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# Effects of Place Identity, Place Dependence, and Experience-Use History on Perceptions of Recreation Impacts in a Natural Setting

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**Abstract** It is generally accepted that recreation use in natural environments results in some degree of negative social and environmental impact. Environmental managers are tasked with mitigating the impact while providing beneficial recreation opportunities. Research on the factors that influence visitors' perceptions of environmental and social conditions is necessary to inform sound environmental management of protected natural areas. This study examines the effect of prior experience with the setting and two dimensions of place attachment (i.e., place identity and place dependence) on visitors' perceptions of three types of recreation impacts (i.e., depreciative behavior, environmental impacts, and recreation conflict). Principal components analysis, confirmatory factor analysis, and structural equation modeling were used to test the study hypotheses using data collected from 351 visitors through on-site questionnaires (response rate of 93 percent). The results show that prior experience exhibited a moderate and significant direct positive effect on place identity, place dependence, and visitors' perceptions of recreation impacts. Contrary to study hypotheses and prior research, neither place dependence nor place identity exhibited a significant effect on the dependent variables. The results show that prior experience causes visitors to be more sensitive to depreciative behaviors, environmental impacts, and recreation conflict. These findings raise concerns over potential visitor displacement and deterioration of site conditions. Implications for resource managers are discussed, which include education, modifying visitor use patterns, and site design strategies.

**Keywords** Recreation management · Oregon · Wilderness management · River management · Sense of place

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## Introduction

Although some degree of social and environmental change is an inevitable consequence of outdoor recreation in natural settings, environmental managers are faced with the challenge of mitigating unacceptable impacts while providing satisfying recreational opportunities. To address this challenge, researchers have identified factors that affect objective environmental and social conditions as well as factors influencing visitors' subjective perceptions of those conditions. Such research provides guidance for the formation of appropriate environmental management strategies and policies.

Research has shown that recreation impacts to natural settings can occur rapidly, can be stable over long periods of sustained use, and environmental recovery times are typically longer than rates of degradation (Cole 2004). Factors affecting the ecological significance and magnitude of recreation impacts include the amount, type, timing, and spatial distribution of use, user behavior, and the resistance and resilience of the environmental setting (Cole 2004). Regarding social and environmental conditions, studies show that visitors' perceptions are related not only to the

objective conditions they encounter (e.g., use levels, amount of trail erosion) but also subjective factors such as visitors' prior experience, expectations, motives, setting preferences, environmental value orientation, and level of place attachment (Manning 1999). Also, visitors' perceptions of site conditions are affected by situational factors, such as type of resource area and proximity to urban centers, size of other groups, type of other groups, intra- and inter-group dynamics, and presence of environmental cues and heuristics (Manning 1999).

As with many areas of inquiry, early research on recreation visitors' perceptions of social and environmental conditions in natural settings tended to be descriptive, key constructs were simplistically conceptualized and measured, and analysis relied on univariate techniques. Although there remain limitations, more recent research has advanced our understanding by drawing on theory from environmental psychology and landscape perception studies, by paying closer attention to measurement, and by employing multivariate analyses. In this article, we examine the effects of experience-use history, place identity, and place dependence on recreation visitors' perceptions of social and environmental conditions in a natural setting. The study was conducted at the Molalla River Recreation Corridor and Table Rock Wilderness in western Oregon. Using data collected from an on-site visitor survey ($n = 351$) we conducted principal components analysis (PCA), confirmatory factor analyses (CFA), and structural equation modeling (SEM) to test the study hypotheses. In this article, we discuss the implications of the findings for environmental research and management with a focus on highly impacted recreation sites.

## Related Research

### Visitors' Perceptions of Recreation Impacts

Based upon our reading of the literature on visitors' perceptions of recreation impacts, it seems that two schools of thought predominate. One perspective is that visitors do perceive impacts; their behavior and experience are affected by impacts; and they formulate acceptability judgments about impacts (Lynn and Brown 2003; Roggenbuck and others 1993; Shafer and Hammit 1995; Shelby and others 1988). For instance, Roggenbuck and others (1993) concluded that both social and environmental impacts negatively affected visitor experiences in wilderness areas, with environmental impacts being most problematic. Others have concluded that damage to vegetation and trees may diminish visitors' recreation experience (Shafer and Hammit 1995). Priskin (2003) found that visitors to the Central Coast Region of Western Australia were negatively affected by tourism impacts.

A second perspective, however, suggests that recreation visitor behavior and satisfaction may not be significantly altered by recreation impacts (Farrell and others 2001; White and others 2001), with the notable exception of impacts tied directly to inappropriate human use such as litter or vandalism. This line of research indicates that many visitors, especially those with less site experience, may not perceive recreation impacts, and, if they do, they do not necessarily judge them to be problematic, even when impacts are of significant magnitude according to accepted management assessment techniques. For instance, White and others (2001) found that visitors camping in several high-use wilderness areas in the Cascade Mountains of Oregon typically were not opposed to impacts; rather visitors found ecological conditions such as bare ground to be amenities that contributed to the desirability of campsites, even though sites were significantly disturbed. Similar findings have emerged from studies of visitors to front country sites and wilderness areas (Heberlein and Dunwiddie 1979; Knudson and Curry 1981).

