

## Temporal and Spatial Displacement: Evidence from A High-Use Reservoir and Alternate Sites

Troy Hall

Department of Resource Recreation and Tourism, University of Idaho

Bo Shelby

Department of Forest Resources, Oregon State University

This study explored the extent of displacement and the types of displacement behaviors used in response to crowding at a popular reservoir in Oregon. Data collected through a mail-back survey of recreational users contacted at the target site ( $n = 1,069$ ) demonstrated that about half altered their behavior in some way because of crowding. Interviews with users ( $n = 168$ ) at three other nearby "alternative" sites indicated that about half of those who had been to the target site (Lake Billy Chinook) go there less than in the past, while about 20-30% reduced their use because of adverse conditions encountered at Lake Billy Chinook, primarily crowding or undesirable management policies. Using a typology adopted from the substitution literature, data showed that changing the timing of visits (temporal displacement) was the most common strategy for coping with crowding (42% of respondents), but shifts in the location of use at the reservoir and between reservoirs (spatial displacement) were also common (26% of respondents). Users who exhibit displacement behaviors were also more sensitive to conflict, facility issues, and environmental impacts.

**KEYWORDS:** *Displacement, lake recreation, crowding*

### Introduction

As use of popular recreation destinations continues to grow, managers are increasingly concerned about the possibility that some visitors are adversely affected by crowding and conflict. Researchers have used the concept of displacement to describe one type of behavior recreationists exhibit in reaction to negative changes in recreation settings (Schreyer & Knopf, 1984; Dustin & McAvoy, 1982). However, many of the early discussions about displacement were speculative, relatively few empirical studies have been conducted, and a number of questions remain unanswered. This paper will contribute to the displacement literature by (a) developing a typology that helps conceptualize and organize descriptive data about displacement behavior, (b) assessing the occurrence of temporal and spatial displacement at one destination, (c) assessing displacement by studying visitors both at a target site and at likely alternate sites within the region (i.e., examining spatial displacement within and between sites), and (d) identifying reasons for displacement among temporal and spatial displacers.

---

\*Correspondence concerning this article should be addressed to Troy E. Hall, Department of Resource Recreation and Tourism, University of Idaho, Moscow, Idaho, 83884-1139. Email: troyh@uidaho.edu. This research was supported by Portland General Electric.

The term displacement has been used to describe the behavior of users who have frequented a site in the past, become consciously dissatisfied with some type of change at the site, and alter their behavior in response (Becker, 1981; Schreyer & Knopf, 1984). The notion assumes that individuals have motives that lead them to pursue an activity at a place with the expectation of certain benefits or outcomes. Thus, displacement researchers assume that recreation is goal-oriented and that actors consciously evaluate conditions they experience in light of those goals. When conditions reach a point no longer judged suitable for attainment of desired experiences, a person chooses to move elsewhere. In such areas, visitors with experience goals (such as solitude) that are dependent on low-density recreation are presumed to be most likely to be displaced.

Displacement refers to a perceived adverse change at a recreation site that causes its visitors to change their behavior. Thus, someone who simply finds another place they like better would not be considered displaced. In Becker's terms, "displacement is a move away from an unacceptable situation, rather than a move toward an optimal one," and is distinguished from other movement behaviors such as active or passive migration (1981, p. 262). Researchers have been most often concerned with displacement caused by increasing use levels (e.g., Becker, Niemann, & Gates, 1981; Kuentzel & Heberlein, 1992). In particular, researchers concerned with wilderness visitors have focused on how increasing levels of development may displace "purist" users seeking primitive experiences (Dustin & McAvoy, 1982).

### *A Typology of Displacement*

Several researchers have investigated behavioral changes associated with displacement. In this study, we adopted a typology developed by researchers studying substitution behaviors (Brunson & Shelby, 1993; Shelby & Vaske, 1991). According to this typology, possible changes can occur in the timing of use (temporal displacement), the spatial location of use (spatial displacement), and the activities in which one engages (activity displacement). Although the three behavioral changes characterized by this typology make intuitive sense, they have yet to be fully supported with empirical evidence. An objective of this study was to document empirical support for two of the behavioral changes.

*Temporal Displacement.* Altering the timing of visits is one possible reaction to adverse changes in site condition. For example, a visitor might cope with increased crowding at peak times by visiting at lower-use times. While a temporal strategy can be used to cope with ephemeral changes (such as increased use at peak times), it could not be used to adapt to more permanent site changes (e.g., in site development). Few studies have investigated temporal displacement. However, Chambers and Price (1986) found indirect evidence of such a strategy: hikers who were "quiet seekers" evaluated the site as more crowded than other visitors and were more likely to visit at off-peak times. Thus, it appears that if one's experience goals can be

accommodated at a different time, and if one is willing and able to visit at that time, one might continue to use a site despite changes in conditions.

*Spatial Displacement.* Visitors can also respond to site changes by altering the location of their activity. It is useful to distinguish between spatial displacement that occurs as rearrangements within a given destination (for example, moving from one campground to another within the same park area) and that which shifts use to a new destination entirely (for example, moving from one park to another). Here, we label the first *intra-site* displacement and the second *inter-site* displacement. Within large recreation destinations, visitors often have the ability to change the specific sites they use. If adverse changes are localized, sensitive users can adjust (*intra-site* displacement) and still obtain high quality experiences at the destination. For example, Anderson and Brown (1984) found that a cross-section of long-term Boundary Waters Canoe Area (BWCA) visitors had changed the entry points they use since the time of their first visits several years before. Kuentzel and Heberlein (1992) reached similar conclusions based on results of their study of changes in use at the Apostle Islands; of those continuing to boat in the area, 55% had changed the specific sites they use.

Two types of studies have dealt with *inter-site* displacement. The first are cross-sectional studies conducted at more than one site simultaneously, to evaluate the extent and causes of displacement away from a target site. For example, Becker (1981) studied two rivers in the mid-west that were believed to be part of a system of sites used by boaters, and identified segments of the user population that had ceased using each river, although he did not report what percentage changed their visitation. Shelby and Vaske's (1991) study of anglers on New Zealand rivers and a study of Oregon boaters (Shelby, Bregenzler, & Johnson, 1988) both identified segments of the population that reported less use of a site over time and increased use of other sites. Taken together, these studies indicate consistent evidence of *inter-site* displacement, although it is not clear how the rate of displacement varies or might be influenced by specific site or visitor characteristics. Thus, the question of how much displacement occurs in different types of settings remains open.

