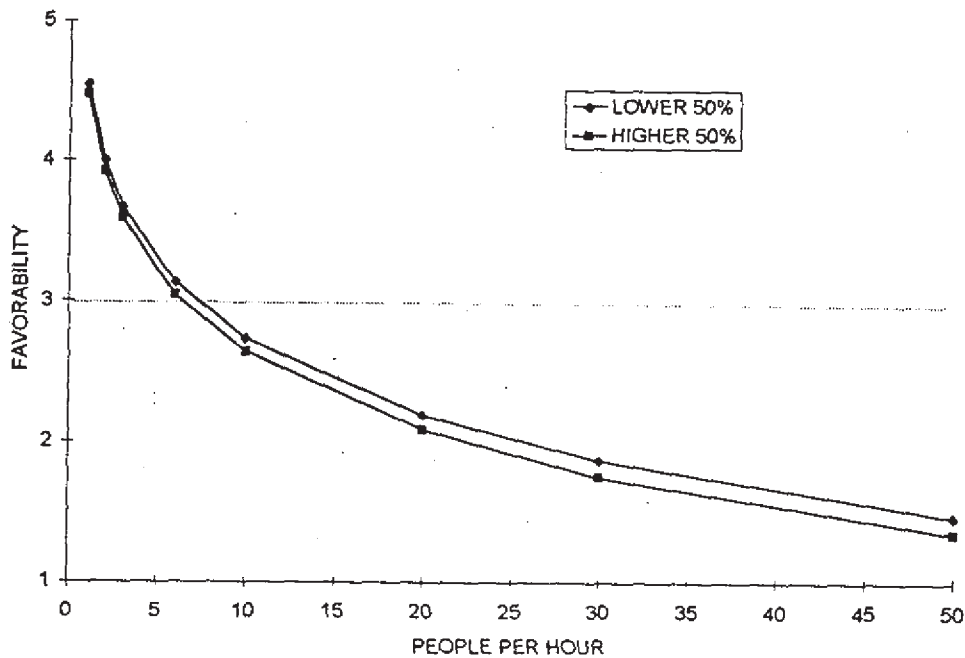
FIGURE 9.5: RESPONSE TO MEETING ____ PEOPLE PER HOUR
by HAD VISITED OTHER MORA BACKCOUNTRY AREAS



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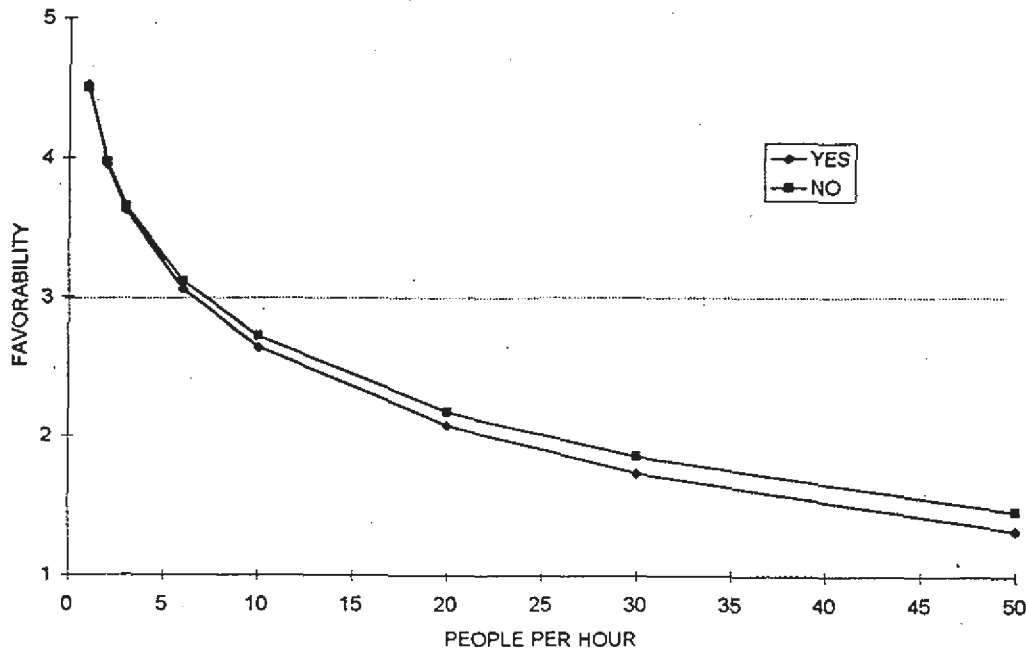
Figures 9.6 and 9.7 show the average preference curves for respondents who spend relatively more or fewer days per year hiking and for respondents who considered, or did not consider the presence of other visitors when planning their trip to Spray Park, respectively. There was a marginally significant difference in the overall favorability of the preference curves shown in Figure 9.6, and a marginally significant difference in the slopes of the preference curves shown in Figure 9.7. As in the above analyses, the small differences in the preference curves of the groups defined by these variables did little to reduce the variability in the curves within each group.

FIGURE 9.6: RESPONSE TO MEETING _____ PEOPLE PER HOUR
by DAYS SPENT HIKING PER YEAR



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FIGURE 9.7: RESPONSE TO MEETING _____ PEOPLE PER HOUR
BY CONSIDERED NUMBER OF OTHER VISITORS IN PLANNING TRIP



The weak differences between the preference curves of groups that, on the basis of intuition and prior literature, would be likely to hold different encounter norms are troublesome because they fail to explain the considerable observed variability in the preference curves. The three most obvious hypotheses that could explain these weak results are:

- 1) We may have failed to measure the variables that could be used to divide the sample and yield groups with less variability (i.e., groups with strong encounter norms).⁶

⁶ In reviewing this document, Wayne Freimund (U. of Montana) noted that he has recently collected similar data at Glacier and found differences in preference curves for groups identified by Recreational Experience Preference scales. However, our analyses (reported below) suggest that such findings are unlikely in Spray Park.

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- 2) Visitors to Spray Park may not hold encounter norms for their experience in that area of MORA.
- 3) Visitors may hold encounter norms but the hypothetical scenarios used to measure them may fail to measure them in a consistent way.

In order to test the first hypothesis, we sought some means of defining groups within the SPVS sample that should clearly share similar norms. Given the assumptions of the norm concept, it would be expected that the norms of visitors within the same party should show consistency. Certainly, members of the same party would not be expected to be identical, but they should show greater consistency than between random visitors. Consequently, one would hypothesize that the SPVS data would show at least moderate similarity in the preference curves provided by members of the same party.

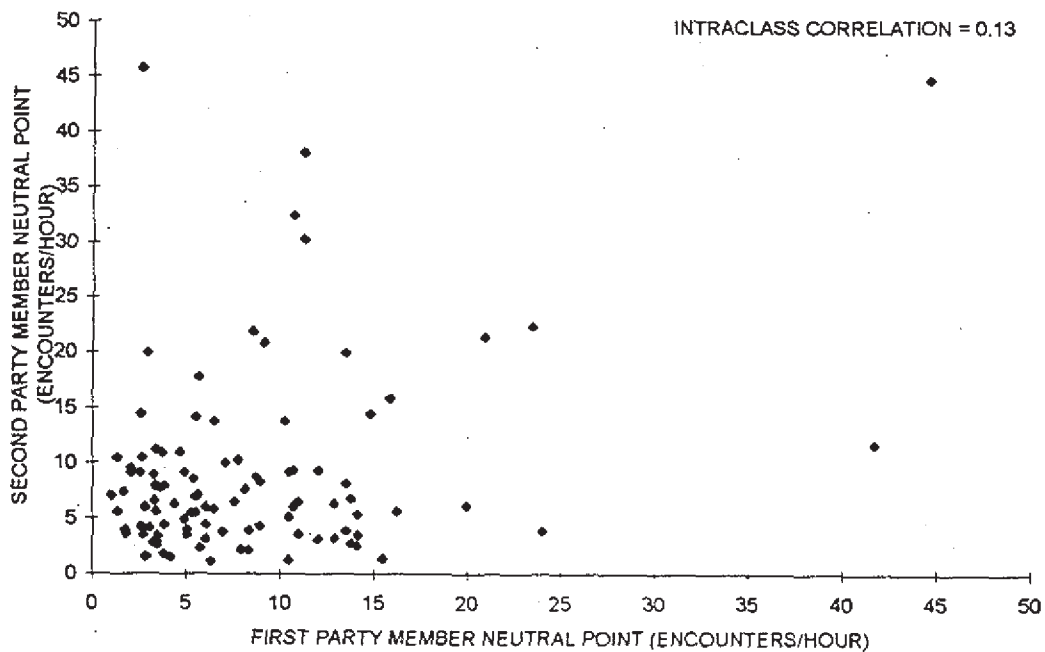
We began our test by selecting the first and second respondent from all parties in our sample greater than size two. In order to eliminate respondents who may have filled out the hypothetical scenario questions using a response set, we eliminated from our sample all respondents who had rated every number of encounters as positive, or every number as negative. This procedure yielded 105 pairs of respondents. We described the preference curve for each respondent using two variables defined by the individual regression equations calculated earlier.⁷ The first variable was the slope of the regression line and the second was the log encounters per hour at which the regression line crossed the neutral point of the favorability scale (the *neutral point intercept*). In the 105 pairs of SPVS respondents, the intraclass correlation between the regression slopes was 0.10 and

⁷ Recall that the regression equations predicted favorability based on log encounters per hour. The average correlation coefficient of 0.79 for the 210 respondents in this subsample indicated the presence of a strong negative relationship between encounters and favorability.

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the intraclass correlation between the neutral point intercepts was 0.13. These correlations show very low levels of agreement, a lack of agreement illustrated by the scatter plot of the neutral point intercepts for the first and second respondents from each party (see Figure 9.8).

FIGURE 9.8. RELATION BETWEEN POINTS WHERE ENCOUNTERS/HOUR ARE NEUTRAL IN FAVORABILITY WITHIN PARTIES



The relationship between the preference curves within visiting parties is so small that it may be due to a few pairs of mail questionnaires where one of the desired respondents filled out both questionnaires. (Although this is not a common problem, it is not unknown when multiple mail questionnaires are sent to the same address). Whether or not the relationship is entirely an artifact of such responses, the levels of agreement are so small that they suggest that there is very little likelihood that some untested variable is likely

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to define subgroups of respondents for whom the SPVS preference curves will show the low degree of variability that is consistent with the presence of social norms.

Accordingly, we conclude that the data do not support the presence of norms for numbers of encounters in the SPVS hypothetical scenario data.

Given the available data, it is not possible to test the two remaining hypotheses concerning the lack of consensus shown in the preference curve data. Thus, it is not clear whether the high and unexplained level of variability in the preference curves is due to an absence of norms among SPVS respondents or a failure of the hypothetical scenarios to measure norms that are present.⁸ In either case, the data do serious damage to the assumption that the SPVS preference curve data in any way describe a precise level of encounters that visitors agree upon as unfavorable.

In summary, there is very little consensus among respondents concerning favorable numbers of encounters that should be experienced in Spray Park. Although two of the 12 available variables that were thought likely to define groups with different preference curves did show significant differences, none of the variables served to define visitor groups that could be considered to have cohesive norms or that were different enough from all respondents to be practically important. Even among members of the same party, there was an extremely low level of agreement concerning the favorability of various numbers

⁸ Several comments on the mail questionnaire are consistent with the idea that responses to the hypothetical scenario questions were difficult for respondents, either because they did not hold norms, or because the questions were not asked in a way that allowed them to consistently express their norms. One respondent complained, "How can a human being possibly distinguish between the 10 minute time intervals you specify?" and another wrote, "It is difficult for me to evaluate my experience on the quantity of people. I am much more concerned about the quality of hikers and how my time is spent. I do not want my hikes to be 'crowded' yet I don't think this survey allows me to respond fairly - it is not representative of my experiences overall." These comments are consistent with the total of 11 negative comments that were received concerning the questionnaire and its administration. The only other major theme in these comments was unhappiness with being asked to complete surveys in the midst of the hike.

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of encounters. Based on these data, we are left to conclude either that Spray Park visitors do not hold norms for favorable numbers of encounters or that the hypothetical scenarios failed to measure such norms. Neither of these conclusions supports the conventional use of the preference curves as measures of social norms that can provide useful information for setting carrying capacity in Spray Park.

Although this evidence suggest that preference curves can not be used in the way they were originally intended -- as measures of crystallized norms defining visitors' perceptions of the social carrying capacity in Spray Park -- it can be argued that the data underlying the preference curves can still be presented in a useful way. For example, rather than presenting the data from each sample or subsample as a single curve, implying that the average response holds a special normative meaning (see Figures 9.4 to 9.7), the data could instead be used to construct a table showing the cumulative percentage of visitors who consider the visitor density to be unfavorable as the number of encounters rises. Table 9.3 presents such data for Q-8 from the mail questionnaire which asked about encounters with a party of four other hikers.

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Table 9.3: *Cumulative percentage of respondents who rated various numbers of encounters as unfavorable in Q-8 of the SPVS mail questionnaire.*

Questionnaire asked about meeting a party of four every ___ minutes	Encounters per hour	Percentage of respondents giving "Somewhat Unfavorable" or "Very Unfavorable" ratings
60	4	6.8
50	4.8	10.3
40	6	19.5
30	8	36.6
20	12	57.1
10	24	77.8
5	48	88.9
2	120	92.1

When visitors' evaluations of visitor density are not consistent with norm theory, representations of the data that do not imply the presence of norms are clearly more appropriate than the standard preference curves. Accordingly, representations such as Table 9.3 are more appropriate for use in setting carrying capacity for areas such as Spray Park.

The fact that the SPVS data can be represented in useful ways does not imply that they are the most valid or useful data to collect when setting social carrying capacity. Acknowledging that norms are not being measured represents a significant retreat from the assumptions that motivated the original adoption of the hypothetical scenario/preference curve methodology. Without the assumption that norms are being measured, the prescriptive element of the preference curves is lost, removing one of the major reasons for gathering data using visitor reactions to hypothetical scenarios. Under such conditions, it is

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quite possible that other methods of measuring responses to visitor density could prove to be more valid and appropriate.

In regard to the original question, "Did the encounter evaluations measure social norms concerning visitor density in Spray Park?" our data support the conclusion that the SPVS encounter evaluations do not show characteristics consistent with norms. However, we have also concluded that the data could be usefully presented in a manner that does not require or imply that norms are present. In light of both of these conclusions, it remains important to move forward and address further important questions concerning the SPVS measures.

Do Respondents' Reactions To The Hypothetical Stimuli Correspond To Their Reactions When Actually Encountering Such Conditions?

As previously mentioned, this question addresses the construct validity of the encounter evaluations. Whether or not respondents share norms concerning favorable numbers of encounters, the consistency and strength of the negative relationship between encounters and favorability in individual respondents' reactions to hypothetical scenarios seems to suggest a high degree of face validity.⁹ Obviously, respondents are expressing opinions about varying levels of visitor density in Spray Park that are logical, and that appear to be meaningful. However, such appearances do not establish construct validity; other evidence must be introduced.

⁹ Face validity is logical or conceptual validity that is determined by an intuitive assessment of whether the superficial characteristics of a measure seem to make sense.

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Are the logical response patterns to the hypothetical questions observed above a result of the methods by which the data were collected? One aspect of the hypothetical scenario data that makes them an attractive source of carrying capacity information is the strength of the curvilinear relationship between favorability and encounters (see Figure 9.2). However, much of that relationship could be due to the questions used in the mail questionnaire and the order in which they were presented. As shown in Figure 9.1, the hypothetical scenarios were presented in a grid format. In Questions 6 through 9, respondents were asked about meeting parties at various time intervals.¹⁰ When each stimulus is represented as a different number of encounters per hour, the stimuli fall almost exactly onto a logarithmic scale (i.e., for Questions 6 through 9, the correlation between the log encounters/hr represented by each time interval and the order in which those intervals are presented is 0.96). By asking visitors to rate numbers of encounters that closely follow a logarithmic sequence, our survey instrument created a situation in which respondents who merely viewed the grid in each question and drew a diagonal line through the response options would provide data consistent with the logarithmic relationship shown Figure 9.2. That is, a simple response strategy could produce the strong nonlinear pattern of responses we observed.

The implication of this line of thinking is not necessarily that the relationship between encounters/hour and favorability is invalid, or even that responses made by drawing a diagonal line through the grid would be invalid. The argument simply shows that the extreme consistency with which the favorability data fall on the log encounters/hour line

¹⁰ In a slight variation on that format, Question 5 asked about meeting parties of various sizes (see Appendix C for the full mail questionnaire). Results calculated for Question 5 are comparable to those for Questions 6 through 9.

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may be due to a simple response strategy. Thus, we should be careful not to place undue theoretical weight on the consistency between the psychological constructs of favorability and encounters in the observed data.

One indication that respondents were doing something more than simply drawing a diagonal line through each response grid is that when all the data are considered together, they fall more tightly along the logarithmic curve than such a trivial response strategy would predict. This is illustrated by the fact that the correlation between order and favorability for all the hypothetical scenario data (when order is coded 1 to 12 for Question 5 and 1-8 for Questions 6 through 9) is 0.789, but that the corresponding observed correlation between log encounters per hour and favorability is 0.918. Clearly, respondents were altering their responses as the number of encounters increased through the questions, and something more than a mindless pattern of response was occurring. Nonetheless, the data remain consistent with the hypothesis that much of the consistency in the observed logarithmic relationship between favorability and encounters per hour may be due to the method by which the data were collected.

Until some future study in which Spray Park visitors are asked hypothetical scenario questions using stimuli arranged in a different progression, we can not conclude whether the strength of the relationship between favorability and encounters/hour observed in the SPVS was caused by a strong psychological relationship between those constructs or was a result of the response format of the mail questionnaire. The existence of the strong relationship is consistent with construct validity, but it is also consistent with at least one other plausible explanation.

Are the respondents who are more sensitive to visitor density in the hypothetical scenarios more sensitive to actual visitor density in Spray Park?

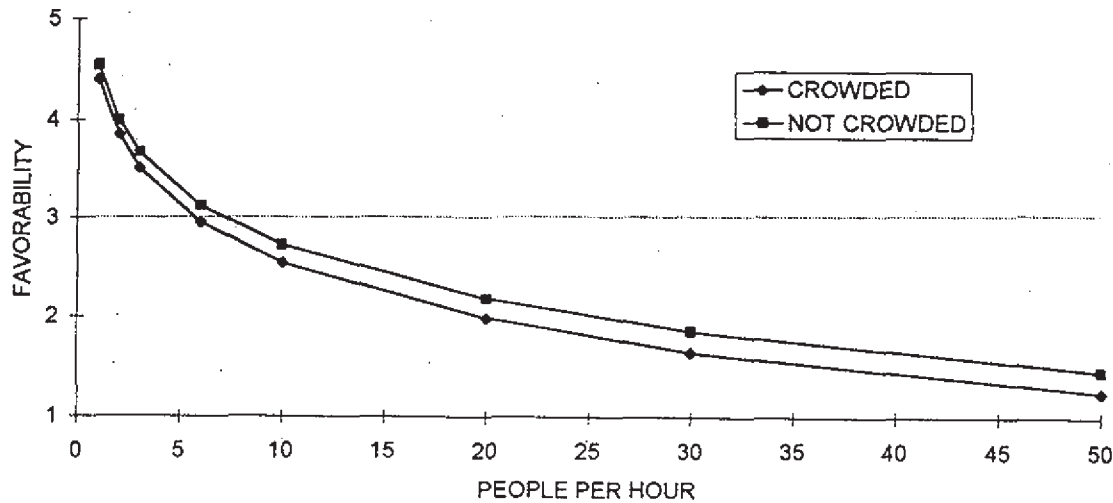
Although the SPVS survey was not designed to directly assess this question, at least one set of results offers an opportunity to test this aspect of construct validity for the preference curve data. If the hypothetical scenario data are valid, respondents who showed greater sensitivity to visitor density should also show a greater probability of feeling crowded due to the number of people they encountered in Spray Park. This hypothesis is supported in the SPVS data.

Figure 9.9 shows that the curve representing the average relationship between encounters and favorability for respondents who reported feeling crowded due to the number of other visitors in Spray Park is significantly lower (indicating less favorable reactions) than the curve for respondents who did not feel crowded ($F(485,1)=15.15; p < .001$).¹¹ Profile analysis (Tabachnik and Fidell, 1989) was again used to test for this difference. Profile analysis also provides a test of the hypothesis that the two curves are parallel. In this case, there was no significant difference in the slopes of the curves.

¹¹ As in previous analysis of the preference curves, the variability of the curves in each group remained large, indicating that neither group showed a great deal of agreement in their favorability ratings. Also, a second analysis using data only from respondents who had visited on busy days (more than 90 surveys collected) showed nearly identical results, indicating that the observed differences were not an artifact of variability in the conditions experienced by each group.

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FIGURE 9.9: RESPONSE TO MEETING ___ PEOPLE PER HOUR
by FELT CROWDED DUE TO NUMBER OF OTHER VISITORS



The finding shown in Figure 9.9 is consistent with the hypothesis that the preference curves have high construct validity, but the difference between the groups was quite small and the variability within each group was quite large. About 65% of curves for visitors who did not feel crowded crossed the neutral point of the favorability scale between 2.7 and 19.8 encounters per hour (average neutral point intercept of 7.3 encounters per hour), and about 65% of those who felt crowded crossed the neutral point of the favorability scale between 2.4 and 11.1 encounters per hour (average neutral point intercept of 5.2 encounters per hour).

The weakness of the finding suggests that the observed pattern may not result because the evaluations of the hypothetical encounters are predictive of visitors' reactions to actual conditions (i.e., because of construct validity), but may instead be explained in other ways. For example, respondents who experienced high visitor density and reported feeling crowded may have been sensitized to the possible negative impact of other visitors.

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If they had not had this negative experience prior to filling out the mail questionnaire, they may have responded to the hypothetical scenarios in ways that were no different than other visitors. In other words, rather than measuring a stable preference that would predict Spray Park Visitors' perceptions of social conditions, the encounter evaluations may measure an unstable preference that was a result of their experiences with social conditions in Spray Park. Such unstable preferences form a poor basis for social carrying capacity decisions.