One explanation for the divergent research findings may be methodological. Studies using open-ended interview techniques in contrast to mail surveys or photo-based assessments tend to conclude that visitors do not perceive most impacts to be a problem, especially during the on-site recreational engagement (White and others 2001). It is possible that close-ended survey questions with negative hypothetical phrases may lead to social desirability bias. Along these lines, White and others (2001) suggested that divergent findings in the literature may be explained by distinguishing between symbolic and functional assessments of site conditions:

"From the functional perspective, impacts are often seen as desirable amenities and would be evaluated negatively only if they interfere with the use of the site…Visitors may perceive impacts as incompatible with wilderness in the abstract, and this evaluation may be separate from the direct effect of impacts on site functionality." (p. 86).

Indeed, the presence of some impact to campsites may be more acceptable than no impact at all. Knudson and Curry (1981) found that visitors perceived loss of ground cover in front country camping sites as a positive aspect of their experience. As with most social phenomena, methodological differences may partially explain divergent research findings. The literature suggests that social-psychological factors, such as prior experience and place attachment, may contribute to the perception of social and environment impacts.

### Prior Experience

Prior experience has been used to segment recreation visitors (Bryan 1977; Hammitt and others 2004; Hammitt and

McDonald 1983; Ibitayo and Virden 1996; Schreyer and others 1984) and to explain recreation site choice (McFarlane and others 1998; Watson and others 1991). Bryan (1977) identified prior experience as an important indicator or dimension of recreation specialization along with centrality to lifestyle and skill. Other researchers have examined past experience as a stand-alone construct. Prior experience with a recreation setting or experience-use history can be measured through total number of previous visits to an area, total length of time visiting an area, and/or frequency of visitation to the area or similar areas (Hammitt and McDonald 1983; Schreyer and others 1984). Ibitayo and Virden (1996) used the number of visits to a park over the last 12 months.

Schreyer and others (1984) identified six categories of river users ranging from novice to veteran. They argued that individuals who have the same level of experience-use history share similar information and perceptions about the environment. This research found support for past experience to be a significant indicator of recreation visitors' perceptions, behavior, and management preferences. Hammit and McDonald (1983) also suggested past experience influences "how users perceive a recreation environment" (p. 266). Ibitayo and Virden (1996) segmented park visitors into high and low experienced groups based upon the number of past park visits. Their results indicated that the level of past experience was related to the perception of depreciative behaviors such as littering, water pollution, noise, alcohol consumption, and vandalism. McFarlane and others (1998) found a relationship between the level of past experience and site choice among Canadian wilderness users. The authors summarized that visitors with more experience were better able to match their preferences with available resources due to increased knowledge and awareness. Hammit and others (2004) identified four categories of users ranging from beginners to veterans. They found a positive correlation between experience-use history and place bonding, supporting the hypothesis of a casual relationship between the two variables.

## Place Attachment

There are several related concepts discussed in the literature that describe human-environment interaction through subjective experience of place, including place identity (Proshansky and others 1983), place dependence (Stokols and Shumaker 1981), place attachment (Moore and Graefe 1994; Williams and others 1992), place bonding (Hammitt and others 2004), and sense of place (Jorgensen and Stedman 2001, 2006). The diversity of place concepts likely reflects the multidimensionality of the construct, which researchers have described in emotional, cognitive, and behavioral terms (Altman and Low 1992).

Proshansky (1978) defined place identity as an individual's personal identity defined in relation to the physical environment, influenced by conscious and unconscious ideals, beliefs, preferences, feelings, values, goals, and behavioral tendencies and skills. Williams and others (1992) suggested that an individual may see a place as part of the self and simultaneously as a resource for satisfying goals or explicitly felt behaviors. The result can be a strong emotional attachment. Place identity not only includes a physical setting or environment, it also includes a social element. Proshansky and others (1983) suggested that physical settings are backdrops for social and cultural existence. Kyle and others (2003) found that activity attraction and self expression contributed to the development of place identity for hikers.

Stokols and Shumaker (1981) suggested that there are two factors that individuals and groups employ to determine place dependency. The first is quality of current place and the second is the relative quality of comparable alternatives. Generic place dependence suggests that an individual or group is attached to a particular category of places for functional reasons. An example of generic place dependence could be a white water rafter who can only achieve his or her preferred goals and activities on rivers with rapids. Often times, generic place dependent individuals can be attached to areas that they have never visited because the area may afford them a unique setting in which to achieve their goals.

There is evidence that setting experience is an important factor in the formation of place attachment, especially for the identity dimension. Backlund and Williams (2004) analyzed ten studies and found weak to moderate positive correlations between two measures of prior experience (i.e., years visiting site and number of visits in prior twelve months) and two dimensions of place attachment (i.e., place identity and place dependence). Although there was variability across studies and the associations were not strong, the findings suggest that prior experience is positively related to place attachment. On the contrary, in a study of lakeshore property owners, Jorgensen and Stedman (2006) found that the number of days an owner spent at the property in the prior year exhibited a weak, negative, indirect effect on attachment and identity. This effect was most pronounced on the identity dimension.

