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The Effects of Place Attachment, Hypothetical Site Modifications and Use Levels on Recreation Behavior

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Abstract

This study integrates place attachment dimensions into a travel cost model utilizing stated preferences for various hypothetical scenarios involving site development and changes to current use levels at a Bureau of Land Management Special Recreation Management Area. We examine changes in intended behavior contingent on hypothetical scenarios and varying levels of place identity and dependence. Results suggest trip behavior to the area will either remain the same or decline in frequency given each of the hypothetical scenarios. The analysis also revealed visitors' level of place identity was significantly related to intended trip behavior while place dependence was not. These findings reveal travel cost modeling approach can incorporate both stated preferences and psychometric scaling to provide useful information for resource managers.

KEYWORDS: Contingent Behavior, Stated Preferences, Place Identity, Place Dependence, Travel Cost Model

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Introduction

Recreation planners and other public land managers face ongoing challenges of providing quality recreational opportunities for an increasingly diverse array of individuals on public lands. These challenges frequently revolve around issues of crowding, user conflicts, concessionaire oversight, permitting, safety, parking, and resource impacts (Siderelis & Moore, 2006). Planners and managers typically face these challenges with limited amounts of time, expertise, and financial resources to devote to problem solving and acquiring information to make objective decisions. To aid recreation planners and public land managers in weighing the potential impacts of their decisions, recent research in the field of outdoor recreation has employed an approach that allows alternative actions to be more objectively compared against one another before an agency must commit limited time and money. This approach utilizes recreationists' responses to proposed or hypothetical scenarios being considered by the managing agency. The data are traditionally acquired through on-site survey methods (Englin & Cameron, 1996). This approach provides users with hypothetical choices, most typically inquiring about the number of trips they would have taken given either changes in site quality or changes in trip prices (e.g., Englin & Cameron, 1996; Layman, Boyce, & Criddle, 1996; Siderelis, Moore, & Lee, 2000; Whitehead, Haab, & Huang, 2000). The use of such stated preference questions can be a valuable addition to observed data by predicting potential effects of management decisions. To this end, we incorporate this stated preferences approach into a travel cost model to estimate changes in recreation demand at the Bureau of Land Management (BLM) Warren Bridge Special Recreation Management Area (SRMA) near Pinedale, Wyoming, contingent upon three hypothetical scenarios of various site conditions and use levels.

The tools recreation researchers use to measure changes in recreation demand, such as travel cost modeling or discrete choice modeling, often fail to account for social psychological factors that influence behavior. Such factors could include users' motivations, level of attachment to a recreation setting, preferred recreation experiences at that setting, or constraints. It has been hypothesized that inclusion of these factors will increase the predictive power of such models (Hailu, Boxall, & McFarlane, 2005; Siderelis & Moore, 1998). We address this gap in the recreation literature by incorporating the place-specific attachments and meanings that individuals hold for a recreation setting into a model of recreation demand that utilizes the stated preferences approach. Of all the potential influences on recreation behavior that could be considered determinants of recreation demand, we suggest the concept of place attachment is particularly influential for three related reasons. First, management agencies responsible for providing recreation opportunities are becoming more aware of the importance of place concepts and have made increasing attempts to manage for not only recreation experiences, but for "special" places as well (Anderson & Fulton, 2008; Driver & Bruns, 2008; Williams & Stewart, 1998). By examining place attachment's effects on individuals' anticipated recreation behavior, this research may provide recreation resource managers with a better understanding of how individuals' functional and affective attachments to particular places affect their recreation behavior. The second reason we suggest the concept of place attachment deserves special consideration

in this analysis is, in spite of a substantial body of place-related research, very little is known about how perceptions of place may affect future recreation behavior given variations in site conditions and use levels. Hammitt, Kyle, and Oh (2009) note that research focusing on place attachment's ability to predict other recreation behaviors remains a substantial research need. In this study, we attempt to address this gap. The final reason place concepts deserve consideration is because we believe analyzing them in conjunction with behavioral characteristics can further the development of recreation demand modeling by paying more attention to the social psychological factors that theoretically influence behavior, and controlling for those factors when assessing changes in demand relative to hypothetical site modifications.

Incorporating place-specific meanings of recreation settings into stated preference modeling can also make a contribution to the recreation-related place attachment literature. This contribution involves better understanding the effects place-specific meanings can have on recreation behavior. The role of past experience in shaping attachments to recreation settings has been examined by a number of studies (Eisenhauer, Krannich, & Blahna, 2000; Hailu et al., 2005; Moore & Graefe, 1994; Williams, Patterson, Roggenbuck, & Watson, 1992). In general, attachments to recreation settings become stronger with repeated visits. However, the effect of place attachment on intended future use remains largely unexplored. This study makes a unique theoretical contribution by exploring the effects of place attachment on visitor behavior under various hypothetical scenarios.