A second alternate explanation that could explain the relationships between the hypothetical scenario and crowding data is that the patterns of response are due primarily to variability in the willingness of respondents to make negative responses to questionnaire items, be they assessments of actual experiences, hypothetical experiences, or any other type of question. This interpretation is supported by the conclusions of the multivariate analysis of satisfaction measures from the SPVS conducted by Pergola and Paschel (see Appendix G). Their conclusion, in its simplest form, was that the extent to which respondents indicated dissatisfaction with their experience was more closely related to the predispositions they brought to the experience than to the conditions they encountered while hiking. Such a "grumpiness" effect explains how some respondents could show a general tendency toward negative responses, a tendency that could underlie the finding that persons who felt crowded also rated encounters as lower in favorability. The failure of the statistical test to detect a difference in the slopes of the preference curves for the crowded and not-crowded groups is consistent with such a negativity effect across all types of questions.

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Summarizing the evidence related to construct validity. The construct validity of the preference curves is supported by the strong relationships between visitor density and favorability in the hypothetical scenario data. Construct validity is also supported by the observation that respondents who rated density least favorably were also most likely to report feeling crowded. On the other hand, both of these observations are also consistent with plausible alternate explanations. Until experiments can be performed to test the construct validity of preference curves as measures of social carrying capacity in Spray Park, any or all of the alternate explanations for the observed data should be considered viable. Our conclusion is that preliminary evidence is consistent with construct validity of the hypothetical scenario/preference curve data in Spray Park, but that construct validity cannot be assumed until plausible alternate explanations for the statistical observations are tested. Thus, the current analyses of the encounter evaluations do not establish that respondents' reactions to the hypothetical stimuli correspond to their reactions when actually encountering such conditions.

Can The Encounter Evaluations Be Related To Management Policy?

It is only appropriate to relate encounter evaluations to management policy if the evaluations correspond to visitors' reactions to actual social conditions, but the discussion above provided no resolution concerning the construct validity of the encounter evaluations. We will nonetheless discuss the issues associated with relating encounter evaluations to management policy because they have implications for the usefulness of

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hypothetical scenario methods in collecting data for use in social carrying capacity decisions. Accordingly, let us temporarily disregard the issue of construct validity.

For clarity purposes, let us also make some simplifying assumptions about the encounter evaluation data. Imagine a best case scenario in which Spray Park visitors had responded to the hypothetical scenarios in a consistent way indicating that their responses were valid indicators of the favorability of actual conditions. Also imagine that these responses showed that up to six encounters/hr would elicit favorable responses but that any more encounters were unfavorable. Based on these data, managers might wish to regulate visitation such that nearly all Spray Park visitors will have six encounters or less during any hour that they spend in Spray Park. In setting such a policy managers would be making two important assumptions (shown in Figure 9.10).

FIGURE 9.10. ASSUMPTIONS UNDERLYING THE DIRECT UTILIZATION OF (IMAGINARY) ENCOUNTER EVALUATION DATA FOR MANAGEMENT POLICY SPECIFYING SIX ENCOUNTERS PER HOUR.

1.	Scenario Description of 6 Encounters/Hour	=	Neutral Favorability Conditions Imagined	=	6 Actual Encounters/Hour
2.	6 Actual Encounters/Hour	=	Neutral Favorability Conditions Experienced		

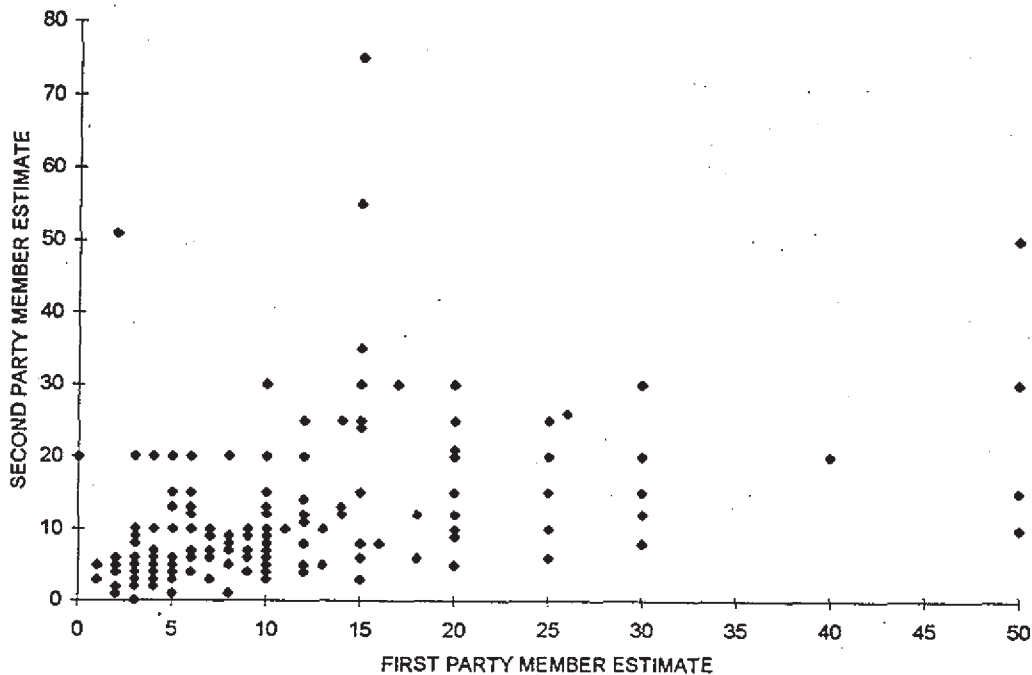
Although the SPVS data do not allow a direct test of either of these assumptions, they suggest that the assumed relationships are unlikely to be highly consistent across subjects. Specifically, these data concern the relationship between actual encounters and perceived encounters in SPVS respondents.

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Literature in recreation and leisure science commonly reports that visitors are inconsistent judges of the number of other visitors they actually encounter (c.f., Austin, 1996; Hall and Shelby, 1993). The SPVS data are consistent with this phenomenon. In the exit questionnaire, conducted as respondents left Spray Park, respondents were asked how many groups of other visitors they encountered on the trail, and off the trail. For groups in which more than one person completed questionnaires, the number of encounters estimated by the first person was correlated with the number estimated by the second person, with resulting coefficients of 0.50 for the number of parties encountered on the trail and 0.43 for parties encountered off-trail. Although statistically significant, these coefficients indicate a relatively weak correspondence in the estimates of encounters recalled by people who presumably experienced nearly identical conditions. The weakness of these relationships is especially striking because sometimes (despite instructions from the field workers) group members asked each other questions such as, "How many groups do you remember?" Figure 9.11 shows estimates of on-trail encounters in a scatter plot relating the estimates made by the first person to the estimates made by the second person in each group. If visitors were accurate judges of the number of encounters they experience, the data would cluster along a diagonal line from the lower left to upper right of the plot. Such is clearly not the case.

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FIGURE 9.11: RELATION BETWEEN ESTIMATES OF ON-TRAIL ENCOUNTERS WITHIN PARTIES



As stated previously, these data do not directly address the assumptions that underlie the direct utilization of the preference curve data to set management policy. However, it seems reasonable that the number of encounters described by the hypothetical scenarios can only be interpreted by the respondent as a perceived number of encounters. If the number of perceived encounters among visitors in the same party do not consistently describe the actual number of encounters they experienced, then on what basis should we believe that the conditions respondents imagine when presented with a hypothetical number of encounters will relate consistently to a specific number of actual encounters?

More problematic even than the inconsistency in the perceived number of encounters is the possibility that the perceived number is a biased estimate of the actual number of encounters. Research might be able to define the relationship between

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perceived and actual encounters/hour but such research would be difficult to conduct.¹²

Research establishing the relationship between the number of encounters/hour described in a hypothetical scenario and the actual number of encounters/hour corresponding to the conditions envisioned by the readers of that scenario is even more difficult to imagine. However, without such research the first assumption, that the neutral assessment of the number of encounters described in the hypothetical scenario will also apply to that same number of actual encounters, relies entirely upon faith.

One apparent solution to the problem of relating hypothetical encounter evaluations to actual encounters is to eliminate actual encounters from the system and deal entirely with the number of encounters that visitors perceive and report in post-visit surveys. However, this approach still requires that managers make both of the assumptions in Figure 9.10. The only difference is that actual encounters are replaced by perceived encounters. In addition, this approach would allow the actual visitor density in the environment to vary if visitors' changed in their reporting of encounters, even while the perceived number of encounters was constant. Allowing such variability due to shifts in social perceptions is likely to be managerially undesirable.

The final problem in the application of the preference curve data to management policy is that it is impossible for managers to directly manipulate encounters between visitors. Instead, they most often regulate visitor density by limiting the number of visitors

¹² One possible design would have trained observers accompany parties during the time they spent in Spray Park and count the number of encounters without revealing that they were doing so. Upon leaving Spray Park, the observer would ask each party member to give their own estimate of the number of encounters. Such research would be time consuming and would impose upon the experiences of the visitors involved. In addition, the SPVS data from members of the same party suggest that a large number of observations would be necessary to accurately describe such a relationship.

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who are allowed to enter a specified area. In order to set such limits using the SPVS preference curve data, the managers of Spray Park would be required to define the relationship between encounters/hour and total visitors in the Spray Park environment. The imprecision or variability involved in making such a translation, added to the variability in the encounters/hour estimates actually observed in the preference curve data suggest that deriving a visitation limit for Spray Park based on the encounter evaluation data would be imprecise at best.

In summary, the SPVS data do not directly address whether the preference curve data can be reliably related to managerially useable measures of visitor density. However, the data concerning visitors consistency in their perceived encounters, as well as existing research concerning the accuracy of such perceptions, suggest that relating the encounter evaluation data to management policy is likely to be unreliable and inconsistent. Thus, the data do little to inspire confidence that the encounter evaluations can be used as strong justification for management policy.

An Alternate Method Of Relating Visitor Density To Visitor Experience

Although we have discussed how managers setting social carrying capacity could use the SPVS encounter evaluation data as non-normative measures of respondents' reactions to visitor density, such use still requires us to assume that visitor reactions to hypothetical scenarios will correspond to their reactions to actual conditions and that numbers of encounters can be related to measures of visitor density which managers can

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monitor and control. Our analyses of the SPVS data do not demonstrate that such assumptions are invalid, but they also fail to establish their validity. Accordingly, our analyses inspire little confidence that the encounter evaluations will be useful measures in the process of setting social carrying capacity.

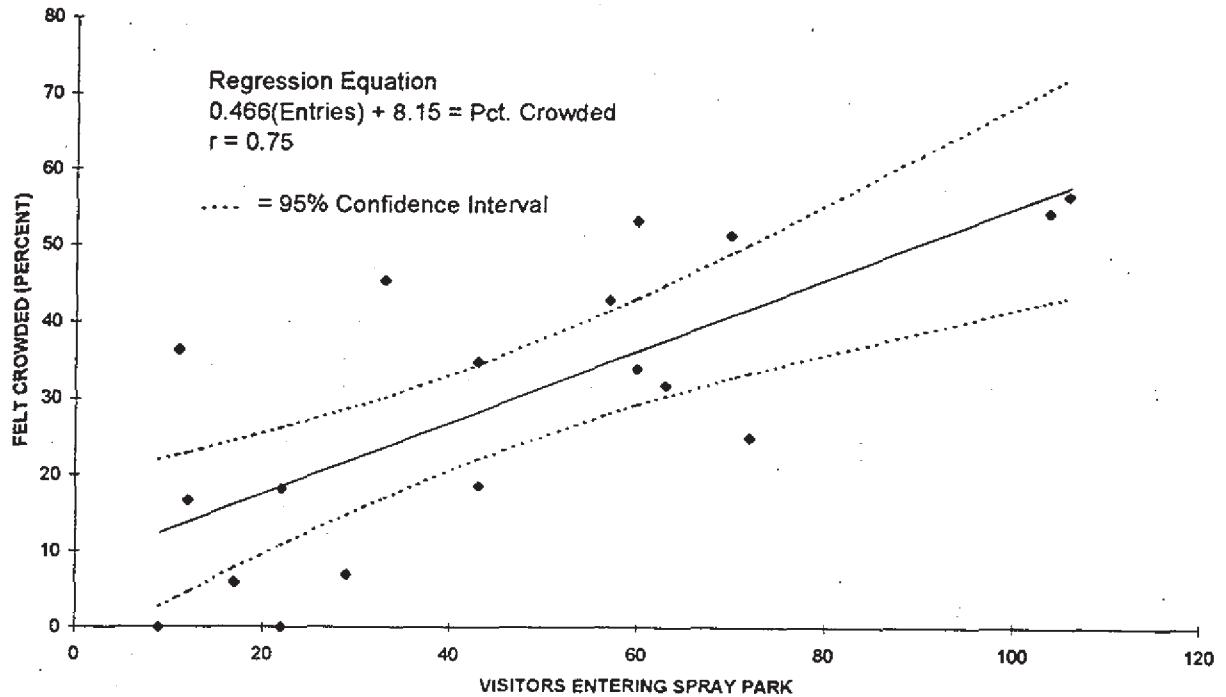
If the encounter evaluation data should not be used as a measure relating visitor density to visitor experience in Spray Park, then what can be? The SPVS data suggest an alternate measure of social carrying capacity that can be fashioned from the relationship between the number of people in Spray Park and the percentage of respondents who reported that they felt crowded due to the actual number of other visitors present. After describing this relationship we will discuss its advantages and disadvantages as a measure of social carrying capacity in Spray Park.

For the 19 sample days, the correlation between the number of visitors entering Spray Park¹³ and the percentage of visitors who reported feeling crowded by the number of other visitors present was 0.75. A regression equation predicting the percentage of crowded visitors based on the number entering Spray Park was also calculated. Figure 9.12 shows the regression line, its equation, and the scatter plot of the 19 data points used to generate them.

¹³ The number of visitors completing interviews was used as a surrogate measure for the number of visitors entering Spray Park. Although these numbers are not identical, they are sufficiently close for the purposes of this analysis. Any bias due to the use of this surrogate could be estimated and removed through more extensive analysis.

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FIGURE 9.12. RELATIONSHIP BETWEEN SPRAY PARK ENTRIES AND PERCENTAGE OF RESPONDENTS REPORTING CROWDING



The crowding prediction regression equation shown in Figure 9.12 was calculated based on simple data collected using a research design focused on answering other questions. Nonetheless, it shows that there is a strong relationship between the number of visitors in Spray Park, and the probability that those visitors will report feeling crowded. It also provides a formula for estimating the number of visitors who will feel crowded based on an easily monitored measure of visitor density – the number of visitors entering Spray Park. If the maximum social carrying capacity of Spray Park was defined as, say 50% of visitors reporting feeling crowded by the presence of other visitors at some point during their visit,¹⁴

¹⁴ Recall, however, that respondents who reported crowding generally gave their trip a positive evaluation.

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then the formula would specify that no more than 90 visitors should enter Spray Park on any day.

One of the primary disadvantages of the crowding prediction equation arises because it is based on reactions to actual conditions that are very difficult or impossible to manipulate in many environments (e.g., it is impractical to manipulate visitor density in Spray Park on a daily basis). Thus, data are collected without random assignment and respondents may differ across levels of visitor density. This self-assignment of respondents to conditions weakens the hypothesis that visitor density is causing any shifts in crowding levels that are observed.

A second disadvantage of the crowding prediction equation concerns the form of the data collected. Because the unit of analysis is an entire day, large sample sizes (i.e., high statistical power) require that data be collected on large numbers of days. Compared to analyses in which the unit of analysis is respondents, this can limit the precision of the crowding estimates and thus represents a significant drawback. Figure 9.12 includes dotted lines indicating the 95% confidence interval around crowding estimates.¹⁵ This interval is fairly wide (at 90 visitors, the confidence interval is approximately $50\% \pm 10\%$), suggesting that the crowding prediction equation is no more precise than the hypothetical encounter evaluations in estimating the relationship between visitor density and experience quality.¹⁶ However, the crowding prediction equation also has some very important advantages.

¹⁵ This confidence interval is not corrected for a finite populations and is thus spans a very conservative (i.e., wide) range.

¹⁶ It is difficult to directly compare the precision of the crowding prediction equation and the preference curves because they predict different measures of experience quality based on different measures of

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One of the primary advantages of the crowding prediction equation as a measure of social carrying capacity is that it uses measures that are directly related to the primary concerns of management. On one side of the equation, actual visitor density is included in the equation as the number of persons entering Spray Park, a measure that is easy to monitor and that can be directly managed through a permit system or other means.¹⁷ In comparison, the encounter evaluation data use hypothetical descriptions of encounters with other visitors to operationalize visitor density. Earlier, we discussed how such hypothetical descriptions are difficult to translate into measures of visitor density that can be managed. In addition, the SPVS do not conclusively establish that visitor reactions to such hypothetical descriptions are predictive of their reactions to actual conditions.

On the other side of the crowding prediction equation, the feeling of being crowded is a specific negative emotion that is generally thought to inhibit visitors' opportunity to experience relaxation, solitude, escape, and a wide variety of other social values associated with outdoor recreation. In comparison, judgments of unfavorability (like those measured by the hypothetical encounter preference questions) may be more difficult to interpret.

Because the crowding prediction equation uses such direct measures, its use as a measure of social carrying capacity requires relatively few assumptions and its

visitor density. However, we argue that such comparisons are relatively unimportant given other advantages and disadvantages of the two methods of measurement.

¹⁷ One of the major advantages of relating visitor reactions to measures of visitor density that can be objectively assessed is the fact that the latter can be much more easily monitored than subjective measures such as perceived encounters. Appendix H reports the results of a test to determine the accuracy of a particular type of trail counter placed on the trail to Spray Park. Unlike other types of counters previously used in Spray Park, the tested counter showed promise as an accurate (and relatively cheap) means of monitoring visitor density.

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implications are relatively simple and direct, particularly in comparison to either the preference curves or the presentations of the hypothetical encounter evaluation data that do not rely on the normative model.

The validity of the crowding prediction equation is also supported by the results of a more complex analysis of the SPVS crowding data that also produced a means of predicting the percentage of respondents who would report feeling crowded based on the number of visitors entering Spray Park. In the first step of this analysis, the average number of hourly encounters with other visitors reported by the SPVS respondents surveyed on each day was predicted based on the number of visitors who entered Spray Park on that day. In the second step, a logistic regression was used to predict the likelihood that any particular subject would report feeling crowded based on the number of hourly encounters with other Spray Park visitors that they reported. Based on this two step analysis, it was determined that 50% of Spray Park visitors would be expected to report feeling crowded on a day when 116 visitors entered Spray Park. The 116 visitor estimate of 50% crowding is 29% higher than the 90 visitor at 50% relationship predicted by the crowding prediction equation. However, it falls within the 96% confidence interval, and the fact that such different analyses yielded results that were even remotely similar should be seen as encouraging.¹⁸

The linear relationship between visitor density and percentage of visitors reporting crowding can be taken as further evidence that there is no consistent norm concerning favorable levels of visitor density in Spray Park. If such a norm were present, one would

¹⁸ The more complex analysis serves to bolster our confidence in the crowding prediction equation, but because it relies upon a relatively long chain of reasoning that requires several assumptions, we suggest that management should rely solely on the estimates of the simple crowding prediction equation.

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expect to see a nonlinear relationship between density and the percentage of visitors who report feeling crowded. There should be almost no crowding when density is low to moderate, a sharp rise in crowding as density reaches an unfavorable level, and almost unanimous crowding ratings at high levels of visitor density. The fact that no such nonlinear pattern is evident has implications that are discussed under the next heading in this section.

In summary, the crowding prediction equation shown in Figure 9.12 is not a perfect measure of social carrying capacity. It does not define a particular level of visitor density at which most visitors begin to feel crowded, the unit of analysis used in its production (interview day) limits the number of data points that can be collected and used as a basis for its calculation, and the absence of random assignment in the collection of the data weakens the inference that visitor density is causing the increase in reported crowding. However, the two measures, visitor entries and percent of respondents reporting crowding, are strongly correlated ($r=0.75$) and are closely related to actual conditions and management concerns. Thus, there is a strong theoretical basis for the validity of the crowding prediction equation as a measure relating visitor density to the quality of visitor experiences in Spray Park, particularly in comparison to measures based on the hypothetical encounter evaluations.

Recommendations For The Process Of Setting Social Carrying Capacity In Spray Park

In this final subsection we will discuss several recommendations for the use of social data relating visitor density to the quality of visitor experiences, as well as other sources of relevant information in the process of setting carrying capacity for Spray Park. It is not assumed that all the information that would be useful for this task is currently available. Accordingly, several of the recommendations below involve future data collection or additional analysis of the SPVS.

Do not consider social data relating visitor density to the quality of visitor experiences to be a definitive measure of social carrying capacity in Spray Park. The crowding prediction equation is a valid measure that can and should be utilized in policy decisions for Spray Park. However, measures relating visitor density to the quality of visitors' experiences can not define social carrying capacity.¹⁹ Three points suggest why not. First, the SPVS data showing that visitor density is not the most important determinant of trip satisfaction suggest that a measure directly relating visitor density to the quality of visitor experiences (such as the crowding prediction equation) should not be taken as the sole determinant of social carrying capacity in Spray Park. Second, the SPVS sampled only those people who visited Spray Park in the summer of 1993. It is questionable whether policy should be set based only on the reactions of those users. Other populations, including past Spray Park visitors who may have been displaced by crowding,

¹⁹ The only exception to this statement are situations in which mandates or managerial policy dictate that a single aspect of experience quality is paramount. For example, some wilderness areas might be managed to provide solitude over all other possible values or aspects of visitor experience. In such areas, visitor ratings of solitude might define the social carrying capacity.

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might have very different views that should be considered in setting policy.²⁰ Third, measures relating crowding to visitor density (such as the crowding prediction equation) can consider only the conditions that were present during the survey. Changes that have occurred since the SPVS (e.g., trail improvements), or that may occur in the future can and will have an unknown effect on carrying capacity as indicated by the crowding prediction equation. Thus, management decisions concerning the physical environment, such as trail maintenance or the presence of signs, can influence social carrying capacity and must be considered with social survey data when making social carrying capacity decisions.

Although the above points clarify why the crowding prediction equation can not be the sole justification for policy, they do not invalidate the equation as a measure that can be of use to management. The equation should be considered as one of many pieces of information and strategies that management can use in making policy decisions that can be theoretically justified.

Search for bottlenecks and common negative effects of other visitors in Spray Park. One other strategy that may be useful in addition to consideration of the crowding prediction equation would be to examine the SPVS data closely for indications that visitor density becomes most salient to respondents at particular locations within Spray Park. It is possible that the social carrying capacity of the area may be limited by visitor density at such bottlenecks and that determining the carrying capacity for those smaller, well defined areas may be critical in setting the social carrying capacity of the entire area. For example, many visitors stop to rest or explore around the tarns just off the trail near Hessong Rock

²⁰ Without data, we can not know whether some visitors have been displaced from Spray Park due to crowding. Our intention is simply to emphasize the importance of asking whether the perceptions of current visitors should be considered representative of all groups that should be considered.

