

A COMPARISON OF CARRYING CAPACITY PERCEPTIONS AMONG VISITORS TO TWO WILDERNESSES

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RESEARCH SUMMARY

Visitors to two wildernesses - the heavily-used Desolation Wilderness in California and the lightly-used Spanish Peaks Primitive Area in Montana - were surveyed. Research objectives were to determine whether use levels produced differences in how wilderness was defined, what constituted appropriate use, the threshold at which crowding occurred, and what management actions were acceptable.

In terms of socio-economic characteristics, visitors to the two areas were similar. Type and pattern of recreational use differed, however: there was virtually no stock use or outfitter use in the Desolation Wilderness while day use and large parties were significantly more common in the Spanish Peaks. Most visitors in both areas reported previous wilderness use, although Desolation Wilderness visitors had more experience in the particular area.

Higher use levels in the Desolation Wilderness did not produce any appreciable difference among respondents in terms of generalized concepts of appropriate and desirable use. This finding is similar to the findings of other studies. Visitors in both areas hold common perceptions about wilderness and its use.

Significant differences were revealed in an analysis of the preference for inter-party contacts and the consequences of not finding preferred conditions. For contacts with backpackers and with large parties (defined as 12 or more people), medium satisfaction levels were consistently higher at increasing levels of contact in the Desolation Wilderness than in the Spanish Peaks. No contact with other parties at campsites was especially important in both areas. In general, it appears that Desolation visitors, exposed to higher use levels, have become more tolerant of heavy use than their Spanish Peaks counterparts.

Nevertheless, while tolerant, it is evident Desolation Wilderness visitors perceive high use as contributing to impact on the area; they were twice as likely to report that area quality was worse than before and that the area was used beyond its capacity. Perhaps as a result of the perception, nearly half of the Desolation Wilderness visitors who reported the area as used beyond capacity changed either the length or route of their trip to avoid crowding.

When use exceeds capacity, visitors in both areas agree that restrictions should be imposed. But there were differences in the types of controls favored. Not only was there a greater acceptance of regulation in the Desolation Wilderness, there was also more acceptance of direct regulation of use and users. Desolation visitors were more supportive of party size regulation and the control of stock numbers.

The data support the need for managers to be flexible and sensitive in their imposition of visitor management programs. Although the types of experience sought by visitors in these two areas were similar, individual differences in use intensity suggest the necessity of adjusting programs to meet particular circumstances. However, it is important that management impose regulation only as is necessary and be careful not to enact excessively regimenting actions before they are needed.

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INTRODUCTION

Over the past two decades, many studies have investigated recreational carrying capacity. Although some authors believe the concept of carrying capacity has only limited application to recreation and wilderness management (Wagar 1974; Bury 1976; Heberlein 1977), there is general recognition that increasing use can produce environmental and social changes inconsistent with management objectives. It is also generally recognized that carrying capacity cannot be set without defining values that are to be emphasized in management (Heberlein and Shelby 1977). Research provides estimates of the probable consequences of alternative decisions, but it cannot define the "right" answer--how much recreational traffic is "too much."

Most students of recreation and wilderness management recognize that carrying capacity judgments derive from two factors: First, the physical-biological impacts resulting from use represent one "cost" that managers must evaluate in determining whether some level of use is "too much." In some areas, substantial impact might be tolerated (at a site managed for off-road vehicle use), while at others only limited changes in the natural order would be acceptable (wilderness). In any case, the *magnitude* of the impact is a relatively objective dimension amenable to precise measure. The *importance* associated with these impacts, on the other hand, will vary according to the relative values held by managers, visitors, and the general public.

Second, the impact of use on the experiences derived from different opportunities are of concern in carrying capacity judgments. High-density conditions might be appropriate for certain opportunities (city parks, group campgrounds), while in other cases, low-density levels would be required (wilderness). Again, the magnitude of the social impacts is subject to relatively objective measures (how many interparty contacts occur at some use level), but the importance of these impacts in affecting the visitor's experience will differ among various recreation opportunities and between visitors and managers.

In an earlier investigation of attitudes about wilderness carrying capacity (Stankey 1973), similar perceptions were discovered among four areas even though there was a 12-fold difference in use between the lightest and most heavily used areas. Nevertheless, there is concern that attitudes as to what constitutes excessive use ("crowding") will gradually shift to more lenient definitions as visitors encounter heavier use and develop a tolerance to it. As these perceptions shift, people who still seek low-density opportunities will be gradually displaced by those with greater tolerance to higher use (Stankey 1973; Shelby and Nielsen 1976; Heberlein 1977).

It is difficult to determine whether definitions of acceptable levels of use are gradually changing. Most previous studies have been one-time, cross-sectional investigations; they have not been followed up to examine changes.

As noted above, an earlier study of four wildernesses having different physical characteristics and use patterns, indicated no important differences in attitudes about capacity. In the study reported here, two areas similar in size and topography were chosen. Visitors to these two areas--the Desolation Wilderness in California and the Spanish Peaks Primitive Area in Montana--were surveyed with an identical questionnaire.

Several issues were investigated: (1) preferences for meeting other groups; (2) expected impact on satisfaction associated with varying hypothetical contact levels; (3) impact of actual use levels on the area's capacities; (4) impact of encounters on respondent travel behavior; and (5) preferences for management techniques.

STUDY AREA DESCRIPTIONS

Table 1 compares the two areas' use and acreage as well as selected indices of dispersion potential and density. Annual visitation in the Desolation Wilderness was approximately 18 times greater than the Spanish Peaks. Although the California area has greater potential for dispersion of use (about 2-1/2 times as many access points and 3 times as much trail mileage per 1,000 acres [405 ha]), the two density measures still suggest a much greater intensity of use there.

Table 1.--Comparison of use in the Desolation Wilderness and Spanish Peaks Primitive Area

Area	Size Acres	Entry points/ 1,000 acres	Trail miles/ 1,000 acres	Visitor days	Visitor days/acre	Visitors/ trail mile
Spanish Peaks (1970)	50,616	0.14	0.51	16,900	0.3	348.5
Desolation Wilderness (1972)	63,475	.35	1.56	305,700	4.9	3,084.5

STUDY METHODS

Sampling Procedures

Visitors to the Spanish Peaks Primitive Area were sampled from the third week in June 1970 and through late November. In the Desolation Wilderness, sampling covered the entire year of 1972, although the bulk of use occurred during the same time period as in the Spanish Peaks.

Compiling a list of wilderness visitors adequate for sampling is difficult (Lucas and Oltman 1971). In this study, two methods were used, which with the 2-year interval between studies, complicates data comparison. This problem will be discussed in subsequent sections.

In the Spanish Peaks, names were obtained by using special registration signs and personal field sampling at selected trail heads. The sign advised visitors that a research study was under way and requested that each person 16 years or older provide their names and addresses on a card. The sign was used at trail heads in the area where hiker use predominated (previous research indicated visitors using horses were less likely to register). On trails where horse use was significant, a field worker was present on sample days to contact all entering and exiting parties.

A list of names and addresses was prepared, using no more than one member of a particular group. A systematic interval sample of 452 individuals was drawn.

Four follow-up mailings were made to increase the response rate. Of the 431 deliverable questionnaires, 409 usable ones were returned, a 95 percent response rate. Responses from individuals contacted in person were weighted so they might be combined with those obtained from the special registration sign (trails covered in person were sampled on only some days; trails where the special sign was posted were, of course, covered every day), yielding an adjusted number of 515.

In the Desolation Wilderness, names were randomly sampled from a list of persons receiving wilderness permits during the 1972 season. A total of 350 names were sampled, but 11 questionnaires were returned by the Post Office; 286 usable responses were obtained from the remaining 339 for a response rate of 84 percent. Thus, our sampling universe was composed of individuals who obtained a permit for their groups. Because the sample is based on groups rather than individuals (as in the Spanish Peaks), data for the two areas are not fully comparable. For some types of data, such as socioeconomic characteristics, substantial variations might be expected between persons defined as the "party leader" and the other group members. However, for other data, such as attitudes about wilderness, less variation apparently exists.

For example, Jubenville (1971) found no significant differences between party leaders and other party members on a series of attitude statements about wilderness. The study reported here focuses primarily on visitor attitudes.

The sum consequence of these differences--time of study, individual versus group sampling frame--mean that it is difficult to accurately assess observed differences between the two areas. Are they a function of real differences (for example, use levels) or are they some complex function of differences in time or survey method?

VISITOR PROFILES

Three different types of descriptive data for users were collected: who they were, how they used the wilderness, and their outdoor recreation experiences.

Socioeconomic Profile

A brief socioeconomic profile of users was developed, based on questions regarding age, education, sex, and student status. Additionally, visitors were questioned regarding their membership in any conservation or outdoor recreation organizations. These data are presented in table 2.