The second type of *inter-site* displacement study uses a panel design to follow users of the target site over time. Panel studies are rare, but are especially powerful for investigating displacement. Similar to cross-sectional studies, these have found that displacement occurs, but that the rate may vary considerably depending on the site. For example, West (1981) contacted visitors using the Sylvania Recreation Area in 1973. In 1978 he recontacted the same people and asked if they still used the area. Forty-one percent reported that they had not returned. Another panel study was conducted by Shindler (1993), whose study group was initially contacted at the Rogue River in 1977 and again by mail in 1991. Sixty-four percent of this group never went back after their original 1977 trip. Kuentzel and Heberlein (1992) classified 61% of their Apostle Islands respondents as "discontinuers"—those who did not return to the study site, and among continuers, 55% avoided

crowded islands. In these studies, it is not always clear what proportion of the "discontinuers" are displaced to other sites, as opposed to ceasing visitation for personal or other reasons. Indeed, it appears that many people do not return to a site because of time, family, or other reasons, or because the visit on which they were contacted by a researcher was a one-time trip. Such visitors would not be classified as having been displaced.

*Activity Displacement.* Researchers have suggested that those who are adversely affected by changes at a site may adopt another activity but continue to use the site (Brunson & Shelby, 1993). This shift might occur when personal attachment to a site is strong or if the substitute activity is equally fulfilling (Iso-Ahola, 1986; Brunson & Shelby, 1993). Research on activity displacement is rare, but this strategy does not appear common. For instance, Shelby and Vaske (1991) found that anglers in New Zealand said they would be more likely to fish at another river than to remain at the study river and adopt another activity. Similar findings have been reported by Manfredo and Anderson (1987). Although activity displacement is an important logical possibility in a displacement framework, it is not investigated in the empirical portion of this paper.

#### *Focus of This Research*

*Limitations of Previous Research.* The studies cited above provide evidence about the occurrence of different types of displacement, but several features warrant the present study. First, most studies to date have dealt with scarce resources, such as unique Wild and Scenic Rivers (Shelby et al., 1988; Shindler, 1993) or wildernesses (Anderson & Brown, 1984). At such sites, some visitors may be so highly invested that they do not leave even if conditions deteriorate, especially if they perceive no adequate alternate sites. Displacement rates observed at these sites might be uncharacteristic of other sites.

In addition, four of the above studies examined displacement at sites with managed use limits, either at the time of the initial survey or by the time of the follow-up study. Use limits themselves may deter some visitors from returning (Hall & Cole, 2000) and may create other changes in site conditions, which in turn may affect displacement rates. Our study provides new evidence from a type of site not previously studied: a large reservoir developed for various kinds of recreational use.

Second, few studies have investigated temporal displacement at all, and even fewer have systematically investigated temporal and spatial displacement in a single study. Our study contributes to an understanding of the patterns of both types of displacement. Furthermore, few displacement studies to date have surveyed users both at a target site and at alternate sites to which visitors may be displaced. In doing so, our study helps understand the patterns of recreation and behavioral choices within a region.

A final limitation of previous research is that, in some of the landmark displacement studies, questions that could have provided stronger evidence

of displacement were not asked. For example, in their BWCA study, Anderson and Brown (1984) asked people what they thought they would have experienced if they had (hypothetically) gone back to the sites they previously used. This resulted in indirect inferences about the causes of displacement. The Kuentzel and Heberlein (1992) study is similar in that researchers did not ask respondents to explain reasons for changing behavior. Direct questions would help resolve possible conflicting inferences. For example, in both cases it is possible that people were attracted to other sites, which would not be classified as displacement at all. One goal of our study was clarify reasons recreationists choose to alter their use patterns. Thus, direct questions were asked about causes of their behavioral change. We explored the reasons for behavior change given by those who continue to use a site (contacted at the site) and those who were contacted at alternate sites. We also investigated whether those who employed different strategies (temporal, spatial, or both) were different in their reasons for displacement and their perceptions of site conditions.

*Crowding as a Cause of Displacement.* A number of studies have investigated the causes of displacement, but findings have been inconclusive. The primary area of research has been the role of crowding, because crowding is viewed as incompatible with a number of important experience goals that are tightly linked to low-density settings (Knopf, 1988). Collectively, these studies provide a mixed body of evidence about the contribution of crowding to displacement behaviors. Anderson and Brown (1984) concluded that BWCA visitors changed the entry points they used in response to impacts and numbers of encounters that occurred at the locations they used in the past. Kuentzel and Heberlein (1992) also found that visitors who ultimately changed the location of their recreation were most likely to have felt crowded during their earlier visits, and they concluded that crowding probably prompted the displacement. Among boaters who used the Rogue River less than in the past, the second most commonly given reason for decreased use was that there were too many people (Shelby et al., 1988).

These studies suggest that crowding is an important correlate or cause of displacement. However, other studies have found that crowding is a cause of displacement in some settings but not others. For example, boaters who stopped visiting the lower St. Croix River were more likely to say the river was too crowded than those who kept visiting, but those who stopped visiting the Upper Missouri River cited problems of barge traffic and pollution, rather than crowding (Becker, 1981; Becker et al., 1981). Similarly, among anglers on New Zealand rivers, crowding was a cause of displacement for some sites but not for others (Shelby & Vaske, 1991).

Other studies, especially panel studies, report that crowding is not an important cause of displacement. For example, although some Sylvania Recreation Area hikers felt crowded, perceptions of crowding were not significantly higher among those who had discontinued use (West, 1981). Shindler's panel study on the Rogue River (1993) found no differences in perceived crowding among those who returned and those who did not. Both

studies identified large proportions of respondents who did not return, which might superficially appear to be displacement. However, upon further scrutiny, their findings suggest that at least some of the discontinuers were not displaced, according to the definition used here (i.e., changing behaviors in response to adverse conditions encountered at a site). For example, Shindler reported that the most important explanation for not returning was change in lifestyle (moving, family changes, or work changes).

Thus, the significance of crowding in leading to displacement is unclear. Other displacing factors have rarely been studied. Although displacement caused by crowding was a primary focus of our study as well, we also examined how perception of other problems, including facility availability, conflict, and physical resource impacts, relate to displacement strategies.

*Relationship of Past Experience to Displacement.* A final area of debate in the displacement literature pertains to the role of a recreationist's past experience. Some have hypothesized that long-time visitors develop expectations and preferences for certain characteristics of a site before use levels increase, and would be the most susceptible to displacement. For example, Vaske, Donnelly, and Heberlein (1980) found evidence that the behavior of more experienced users was more affected by site changes. However, West's (1981) study indicated that more experienced users were *not* more likely to be displaced by crowding, and Anderson (1981) found the same unexpected results among canoeists at BWCA. Thus, the influence of past experience has not been uniformly supported. This study investigated the relationship between experience levels and displacement.

## Objectives

Specific objectives were: (a) to identify the proportion of visitors who are displaced from Lake Billy Chinook; (b) to determine the prevalence of spatial (intra-site and inter-site) and temporal displacement; (c) to examine how perception of other problems, including facility availability, conflict, and physical impacts relates to displacement strategies; and (d) to investigate the relationship between experience levels and displacement.