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and Mt. Pleasant. If this area was identified as the primary area in which respondents felt crowded, then efforts to determine the social carrying capacity of that area either through reanalysis of the SPVS data or additional data collection could prove very useful in setting policy for visitor density in Spray Park as a whole.

A related strategy would be to search for the most common negative effects of other visitors on respondents' experiences. If certain effects are commonly agreed upon as the most disturbing, then management action to reduce those effects might improve visitor experiences and reduce the immediate need for restriction of visitor access from a social carrying capacity perspective. For example, noise was one of the most commonly observed indications of other visitors in Spray Park and, among respondents who felt crowded due to other visitors' behavior, was the behavior most commonly identified as the cause of that crowding. Communicating to visitors that noise is disruptive to others and asking them to voluntarily control the volume of their noise in Spray Park would be likely to increase social carrying capacity in the area and have positive effects on visitor experiences.

Assess built environment and visitor infrastructure. The implications of the crowding prediction equation should also be weighed against the limitations of the built environment to handle the number of visitors using Spray Park. Such limitations may constitute a different type of bottleneck than those in the Spray Park environment itself. Perhaps the most obvious limitation is the parking lot capacity for the area. Currently, parking on peak days overflows from the official lot and cars park on the side of the road for hundreds of yards. If such a situation is deemed undesirable for either biological or safety

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reasons, then a form of carrying capacity could be established by the parking lot size. Although such a justification for management action may appear simplistic, the carrying capacity of the parking lot may be just as "scientific" as one established by social psychological measures. In addition it is likely to be relatively easy to enforce. Carrying capacities based on existing infrastructure may be particularly useful when they correspond with carrying capacities suggested from other sources. For example, the parking lot capacity may coincide with a number of visitors to Spray Park that is likely to lead only a small percentage of those visitors to feel crowded.

Another aspect of the physical environment of Spray Park is the main trail through the area. Considerable work has been done recently to upgrade and maintain the trail, but it still retains a basic limitation in the number of persons that it can accommodate without forcing people to walk around other parties on the meadow. A careful assessment of the number of visitors that the trail, as designed, can carry without unacceptable off-trail biological impacts may also yield an independent estimate of carrying capacity in Spray Park.

Implement policy with explicit acknowledgment of experimental management.

No matter what methods are used to set social carrying capacity in Spray Park, policy implementation should be conceptualized as an experiment for which the results will be monitored and analyzed, and which may be altered to achieve the desired conditions. The results of the SPVS or any other research aimed at setting carrying capacity should be seen as attempts to limit the range at which carrying capacity might be set, not as determinants of the exact level that is "correct". The SPVS can provide information that

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suggests what the social carrying capacity of Spray Park might be, but attempts to implement policy that sets the capacity at those levels should incorporate an acknowledgment that asking about certain conditions is not the same as implementing those conditions.

Epilogue: Social Science In The Management Of Spray Park And Other Natural Areas

Our conclusion that the hypothetical preference curves were not a valid measure of social carrying capacity in Spray Park, our cautionary discussion of the limitations of the crowding prediction equation, and our recommendation of experimental management may all seem to suggest that we are generally pessimistic about the contributions that social science data can make to the management of Spray Park. In actuality, our perspective is the exact opposite. Our caution is motivated by a concern that when certain social science data are presented as a definitive and unassailable justification for policy, their failure to live up to those standards can lead to the complete rejection of social science research. Although we are pessimistic about the prospects of the hypothetical encounter evaluation data as a measure relating visitor density to experience quality, we see those data as only a small part of the SPVS. In contrast, our discussion of the crowding prediction equation and other data that can be brought to bear in the process of setting social carrying capacity reflects our optimism by illustrating the basic usefulness of relatively simple social science data.

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APPENDIX A - ENTRANCE QUESTIONNAIRE

**SPRAY PARK VISITOR USE SURVEY
ENTRANCE QUESTIONNAIRE**

1. Is this your first visit to Mt. Rainier National Park? *(Circle one number)*

1 YES

2 NO --> Including this trip, how many times have you visited Mt. Rainier National Park over the last three years? *(Please specify a number)*

NUMBER OF TRIPS: _____

2. Is this your first visit to Spray Park? *(Circle one number)*

1 YES

2 NO --> Including this trip, how many trips have you made to Spray Park over the last three years? *(Please specify a number)*

NUMBER OF TRIPS: _____

3. Where did you start your hike to Spray Park? *(Circle one number)*

1 Spray Park Trail (main trail) from Mowich Lake

2 Wonderland Trail from Ipsut Campground

3 Wonderland Trail from other trailheads (please specify) _____

4 Other (please specify) _____

4. How will you be leaving Spray Park? *(Circle one number)*

1 Return on this route (Spray Park Trail) back to Mowich Lake

2 Cross-country route via Knapsack Pass to Mowich Lake

3 Spray Park Trail Northeast to Wonderland Trail

4 Other (please specify) _____

5. Please write your initials in the space below. (For matching purposes we will ask that you also write these on the exit questionnaire.)

INITIALS: _____

For Official Use Only

Party # _____

Date ___ / ___ / ___

6. What time did you start hiking to Spray Park? *(Please specify the time as closely as possible)*

TIME: _____

7. What time is it now? *(Please specify the time as closely as possible)*

TIME: _____ AM / PM

8. Before you decided to visit Spray Park today, did you consider other destinations in Mt. Rainier National Park as alternatives to visiting Spray Park? *(Circle one number)*

1 NO

2 YES --> What destinations in Mt. Rainier National Park did you consider as alternatives to visiting Spray Park today? *(If more than two, please specify the two most likely alternative destinations)*

9. Why did you choose Spray Park as your destination? *(Please specify)*

10. When planning for your trip to Spray Park did you take into consideration the number of visitors that you were likely to see in Spray Park today? *(Circle one number)*

1 NO

2 YES (please explain) _____

11. Before starting your trip, did you have an expectation about the number of parties that you will see in Spray Park today? "Seeing" refers to meeting people on the trail and sighting people in the distance (*Circle one number*)

1 NO

2 YES --> Indicate how many parties you expect to see today. (*Please specify a number in the space provided*)

Number of parties _____

12. Are you planning to visit a specific place or area within Spray Park on this trip? (*Circle one number*)

1 NO

2 YES --> Please circle the appropriate numbers below to specify the place(s) you are planning to visit within Spray Park on this trip. (*Circle as many numbers as apply*)

- 1 Mt Pleasant
- 2 Lower Spray Park
- 3 Upper Spray Park
- 4 Knapsack Pass
- 5 Hessong Rock
- 6 Other _____

13. Are you planning to travel through Spray Park to reach a destination outside of Spray Park? (*Circle one number*)

1 NO

2 YES --> Listed below are some destinations located outside of the Spray Park area. Please indicate if you are planning to visit any of these destinations by circling the appropriate number. (*Circle as many numbers as apply*)

- 1. Mist Park
- 2. Echo Rock
- 3. Observation Rock
- 4. Ptarmigan Ridge
- 5. Seattle Park
- 6. Mother Mountain
- 7. Russell/Flett Glacier
- 8. Other (please specify) _____

14. Below is a list of recreation activities. During this visit to Spray Park, in which of these activities do you plan to participate in? (*Circle the number of all that apply*)

- 1 CAMPING - BACKCOUNTRY SITE OR ZONE
- 2 PHOTOGRAPHY
- 3 HIKING
- 4 NON-TECHNICAL MOUNTAIN CLIMBING
- 5 OBSERVING WILDLIFE
- 6 EXERCISE
- 7 PICNICKING
- 8 SKIING
- 9 VIEWING WILDFLOWERS
- 10 VIEWING MOUNTAIN SCENERY
- 11 OTHER (Please specify) _____

15. Of the activities circled above, which two activities do you consider to be the most important to your enjoyment of Spray Park? (*Enter a number from 1-11 in each of the blanks*)

_____ MOST IMPORTANT ACTIVITY

_____ SECOND MOST IMPORTANT ACTIVITY

16. Do you expect to see any evidence that Spray Park is being unacceptably affected by human activity? (*Circle one number*)

- 1 YES
- 2 NO

17. Before entering the Spray Park area, how many parties do you remember seeing at each of the following locations? (*Please specify a number in the spaces provided*)

Number of parties

TRAILHEAD/PARKING AREA _____

TRAIL BEFORE SPRAY PARK: _____

18. Do you plan to camp in Spray Park on this trip? *(Circle one number)*

1 NO

2 YES --> For how many nights are you planning to camp in Spray Park on this trip?
(Please specify a number in the space provided)

NUMBER OF NIGHTS: _____

ADDRESS INFORMATION

Thank you for allowing us to talk with you about your Spray Park trip. We would like to send you a brief follow-up mail questionnaire concerning your present trip to Spray Park. Your participation in this survey is greatly appreciated and contributes valuable information for park managers on how to manage this wilderness area. This information is kept confidential and will not be used for any other purposes. Would you please provide the following information so that we can contact you in the future?

Name _____

Mailing Address _____
(Number and Street)

(City, State/Country, Zip Code)

Age: _____

Sex: M F

● APPENDIX B - EXIT QUESTIONNAIRE



**SPRAY PARK VISITOR USE SURVEY
EXIT QUESTIONNAIRE**

1. While you were in Spray Park, did you see any evidence that Spray Park is being unacceptably affected by human activity? *(Circle one number)*

- 1 YES
- 2 NO

2. Listed below are some effects of human activity that may or may not have been present in Spray Park during your trip. About how often, if at all, did you observe these effects? *(For each item rate put a check in only one box)*

HOW OFTEN YOU OBSERVED

	Never					Very Often
	0	1	2	3	4	5
1 Unmarked Trails						
2 Litter						
3 Trampled Vegetation						
4 Cut Trees						
5 Graffiti						
6 Human Waste						
7 Campfire Rings						
8 Jets/Jet noise						
9 Voices						
10 Other (Please Specify)						

3. Please write your initials in the space below. (Recall that for matching purposes we also asked you to write these on the entrance questionnaire.)

INITIALS: _____

For Official Use Only

Party # _____

Date ___ / ___ / ___

4. How many **groups** of people (parties) do you remember seeing in Spray Park? "Seeing" refers to meeting people on the trail and sighting people in the distance, off-trail. (*Please specify a number in the spaces provided*)

NUMBER OF **GROUPS MET ON TRAIL** WAS _____

NUMBER OF **GROUPS SEEN OFF-TRAIL** WAS _____

5. What areas of Spray Park did you visit? Look at the map below and indicate what areas you visited by drawing "X"s. By each "X", please indicate how many visitors you remember seeing in that area.

[Map not included on this copy of questionnaire.]

6. How did the **number of hikers** that you saw in Spray Park compare with the number of hikers that you expected to see? (*Circle one number*)

- 1 MUCH MORE THAN EXPECTED
- 2 SOMEWHAT MORE THAN EXPECTED
- 3 ABOUT WHAT WAS EXPECTED
- 4 SOMEWHAT LESS THAN EXPECTED
- 5 MUCH LESS THAN EXPECTED
- 6 NO EXPECTATIONS

7. At any time during your visit to Spray Park did the number of people cause you to feel "crowded"? (*Circle one number*)

- 1 NO
- 2 YES --> To what degree did the number of people that you encountered in Spray Park make you feel "crowded"? (*Circle one number*)

- 1 FELT EXTREMELY CROWDED
- 2 FELT VERY CROWDED
- 3 FELT FAIRLY CROWDED
- 4 FELT A LITTLE CROWDED

8. At any time during your visit to Spray Park did a person's or party's behavior cause you to feel "crowded"? (*Circle one number*)

1 NO

2 YES --> To what degree did the person's or party's behavior in Spray Park cause you to feel "crowded?" (*Circle one number*)

1 FELT EXTREMELY CROWDED

2 FELT VERY CROWDED

3 FELT FAIRLY CROWDED

4 FELT A LITTLE CROWDED

Please indicate what the behavior was that caused you to feel "crowded."

9. At any time while you were in Spray Park did you leave the Spray Park trail for more than a few feet? (*Circle one number*)

1 NO

2 YES --> Listed below are some possible reasons for leaving the Spray Park Trail (main trail). Please indicate for which of these reasons you left the Spray Park Trail. (*Circle as many numbers as apply*)

1 TO VISIT A PLACE NOT REACHED BY THE SPRAY PARK TRAIL

2 WENT TO THE BATHROOM

3 TO GET AWAY FROM PEOPLE

4 TO BE ALONE

5 TO VISIT PONDS OR TARNs

6 TO VIEW WILDFLOWERS/WILDLIFE

7 TO GET A BETTER VIEW OF MT RAINIER

8 TO EXPLORE

9 DON'T KNOW WHY

10 OTHER (please specify) _____

10. To what degree did the presence of other people **increase** the satisfaction of your trip experience? *(Please rate the degree of satisfaction by circling one number)*

0	1	2	3	4	5	6
did not increase satisfaction		slightly increased satisfaction		moderately increased satisfaction		greatly increased satisfaction

11. To what degree did the presence of other people **decrease** the satisfaction of your trip experience? *(Please rate the degree of satisfaction by circling one number)*

0	1	2	3	4	5	6
did not increase satisfaction		slightly increased satisfaction		moderately increased satisfaction		greatly increased satisfaction

12. Overall, how satisfied are you with your Spray Park trip? *(Please rate the degree of satisfaction by circling one number)*

0	1	2	3	4	5	6
very dissatisfied			neither			very satisfied

13. How **satisfactory** was your Spray Park trip compared to other hiking/backcountry trips that you have done? *(Please rate the degree of satisfaction by circling one number)*

0	1	2	3	4	5	6
very unsatisfactory			neither			very satisfactory

14. Are there actions that you feel Mt Rainier National Park could take that would preserve or increase the quality of your Spray Park trip?

1 YES (Please specify) _____
2 NO

15. Will your experience(s) in Spray Park today affect whether you will visit Spray Park again? *(Circle one number)*

1 NO

2 YES --> Based on your experience in Spray Park today, how likely is it that you will visit Spray Park again? *(Circle one number)*

1 EXTREMELY LIKELY

2 VERY LIKELY

3 SOMEWHAT LIKELY

4 SOMEWHAT UNLIKELY

5 VERY UNLIKELY

6 EXTREMELY UNLIKELY

16. What time is it now? *(Please specify the time as closely as possible)*

TIME: _____ AM / PM

Thank you for your generous time and effort in completing this survey.

● APPENDIX C - MAIL QUESTIONNAIRE

1993 MOUNT RAINIER NATIONAL PARK
SPRAY PARK VISITOR SURVEY

On a recent trip to Mount Rainier National Park you participated in an on-site survey and also agreed to participate in a mail questionnaire to follow up on some of your observations. Thank you for your cooperation. This is the questionnaire that concludes our survey.

The first set of questions asks about your previous hiking and backcountry experiences.

Q-1 How many years have you been hiking? *(Please indicate in the space provided)*

Q-2 In the past three years, about how many times have you visited a wilderness area? *(Please indicate in the space provided)*

Q-3 On average, how many days do you spend hiking during a year? *(Please indicate in the space provided)*

Q-4 Besides Spray Park, have you visited other backcountry areas within Mt. Rainier National Park? *(Circle one number)*

1 NO

2 YES -> Have you visited any of the following areas? *(Circle one number)*

NO

YES -> CIRCLE as many areas as you have visited.

Paradise Meadows

Mystic Lake

Berkeley Park

Summerland

Van Trump Park

Mazama Ridge

Indian Henry's

Crystal Lakes

Tolmie Peak

Burroughs Mt

The next set of questions ask you to imagine how you would respond to seeing different numbers of people or parties in Spray Park.

Q-5 Imagine that for the last hour, you have been hiking through the meadows of Spray Park on the Wonderland Trail in view of Mt Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a single party of two people. How would you respond to seeing a single party of twenty people? For each party size listed below, we would like you to imagine seeing a party of that size while hiking along the Wonderland Trail and indicating how you would respond. Assume that the party encountered was the party you met during this hour. (Please circle a response for each party size listed in the left column)

RATE HOW YOU WOULD RESPOND TO MEETING A SINGLE PARTY OF SIZE _____

<u>PARTY SIZE</u> (number of people in a group)	VERY FAVORABLE	SOMEWHAT FAVORABLE	NEITHER FAVORABLE NOR UNFAVORABLE	SOMEWHAT UNFAVORABLE	VERY UNFAVORABLE
1	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
2	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
3	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
4	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
5	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
6	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
7	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
8	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
9	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
10	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
15	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
20	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV

Q-6 Again, imagine that for an hour, you have been hiking through the meadows of Spray Park on the Wonderland trail in view of Mt Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a single person every 60 minutes? How would you respond to encountering a single person every 2 minutes? For each time interval listed below, we would like you to imagine seeing a single person at that interval while hiking along the Wonderland Trail and indicating how you would respond. (Please circle a response for each TIME listed in the left column)

RATE HOW YOU WOULD RESPOND TO MEETING A SINGLE PERSON EVERY _____ MINUTES.

MEETING A SINGLE PERSON EVERY	VERY FAVORABLE	SOMEWHAT FAVORABLE	NEITHER FAVORABLE NOR UNFAVORABLE	SOMEWHAT UNFAVORABLE	VERY UNFAVORABLE
2 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
5 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
10 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
20 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
30 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
40 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
50 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
60 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV

Q-7 Again, imagine that for an hour, you have been hiking through the meadows of Spray Park on the Wonderland trail in view of Mt Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a party of two every 60 minutes? How would you respond to encountering a party of two every 2 minutes? For each time interval listed below, we would like you to imagine seeing a party of two at that interval while hiking along the Wonderland Trail and indicating how you would respond. (Please circle a response for each TIME listed in the left column)

RATE HOW YOU WOULD RESPOND TO MEETING A PARTY OF TWO EVERY ____ MINUTES.

MEETING A PARTY OF TWO EVERY	VERY FAVORABLE	SOMEWHAT FAVORABLE	NEITHER FAVORABLE NOR UNFAVORABLE	SOMEWHAT UNFAVORABLE	VERY UNFAVORABLE
2 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
5 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
10 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
20 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
30 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
40 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
50 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
60 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV

Q-8 Again, imagine that for an hour, you have been hiking through the meadows of Spray Park on the Wonderland Trail in view of Mt Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a party of four every 60 minutes? How would you respond to encountering a party of four every 2 minutes? For each time interval listed below, we would like you to imagine seeing a party of two at that interval while hiking along the Wonderland Trail and indicating how you would respond. (Please circle a response for each TIME listed in the left column)

RATE HOW YOU WOULD RESPOND TO MEETING A PARTY OF FOUR EVERY _____ MINUTES.

MEETING A PARTY OF FOUR EVERY _	VERY FAVORABLE	SOMEWHAT FAVORABLE	NEITHER FAVORABLE NOR UNFAVORABLE	SOMEWHAT UNFAVORABLE	VERY UNFAVORABLE
2 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
5 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
10 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
20 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
30 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
40 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
50 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
60 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV

Q-9 Again, imagine that for an hour, you have been hiking through the meadows of Spray Park on the Wonderland trail in view of Mt Rainier's north face. How would you respond if during that one hour while you were hiking in Spray Park you encountered a party of ten every 60 minutes? How would you respond to encountering a party of ten every 2 minutes? For each time interval listed below, we would like you to imagine seeing a party of two at that interval while hiking along the Wonderland Trail and indicating how you would respond. (Please circle a response for each TIME listed in the left column)

RATE HOW YOU WOULD RESPOND TO MEETING A PARTY OF TEN EVERY ____ MINUTES.

MEETING A PARTY OF TEN EVERY	VERY FAVORABLE	SOMEWHAT FAVORABLE	NEITHER FAVORABLE NOR UNFAVORABLE	SOMEWHAT UNFAVORABLE	VERY UNFAVORABLE
2 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
5 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
10 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
20 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
30 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
40 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
50 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV
60 MIN	VERY FAV	SOMEWHAT FAV	NEITHER	SOMEWHAT UNFAV	VERY UNFAV

Q-10 Is there anything else you would like to tell us about your trip to Spray Park?
 (Please specify in the space provided, continuing on the back of this page if necessary.)

Thank you very much for your time and consideration in completing this survey.

APPENDIX D - VISITOR COMMENTS

Compliments

- ⇒ This was my first hike, it was beautiful. I was shocked, but not dismayed by how many hikers I did run into. I had a nice time and intend to do more hiking. I would like to be in a less populated hiking area next time. (I would also add that Spray Park did not appear to be affected by the number of hikers going through it was lovely)
- ⇒ I thanked my friend who recommended it. Although I was very shocked at the number of cars parked at the trailhead, the congestion wasn't nearly as bad as I thought it might be from the number of cars [in the lot] The arrows painted on various rocks were really more annoying than the number of hikers. I don't mind small parties, they're usually people just like me doing the same thing I'm doing. Maybe I don't know what I'm looking for, but I didn't notice a whole lot in the way of meadow wear and tear, and I did not see any litter. I really love Mt. Rainier (even though it threw a rock at me that nearly killed me on the Interglacier last year), and I [would] really miss it if I moved away. In a way I'm glad there were so many people there enjoying it and not causing problems. I've got a new favorite waterfall (Narada is now second), and found Spray Park a great place to smooch.
- ⇒ It was a beautiful area and very well maintained.
- ⇒ The park is beautiful!
- ⇒ Very beautiful trip; one of my favorites.
- ⇒ Beautiful.
- ⇒ Great place. I have no significant problem with the presence of other visitors in this area. Thanks
- ⇒ I hope everybody enjoys the beauty of Spray Park forever. Thanks.
- ⇒ Beautiful place. It is reassuring to know that your study group is taking measures to ensure the conservation of the wilderness so that all may enjoy a peaceful retreat in the mountains.