Table 2.--Socioeconomic characteristics of visitors to the Desolation Wilderness and Spanish Peaks Primitive Area

Area	Years of education							Student			
	<8	9-11	12	13-15	16	17 & over		N ¹	Yes	No	N
						Percent					
						Percent					
Desolation	0	9	11	29	19	32	281	39	61	276	
Spanish Peaks	3	12	21	19	16	29	500	36	64	469	

Area	Age								N
	11-15	16-20	21-25	61 & over					
				26-30	31-40	41-50	51-60		
								Percent	
Desolation	2	17	20	21	19	13	7	1	282
Spanish Peaks	2	17	17	16	24	16	6	2	494

Area	Sex		N		
	Male	Female			
				Percent	
				Percent	
Desolation	87	13	282		
Spanish Peaks	67	33	494		

¹Differences in sample size from one variable to another are due to nonresponse.

How names were collected affects interpretations of resulting data, particularly for descriptive information. For example, self-selected party leaders, such as we are dealing with in the Desolation Wilderness, probably have important differences from other party members--namely, they could be more experienced, older, and so on.

Despite these problems, the data in table 2 are more striking for similarities than for differences. In both areas, educational attainment is high, with nearly half of all visitors reporting a college degree or postgraduate work. This is consistent with previous studies of wilderness users throughout the country (Outdoor Recreation Resources Review Commission 1962; Hendee and others 1968; Echelberger and Moeller 1977). The age distribution of visitors to the two areas is also similar, with slightly over one-third 25 years or younger, 40 percent between 26 and 40, and nearly one-fourth over 40 years of age. In the Spanish Peaks, only those persons 16 years or older were asked to register; in the Desolation Wilderness, the party leader registration obtained from the mandatory permit probably also resulted in an upward bias in the age profile. Nevertheless, the overall age profile is similar.

The distribution of females and males is reliable only for the Spanish Peaks, where *all* visitors were asked to register and names from this list were randomly chosen. Again, the party leader bias in the Desolation sampling list almost certainly overestimates males. In the Spanish Peaks, males outnumber females two to one; at the time of this study, wilderness recreation appears still to be predominantly a male activity, but this situation is probably in flux and rapidly changing.

Finally, we found that a substantial number of visitors in both areas were still students, but they are clearly a minority (approximately one-third).

Thus, our socioeconomic profile of visitors to the Desolation and Spanish Peaks suggests that both areas draw a similar clientele. This is as we suspected; wilderness visitors in previous studies have been typically found to be highly educated, drawn from a wide age range, male, and nonstudent (Outdoor Recreation Resources Review Commission 1962; Hendee and others 1968; Stankey 1971, 1973; Echelberger and Moeller 1977).

Characteristics of Recreation Use

While user characteristics in the two areas were quite similar, the recreation use characteristics differed in several instances. Table 3 summarizes data for five use-related variables: method of travel, length of stay, party size, use of outfitters, and recreational activities.

Wilderness Activities

Both wildernesses were mainly used by backpackers. Virtually all use in the Desolation Wilderness was by backpackers while about one-fourth of the Spanish Peaks visitors used horses. Thus, the potential for conflict between travel methods was clearly present in one area and almost absent in the other.

Table 3.--Characteristics of visitor use in the Desolation Wilderness and Spanish Peaks Primitive Area

Length of stay (number of nights)													
Method of travel													
Hiker with													
Hiker Horseback stock N													
Percent													
0 1 2 3 4-5 6-7 8-10 11 & over N													
Desolation													
99 0 1 285 22 21 21 16 12 6 2 1 283													
Spanish Peaks													
74 26 0 508 63 6 14 11 3 1 0 0 513													
Activities													
Traveling with outfitter													
Fully outfitted Spot pack N													
Percent													
Fish Hunt Photography study Mountain climb Swim N													
Desolation													
99 1 0 286 47 2 64 49 7 49 286													
Spanish Peaks													
91 4 5 508 45 27 67 39 6 13 514													
Party size													
1 2 3 4													
Percent													
5-6 7-9 10 and over N													
Desolation													
12 37 17 19 7 3 5 284													
Spanish Peaks													
5 23 16 19 15 11 11 499													

Length of stay in the two areas varied significantly, with nearly two-thirds of the Spanish Peaks visitors reporting day use only. About one-fifth of the Desolation Wilderness visitors were day users; however, this figure probably underestimates actual day use because of the lower compliance among day users in obtaining a mandatory wilderness permit (Lucas and Oltman 1971). Correcting for noncompliance, Lucas (review draft, Forestry Sciences Laboratory, Missoula, Mont.) has estimated day use in the Desolation Wilderness to be about 40 percent, still significantly less than the Spanish Peaks. Trips of more than 3 days are more common in the Desolation Wilderness than in the Spanish Peaks.

Average party size in the two areas was significantly different. Two-thirds of the groups in the Desolation Wilderness had 3 or fewer people in them, while 57 percent had 4 or more in the Spanish Peaks.

Outfitter use was nonexistent in the Desolation Wilderness and accounted for less than 10 percent of the Spanish Peaks use. As in most wildernesses, visitors usually travel on their own.

Finally, most visitors reported participating in a variety of recreational activities. Fishing is a common activity, as is photography and nature study. Swimming is quite popular in the Desolation Wilderness. Hunting was reported by about one-fourth of the Spanish Peaks visitors, but by only 2 percent of the Desolation Wilderness respondents.

Outdoor Recreation and Wilderness Experience

Our final descriptive information concerned previous outdoor recreation and wilderness experiences of the visitors (table 4). Visitors to both areas had similar childhood camping experiences. Although the majority had auto-camped with their parents, most had not camped, hiked, or canoed remote areas. However, most had been introduced to wilderness camping prior to our survey; only about 10 percent of the Desolation Wilderness visitors and 25 percent of the Spanish Peaks visitors were on their first wilderness trip.

Moreover, most were young when their first wilderness trip occurred; nearly one-half had made their first trip before the age of 15. Only about one-fifth of the visitors reported their first visit after the age of 26. However, this does not necessarily mean that age represents a constraint on use. It more likely reflects the fact that tastes are shaped early in life and that these patterns, once established, are generally stable over time. Nevertheless, new entry does continue to occur past the age of 30.

Most visitors reported more than one visit per year as typical. These wilderness visitors may also be considered consistent users, with 8 out of 10 in both areas indicating at least one wilderness visit each year. This is further supported by looking at the number of wilderness trips reported in the past 12 months. Overall, about half reported visiting a wilderness from 2 to 5 times in the previous year. About twice as many Spanish Peaks visitors as Desolation Wilderness visitors reported no visit in the past 12 months. About two-thirds of the Desolation Wilderness users reported a previous visit to that area, whereas only about half of those in the Spanish Peaks had been there previously.

Table 4.--Experience levels of visitors to the Desolation Wilderness and Spanish Peaks Primitive Area

Area	Frequency of auto camping trips as a child			Frequency of hiking or canoe camping trips as a child			N								
	Never	Occasionally	Often	Never	Occasionally	Often									
	Percent														
Desolation	44	38	18	272	62	28	10	267							
Spanish Peaks	46	36	18	466	58	31	11	481							
Was this your first wilderness visit?															
Area	No	Yes	N	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36 & over	N			
	Percent			Percent											
Desolation	88	12	283	5	21	23	19	14	7	5	7	243			
Spanish Peaks	77	23	511	7	22	17	24	12	8	5	5	395			
Frequency of wilderness trips															
Area	More than once a year	About once a year	Less than once every 2 years	N	0	1	2	3	4	5	6-10	11-20	21 & over	N	
	Percent			Percent											
	Percent														
Desolation	61	19	10	9	249	10	23	14	8	8	11	4	0	273	
Spanish Peaks	60	22	6	14	405	19	19	15	14	9	5	14	4	1	514
Previous visit to the Desolation Wilderness (Spanish Peaks)?															
Area	No	Yes	N												
	Percent														
Desolation	33	67	283												
Spanish Peaks	49	51	484												

EXPECTATION OF VISITOR CONTACT

Eight statements were developed to determine visitor attitudes about wilderness, particularly feelings about the level and type of social interaction that was appropriate. We were especially interested in comparing attitudes of visitors to the Desolation Wilderness, where use levels are high, with attitudes of visitors to the Spanish Peaks, where use levels are light. Did high use breed tolerance or were attitudes independent of actual use?

Levels and Types of Contact

How many other parties do visitors expect to encounter in wilderness? Are these expectations shaped by actual use in the area?

More than three-fourths of the visitors in both areas agreed with the statement, "It is reasonable to expect that one should be able to visit a wilderness area and see few, if any, people."

There was no difference between the two areas in responses to the statement. The data suggest relatively uniform expectations of what a wilderness ought to provide--an ideal that most subscribe to regardless of the actual use found in the specific areas they visit.

