

Social-Psychological Factors Influencing Recreation Demand: Evidence From Two Recreational Rivers

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Abstract

Traditional methods of estimating demand for recreation areas involve making inferences about individuals' preferences. Frequently, the assumption is made that recreationists' cost of traveling to a site is a reliable measure of the value they place on that resource and the recreation opportunities it provides. This assumption may ignore other important social-psychological factors influencing individuals' behavior. In this study, the authors augment a traditional travel cost model with several of these factors, namely, individuals' social-psychological attachment to the resource and their motivations for recreating there. Using data collected from two visitor use surveys of recreational rivers, the authors find that individuals' affective and emotional attachments to recreation settings as well as certain desired recreation experiences have significant effects on recreation demand. These results reveal that various social-psychological constructs can be incorporated into a traditional travel cost model to create empirically and theoretically more robust estimates of recreation demand.

Keywords

travel cost model, recreation experience preferences, place attachment

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The management of natural areas used for recreation involves more than simply providing recreation facilities and monitoring their use. Rather, recreation resource management involves sustaining environments while providing recreationists with opportunities to realize desired recreation experiences in settings that are often imbued with personal meanings. This philosophy of managing recreation settings for desired social and psychological benefits has been widely accepted in the United States since the late 1960s and early 1970s (Wagar, 1966); it has subsequently been adopted in other countries such as Australia (Weber, Senior, Zanon, & Anderson, 2008), New Zealand (Booth & Edginton, 2008), and Canada (Nilsen, 2008). Resource management systems adopting this philosophy call for explicit consideration of recreationists' desired opportunities and their social-psychological attachments to the resource. Despite the fact that desired outcomes and attachments to natural landscapes have become shibboleths in the natural resource management literatures, there is a need for continuing research aimed at understanding how the social-psychological constructs of motivation and place attachment affect recreation demand. This research assists in addressing this need by examining how the motivations and attachments of visitors to two recreational rivers in the United States affect recreational demand for those areas. By conceptualizing recreation behavior as the product of individuals' characteristics instead of an antecedent to social-psychological constructs, which is often the primary focus of recreation management research that attempts to segment users (e.g., experience use history research), this empirical examination is able to make three distinct contributions to three related fields.

First, most recreation demand models rely on incomplete information about recreationists' traits and the utility derived from visiting recreation areas. More specifically, travel cost models (TCMs) of recreation demand traditionally assume individual utility is primarily a function of the full cost of engaging in the activity. The most basic models assume the full cost of a recreational visit can be approximated by knowing the cost of traveling to the site combined with the total time spent on-site (Freeman, 2003). Although this assumption is well founded within the recreation economics literature (Parsons, 2003), relying on it alone does not provide a complete measure of individuals' value for specific sites. Rather, the travel cost modeling framework could be well served if the place-specific symbolic meanings and values associated with recreation areas were accounted for (Hailu, Boxall, & McFarlane, 2005; Smith, Siderelis, & Moore, 2010). By incorporating social-psychological constructs into TCMs of recreation demand, this research is able to develop more theoretically and empirically robust estimates of demand.

Second, a very broad literature exists on individuals' motivations for engaging in recreation experiences. Manfredi, Driver, and Tarrant (1996), in their review of the recreation motivation literature, defined six categories into which empirical examinations of recreation motivations could be classified. These categories include studies which

- i. describe and compare recreationists' motivations across activity types;
- ii. segment recreationists according to their motivations;
- iii. analyze the relationship between motivations and recreationists' preferences for settings and activities;
- iv. examine recreation motivations against nonleisure characteristics (i.e., industry of employment, size of family, etc.);
- v. explore motivations against other social-psychological constructs (e.g., personality, concern for the environment, etc.); and
- vi. develop and refine the psychometric properties of the scales used to measure motivation.

A notable gap exists in that no previous study has examined how individuals' motivations for visiting specific settings influence the demand for those settings. The majority of previous outdoor recreation research has examined motivations for engaging in particular *activities* as opposed to examining motivations for visiting a particular setting (Manfredi et al., 1996). The attitude objects of activities and settings are interdependent yet empirically distinct. The latter is the most appropriate for use in formal models of recreation demand. By including motivations into a traditional TCM, this research can begin to assess whether certain sets of motivations have a greater impact on resource demand relative to others. By doing so, this research aims to assist management agencies in their continued efforts to manage resources in ways that maximize human benefits.