Changes in setting characteristics can affect the demand for those settings, but are these changes in demand magnified or suppressed when visitors' attachments to the setting are considered? Moreover, do distinct dimensions of place attachment effect demand differently? The purpose of this research is to answer these questions. This is accomplished by examining the effects of hypothetical management actions being considered by the BLM within the Warren Bridge SRMA by incorporating recreationists' stated preferences for future visits and their levels of place attachment into a travel cost model.

Related Literature

Stated Preference Models in Previous Research

The primary motivation for the development of stated preference approaches in recreation research was to enable researchers and analysts to predict how recreation behavior might change contingent upon various management actions without having to actually change current management policy or commit significant amounts of financial resources to plans that have unknown consequences. While questions over the validity of stated preference data often arise (c.f., Adamowicz, Swait, Boxall, Louvier, & Williams, 1997), recent research has shown stated preference data to be valid when compared directly with forecasted demand estimates (Loomis & Richardson, 2006) and revealed preference data (Jeon & Herriges, 2010). Succinctly, the predictions enabled through the use of stated preference data can produce valid demand estimates that offer managers increased decision making capabilities.

Stated preference approaches have been utilized frequently to estimate potential changes in recreation demand. Most typically, researchers are concerned with how variations in resource conditions, such as water levels (Eiswerth, Englin, Fadali, and Shaw, 2000), in-stream flows (Loomis, 2002), water quality (Eiswerth, Kashian, & Skidmore, 2008) or overall site conditions (Siderelis, Moore, & Lee, 2000), alter demand. Other research has placed greater emphasis on understanding how management actions, such as permitting procedures (Siderelis & Moore, 2006), fire and fuels management (Starbuck, Berrens, & McKee, 2006), resource-use advisories (Morey & Breffle, 2006) or entrance fees (Chase, Lee, Schulze, & Anderson, 1998), will effect individuals' trip behavior.

All of the studies cited above contribute to a general understanding of how resource conditions can alter recreation behavior. Notably absent is an analysis of the role individuals' functional and emotional attachments to settings play in affecting behavior under varied resource conditions. This study builds upon the above research and contributes to the stated preference literature by augmenting a travel cost model with contingent behavior data and measures of place attachment. We argue the inclusion of factors that influence recreation behavior into count models of recreation demand increases those models' analytical power and theoretical robustness.

Single-site estimates of demand using stated preference data are not the only way variations in setting characteristics can be examined. Many of the above questions can also be addressed with revealed preference data. The most notable applications have linked random utility models to seasonal visitation data across sites (e.g., Morey, Rowe, & Watson, 1993; Parsons, Jakus, & Tomasi, 1999). This approach enables the researcher to treat individual trips as discrete choices, where the individual is maximizing utility through the setting characteristics of particular sites. As a result, variations in demand and welfare can be estimated under varied setting characteristics. These alternative approaches would be more suitable if individual trip data are available regarding multiple sites; however, the approach employed in this research focuses solely on estimating changed trip-behavior to a single site.

Place Attachment

The complex emotional and affective connections that relate the self to place are often referred to through the broad concept of place attachment. These connections can most easily be understood as the extent to which an individual values or identifies with geographically locatable spaces (Tuan, 1980; Williams & Roggenbuck, 1989). The values individuals attach to specific places are temporally variable (Low & Altman, 1992) and dependent upon a variety of contributing factors such as broad cultural influences, community connections to place, and personal behaviors (Eisenhauer et al., 2000). The place attachment construct is thought to be comprised of at least two dimensions, place identity and place dependence, that are not necessarily mutually exclusive. Generally speaking, where the place identity concept develops more from affective and cognitive processes, the place dependence concept develops from behavioral and functional processes.

Place Identity. Place identity refers to the extent to which place contributes

to individuals' self-identities (Proshansky, Fabian, & Kaminoff, 1983).The formation of self-identity is created and expressed through social relationships (Breakwell, 1992) as well as relationships with physical settings that define and structure everyday life (Ittelson, Franck, & O'Hanlon, 1976). An individual's sense of self therefore is at least partially comprised of the emotional and symbolic values they attach to specific places (Williams et al., 1992).

Place Dependence Place dependence on the other hand is best described as the extent to which individuals perceive themselves to be associated with and dependent upon a particular place or a category of functionally similar places (Moore & Graefe, 1994). Place dependence within the recreation literature can specifically be described as how well a setting facilitates individuals' goals (Jorgensen & Stedman, 2001). Settings can facilitate goal achievement by enabling recreationists to participate in specific activities (Williams et al., 1992) or to meet psychological needs (McCool & Martin, 1994). Thus individuals will value recreation settings that meet their functional and psychological needs more than those that do not.