Two additional questions were asked about interparty contact:

"It's most enjoyable when you don't meet anyone in the wilderness."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	<i>Percent</i>					
Desolation	3	14	18	31	34	279
Spanish Peaks	2	13	15	28	42	497

Chi-square = 4.28, 4 df, p <0.50

"You should see at least one group a day in the wilderness to get the most enjoyment out of your trip."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	<i>Percent</i>					
Desolation	16	36	24	20	4	285
Spanish Peaks	22	39	17	19	3	496

Chi-square = 9.47, 4 df, p <0.10

Again, the pattern of response is striking for its similarity rather than its difference. About 2 out of 3 visitors to both areas agree that it is most enjoyable not to meet anyone; the strength of this attitude appears to diminish slightly in response to the second item. Spanish Peaks visitors did show a tendency to select the more extreme response category ("strongly agree" in the first item, "strongly disagree" in the second).

Socialization at Campsites

Previous work (Stankey 1973) suggests that contacts at campsites are a particularly crucial problem. Two items were asked to determine the relative importance of solitude at the campsite. As can be seen, there was virtually no difference in response between the two areas for either item:

"Meeting other people around the campfire at night
should be part of any wilderness trip."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	<u>Percent</u>					
Desolation	14	35	30	19	2	281
Spanish Peaks	17	31	33	16	4	496

Chi-square = 4.34, 4 df, $p < 0.50$

"When staying out overnight in the wilderness, it is
most enjoyable not to be camped near anyone else."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	<u>Percent</u>					
Desolation	0	6	13	40	40	284
Spanish Peaks	1	7	14	43	36	503

Chi-square = 1.89, 4 df, $p < 0.75$

It is clear that minimal intergroup contact at the campsite is important for visitors in both areas. While about half of the respondents disagree that "meeting others around the campfire" is part of the trip, about one-third are neutral on the matter, suggesting that some temporary contact might not be inappropriate. However, respondents clearly endorsed the notion that campsites ought to be located in relative isolation. (We will return to this issue when we examine preferences for interparty contact.)

A third element of the normative question of intergroup contact relates to perceived differences among user groups and the subsequent effects on social carrying capacity. Earlier work by a number of investigators (Lucas 1964; Stankey 1973; Lee 1975) suggests that the presence of dissimilar groups contributes to feelings of crowding and dissatisfaction.

Responses to these items varied more than previous items. The first item concerned whether people who backpack differed from those who travel on horseback. Visitors thought the two groups significantly different:

"There is a great deal of difference between the kind of people who like to backpack in the wilderness and those who prefer to travel by horseback in the wilderness."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	-----	-----	-----	-----	-----	
			Percent			
Desolation	2	15	24	34	24	284
Spanish Peaks	7	25	24	29	15	495

Chi-square = 26.47, 4 df, p <0.001

About 6 out of 10 Desolation Wilderness respondents thought that backpackers were different from those who use stock; only slightly more than 4 out of 10 agreed in the Spanish Peaks. Stock use is certainly more common in the Spanish Peaks than in the Desolation Wilderness; about one-quarter of the respondents in the Montana area were using stock, compared to only one party in the Desolation Wilderness sample. When method of travel was used as the independent variable, we found that Spanish Peaks hikers were about twice as likely to agree with the statement as were stock users. In this sense, the Spanish Peak hikers were more similar to their Desolation Wilderness counterparts than they were to their fellow Spanish Peaks visitors on horseback.

While there was a clear difference on this item between the two areas and between hikers and horse users, our second item concerning other kinds of parties revealed no difference between areas and only a small difference between hikers and horsemen in the Spanish Peaks:

"Seeing a large party (a dozen or more people from a club, etc.) reduces the feeling that you are out in the wilderness."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	-----	-----	-----	-----	-----	
			Percent			
Desolation	1	12	8	42	38	284
Spanish Peaks	1	11	11	38	39	502

Chi-square = 3.13, 4 df, p <0.50

Large groups tend to be perceived as inappropriate in wilderness (Outdoor Recreation Resources Review Commission 1962; Stankey 1973). The typical style of use in both areas reflected this perceived inappropriateness; only 11 percent in the Spanish Peaks and 5 percent in the Desolation were in groups larger than 10 persons. About two-thirds of the horsemen in the Spanish Peaks agreed compared to three-fourths of the overall sample.

The final normative element concerned the relative importance of perceived crowding as compared to finding litter. More than half the respondents disagreed with the item below, but another 25 percent did concur. There was no difference in response between the two areas:

"Seeing too many people in the wilderness is more disturbing than finding a littered campsite."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	<u>Percent</u>					
Desolation	12	42	17	19	10	281
Spanish Peaks	16	42	15	19	8	500

Chi-square = 0.44, 4 df, p < 0.97

Although most visitors apparently find the presence of litter, especially at their campsite, more disturbing than crowding, a significant minority do not.

In summary, despite sharp differences in use levels and intensities, visitors to the two areas hold highly similar notions of appropriate and desirable use. Exposure to higher use in the Desolation Wilderness does not appear to influence generalized concepts of desirable social interaction, given their similarity to those held by Spanish Peaks visitors. Spanish Peaks' visitors are somewhat less likely to believe that hikers and stock users are different from one another, but this response is largely accounted for by individual method of travel; Spanish Peak hikers are quite similar in their beliefs on this issue to Desolation Wilderness visitors, almost all of whom were backpackers. Horse users in the Spanish Peaks generally see little difference between themselves and hikers.

PREFERENCES FOR VISITOR CONTACT

Studies of visitor preferences are familiar to most managers. But as Driver and Bassett (1977) have discussed, the concept of "preference" is complex, with several distinct meanings. In this discussion, preference refers to the relative importance that visitors attach to some situation or condition.

Measures of preference were obtained for several different situations. Preferred amounts and types of use were measured separately. However, because these elements are not independent (users contacted and how they react involves not only how many, but also what kinds), an effort was made to calculate how varying amounts of different types of use affected expressed preferences.

Level of Contact

Preferences for contact with other groups were examined in two settings: along trails and at campsites.

Two questions tested visitor preference for trail contacts: "meeting many other people on the trail" and "meeting no one all day." Responses to the two items were related, as can be seen below:

"Meeting many other people on the trail"

<u>Area</u>	<u>Bother a lot</u>	<u>Bother some</u>	<u>Neutral Percent</u>	<u>Enjoy some</u>	<u>Enjoy a lot</u>	<u>N</u>
Desolation	22	40	20	16	2	284
Spanish Peaks	28	39	21	11	1	502

Chi-square = 8.22, 4 df, $p < 0.10$

"Meeting no one all day"

<u>Area</u>	<u>Bother a lot</u>	<u>Bother some</u>	<u>Neutral Percent</u>	<u>Enjoy some</u>	<u>Enjoy a lot</u>	<u>N</u>
Desolation	0	8	23	22	46	283
Spanish Peaks	0	4	30	18	48	504

Chi-square = 10.06, 4 df, $p < 0.05$

About two-thirds of the respondents in both areas indicated a preference for minimal contact with others. Meeting many others along the trail was bothersome to most and enjoyable to only a few; conversely, meeting no one all day was something most enjoyed. However, about one-fourth of all responses to these two items fell into the "neutral" category, suggesting the existence of a significant minority who find the level of contact, at least along the trail, to be relatively unimportant.

Crowding at campsites might represent a critical constraint on wilderness carrying capacity. This was confirmed by the response to the following item:

"Camping at a place where several other parties are camped"

<u>Area</u>	<u>Bother a lot</u>	<u>Bother some</u>	<u>Neutral</u>	<u>Enjoy some</u>	<u>Enjoy a lot</u>	<u>N</u>
	-----	-----	Percent	-----	-----	
Desolation	38	47	11	4	0	283
Spanish Peaks	42	41	14	3	0	504

Chi-square = 5.68, 4 df, p <0.30

More than 8 out of 10 respondents in both areas would be bothered by the presence of others near their campsite. None indicated they would enjoy such contact. A small percentage of users indicated a neutral response to the item. There seems to be a fairly strong preference for campsites that offer complete or partial isolation.

To follow up on the question of what level of campsite development was considered appropriate, we next asked respondents, "When you are camped in the wilderness, how many other parties would you prefer camped within sight or sound of your campsite?" Overall, two-thirds of the respondents preferred a campsite with no other camps within sight or sound. Desolation Wilderness visitors showed slight preference for two other camps nearby. Low-density camping is clearly preferred and there is little preference for more than two other camps.