## Methods

### *Study Area*

This study investigated displacement behavior at Lake Billy Chinook, a heavily-used, intensely developed reservoir. Specifically, it addressed displacement behavior caused by perceived impacts such as crowding at the lake. This environment was selected to study displacement for four reasons. First, use varies considerably by day of the week and season of the year, allowing opportunities for temporal displacement, should visitors choose to adopt such strategies. Second, the lake is quite large and has numerous sites with different characteristics and use levels, so sensitive users have the opportunity to visit less-used parts of the lake. This allows an assessment of intra-site

displacement. Third, there are three other reservoirs within a one- to two-hour drive that provide alternatives for users who experience adverse conditions at Lake Billy Chinook, allowing an assessment of inter-site displacement. Finally, Lake Billy Chinook is the most heavily used inland water body in Oregon (with 112,000 use days annually by registered motor-boat owners), and use has been increasing consistently and rapidly (Oregon State Marine Board, 1996), allowing an assessment of displacement caused by crowding or conflict versus other conditions.

Lake Billy Chinook lies in the high desert of central Oregon. Although only a two-hour drive from the Portland metropolitan area, the environs are quite rural, consisting of undeveloped public land (Forest Service, Bureau of Land Management, and state) and small towns surrounded by agricultural land. The lake has 4,000 surface acres, and attracts more than 600,000 visitors annually. Nearly all visitors engage in some type of boating. The primary destination on Lake Billy Chinook is Cove Palisades State Park, which has three developed day use areas, two large campgrounds, and a marina. The campgrounds are full from July first through Labor Day, and the parking and picnic facilities at the day use areas are full on all weekend days and many weekdays during this season. In addition to the state park, there are two more remote Forest Service campgrounds which receive much less use. A very lightly-used overlook/day use area is provided by the utility company, and a moderately-used undeveloped day use area is located on the lake's only island.

Immediately downstream from Lake Billy Chinook is Lake Simtustus. This reservoir is smaller and narrower than Billy Chinook, and a 10 mph speed limit effectively prohibits waterskiing and jetskiing (which are popular at Lake Billy Chinook). This lake has a privately owned RV park, a developed campground owned by the electric company that operates the hydroelectric project, and a small, primitive campground maintained by the Confederated Tribes of the Warm Springs. Nearly all Lake Simtustus users have been to Lake Billy Chinook at some time.

There are three other reservoirs located nearby that serve as alternatives to Lake Billy Chinook. All are smaller than Billy Chinook, but are used for similar activities. Haystack Reservoir is about 45 minutes from the state park at Lake Billy Chinook, with a developed National Grassland campground and dispersed lakeshore camping. Slightly more distant are Ochoco and Prineville Reservoirs; both have developed campgrounds and day use areas. According to the Oregon State Marine Board (1996), Haystack receives approximately 1,400 user days of boating annually by registered boat owners, while Ochoco receives 2,400 and Prineville receives 35,100. Thus, use levels are considerably lower than at Lake Billy Chinook.

### *Survey Instruments and Administration*

Assessing the different forms of displacement requires different sampling considerations. Detection of temporal displacement requires sampling

during off-peak as well as peak times. Detection of intra-site displacement (rearrangement of use among sites at Lake Billy Chinook) requires sampling at a range of use sites at the lake. Detection of inter-site displacement (shifts of use away from Lake Billy Chinook to alternate sites) requires surveying users of the alternate sites as well as those at the target lake. These considerations of timing and location of visitor contact resulted in written surveys administered to visitors at sites around Lake Billy Chinook and Lake Simtustus and a structured oral interview conducted with recreational users at the three nearby alternate reservoirs.

*Survey of Visitors at the Target Destination.* At Lakes Billy Chinook and Simtustus, data were obtained by on-site and mail questionnaires. (Lake Simtustus users were included with Lake Billy Chinook users because the two sites are adjacent to one another, and they received the same surveys about their use at Lake Billy Chinook.) Researchers visited all developed sites and the undeveloped island on a random sample of weekdays and weekend days (approximately 20 days per site), stratified by month, between May 15 and September 30, 1997. This ensured adequate representation of high- and low-use times as well as high- and low-use sites. All group members in sampled groups were asked to complete a 2-sided on-site questionnaire, which obtained demographic information and names and addresses for a mail survey.

Mail surveys were sent to those providing names and addresses, followed by postcard reminders, a third mailing, and a final certified mailing (Dillman, 1978). The mail survey included several questions about perceived crowding and conflict at Lake Billy Chinook. Respondents were asked whether they had ever "changed their visits to Lake Billy Chinook because of crowding," and could select all that applied from a list of five possible behavioral responses, including two spatial and three temporal options. They were also asked about "the extent to which the amount of use at Lake Billy Chinook affects your overall enjoyment of your visits" (with a 5-point scale from "adds a lot" to "detracts a lot"). Other questions asked respondents to evaluate how much each item in a list of possible impacts and conditions (including social, facility, and ecological factors) had affected their experiences.

*Interviews of Visitors at Alternate Sites.* In-person interviews were conducted during 22 visits to Haystack Reservoir and 14 visits each to Prineville and Ochoco Reservoirs. A researcher visited each site on a random sample of weekdays and weekend days, stratified by month. During each visit, the researcher attempted to obtain four group interviews, with respondents randomly sampled from among those present at the site.

Interviewers asked visitors how many times (if any) they had been to Lake Billy Chinook. Those who had visited Lake Billy Chinook were asked whether they visited it more, the same, or less often than in the past, and why. Responses were recorded verbatim and later classified by type of answer. Those who reported visiting less than in the past and who attributed the decrease to adverse conditions at Lake Billy Chinook were considered to have been displaced.



## Results

### *Response Rates and Sample Sizes*

On-site, self-administered questionnaires were completed by 2,128 individuals at the target destination, for a 73% response rate. The mail surveys generated 1,069 completed questionnaires, a 64% response rate among those who provided names and addresses. On several low-use sample days during the research at alternate sites, fewer than the desired four groups were present, and the effort resulted in 168 interviews, with response rates of 97% at Haystack ( $n = 74$ ), 95% at Ochoco ( $n = 34$ ), and 83% at Prineville ( $n = 60$ ).

### *Temporal and Spatial Displacement*

*Respondents Contacted at the Target Site.* Just under half (49%) of all recreational users contacted at sites around Lake Billy Chinook and Lake Simtustus said they had "changed their visits to Lake Billy Chinook because of crowding" and indicated using at least one of the five behavioral strategies (Table 1). The most common strategies were temporal: visiting on weekdays or at a different time of the year, to avoid high-use times. Forty-two percent used at least one temporal strategy. For spatial strategies, 17% of respondents reported intra-site displacement (going to different sites on Lake Billy Chinook), and 15% reported inter-site displacement (going to other Central

TABLE 1  
*Displacement Strategies Employed by Visitors Contacted at Lake Billy Chinook*

	Percent
<i>Non-displacers</i>	51
Temporal Displacers	
1. Come earlier or later in year	25
2. Visit on weekdays to avoid weekends	30
3. Come earlier in the day	12
One or more temporal strategies	42
Use <i>only temporal</i> strategies	23
Spatial Displacers	
4. Use different sites on Lake Billy Chinook (intra-site)	17
5. Go to other Central Oregon places (inter-site)	15
One or both spatial strategies	26
Use <i>only spatial</i> strategies	6
Use both <i>temporal and spatial</i> strategies	20

*Note.* Respondents could mark all that apply of the five numbered strategies. Final classification of respondents is identified in italic type.