Research has shown that place attachment affects a variety of dependent variables (Bricker and Kerstetter 2000; Budruk and others 2008; Kyle and others 2003; Kyle and others 2004; Vaske and Korbin 2001; Warzecha and Lime 2001). Kyle and others (2003) examined the relationship between place attachment and visitors' attitudes toward paying recreation use fees as well as spending

preferences for spending the program fee revenue. The authors hypothesized that place identity and place dependence would moderate the relationship between visitor attitudes toward the fee program and visitor support for spending of the fee program revenue for environmental education, environmental protection, and facility and service development. Results suggested that only the place identity dimension was a significant moderator, and thus as visitors' attachment to the setting increased, their support for the fee program and spending increased as well. Bricker and Kerstetter (2000) examined the relationship between specialization among whitewater recreationists and the two dimensions of place attachment. Place dependence was negatively related to specialization whereas place identity was positively related. In a study on Appalachian Trail (AT) hikers, Kyle and others (2004) found that as place identity increased, respondents' negative perceptions of crowding increased. As place dependence increased, however, respondents' evaluation of setting density became more favorable. Budruk and others (2008) found that place identity was a significant predictor of visitors' perceptions of authenticity at a Native American cultural heritage tourism destination.

Of particular relevance to this study, Kyle and others (2004) examined the effects of place attachment on visitors' perceptions of social and environmental conditions along the AT. They found that visitors with higher perceptions of place identity were more critical of social and environmental conditions along the AT, but place dependent respondents were not as critical of recreation impacts. Arguing that place dependent respondents should express greater tolerance for recreation impacts, they concluded, "While empirical evidence supporting this reasoning remains scant, the logic is conceptually consistent and warrants further investigation" (p. 223). These findings, along with results of other studies (Bricker and Kerstetter 2000; Kyle and others 2003), reinforced the notion that place identity and place dependence have differential effects on recreation visitors evaluations of social and ecological conditions.

Based upon existing research on prior experience, place attachment, and visitors' perceptions of social and ecological conditions in natural recreation settings, we developed the following study hypotheses:

H1: The longer respondents have been visiting the site, the greater their level of place identity and place dependence.
H2: The longer respondents have been visiting the site, the more negative their appraisals of environmental and social impacts.
H3: As place identity increases, so too will respondents' negative evaluations of social and environmental impacts.
H4: As place dependence increases, respondents' will be less critical of recreation impacts in a natural setting.

In the next section, we detail the study methods, including the study area, sampling design, survey administration, and variable operationalization, measurement, and analysis plan.

## Methods

### Background, Sampling, and Survey Administration

This study was conducted in association with management planning for the Molalla River Recreation Corridor and Table Rock Wilderness, located in the western foothills of the Cascade Mountains in close proximity to Oregon's three largest population centers of Portland, Eugene, and Salem. The Molalla River Recreation Corridor was obtained by the BLM in 1992 through a land exchange with a private landowner. The twelve mile river corridor is accessible by road and provides opportunities for water-based recreation in a scenic natural setting. Table Rock Wilderness preserves approximately 2225 hectares (5500 acres) of rugged forest in the headwaters in the Molalla River drainage above the recreation corridor, in an area otherwise characterized by intensive forest management. The area was added to the National Wilderness Preservation System by the Oregon Wilderness Act of 1984 and is the only wilderness area under management by the BLM Salem District. The increasing popularity of the recreation area, especially during summer weekends, and its close proximity to large population centers has led to management concerns over unacceptable impacts to the social and environmental conditions.

The data analyzed for this article were collected via on-site questionnaire administered to adult visitors to the Molalla River Recreation Corridor and Table Rock Wilderness. The questionnaire included sections on visitor characteristics, trip/visit characteristics, visitors' perceptions of their park experiences, and visitors' evaluations of park facilities, programs, and services. Sampling occurred July to September 2006 and was stratified by time of week (weekday/weekend), time of day (a.m./p.m.), and resource area (river/wilderness). During sample periods, trained surveyors who approached each group encountered and selected a random adult visitor using the most recent birthday method. Surveyors achieved a 93 percent on-site response rate resulting in a total of 351 completed questionnaires with 304 (86%) respondents being river visitors and 51 (14%) being wilderness visitors. Non-response bias analysis revealed no significant differences between respondents and non-respondents based upon gender, children present, or group size.

### Variables, Measurement, and Analysis

Variables included in this analysis are prior experience with the setting, place identity, place dependence, and

perceptions of three categories of recreation impacts, namely depreciative behavior, environmental impacts, and social conflict. The analysis is based on data collected from 351 completed surveys. Data were analyzed using Statistical Package for Social Sciences (SPSS) 16.0 and AMOS 16.0. Prior to conducting the analysis, data were screened for missing values, which accounted for 1% of the data for the variables. Missing values were replaced using series mean. Variables were screened for skewness and kurtosis and transformed to normalize skewed distributions.