Other Dimensions. While place attachment has been most frequently expressed through the dimensions of place identity and place dependence, some studies have hypothesized other dimensions as well. Williams and Roggenbuck (1989) identified a third dimension of place attachment which they referred to as the "indifference dimension". For their study of college students, this dimension manifested itself through variables which made negative appraisals of the setting. Alternatively, Bricker and Kerstetter's (2000) study of whitewater recreationists on the American River found a third dimension which they termed "lifestyle" as well as an unnamed fourth dimension. "Social bonding" has also been explored as a third dimension in studies that use a modified place attachment scale (Hidalgo & Hernandez, 2001; Kyle, Graefe, & Manning, 2005). The social bonding dimension of place attachment can be conceptualized as a corollary to place identity given self-identity is formed through *both* relationships to place and relationships to others. Kyle et al. (2005) argue the inclusion of social bonding as a third dimension is especially warranted in the leisure literature because outdoor recreation settings facilitate and maintain meaningful social relationships. Exploring the dimensionality of place attachment remains an ongoing process; however, place identity and place dependence have frequently emerged as core dimensions of place attachment (e.g., Kyle, et al., 2005; Williams & Vaske, 2003).

Attachment and recreation use. Moore and Graefe (1994) proposed that the more frequent the visitation to a site, the more some individuals perceive fewer suitable alternative sites, and that they come to depend on that site to facilitate participation in a recreational activity. Studying rail-trail users in three states, Moore and Graefe found recreationists with high levels of place dependence used the rail-trails more often than those with lower levels of place dependence. In a similar vein, Williams et al., (1992) found more frequent visitors to wilderness areas also exhibited higher levels of place attachment to those areas. Given this research and subsequent studies which have reinforced these findings (Eisenhauer et al., 2000; Hailu et al., 2005; Hammitt, Kyle, & Oh, 2009), it is generally understood that recreationists' amount of prior visitation is positively correlated to their attachment to the setting. A key point remains largely unexplored in the literature however.

Little is known about the relationship between individuals' levels of place identity and place dependence and their *intended* recreational behavior. Do these dimensions function similarly on individuals' intentions to visit recreation areas in the future? Or does only one have a significant influence on behavior? Our analysis addresses this question through the use of the stated preference approach to examine hypothetical future situations.

In summary, previous research has shown that people value and identify with specific places based upon an array of affective, emotional, behavioral, and functional factors. The attachment formed is often described through two broad dimensions: place identity and place dependence. Place identity is the emotional and symbolic values attached to specific places, which contributes to self-identity, while place dependence is the level to which individuals perceive themselves to be associated with and dependent upon a particular place or a category of functionally similar places. Place attachment has been shown to be significantly correlated to prior use of recreation settings, yet the concept's relationship to intended future use has remained largely unexplored.

Methods

Study Area

The Warren Bridge Special Recreation Management Area (SRMA) is located along the upper Green River between Pinedale and Jackson, Wyoming. The SRMA is located within the Wind River Range and consists of 7,100 acres managed jointly by the BLM and the Wyoming Game and Fish Department. Access to the SRMA is facilitated through a nine-mile unpaved access road off of Highway 191. The road provides access to nearly 13 linear miles of the Green River which can be accessed at 12 points, each of which also contains overnight campsites. Outdoor recreational opportunities are abundant in the SRMA which is particularly noted for the high-quality angling opportunities for trophy Cutthroat, Brown, and Rainbow trout. Hunting for big game and waterfowl is also a prominent activity during the fall.

The stretch of the Green River located within the SRMA was deemed suitable for consideration as a "scenic" river under the Wild and Scenic River Act of 1968 (Wild and Scenic Rivers Act, 16 U.S.C. 1271-1287, 1968). In response to possible designation and increased commercial and private use of the SRMA, the Pinedale BLM field office proposed upgrades to the SRMA access road and facilities at river access sites to better protect the natural resources while continuing to provide high quality recreational opportunities. These site improvements included improved grading of the access road and facility upgrades such as new picnic tables and fire rings at campsites. This study examined on-site recreationists' hypothetical behavioral responses to these planned site improvements.

Data Collection

Between July 22 and October 30, 2006 and between May 27 and July 29, 2007 visitors to the SRMA were contacted on-site and asked to participate in the study. The survey periods were selected to represent peak use during the spring/summer as well as peak use during the fall hunting season. In total, 176 site sampling visits

were completed over 107 days. The timing of site visits was varied in an effort to capture recreationists who utilize the area at different times of the day.

Visitors who agreed to participate in the study were given a one-page self-administered questionnaire that concluded by asking the respondent if they would be willing to complete a more extensive mail-back questionnaire. The one-page on-site questionnaire asked respondents about their visit to the SRMA that day while the mail-back questionnaire asked about previous visits and experiences in the area. The mail-back questionnaire also contained the place attachment scale as well as respondents' intended future trips to the area given possible management actions and site-characteristics.

A total of 360 individuals were contacted during the sampling periods. Of these individuals, 346 completed on-site questionnaires and 304 agreed to complete the mail-back questionnaire. The questionnaire was sent to these respondents up to three times in order to maximize the response rate (Dillman, 2000). Of the 360 on-site contacts made, 192 resulted in completed and returned usable questionnaires. The study's response rate was therefore 53%. Non-response bias was checked across comparable variables included on the on-site questionnaire. For four measures—gender, distance traveled to reach the SRMA, group size, and whether or not the respondents used a guide or outfitter—no significant differences ($|t| \leq 1.793$, $df = 340$) were noted between those individuals who completed only the on-site questionnaire and those who completed the mail-back questionnaire.