Oregon places). Twenty-six percent used one or both of the spatial strategies. For the purposes of subsequent analysis, respondents were assigned to one of four categories (indicated in italics in Table 1): non-displacers (those who had not changed their use), temporal-only displacers (who adopted one or more of the temporal strategies, but no spatial strategy), spatial-only displacers (who adopted one or both of the spatial strategies, but none of the temporal strategies), and temporal/spatial displacers (who adopted at least one temporal and one spatial strategy).

*Respondents Contacted at Alternate Sites.* The majority of those interviewed at the three alternate sites had been to Lake Billy Chinook in the past, although most were not visiting it on the trip when contacted by our researchers (Table 2). Of those who had been to Lake Billy Chinook, about half said they visit it less than in the past, and very few said they visit more than in the past. Only 4% of those who had ever been to Lake Billy Chinook said they have completely stopped going there. It is important to note that, while the survey of respondents at the target site asked only about displacement caused by crowding, the open-ended interviews at the alternate reservoirs allowed respondents to describe any type of adverse changes that might have led them to change their behaviors. Approximately 20-30% reported being displaced, according to the definition used here. These findings clearly suggest that some inter-site spatial displacement is occurring.

### *Causes of Displacement*

*Crowding.* When target site visitors were asked about the "effect of the amount of use at Lake Billy Chinook" on their experience (Figure 1), non-displacers were significantly less likely to say that use levels detract (37%) compared to temporal displacers (66%), spatial displacers (63%), and temporal/spatial displacers (81%). This is consistent with our conceptualization of displacement as a conscious reaction to conditions that interfere with goal

TABLE 2  
*Use of Lake Billy Chinook by Users Contacted at Alternate Sites*

	Haystack (n = 74)	Ochoco (n = 34)	Prineville (n = 60)
	Percent of Respondents		
Have visited Lake Billy Chinook at least once	84	65	66
Visited Lake Billy Chinook on this trip	20	0	5
Of those who have been to Lake Billy Chinook at least once:			
Use LBC less than in the past	52	42	56
Use LBC less <i>because of adverse change at LBC</i>	32	18	30
Use LBC same as in the past	36	53	32
Use LBC more than in the past	12	5	12

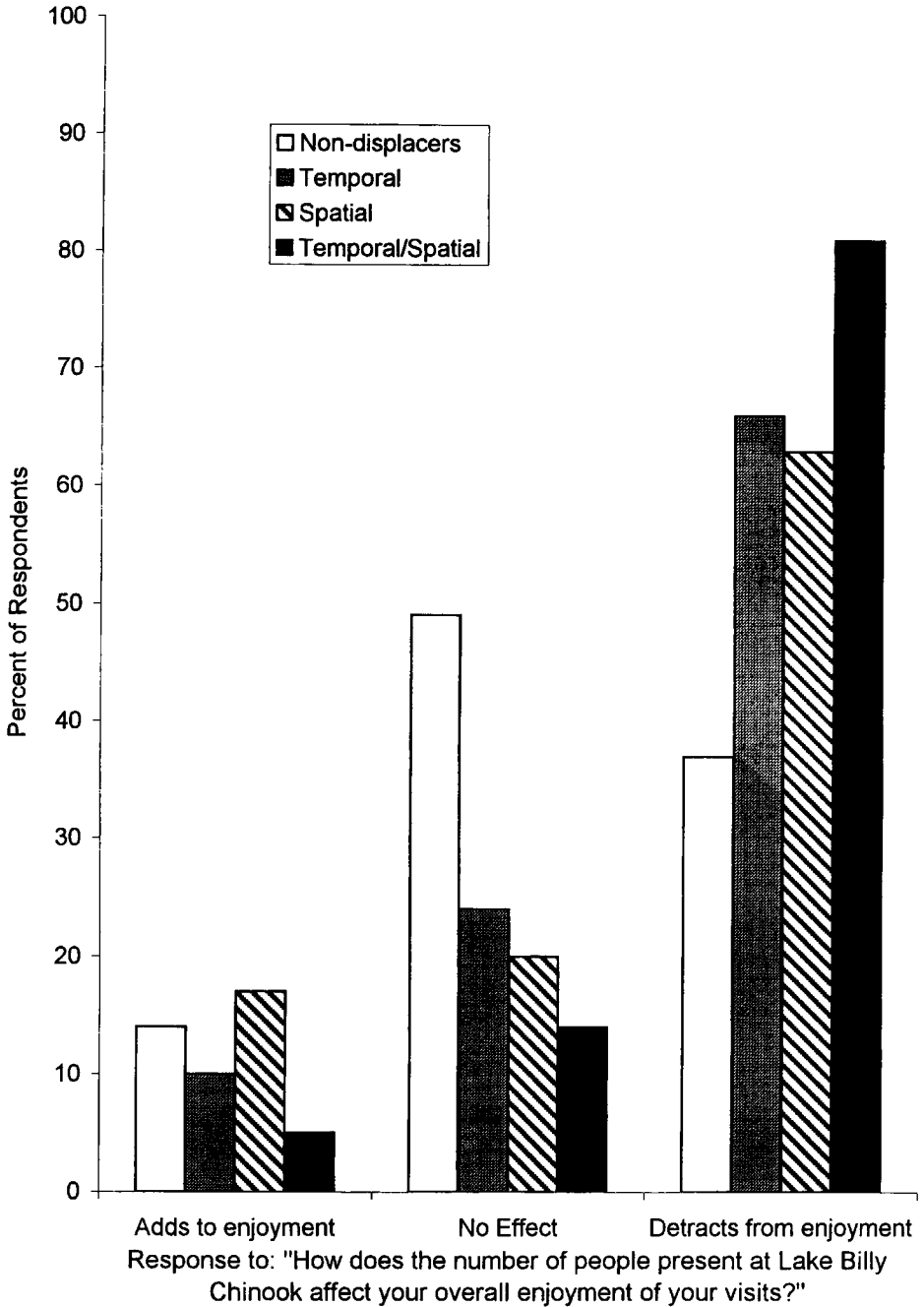


Figure 1. Effect of Use at Lake Billy Chinook on Enjoyment, by Displacement Strategy

attainment. Those who felt that use levels interfere were more likely to adopt displacement behaviors.