- ⇒ Generally people are being more careful about staying on trails than they were 30 years ago. Keep up the pressure to do so!
- ⇒ Great trip --It's nice to see others enjoying it as well. P.S. Please mail me a copy of final report.
- ⇒ We were pleased to see the trail repaired.
- ⇒ Thoroughly enjoyed my hike. Some trails [were] closed due to too much mud and water.
- ⇒ The content of the group is far more important than size. About 1980, I encountered about 20 people of the "Mountaineers Club." No problem at all; they were nice. Last month I encountered two beer drinkers camping in the Puyallup River area; I responded very unfavorably! I enjoy meeting a person every now and then if their conduct is acceptable. On one hike we met some church people singing their choir songs on the trail -- very nice!!!
Considering the job you have to do, I think you do a wonderful job!
- ⇒ Please preserve it! It was beautiful.
- ⇒ [The] Park [is] in much better condition than 20 years ago!, in spite of greatly increased use. Off trail areas are the real treat and [the] reason for our trips up there.
- ⇒ Trail work and changes in compiling practices have greatly improved the park over 20-30 years. Still, the off trail areas are best!
- ⇒ It's one of the few hikes I've taken multiple times in Washington (because there are so many) and I always enjoy its beauty.
- ⇒ The short and easy hike to Spray Park is a pleasure to take children on to enjoy nature and Rainier's beauty.
- ⇒ We are from the Midwest - no mountains and few parks. We were in such awe of Mt. Rainier and Spray Park that we didn't notice the people. We are used to much larger crowds. Hope we are able to go again!
- ⇒ Spray Park was extremely scenic - with awesome views of Mt. Rainier - inspiring! -Thanks.
- ⇒ Enjoyed it.

- ⇒ It was my first [trip], but not my last. Incredibly beautiful, extremely well maintained, good quality of people hiking in the area. Look forward to hiking many other trails in Mt. Rainier.
- ⇒ It was a wonderful hike.
- ⇒ It was beautiful.
- ⇒ I loved Spray Park & thank all of those that help to maintain it! Thanks!
- ⇒ Beautiful hike. Too many horse flies at beginning of trail.
- ⇒ Have been visiting yearly. [The] Restoration process in meadows is working well.
- ⇒ It was beautiful. The alpine flowers, the view of Mt. Rainier, and the marmot all combined to make a very enjoyable hike.
- ⇒ I enjoy the trails you provide for the public. You do great job considering the varieties of people you must deal with and try to make happy. Thank you!
- ⇒ It is a beautiful place. Trails and landscape [are] in good shape.
- ⇒ In some places the tread is not wide enough for two people to pass without one stepping off the trail.
- ⇒ Trip [was] thoroughly enjoyable. People were considerate and [there was] no sign of litter.
- ⇒ It was great! Please send me results.

Criticism

- ⇒ Appalled at meadow damage.
- ⇒ This area is being decimated from overuse. It makes me very sad to see the meadows used for weddings. Why isn't this park entrance controlled more? There seems [to be] no limit to all the cars parked, and hikers walk in all sorts of weird attire. It's no wonder the trails look so gutted. Who would want to wreck their sandals or soak their Keds when they can walk around the muddy areas? My last visit was not the special experience it has been before. I was absolutely appalled by the sheer numbers of hikers coming up the trail, the tents in the meadow and of course that wedding which sent my spirits to a new low. There are very few fragile alpine meadows that can take the impact of large groups of hikers. Very few in large groups have the self discipline to stay on the trails - they are all over the meadows. People don't understand just how short that growing season really is for vegetation. The public needs more restrictions and better education.
- ⇒ You've got it - too many groups of more than three lead to destructive and disruptive behavior.
- ⇒ The trail needed better maintenance -[it was] very muddy and wet. My memory of my only trip to this park is [of] an unkempt, fairly crowded trail. I understand that the park has beautiful trails, etc., but I'm reluctant to return.
- ⇒ The most annoying thing was the arrangement of boards put on the trails.
- ⇒ The rangers patrolled the Spray Park area pretty heavily. I felt like we were being policed.
- ⇒ Big parties are just too darn noisy!
- ⇒ Too many hikers leave the main trail to explore, eat, etc. It is starting to show especially in the upper meadows.
- ⇒ The road to Mowich Lake is horrible. The road is opened late in the season.
- ⇒ Big parties hiking together disturb me because they tend to be louder, spread all over the trail, and trample the meadow.
- ⇒ Too many people; very muddy trail.

- ⇒ I don't think I will hike in Spray Park during the summer again because of the number of people using the area.
- ⇒ We were shocked. We thought we were going to avoid the crowds. (The parking lot looked like a rodeo.) We'll go back when it's raining!
- ⇒ Saw a black bear! I think the trail is overgroomed -[it] doesn't feel like wilderness walking on gravel path that has edging.
- ⇒ First trip to Spray Park. Rather distressed at [the] number of people - especially unprepared people closer to trail head.
- ⇒ The trails are a muddy mess and spread too wide.
- ⇒ The trails through the meadows aren't clearly marked, making it easy to get off the path.
- ⇒ We were planning on staying somewhere around Carbon Glacier. The woman at the ranger station did not help us very well in making an informed decision of where to stay. The "Eagles Roost?" was where she recommended we stay. We were penalized for carpooling to Mt. Rainier National Park. There were four of us that drove together and we were only given one campsite for our two tents etc. We should have been informed of this before. Also, at the turnoff for Carbon Glacier or Spray Park we were forced to go to Carbon Glacier to get a camping permit, even if our destination was Spray Park. It seems like this car pollution might be minimized by placing one of the many rangers we saw at Spray Park parking lot to handle registration. The rangers who patrolled this campground seemed to be extremely rude to the park visitors. They looked to be out managing the campground. I feel that the Parks are here for people to enjoy and learn about conservation and the need to preserve our forests for future generations. In the 70's I spent time up at the high country in the Olympics. It was beautiful but trampled. I went back to Lunch Loch last fall. It was incredible how beautifully that restoration project was working. They had interpretive signs at the entrance to the camping area - the backpackers seemed capable of reading this and respecting the area. I think the park visitors need to be treated like the intelligent, well intentioned people they are instead of like grade school kids who do not understand the effects of their wanton acts. Park visitors want to see and contribute to the beauty of Mt. Rainier. It seems to me that Olympic park does a better job of managing the rangers to achieve the competing goals of wilderness management, and the impact on visitors to the park. When I go to the Olympics I feel revitalized. When I go to Rainier the rangers always seem to put a big damper on our

experience. By the way, we always follow the rules. It is too bad for all concerned.

- ⇒ My husband and I hiked the Wonderland Trail to Mowich Lake in 1991. We returned to Washington this year. Because the guides (written) said how wonderful Spray Park was, we wanted to see it since we missed it earlier. The trail was in very poor shape. You could see many side trails across the meadows. It was very disappointing. There were many other areas that were much prettier and less used than we saw in 1991. The only way we would go back to Spray Park is if we were going to complete the Wonderland Trail. You may want to harden the trails and cover up side trails - here in NY, we have done that & it greatly improved the overall conditions of the area.
- ⇒ There were too many people; however, that is true nearly everywhere.
- ⇒ Trip was very beautiful. Seemed well kept except for some of the trails.
- ⇒ My memory of Spray Park is a mixture of its beauty and peacefulness, and of encountering a number of people on the way. Not too many, but enough to have a small negative impact.
- ⇒ I have answered all of these questions on the basis that this trail is not very wide and it can be difficult to pass people you meet on the trail.
- ⇒ We go hiking mostly during the week which is very pleasant! But the one time [we took] the survey it was a Sunday and we sure did not like seeing so many people. Also [we] did not expect such a crowd back in Spray Park. That's why we decided [not] to go back there.
- ⇒ The road to Spray park is in terrible condition. I don't know if it's just good for limiting people coming to the park. The situation up there was not as bad as I imagined from the amount of cars on the road. Especially, off-trail wanderings brought us the privacy and pleasure we were looking for.
- ⇒ Happy to see trail restoration to restore eroded areas due to heavy use. I still see too many people wandering away from established trails stomping on delicate meadows.
- ⇒ I doubt that I'll return to Spray Park because the throngs of people certainly deprived me of the wilderness experience. Also, it was terrible to have to stay on the path at all times. I love cross-country travel.
- ⇒ The rangers patrolled the Spray Park area pretty heavily. I felt like we were being policed.

- ⇒ Thought it was extremely overused. I would not make plans to go back there at its present rate of use. I would virtually never go someplace that had people swarming everywhere like Spray Park did. Groups of ten? Ugh.
- ⇒ On the other hand, it was very pretty and I would consider going there for a walk - but not a wilderness experience.
- ⇒ The so-called "walk-in" campground at Mowich Lake [was] terrible. Why have it there at all if it can't be more pleasant? It was very pretty at Spray Park. We got to take a lot of pictures.
- ⇒ I was disturbed to see the number of "cow paths" criss-crossing the meadows. I believe these dirt trails were caused by visitors not abiding by the rules of hiking: Stay on the Trail.

Suggestions

- ⇒ Move the parking lot down the road to the Pauls Park T.H. Don't allow drive-in camping at the lake.
- ⇒ Visiting other wilderness areas since my hike to Spray Park has made me more appreciative of its fragile state. I am now more concerned about size of groups and frequency [of use]. I also favor additional charges to those using an area to help maintain it where needed.
- ⇒ Larger groups could be tolerated, spaced out. Also, behavior of younger hikers needs to change. They need to respect the fragility of plants and trees etc., in the mountains at higher elevation. People go to the mountain to enjoy the peace, quiet and beauty of the area. Large groups not only mess up the trails by their impact, some even leave their garbage. They spoil the beauty with their noise, and frighten the animals so you rarely see one anymore.
- ⇒ Spray Park has the reputation for being THE BEST hike for seeing meadow flowers. That is why I went there recently for my first and only time. The flowers were indeed lovely. However, upon viewing hiking pictures of my friends' on other hikes during this same time period I could see that their hikes had equal or better flowers. If you want less people at Spray Park you must get the word out - other hikes have good flowers too.
- ⇒ The upper trail could use some work.
- ⇒ I usually hike with a private club in a group of 8-12, so I'm more tolerant of other large groups. On the other hand, its very inconvenient, when one is in a group of that size, to be constantly stepping off the path for small groups. Though I've been to Tolmie Peak several times over the past six - seven years, I never dreamed Spray Park hike would be so crowded. However, the people I saw at the end of the hike in Spray Park were actually remarkably well behaved and considerate, if abundant. The area seemed well used, but not visibly abused. Where I experienced aggravation was in the first two miles of the trail from Mowich Lake, where the flow of other hiking parties seemed constant, and not always considerate about their manner of sharing the trail. Some were members of a wedding party who were in a big hurry. I also encountered several families with very young (under five) children on foot (some of these were just starting onto the trail as we returned in the late afternoon). This concerned me. I'm not so sure trails with this kind of traffic and elevation gain are an appropriate, safe place for children that young. I appreciate the opportunity to participate in this survey. Please forgive the crumpling - my mail carrier crammed the survey into a tiny apartment-sized mailbox.

- ⇒ No camping should be allowed in Spray Park. [There are] Plenty of other places to camp.
- ⇒ Obviously erosion and random trail blazing are major concerns.
- ⇒ From the tone of this questionnaire, I gather you are concerned about over-use of Spray Park. Though I appreciate solitude, I am not in favor of limiting access to the area. Maybe a management approach similar to Paradise or Sunrise would be appropriate.
- ⇒ Spray Park is a special place that should be open to everyone. Artificial limits on the number of people would be a shame if it prevented even one person from visiting Spray Park.
- ⇒ It's a beautiful park and it seems to be well maintained except for portions of the trail that were washed out and needed rebuilding.
- ⇒ I would like to see the road to Mowich Lake closed about one mile before you reach the lake. I don't believe vehicles should be allowed to drive right up to Mowich Lake (only NPS service vehicles). I was also disappointed by the obvious deterioration of trails at Spray Park caused by overuse.
- ⇒ Don't close the Mowich Road.
- ⇒ A few more signs would be helpful (directing to further destinations).
- ⇒ More education is needed, whether it is [in the form of] signs, pamphlets, or staff (volunteer or paid) along the trail. People need to be made aware of their impact on the wilderness. They need to be made feel responsible for maintaining it because they are. Weekenders may just feel that it is somebody else's job to keep up these areas so that they may enjoy it. Impose fines freely for infractions such as wandering off the trail, urinating, littering, etc.. Add a fee station at or near trail heads. Serious hikers will remain unaffected if they purchase an annual pass, and it may thin the crowds of wanton destroyers.
- ⇒ This was my first visit to Spray Park and I probably will not return. The park is too vast to bother with the crowds in this area. I spent most of my two days angry at the ignorance displayed around me. Use of National Parks and Wilderness Areas is a privilege. I am an ardent pack-it-outer and am outraged at the arrogance of those who think somebody else will take care of their mess.

- ⇒ Make literature available to children at their level so responsibility can be taught to them for their mature years. After all, whatever we leave behind is theirs.
- ⇒ Hiking in Spray Park was not a wilderness experience. I would be willing to go to [the] extra effort (reservations, etc.) in order to assure an experience that involved seeing fewer people. Also, visitors that I saw were careless and dangerous to the meadow, especially children. Education of visitors is necessary in order to protect the fragile areas [as well as] greater monitoring in heavily visited areas.
- ⇒ It's beautiful, and I think admission should be charged. I prefer hiking in areas where few other people are.
- ⇒ Please, less bureaucratic waste and better maintenance of the trails. I think your time and money would be better spent maintaining the trails than on surveys like this.
- ⇒ Trail maintenance needs improvement. Trails above Paradise are much better.
- ⇒ Needs serious trail maintenance. Most people I've seen are singles during the week (which is the only time I like at Mt. Rainier).
- ⇒ I enjoy being there without a lot of people but I wouldn't like to see a permit system imposed on me for day hiking.
- ⇒ The trail needs to be built up out of the mud so that hikers do not trample the meadows on the edge of the trail.
- ⇒ You need to protect the meadow with more boardwalks over wet areas.
- ⇒ Pave the road from [the] fork (at Carbon Glacier road) to Mowich Lake.
- ⇒ I thought overall the places and trails I visited were very clean. However, the trails themselves should have been more carefully planned. They also could have had less mud and water on them.
- ⇒ Definitely need more benches or places to sit and lunch, or whatever. One needs to trample wildflowers to get to rocks to sit on. They never said there would be a mail survey.

- ⇒ The size of a party doesn't always matter if they're quiet. People go into the wilderness for solitude. Education (signs, for instance) asking people to be quiet might help. I especially hate noisy teenage boys.
- ⇒ Add an escalator.
- ⇒ The sheer number of people take away the beauty of the park. Limit it on weekends, not during week days.
- ⇒ I would pay a fee if the trails were maintained.
- ⇒ This survey points out that it is party size that affects the hiking experience at a busy trail such as Spray Park. There should be busy trails with low mileage to pretty sites, for lazy folks, busy folks and people with kids and bad knees. But ban those Mountaineer Armies!
- ⇒ If making restrictions, you may want to corridor destinations. For example, I go to Observation Rock via Spray Park. I think I have less [of an] impact than those who go to Spray Park for the day.
- ⇒ The off-trail paths right as you enter lower Spray Park should be marked as such - both the trail and these paths look the same.
- ⇒ Should educate people on where exactly they can and can't hike, e.g., obvious trails that aren't on park map. Also, please send me employment information.
- ⇒ Limit access and/or charge [a fee] to cover costs of maintenance. People will start complaining and then just maybe there will be adequate resources for proper maintenance. However, I do believe that limited access will be necessary given: 1) increased population in the area 2) increased popularity of outdoor activities, and 3) decreased available wilderness (but maybe we can get John Q. Public to complain about this one too!).
- ⇒ Very enjoyable. Not too crowded since it was mid-week. (I think it would be [a] great idea to limit party size to two in such a small and fragile area.
- ⇒ I am concerned with visitor damage to trail side and plants. More Maintenance and education [are] needed.
- ⇒ Spray Park is too heavily used simply because large groups of people can drive right to the trail head and park their cars in a mall- like atmosphere. Close the road five miles back from Mowich and the problem is solved.

Only genuine hikers will do the extra five [miles]. All the others can drive their cars to "Sunrise" or "Paradise", enjoy the view and do a little eating and shopping. Keep these two places for the day trippers, and keep the rest for wildlife and people who really appreciate it.

- ⇒ Spray Park is over used. It would be better if Mowich Lake was closed two miles back down the road, thereby making Spray Park more for the serious hiker, [and] also preserving Mowich Lake which way over used.
- ⇒ The people on the trail are great. There is no trash left by hikers. The real problem is the trail. There is a real need for trail crews to get the upper trails maintained. I think money for trails crews is a big money problem.
- ⇒ I first visited Spray Park five years ago. Since that time I would estimate the number of people has increased considerably making the hiking trip less enjoyable. People are not staying on the trails and there has been a lot of meadow destruction. At Mowich Lake on the small island, a group of people lit their barbecue and had a raging fire. Several people were upset and we looked for a ranger. No one was available because of the survey. These people were loud and rude. I didn't have the courage to talk to them since I am a female and they were super macho. I felt it wouldn't have corrected the problem, [and] they would have become more antagonistic. I'm surprised since the road hasn't been maintained that so many people still visit the area.
- ⇒ I would very much favor the possibility of applying for a permit for camping at Mowich Lake and a fee as they have at Carbon River or Sunrise so that they would be able to hire more people to maintain the area. This may be very necessary since Spray Park/Mowich Lake area receives the least amount of funds for Rainier Park. Government will cut funding for the parks soon if they haven't already.
- ⇒ Five years ago there was more wildlife visible, which also makes the hike most enjoyable. We saw a bear, deer, more marmots, and in the campground the largest deer with an exceptionally huge rack of antlers. It may have been an elk. We had camped for three days. At that time, it was one the nicest areas I'd enjoyed staying at. I hope that measures can be taken as soon as possible to maintain the beauty of the environment for future generations.
- ⇒ I would gladly participate in any future studies, although I do most of my hiking trips in the Olympics. When I retire, I hope to volunteer my time in the summer to the National Park Service for whatever needs there might be for preserving our wilderness recreation.

- ⇒ Parks should charge a user's fee to hike [and] use these funds for maintenance and staffing to educate the public about parks and nature.
- ⇒ Too many large, loud parties. I would favor use of a permit system if that's what it takes to limit party size and density. I don't expect a wilderness experience, but this was a bit much.
- ⇒ I would like to volunteer to remove the paint from rocks along the trail. I respond very unfavorably to painted trail markings.
- ⇒ Put some solar or compost toilets in. I don't think any other type of structure is appropriate (picnic tables).
- ⇒ People will walk where they please despite attempts to channel and contain and instruct them.
- ⇒ The partially built trail sections - rock frame to be filled in with gravel (I presume)- were very effective in getting people to walk on the side of the trail, not in it. I hope these sections are completed now, otherwise the trail will keep getting wider.
- ⇒ Please keep the roads to White River Campground and the to Mowich Lake open in the winter!!! And to Sunrise!!!
- ⇒ These questions about meeting people on the trail are like the apex of subjectivity. There are a million variables not considered!!!
- ⇒ Saw large number of people off the trail and in the meadow area, which is too fragile to handle that abuse. Hope you're planning to address this issue. I suspect permitting is in store.
- ⇒ I like the accessibility and I don't mind sharing the beauty. Having the park so close brings people that otherwise wouldn't visit any wilderness area, and the value of that experience outweighs the inconvenience of having to share the view with others. Not so for the Sherman Route - climbing should be restricted to limit risks and waste accumulated on the glacier. I'm for [an] insurance fee for climbing parties to participate in reserve costs.
- ⇒ There is a comfort zone of seeing enough people to make us feel we are not too crowded or too lonely. I also think there's a big difference in what kind of big group I encounter. I don't mind meeting a group of 20 geology students with a guide, but I would feel uncomfortable with a group of 20 teenagers who may have been drinking.

- ⇒ Altogether, I believe the wilderness should be open to anybody who wants to hike, but I would like the park to be managed in a way that would make me feel safe.
- ⇒ I do appreciate your efforts to improve the park.
- ⇒ The trail erosion is sad. People have to learn to stay on the trails. It's not so much the number of people that affect my enjoyment, but how those people treat the trail and the place.
- ⇒ Trail maintenance and erosion control seem to have improved since my last visit (~2 years ago). Continue this improvement and continue camping restrictions. Police "climbers camps" above the divide between Spray Park and Seattle Park. "Highway paint" trail markers are jarring, graffiti-like. An alternative should be sought, though I don't encourage cairn-building either!
- ⇒ Groups of more than four could tend to cause more damage. Four can walk single file and quietly, but more could become a problem.
- ⇒ I don't think it is proper to control the number of people by releasing queues. IF a trail has many people and you don't like to see people, you have the choice to hike elsewhere. There are places that are difficult to hike that very few people will see. Try bushwhacking through Devils Club. You can't expect to have an easy trail with no people in an accessible area. If you want less people to travel Spray Park why not make the approach road very rough so less people can drive it in their cars?
- ⇒ It appears that you are considering limiting access to Spray Park, perhaps by adding restriction to day use to those restrictions already in place over camping. Please consider the likely consequences that day use restrictions for Spray Park will have (i.e. increased use of other areas in the Park). Thus, it would become more difficult to find solitude in those areas, which at present are less heavily used. Further, the impacts of human activity, now seen at Spray Park would become widespread throughout the Park.
- ⇒ Perhaps it would be wiser to designate Spray Park an area for heavy day use, due to its popularity and its ease of access. Continue with the trail building now underway, and add some permanent side trails as well. Thus, those people with little time or experience in the mountains, those not in the best of physical condition, and those with small children (one circumstance) could still enjoy a hike to a mountain meadow.

I believe that Spray Park is popular more due to the ease of its access than due to anything extraordinary about it, in comparison to other meadows in the Park. When our children are older, we will go to other meadows where access is more difficult and there we would like find solitude and the landscape less disturbed.

- ⇒ Trail would need to be wider.
- ⇒ I would like everyone to have the experience of situations such as [in] Spray Park.
- ⇒ It would be nice to have broad, graveled trails everywhere.
- ⇒ I would pay day trip fees to have nice trails. I would volunteer for trail building. As a hiker and mountain biker, I would like to see separate classes of trails for each. Currently, on a 15-20 mile leg of the wonderland trail as a day trip, on the middle stretch away from the trail-head, you may only see one or two dozen people in a day. To me, this is not over-use. Thank you.
- ⇒ Our group was hoping to see a more favorable picnic area with benches, grassy fields to walk on, and port-o-toilettes or bathrooms. We greatly enjoyed the scenery of the lush fields as well as the interesting acoustical properties of the nearby hills (the echo). If anything needs to be added to the park it's more maps, and/or distance markers. When we started at the trailhead junction of Spray Falls/Spray Park, we had no idea of what Spray Park was or how long the trail continued. Our group had an enjoyable afternoon there, but we were unprepared for the size of the park and length of the trail. Your consideration to install more map boards with distance markers would be most appreciated.
- ⇒ My first visit to Spray Park was in a continuing education class with about 25 students. Because of our different abilities and experiences, we were spread out several miles on the trail many times, thus not appearing to be a large group. In whatever efforts are made to monitor the number of people in the Park, please don't penalize organized classes. This class strengthened my conviction to protect wilderness/old growth - not only for aesthetic reasons, but also for the purpose that this environment aids the earth and people.
- ⇒ The beauty of Spray Park could be preserved by limiting the number of people in the park per day. When I go hiking, I do it to get away from it all, find solitude, and enjoy nature. My last trip to Spray Park was a joke. We counted over 75 people on the trail that we passed! I realize that

Washington is growing and everyone wants to enjoy the view, but it's not worth going when all you do is pass person after person on the trail.