To measure place attachment, respondents rated the extent to which they agreed or disagreed with nine statements representing two theorized dimensions of place attachment. The items were drawn from prior research (Kyle and others 2004) and were measured on a five-point strongly agree to strongly disagree response scale. The place attachment construct has undergone adequate theoretical specification, conceptualization, and operationalizization, and therefore a confirmatory factor analysis was used to create latent (unobserved) constructs for each dimension (place identity and place dependence), each with multiple manifest (observed) indicators.

To measure perceptions of impacts, respondents evaluated 16 social and environmental conditions on a five-point scale (1 = "Not a problem"; 5 = "Very serious problem"). There has not been adequate research on measurement of perceptions of recreation impacts to justify confirmatory factor analysis, and thus we used principal components factor analysis to reduce the number of items and identify underlying dimensions. Items were retained in the factors if Eigenvalues were > 1.0, individual and item factor loadings and all inter-item correlations were >.40.

Prior experience with the site was assessed by a single item measuring the number of years visiting the area. Research by Ibitayo and Virden (1996) and Backlund and Williams (2004) suggested that a past experience indicator that assesses the number of visits to a particular resource or place is preferable to other more generalized experience indicators. To examine the effect of prior experience, place identity, and place dependence on visitors' perceptions of recreation impacts, we used confirmatory factor analysis and structural equation modeling.

## Results

### Respondent Profile, Levels of Place Attachment, and Perceptions of Social and Environmental Conditions

The socio-demographic and experience profile for respondents is presented in Table 1. Men comprised just more than half (55.2%) of the completed sample and the average age for respondents was 37 years. Regarding educational attainment, 39.5% of respondents were high school graduates and 29.7% had attained a Bachelor's or more advanced degree. This suggests a visitor population that is more educated than the national or state average. Regarding racial and ethnic identification, 95.2% or respondents identified themselves as White, and 6.2% as Hispanic.

**Table 1** Socio-demographic characteristics for respondents

| Respondent characteristics | |
|---|---|
| Racial and ethnic identification JH | |
| Hispanic | 6.2% |
| American Indian or Alaska Native | 3.6% |
| Asian | 0.3% |
| Black or African American | 0.6 |
| Native Hawaiian or other Pacific Islander | 0.3 |
| White | 95.2 |
| Education | |
| Less than high school | 2.1% |
| High school graduate | 39.5% |
| Technical school or Associates degree | 28.8% |
| Bachelor's degree | 20.2% |
| Master's degree | 6.5% |
| Ph.D., M.D., J.D., or equivalent | 3.0% |
| Gender | |
| Male | 55.2% |
| Female | 44.8% |
| Mean age in years (SD) | 37.18 (13.17) |
| Mean years visiting area (SD) | 10.8 (11.50) |

The results of the CFA procedures for the place attachment construct (see Table 2) supported the theoretical conceptualization of two dimensions of place attachment—place identity and place dependence. For place identity, the standardized coefficients were significant for all indicators of the construct. The values ranged from a low of $\beta = .58$ (I have a lot of fond memories about the Molalla River Recreation Corridor) to a high of $\beta = .89$ (I am very attached to the Molalla River Recreation Corridor). The reliability coefficient ($\alpha = .87$) demonstrates high internal consistency for the factor. Similarly, the place dependence factor showed high internal consistency ($\alpha = .87$). The standardized coefficients were all significant for the indicators of the place dependence factor and ranged from a low of $\beta = .78$ (I wouldn't substitute any place for the type of recreation I do here) to a high of $\beta = .98$ (I enjoy recreating in Molalla River Recreation Corridor more than any other area). Measures of model fit, including goodness of fit (GFI = .95) and baseline comparison fit (CFI = .95), which are discussed in the next section, demonstrated a good fitting model. As expected, the two factors were moderately positively correlated ($\rho = .48$).

**Table 2** Means, standard deviations, standardized parameter coefficients, significance levels, and reliabilities for place attachment variables

| Scale (α) | M | SD | β | p | α |
|---|---|---|---|---|---|
| Items | | | | | |
| Place identity | 4.10 | 0.72 | | | .87 |
| Molalla River Recreation Corridor means a lot to me | 4.47 | 0.75 | .60 | <.001 | |
| I am very attached to Molalla River Recreation Corridor | 4.20 | 0.89 | .79 | <.001 | |
| I identify strongly with Molalla River Recreation Corridor | 4.06 | 0.88 | .78 | <.001 | |
| I have a lot of fond memories about Molalla River Recreation Corridor | 4.07 | 0.92 | .58 | <.001 | |
| I have a special connection to Molalla River Recreation Corridor and the people who live and visit here | 3.69 | 0.98 | .73 | <.001 | |
| Place dependence | 3.27 | 0.87 | | | .91 |
| I enjoy recreating in Molalla River Recreation Corridor more than any other area | 3.46 | 0.98 | .81 | <.001 | |
| I get more satisfaction out of visiting Molalla River Recreation Corridor than from visiting any other NM | 3.28 | 0.95 | .87 | <.001 | |
| Recreating here is more important than recreating in any other place | 3.18 | 0.96 | .90 | <.001 | |
| I wouldn't substitute any place for the type of recreation I do here | 3.15 | 1.00 | .78 | <.001 | |