Additional evidence about the importance of crowding in displacement is available from respondents contacted at alternate sites. Interviewers asked respondents to explain their reasons for changing their use at Lake Billy Chinook, with no prompting as to possible causes. Various problems were described by those who had decreased their use, nearly all related to some aspect of use level, management conditions, or the physical environment at Lake Billy Chinook. In Table 3, answers are grouped into three categories: displacement caused by use-related factors such as crowding or conflict; displacement caused by adverse conditions that are unrelated to use; and other reasons for changing use that are not considered displacement. Because this was an open-ended question, a diversity of types of responses was expected and respondents could indicate more than one reason. Crowding was the

**TABLE 3**  
*Percent of Respondents at Alternate Sites Giving Reasons for Decreased Use of Lake Billy Chinook*

Reason	Haystack (n = 30)	Ochoco (n = 8)	Prineville (n = 19)	All (n = 57)
	Percent of Respondents			
Reasons related to use at LBC	53	25	42	46
General reference to crowding	43	25	26	35
Difficulty getting a campsite	0	13	11	5
No quiet place to fish	3	13	11	7
Too much noise	7	0	5	5
Conflict with jetskiers or waterskiers	7	0	0	4
Conditions at LBC unrelated to use	30	26	26	32
Cost too high	13	0	0	7
Poor site design	13	0	5	9
Fishing is better at other sites	10	0	5	7
Too hot or windy	7	0	11	7
Can't do desired activity at LBC	3	13	5	3
Too many rules	3	0	0	2
Topography prevents waterskiing	0	0	5	2
Favorite campground has been closed	0	13	0	2
Reasons unrelated to LBC	40	50	68	51
No time / too busy	7	25	16	12
Simply prefer other places more	7	0	26	12
Too far from home or moved	3	25	5	7
Family changes	7	0	5	5
Age	0	0	5	2
Quit activity used to do at LBC	3	0	5	4
Other	13	0	6	9

*Note.* Responses to open-ended question. Respondents could volunteer more than one answer.

most common reason, mentioned specifically by 35% of all respondents. Opinion researchers generally agree that if more than about 25% of respondents mention the same item in an open-ended question, a majority would agree to that item in a closed-ended framework (Schuman & Presser, 1981). Thus, it appears that crowding is an important displacing factor among users who are spatially displaced from Lake Billy Chinook.

*Other Factors Related to Displacement.* We were interested in discerning the relative importance of other factors, including conflict, facilities, and environmental conditions, in causing displacement. Among alternate site users, the open-ended responses (presented in Table 3) about reasons for decreased use of Lake Billy Chinook highlighted some of these factors, including noise and conflict with users of personal watercraft. Interestingly, none of these respondents described environmental impact factors such as erosion, litter, or devegetation of sites. Instead, adverse conditions at Lake Billy Chinook unrelated to use or visitor behavior (such as cost and site design), reasons unrelated to use or conditions at Lake Billy Chinook at all (e.g., being far from home or family changes), and an unspecified preference for the alternate site were among the reported reasons. The proportion identifying unrelated factors—i.e., not displacement at all—was quite high (40-68%), suggesting that studies that do not investigate the reasons underlying use changes may misclassify some reduction in use as displacement.

Although the samples for the part of the study conducted at alternate sites were small, data suggest that different reasons for spatial displacement were related to each site. For example, distance and time were more common reasons for users contacted at Ochoco and Prineville (the more distant alternatives to Lake Billy Chinook), and crowding was a more common reason reported by among users contacted at Haystack (the closest alternative).

Additional data from the mail survey allow analysis of the relationship between displacement strategies and perceptions of crowding/competition, conflict, facilities, and environmental issues for visitors contacted at the target site itself. The survey presented 14 possible problems or impacts visitors might have noticed at Lake Billy Chinook. Displacers were significantly more sensitive to all items (Table 4), and in some cases the differences were quite dramatic. The largest differences—those that discriminate the best between displacers and non-displacers—were crowding and conflict issues, while facilities and environmental conditions discriminated somewhat less well. Almost always, non-displacers were least likely to perceive a problem, followed by temporal displacers and spatial displacers. Those who use both temporal and spatial strategies were the most sensitive. Those using only spatial strategies were more like the temporal/spatial displacers than temporal-only displacers. Thus, those displaced by crowding were more sensitive to a whole range of impacts and problematic conditions beyond just crowding.

#### *Relationship of Past Experience to Displacement*

Displacers (the 49% of Lake Billy Chinook visitors indicating they used a displacement strategy) as a group have been coming to Lake Billy Chinook

TABLE 4  
*Evaluation of Conditions<sup>1</sup> and Impacts at LBC by Target Site (LBC) Visitors*

Type of Impact	ND <sup>2</sup>	T	S	T + S	F <sup>3</sup>
Crowding and competition					
Crowding at state park	2.91 <sub>a</sub>	2.34 <sub>b</sub>	1.94 <sub>bc</sub>	1.95 <sub>c</sub>	36.7**
Difficulty finding campsite	3.16 <sub>a</sub>	2.67 <sub>b</sub>	2.27 <sub>b</sub>	2.37 <sub>b</sub>	24.1**
Difficulty finding a picnic table	3.23 <sub>a</sub>	2.92 <sub>b</sub>	2.84 <sub>ab</sub>	2.72 <sub>b</sub>	10.0**
Use conflicts					
Conflict between personal watercraft and others	3.16 <sub>a</sub>	2.51 <sub>b</sub>	2.67 <sub>b</sub>	2.36 <sub>b</sub>	23.6**
Conflict between waterskiers and others	3.62 <sub>a</sub>	3.25 <sub>b</sub>	3.45 <sub>ab</sub>	3.12 <sub>b</sub>	14.1**
Boater-angler conflict	3.62 <sub>a</sub>	3.43 <sub>ab</sub>	3.19 <sub>b</sub>	2.30 <sub>b</sub>	9.3**
Inconsiderate behavior	3.13 <sub>a</sub>	2.65 <sub>b</sub>	2.53 <sub>b</sub>	2.39 <sub>b</sub>	26.6**
Excessive boat speed or wakes	3.42 <sub>a</sub>	3.13 <sub>b</sub>	3.06 <sub>ab</sub>	2.90 <sub>b</sub>	12.3**
Facilities					
Lack of restrooms	3.40 <sub>a</sub>	3.39 <sub>a</sub>	3.19 <sub>ab</sub>	2.94 <sub>b</sub>	11.6**
Lack of services or facilities	3.49 <sub>a</sub>	3.52 <sub>a</sub>	3.47 <sub>ab</sub>	3.20 <sub>b</sub>	6.0**
Too little access to shoreline	2.87 <sub>a</sub>	2.77 <sub>a</sub>	2.75 <sub>ab</sub>	2.32 <sub>b</sub>	9.1**
Environmental conditions					
Fluctuation in water levels	3.80 <sub>a</sub>	3.72 <sub>ab</sub>	3.69 <sub>ab</sub>	3.59 <sub>b</sub>	3.7*
Erosion of shoreline	3.53 <sub>a</sub>	3.57 <sub>a</sub>	3.21 <sub>ab</sub>	3.22 <sub>b</sub>	6.9**
Litter around the reservoir	3.52 <sub>a</sub>	3.48 <sub>ab</sub>	3.15 <sub>bc</sub>	3.18 <sub>c</sub>	10.0**

<sup>1</sup>Mean on scale where 1 = a big problem, 2 = moderate problem, 3 = slight problem, 4 = not a problem.