"Number of other camper groups preferred within sight or sound"

<u>Area</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4 or more</u>	<u>N</u>
	-----	-----	Percent	-----	-----	
Desolation	60	12	18	5	5	267
Spanish Peaks	69	12	11	3	5	508

Chi-square = 11.40, 4 df, p <0.05

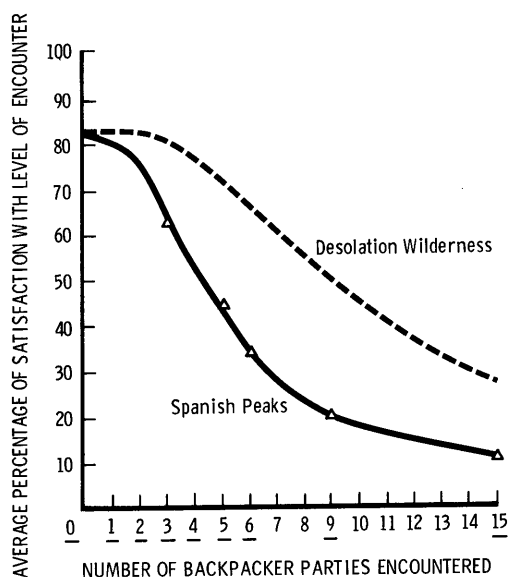
Amounts and Types of Contact

People who may not mind meeting two or three small backpacking parties may dislike meeting two or three similarly sized groups on horseback. Thus, it is difficult to dissociate preferences for amount of contact from preferences for types of contact. To deal with this problem, we asked a series of questions that probed how various amounts of different types of encounters affected visitor satisfaction with the level of interparty contact (as opposed to their satisfaction with the overall trip). The question required the respondent to judge a hypothetical situation; the question was to provide data for construction of a profile of the relationship between encounters and the hypothesized satisfaction with that encounter.

A number of investigators have found little or no relationship between actual use levels encountered and visitor reports of overall trip satisfaction (Lee 1975; Heberlein 1977; Neilsen and Shelby 1977). However, most also argue that it should not be inferred that crowding is not a problem or that people don't care about the level of use encountered. Thus, the most appropriate measure of satisfaction should be that associated with the level and mix of use encountered rather than the effects of interparty contacts on overall satisfaction. The purpose of the following data is to establish an index of what people prefer with regard to interparty contacts and the consequences of conditions that do not meet those preferences.

Four different encounters were described: (1) meeting average-sized backpacking parties (and no other kinds) on a 3-day trip; (2) meeting average-sized horseback parties on a 3-day trip; (3) meeting large parties (at least a dozen people) on the trail on a 3-day trip; and (4) camping within sight or sound of an average-sized backpacking party. Respondents were asked to consider various levels of encounters with these different groups (for example, no encounters at all in 3 days, etc.) and to state their level of satisfaction with that particular encounter level (see appendix for a discussion of some of the methodological problems with this technique). If a situation was perfectly satisfactory, they would indicate 100 percent; if totally unacceptable, 0 percent. Intermediate situations would be rated somewhere between 0 and 100. Although this required a major effort by respondents (more than 28 separate responses were needed), cooperation was excellent; more than 90 percent of the respondents fully completed the question.

Figures 1 to 4 show response to the questions. The curves are plotted on the basis of area averages. However, two intra-area tests for significance ($p < 0.05$) were also made. In both areas, the preferences of those visitors with less than 1 year's wilderness experience were tested against those with more than 1 year's experience. In the Spanish Peaks, attitude differences between hikers and horseback riders was tested (no such test was performed in the Desolation Wilderness because all visitors were hikers).

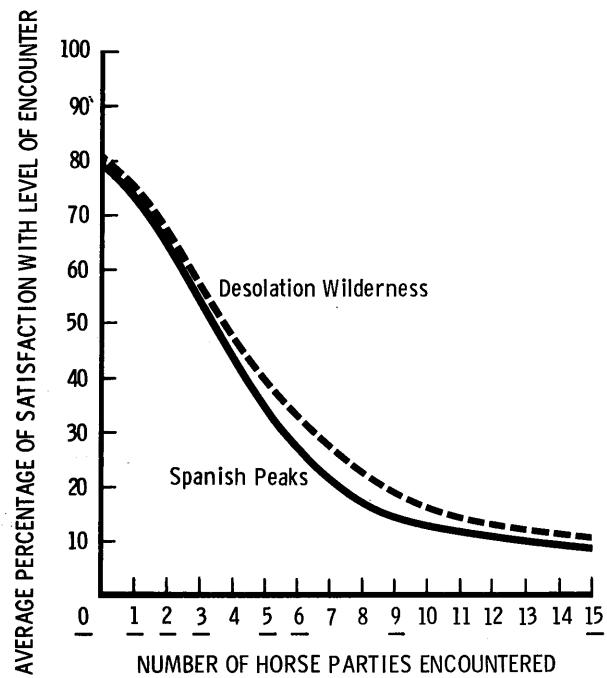


△ Statistically significant differences at the 0.05 level based on method of travel.

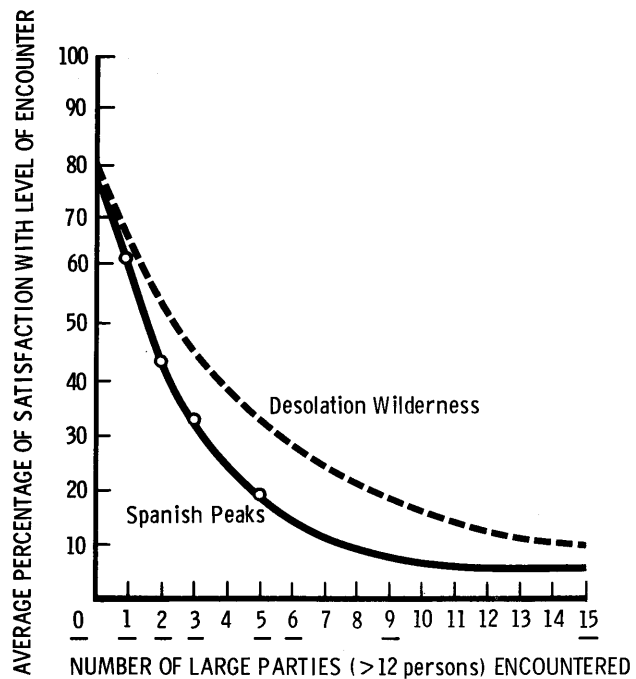
Underlined numbers represent contact levels for which data were collected.

Figure 1.--Reported satisfaction with backpacker contacts.

Figure 2.--Reported satisfaction with horseback party contacts.



Underlined numbers represent contact levels for which data were collected.

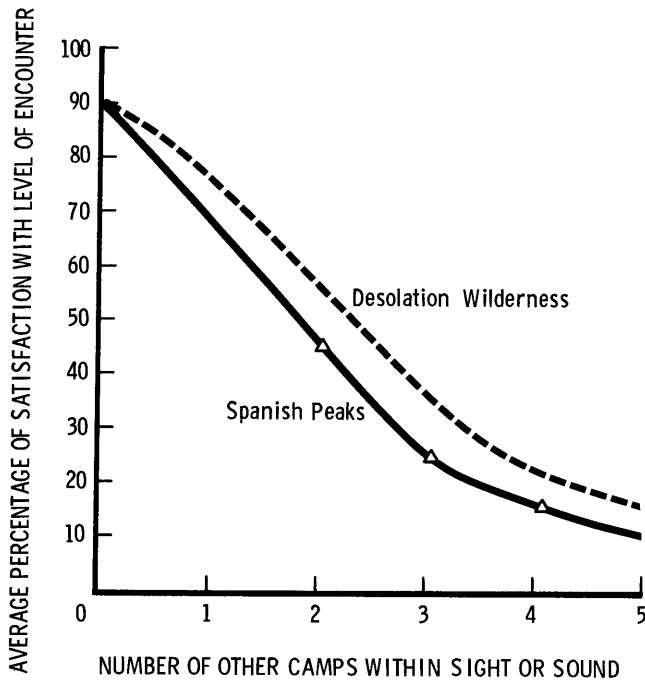


○ Statistically significant differences at the 0.05 level based on prior wilderness experience.

Underlined numbers represent contact levels for which data were collected.

Figure 3.--Reported satisfaction with large party contacts.

Figure 4.--Reported satisfaction with contacts at campsites.



△ Statistically significant differences at the 0.05 level based on method of travel.

In the Spanish Peaks, previous wilderness experience had little influence on preferred levels of contact, with the exception of encounters with large parties [defined as 12 or more people (fig. 3)]. Interestingly, more experienced users indicated a higher level of satisfaction with large parties than those less experienced. This may be related to the greater frequency of such parties in the area and the fact that repeat visitors are more accustomed to seeing them.

Tests for differences between hikers and horsemen in the Spanish Peaks also revealed little difference. One exception was the preference of contact with back-packing parties; hikers were more favorably inclined toward their fellow walkers than were horsemen (fig. 1).

In the Desolation Wilderness, no significant differences for preferred contact levels based upon previous experience were found.

A central interest has been the degree of similarity in preferred contact levels between the two study areas. At a general level, the image of wilderness and the wilderness experience seem closely shared, a finding previously reported (Outdoor Recreation Resources Review Commission 1962; Stankey 1973). But do the great differences in use intensity stimulate different notions of acceptable levels of inter-party contact?