Looking at the individual place identity items in Table 2, the results show that visitors strongly agreed that the area means a lot to them, they will have a lot of fond memories of the area, they feel attached to the area, identify strongly with the area, and have a special connection to the area. The mean value for three of the four place identity items was greater than 4.0, indicating than most visitors agreed or strongly agreed with these statements. For the place dependence items, however, the results show that visitors were in less agreement with statements that their goals, activities and experiences were specifically dependent on the area. In other words, visitors considered other places to be potential substitutes for the goals, activities, and experiences provided by the area.

The results of the exploratory factor analysis (EFA) for the perceptions of social and environmental conditions are shown in Table 3, along with descriptive statistics for the scales and individual items. A three factor solution was accepted that explained 78% of the variance and included ten items. The first factor was named depreciative behavior and included three items: litter, trash dumping, and vandalism. This factor explained 58.81% of the variance and showed very high internal consistency ($\alpha = .92$). The second factor was named environmental impacts and included four items: water pollution, trampling/removal of vegetation, stream bank disturbance, and erosion of trails. The environmental impacts factor explained 10.59% of the variance and had very high reliability ($\alpha = .92$). The third factor was named recreational conflict and included three items: conflict with other visitors, unskilled people using the site, and uncontrolled dogs. This factor explained 8.7% of the variance and also showed high reliability ($\alpha = .76$). The three factors were treated as latent constructs with multiple manifest indicators for each construct in the modeling procedures described in the next section.

Based upon mean scores for the factors, which were measured on a five-point response scale, the most problematic individual conditions were related to depreciative behavior ($\mu = 2.85$) including litter, trash dumping, and vandalism. This is not surprising considering that "wildcat dumping" is a significant concern in that managers have recently been forced to remove several burned-out cars among other large debris. Of the items comprising this factor, litter was the most problematic issue, rated as a moderate problem ($\mu = 3.02$). This is probably related to an area open to target shooting where spent ammunition and boxes accumulate. Visitors rated environmental impacts ($\mu = 1.95$) as not a problem to a slight problem. Among the individual items, water pollution ($\mu = 1.99$) and trampling/removal of vegetation ($\mu = 1.95$) were the highest rated items. Finally, visitors also felt that recreational conflict ($\mu = 1.61$) was not a problem to a slight problem. Of the conflict items, the problematic condition was unskilled people using the site ($\mu = 1.85$).

## Effect of Prior Experience, Place Identity, and Place Dependence on Perceptions of Impacts

A two step procedure was used to examine the effects of prior experience, place identity, and place dependence on visitors' perceptions of social and environmental impacts. First, confirmatory factor analysis was employed to assess fit for the full measurement model. The measurement model was then modified to represent the study hypotheses and tested through structural equation modeling. Maximum likelihood estimation was used to estimate both measurement and structural models.

Multiple fit indices were used to assess both the measurement and structural model, including minimum sample discrepancy function (chi-square statistic, relative

**Table 3** Means, standard deviations, factor loadings, reliabilities, and variance explained for perceptions of recreation impact variables

| Component | M | SD | Loadings | α | Variance (%) |
|---|---|---|---|---|---|
| Items | | | | | |
| Depreciative behavior | 2.85 | 0.70 | | .92 | 58.81 |
| Litter | 3.02 | 1.48 | .87 | | |
| Trash dumping | 2.88 | 1.52 | .89 | | |
| Vandalism | 2.64 | 1.47 | .76 | | |
| Environmental impacts | 1.95 | 0.87 | | .89 | 10.59 |
| Water pollution | 1.99 | 1.32 | .69 | | |
| Trampling/removal of vegetation | 1.83 | 1.16 | .80 | | |
| Stream bank disturbance | 1.95 | 1.18 | .68 | | |
| Erosion of trails | 2.02 | 1.01 | .81 | | |
| Recreational conflict | 1.61 | 0.79 | | .76 | 8.70 |
| Conflict with other visitors | 1.43 | 0.88 | .79 | | |
| Unskilled people using the site | 1.85 | 1.19 | .76 | | |
| Uncontrolled dogs | 1.56 | 1.06 | .73 | | |

chi-square), measures based on population discrepancy (RMSEA), baseline comparison measures (CFI), and goodness of fit (GFI). The rules of thumb provided by Arbuckle (2005) and Kline (2005) were used to assess model fit. A relative chi-square in the range of 3 to 1 indicates favorable fit between the hypothetical model and the sample data for large samples (i.e., >200). An RMSEA value of .05 or less indicates a close fit to the data, a value of .08 indicates a reasonable fit and a value of .10 or greater indicates a poor fit. The CFI measure is based on discrepancy between the hypothesized model and a baseline or comparison model (i.e., the independence model). This measures ranges from 0 to 1 with values close to 1 indicating a perfect fit and values below .90 indicating potential for improvement. Values for GFI of .90 indicate a good fit.