<sup>2</sup>ND = non-displacers; T = temporal only; S = spatial only; T + S = temporal and spatial.

<sup>3</sup>ANOVA. Means with different subscripts are significantly different at  $p = .05$  using Duncan's post hoc comparisons.

\* $p < .01$ . \*\* $p < .0005$ .

longer than non-displacers (Figure 2). Interestingly, spatial displacers are more similar to non-displacers than to temporal/spatial displacers. The two groups who use temporal strategies are quite similar, with 25% of each having come to the site for at least 25 years.

## Discussion

### *Rates and Types of Displacement*

In this study, target-site data indicated that about half of Lake Billy Chinook visitors who still visit the lake exhibit some temporal and/or spatial displacement behaviors. Among alternate site visitors with experience at the target site, between 25 and 53% reported inter-site displacement caused by crowding or conflict, while about 30% reported being displaced by managerial or environmental conditions. Managers and researchers often debate the extent of displacement in the absence of empirical data. This study suggests that, at least at a high-use destination where use is increasing, rates of

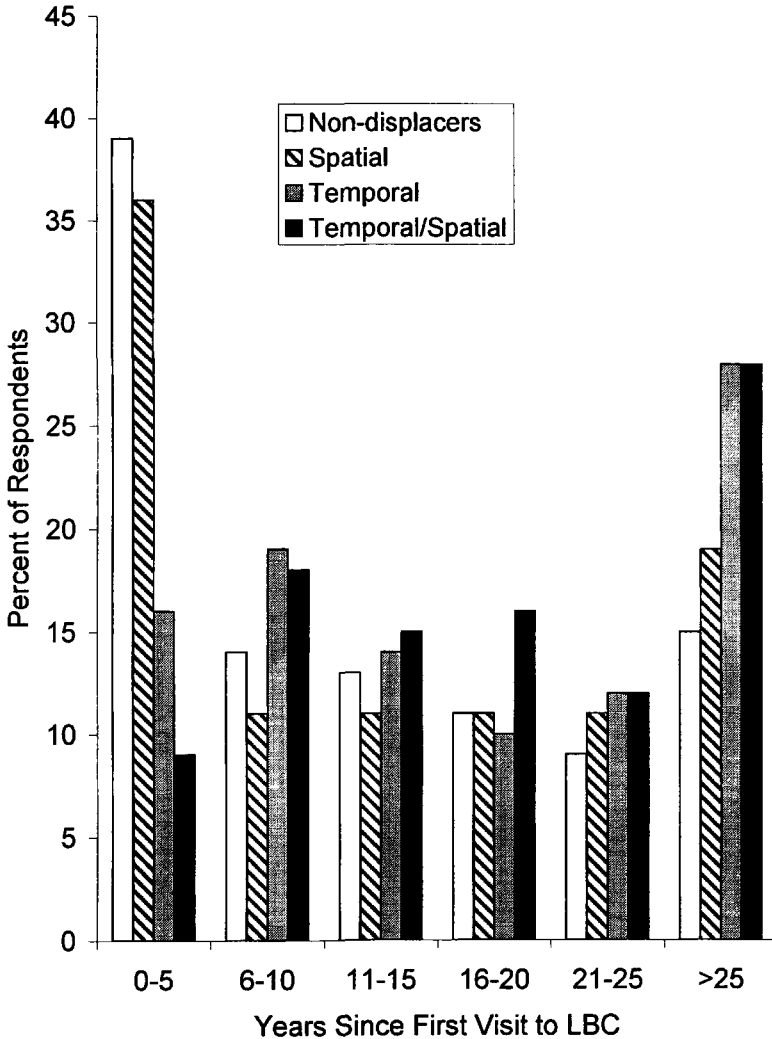


Figure 2. Relationship between Past Use of Lake Billy Chinook and Displacement Strategy

displacement can be substantial. Interestingly, using a question similar to our operational measure, Kuentzel and Heberlein (1992) found that 55% of those who continued visiting throughout the duration of their panel study said they had “avoided crowded islands” at some point in time. The similarity of the two studies is surprising, given that these settings are so different. Lake Billy Chinook, with over 600,000 visitors per year, has much higher use levels than the Apostle Islands (where use was estimated at approximately 7,000 boaters or 16,000 user days per year at the time of the study). Given

that displacement rates undoubtedly reflect site conditions, visitor characteristics and goals, and availability of alternate times and sites, we should expect displacement rates observed in different studies to vary, and future research would be helpful in describing the extent of displacement.

Among those who continued to use Lake Billy Chinook, temporal adjustments were the most common displacement strategies for those adversely affected by crowding. Just over 40% of target site respondents employed at least one temporal displacement strategy. Even among those interviewed at the alternate sites, almost 25% volunteered that they use some type of temporal adjustment when they go to Lake Billy Chinook. Past studies, which have tended to focus on spatial displacement, most likely underestimate the overall magnitude of displacement.

This study did not explore reasons that individuals might exhibit temporal instead of spatial displacement or vice versa. It is likely that choice of strategy reflects many considerations. For example, if place attachment is high, one might be more likely to adopt temporal strategies; high place attachment might imply that there are experience goals uniquely associated with the target site that could not be attained with spatial displacement. Similarly, if few alternative sites are available, one might adopt temporal strategies, while having many acceptable alternatives might encourage spatial strategies. The likelihood of perceiving available, acceptable alternatives will probably depend on the type of activity, logistical constraints such as travel distance, and other factors. Choice of strategy will also depend on the type of goal one has for a site. For example, crowding-sensitive goals such as solitude or contemplation are affected by encounters and the behavior of others. At sites where use is high all the time, perhaps only spatial strategies will permit attainment of these goals. If use levels are uneven in time, temporal strategies may allow one to continue to achieve these desired goals. Other types of changes in a site (e.g., in physical facilities) may preclude desired experiences at the site at any time, leaving only spatial alternatives. Our data are consistent with this suggestion; those using spatial strategies at Lake Billy Chinook were most sensitive to physical site conditions that do not vary temporally.

### *Causes of Displacement*

The literature suggests that there are different causes for different types of displacement, and that factors include social and environmental conditions encountered within a setting as well as external factors beyond managerial control. Of particular interest, conflicting evidence has been reported in previous research on the role of crowding in leading to displacement.