To answer this question, we examined the median levels of satisfaction reported in each area and tested for differences between the medians using a Kolmogorov-Smirnov test (Blalock 1972).¹ This interarea comparison allowed us to determine whether visitor attitudes were significantly different in two areas. Table 5 presents the results.

There is a statistically significant difference between the median values reported for backpacker contacts and encounters with large parties (defined as 12 or more persons). In the Desolation Wilderness, median satisfaction levels are consistently higher at increasing levels of contact than in the Spanish Peaks. In the Spanish Peaks, however, large parties appear more acceptable than in the Desolation Wilderness. Parties of a dozen or more people were about twice as common in the Spanish Peaks.

Table 5.--A comparison of Desolation Wilderness and Spanish Peaks encounter tolerance levels

Type of encounter	Number of encounters	Median level of satisfaction		Level of significance
		Desolation Wilderness	Spanish Peaks	
Backpacker	0	98	99	0.001
	1	95	90	
	3	90	70	
	6	70	25	
	9	50	10	
	15	19	0	
Horseback	1	90	90	NS
	3	60	50	
	6	21	10	
	9	1	0	
	15	0	0	
Large parties (<12 persons)	1	70	80	.001
	3	19	49	
	6	0	10	
	9	0	0	
	15	0	0	
Camping near other parties	0	100	100	NS
	1	89	80	
	2	61	49	
	3	30	11	
	5	1	0	

¹Because of the highly skewed distribution of responses, the median values were selected as being more representative of central tendency than the mean (Blalock 1972). A Kolmogorov-Smirnov test was adapted to compare the cumulative frequency distributions of median satisfactions at different contact levels in the two areas. Because the cumulative distributions are based on median values rather than case observations, the actual sample sizes were used in computing the chi-square values rather than the sum of the distributions.

Horseback parties and encounters at campsites seem to evoke similar responses in the two areas. Although the level of satisfaction declines more rapidly in the Spanish Peaks for both types of encounters, the difference in the overall distributions is not statistically significant.

The similarity of attitude toward use of horses is especially interesting, given the virtual absence of horses in the Desolation Wilderness.

Although no difference in satisfaction is reported for no contact while traveling or while camped for the two areas, no contact at campsites is more desirable than no contacts on the trail. This concurs with earlier findings (Stankey 1973) indicating the importance of protecting campsite solitude and the possibility that campsite capacity might be the critical factor in prescribing visitor capacity.

Differences in reported satisfaction from the two areas diverge rapidly with subsequent encounters. For example, with three trail encounters with backpackers, there is a 20 percent difference between the two areas; with six trail encounters, the spread rises to 45 percent.

In summary, table 5 reveals a high level of reported satisfaction with no contact conditions on the trail and at the campsite, and a relatively steady decline in satisfaction as contacts increase. However, Desolation Wilderness visitors exposed to substantially higher use levels have become more tolerant of conditions. Whether or not these norms will continue to demonstrate flexibility to accommodate greater use cannot be determined from these data. The data do suggest, though, that exposure does breed tolerance; thus reliance on some measure of satisfaction as an indicator of whether or not conditions are becoming unacceptable may not be warranted.

PERCEPTIONS OF ACTUAL CONDITIONS

The previous two sections have dealt with how visitors defined and perceived capacity in a hypothetical situation. We next consider how they perceived actual conditions and if, and in what ways, these conditions affected the trip.

Judgments about what constitutes "appropriate" or "acceptable" are, of course, dependent on the expectations that visitors hold. Expectations, in turn, are a function of many factors, including past experience in wilderness. Most visitors in both areas had previous wilderness experience: 77 percent in the Spanish Peaks and 88 percent in the Desolation Wilderness. A similar percentage in both areas visited a wilderness at least once a year.

Changes in Area Quality

We asked respondents who had previously visited the areas to indicate whether conditions were improving, getting worse, or unchanged. Although the majority of respondents in both areas felt that conditions were unchanged, visitors to the Desolation Wilderness were nearly twice as likely to describe conditions as worse than before:

"How does the quality of the area compare with the way it was?"

<u>Area</u>	<u>Same</u>	<u>Better</u>	<u>Worse</u>	<u>N</u>
	-----	Percent -----	-----	
Desolation Wilderness	54	4	43	183
Spanish Peaks	70	6	24	238

Chi-square = 15.87, 2 df, p <0.001

Specific complaints were the same in both areas--the increasing level of use and the growing presence of litter. Accurate, long-term records are not available for either area; thus, it is difficult to assess accurately how visitor perceptions relate to actual increases in use. Whether the perceived decline in quality is a function of measureable changes or of selective perception (remembering the good things that once were, forgetting the bad) is also not clear. Nevertheless, a substantial percentage of the Desolation Wilderness visitors reported that conditions were worse than before. In neither area do we find much support for the idea that conditions are improving.

The Relationship Between Use and Capacity

Returning to a consideration of all the sampled visitors, we next asked whether the respective areas were overused. No effort was made to define capacity or to specify whether social or ecological measurements (or both) should be used to define it.

Desolation visitors were more likely to define the California area as overused.

"Is the Spanish Peaks (Desolation) used beyond its capacity?"

<u>Area</u>	<u>No</u>	<u>In a few</u>	<u>In most</u>	<u>N</u>
	-----	places -----	places -----	
		Percent -----		
Desolation	32	54	13	281
Spanish Peaks	72	25	3	485

Chi-square = 17.82, 2 df, p <0.001

Two-thirds of the Desolation Wilderness visitors thought the area overused. In the Spanish Peaks, about 3 out of 4 felt the area was not used beyond capacity; most of those who thought it was overused thought the problems were localized (at one particular lake).

We next asked two questions of those who thought the areas were used beyond capacity--did excessive use bother them and did it influence their trip (their route or their length of stay)?

As expected, those who felt the area was used beyond capacity also indicated the overuse bothered them, as shown in the following tabulation:

"Did overuse bother you?"

<u>Area</u>	<u>No</u>	<u>A little</u>	<u>Some</u>	<u>A lot</u>	<u>N</u>
	-----	-----	-----	-----	
		Percent			
Desolation	0	12	49	39	187
Spanish Peaks	1	23	38	39	132

Chi-square = 8.55, 3 df, $p < 0.05$

Although visitors to both areas were bothered by overuse, Desolation Wilderness visitors responded more strongly to it. Perhaps a more significant measure of response is found in the data describing the behavioral reaction to overuse:

"Did overuse cause you to change the length of trip,
route of trip, or both?"

<u>Area</u>	<u>No</u>	<u>Length</u>	<u>Route</u>	<u>Both</u>	<u>N</u>
	-----	-----	-----	-----	
		Percent			
Desolation	56	6	24	14	187
Spanish Peaks	75	3	9	13	132

Chi-square = 15.31, 3 df, $p < 0.01$

Whereas 3 out of 4 Spanish Peaks visitors did not find overuse sufficiently distressing to alter their trip, nearly half of the Desolation Wilderness visitors did. One out of four altered the route (easy to do in the open, gentle terrain). Length-of-stay and route-of-travel were altered by about the same percentage of visitors in both areas.

Thus, while previous responses from the two areas have been markedly similar, actual conditions do produce different perceptions of changes in area quality, level of crowding, and how crowding affects visitor behavior. The more heavily used Desolation Wilderness is perceived as crowded more commonly than the Spanish Peaks and visitors make more effort to avoid or offset these overcrowded conditions.

The situation in the Desolation Wilderness might be called a "predisplacement" condition. That is, the use conditions may be approaching the point at which one group, originally attracted by relatively low use, increasingly discovers this condition more difficult to find. At the same time, the nature of the existing opportunity is increasingly attractive to a new clientele drawn by the greater opportunity for social interaction. Thus, the potential for a "turnover" in the kinds of people found in the area must be recognized, one that could lead to a new series of attitudes and behavior, which wilderness managers might find difficult to accommodate in wilderness.

MANAGEMENT PREFERENCES

The final set of data concerns visitor preferences for management actions that could hold use within carrying capacity. Our interest centered on the acceptability of management actions, ranging from no control to tight restrictions on specific kinds of use.

A number of studies of wilderness users have highlighted the spontaneity and freedom of the experience as primary elements that attract people (Outdoor Recreation Resources Review Commission 1962; Hendee and others 1968; Stankey 1973). Freedom from increasing regulation may prompt many people to visit wilderness. At the same time, we have seen in both areas a substantial expression of concern about increasing use. In the Desolation Wilderness, 2 out of 3 respondents told us the area was used "beyond capacity"; more than 1 out of 4 felt the same about the Spanish Peaks. Thus, many visitors seeking freedom and spontaneity discover that the unregulated traffic is destroying the values sought.