Measuring Place Attachment

Most empirical investigations into place attachment within outdoor recreation settings have employed a 15-item place attachment scale developed by Williams and Roggenbuck (1989). Utilization of this scale enables conclusions about the two frequently emergent dimensions, place dependence and place identity to be drawn. The psychometric properties of Williams and Roggenbuck's scale have undergone numerous examinations regarding reliability and validity (Jorgensen & Stedman, 2001; Kyle et al., 2005; Williams & Vaske, 2003). Results indicate the scale is a valid instrument for measuring the place attachment construct.

Responses to the scale's 15 statements were measured using a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Three of the statements required reverse coding as stronger agreement indicates lower levels of place attachment. The place attachment scale was analyzed using confirmatory factor analysis on the two well-documented *a priori* dimensions of place attachment. Factor score variables were subsequently created for each of the two dimensions. The factor scores were then utilized in the intended trips model described later in the methods section.

Trip Response Questions

Asking respondents five different trip response questions allowed for the creation of the panel data used in the intended trips response model. First, respondents were asked "About how many trips did you take to the Warren Bridge Access Area during the *past twelve months*?" Next, respondents were asked how many trips they *expect* to take in the *next twelve months*. Respondents' intentions could

include taking zero trips in the coming year. The three remaining trip response questions asked about intended trips if specific management actions were taken and visitation to the area either changed or remained the same. The scenario was set up by informing respondents "The current BLM Recreation Project Plan for the Warren Bridge Access Area calls for improved grading of the access road and facility upgrades such as new picnic tables and fire rings for the river access sites." Respondents were then asked "If these access and facility improvements were in place, and the number of recreation users in the Access Area was to remain the same, how many trips would you take to the Warren Bridge Access Area during the *next twelve months*?" The second hypothetical scenario asked about intended trips if access and facility improvements *were not* completed and visitation to the area was to *double*. The final scenario asked about intended trips if access and facility improvements *were* completed *and* visitation to the area *doubled*.

Estimating Future Recreation Trips

Satisfaction with the SRMA is considered a function of a recreationist's number of trips per season, their perception of site facilities and use levels within the area, their attachment to the SRMA (defined through the place attachment scale), their income, and their personal trip costs. Income and personal trip costs are included in the model as a constraint on recreation behavior. Satisfaction is therefore assumed to be maximized after expenditures on household goods and services. Hence, the recreation demand function is modeled as:

$$y_{ij} = \mu + \beta TC_i + \beta INC_i + \beta EXP_{ij} + \beta ALT1_{ij} + \beta ALT2_{ij} + \beta ALT3_{ij} + \gamma PI_i + \gamma PD_i + \varepsilon_{ij}$$

The dependent variable y_{ij} represents the i^{th} respondent's intended trips per year given each of the three hypothetical scenarios as well as the number of trips to the SRMA over the past 12 months and the number of expected trips to the SRMA in the next 12 months given no changes to site conditions or area use (i.e., the j^{th} trip response). The shift coefficients on the right side of the equation, βTC_i and βINC_i, represent the fixed effects of the ith respondent's average trip cost and income. These effects are included because recreationists with different income levels will make different trip expenditure choices (Mendelsohn, Matzkin, Peterson, & Rosenthal, 1994). The other shift coefficients, $\beta ALT1_{ij}$, $\beta ALT2_{ij}$, and $\beta ALT3_{ij}$,

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[1] Average personal trip price was calculated as: $P = [(d \times 0.145) + (w \times h \times 0.33)] \times 2 + f$.

d = One-way distance to the SRMA in miles (as reported by the respondent) multiplied by \$0.145 per mile for fuel and upkeep (American Automobile Association, 2009).

w = Hourly wage rate, calculated as income divided by 2080 annual work hours. The fraction of the imputed wage rate to time value is 0.33.

h = Hours spent traveling to the SRMA (as reported by the respondent). If missing or zero, distance to the SRMA in miles was divided by 54 miles per hour. This value was based on distance traveled and time spent in transit (Hellerstein, Woo, McCollum, & Donnelly, 1993).

f = Average personal costs per trip to the SRMA over the past 12 months divided by the average number of people those expenses covered per trip over the same time frame.

Also, median values from an 11-category income question were used to convert the categorical data into a continuous measure. Values for the first and last categories, under *$20,000* and *$200,000 or more*, were assigned values of \$10,000 and \$210,000 respectively.

represent slopes of dummy variables corresponding to each to the three hypothetical scenarios. The hypothetical trip responses are evaluated against the base category response of trips taken within the past 12 months. The base category is therefore not included in the trip response model. Respondents' expected number of trips to the SRMA if no site modifications were completed and use remained the same was included as the indicator variable $\beta_{EXP_{ij}}$. Finally, the place identity variable is included as γ_{PI_i} and the place dependence variable is included as γ_{PD_i}.