In an early cross-sectional study at Apostle Islands, 22-46% of boaters "avoided crowded islands" (Vaske et al., 1980), while a later panel study reported 55% giving a similar response (Kuentzel & Heberlein, 1992). These studies suggest that crowding is an important displacing influence. However, Anderson and Brown (1984, p. 72) "found little support for crowding [en-



counters] as an indicator of displacement in comparison to other possible indicators" such as litter or environmental damage. The direct questions employed in our study provided clear evidence from both the target site and alternate sites that crowding led many individuals consciously to change their behavior. Among those contacted at alternate sites, there was no mention of litter or environmental impacts as causes of displacement; crowding and managerial factors (e.g., cost or site design) were the primary setting factors mentioned. One possible explanation for the findings of Anderson and Brown is that their study did not measure crowding per se (only whether people encountered other groups), and did not inquire about causes of behavioral changes.

In addition to the evidence pertaining to crowding, our findings at both the target and alternate sites suggest that other factors play a role in displacement. Those contacted at the target site who used either temporal or spatial strategies in response to crowding were also more likely to perceive problems of conflict, inadequate facilities, and some environmental conditions than non-displacers. These target site data indicate correlations, not causal relationships, but are consistent with a conclusion that factors beyond crowding may contribute to displacement. Self-reports of causal factors from those contacted at alternate sites provide a more direct indication of the causes of inter-site displacement in this system. Although crowding was cited most often by these respondents, other management factors were important as well, while environmental impact conditions were not. The marked differences in sensitivity we observed among the different displacement categories are rarely observed among subgroups in recreation research and suggest that classification by displacement strategy is a powerful and important discriminator among recreationists.

#### *Relationship of Past Experience to Displacement*

Schreyer and Knopf (1984) and Dustin and McAvoy (1982) expressed concern that systematic changes toward higher use and more development might adversely affect certain types of users. Veteran users are often discussed as being most sensitive to such changes; some assert that they may have more stringent and longer-standing expectations and preferences, which could lead to a higher rate of displacement. However, the logic behind this contention is not straightforward. One could equally argue that those who have been long-time users may be more attached to a setting (perceiving fewer feasible alternatives), which could translate into lower rates of displacement among this group. Indeed, West (1981) and Anderson (1981) found no relationship between displacement and past experience. At Lake Billy Chinook, we found a higher proportion of displacers among highly experienced visitors and a higher proportion of non-displacers among relative newcomers, but the evidence was not decisive.

In trying to understand the differences between studies regarding past experience, it is useful to examine the specific displacement questions asked.

At Lake Billy Chinook, we found a relationship between experience and displacement only among those individuals adopting temporal or temporal-and-spatial strategies. Anderson (1981) asked only about spatial displacement, and perhaps if questions related to temporal strategies had been asked in that study, such a difference might have emerged among BWCA users. West (1981) asked only about ceasing use (which may or may not qualify as displacement, depending on the causal factors), so we cannot determine whether spatial and/or temporal strategies might have been differentially employed by Sylvania hikers with different levels of experience.

Our data are consistent with the explanation, common in the literature, that experienced users are more upset with adverse changes and therefore are more likely to change their behavior. However, it is also possible that more experienced users (who may have sought out or stumbled upon more information) are aware of a greater range of alternative sites or locations within the destination as a whole. With greater knowledge of use patterns and site characteristics, they may mitigate the adverse effects they perceive by adoption of temporal or spatial strategies. This interpretation is consistent with Manfredo's (1989) finding that more committed users make a greater effort to obtain information and with Perdue's (1987) finding that knowledge about sites is correlated with use of the sites. Thus, it could be that more experienced users are not necessarily more sensitive than newer users, but simply have more of the knowledge needed to alter their behavior.

### *Management Implications*

*Planning for Temporal and Spatial Changes in Use.* The importance of temporal displacement strategies suggests that managers might need to be concerned about possible increases in use during off-peak times. Because those who seek such alternatives are more affected by crowding, perhaps there may be a need to protect lower-use opportunities and ensure that they do not become as crowded as the times and places which caused displacement. This issue is of some concern at sites like Lake Billy Chinook that are at capacity during the summer months, where managers are intentionally trying to increase overall use (and, thereby, revenue and economic impact) by encouraging off-peak use. Such strategies should be adopted with the overt recognition of the potentially adverse impacts on some users (Hall & Cole, 2000).

Managers should also be concerned about the potential effects of spatial displacement. As recreation settings become more popular, some visitors will move away from them to seek lower-density sites. In long-range planning, managers should identify the likely alternate sites (not all will be equally desirable or feasible), and consider how to react as use shifts to them. Although both forms of spatial displacement described in this study involve shifting use to another physical location, distinguishing between the amount of intra-site and inter-site displacement may be important for managers. When intra-site displacement occurs, overall use levels at a destination may

not change. A manager may be forced to reallocate resources and should be alert to potential experience and resource degradation at different places within the destination, but may or may not incur any additional costs. When inter-site displacement occurs, managers of the alternate sites experience an influx of new visitors and an overall increase in use. The new visitors may also have different expectations and desires than long-time visitors. Reacting to this situation may require different approaches than reacting to intra-site displacement. As with temporal displacement, there should be overt recognition of the potentially adverse impacts on recreation opportunities at "new" locations that are associated with any management action or inaction.

These points draw attention to the need for regional planning on a scale beyond individual sites. Indeed they strengthen the case for applying a Recreational Opportunity Spectrum (ROS) approach, and point to the need for ROS to include temporal dimensions in addition to spatial dimensions.

### *Theoretical Considerations and Opportunities for Future Research<sup>1</sup>*

*Clarifying Definitions.* In reviewing studies of displacement, we discovered some lack of clarity in contemporary definitions. The restricted definition developed by Schreyer and Knopf (1984) and Becker (1981)—of displacement as a move away from an adverse condition—is sometimes used (as in our study), but sometimes any decrease in use, regardless of cause, is labeled displacement. In Shindler's (1993) panel study, for example, one-time thrill-seeking commercial passengers, people who moved away from the area and did not return, and people who come less often now than in the past (for whatever reason) were all classified as "displaced." Where displacement is conceived as a behavioral change arising because conditions do not fulfill desired experience goals, perhaps only some of these would properly be considered displacement. For example, thrill-seeking commercial passengers probably achieved their desired experience, and their failure to return should not be classified as displacement. The conflation of displacement with other reasons for reducing or changing use is especially problematic in panel studies. Because of the passage of time (e.g., 14 years in Shindler's study), changes in life stage or lifestyle are likely to have significant effects on recreation behavior and site visitation, independently of true "displacement."