We set out to discover how visitors felt about allowing use to continue unabated, thus preserving maximum individual freedom. Three statements were posed as follows:

"It would be better to be able to go to the wilderness whenever you want to, even if it was being used beyond capacity, than to have any kind of regulations on use."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	-----	-----	Percent	-----	-----	
Desolation	46	37	9	4	4	283
Spanish Peaks	30	44	8	13	5	499

Chi-square = 31.60, 4 df, $p < 0.001$

Visitors to both areas substantially disagreed with the statement. Unrestricted entry, when capacity has been exceeded, is clearly not acceptable. Desolation visitors are more inclined to disagree with the statement than Spanish Peaks users, which is not surprising considering the lighter traffic in the latter area.

We then asked to what extent visitors agreed or disagreed with the following statements:

"There should be restrictions on how many people can be in a wilderness at any given time."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	-----	-----	Percent	-----	-----	
Desolation	1	7	6	51	35	282
Spanish Peaks	9	16	20	43	12	492

Chi-square = 101.00, 4 df, $p < 0.001$

"If a wilderness becomes overcrowded, restrictions on the number of people allowed to visit it should be enforced."

<u>Area</u>	<u>Strongly disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly agree</u>	<u>N</u>
	- - - - -	- - - - -	Percent	- - - - -	- - - - -	
Desolation	2	4	3	41	51	283
Spanish Peaks	5	7	12	46	30	498

Chi-square = 45.61, 4 df, p <0.001

About half of the Spanish Peaks visitors agreed with the first statement; in the Desolation Wilderness, nearly 9 out of 10 agreed. However, in the second item, which at first appears to merely restate the first, the differences in attitudes between the two areas, while still statistically significant, are much less sharp. The difference is linked to the fact that the first statement proposes use restrictions without considering carrying capacity. In the Spanish Peaks, where use levels are low and most visitors (72 percent) feel the area's capacity has not been exceeded, use restriction does not have overwhelming support (although more than half do agree with it). On the other hand, nearly 90 percent of the Desolation Wilderness visitors agree with the statement, an outcome that can probably be attributed to considering the item in the context of the situation in the Desolation.

When we look at the data for the second item, we find a sharp increase in the percentage of Spanish Peaks users supporting use controls. By specifying that use restrictions ought to be imposed only at such time the area becomes overcrowded, we have added an important new condition with which most Spanish Peaks visitors can concur. Apparently, Desolation Wilderness visitors distinguished very little between the two items, considering both in the context of the conditions in the area.

Specific Control Measures

Lime (1975) has described a continuum of management actions that range from subtle (such as providing people with better information) to authoritarian (such as rationing). In general, these actions can be grouped according to whether they directly influence the behavior of the visitor or indirectly influence behavior by persuasion, etc. Generally, indirect measures seem preferable to direct measures (Stankey and Baden 1977) and are favored by most wilderness users (Stankey 1973).

Visitors to the two areas were presented a list of possible management actions and asked if use of a wilderness was heavy and controls on use were being considered, to what extent they would favor or oppose each action. Table 6 presents the results in terms of the percentage of respondents favoring each technique.

The pattern of response is not clear and simple. In the Desolation Wilderness a majority of visitors favored a first-come, first-served permit system, a mail reservation system, a test of wilderness skills and knowledge, and blocking off access roads back from the wilderness boundary. In the Spanish Peaks, only a reduction in the number of trails and signs received as much as 50 percent support. Thus, there is greater acceptance for visitor regulation in the Desolation Wilderness than in the Spanish Peaks, as well as more acceptance of direct control.

Table 6.--Visitor support toward selected use-control measures

Policy	Percentage favoring		Level of significance
	Spanish Peaks ¹	Desolation Wilderness ²	
	- - - - - Percent - - - - -		
Require test of wilderness skills and knowledge (asked only in Desolation)	--	57	--
Reduce number of trails and signs	50	43	0.1
Block access roads back from wilderness boundary	45	53	.01
Issue permits on first-come, first-served basis	41	57	.001
Issue permits through mail reservation system	29	59	.001
Charge entrance fee	25	30	.02
Assign visitors to campsites	23	17	.02
Issue permits on a lottery basis	18	11	.05

¹Sample size approximately 500.

²Sample size approximately 280.

A mandatory permit system is in effect in all California wildernesses, and although these permits were not used to regulate use in the Desolation Wilderness visitors are accustomed to obtaining one. As can be seen in table 6, there is substantial support for having to obtain a permit either on a first-come, first-served or mail reservation basis--techniques currently used to distribute the mandatory permits.

The lottery is the least-favored system in both areas. It has less support than either a fee or assigning visitors to specific campsites, measures that are frequently cited as being particularly inappropriate in wilderness (Stankey and Baden 1977).

Some favor requiring visitors to demonstrate knowledge and skill as a prerequisite to visiting wilderness (Hardin 1969). The idea is not new; Wagar (1940) suggested the idea of the "certified outdoorsman" back in the early forties. The idea is that by reducing the level of impact of each individual user, more onerous control measures, such as permits or fees, can be avoided or at least postponed.

Data on this type of control were obtained only for the Desolation Wilderness. Support was high, with only about one-fourth opposed to it. People have very little experience with this type of method for allocating outdoor recreation. The "Hunter Safety" program that requires a youth to pass a test of hunting knowledge and gun safety is perhaps the closest thing. However, the response does suggest such a technique might have promise for allocating entry to wilderness.

The overall pattern of response for the two areas is not strikingly dissimilar, but different techniques receive more support in one area than in the other. In general, there is less support for direct control in the Spanish Peaks (probably because visitors do not see a need for such action yet); preferences for indirect measures are mixed. Certain measures are clearly more preferable than others; the data strongly suggest that some standardized national program for controlling visitor entry if rationing becomes necessary would be inappropriate, at least from the visitors' viewpoint.

Party Size Restrictions

Limitations on party size are a common management action in many wildernesses. Large parties have been cited as the cause of a disproportionate amount of resource damage, as well as a major source of dissatisfaction for other users (Lime 1972; Stankey 1973). Thus, restrictions on party size may be a relatively easy way to eliminate several problems.

Support for a party size restriction differed between the two areas. As can be seen below, just half of the Spanish Peaks visitors supported restricting party size; in the Desolation Wilderness about 8 out of 10 did:

"Should there be a limit to the size of parties
visiting a wilderness?"

<u>Area</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	<u>N</u>
	-----	Percent -----	opinion -----	
Desolation	13	81	6	279
Spanish Peaks	38	51	11	512

Chi-square = 68.86, 2 df, $p < 0.001$

Average party size in the two areas (4.8 in the Spanish Peaks, 3.4 in the Desolation Wilderness) was well within the limits commonly imposed on party size in most wildernesses (approximately 12-15). Nevertheless, there are sharp differences between the two areas in terms of the acceptability of large groups.

Among those who answered "yes" to the need for party size limits, we asked for estimates as to what those limits ought to be, both for visitors and for recreational stock. While there are sharp differences in the number of stock that ought to be allowed, there is substantial consensus regarding the permitted number of people:

Maximum number of stock

<u>Area</u>	<u>0</u>	<u>1-2</u>	<u>3-4</u>	<u>5-7</u>	<u>8-10</u>	<u>>11</u>	<u>N</u>
	-----	-----	-----	Percent -----	-----	-----	
Desolation	37	20	21	15	6	1	265
Spanish Peaks	10	10	22	19	20	19	251

Chi-square = 376.6, 5 df, $p < 0.001$

Maximum number of people

Area	<u>1-2</u>	<u>3-4</u>	<u>5-7</u>	<u>8-10</u>	<u>>11</u>	<u>N</u>
	- - -	- - -	Percent -	- - -	- - -	
Desolation	0	9	33	38	20	218
Spanish Peaks	0	9	31	36	24	235

Chi-square = 2.34, 4 df, $p < 0.80$

More than one-third of those visiting wilderness preferred no stock and three-fourths preferred a restriction of no more than four animals. Overall about 40 percent of the Spanish Peaks respondents supported a limit of four animals; however, about half the hikers endorsed this limit as opposed to only 10 percent of the horsemen. Given the make-up of our sample populations in the two study areas (no stock users in the Desolation, about 25 percent in the Spanish Peaks), the support for stock restrictions is not surprising.

Response to a party-size restriction is remarkably similar. Nearly 8 out of 10 respondents in both areas supported a limit of no more than 10 persons per party. However, these data were derived from those users who supported the general idea of a party-size restriction (about 50 percent in the Spanish Peaks, 80 percent in the Desolation Wilderness) and who were in small parties themselves. Nevertheless, among those who do support such restrictions, there is little difference in the judgments as to optimum party size.

SUMMARY AND CONCLUSIONS

One of the major purposes of this study was to obtain a better understanding of how changing use conditions altered visitor preferences for social interaction and management actions. Did increasing use bring an increased tolerance of, or even desire for, contact with others? Were there significant differences between areas of differing use levels with regard to visitors' perceptions of acceptable management control actions?