- ⇒ The last time I went to Camp Muir in June '93, I was also shocked by the masses of people on the way back to Paradise. In the future I will only visit the park in the winter (backcountry skiing) or during the week in fall. I would rather drive two hours and go to the Olympics to get away from it all. I just hope that someone comes up with some way to limit the numbers of people in wilderness areas.
- ⇒ Spray Park, Summerland, Ice Caves, and Von Trump are all rather arduous hikes, appealing to those who are willing, capable, enthusiastic, nature-lovers. These aren't the ones we worry about. It's the ORV, ski machine, snow-mobile types who abuse our land, rather than nurture and love its nature and peace. Please don't penalize those of us who care, respect and treasure each needle laden path we trod, each crisp, sweet, fresh breath our wilderness offers, each eternal, majestic view we earn of our mountain.
- ⇒ I encourage more educational programs about the fragility of the meadows. Don't make the park more accessible or it will be ruined.
- ⇒ It is exciting to see groups of people exercising and enjoying the scenery and companionship. The more the merrier - if they are all environmentally/ecologically considerate. "Rules of the Road" or "Rules of the Trail" must be clearly communicated (including explanations as to why no meadow stomping) to park users. Continued education is needed as Washington Parks are increasingly visited by out-of-state and international visitors, some of whom come from areas less environmentally sensitive.
- ⇒ Thank you for asking and taking the time to collect the data! M.
- ⇒ People wander across country too much. Allow a few trails away from developed [the] trail.
- ⇒ Very pleasant. It would be nice if I know for sure if I can walk on the trails that lead to the lake or ponds. I did stop at a side to take pictures of wild flowers!
- ⇒ Maybe if you charged a fee at that entrance more people would stay away!

- ⇒ Although I recognize the detraction of pit toilets to the aesthetic beauty of the setting, perhaps some inconspicuous, but well marked ones, could keep people on the trails and out of rehab areas. [I] Also want to compliment the Park Service on the good condition of most of the trails. Thanks.
- ⇒ The number of people needs to be limited. Given Paradise, perhaps the trail up to Spray [Park] needs to be limited to "other trail" hikers.
- ⇒ Too many rowdy kids [were] tromping ground off the trail. I feel day hike permits would be nice for congested areas like Spray Park.
- ⇒ I would like to see fresh water available at Mowich Lake to limit trip back and forth.
- ⇒ I'd like to say that prior to my on-site survey, I hadn't heard any jet noise. After my descent, I heard two jets fly overhead - very disrupting. Also, I was discouraged when I witnessed hikers eating and resting in the meadows, off the trails. My understanding of sub-alpine flora indicates this is a hazardous practice. Perhaps educating hikers at the meadow's entrance with a plaque might help them understand how to respect this fragile system. Thanks and good luck!
- ⇒ I don't want to be too selfish about use of any National Park because that is what they are for. However, to protect the park it may be necessary to implement [a] reasonable limited use permit. I think the size of the party should be limited to approximately eight, a limit on total hikers at any one time should be established, but not a limit to create complete solitude. Thank you for this. I love Spray Park and I did not mind others enjoying it as well while visiting there.
- ⇒ Just from my short two day stay at Mowich Lake I can see why you are performing this study. To minimize trail meetings and off trail trekking, it might be an idea to have a series of secondary trails through Spray Park to detour to "scenic views." Losing a little bit of the "wilderness feel" might be worth having an extra set of trails so there is that much less cross country travel in a fragile environment. I'd never been to Spray Park before, but would go again.
- ⇒ Park upkeep should come from common funds, just like other social services - whether they are used or not. I pay taxes for lots of things that don't benefit me directly.

- ⇒ Whether I like meeting large groups or not - everyone should be able to enjoy the wilderness areas. I can always go further into the wilderness if I want solitude.
- ⇒ Spray Park trail needs a lot of maintenance, and the Park needs to ask people to stop having lunch and sitting down on the foliage. (if you people had spent as much time and effort on the [issues] above, the problem would be solved)
- ⇒ My enjoyment while hiking in Spray Park has not been adversely affected by encounters with other hikers or backpackers. Usually I am more distressed by overt controls or constraints placed by the Park Service in the attempt to protect the environment. While I understand the need to preserve areas of high traffic, I think that education is the key to successful trail management. Laminated guides describing the area, it's flora and fauna, and pointing out those areas where heavy human encroachment has adversely affected the area, would offer people a chance to be participants in the efforts to preserve and protect. I always feel better when I am part of the solution, instead of being treated (or managed) as if I'm the problem. The number of visitors can hardly be controlled. The quality of the experience can definitely be improved. Thanks for your efforts.
- ⇒ Don't worry so much about people seeing other people!! We expect to see other people in such a beautiful place. Worry about physical degradation instead and harder things!!
- ⇒ Spray Park, to me, is just one very well traveled trail. I believe such trails are important. They are important to people with young children, and to people who have minimum hiking skills but enjoy the lovely mountains. That is GOOD. I am still able to seek the more remote and more difficult [areas]. The time will soon come when I cannot, and the likes of Spray will be a part of my joy. So it is with a perspective that I judge. I expect [to see] people at Spray [Park], Paradise, Comet Falls, etc. There are other trails I cherish for the quiet, the beauty, and the lack of people. Spray Trail is surely in need of repair. Thanks
- ⇒ I saw much evidence of overnight camping in a non-camping area. Too much heavy use; beautiful place to visit though.
- ⇒ There should be a chemical bathroom facility - it's better than having everyone going behind a bush - possibly at the edge of the first meadow.
- ⇒ Parking was a problem; suggest shuttle service.

- ⇒ I would like to see clear markings on which trails should not be walked. I would rather see more signs and less trampling. I think more education needs to take place on what is acceptable behavior. This might include a short set of rules to be read and signed by hikers at the trailhead. Willful abuse is one thing, ignorance is another. I believe a lot of damage is done through ignorance. With a well-behaved population of hikers, I am much less concerned with the numbers. It may also be wise to develop a few more "destinations" that would have stone seats, etc. - so that people would not make many of their "lunch spots" [in the meadows]. By developing some places for high usage you will save over-use on many other areas. Thank you very much for sending me another copy of this survey - I lost the original in September. Good luck with hard decisions.
- ⇒ If things don't change a great deal from the status quo, Spray Park is still a great place to go. If a latrine were available, off trail use would decrease. I hope access does not have to be limited.
- ⇒ Do not mind preserving the wilderness through a permit/fee scheme.
- ⇒ I expect to see more people at Spray Park than other places because of its accessibility and beauty. Because I expect to see more people, solitude is not a major motivator when going to Spray Park. I would be more unfavorable to large numbers of people, or a continuous stream of people in other areas when I am on a long hike. The day I was at Spray Park it was busy. We came early and hiked farther than most people, so [we] were not in the crowds; but I did not mind a lot of people as we met at the checkpoints and coming down the mountain. I think limiting access to park areas should be done to protect wildlife and vegetation, not primarily for the purpose of ensuring that those who go have solitude. Greater access can mean greater public appreciation of nature and greater support for park departments, nature, and preservation.
- ⇒ I enjoy trails that do not have nearly the traffic I found. Maybe some trails can have restricted access.
- ⇒ People entering the park need to be told verbally to stay on trails and look at - not pick - the flowers. Many people do not follow the written pleas. Foreign people cannot read signs.
- ⇒ Mark trail at fork top of ridge after Spray Park.
- ⇒ Limit number of day hikers on a trail (depending on party size and hikers still hiking)
- ⇒ Ban aircraft overflights except for emergency rescue.

- ⇒ I'm glad on [the] trail and [do] not create any more damage! I realize that other people would like to use the park so it might make sense to have large groups accompanied by a group leader to keep them in line! Of course, I don't want to see someone is working on improving the trail so that people will stay have to go in a large group!
- ⇒ Given the proximity to Seattle & Tacoma & the easy hike, I was expecting to see a lot of people at Spray Park. Since I was expecting a lot of people and because Spray Park is a big area, I still enjoyed my visit! I feel that with the increased amount of people visiting the Parks, some (more) areas will need to be set aside for highly populated areas (as long as there is little or no environmental damage). For those that want to get away from the crowds, they can always climb to the top of the mountain!
- ⇒ For future use of Spray Park: 1) Continue to prohibit camping. 2) Continue to build durable trails, with a few side trails added to favorable viewing/picnic areas. 3) Continue (unlimited) public access: It will be self-limiting to those who don't like crowds because they won't go back. It will provide a back-country experience to those who normally don't go in the back-country, which in turn may encourage people to take better care of our natural resources!
- ⇒ I feel there should be a number of dead end trails to various pleasant viewpoints (the dead end should be indicated on a small sign board). I dislike the elitist attitude of the Park. The Parks are for people as well as being environmental museums. That being the case, specific environments should be accessible to [people with] various physical abilities. For instance, the Paradise Park is available to physically limited persons. Spray Park access is more arduous, but still accessible to many persons, and has a reduced visitor rate; therefore, those willing to hike can have an experience involving fewer people. There are parks that are accessible only cross country and thus almost never visited. I think a graded range of access should be available to park visitors, not a policy of making things inaccessible to all but the most fit and determined.
- ⇒ At Spray Park people are going to go see specific features and the trails to them are not going to go away. Thus the intelligent response would be to make satisfactory trails to them (once again dead end trails). The park should continue to be a no camping area.
- ⇒ More signs and detailed maps of area would be a big help.
- ⇒ Spray Park is a great place for a hike any time of year (summer/fall). True it gets a lot of use, but for the most part, human impacts are limited to

relatively small areas. I feel that if measures can be taken to keep people on the trail, then that is sufficient. If people need more solitude then they should arrive at the trailhead earlier, as I have done many times. I don't think a permit/fee system is warranted. Thanks.

- ⇒ I am concerned you might limit access to Spray Park and feel this would be unfortunate.
- ⇒ Road to Mowich should be better maintained.
- ⇒ The fewer people seen in the backcountry, the better. As the demand increases for hiking areas like Spray Park, the response should be to create more wilderness areas protected for recreational use.
- ⇒ There should always be some access to this area at all times without reservation.
- ⇒ I like to hike in Spray Park, but on my two visits there I found it practically impossible to find any privacy or solitude -even after leaving the main trail. I understand that inexperienced people hiking on the meadows damage the wildlife, but there are just too many people in Spray Park to expect people to stay on the trail. I think the road needs to be closed at Paul's Peak, and I think there should be more education at the entrance to the Park as to where and how to hike responsibly.
- ⇒ Improve trails to minimize environmental damage. Don't restrict access. Encourage people to see the beauty of nature. If Spray Park is too crowded, let the people who hate crowds go elsewhere. Do not restrict access to hikers.
- ⇒ Visited on Labor Day weekend so it was expected that we would see [many] people. However having the trailhead so close to the lake with the campground, and such a short hike to the meadows, also increases the number of people seen and the abuse of the meadows. I would like to see the trailhead moved back down the road. The westside road is now an ideal situation and the only place where you can really be assured of any isolation in the Park. The Park already has enough easy access to high elevation meadows.
- ⇒ I was impressed with the care being taken to protect meadows. Need outhouses of some kind.
- ⇒ I visited Spray Park on a beautiful, warm Labor day Monday. I came away with a very positive feeling. The Park was magnificent offering many off trail roaming [possibility]. The views were spectacular. I did not find the

park crowded, trashed, over-run or cut-up with too many "social" trails. In fact, considering the time of year and the particular day I visited, I must emphatically say the park was much less crowded and trampled than I might have guessed. I would suggest completing the trail upgrades and increasing efforts to educate visitors regarding off trail hiking techniques and wilderness sanitation. In general I would say the park is in fine shape despite heavy visitation. Avoid the temptation to over manage these areas. Accept that the understandable popularity at places like Spray Park will lead to a certain amount of unwanted wear and tear (although this was not much in evidence). Work to mitigate and repair this, rather than limit the visitations through permits or road closures. MRNP has already gone too far recently in limiting access through road closure (outright closure e.g. West Side Rd, lengthy seasonal closures e.g. White River/Sunrise) and permitting). It's understandable to be very concerned about the fragile alpine ecosystems under the weight of constantly increased visitation, but making access more and more difficult is contrary to the mission and purpose of a National Park. Working to educate and distribute visitors is better policy than limiting and herding them. P.S. The new parking lot-turned-campground at Mowich Lake is perhaps the least inviting, denuded, campground I've seen in any National Park.

- ⇒ [For] The number of people I saw, there should be toilets!
- ⇒ I think you need to have instructions in Japanese. Many Japanese tend to trample the vegetation in order to take pictures of their partners. We cherish the area and bristle when we see people violate the quiet and forget that any destructive act lasts for many years. I could not believe the number of cars in the parking area this year. I guess that things are as good as they are ever going to be right now and that it will only deteriorate in time. I guess that goes not only for our parks but [also] for our neighborhoods and cities. I feel bad for the future generations because they will never be able to see the world as it is today. They will read stories about the time fish ran in our clear streams and wild animals appeared in the small towns. You park employees have a difficult job ahead of you. All you can really do is slow the changes that shape our environment, but you can't really stop the destruction. Good Luck!
- ⇒ Appreciate very much the hard work being done this summer on the trails. Would like to see a little more freedom to leave the main trail, especially in the upper park areas, where side trails were blocked off even though they seemed fairly minimal. I realize this may cause more damage. Perhaps a small amount of maintenance on some of the side trails would extend their useable lifespan without adding too much to the workload. Spray Park is gorgeous, but because the main trail seems to be something of a highway for hikers & backpackers, and because of the

area's acoustics, it can be hard to enjoy in peace. A chance to get around the corner or over a hill would help.

- ⇒ I was discouraged to see a great number of people leaving the trail and walking disrespectfully in the woods and across the meadows. I think there needs to be signs discouraging people from doing this. Also, maybe there should be a park entrance fee at Mowich Lake to keep away those who might be disrespectful to the wilderness. Thanks!
- ⇒ The sheer number of people take away the beauty of the park. Limit it on weekends, not during weekdays. In spite of preferring fewer people in the wilderness, I would prefer to encounter people [rather] than be denied the opportunity of hiking! The people one encounters are usually considerate of the environment. They are mostly pleasant folks. They pass you on the trail, say a few words and are gone. I'd rather have them all there than take a chance at being denied access to my favorite hikes. So..If you are planning to limit access based on the survey, then people are all "favorable" and only being told [that] I can't go this week is "unfavorable."
- ⇒ I don't think you should ever be charged for hiking in National Parks!
- ⇒ I feel the trail needs to be closed to dayhikers while under construction. The gravel was not in place yet and it was like a river between the sides of the trail - steps area forced us to walk on the higher edges where the fragile meadow flowers are. The day was after the first thaw and it was muddy. It must have been hard for the trail crew to work with us hikers there. As an aside, during the summer of 1993 I spent time in Alaska in Denali and in Gates of the Arctic. A good job is done especially in bear/animal awareness education so that no human food becomes available to the animals. Also, when entering Rainier, our hiking group would probably be happy to put an entrance fee in our envelope and deposit in a slot box when no attendant is there.
- ⇒ We followed another party off the wrong trail. I think we should have known, but didn't. Maybe the trail could have been marked better.
- ⇒ My most negative experiences were encountering families who allowed their children to run, scream and trample the environment. It ruins the tranquillity of the wilderness experience and scares any wildlife that might be seen. Also, I would like to see smoking banned on wilderness hiking trails.
- ⇒ I would encourage people in small groups to visit. More trail construction should be done to make it accessible. Hiking is very important part of the Northwest.

- ⇒ Close the road to Mowich, provide parking at Paul's Peak, and extend [the] hike to Spray Park by two miles. I love Mt. Rainier National Park!
- ⇒ Please make sure people do not take advantage of the park and wander off trails too much.

Miscellaneous

- ⇒ I visited Spray Park two times this summer. Both were very pleasant, with not many people.
- ⇒ Given the pressures on wilderness areas, Spray Park did not feel overtly crowded. The higher elevations had virtually no people.
- ⇒ Regarding Q-6, people shouldn't be hiking alone. I like seeing people on the trail. For safety reasons it's comforting to know people are close by. Though I don't come to Spray Park to be absolutely alone I have never felt overwhelmed by crowds. In fact I have always seen very few people at the crest of Spray Park and the top of Seattle Park. It's a wonderful place to hike.
- ⇒ The trail was heavily traveled, but everyone I met was courteous and seemed to stay on the trail; it was more or less peaceful.
- ⇒ Going on Friday [there were] not too many people. Wouldn't want to go when crawling with people. I go there to get away!
- ⇒ I only got three mosquito bites! Very favorable!
- ⇒ Actually, when we were in the park (maybe as a result of the weather), we did not see a lot of people.
- ⇒ We lost the trail in the meadows.
- ⇒ I'm not as concerned about seeing people as I am seeing damage to the landscape caused by their trail erosion and myriad of side trails. I see behavior to be crucial factor. I don't mind a party of four that is calm, or should I say, reverential to the place. But, if this party is chattering, shrieking, "yee-hawing," dog-barking, flower picking, latrine digging, etc., I would not be favorable.
- ⇒ Beautiful. Bathrooms or stay off meadows?
- ⇒ It was a gorgeous day, but it was a bit more crowded than I had expected (about 10 minutes between parties).
- ⇒ It's in surprising good condition, i.e., few side trails, evidences of camping, signs of erosion, etc.

- ⇒ I enjoy seeing people enjoying nature. I get negative when I see damage, not people.
- ⇒ The erosion seemed more dramatic. I actually got "lost" on a spur. It wasn't near where the main trail was. It was also interesting that the number of cars in the parking lot did not match the number of people on the trails. I'm into limited use - I'd rather go less frequently than spend my time waiting for the crowds to thin so I can get uncluttered pictures.
- ⇒ Large parties would make the trails wider.
- ⇒ Make one to two trips to Spray Park each year. Prefer weekdays with few people.
- ⇒ I was saddened to see the damage to the trails during my last visit, although I have to say that I noticed little damage off-trail. I am one who has supported increasing wilderness areas, banning motorcycles and ski mobiles from roadless areas, and restricting horses. I strongly believe that the wilderness does not just exist for our pleasure, and that we must act to preserve it. If this also includes limiting the amount of foot traffic, then I also support this measure. It's only fair that we who love the wilderness are willing to make the sacrifices we've asked of others.
- ⇒ In the past five years of hiking at Rainier this was my first trip to Spray Park which I'd heard was always crowded - it was. Expectations change your tolerance level to lot of people.
- ⇒ I enjoyed myself. Some parts of the trial needed repair or were in the process. I think the fact that it was a weekend and [there was] still sunny weather contributed to the amount of people. I would imagine Mt. Rainier is popular because it's so close to Seattle and outdoor recreation like hiking is an increasingly [popular] past time.
- ⇒ It was snowing.
- ⇒ It was cold and raining, so we didn't see very many people.
- ⇒ Twelve is about the largest group I'd ever like to see.
- ⇒ I have stopped expecting to have a "wilderness experience" on a day hike on a weekend in a national park. It just doesn't happen. So I wasn't too disappointed to see a lot of people at Spray Park. I know that if I want solitude. I have to work a bit harder than that.

- ⇒ I'm a native Montanan and that was my first trip to Mt. Rainier. It was more crowded than what I'm used to, but it's good to encounter at least one person every 30 minutes in case you encounter problems.
- ⇒ On the hike down from Spray Park, we encountered 120 down the trail.
- ⇒ It is not just the numbers of people that one meets; very much it depends on their environmental manners and general behavior. If they are quiet, keep on the footpaths etc., one does not object so much to passing such people. But when they are shrieking and yelling, two can be too many.
- ⇒ I value "solitude" experience greatly. I always prefer to see only a rare person or two. I also prefer to hike with groups of four or less. Two is the ideal number for me on a hike.
- ⇒ My second trip to Spray Park was on Labor Day weekend. I felt that there were many more people around than in the middle of the week when I went the first time. [On] The second trip, the weather was better so it was worth the trip for the view, but the trail was crowded. It did not feel like a wilderness but like a mall. I don't know how my experiences would compare to a typical summer weekend.
- ⇒ The number of people our group encountered was not excessive --it was a weekday.
- ⇒ I really enjoyed it. I don't mind other people who are conscientious. Most people are. I do like to see other people every 30 minutes or so; if I get hurt, it would be important to see someone else who could help.
- ⇒ I think it's great that people want to be out in the backcountry. In fact, I wish more elderly folks and small children would make more use of the parks. But I don't like to see large groups too close together.
- ⇒ I like seeing other hikers on my hikes. I am a sociable person. I feel safer when I see people. This tells me that if something happens to me, help may not be far away. This is one reason I always hike in a group. There is a lot of beautiful country around here and I have never found it overcrowded. I like to meet people on the hike, [and] sometimes a word of encouragement or a description of a beautiful vista makes the hike just a bit easy for us folks who are over the hill.
- ⇒ Since I am fortunate enough to be able to go on weekdays. I've never been overwhelmed by people at Spray Park. Also, I tend to go off the main trail to Mt. Pleasant or toward the mountain.

- ⇒ Didn't like hearing the airplanes.
- ⇒ A major reason for hiking in that area is to photograph the resident black bear, goat and butterflies.
- ⇒ The day we went it was very quiet!
- ⇒ Exception to large groups: the scout troops we have met (twice -groups 15-25) were great! [They were] Polite, "shared", [and] yielded to heavy-packed uphill etc.
- ⇒ We do not want to answer the remaining questions, because it appears access to nature is planned to be limited in the future.
- ⇒ I've not encountered many parties of 10 except Scouts, but I get your point. On certain days, especially weekends, it gets overcrowded.
- ⇒ I am somewhat more tolerant of crowded trails in Mount Rainier National Park than in other areas because of its national park status and its status as one of our national landmarks. I would be very disturbed by encountering such numbers of people in, say, the Pasayten Wilderness, or even the Alpine Lakes.
- ⇒ It is understandable that many love Spray Park, thus I am willing to accept the crowds despite size and frequency. It's [not as] bad [as] most Yosemite trails.
- ⇒ People were walking over the meadows, I observed during our last visit.
- ⇒ Sorry my response is late - hope you can use it.
- ⇒ Although crowded, I thought the Spray Park trail to be one of the most scenic I've been on.
- ⇒ One reason that I travel to Spray Park is to get away from crowds. You might say "Paradise" is a relative term.
- ⇒ Lots of flies and skeeters. If there are too many people per group, some [of those] people then are much more careless.
- ⇒ During a day hike, I expect to see people but for overnight trips my expectations change.