If managers view their job as providing high quality recreational opportunities to achieve desired experiential outcomes (Driver, 1996; Hawkes, Shew, & Carroll, 1992), they should care about not only the occurrence of a behavioral change (what proportion do not return, or what proportion use temporal or spatial strategies), but the reasons for that change. In the case of Lake Billy Chinook, managers might be concerned about visitors who go to alternate sites because crowding has eliminated desired opportunities or because of poor facilities or site design (all factors subject to managerial

---

<sup>1</sup>The authors would like to acknowledge the Associate Editor for providing the impetus to discuss these issues.

control). Managers might be less concerned about those who simply enjoy another site better (having never perceived a problem at Lake Billy Chinook), or who have other reasons for their behavior change (e.g., aging) that are completely unrelated to Lake Billy Chinook itself. Thus, for displacement research to be most useful to managers, it is important that the causes of displacement be identified and that true displacement be distinguished from other causes for altering behavior.

*Including Displacement in a Context of Recreation Choice and Decision-making.* The process of displacement originally described as a conscious decision to move away from adverse conditions is heuristically useful. However, it focuses narrowly on one facet of complex decision-making processes (perceived adverse change in a site) to the exclusion of other elements. Although this study characterized people simply as displacers or non-displacers, recreation choices are complex, and a person might be a "displacer" in one time or place and not in another. The recreation field could benefit from a more thorough model that incorporates other factors known to be important in recreation decisions. For example, the model does not account well for the behavior those who seek novelty or variety for their own sake or are new to an area and exploring different options. Nor does it encompass individuals who remain at a site when conditions change, but alter their expectations or goals for their visits. This reaction has not been labeled displacement (it has been labeled product shift or rationalization), but is obviously of parallel importance. At Lake Billy Chinook, almost 40% of respondents at the target location said the amount of use at the lake detracted from their experience, but did not adopt temporal or spatial behavioral strategies. It would be helpful to know whether this group copes with the impacts of use in any other way besides displacement.

Finally, displacement studies should address the larger context within which temporal and spatial displacement behaviors occur. A decision to change one's behavior involves trade-offs among important goals, not all of which are equally sensitive to changes in conditions. The decision also takes place within a context of possible constraints, such as the availability of alternate sites, knowledge of those sites, how far one is able or willing to travel, and how one's social group perceives conditions. Displacement is an important phenomenon with potentially significant effects on experience quality and visitation patterns. Although we are beginning to understand the occurrence of displacement and the factors leading to it, more thought is needed about how to link displacement theory with other frameworks that account for an individual's decision-making processes and site selection behaviors.

## References

- Anderson, D. H. (1981). *The effect of user experience on displacement*. Paper presented at the Applied Geography Conference, Binghamton, NY.
- Anderson, D. H., & Brown, P. (1984). The displacement process in recreation. *Journal of Leisure Research*, 16(1), 61-73.

- Becker, R. H. (1981). Displacement of recreational users between the lower St. Croix and Upper Mississippi rivers. *Journal of Environmental Management*, 13, 259-267.
- Becker, R. H., Niemann, B. J., & Gates, W. A. (1981). Displacement of users within a river system: Social and environmental trade-offs. In D. W. Lime & D. R. Field (Eds.), *Some recent products of river recreation research*. (General Technical Report NC-63). St. Paul, MN: USDA Forest Service, North Central Forest Experiment Station.
- Brunson, M. W., & Shelby, B. (1993). Recreation substitutability: A research agenda. *Leisure Sciences*, 15, 67-74.
- Chambers, T. W. M., & Price, C. (1986). Recreation congestion: Some hypotheses tested in the forest of Dean. *Journal of Rural Studies*, 2(1), 41-52.
- Dillman, D. A. (1978). *Mail and telephone surveys: The total design method*. New York: Wiley.
- Driver, B. L. (1996). Benefits-driven management of natural areas. *Natural Areas Journal*, 16(2), 94-99.
- Dustin, D. L., & McAvoy, L. H. (1982). The decline and fall of quality recreation opportunities and environments. *Environmental Ethics*, 4, 49-57.
- Hall, T. E., & Cole, D. N. (2000). *An expanded perspective on displacement: A longitudinal study of visitors to two wildernesses in the Cascade Mountains of Oregon*. In Cole, David N., McCool, Stephen F., Borrie, William T., & O'Laughlin, Jennifer. (Comps.), *Proceedings: Wilderness science in a time of change conference—Volume 4: Wilderness visitors, experiences, and visitor management*. Proceedings RMRS-P-15-VOL-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Hawkes, D. L., Shew, R. L., & Carroll, M. S. (1992). Managing for quality in recreation: Viewing recreational opportunities as a service rather than a commodity. *Journal of Forestry*, 90(7), 42-45.
- Iso-Ahola, S. E. (1986). A theory of substitutability of leisure behavior. *Leisure Sciences*, 8, 367-389.
- Knopf, R. C. (1988). Human experience of wildlands: A review of needs and policy. *Western Wildlands*, 14(3), 2-8.
- Kuentzel, W. F., & Heberlein, T. A. (1992). Cognitive and behavioral adaptations to perceived crowding: A panel study of coping and displacement. *Journal of Leisure Research*, 24(4), 377-393.
- Manfredo, M. J. (1989). An investigation of the basis for external information search in recreation and tourism. *Leisure Sciences*, 11, 29-45.
- Manfredo, M. J., & Anderson, D. (1987). The influence of activity importance and similarity on perception of recreation substitutes. *Leisure Sciences*, 9, 77-86.
- Oregon State Marine Board. (1996). *Oregon recreational boating survey*. Salem, OR: Oregon State Marine Board.
- Perdue, R. R. (1987). The influence of awareness on spatial behaviour in recreational boating. *Leisure Sciences*, 9(1), 15-25.
- Schreyer, R., & Knopf, R. C. (1984). The dynamics of change in outdoor recreation environments—Some equity issues. *Journal of Park and Recreation Administration*, 2(1), 9-19.
- Schuman, H., & Presser, S. (1981). *Questions and answers in attitude surveys: Experiments on question form, wording, and context*. New York: Academic Press.
- Shelby, B., Bregenzler, N. S., & Johnson, R. (1988). Displacement and product shift: Empirical evidence from Oregon rivers. *Journal of Leisure Research*, 20(4), 274-288.
- Shelby, B., & Vaske, J. J. (1991). Resource and activity substitutes for recreational salmon fishing in New Zealand. *Leisure Sciences*, 13, 21-32.
- Shindler, B. A. (1993). *Management implications of displacement and product shift: Longitudinal research on the Rogue River*. Unpublished doctoral dissertation, Oregon State University, Corvallis, Oregon.

- Vaske, J. J., Donnelly, M. P., & Heberlein, T. A. (1980). Perceptions of crowding and resource quality by early and more recent visitors. *Leisure Sciences*, 3(4), 367-381.
- West, P. C. (1981). *On-site social surveys and the determination of social carrying capacity in wildland recreation management* (Research Note NC-264). USDA Forest Service, North Central Forest Experiment Station.