For the measurement model, the standardized parameter coefficients were significant for all latent constructs on their respective indicators. The measurement model was deemed to have a fair fit to the data and was accepted (see Table 4). The relative chi-square (2.43) indicated a favorable fit to the data. The RMSEA value of .06 indicated a reasonable fit. The values for the CFI (.95) and GFI (.91) indicated good to fair model fit. With the measurement accepted, the analysis proceeded to the structural equation modeling. The fit indices also indicated that the structural model had a reasonable to favorable fit the data (see Table 4). The relative chi-square value of 3.46 demonstrated a reasonable fit to the sample data. The values for the CFI (.90) and GFI (.86) indicated a favorable fit. The RMSEA value of .08 signifies a reasonable fit with some potential for improvement to the model.

**Table 4** Fit indices for study models

| | $\chi^2$ | df | p | $\chi^2/df$ | GFI | CFI | RMSEA |
|---|---|---|---|---|---|---|---|
| Full measurement model | 374.65 | 154 | <.01 | 2.43 | .91 | .95 | .06 |
| Structural model | 540.60 | 156 | <.01 | 3.46 | .86 | .90 | .08 |

Examining the direction, strength, and significance of the standardized parameter coefficients allowed us to test the study hypotheses (see Table 5 and Fig. 1).

The analysis supported Hypothesis 1. Prior experience has a significant, direct, positive effect on both dimensions of place attachment. That is, over time, visitors develop a stronger emotional connection to the area and become more dependent on the recreation opportunities afforded there. The standardized parameter coefficient for the path from prior visitation to place identity was $\beta = .37$. In other words, for each additional year of experience with the site, visitors' sense of place identity increased by .37 units, or about 7% of the five-point scale. The coefficient for the path from prior visitation to place dependence was $\beta = .18$. Thus, for each additional year of experience with the site, place dependence increased by .18 units, or about 4% of the five-point scale. Prior experience explained 13% of the variance in place identity and 3% of the variance in place dependence.

Hypothesis 2 was also supported by the data. Prior visitation had a significant, direct, positive effect on perceptions of recreation impacts for each of the three factors. That is, the longer visitors have been coming to the site, the more problematic they perceived recreation impacts to be. For depreciative behavior the standardized parameter coefficient was $\beta = .22$, indicating that for a one unit increase in prior visitation there is a corresponding .22 unit change in visitors' negative appraisals of depreciative behavior. Put another way, for each additional year of experience with the site, visitors' evaluations of depreciative behavior were .22 units more negative, or about 4% of

**Table 5** Parameter estimates for structural model

| Independent variables | Mediator variables | | Dependent variables[a] | | |
|---|---|---|---|---|---|
| | PLACEDEP | PLACEID | CONFL | ENVIMP | DEPBVR |
| YEARS | .18[b] | .37[b] | .24[b] (−.02) | .18[b] (−.01) | .25[b] (.03) |
| PLACEDEP | | | .07 | −.06 | −.02 |
| PLACEID | | | −.08 | .01 | .09 |
| $R^2$ | .03 | .13 | .06 | .03 | .07 |

[a] Figures in parentheses are indirect effects; [b] $p < .05$

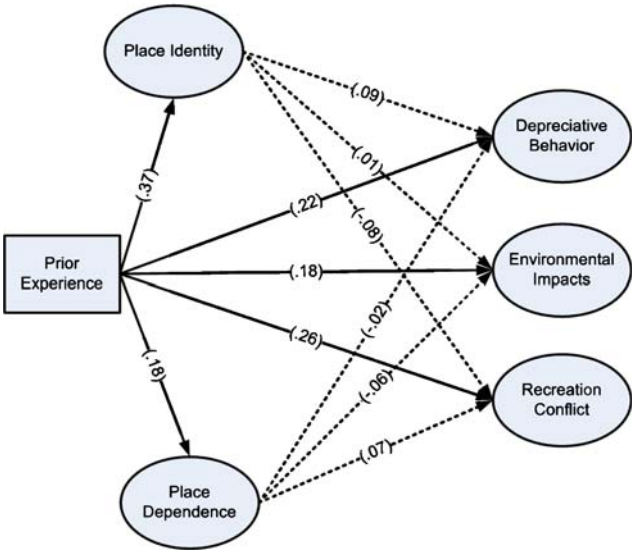


**Fig. 1** Structural equation model with standardized parameter estimates (dotted lines are nonsignificant)

the five-point scale. Regarding environmental impacts the coefficient was .18 and for recreation conflict the coefficient was $\beta = .26$. In other words, for each additional year experience, visitors' evaluations of environmental impact and recreation conflict are about 3% and 4% more negative, respectively. Thus, prior visitation had the strongest effect on the two social dimensions of recreation impacts.