Trip responses are non-negative integers for which all counts besides the number of trips taken over the past 12-months could be zero. As a result, the data are assumed to take a Poisson distribution. Poisson distributions assume the dependent variable's conditional mean and conditional variance are equal. Violating this assumption results in the model underfitting the amount of dispersion in the outcome, biasing standard errors downward (Long & Freese, 2006). In recreation trip count data, equal conditional means and conditional variances are infrequent. Because of this, whether or not the data were Poisson was tested through the use of a Wald test on the additional parameter α included in the alternative negative binomial regression model. If the additional parameter α is equal to zero, the data are Poisson; if not, the negative binomial model is utilized.

Population-Averaged Negative Binomial Panel Regression Model

While both fixed-effects and random-effects models have been used to fit panel data in studies of recreation demand (e.g., Englin & Cameron, 1996; Siderelis et al., 2000), we utilized a generalized estimating equation (GEE) method that averages the marginal effects of the model across every case. This method is different than random-effects models which are subject specific, modeling individual observations.

The GEE method is also advantageous in that it accounts for extra correlation in the data by adding a unique within-panel (independent) correlation structure to the variance function (Hilbe, 2007). The variance function is created though a repeated process occurring after each iteration of the model. First, Pearson residuals are calculated from regression parameters. Second, the residuals are then imputed into the exchangeable correlation structure (Hardin & Hilbe, 2002). Next, the subsequent unique correlation structure is included in the variance function. Finally, the updated variance function is used in the model's second iteration. The process repeats until the model converges.

The use of the GEE algorithm requires the specification of correlation structure type. The data are best suited for an independent correlation structure because the number of panels is small. The independent correlation structure assumes independence among panels, i.e. zero correlation between subsequent measures of a respondent within panels (Hilbe, 2007).

The independent correlation structure is augmented with a robust variance estimator. The use of a robust variance estimator is appropriate because the variance function, created through the repeated process mentioned above, is not based on a pure probability function. The model therefore can be classified as quasi-likelihood, enabling a robust variance estimator to be used for adjusting standard errors (Hilbe, 2007). When modeling the negative binomial model with the GEE

algorithm, we do not include the variance estimator as a stand-alone parameter; rather it is allocated across panels. To derive the heterogeneity parameter the data were first fit to a maximum likelihood negative binomial. The model's ancillary parameter, α, was then included as a constant in the subsequent GEE algorithm.

Results

Basic descriptive statistics for the sample (Table 1) and frequency distributions of responses to the 15-item place attachment scale (Table 2) are included for reference. We first turned our attention to analysis of the place attachment scale. Bartlett's test of sphericity ($p < .000$) and the Kaiser-Meyer-Olkin statistic (0.915) were utilized to ensure factor analysis was appropriate. Given the expansive body of place attachment literature which has identified the identity and dependence constructs, we chose to perform a confirmatory factor analysis. We loaded specific statement items onto their respective theoretical dimensions, either place identity or place dependence, as defined throughout the literature using the Williams and Roggenbuck scale (or slight derivations of it) (e.g., Kyle et al., 2005). Model fit was judged using the following criteria: $\chi^2/df \leq 3.0$ (Kline, 1998), RMSEA < .05, CFI > .95, NNFI > .95, AGFI > .95 (Schumacker & Lomax, 2004).

The hypothesized model, with 7 items defining place identity and 8 items defining place dependence did not fit the data well ($\chi^2 = 1021.55$, $df = 89$, $\chi^2/df = 11.47$, $p = 0.000$, RMSEA = 0.105, 90% RMSEA C.I. = .099 – .110, AIC = 1083.55, ECVI = 1.130, 90% ECVI C.I. = 1.026 – 1.241, CFI = .366, NNFI = .352; AGFI = 0.808). After eliminating scale items which did not load on their respective dimensions well (i.e., factor loadings < 0.70) and one item ("no other area can compare

TABLE 1: DESCRIPTIVE STATISTICS

	Percent	*M*	*SD*
Respondent Characteristics			
Age	—	49.2	13.2
Female	27.6	—	—
Annual household income (mode)	16.9	$80,000 – $99,000	—
4-year college degree or higher	69.3	—	—
Resident of Wyoming	47.4	—	—
Trip Characteristics[a] (to the Warren Bridge SRMA)			
Trips during the past 12-months	—	5.0	12.2
Intended trips during next 12-months	—	5.0	12.6
Avg. personal costs/trip during the past 12-months	—	$393.24	$473.96
Avg. group size	—	2.4	1.9
Miles traveled (one-way)	—	531.2	644.5
Length of stay (hours)	—	14.0	9.3

[a] Specific to trips to the Warren Bridge SRMA during the past 12-months unless otherwise noted.