The most appropriate study design for answering such questions would be to follow the behavior of specific individuals and groups over time (LaPage and Ragain 1971). The study reported here looked at two areas at about the same time and considered how different use levels affected the perception of crowding. Our understanding of how people adjust to and accommodate increasing use would have been deeper with a well-designed long-term study.

Nevertheless, we believe the lack of data on effects of increasing use levels on tolerances for high density, perceptions of appropriate behavior, and preferences for alternative management actions makes this analysis worth while. The Desolation Wilderness possibly represents a future scenario for the Spanish Peaks Primitive Area. In addition, of course, the data should provide some insight as to the effects of increased use levels on visitor perception of crowding and other changes.

In terms of socioeconomic characteristics and experience, visitors to the Spanish Peaks and Desolation Wilderness revealed little difference, either among themselves or compared with other wilderness users around the country. For example, the high educational attainment of most visitors again reminds us that perhaps one of our most significant management tools is the ability of most visitors to use information about what or what not to do, where and when to go, how to behave, and so on.

Recreational uses in the two areas did show similarities, but there were also some key differences. Perhaps the most significant were the virtual absence of stock use in the Desolation Wilderness and the preponderance of day use in the Spanish Peaks.

When we turn to the major objective of this study, two central conclusions emerge. First, visitors to both areas share a highly similar image of wilderness; their notions as to what a wilderness ought to be show little variation. (This is in keeping with past studies.) ORRRC Study Report 3 (1962) noted there seemed to be a "generic" appeal about wilderness that transcended individual area differences. In another study, Stankey (1973) found a similar pattern across four areas of widely differing use intensities, types of use, and physical characteristics. More recently, Echelburger and Moeller (1977) reported a high level of similarity in terms of characteristics, expectation, and satisfactions between visitors to the Cranberry Backcountry in West Virginia and visitors to western wilderness.

Secondly, acceptable frequency of interparty contact differs in the two areas, with visitors to the more intensively used area more tolerant. What are the implications of this: does it suggest that crowding need not concern us? Will people simply adjust to increasing densities with no appreciable loss in the quality of their experience?

A more appropriate interpretation of these data is to recognize that interparty contact--"solitude"--is only one dimension of the complex phenomenon we call the "wilderness experience." While it is probably an important element to many, and perhaps the major value to at least some, it is coupled with many other values related to esthetic experiences, exercise, challenge, socialization, and so forth. As opportunities for solitude decline, a variety of coping strategies probably will come into play. Some of these strategies relate to increasing the odds of finding the desired level of solitude, such as changing the route of travel (traveling cross-country) or by changing the time of visitation (avoiding weekends). In the Desolation Wilderness such actions were about twice as common as in the Spanish Peaks, a logical response considering that visitors reported the Desolation Wilderness was used beyond its capacity nearly 2-1/2 times as commonly as did Spanish Peaks visitors.

Visitors may adopt other strategies. For example, they may simply resign themselves to the situation and alter the relative importance they assign to solitude, making some other dimension(s) more important. Simply put, visiting the wilderness with more people than might be preferred is better than not going at all.

This may be true, however, only if access to wilderness is unrestricted. Some visitors may prefer a management program that limits their visits, but that insures lower density levels. Also, the presence of people in high-use conditions does not necessarily mean these use levels are preferred or desired. As Driver and Bassett (1977) have noted, "One can be recreating in a non-preferred area and be satisfied, but have a strong preference for an alternative area if conditions were such that the alternative were a real choice."

We need also to recognize that use intensities will always vary among units of the National Wilderness Preservation System. For example, if visitors-days-per-acre is used as a crude index of use intensity, in 1975 use varied from 0.01 to 7.6 visitor days/acre among National Forest wildernesses. That some areas are heavily used should not constitute a precedent for allowing all others eventually to support similar use levels. This probably would not happen anyway, given the diversity of physical characteristics, proximity to population centers, and access. Nevertheless, reducing opportunities for solitude would diminish an important part of the wilderness experience. Perhaps most seriously, it would truncate the range of experiences sought by wilderness visitors.

The data in this study support the need to maintain flexibility and sensitivity in visitor management. The need for visitor management is clearly recognized by most visitors; the criterion of acceptability seems linked to the perceived need for the specific type of action.

Managers should institute controls only after careful analysis of problems. Management overreaction could result in a visitor backlash to programs that might be needed later on.

The principle of "minimum regimentation" should guide management actions. Judiciously applying only the minimum level of regulation needed to accomplish an objective will almost certainly gain visitor support.

Visitors in our survey may be subject to the concept of recreational "invasion and succession" (Clark and others 1971). As new clientele enter an area (with different demands for facilities, access, level of social interaction, and so forth), their more tolerant standards can eventually lead to conditions that cause the original clientele to leave and be succeeded by the new group. Thus, it is possible that some of those most sensitive to crowding have, in fact, been displaced in the Desolation Wilderness. However, it seems more likely that most visitors have accommodated to changing use conditions by changing their norms.

The similarity-dissimilarity in the findings of this study has at least two important management implications. First, while individual wildernesses have obvious unique qualities about them, it is important that managers recognize that the general experiences sought by visitors probably vary little across space and, perhaps, time. Thus, it does not necessarily require a completely comprehensive profile of visitor data to manage wilderness.

The data presented here do not justify standardization of wilderness management procedures. Problems vary in their relative importance, their stage of development, and their most appropriate solution. What is appropriate or what will work best varies not only among areas, but within individual areas. For example, measures undertaken to manage horse use would be obviously different in the Spanish Peaks than those in the Desolation Wilderness. The data also suggest, however, that within the Spanish Peaks a variety of horse-use management actions would be appropriate. Thus, management diversity is called for, not only on an interarea basis, but intra-area as well. Such an approach will require an improved program of public information to alert visitors to these differences and, perhaps most importantly, to the reasons for them. Given the interest, commitment, and education of most wilderness supporters, this task should not be viewed as unreasonable or unattainable.

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APPENDIX:

THE EFFECTS OF ORDER ON THE STATISTICAL RELIABILITY OF SATISFACTION ESTIMATES¹

Respondents were asked to estimate the satisfaction they would receive from various use levels. Because of the much greater use levels present in the Desolation Wilderness, a slightly different set of categories were used. For example, contact with small backpacking groups were presented in the following order in the two areas:

	<u>Desolation</u>	<u>Spanish Peaks</u>
Encounters with:		
No other groups	1	1
One other group	2	2
Two other groups	omitted	3
Three other groups	3	4
Five other groups	omitted	5
Six other groups	4	6
Nine other groups	5	7
Fifteen other groups	6	8
Thirty other groups	7	omitted
Sixty other groups	8	omitted

The differences in order raise the following question: Are responses (percentage of satisfaction assigned to an item) affected by the item's location in the array? For example, does the fact that "three other backpacking parties" was item 3 in the Desolation Wilderness, but item 4 in the Spanish Peaks, affect the manner in which respondents answered?

The problem stems from how a person would respond to an item array. Would he first assign values at the ends, and then fill in the middle items? Would he proceed from beginning to end? If reliability problems exist (i.e., that the measure is valid but inaccurate), then the structure of the array could influence how a person assigns values in order to produce a "consistent" distribution. However, if no such reliability problems were present, then responses to each item should be independent of order.

To test whether differences between the Desolation and Spanish Peaks samples are due to real differences in response to encounter levels or to item order, tests for difference between samples were used by comparing items (1) by their actual assigned value in encounter levels and (2) by the order of presentation regardless of actual value.

To reject the possibility of effect of order, the following hypothesis was tested:

If order exerts "some" influence on the distribution of responses (relative effect in comparison to value not determined), then the two sample distributions will not differ when items are matched by order presented (regardless of item value).

¹The author is indebted to Randel F. Washburne for collaboration in preparing this appendix.

This "hypothesis" only suggests presence of an effect by indicating that scores do not differ significantly from their "order-mates." Confirming it does not deny the existence of a difference between samples due to actual response to item encounter value; nor do the data allow comparing effects of value and order in explaining variation between samples. It seems appropriate only to conclude that some effect of order does exist.

To test the hypothesis, cumulative distributions of satisfaction values in each type of encounter were compared between samples for (1) actual value and (2) order value. The former was done to insure that this technique produces similarly significant results to the item-by-item t-tests and to compare to the order tests. For actual value, only those items present in *both* samples were matched; all items presented to respondents were present in the order test (though item composition varied between samples). Campsite encounters are not included because the encounters were the same.

A modified Kolmogorov-Smirnov test of significance was used to compare each cumulative distribution, using the satisfaction values in the cumulative distribution and the sample sizes for the N's.² The test divides the cumulative value for each item by the cumulative total (F_S or F_D) and then subtracts each F from its counterpart. The largest of these is the greatest point of deviance of the two distributions (D). Significance is computed by:

$$\text{Chi-square} = 4D^2 \frac{N_D N_S}{N_D + N_S}$$

A chi-square table is then used to determine significance, using two degrees of freedom.