Finally, the construct of place attachment has been examined frequently in the past as an output of individuals' previous engagements in recreation behavior (McIntyre, 1989; Moore & Graefe, 1994; Williams, Patterson, Roggenbuck, & Watson, 1992), their recollections about previous recreation engagements (Stokowski, 2002), the personally significant bonds cultivated while at the site (Kyle, Graefe, Manning, & Bacon, 2003; Kyle & Chick, 2002; Kyle, Graefe, & Manning, 2005), and the unique recreational opportunities provided by specific recreation settings (Kyle, Mowen, & Tarrant, 2004). The concept has rarely been utilized in predictive models of recreationists' trip-taking behavior.¹ By focusing on how place attachment affects

behavior as opposed to how individuals' attachments to recreation settings are formed, this line of inquiry can provide resource managers with a more tangible understanding of how recreationists' affective bonds to landscapes actually influence behavior and therefore have a direct impact on management's goals and objectives.

In sum, this research shifts the focus from understanding how individuals' motivations and affective attachments are formed to attempting to utilize these social-psychological constructs in predictive models of recreation demand. Hammitt, Kyle, and Oh (2009) noted how the utility of repeatedly validating social-psychological constructs is of limited use if those constructs are not related and or predictive of actual recreation behavior. We concur with this argument, and contend that utilizing recreationists' motivations and their attachments to the setting in estimates of recreation demand can be a useful step forward for the various allied disciplines that study natural resource-based recreation behavior and management.

Related Literature

TCMs

TCMs are tools used by recreation economists to estimate recreation demand. The traditional TCM approach assumes that individuals' average personal trip costs can be used as a proxy for how much value that individual places on the resource (Fletcher, Adamowicz, & Graham-Tomasi, 1990). Although most early TCM research adopted a regional or zonal approach where trips were aggregated according to counties or planning districts, more recent research has focused on estimating demand functions at the level of the individual (Fletcher et al., 1990). As Hailu et al. (2005) noted, focusing on the level of the individual raises numerous behavioral issues. The authors contend that, given the information, TCM estimates should not rely solely on the assumption that average per trip costs are a proxy for value but should also incorporate the social-psychological factors which drive behavior. The underlying thesis is that recreationists will focus their choice of sites to those for which they have an emotional attachment or functional dependency. This research extends the TCM literature by explicitly incorporating individuals' motivations for visiting and their emotional/affective ties to the place into a formal model of recreation demand. In the following sections, we expound on how each of these social-psychological constructs influences recreation demand.

Motivation and Expectancy-Valence Theory

Many land management agencies in the United States as well as elsewhere around the globe attempt to manage recreation resources for specific outcomes desired by those individuals engaged in recreation behavior (Driver, 2008). Outcomes-focused management frameworks were built on motivational theory from environmental and organizational psychology. Driver and Tocher (1970) originally hypothesized that recreational activities are behavioral pursuits instrumental to attaining certain social and physiological goals. In subsequent research, Driver and his colleagues (Driver, 1976; Driver & Brown, 1975; Driver & Knopf, 1976) proposed that the recreation experience comprised “packages” or “bundles” of psychological outcomes desired by individuals.

Motivational theory, as it has been applied to managing recreation settings, draws heavily on the work of Lawler’s (1973) expectancy-valence framework of motivation. Lawler, who developed the framework within the context of work organization, hypothesized that motivation could be analyzed as a system leading from instrumental to terminal expectations. Instrumental expectations describe the relationship between effort (e.g., absentee and production rates) and performance outcomes (e.g., more pay or praise) which, in turn, lead to terminal or long-term outcomes (e.g., social recognition, group solidarity, social affiliation). Lawler’s framework was influential in the formation of early motivation theories as they were applied to outdoor recreation² (Manfredo et al., 1996).

The work of Driver and his associates as well as Lawler’s expectancy-valence theory, at their most fundamental level, propose that, assuming sovereignty, individuals’ behavior is a function of their desire to fulfill a set of unmet personal needs. The expectation of individuals is that engagement in specific activities in specific settings will facilitate these needs.

Place Attachment

The concept of attachment is, at its most elemental level, the psychological desire to maintain closeness to the object of attachment (Bowlby, 1969, 1973, 1980). When a geographically locatable place serves as the object of attachment, the concept of place attachment emerges. Hidalgo and Hernández (2001) surmised the concept of place attachment is best described as “a positive affective bond between an individual and a specific place, the main characteristic of which is the tendency of [an] individual to maintain closeness to such a place” (p. 274).

The vast majority of place attachment literature concerning natural and/or recreational environments has focused primarily on how individuals' affective bonds with these environments are formed. One of the most frequently cited determinants of place attachment is previous interactions with the landscape. Numerous studies of recreation behavior have shown individuals who recreate in a specific setting more often tend to be more attached to that setting (e.g., McIntyre, 1989; Moore & Graefe, 1994; Williams et al., 1992). Others have suggested that individuals are more likely to be attached to recreational setting if those settings facilitate activities which are central to individuals' lives (Bricker & Kerstetter, 2000; Kyle, Bricker, Graefe, & Wickham, 2004). Another line of inquiry has suggested that not only does previous experience and activity involvement affect the formation of place attachment, but the social bonds and memories of others that are facilitated by natural settings lead to increased levels of attachment (Kyle et al., 2003, Kyle, Graefe, Manning, & Bacon, 2004a; Kyle, Graefe, & Manning, 2005). Finally, research has shown that attachments to specific environments may be formed because those environments facilitate the attainment of specific psychological, social, and physiological needs and desires (Kyle, Mowen, et al., 2004). All of the above antecedents of attachment directly address the question of how attachments are formed while indirectly answering the question of why they are formed. Two broad dimensions of attachment, place identity, and place dependence have been fundamental to answering this question.