- ⇒ I have hiked there three or four times over the last several years, usually on a fall weekend and have never felt crowded or disturbed by [the] presence of too many people. I usually hike well beyond the meadows and up on the ridges, and have rarely encountered anyone up above. Most trails and areas I hike in (mostly in North Cascades around [the] Mt. Baker area) are similarly populated. They are usually crowded within a few miles of the trailhead but drop off beyond that; solitude is very easily attainable.
- ⇒ I walk mainly in National Parks on the central coastal areas of New South Wales, which have steep sandstone cliffs (200 feet) overlooking the ocean, interspersed with beaches. The cliff tops are covered with low coastal heath, dry Eucalypti forest and pockets of sub-tropical rainforest along creek beds. I also walk regularly in the Blue Mountains behind Sydney. The name is a misnomer as they are really gorges. The townships are on a plateau with 1000 feet sandstone cliffs dropping into the gorges. The cliff tops are covered by dry Eucalypti forest and some heath. The valley is rain forest along the creeks. Waterfalls are fed by seepage and [are] at low volume compared to yours. The hiking trails consist of rock cut steps, [and] steel stairways descending to the valleys with cliff top and valley trails. It is so different from Mt. Rainier scenery [that] it is impossible to draw comparisons. I enjoyed what little I saw of Mt. Rainier greatly. Possibly because it is so different.
- ⇒ I like to see people on the trail so I know I'm not out in the wilderness alone. Yet, I like to have 20-40 minute stretches alone to be at peace. Another bias you might find in my circles is that I don't think people should hike alone because it's not safe.
- ⇒ Our party of two went on a weekday, and only encountered several other parties of two or three people. The others we encountered were always courteous and friendly. This has been pretty much the way it's been on all hiking trips to Mt. Rainier National Park.
- ⇒ The mountains belong to all of us, but we have a responsibility to preserve our wilderness as best we can without keeping people out. I rarely hike on weekends with the crowds but I live so close it's easy to go other days.
- ⇒ Whether visitors are encouraged (or discouraged) from using side trails to vista points, etc.
- ⇒ I enjoyed everything except the flies. Thank you for doing this.
- ⇒ It was cold and raining, so we didn't see very many people.

- ⇒ There were a lot of cars there but not too many people encountered on the path. I also saw some people trampling vegetation off the trail just to find a walking stick. There were four people.
- ⇒ The only down side of my trip was [that] the trail was thick with mud at areas.
- ⇒ I realize [being] a lone hiker puts me a bit on guard! Parties of five and more, if close together, do not foster my wilderness experience. Spray Park is a magical place for me, and I hope to return at least once every year for the rest of my life. It feels to me like a spiritual home.
- ⇒ The day we went it was very quiet!
- ⇒ Since I live outside of Washington, my trips to your area are infrequent.
- ⇒ I thought it was a very enjoyable trip besides having to park far from the trailhead alongside the road.
- ⇒ Most hikers I've met on the trail are very courteous. This survey does not truly reflect my responses. A rowdy group of four every 30 minutes would be far more disturbing than a group of 20 respectful hikers over the same time period. After all I go to the mountains to be at peace and to escape the noise, familiarity, rudeness, and stress of daily living. There's nothing better than fresh air, a little exercise, and beautiful scenery to do the trick. As long as hikers don't disturb these things I don't mind them.
- ⇒ I consider it a high use area and do not expect as much solitude as elsewhere.
- ⇒ Spray Park as it stands is a very beautiful place and does not yet show many signs of human impact. I would like to see it stay that way.
- ⇒ Normally I hike alone and welcome the presence of others. I believe that everyone should have the right to enjoy the outdoors. There are never enough places for the public to walk. There are very few right-of-ways and the more access the public has to the land the better. Too much land is in private hands. Also, it is important to have hiking places which are safe from hunting where people can recreate in safety.

APPENDIX E - HOW TO USE THIS REPORT

This section is a brief introduction to the basic statistical methods included in this report. It defines some key terms and illustrates the ways in which the statistical tables and graphs have been prepared.

The main tool used in statistics is data--those observations and measurements that are recorded in a study. As commonly used, the word "data" is plural. For example, all of the visitors' ages comprise data. A single unit of data -- for example, the age of a single visitor -- is a datum.

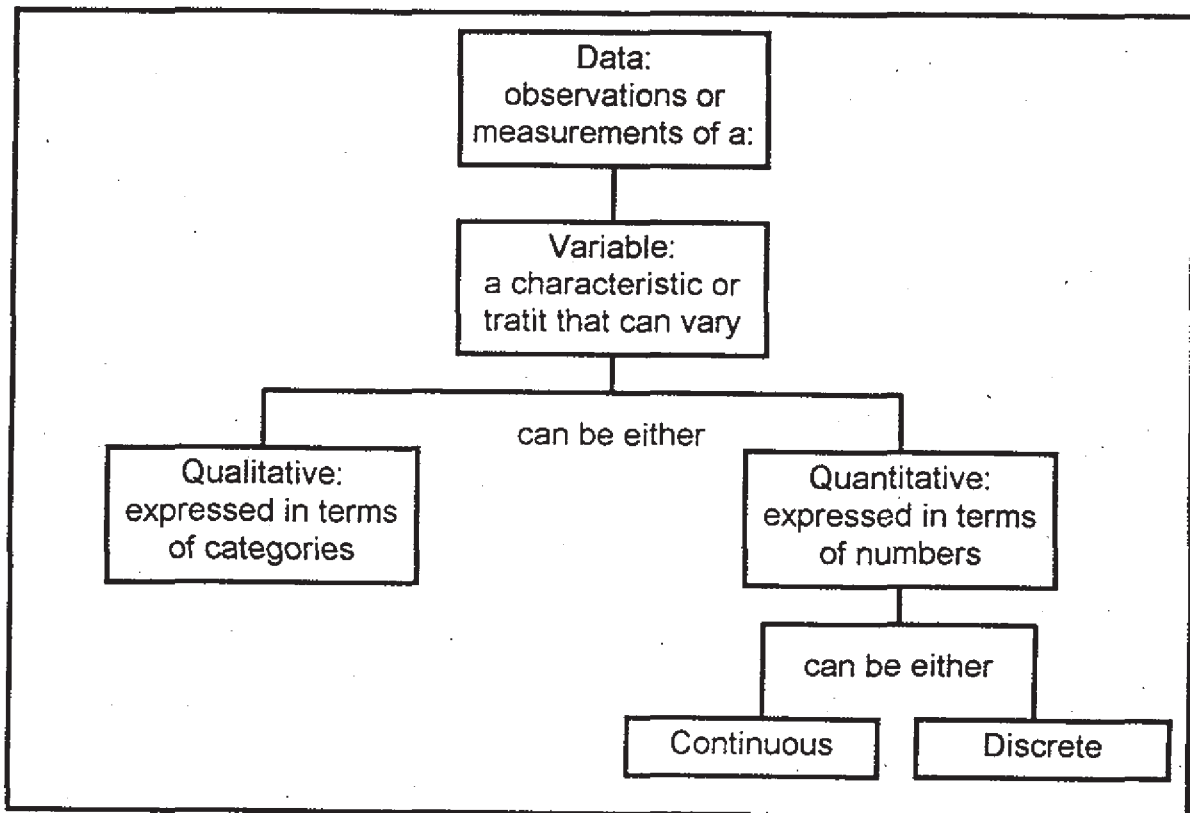
Data are collected about relevant variables. A variable is simply a characteristic or trait of interest that can vary. For example, the ages of visitors, their party characteristics, or their satisfaction with wildlife sightings at MORA can all be considered variables: Each of these traits or characteristics varies from person to person in the study sample.

Variables can be of two types: Qualitative variables are expressed in terms of categories, such as whether or not a visitor has been to the Visitor Center. Quantitative variables are expressed in terms of numbers, such as the size of a visitor party.

Discrete quantitative variables have distinct and separate units. There are no values possible between the units of a discrete variable. For example, the number of visitors in a single party consists only of whole numbers of people. One cannot talk about a party of 1 1/2 persons.

Figure G.1 illustrates these concepts.

FIGURE G.1. FLOW CHART OF STATISTICAL CONCEPTS AND TERMINOLOGY



Often data for more than one variable are collected. The data for the unit of analysis under consideration (an individual visitor, a single party, a specific park) are a case. Statistical analyses are done on groups of cases to form a dataset. The number of cases in a data set is usually referred to as "n." For example, if 1000 visitors answered a question, $n = 1000$.

In many instances, respondents do not answer all of the questions in a survey. They either inadvertently skip a question or are asked to skip question

because it does not apply to them. When a respondent does not answer a question that they should have answered, he/she is a "missing case" for that question. If the number of missing cases exceeds 10 percent of those who should have answered the question, a corresponding footnote or statement in the text will indicate this fact.

Data can be collected for all of the possible cases such as on every visitor to MORA. This is a census. Alternately, data can be collected for a sample of the total population. There are many ways to choose a sample. One common approach is a random probability sample, in which each individual has an equal chance of being included in the data set. In the strictest mathematical sense, the MRNP sample is not random due to the possibility of bias through non-response. However, the writer believes that the potential bias is so minimal that, for ordinary management purposes, the sample can be considered random and therefore, representative of the population of park visitors.

The data in this paper are reported as descriptive statistics. These statistics are used to summarize a large group of numbers and to describe general characteristics of the data set. For example, there might be a long list of each visitors' ages. Descriptive statistics can be used to quickly summarize this long list. The average (mean) age would be the total of all of the cases' ages divided by the number of cases. The modal age (mode) would be the most frequently reported age. The range would be the spread of ages from the youngest to the oldest. Statistics can be presented in several formats.

Tables simply organize the data into horizontal rows and vertical columns and sometime include brief explanations. Graphs or figures illustrate the data through a visual presentation. All of these formats are present in this report.

APPENDIX F - DRAFT DESCRIPTION OF OBSERVATIONAL DATA

DRAFT REPORT OF QUANTITATIVE OBSERVATIONS SPRAY PARK VISITORS

DOUG BAKER

I. Summary of Observations

A. Schedules, locations, and dates of observations

The qualitative observations for Spray Park consisted in of marking, at half-hour intervals, user behavior (size of party, direction of walk, distinguishing traits of activities) over a period of 11 days during August and September 1993. Doug Baker did eight days and John Davis did two days. We used binoculars and worked mainly from locations on Mount Pleasant and Hessong Rock overlooking the lower (northwest) end of Spray Park.

DATE	TIMES OF OBSERVATION	NUMBER OF OBSERVATION
07/29/93	None	None, training visit, fogged in
08/06/93	2:30 to 5:30	7
08/07/93	8:30 to 3:30	15
08/08/93	10:30 to 3:30	11
08/20/93	2:00 to 4:30	6
08/28/93	11:30 to 2:30	7
09/02/93	1:00 to 3:30	6
09/03/93	3:00 to 5:30	6
09/05/93	10:30 to 3:00	10
09/06/93	11:30 to 4:30	10
09/17/93	12:30 to 3:00	2 (fogged in, did some interview)
	TOTAL OBSERVATIONS	80

B. Objectives of the Observations (compared to objectives of Spray Park Visitor Survey [SPVS] data collection).

The observations were meant to provide qualitative and behavioral data to supplement sample surveys of Spray Park user attitudes. In contrast with survey items (which focus primarily before and after the fact on attitudes and experiences of individual visitors), the field observations were intended to identify and map activities, impacts, and, where possible, interpret experiences as they occurred.

II. Findings - Summary

A. Elements of interpretation: Activity and Experience Types

1. Activity Types

I will organize a summary of Spray Park behavior according to two main types of users - those whose activities are confined to the trail corridor (the main Spray Park trail and areas within approximately 20 feet on each side) and those whose activities primarily occur outside the trail corridor. The six off-trail behavioral patterns include: 1) social trail use for transit into and out of Spray Park; 2) scrambling on steep terrain; 3) strolling; 4) multi-age parties; 5) campers in Spray Park; and 6) Park staff work and supervision. Behavioral patterns remaining within the trail corridor include Wonderland hikers and climbers who pass through Spray Park without leaving the main corridor. Both sets of behavioral patterns are, for the most part, distinctive (with the exception of some mutual use of social trails), stable, and persist for most individuals and groups throughout their visit. These seem to be useful as the main organizing themes for analysis.

- a) I have defined six visitor types whose activities vary according to off-trail behavior patterns:
 - i) Rapid transit in and out of Spray Park
 - ii) Scramblers
 - iii) Strolling
 - iv) Multi-age parties
 - v) Campers in Spray Park
 - vi) Park Staff and Work Supervision

- b) Activities on the main trail corridor are naturally less discreet: virtually all visitors use the main trail for a portion of their visit. Two significant user types in Spray Park - trail maintenance and Wonderland Trail hikers - remain in the main corridor and are definable by their distinctive patterns there. Visitor activities on the main corridor follow two patterns: rapid passage or stroll/picnic. There was trail reconstruction in progress the enter 1993 summer season. This created no discernible effects on hiker behavior, beyond some trail breaking to avoid unfinished sections.

B. Experience Types I will, for each kind of user, discuss three types of experience

1. Spray Park as a tangential experience: Relatively unimportant or easily replaceable as an item in the repertoire of experiential resources/objectives;
2. Spray Park as a frame experience: Foundation object essential to, or preferred, in some exercise;
3. Spray Park as a generative experience: The main resource or objective of the wilderness experience.

These are tentative constructs. I am not sure about the relation between these three types of experience. I discuss these as a continuum of experiential types but the experiences of visitors may, in reality, have no such logical continuum. Visitors may blend or alternate the experiential types. Some visitors might even presumably experience Spray Park in three different types in a single day.

C. Visitor Types (by activity and user)

1. Rapid Transit Visitor: Climbers and Wonderland hikers who traverse Spray Park rapidly, generally remaining entirely in the trail corridor.

a) Climbers - generally enter in the morning at lower Spray Park and exit via social trails towards Observation Rock/Echo Rock at the extreme upper end of Spray Park. They generally retrace this route in regress in the afternoon. Some climbers enter or exit via Knapsack Pass and thus avoid much of the main trail corridor. Climbers tend to pause at the upper reaches of the Park for lunch, regrouping, etc. I have observed them on either side of the trail there. I suspect that the majority of such pauses alongside trails occur further up the mountain off the Observation/Echo social trail. I have conducted a few brief interviews with climbers. Spray Park itself seemed a tangential experience to all of them. They seemed unconcerned with the features of Spray Park itself, being mainly bent on getting up to the 7,500+ feet level. They seemed unconcerned with or unaware of natural or social events within Spray Park and thus had little comment on degradation or improvements of Spray Park.

b) Backpacker: generally stay on the corridor throughout the park. If they pause, ordinarily it is rest at the extreme upper or lower ends of the Park. Backpackers' group members seem often to be separated as they pass through Spray Park on the main corridor (and thus are identified as a group only if they pause to rest or lunch together). I presume that experientially, Spray Park is for backpackers either tangential and/or framing. That is, for many, Spray Park is just one of a number of subalpine areas encountered that frame their experience of hiking around Mt. Rainier. I suspect that subalpine areas in which they camp or are able to spend more time outside the trail corridor have more generative effects.

c) Loop Day-Hikers - a third group which may be distinguished through surveys or interviews who leave upper Spray Park to head down to Ipsut Lake. Spray Park for these hikers is probably *enframing*: a portion of their Mt. Rainier centered hike, a frame portion, perhaps preferred to the frames provided by views from Ipsut Lake and Tolmie Peak Lookout.

d) Rapid transit visitors seem to have little impact on Spray Park. Backpackers tend to pause at the lower Park area, thus contributing to crowding and erosion of the corridor. Climbers and backpackers tend to pause and lunch at the Mist Park Overlook at the upper (eastern) end of the main corridor. The Mist Park Overlook has a number of social trails on the northern side of the mail trail corridor. The Observation Rock approach social trails create perhaps the most eroded steep slope areas of Spray Park. Rapid transit visitors are likely undersampled by the SPVS since they occasionally did not encounter exit survey boxes; often, they chose not to fill out exit surveys. In addition, those rapid transit visitors who have been sampled are probably, in general, not as concerned with the items of the survey questionnaire (being a group for which Spray Park is likely, in general, a tangential experience). A few in-depth interviews of climbers and backpackers about their experience of Spray Park and the role of its reputation in their experience, would probably be a useful supplement to the field surveys.

2. Scrambling Visitors

a) Scramblers are interested in the steep terrain of Mt. Rainier. Objectives requiring traverse of steep terrain may turn a few hours of a day-hike into a scramble or the act of traversing steep terrain may be the point of a large party's visit. There seem to be two kinds of scrambling: the organized groups from climbing clubs (with a defined itinerary, largish parties, and a tendency not to intersect with the main corridor at all) and the day-hikers (who tend to have one or two off-trail objectives, small parties, and arrive and depart via the main corridor at a more leisurely pace). Scrambling groups enter Spray Park frequently from off-trail routes - over Mt. Fey-Pleasant Ridge, via Knapsack Pass, as well as by the main trail corridor. They are distinguished from climbers by not having a 7,500+ foot objective, being content to visit Hessong Rock, Pleasant Ridge, the lower reaches of Ptarmigan Ridge, etc. Scramblers' routes are thus much more likely to take them across Spray Park on social trails and cross county (only the Echo-Obs social trail seems a "climber's trail"); they are much more likely to avoid the main corridor entirely than any other group. Scrambling groups probably experience the main corridor of Spray Park as tangential. However, their experiences of Spray Park seem more heterogeneous than those who are primarily in transit: both framing and generative. In a manner similar to the rapid transit visitors, scramblers often avoid the main trail for much or all of their visit. They encounter Spray Park in different and more varied locations than does the rapid transit group, spend a longer period in off-trail portions of the Park. For some climbing clubs on the Fey Peak route, Spray Park may be truly tangential.

b) Impacts: Scramblers and others engaged in off-trail steep terrain recreation seem to constitute one of the most pervasive and destructive sources of errant "social trail making" and erosion. Each ridge, such as the Fey Peak-Pleasant-Hessong route, has several, well-beaten trails running along it; one at the ridge point and one each on either side of the ridge point. Most steep-slope social trails have reasonably well-beaten "shadow" paths, paralleling the main one (e.g., the route from lower Spray Park to Pleasant). In some areas, "shadow" trails merge and separate through eroded slopes to the point where there is no clear route (sections of the climb along Hessong saddle). Day-hiking scramblers occasionally seem unaware of how

far their voices carry, are more likely not to know the main social trail routes and thus seem more like to create new erosion. I may have observed a triggering effect of lower Park crowding to provoke day-hikers into "escape" scrambles onto Mount Pleasant or the saddle between Pleasant and Hessong. Scramblers like to eat lunch in high places. How subsequent parties of scramblers respond to the presence of 11 people lunching on the top of Mount Pleasant and what this does to their itineraries is of interest.

c) Sampling: Scramblers are probably undersampled in the SPVS since, like climbers, many passed through the survey points only once (Fey Peak groups not at all). Many scramblers seem frequently to traverse Spray Park to a variety of points. It seems worth exploring how distinct scramblers' activities, experiences, and impacts are. It might be useful if a day-hiking scrambler's responses can somehow be identified as a sub-sample from the sample surveys. Representatives of climbers' groups/clubs who visited Hessong-Pleasant summit registers might be interviewed, thus gaining some insight into visitors who avoid the main corridor. Behavioral observations provided a reasonable sense of scrambler activities over time and space for the Hessong-Pleasant portion of the Park. If behavioral observations had continued for a few more sessions, it might have been worth focusing on the movements of scramblers elsewhere in Spray Park, (e.g., those who often seem to cross Spray Park "all over the map"). How scramblers respond to crowding (both on the trail corridor and when their favorite objectives become heavily visited) and what their traffic patterns are, seem to be best explored through on-site interviews, coupled with observation.

3. Strolling Activity Which Avoids Steep Slopes (Off-trail strolling, trail corridor strolling).

a) On-Trail: The stroll through Spray Park (entering and leaving via Mowich Lake) by individuals and small groups of adults (one to four) who stay together, whether on the main corridor or not, is probably the modal Park activity. Strollers include small groups of day-hikers, members of multi-age parties, and campers.

b) Off-Trial: Strolling within site of the main trail occurs frequently. It is the observer's impression that strolling is most often an objective/activity type distinct from scrambling. While some visitors combine strolling and scrambling, far more confine their activities to one type or the other. Strollers don't scramble much and scramblers aren't much interested in wandering on low trajectory terrain. Most strolling off the main corridor is on a few established social trails. Off-trail strolling from the main corridor by multi-person parties seems confined to limited areas within about one-quarter mile of the corridor. Individuals and two-person parties seem to more frequently range further in strolls. Strolling is sometimes provoked by a feature of the Park, with tarns, vistas, and marmots being the most frequent objectives.

4. Multi-Age Parties

a) The observed multi-age groups were defined by at least two generations (usually adults and children but, in one personal encounter by Doug on Hessong Rock, three generations). The multi-age group of day-hikers seemed behaviorally distinct from other day-hikers. They often separated and recombined into a variety of activities/locations over a several hundred square yard area). While members engage in scrambling and strolling, some of the other activities are largely unique to the multi-age party, perhaps because of group sizes and certainly because of the interests of children and exigencies of caring for children. Distinct activities included: large congregations of people which lasted several hours in one location, accompanied by frequent, intensive trampling of the meadows in that area, inevitable and intensive use of tarn shores, and tarn wading.

5. Camping

Camping is prohibited in most the lower Spray Park. My wild guess is that an average of about two parties per weekend night camp in the larger Spray Park area (including Ptarmigan Ridge and Knapsack Pass areas). Some Park staff suggested that there is considerable unauthorized camping. Visitors interviewed suggested that camping use has declined considerably from the period before permits were instituted.

a). Activities, Experiences, and Impacts of Campers

i) Campers might be thought to be the quintessentially Spray Park-focused group, interested enough to haul enough equipment into the Park to live in it for several days. Campers probably engage in more complex behavior and experiences than SPVS respondents, in part because of the exigencies of temporary residence at 6,500 feet; because they are located in the Park a considerable distance off the main corridor; because they are in the Spray Park at different times (early morning and late evening); and because they simply have more time available to experience the Park in a variety of ways than the average day-hiker. Campers were observed strolling, day-hiking, and scrambling throughout the Spray Park area. Campers' activities, experience, and impact on Spray Park were probably not recorded at all in the survey sample. One approach to analyze camping in Spray Park is through retrospective interviews with: 1) the Park rangers; and 2) selected survey interviewees who indicated that they have camped in Spray Park in the past. Targets of interviews ought to include: the illicit camper, changes in camping activities, and locations commonly frequented by Spray Park campers.