Hypothesis 3, which stated that place identity has a direct positive influence on perceptions of recreation impacts, was not supported by the data for any of the three types of impacts. The coefficient for the path from place identity to depreciative behavior was in the predicted direction ($\beta = .09$) but was not statistically significant at $p < .05$ (the relationship was significant at $p < .10$). The effect of place identity on perceptions of environmental impacts ($\beta = .01$) was also in the predicted direction but not significant. Finally, the effect of place identity on perceptions of recreation conflict was not supported and the direction of the relationship was negative ($\beta = -.08$), contrary to the study hypothesis.

Hypothesis 4, which stated that place dependence has a direct negative influence on perceptions of impacts, was not supported. For perceptions of depreciative behavior and environmental impacts the effect was in the predicted direction, $\beta = -.02$ and $\beta = -.06$ respectively, but the relationships were not significant. The direction of the path from place dependence to recreation conflict was not significant, and positive ($\beta = .07$), contrary to the study hypothesis.

Analysis of indirect (mediated) effects of experience-use history on perceptions of recreation impacts, through place identity and place dependence, uncovered no significant relations. That is to say, essentially all of the effect of prior experience on visitors' perceptions of recreation impacts is due to the direct influence of the independent variable on the dependent variable, and this relation is not significantly affected by mediation processes involving place attachment. Overall, the model explained 7% of the variance in visitors' perceptions of depreciative behavior, 3% of the variance in visitors' perceptions of environmental impacts, and 6% of the variance in visitors' perceptions of recreation conflict.

## Discussion

The results of this study provide partial support for the hypothesized model explaining visitors' perceptions of recreation impacts in a natural setting. As hypothesized, prior experience significantly predicted visitors' level of place identity and place dependence as well as visitors' evaluations of depreciative behavior, ecological impacts, and recreation conflict. Contrary to our expectations and prior research (e.g., Kyle and others 2004), place identity and place dependence did not exert significant influence on perceptions of recreation impacts. The following discussion offers some insights into these findings as well as recommendations for future research and environmental management.

Our results reinforce earlier research demonstrating that prior experience is an influential component of the development of place identity (e.g., Backlund and Williams 2004). In our study, a single item measuring number of years visiting the site explained 13 percent of the variance in place identity. This finding reinforces the notion that repeated exposure to a natural setting, such as a scenic river corridor, promotes an emotional and symbolic bond between people and place. As recreation visitors gain

experience with the site, they are more likely to view the setting and the other visitors as reflections of themselves and their values. Prior experience is also a significant factor in the development of place dependence, although to a lesser degree. This may be because that even after multiple visits, the respondents did not perceive the specific setting to have unique qualities or there are other comparable alternative places in the region that afford similar opportunities.

An important finding in this study is that the longer visitors have been coming to the site, the more negatively they evaluate social and environmental conditions, specifically, depreciative behavior, environmental impacts, and recreational conflict. The effect of prior visitation on evaluations of social and environmental impacts supports the conclusion that increased experience causes greater sensitivity to deteriorating site conditions in natural recreation settings. This finding is consistent with other studies, such as Ibitayo and Virden (1996), who found that more experienced visitors to a suburban community park were also more sensitive to impacts. The effect of prior visitation was most pronounced on recreation conflict and depreciative behavior. This finding reinforces the notion that visitors are more sensitive to recreation impacts that are clearly tied to inappropriate human use or noncompliant visitor behavior.

Our results partially contradict earlier findings that place identified visitors are more critical of social and environmental conditions in natural recreation settings (Kyle and others 2004). In our study, place identity exhibited a very small non-significant positive effect on depreciative behavior and environmental impacts and exhibited a small nonsignificant negative effect on depreciative behavior. In contrast, Kyle and others (2004) argued that place identified respondents had a more narrow latitude of acceptance for impacts. One possible explanation for the divergent findings is that Kyle and others (2004) did not control for prior experience in their model. It is possible that, had those authors controlled for the effect of previous visitation, the effect of the place attachment on perceptions of impacts would have been moderated. In fact, Kyle and others (2004) mentioned that "While not reported in this manuscript, previous analyses of these data indicated that as the length of users' visits increased… so too did sensitivity to social and environmental problems" (p. 222).

The results also show that more place dependent respondents were no more accepting of social environmental impacts than less dependent respondents. This finding at least partially contradicts the conceptual argument that visitors who are more dependent on specific recreation settings to fulfill their goals, are more willing to accept a wider range of environmental and social changes. Because the coefficients were in the predicted direction for two of the three paths related to Hypothesis 3, we are hesitant to jettison this argument entirely and recommend additional research.