TABLE 2: SUMMARY OF RESPONSES TO PLACE ATTACHMENT STATEMENTS

	Response by Percentages						
Place attachment statement (n ≥ 186)	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	***M***	***SD***
I would prefer to spend more time here if I could	1.1	1.1	24.1	28.3	45.5	4.16	0.90
I wouldn't substitute any other area for doing the type of things I do here	14.4	21.4	34.8	15.5	13.9	2.93	1.22
The time I spend here could just as easily be spent somewhere else[a]	19.0	22.6	30.5	19.5	8.4	2.76	1.21
I get more satisfaction out of visiting this area than from visiting any other	11.2	19.2	43.6	16.5	9.6	2.94	1.09
The things I do here I would enjoy just as much at another site[a]	13.3	22.9	34.0	22.9	6.9	2.87	1.12
One of the major reasons I now live where I do is that the river is nearby	52.7	14.0	14.5	7.5	11.3	2.11	1.41
I identify strongly with this area	14.4	12.8	29.8	21.3	21.8	3.23	1.32
This area is the best place for what I like to do	11.7	17.0	34.0	20.7	16.5	3.13	1.22
I am very attached to this area	16.6	18.2	24.6	21.4	19.3	3.09	1.35
I find a lot of my life is organized around this area	51.6	24.2	15.1	4.8	4.3	1.86	1.11
I enjoy doing the type of things I do here more than in any other area	19.3	24.1	29.4	16.0	11.2	2.76	1.25
This area means a lot to me	9.0	17.5	26.5	22.2	24.9	3.37	1.27
No other area can compare to this one	25.7	19.8	29.4	15.0	10.2	2.64	1.29
I feel no commitment to this area[a]	36.9	23.0	25.7	8.0	6.4	2.24	1.21
Doing what I do here is more important to me than doing it in any other place	20.9	20.3	38.5	12.3	8.0	2.66	1.17

Note. Response code: 1 = *strongly disagree* to 5 = *strongly agree.*

[a] Frequencies are reported as the statement was asked, reverse coding was completed prior to factor identification.

to this one") whose error term was highly correlated with several other measurement items' error terms, the final reduced model proved to be a much better fit to the data (χ^2 = 24.168, *df* = 8, χ^2/df = 3.021, *p* = 0.002 RMSEA = 0.046, 90% RMSEA C.I. = .026 – .067, AIC = 50.168, ECVI = .052, 90% ECVI C.I. = .041 – .072, CFI = .970, NNFI = .956; AGFI = 0.978). The items included in the reduced model are shown in Table 3, which also indicates the reliability coefficients for each set of observed variables were more than adequate. Given this, we calculated two factor scores, one for place identity and one for place dependence, based on individuals' mean response to the scale items intended to measure each dimension of place attachment. As one would expect, the correlation between the place identity and the place dependence factor was high (*r* = 0.80). With the reliability of the two factors checked and respective identity and dependence indices created, we next turned our attention to the analysis of respondents' intended trips.

As with many count data models, attention is first given to the correct specification of the response's distribution (Cameron & Trivedi, 1998). Responses to the question concerning frequency of trips to the Warren Bridge SRMA were unsurprisingly overdispersed. The average number of trips to the SRMA during the past 12 months was 5.0 while the standard deviation was ± 12.2 trips (Table 1). The Wald test on the estimated dispersion coefficient α included in the alternative negative binomial model confirmed overdispersion, rejecting the hypothesis the data have a Poisson distribution. Subsequently, data were fit using the population-averaged negative binomial model described above.

Initially we ran the model with the main effects of the place identity and place dependence factors as well as the interactions between the two; we also included interactions between either the place identity or place dependence factor

TABLE 3: FACTOR LOADINGS FOR PLACE ATTACHMENT STATEMENTS

Place attachment statements (*n* ≥ 186)	α	**Factor Loading**	***M***	***SD***
Place Identity	0.90			
I identify strongly with this area		0.88	3.23	1.31
I am very attached to this area		0.89	3.08	1.35
This area means a lot to me		0.83	3.37	1.28
Place Dependence	0.88			
This area is the best place for what I like to do		0.84	3.13	1.22
I enjoy doing the type of things I do here more than in any other area		0.88	2.76	1.25
Doing what I do here is more important to me than doing it in any other place		0.74	2.66	1.17

Note. Model fit indices: χ^2 = 24.168, *df* = 8, χ^2/df = 3.021, p = 0.002 RMSEA = 0.046, 90% RMSEA C.I. = .026 – .067, AIC = 50.168, ECVI = .052, 90% ECVI C.I. = .041 – .072, CFI = .970, NNFI = .956; AGFI = 0.978. The following criteria were used to assess model fit: $\chi^2/df \leq 3.0$ (Kline, 1998), RMSEA < .05, CFI > .95, NNFI > .95, AGFI > .95 (Schumacker & Lomax, 2004).