6. Park Staff (Supervision, Trail Maintenance)

a) Park staff were seldom seen in Spray Park this season. Mowich Lake-based rangers appear to experience Spray Park like some Seattle cops must experience the University District: it is not a place they personally enjoy hanging out in. When in Spray Park, staff expect to face a large amount of routine, tedious enforcement of public discipline. One backcountry ranger described Spray Park as "our sacrificial lamb", an area subjected to considerable crowding and use "so that other areas remain all right to visit". In 1992, however, a Park summer intern camped the whole summer at Spray Park.

III. Assessment of the Observations

A. Were the Objectives Reached?

1. Initial Objectives:

The initial objectives of the behavioral research were open enough that they can largely be considered to have been achieved. 80 hours of observation is satisfactory to develop hypotheses and to suggest methods of sampling or analysis that need modification. Nevertheless, the behavioral evaluation often took second place to SPVS data collection and suffered from weather several times. If it had been initiated earlier in the season, a more adequate sampling of behaviors throughout Spray Park and interpretive components might have been developed.

B. The Observer's Experience of Observing

1. The observations proceeded from a weakly defined portion of the research.

Observations were conducted by new employees previously unconnected with the planning portions of the Spray Park research project or indeed, any past work with CPSU. The frequent bad weather of late July and early August not only limited the number of visitors to the park, causing survey sampling to fall behind in the White River or Mowich portions of the project but also limited conditions for proper observation. On several days, observations were limited by clouds and/or terminated early. On at least two occasions (one being the training session for Doug and John), observations were entirely prohibited by the weather. On several occasions, the duration of the observation was shortened due to staffing needs for the field survey. In addition, observations were canceled or not conducted on at least five days because of the need for Doug and John to help in staffing the survey collection at Spray Park/Mowich or at White River. The initial experience of observation was one of nagging uncertainty. Spray Park on a weekend is a very busy place. Visitors hiking at a rapid pace can transverse the Park within a half hour, so rapidly that they appear only once in an observation. Even those who linger, or wander within Spray Park itself, are easily lost from view within trees or by entering the broken topography of the upper Park. I became resigned to having no means by which to gather systematic data about the upper two-thirds of Spray Park since I lost sight of people once they wandered a few hundred yards south of the main trail. On the other hand, my confidence that I was keeping track of events in lower Spray Park increased over time as did my sense that I had some interpretive grasp of their behavior.

C. The Objectives of the Observation Section Have Evolved in Several Ways.

1. Towards expanding the scope and variety of behavioral observation

a) Developing a more elaborate behavioral analysis. We attempted to increase the interpretive quality of our latter observations by "tracking" groups from time frame to time frame and describing their activities in more detail.

b) Viewing visitor activity in upper Spray Park

c) Focusing observations on behavior of under-surveyed visitors; examining off-trail behavior in the upper Park; multi-age groups; campers.

d) Towards a more interpretive element
Building "stories" of visitor experiences rather than merely recording behavior (directions of walk, group size, etc.).

2. Interviews Supplementing Observations

3. Towards Exploration of Impacts and Park Staff Intervention Possibilities as well as Visitor Behavior and Experience

a) Investigating areas of physical degradation and possible improvement of visitor experiences

b) Investigating Park capability to mitigate degradation

c) Developing hypotheses; scenarios to improve experiences/decrease degradation.

IV. Outline of Criteria for Analysis

A. Types of Behavior; experiences; impacts (reviewed above)

B. Events by time, frequency, and location;

Data could be compiled on several descriptive tables, bar charts, etc., and, on a few "snapshot" maps, demonstrating variation in density and mix of activities by time of day. At the most elementary level, the visitor population location and flow in lower Spray Park can be mapped from our present data. Relevant basic indicators include: party size, direction of walk, time of day, and type of day (weekday or weekend).

C. Kinds of activities included: *Physical activities*

D. Experiences: Experiences of Spray Park Users

There are two user types for which insights of plausible reliability have been obtained: scramblers who passed by the observations points and were engaged in conversations; picnicking groups whose activities were close to the observation points (generally near the two principal lower tarns or around several rocks in the lower Spray Park).

E. Impacts

1. Physical Impacts
2. Experiential Impacts

F. Density Effects on Behavior

G. Hypotheses

1. That density has an overall effect on behavior and experience.
2. That density affects different visitor types depending on their capacities, objectives and the time of day¹

V. Research Directions

A. Completing qualitative sections of the research

1. Incorporating qualitative observations of the survey persons, Park staff, and other visitors.
2. Linking observations to qualitative research

B. There seem to be two logical stages to qualitative research.

1. Compiling our staff's experience and observations to develop an interpretive framework and objectives. Analyzing survey data for interpretive potential.
2. Interviewing for deeper insight where necessary.

C. Linking qualitative to quantitative research.

¹ Their experiential reservoir (how much of the experiential thread they have obtained)

Supplementing survey sampling to mitigate biases; multi-age campers, illegal campers, staff. Survey analysis seems most useful to analysis of homogenous and "limited-purpose" groups (e.g., single generation groups, occasional visitors engaged in day-hiking, climbing, backpacking). Larger parties, more heterogeneous parties in which group dynamics predominate. More multi-purpose parties such as campers and staff. There also may be an increase in experiential complexity and commitment from repeated, ritual visits, so that the day-hiker who has visited Spray Park during the same season for 10+ years running is probably sampled in the survey with low validity.

1. Longitudinal linking: How to Contact Interview Groups?

D. Evaluations of observation and suggestions for further research. The observational data collection began under what now appears to have been an unfortunate drawback: it was generally conceived/described as entirely behavioral (observation with binoculars from Mt. Pleasant, drawing Xs and lines on maps), involving few explicit plans for interpretive and interactive portions. The bad weather, by forcing more attention to survey collection, may have prevented development of interpretive approaches until too late in the season.

E. Suggested Next Stage

1. Review qualitative observations of CPSU survey staff
2. Preliminary analysis of selected groups in the SPVS (multi-age, campers).

F. Final Field Observations Stage

1. Interviews: multi-age, campers, staff
2. Facilities mapping

G. Policy Suggestions

1. Improving Visitor Experiences
 - a) Developing multi-age group facilities (picnicking spots, short trails for observation in lower Spray Park?)

b) Mitigated environmental degradation (developing Mowich and Spray Falls areas further as destinations to divert day hikers?)

2. Improving Park management of Spray Park

a) Interviews with present and past Spray Park staff?

APPENDIX G - GRUMPIES AND POLLYANNAS MANUSCRIPT

**Grumpies and Pollyannas: New Evidence in the Search for Understanding a
Visitor's Recreation Experience**

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Grumpies and Pollyannas: New Evidence in the Search for Understanding a Visitor's Recreation Experience

Abstract: In recent years, the idea that recreationists have consensus over crowding norms has been questioned. One explanation for the lack of consensus is that there are different types of visitors to wilderness areas. With the use of a structural equation model, we analyzed data collected from hikers in the Spray Park area of Mount Rainier National Park. Our findings lend support to a "cognitive propensity" model. That is, the actual conditions one encounters while hiking appear to have little effect on one's overall satisfaction with the wilderness experience. Instead, respondents vary in a general mindset such that there are "grumpies" at one end and "pollyannas" at the other. Results suggest implications for management stressing re-education when concerned with maximizing visitor satisfaction.

Keywords: wilderness, cognitive propensity, structural equation modeling, crowding

Introduction

Crowding and its impact on the visitor experience in wilderness settings is one of the very active areas of research on social relations in wilderness environments (Manning 1986). Prior researchers commonly looked either at simple bivariate relationships or simple multivariate models that sought to explain some aspect of the wilderness recreation experience. Some explored the effect of previous wilderness experience on the feeling of being crowded (Vaske et al. 1980; Absher and Lee, 1981; Ditton et al. 1983; and Watson and Cronn 1994) and on satisfaction (Schreyer et al. 1984;

and Williams et al. 1990). Others examined the relationship between visitor density and user satisfaction (Stankey 1973; and Manning and Ciali 1980). A third research focus has been on personal characteristics that contribute to a visitor's perception of crowding (Shelby and Heberlein 1986; Roggenbuck et al. 1991; Shelby and Vaske 1991; and Hall and Shelby 1996). The usual focus in prior research was on relatively long-term hikers, i.e., those who spend several days in a wilderness area.

In this paper we seek to extend current understanding of the wilderness recreation experience in two arenas. First, we will utilize a more robust measurement model that considers, simultaneously, several of the relationships explored in previous work. Also, for these analyses we will focus on *short-term* hikers (i.e., hikers who ordinarily enter and leave the wilderness area on the same day).

The statistical technique we employ is known as structural equation modeling, and it is well suited to our purpose here because it allows us to (a) incorporate as a part of the analysis an explicit set of assumptions about the causal structure linking the variables, (b) consider the impact of several independent variables simultaneously, and (c) make appropriate adjustments for both random and correlated measurement error. Our major focus in this research is how factors related to crowding influence hiker satisfaction. We assume that hiker satisfaction is influenced by previous hiking experience and perceived density of hikers in the area. Furthermore, we assume that these factors will affect hiker satisfaction primarily through their effect on the hiker's *perception* of crowding in the area. By using multiple indicators for each of these variables, our analysis will permit us to (a) discern and adjust for any correlated measurement error that would otherwise distort the findings, (b) make adjustments for random measurement error and thus remove the biasing effects of such "noise" in the measurements, and (c) consider the variables simultaneously so as to be able to estimate the independent effects, both direct and indirect, of each of the independent variables. Thus, in spite of having a limited number of variables and a relatively

simple model, we believe our results will highlight factors that influence satisfaction, and shed further light on the cognitive process through which those factors have their effects. We also anticipate that our findings will speak directly to management and policy concerns and thus provide one illustration of the general utility of social science research in enhancing the recreational use of wilderness areas.

Related Research

The model of the visitor experience explored in this study depends heavily on findings from prior research in this field. We will now summarize briefly the relevant findings. This will be followed by a presentation of the model we plan to explore in this paper.

Previous Experience

The influence of visitors' past experiences on their current recreation activity has been of continuing interest to researchers (Watson and Niccolucci 1992). Some have constructed a single variable that measures experience use history (EUH) to explain the effect of past experience on visitor behavior and satisfaction (Schreyer et al. 1984; Williams et al. 1990). Others created composite indices to examine how past experience shapes on-site perceptions, cognitions, and preferences of recreation users (Hammitt et al. 1989). The findings from these studies suggested that because the relationship between past experience and current recreation activity is more complex than first suspected, better measures of previous experience were needed.

In order to tease out some of the complexities involved with the influence of previous experience on visitor satisfaction, more advanced techniques have been in current use to describe experience use history as a multidimensional construct (Watson et al. 1991). In their 1992 study of Cohutta Wilderness visitors, Watson and Niccolucci

use principal-component and factor analysis techniques to explicate the past experience construct and demonstrate its use in hypothesis testing.

Other researchers focused specifically on the effect of previous wilderness experience on perceptions of crowding. Studies by Vaske et al. (1980), Ditton et al. (1983), and Watson and Cronn (1994) found general, positive relationships between experience levels and sensitivity to crowding, while Absher and Lee (1981) found no statistically significant relationship between previous experience levels and perceived crowding.

In sum, there appears to be several unanswered questions concerning the effect of visitors' previous experiences on their current recreation activity. In the model described in this paper, we incorporate previous experience as a theoretical dimension measured with four unique indicators.

Density

Stokols (1972), was one of the first to make the distinction between density (a physical concept specifying the number of people per unit of space) and crowding (a negative and subjective evaluation of a density level) in the literature. Most subsequent research considered the effects of density on user satisfaction and perceived crowding. One of the most consistent findings in the literature to date is the lack of measurable relationship between density and user satisfaction when using field, as opposed to hypothetical data. Researchers asking subjects to evaluate hypothetical levels of crowding (Stankey 1973; Manning and Ciali 1980) found support for the premise that satisfaction declines as use-levels increase. When the same models were tested in field conditions - with researchers observing and recording actual density levels - such relationships disappeared. While there is an important distinction in the literature between density levels as measured by the researcher and density level as reported by

the user on a survey form (Absher and Lee 1981; Shelby and Colvin 1982), neither method has shown any significant relationships between density levels and user satisfaction.

The bulk of research concerned with the relationship between density levels and perceived crowding suggests a significant positive relationship, such that as use levels increase, recreationists are more likely to evaluate the experience as crowded (Kuss et al. 1987). Note, however, that many of the correlations in these studies are weak, leading investigators to suggest that crowding perceptions might be better predicted by including visitor expectation and preference indicators. In sum, there is reason to believe that while both user satisfaction and crowding perceptions may be related to actual visitor density, the relationships are too complex to be measured by simple bivariate correlations (Kuss et al. 1987).

Perceptions of Crowding

Some researchers working specifically on the issue of crowding argue individuals' preconceptions and psychological orientations influence perceptions of crowding more than variations in density levels. (Shelby and Heberlein 1986). Those engaged in this area of research, often employ a normative approach to conceptualize, collect, and organize empirical data. Thus, the focus here is largely on the issue of crowding and encounter norms in backcountry settings (McDonald 1996).

Over the years there have been debates over the utility of this normative approach, with a great deal of criticism regarding group consensus on a specific norms. For example, one question may be: to what extent do a population of recreationists share a common norm regarding what is a crowded area? Recent studies responded to this criticism by focusing on a) variability in personal norms based on the type of experience a visitor has or desires (Shelby and Vaske 1991) and b) variation in in-group

socialization between discrete subgroups in a population of visitors (Roggenbuck et al. 1991). In a study of visitors to the Eagle Cap Wilderness in Oregon, Hall and Shelby (1996) found that less than half of their respondents reported a specific norm for encounters, and a substantial minority did not care at all about encounters.

We extend some of the previous work on norms by including factors that may contribute to variation in perceptions of crowding and consider how these perceptions ultimately influence visitor satisfaction.

User Satisfaction

User satisfaction is often the dependent variable in this area of research. Since the recreation experience is typically free - or available at a nominal cost - for visitors, researchers rely on visitor satisfaction as a proxy for the value of the recreation experience to the visitor. In this way, park managers are provided with some indication of how consumers are evaluating the wilderness area. However, as several investigators contend, the concept of satisfaction is difficult to define, yet alone measure (Kuss et al. 1987). Many found their satisfaction measures to be highly skewed in the positive direction. That is, most people report "somewhat" to "extremely" positive outdoor recreation experiences. Others note that because satisfaction is a multidimensional concept, overall measures of satisfaction may be too broad to be useful (Manning 1986).

In sum, the overall picture that emerges from a review of this literature is that there are few consistent findings and many remaining questions. There is a need for more research that incorporates antecedent and mediating variables into models of crowding and user satisfaction in the hopes of finding out more of what is really going on during a visitor's recreation experience. Additionally, more work needs to address

the measurement of multifaceted concepts such as past experience, perceptions of crowding, and visitor satisfaction. This paper attempts to make progress in these areas.

Causal Model

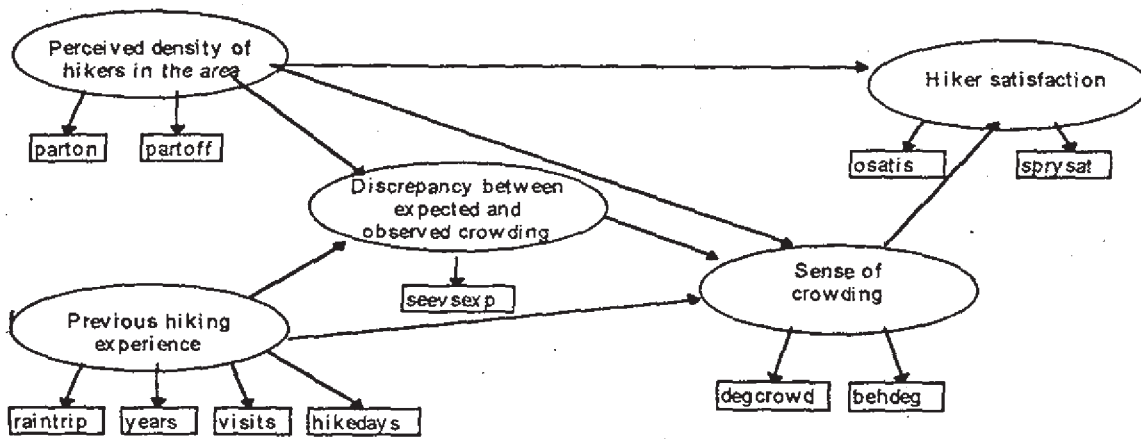
Background

We contend that any proper test of the relationships between the concepts common to this literature should attempt to model them simultaneously - in relation to one another. After all, conclusions drawn from previous research suggest that the wilderness experience is too complex to be modeled by simple, bivariate relationships. (Absher and Lee 1981; Kuss et al. 1987). Furthermore, these theoretical concepts should, when possible, be measured by multiple indicators. Traditional multivariate models often employ one indicator per theoretical concept, assuming implicitly that they are capturing the essence of a complex theoretical dimension with a single answer to a survey question. While multiple indicator models do not solve this dilemma completely, they do bring us closer to our goal. The model we present here is an initial attempt to address these concerns through the use of structural equation modeling with latent variables.

Structural equation modeling with latent variables is a technique developed in the 1960's that is now in common use in the social science literature. This technique allows the investigator to estimate more precisely the parameters of interest, as compared to estimates based on a path analysis model. A correctly specified model in this procedure includes a set of unmeasured, theoretical dimensions. These theoretical dimensions can be thought of as conceptual variables uncontaminated by any source of measurement error. Ideally, cases are located on these theoretical dimensions by their responses to a series of multiple indicators that are meant to reflect the dimension of interest. The indicators are commonly, but not necessarily, responses to survey

questions. Finally, the theoretical dimensions are linked by the researcher in attempt to model the process of interest. A sketch of our model is detailed below. The items to which the indicators (labels in the rectangles) refer to are listed in Appendix A and are described in detail in the following section.

Figure 1. Multiple Indicator Model of Proposed Effects on Hiker Satisfaction



Dimensions and Indicators

For our initial model, we chose to include five theoretical dimensions common to the literature: Previous Hiking Experience, Perceived Density of Hikers in the Area, Discrepancy between Expected and Observed Crowding, Sense of Crowding, and Hiker Satisfaction. This section defines these dimensions and the indicators that are used to reflect them. The survey questions and levels of measurement are listed in Appendix A.

Previous Hiking Experience In accordance with recent work that defines experience use history as a multidimensional construct, we use several variables to measure experience. Previous experience is represented by four indicators: number of years

respondent has been hiking (YEARS), frequency of visits to a wilderness area in recent years (VISITS), the number of days the respondent hikes during a year (HIKEDAYS), and the frequency of visits to Mount Rainier in recent years (RAINTRIP).

Perceived Density of Hikers in the Area Density is conceptualized as the number of encounters that occur between hikers in the day-use area. Density is represented by two interval-level indicators from our data set, one that asks respondents to specify the number of parties encountered *on* the trail (PARTON) and another that asks them to specify the number of parties encountered *off* the trail (PARTOFF).

Many researchers criticize self-report measures, claiming they are subject to estimation error on the part of the respondent. Our measures address these shortcomings in two ways. First, our respondents were asked to report these numbers immediately after their hike, as opposed to several weeks later in a mail questionnaire. Secondly, as long as estimation errors occur randomly and are not subject to any systematic error, adjustments for such error will be made by our modeling technique.

Discrepancy between Expected and Observed Crowding Discrepancy between expected and observed crowding is designed to be a measure of visitor expectations. The indicator we use for this (SEEVSEXP) is similar to that used by other researchers considering cognitive characteristics of visitors. It is represented by the responses to an ordinal-scale variable which asks respondents to compare the number of hikers they *saw* during their visit with the number of hikers they had *expected* to see.

Sense of Crowding We chose to conceptualize crowding as a subjective or evaluative judgment regarding all aspects of one's interactions with others on the hiking trail. To better tap the complex nature of this dimension, we chose to include indicators

measuring *numbers of people* encountered (DEGCROWD) as well as the *behavior* of those encountered (BEHDEG).

Hiker Satisfaction Satisfaction is conceptualized as a general evaluation of the hiking experience. We represent satisfaction with two distinct indicators, one that asks respondents to evaluate their overall satisfaction with this specific area (OSATIS) and another that asks respondents to compare the trip they were on with other hiking trips (SPRYSAT).

Reading the Model

In Figure 1, the dimensions are located in their presumed causal order as one moves from left to right. Thus "previous hiking experience" and "perceived density of hikers in the area" are located on the far left; the presumption is that each of these dimensions influences, but is not influenced by the other variables in the model. The curved, double-headed arrow connecting them means simply that they are allowed to be correlated with each other. On the far right is "hiker satisfaction", the "final" dependent variable in this study. The presumption is that it is influenced by each of the other variables in the model but that it does not have an effect on any of them. Between the far left and the far right are three additional dimensions that are presumed to mediate the effect of "previous hiking experience" and "perceived density of hikers in the area" on "hiker satisfaction". Each of these three mediating variables is assumed to be affected by the dimensions to its left in the figure, and each is assumed to have an effect on the dimensions to its right in the figure.

Associated with each of these dimensions are its indicators. The indicators for each dimension are the empirical variables, and those variables are assumed to reflect variation in that dimension (i.e., to be influenced by that dimension). The indicators

and their relationships to each other provide the empirical data for the study. The parameters associated with each of the arrows in the model will be estimated on the basis of the model and of the relationships among the indicators. The first step in the analysis will be a "confirmatory factor analysis", undertaken for the purpose of determining whether to continue with the linkages between dimensions (in ovals) and indicators (in rectangles) assumed in the model, or whether to modify those linkages before estimating the parameters of primary interest.

Methods

Study Area

The study site was Spray Park, located in the northwest corner of Mount Rainier National Park. Although Spray Park is legally designated as a wilderness area, it is primarily used by many day hikers. On a sunny, summer weekend it is not uncommon for the trails to be traveled by up to one hundred and fifty people. Visitors gain access to Spray Park by hiking three miles from the parking area through forested area. Both the entrance and exit surveys were administered at the entrance to Spray Park.