Results

A. BACKPACKERS

(1) By actual value:

Category value	Spanish Peaks			Desolation Wilderness			$F_S - X_D$
	\bar{x} (sat. score)	Cum.	F	\bar{x}	Cum.	F	
0	82	82	0.285	80	80	0.209	0.076
1	80	162	.563	82	162	.423	.140
3	62	224	.777	80	242	.632	.145=D
6	33	257	.892	64	306	.799	.093
9	20	277	.962	49	355	.927	.035
15	11	288	1.00	28	383	1.00	--

$$\chi^2 = 12.87 \quad \text{significance} = 0.01$$

²The test usually uses the sum of the cumulative distribution as N, since these usually represent cases or observations. Here it seems appropriate to use sample size, since the distribution is based on *scores* rather than cases.

(2) By order:

Order position	Spanish Peaks			Desolation Wilderness			$F_S - F_D$
	\bar{x}	Cum.	F	\bar{x}	Cum.	F	
1	82	82	0.202	80	80	0.199	0.003
2	80	162	.4	82	162	.403	-.003
3	73	235	.58	80	242	.603	-.023
4	62	297	.733	64	306	.763	-.03
5	44	341	.842	49	355	.885	-.043=D
6	33	374	.923	28	383	.955	-.032
7	20	394	.972	13	396	.987	-.015
8	11	405	1.00	5	401	1.00	--

$\chi^2 = 1.12$ not significant

B. HORSE PARTIES

(1) By actual value:

Category value	Spanish Peaks			Desolation Wilderness			$F_S - F_D$
	\bar{x}	Cum.	F	\bar{x}	Cum.	F	
1	75	75	0.431	75	75	0.401	0.03
3	53	128	.736	54	129	.690	.046=D
6	25	153	.879	31	160	.856	.023
9	14	167	.960	18	178	.952	.008
15	7	174	1.00	9	187	1.00	--

$\chi^2 = 1.29$ not significant

(2) By order:

Order position	Spanish Peaks			Desolation Wilderness			$F_S - F_D$
	\bar{x}	Cum.	F	\bar{x}	Cum.	F	
1	75	75	0.271	75	75	0.387	-0.116
2	67	142	.513	54	129	.668	-.155=D
3	53	195	.704	31	160	.829	-.125
4	36	231	.834	18	178	.922	-.088
5	25	256	.924	9	187	.967	-.043
6	14	270	.975	4	191	.990	-.015
7	7	277	1.00	2	193	1.00	--

$\chi^2 = 14.6$ significance = 0.001

C. LARGE PARTIES

(1) By actual value:

Category value	Spanish Peaks			Desolation Wilderness			$F_S - F_D$
	\bar{x}	Cum.	F	\bar{x}	Cum.	F	
1	64	64	0.520	67	67	0.399	0.121=D
3	33	97	.789	46	113	.673	.116
6	14	111	.902	28	141	.839	.063
9	8	119	.967	18	159	.946	.021
15	4	123	1.00	9	168	1.00	--

$$\chi^2 = 8.9 \quad \text{significance} = 0.02$$

(2) By order:

Order position	Spanish Peaks			Desolation Wilderness			$F_S - F_D$
	\bar{x}	Cum.	F	\bar{x}	Cum.	F	
1	64	64	0.342	67	67	0.385	-0.043
2	44	108	.576	46	113	.649	-.073=D
3	33	141	.754	28	141	.810	-.056
4	20	161	.861	18	159	.914	-.053
5	14	175	.936	9	168	.966	-.03
6	8	183	.979	4	172	.989	-.01
7	4	187	1.00	2	174	1.00	--

$$\chi^2 = 3.24 \quad \text{not significant}$$

Conclusions

The hypothesis that order exerts "some" effect is sustained for backpacker and large party encounters, because the distributions matched on order were not different (though the actual value distributions did differ significantly). However, for horse party encounters, the order distributions were significantly different, although the actual value distributions were not.

The graphs (fig. 5) of backpacker encounters for both item order and item value provide some insights. The slopes of the lines for the order graph are generally quite similar (except between positions 5 and 6 where they cross), even though the intervals of values are quite different (e.g., at positions 5-6, value changes of 3 versus 15 occur).

Thus, the possible effects of order cannot be dismissed but neither are its effects clear and obvious. The potential for confusion, however, could be eliminated in the future by the use of identical categories and by their random ordering.

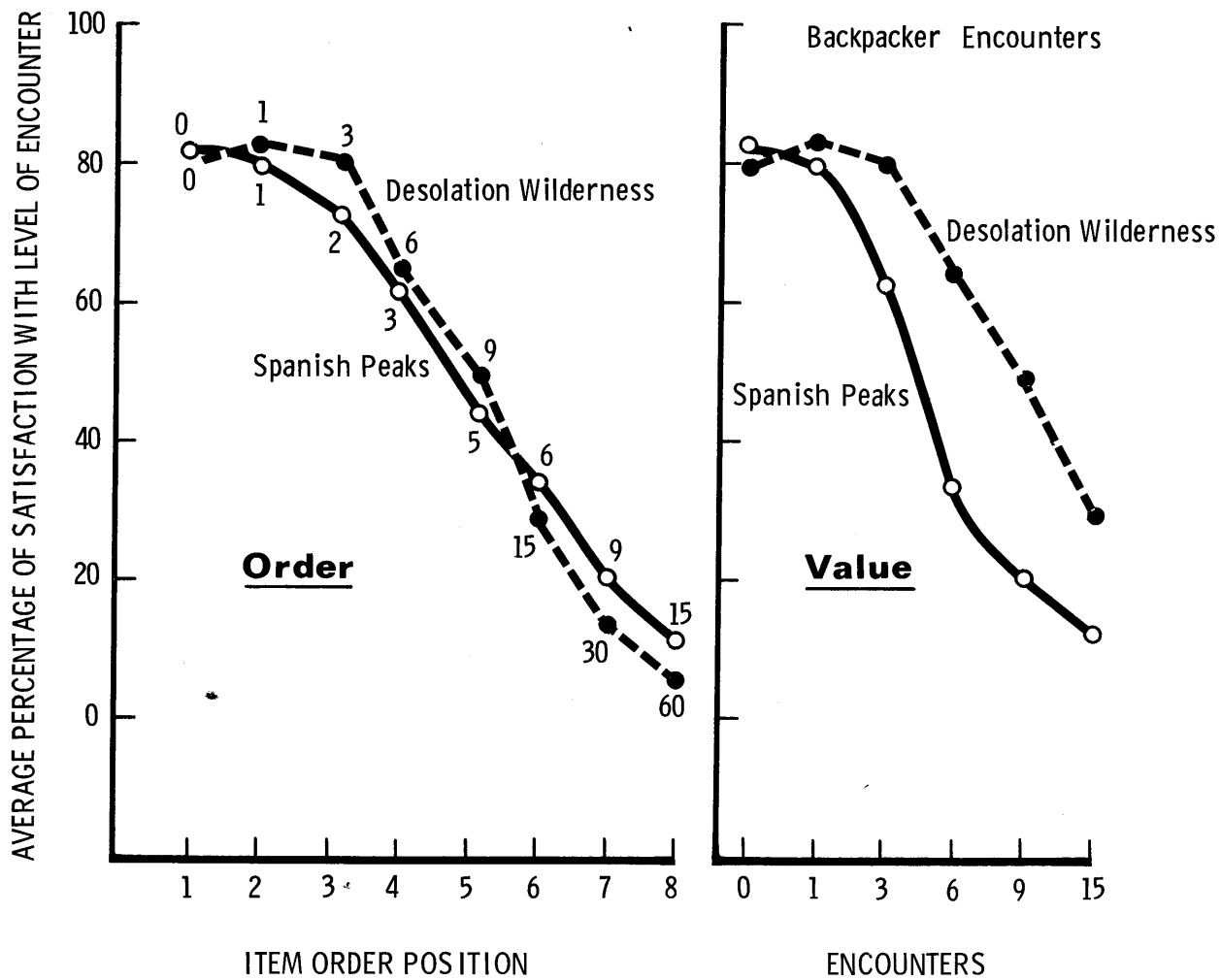


Figure 5.--Changes in satisfaction with backpacker encounters by item order and value.

Stankey, George H.

1979. A comparison of carrying capacity perceptions among visitors to two wildernesses. USDA for. Serv. Res. Pap. INT-242, 34 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Reports on a study of visitor perceptions of carrying capacity in a lightly used and a heavily used wilderness. Although visitors to both areas had common images of wilderness in a general sense, those in the heavily used area were more tolerant of higher use. They were also more likely to define the area as overused and were more willing to accept use controls.

KEYWORDS: wilderness management, perception, carrying capacity.

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