TABLE 4: ESTIMATES OF TRIP RESPONSES TO POPULATION-AVERAGED NEGATIVE BINOMIAL REGRESSION MODEL WITH PANEL DATA (N = 731)

Variable	Coefficient	Standard	Z-value
Expected trips during the next 12 months with no site modifications or use changes	−0.0367	0.0565	−0.65
Expected trips during the next 12 months if…			
Improved access road, new picnic tables and fire rings, no use changes	0.0854	0.0583	1.47
No site modifications but use were to double	−0.4067***	0.0604	−6.74
Improved access road, new picnic tables and fire rings, and use were to double	−0.4007***	0.0602	-6.66
Income	0.0000	0.0000	1.05
Average personal trip costs	−0.0004***	0.0001	−5.06
Place identity	0.5448***	0.1559	3.49
Place dependence	0.0909	0.1550	0.59
Constant	1.4454***	0.1743	8.29
Summary Statistics: Wald $\chi^2(8) = 176.26$			

Note. The number of trips to the Warren Bridge SRMA during the previous 12-months is the base outcome.

*** Significant at $p<0.001$

and the hypothetical situations. The interactions were included in the model to test for whether respondents gave significantly different behavioral responses to the hypothetical scenarios based upon either their level of place identity or place dependence. All the interactions were insignificant however, and subsequently were deleted from the model.

The results from the final population-averaged negative binomial regression model are displayed in Table 4. Hypothetically, respondents' intended number of trips over the next 12-months given no site modifications or use changes wasn't expected to be significantly different from actual trips within the past 12-months. More simply, we expected no significant unexplainable intentions in respondents' intended number of trips compared to their past trips. Our expectation was supported as shown by the insignificance of the first coefficient in the model. In short, no significant differences between past and intended trips given no site modifications or use changes were found.

Respondents' behavioral intentions given each of the three hypothetical site modifications and changes to use levels are also reported in Table 4; all subsequent discussion of the results are contingent upon *ceteris paribus*. The coefficient for the first hypothetical change was insignificant; indicating visitors to the SRMA do not intend to change their behavior if the access road and campsites were developed and if current use levels were to stay the same.

The coefficients for the remaining two hypothetical situations were both negative and significant at the .001 level across both models. Respondents indicated that if use to the SRMA were to double, their intended number of visits to the site

would decrease significantly. We hypothesized that significant negative behavioral intentions due to an increase of use to the area might be mitigated by knowledge of potential area and campsite modifications. However, this proved not to be the case as respondents also indicated significant reductions in intended trips even if the access road and campsites were to be developed while usage to the area doubled.

The average personal trip costs and income variables are constant across each of the panels. Subsequently they could have been deleted from the model; however we retain these variables in the final models for purely theoretical reasons of assessing the constraints they place on behavior. Income was not a significant constraint on behavior. However, average personal trip costs do appear to significantly decrease intended recreation trips. As personal trip costs increase, trips decline.

The coefficient associated with the place identity variable was both positive and highly significant. This indicates that as an individual's place identity increases, the number of intended trips increases significantly as well. Respondents did not give significantly different behavioral responses to the three hypothetical scenarios based on their level of place identity however, as all interactions were insignificant. Thus behavioral intentions are not affected by place identity when respondents believe the area's facilities or its level of use will change. Unlike the place identity variable the coefficient associated with the place dependence variable was not a significant predictor of behavioral intentions.

The resulting coefficients from the population-averaged negative binomial model while informative, do not allow for the magnitude of effects from each of the hypothetical situations to be easily interpreted. Thus we compared individual responses to each of the hypothetical scenarios to the baseline response of trips taken within the previous 12 months. As mentioned previously, respondents visited the SRMA on average five times a year over the previous 12 months (M = 5.0 trips; SD = ± 12.2 trips). We alternately could have used intended number of trips to the SRMA assuming no site modifications or use changes (M = 5.0 trips; SD = ± 12.6 trips) as the base category response, but differences to the marginal effects would be trivial. The marginal behavioral effects for each of the hypothetical scenarios and place attachment variables are reported in Table 5 as percentages. Viewing the marginal changes to recreation behavior as the difference between perceived quality of the current area and perceived quality of a future visit with site modifications and use changes in this manner enables us to interpret their perceptions of how each hypothetical scenario would either decrease or increase current recreationists' visitation to the area.

Table 5 displays recreationists' significant dissatisfaction with perceptions of increased use to the area. Given no site modifications and a doubling of use, anticipated use to the area would decrease by 33.4%. Site modifications, such as improved access roads, new picnic tables, and new fire rings had almost no mitigating effect on declining visitation in the face of a doubling of use to the area. Table 5 also displays the marginal effects for the place identity variable. Again individuals whose identity is highly defined by the SRMA indicated an increase in intended number or trips.

TABLE 5: MARGINAL EFFECTS REPRESENTED AS PERCENTAGE CHANGE IN ANNUAL INTENDED TRIPS (N = 707)

Variable	Percentage Change
Expected trips during the next 12 months with no site modifications or use changes	ns
Expected trips during the next 12 months if…	
Improved access road, new picnic tables and fire rings, no use changes	ns
No site modifications but use were to double	−33.4%
Improved access road, new picnic tables and fire rings, and use were to double	−33.0%
Income	ns
Average personal trip costs	negligible
Place identity	72.4%
Place dependence	ns
Summary Statistics: Wald $\chi^2(8) = 176.26$	

Note. The number of trips to the Warren Bridge SRMA during the previous 12-months is the base outcome.