Returning to the two schools of thought on visitors' perceptions of recreation impacts in natural areas described in the literature review, our results provide partial support for each point of view. On one hand, visitors did not perceive most types of impacts to be a problem despite the fact that the area is, in objective terms, very heavily impacted. Although this study did not include a formal biophysical impact assessment, researcher observation and manager judgments would indicate that recreation impacts in the Molalla River Corridor are widespread. There are several possible explanations for this finding. First, it could be that visitors are dependent upon the site to fulfill specific recreation experiences (i.e., river-based recreation) and there are no substitute sites. This explanation, however, is inconsistent with our findings as place dependence did not exhibit a significant effect on visitors' perceptions. Second, it is possible that visitors simply do not perceive environmental and social impacts in the same way as managers and researchers, despite managers' significant concerns. Prior studies have concluded that managers and visitors have divergent perceptions about environmental quality in recreation settings and that managers are more sensitive due to disciplinary training and socialization (Farrell and others 2001; Ibitayo and Virden 1996; van Riper and White 2008). Thrid, it is possible that visitors who are more sensitive to impacts have been displaced to another site to attain their desired experiences (Hall and Shelby 2000; Shelby Bregenzer and others 1988). For instance, Hall and Shelby (2000) found that visitors who were adversely affected by crowding and conflict at a high-use reservoir in Oregon were displaced to substitute sites.

On the other hand, our study did find that visitors who have been visiting the site longer express more negative evaluations of recreation impacts. It is possible that longer-term visitors are comparing current conditions to an earlier time in a process of benchmarking or anchoring. Moreover, they may actually perceive the social and environmental shift that has occurred over time. According to managers, visitor use and associated impacts have increased significantly since the recreation area was taken over by the BLM in 1992. Thus, longer term visitors may be more accurate in their assessment of site conditions. This interpretation raises additional concern about the potential for visitor displacement.

## Implications for Environmental Management

The findings of this study have implications for managers of the resource. Most indicators of environmental impacts and recreation conflict were seen either as not a problem or

a slight problem by visitors. While all of these variables represent areas for continued monitoring, the results do not indicate that a management problem currently exists, at least as far as current visitors are concerned. The mean values for the indicators of the depreciative behavior factor, however do suggest that these are moderate problems as perceived by the overall sample. Management efforts to address these specific behaviors would have greater public support. Specifically, both managers and visitors appear to agree that vandalism in the Molalla River Corridor is causing degradation of facilities, such as signs, restrooms, fire pits, picnic sites, and information kiosks.

Potential environmental management strategies include modifying amount or type of use, modifying density of use through dispersal or containment, placing special restrictions on types of uses that result in greater or disproportionate levels of impacts, modifying visitor behavior through education and interpretation, and modifying the site through site hardening, new and/or relocated trails and campsites (Hammit and Cole 1998). While the Table Rock Wilderness is generally more remote and experiences lower levels of visitation, the Molalla River Corridor experiences higher levels of use, particularly in the summer. Modification of visitor behavior through improved information and education programs are recommended. Physical improvements that could improve depreciative behavior could include more trash receptacles, more day use facilities and designated parking, improved signage and information kiosks. Increased presence by managers, maintenance staff, and law enforcement personnel would also serve to reduce depreciative behavior.

Another concern is greater perception of depreciative behavior, environmental impacts, and recreation conflicts by more experienced visitors. There is some support for the idea that experienced visitors are better able to moderate their site choice and time of visitation to minimize their exposure to negative impacts (Bryan 1977; Hammitt and others 2004; McFarlane and others 1998). However, the Molalla River Corridor is a contained linear site and offers a limited number of developed areas. It is likely that there is some displacement occurring among visitors as number of visits increases. In other words, some of the experienced visitors likely choose other recreation opportunities (out of the area) rather than continue to put up with increasingly negative perceptions of social and environmental impacts to the resource. This proposition is supported by the generally low levels of place dependence found among the sample, indicating the potential that other areas could substitute for the kind of experience gained in the Molalla River Corridor. Since the resource is close to Portland's growing metropolitan population, there is a constant supply of new visitors to keep visitation strong. Managers should monitor for displacement by either tracking visitors over time or holding focus groups with former visitors who now frequent other outdoor recreation sites in northern Oregon.

The moderately strong degree of place identity present in the overall sample as compared to the less strong sense of place dependence speaks to the importance of the wilderness and river corridor to visitors. Newcomers are less likely to be as bothered as longer-term visitors by social and environmental impacts to the resource. Some past research suggests that novices may be less discerning and more accepting of problems in the social or physical setting (Virden and Schreyer 1988). Furthermore, some research suggests that more experienced visitors' perceptions are more similar to manager's perceptions than for novice or new visitors (Ibitayo and Virden 1996). If this is the case and evidence of displacement is occurring, the tracking of more experienced visitors may be a key indicator for monitoring the social and physical conditions of the resource.

## Conclusion

Recreation areas provide society with important opportunities to bond with the natural environment. Recreation use, however, has the potential to degrade the environment if not properly managed. Understanding human subjective experience of place in protected natural areas is necessary to derive appropriate environmental management strategies to ensure that both amenity values and recreation opportunities are protected. In this study, we demonstrated the significance of prior experience in the development of place attachment and perceptions of recreation impacts. We also contradicted some earlier research by finding that place attachment did not significantly affect impact perceptions. We feel that there is cause concern over the potential for visitor displacement. Furthermore, we are troubled by the apparent disconnect between resource managers, who expressed significant concern over deteriorating conditions, and current visitors, who, by and large, did not perceive impacts to be a problem. We recommend that researchers give increased attention to understanding the multitude of factors affecting visitors' perceptions of recreation impacts.

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