Sampling

The data were gathered from a random interval sample of day-use visitors to the Spray Park area during the summer of 1993. The specific sampling days were chosen after consultation with park officials, with emphasis on maximizing variation in weather conditions and travel periods. Every fifth party was chosen as they approached the entrance gate to the park and each person over the age of 18 was handed a survey with instructions. The completed questionnaires were then collected before the party began their hike. Later, as the chosen parties left the trail, the same individuals were given a similar questionnaire to be completed and turned in on the premises. Finally, questionnaires were mailed to the same individuals two weeks after

they returned from their trip. After the data were entered and cleaned, all three data sets (entrance, exit, mail) were joined. There were 587 cases who successfully completed all three questionnaires, yielding a response rate of 56%.

Data Analysis

Our first step was to generate a correlation matrix, (i.e., a correlation for each pair of indicators in the model), using listwise deletion of cases with missing data. This means that a case with a missing value on any indicator was deleted from the analysis. Since several respondents had neglected to respond to at least one question and were therefore deleted by this procedure, the sample with complete data actually used in the analysis numbered 423.

The second step was to run a confirmatory factor analysis, a procedure that allowed us to check the fit between the measurement model (i.e., the specified linkages between dimensions and their indicators) and the data. A poor fit would indicate that the measurement model was misspecified in some respect and some modification would be required. In order to proceed with the confirmatory factor analysis, we needed to estimate the error variance for the "solo indicator" of the dimension representing the "discrepancy between the expected and observed crowding". This was necessary because the program cannot estimate such error variances for a dimension without multiple indicators. After discussion with the researchers who designed the questionnaire, we decided that a reasonable estimate of the correlation between dimension and indicator in this instance would be .75. With this estimate, the implication is that approximately 44% ($1 - r^2$) of the variance in the indicator is error variance. Since the variance of the indicator was 1.14, the implied error variance was .50.

The confirmatory factor analysis yields an estimate of the "loading" of each indicator on its dimension, an estimate of the bivariate correlations between dimensions (corrected for random measurement error) and several measures relevant to the goodness of fit between the measurement model and the data. Our initial focus was on the goodness of fit measures since the other estimates will be biased to some degree if the fit is poor. The chi square value reflecting the goodness of fit provided a probability of approximately .05. This suggests an acceptable fit, but not an especially good fit. However, recent work by Satorra and Bentler (1994) and Hu, Bentler and Kano (1992) indicates that the chi square distribution provides probability estimates that are too small, leading to inappropriate conclusions of poor fit under certain conditions (i.e., samples larger than about 200 and non-normally distributed indicators). Since these conditions apply in this model (the sample size is over 400 and the distributions of some indicators are highly skewed) the probability implied by the chi square value is undoubtedly too small, so it is reasonable to conclude that the measurement model is satisfactory. Other measures pertaining to the fit of the measurement model suggest a similar conclusion. There were only 12 "modification indices" that exceeded the critical value of 3.84, whereas we would expect 14 indices in excess of that value because of random error alone. Finally, the adjusted goodness of fit index, the only measure relating to goodness of fit that is not dependent on the sample size, was .96, suggesting a very good fit for the measurement model.

Having established that the fit is satisfactory, we can examine the estimated bivariate correlations between dimensions (corrected for random measurement error). While these are NOT the estimates of the effects of primary interest in the model shown in Figure 1, they are of interest nonetheless. These estimates are shown in Table 1. These estimates show that "previous hiking experience" has very modest correlations with the other variables in the model even when those correlations have been adjusted for random measurement error. But these estimates also show that each of the four

remaining variables in the model has a moderately strong correlation with at least two other variables. Hence, we have a clearly connected set of four dimensions, with "previous hiking experience" much more weakly linked into the set.

Table 1. Parameter Estimates for Bivariate Correlations between Dimensions

Relationships	Standardized Param. Est.
Previous Experience & Discrepancy	.10
Previous Experience & Crowding	.18
Previous Experience & Density	-.03
Previous Experience & Satisfaction	-.21
Discrepancy & Crowding	.60
Discrepancy & Density	.45
Discrepancy & Satisfaction	-.53
Crowding & Density	.46
Crowding & Satisfaction	-.59
Density & Satisfaction	-.12

Note: Bivariate correlations between pairs of dimensions, corrected for random measurement error.

The achievement of a satisfactory fit for the measurement model justified movement to the next step, which was the estimation of the parameters of the causal model displayed in Figure 1. The first attempt to make these estimates was not successful; due to an identification problem that created an impediment to estimating the simpler confirmatory factor analysis model.

We were able to get the program to make the parameter estimates required by removing one parameter from the model-- the parameter for the effect of "previous hiking experience" on "hiker satisfaction". This omission from the parameters estimated should not bias the estimates for the other parameters because the estimates in Table 1 suggest that this parameter is approximately zero. We infer this from the results of regressing the "hiker satisfaction" dimension on each of the other dimensions in the model, using the estimated adjusted correlations in Table 1 as the correlation

matrix for these estimates. This yields an estimate of .04 for the (standardized) regression of "hiker satisfaction" on "previous hiking experience". Hence we conclude that we are omitting a parameter that is approximately zero to remove the blockage that keeps the program from estimating each of the other parameters in the model.

This final run will provide estimates for each effect represented by an arrow in Figure 1. These results, displayed in Table 2, are maximum likelihood estimates, and the parameters of interest are comparable to path coefficients except that the coefficients have been corrected for random measurement error. Each such parameter has an associated standard error, so that a judgment about the "significance" of each coefficient can be made.

Table 2. Parameter Estimates for the Structural Effects Shown in Figure 1

Relationships	Standardized Param. Est.	Unstandardized Param. Est.	Standard Error
Density ↔ Previous Exp.	-.02	--	--
Density → Discrepancy	.45	.05	.01
Previous Exp. → Crowding	.17	.03	.01
Discrepancy → Crowding	.49	.51	.09
Discrepancy → Satisfaction	-.32	-.30	.11
Density → Satisfaction	.28	.03	.01
Crowding → Satisfaction	-.54	-.49	.12
Density → Crowding	.26	.03	.01

Results and Discussion

The findings suggest that "previous hiking experience" has little effect on any of the remaining dimensions in the model. Its greatest effect (on "sense of crowding") is positive, suggesting that those with more hiking experience are slightly more likely to report feeling crowded in day-use areas. But the effect is so slight that it should be evident that "sense of crowding" is only very weakly linked to previous hiking experience.

The parameters representing the effect of the one other exogenous dimension, "perceived density of hikers in the area" indicate that its indirect effects on the final dependent dimension are partially counteracted by its direct effect. The indirect effects, through "discrepancy between expected and observed crowding" and through "sense of crowding" were negative; otherwise stated, higher "perceived density of hikers in the area" had a positive effect on the mediating dimensions which, in turn, have a negative effect on "hiker satisfaction", implying a standardized negative indirect effect of about -.40 (i.e., the sum of the products for the indirect paths: $.45 \times -.32 + .45 \times .49 \times -.54 + .26 \times -.54 = -.40$). Surprisingly, when these indirect effects are controlled, the "perceived density of hikers in the area" has a direct effect on "hiker satisfaction" (i.e., an effect through mediating variables not included in this model) that is positive; this direct positive effect is .28 (standardized). Hence the total standardized effect of "perceived density of hikers in the area" on "hiker satisfaction" is a negligible -.12 (as indicated in Table 1). Another way of saying this is that "perceived density of hikers in the area" has effects on "hiker satisfaction" through several paths, some positive and some negative, to yield a net effect that is very slight.

The two mediating dimensions are positively correlated with each other and have similar negative and moderately high effects on "hiker satisfaction". The standardized parameter for the direct effect of "sense of crowding" on "hiker satisfaction" is -.54. The "discrepancy between expected and observed crowding" has both a direct effect (-.32) and an indirect effect through "sense of crowding" ($.49 \times -.54 = -.26$), yielding a total effect of -.58 ($-.32 - .26 = -.58$).

In summary, the dimensions that have the strongest effect on "hiker satisfaction" are the two mediating dimensions: "discrepancy between expected and observed crowding" and "sense of crowding". Note that these dimensions describe hiker's judgments about crowding more than they describe the objective condition of crowding. This is most evident for the dimension "discrepancy between expected and observed

crowding". But the "sense of crowding" is also a judgmental dimension. To be sure, our findings indicate that the number of other hikers seen by a hiker influences their judgment about crowding, but these judgments must also be heavily influenced by the perspectives that hikers bring with them. Otherwise, we should expect the correlation between "perceived density of hikers in the area" and "sense of crowding" to be very high. On the basis of the estimated correlation of .46 between these two dimensions shown in Table 1, we note that the two dimensions have less than 25% of their variance in common (even after correcting for random measurement error).

The findings summarized above draw us to the conclusion that hiker "satisfaction" is dependent primarily on "judgmental" dimensions that hikers bring with them, and little dependent on their past experience with hiking or the objective conditions of crowding that they encounter in the wilderness area. Indeed, one must consider the possibility that "hiker satisfaction" itself is a manifestation of the same set of judgmental dimensions, i.e., perspectives and outlooks that hikers bring with them to the wilderness. This is analogous to Hollenhorst et al.'s (1994) finding that predispositional factors that a visitor brings to the wilderness experience are stronger predictors of solitude achievement than are physical characteristics of the setting. The perspectives and outlooks that hikers start with seem likely to have more influence on their sense of satisfaction (and other goals) than any objective conditions they encounter in the wilderness area - so long as it is a wilderness area.

Exploratory Analysis of a Cognitive Orientation Typology

Background

The results summarized above suggest the potential utility of incorporating cognitive orientation dimensions into a causal model. While the study from which our data originated was not designed to address questions regarding the cognitive

orientation of the respondents, we can use the data to examine the utility of such dimensions in future analyses.

Our conclusions from the causal model suggest that wilderness visitors probably begin their hike with established tendencies to see it positively (i.e., no more crowded than expected, not generating a sense of crowding, and generally satisfactory) or negatively (i.e., more crowded than expected, generating a sense of being crowded, and generally less satisfactory). To attach labels to these two differentiated sets of characteristics, we might refer to hikers of the first type as having a "pollyanna" mind set, i.e., "all is well and we will have - and have had - an exhilarating experience in the wilderness". In contrast, we might refer to hikers of the second type as having a "grumpy" mind set, i.e., "things are just not right and we will have - and have had - a disappointing experience in the wilderness". Any typology of this kind is undoubtedly an oversimplification as compared to having a set of measured dimensions describing each hiker's cognitive orientation. But the limitations of our data suggest that we explore the utility of this cognitive orientation hypothesis with a typological analysis.

One way to test for distinct groupings among a set of objects (in this case, day-use hikers) is through a set of procedures generically known as cluster analysis. This technique is employed widely in leisure research and takes a variety of forms (Romesburg 1979). We chose to employ a simple cluster analysis to see how easily the cases drop into distinct groups which we can label as cognitive orientations.

We selected the three variables from our analysis representing our dimensions of "discrepancy between expected and observed crowding" and "sense of crowding" (SEEVSEXP, DEGCROWD, BEHDEG) and performed a K-means cluster analysis, specifying only two clusters. In essence, we told the computer to separate the cases into two groups based on their responses to these three items. The results are detailed below:

Table 3. Results of Cluster Analysis

Cluster	Number	BEHDEG	DEGCROWD	SEEVSEXP
1	333.0	1.08	1.26	2.83
2	94.0	2.03	3.00	4.17

The results displayed in Table 3 are in accord with our expectations, i.e., the three variables consistently differentiate between two clusters. The majority of our respondents (333 or 78%) show significantly lower scores on the crowding and discrepancy indicators. For the sake of argument, we'll choose to label these folks as our "pollyannas". A much smaller group (94 or 22%) report markedly higher scores on these three indicators -- especially on the discrepancy (seevsexp) measure. We'll characterize these as our "grumpies". Note that all three of these indicators are coded in the positive direction such that the greater the score, the greater the reported level of crowding or discrepancy.

Our next step was to test the relation between these groups and different sets of indicators (variables) from the theoretical dimensions of our model. If our general argument holds - that there are separate cognitive orientations which better predict satisfaction with the hiking experience than any of the experience or density dimensions - then these clusters or groups of people should be less associated with the indicators associated with the dimensions "previous hiking experience" and "perceived density of hikers in the area" dimensions and more associated with the indicators associated with the "hiker satisfaction" dimension. To test these assumptions we turned to analysis of variance techniques.

We conducted a basic analysis of variance using the clustered groups as a categorical, predictor variable. The results from our first series of runs are listed below in Table 4.

Table 4. Analysis of Variance of Density and Experience measures by Clusters

Variable	Mean Cluster #1 (333) "Pollyannas"	Mean Cluster #2 (94) "Grumpies"	Significance F test	ETA Squared
PARTON	9.94	14.96	.000	.06
PARTOFF	3.13	5.07	.000	.04
RAINTRIP	8.63	9.68	.350	.00
YEARS	16.99	15.67	.313	.00
VISITS	15.68	18.64	.090	.01
HIKEDAY	13.43	15.53	.160	.01
S				

Looking at the table above, we see that the mean scores are significantly different between our grumpies and pollyannas for the two measures of "perceived density of hikers in the area" (PARTON and PARTOFF). While the F test is significant (at the .05 level) for these two density measures, one should remember that F tests are sensitive to particularly large sample sizes like ours. In this sense, a finding of "significance" doesn't really say too much. We suggest a better approach would evaluate how much of the variation in the given dependent variable is accounted for by our predictor variable (the clusters). This measurement is calculated as the square of the ETA coefficient. In the instances above, our cluster variable accounts for six percent of the variation in the measure of the number of parties encountered on the trail (PARTON) and four percent of the variation in the measure of the number of parties encountered off the trail (PARTOFF). Of the remaining four experience variables, visits and hikedays register a meager one percent each. In sum, we conclude that the clustering pattern we've created shows no relationship whatsoever with the indicators of the previous hiking experience dimension. Further there is a small, but weak, relationship with the indicators from the perceived density dimension such that grumpies report slightly higher levels of trail density than pollyannas. Now we will approach the satisfaction indicators with the same analysis of variance procedure. The results can be found in Table 5 below:

Table 5. Analysis of Variance of Satisfaction measures by Clusters

Variable	Mean Cluster #1 (333) "Pollyannas"	Mean Cluster #2 (94) "Grumpies"	Significance F test	ETA Squared
OSATIS	5.23	4.37	.000	.09
SPRYSAT	4.70	3.63	.000	.13

The difference in means is obviously significant, suggesting that as a whole pollyannas are more satisfied with their hiking experience than grumpies. The ETA-squared scores are stronger than those in Table 4, but they are only modest in magnitude. Our clustering variable explains 9 percent of the variation in the measure of overall satisfaction (OSATIS) and 13 percent in of the variation in the measure of relative satisfaction (SPRYSAT).

The results from this exploratory typological analysis should be regarded as preliminary and tentative. The crude types generated here are consistent with the supposition that the cognitive orientation of hikers influence hiker satisfaction. The variance in satisfaction "explained" by the types is not large, but cognitive orientation dimensions measured by carefully constructed indicators seem likely to influence hiker satisfaction more than such variables as hiking experience or density of visitors in a wilderness area.

As a cautionary note, we should point out that the respondents in this study were all visitors to the same area, which implies that variation in actual conditions encountered has been minimized. A more demanding test of the influence of cognitive orientation on hiker satisfaction would entail a sample of hikers from areas that vary in actual conditions. The implication of the argument here is that the cognitive orientation of "pollyannas" and "grumpies" would lead them to make different evaluative judgments about their experience in different areas. However, the actual conditions encountered in the areas should loom larger in explaining variation in satisfaction in a study covering multiple and varied wilderness areas.

Conclusions and Implications

The findings from this study suggest that most visitors are very happy with their day-use hiking experiences. However, to the extent that they are not happy, it does not seem that their disapproval is directly related to the conditions they encountered while hiking. The evidence suggests that visitor satisfaction may have more to do with the visitors' predispositions than material factors such as the actual numbers of people encountered on the trail. One of the implications for wilderness management is that in the near term, while visitors are still generally very pleased with their day-hike experiences, effort should be directed at reorienting their expectations and predispositions with regards to their day-use hiking experience. Note, we are not suggesting that the conditions one encounters do not matter. Indeed, as many trails continue to be more and more popular, particularly in easily accessible day-use areas, they may very quickly reach a carrying capacity. At the present time, however, effort might best be directed at visitor education. That is, visitors to these areas should be made aware that they will be sharing their wilderness experience with others and that this may be characterized as a positive, social experience.

Secondly, and perhaps more significantly, are the implications that this model has for the future applicability and utility of sophisticated social science modeling techniques in these sorts of settings. Previous research in this area often relied on the methods of bivariate correlation and OLS regression. These methods are highly prone to measurement error and tend to render the results tentative at best. Unfortunately, the lack of appropriate funds in this line of research usually makes it difficult to design data collection efforts that maximize the utility of such techniques as structural equation modeling. Even the measures in our study were sometimes not ideal as these data were originally gathered for similar, yet slightly differing, purposes. We contend that the use of the general structural equation model deserves a robust test - complete

with a pre-test and full sample collection effort - to ascertain whether these models are useful for future recreational research in wilderness settings.

Appendix A

KEY TO VARIABLE LABELS

- YEARS "How many years have you been hiking?"
- VISITS "In the past 3 years, how many times have you visited a wilderness area?"
- HIKEDAYS "On average, how many days do you spend hiking during a year?"
- RAINTRIP "Number of visits to Mt. Rainier over the last three years?"
- PARTON "How many parties did you encounter on the trail today?"
- PARTOFF "How many parties did you encounter off of the trail today?"
- SEEVSEXP "How did the number of hikers that you saw in Spray Park compare with the number of hikers that you expected to see?"
- This indicator is measured on a five point scale with the middle response being "about what was expected" and the end responses being "much more than expected" and "much less than expected".
- DEGCROWD "To what degree did the number of people that you encountered in Spray Park cause you to feel crowded?"
- This indicator is measured on a five point scale with the middle response being "fairly crowded" and the end responses being "extremely crowded" and "not crowded at all".
- BEHDEG "To what degree did the person's or party's behavior in Spray Park cause you to feel crowded?"
- This indicator is measured on a five point scale with the middle response being "fairly crowded" and the responses being "extremely crowded" and "not crowded at all".

OSATIS "Overall, how satisfied are you with your Spray Park trip?"

For this indicator, respondents ranked their satisfaction on a scale of 1 to 7, where 1 = very unsatisfactory and 7 = very satisfactory.

SPRYSAT "How satisfactory was your Spray Park trip compared to other hiking/backcountry trips that you have done?"

For this indicator, respondents ranked their satisfaction on a scale of 1 to 7, where 1 = very unsatisfactory and 7 = very satisfactory.

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APPENDIX H - TRAIL COUNTER INFORMATION

Accuracy of the Compu-Tech TR-41 Trail Counter Placed on the Spray Park Trail

In conjunction with the 1993 visitor survey at Spray Park, the UW CPSU collected some information useful in assessing the accuracy of a newly purchased Compu-Tech TR-41 trail counter. A relatively small number of observations were made, but analyses indicate quite clearly that the trail counter overestimated the number of hikers visiting Spray Park, but that the degree of overestimation was very consistent.

Managers and researchers were interested in testing the accuracy of the new trail counter because of problems with the accuracy of infra-red beam counters previously used (rather than a beam, the Compu-Tech counter uses a buried pad to sense hikers' footsteps). In the summer of 1992, CPSU employees who were pilot testing questionnaires had found that the beam counters were inaccurate and inconsistent in operation. The counters sometimes registered impossibly large numbers of visitors (possibly due to fog breaking the beam) and sometimes failed to register any visitors at all. It was hoped that the new trail counters would prove more accurate.

Because of delays in the installation of the trail counter, comparisons of the number of hikers observed by the survey crew with the number of hikers registered by the counter were not possible before August 25. Data were collected on the eight days after August 24 when survey crews were present in Spray Park.

The placement of the trail counter was such that *day-hikers* following an up-and-back route to Spray Park would trip the counter twice. *Loop-hikers* planning to exit Spray

Park by other routes (e.g., Knapsack Pass, Wonderland Trail) would only trip the counter once. And also, *campers* (hikers planning to camp in Spray Park) would trip the counter only once on the day they were surveyed. The survey crew recorded the number of hikers in the three categories and the number of hikers that should have been registered by the trail counter was estimated by taking the hiker categories into account. The table below shows the data that were collected.

Date	Day-Hikers	Loop-Hikers	Campers	Expected Trail Counter Reading	Actual Trail Counter Reading
8/25/93	33	0	0	66	59
8/28/93	99	0	0	198	240
8/29/93	101	0	0	202	280
8/31/93	29	0	0	58	63
9/5/93	146	6	4	302	370
9/6/93	64	7	1	136	294
9/12/93	50	0	0	100	148
9/18/93	51	7	5	114	177

Before analyzing the relationship between the expected and actual counter readings we decided to drop the data collected on 9/6 from the analysis. The survey crew on that day consisted of a single person who, because of heavy visitor traffic, was unable to record information about all the hikers. Thus, the expected counter reading for that day was known to be an underestimate.

The accuracy of the trail counter was tested using linear regression. The expected counter reading was predicted using the actual reading. The regression equation was:

Expected = 0.76(Actual) + 2.6. There was an extremely strong relationship between the expected and actual readings (the correlation was .98).

The analysis indicates two primary points: 1) the number of hikers recorded by the trail counter was higher than it should have been (see the regression equation), and 2) the overestimation of the trail counter was extremely consistent (see the correlation above). These points suggest that the new counter is more useful than the older beam-type counters because users can be confident that increases and decreases in the number of hikers recorded over several weeks indicate changes in the number of hikers actually present.

When installed at various locations, it is likely that the counter readings would maintain a strong correlation with actual hikers. However, the degree of over or underestimation may vary. The present data do not confirm or deny this possibility, but its likelihood should be considered before readings from a counter at one site are compared to those at another. Also, the data used in this analysis were collected over a relatively brief period of time. It is possible that the counter may become more, or less prone to overestimation as longer periods of time pass. The existing data are not sufficient to test this hypothesis. Finally, the sensitivity of the counter can be adjusted. It is possible that the counter was not properly adjusted and that if it had been, the total counts recorded would have been accurate.

In summary, the data indicate that, as installed at Spray Park, the trail counter readings were very highly correlated with the actual number of hikers but that the total number of hikers was overestimated by the counter. This indicates that the Compu-Tech

TR-41 trail counter can be a useful tool in measuring visitor use patterns, and if calibrated correctly, can accurately measure the total number of hikers using a trail.



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