Discussion

The purpose of this study was to examine the effects of hypothetical management actions being considered by the BLM within the Warren Bridge SRMA by incorporating recreationists' stated preferences and levels of place attachment into a travel cost model. The method was successful and makes three distinct contributions to the recreation literature.

First, our approach shows that econometric models can draw from existing literature on the social psychological components of recreation behavior to create more theoretically robust models of recreation demand. Because the travel cost model focuses on individual recreation trips to a particular site, issues of understanding behavioral influences is a critical endeavor in generating more valid models of recreation demand. Recreation demand models have continually tried to address these issues (Hailu et al., 2005; Hunt, 2008; Ward & Beal, 2000). In our analysis, we have shown the social psychological construct of place identity can play a significant role in affecting intended recreation behavior. These findings reveal that economic models of demand cannot and should not operate in a vacuum ignorant of the various social psychological constructs that recreation scholars believe to affect behavior. Future research should continue to explore the individual characteristics that influence recreation behavior, such as motivations or constraints, through formal models of recreation demand.

Second, our approach shows the understanding of social psychological constructs such as place attachment can be furthered through their incorporation into stated preference approaches and recreation demand modeling. Hammitt, Kyle, and Oh (2009) suggest that research on the psychometric properties of various place attachment scales is only of limited use. What is needed the authors

argue, are theoretical models which are "related and/or predictive of recreational behavior" (p. 58). While previous research has linked place attachment to past use (e.g., Budruk, Wilhelm Stanis, Schneider, & Heisey, 2008; Hammitt et al., 2009), this analysis has incorporated the concepts of place attachment into a predictive model of recreation demand. We have shown that place identity significantly influences intended recreation behavior; yet curiously place dependence does not. This finding raises several issues that are critical to the future theoretical development of the temporal links between use, place identity, place dependence, and intended use. Moore and Graefe (1994) initially suggested that place identity might be developed through place dependence, suggesting that "a person who participates in a recreation activity frequently at a particular site would tend to come to depend on that site and value it more highly…[therefore] it would generally take longer to develop the emotional—symbolic meanings characteristic of place identity" (p. 21). Much of the subsequent recreation place attachment literature however has treated the two concepts as temporally independent of one another. Our findings suggest that regardless of the temporally relationship between place identity and place dependence, place identity is likely to be the dominant factor in predicting future recreation use. Recreationists in this study who identified more strongly with the area indicated they were more likely to keep visiting the area in the future relative to individuals who are more functionally dependent on the recreation setting. The relative minority role of place dependence in affecting behavior to a particular site is likely due to the fact dependence is influenced by the availability of alternative areas that provide similar recreation opportunities. Further research needs to continue to explore the causal mechanisms of place attachment more explicitly; it also needs to acknowledge the various social and psychological factors that either constrain or bolster recreation participation.

Finding place identity to be a stronger predictor of intended behavior relative to place dependence may be a direct result of the robustness of the identity concept. Several authors, writing on the development of place attachment scales have concluded the place identity construct emerges from various factoring techniques in a near universal fashion (Hammitt, Backlund, & Bixler, 2006; Hammitt, Kyle, & Oh, 2009; Williams & Vaske 2003). Hammitt, Kyle, and Oh (2009) have even suggested the possibility the place identity construct may be comprised of several sub-dimensions. As these authors suggest, further research needs to more fully examine the variations across place concepts and the relative strength of these concepts in predictive models.

The third and final contribution made through our analysis relates to implications for management. Our analysis revealed potential site modifications such as improved road access and the development of fire rings at campsites near river access areas will not strengthen an individual's intention to visit the area in the future, even assuming use remains at current levels. Perhaps current users are satisfied with site development and need no further improvements to either travel to the site. Our results also have shown that visits to the SRMA by current users would decline significantly if use in the area was to double. This significant decline in visits attributable to increased use to the areas cannot be assuaged by improved site conditions. These results, while not exhausting the many possible

changes to site conditions and use in the area, reflect the concerns regarding the potential management actions being evaluated by the BLM when the study was commissioned. These findings should be interpreted cautiously however, given our sample only came from individuals already using the site. It is a possibility that road and campsite developments could draw visitors to the site that do not already recreate in the area.

Given the results of this study, we believe the use of stated preferences within a travel cost model to determine the marginal effects of hypothetical management variations is an appropriate method for providing information that advances research and allows management to move forward in making empirically grounded and user-informed decisions. This approach allows decision makers to see and relatively easily compare the consequences of a host of management actions, an option that will become even more valuable as the responsibilities of management are expanded in the face of tightening budgets. The inclusion of social psychological concepts, like place attachment, in stated preference models creates a more analytically powerful and theoretically robust tool which, in turn, enables more holistic understanding of changes to recreation demand.

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