Place dependence is defined as a form of attachment associated with the potential of a particular place to satisfy the needs and desires of an individual and the assessment of how the place compares with others that may satisfy the same needs (Stokols & Shumaker, 1981). Applying the concept to recreation settings, Schreyer, Jacob, and White (1981) suggested that recreationists value specific settings primarily because the activities in which they are engaged in are functionally dependent on those settings. Schreyer et al. (1981) also suggested recreationists value specific settings because, over time, they develop emotional and symbolic attachments to those places. Emotional and symbolic attachments represent the extent to which individuals' self-identity is defined by the setting. More broadly, Proshansky (1978) referred to this concept as place identity and defined it as "those dimensions of the self that define the individual's personal identity in relation to the physical environment" (p. 155).

Place dependence and place identity represent the two most frequently cited dimensions of attachment to recreation settings. Other dimensions have been suggested to answer the question of why individuals become attached to specific settings.³ Foremost among these is the social bonding dimension

suggested by Kyle and his colleagues. Kyle notes that the social characteristics of place attachment have been marginalized with regard to the dependence and identity constructs, and goes on to note this is particularly surprising given that much of recreation is social in nature (see Burch, 1969; Kyle & Chick, 2002). Other dimensions not entirely distinct from identity, dependence, or social bonding that have been proposed include place familiarity (Roberts, 1996), place belongingness (Mesch & Manor, 1998; Milligan, 1998), and rootedness (Tuan, 1980). This research empirically engages the two concepts of dependence and identity while acknowledging the presence of other dimensions presented in the literature.

Relationship Between Motivations and Place Attachment

In a review of the literature related to why humans are drawn to natural landscapes, Knopf (1987) identified two broad philosophical orientations that have been employed. The first philosophy is a sociobiological one that contends humans remain connected to natural landscapes in modern society because during our evolutionary history, survival was highly dependent on knowledge about natural environments. The second philosophy rejects this proposal and posits that humans' attachment to landscapes results through socialization processes, which occur over the life span, particularly in early childhood (e.g., Bixler, Floyd, & Hammitt, 2002; Holcomb, 1977; Tuan, 1977). Adopting the latter perspective, Kyle, Mowen, et al. (2004) suggested that over time, expectations concerning perceived outcomes related to place are learned through interactions with others and personal experiences. They go on to suggest that "expectations of positive outcomes act to draw people to specific settings and, over time, attachments to these specific settings evolve" (Kyle, Mowen, et al., 2004, p. 443). We acknowledge that this may be the case but make no empirical attempt here to elucidate the temporal relationship between recreationists' expectations for visiting a setting and their specific attachment to that setting. Rather, we feel it prudent and theoretically relevant to explore the potential relationship between place motivations and place attachments while remaining unconvinced that there is a normative and predictable relationship between the two constructs.

More specific evidence concerning a motivation–attachment relationship can be inferred from previous empirical research examining the relationship between the two constructs. Studying the perceptions of hikers along the Appalachian Trail, Kyle, Graefe, Manning, and Bacon (2004a) found that those individuals who were highly attached to the trail were more likely to seek out solitude. Another study of individual users of the Cleveland

Metroparks system found individuals who identified strongly with the park system were motivated primarily by desires to learn about the area or to experience solitude (Kyle, Mowen, et al., 2004). Finally, in a study of hunters and wildlife watchers in Minnesota, Anderson and Fulton (2008) found hunters' place identity was significantly related to their motivations to experience autonomy, leadership, and to teach or lead others. These authors also found wildlife watchers' level of place identity was significantly related to their desire to learn about an area and experience introspection. The inconsistency of these previous findings suggest the sense of identity individuals derive from recreation resources may be positively related to how strongly motivated they are; however, the specific motivations related to place identity are not theoretically well established or specific to the context of a particular recreation resources (i.e., place identity formation is highly dependent on the specific needs, which can be met in particular recreation settings). Given this ambiguity, we consider our examination of the relationship between place attachment dimensions and motivations as exploratory.

Motivations, Place Attachment, and Recreation Behavior

Motivation and expectancy-valence theory explicitly state that behavior is tied to motivations and that individuals' decisions are predicated by the existence of unmet personal needs. Given this, we posit that all else being equal, the strength of an individual's motivations for visiting a site are positively correlated with the frequency with which they visit that site. In short, we believe that the social-psychological motivations that individuals have for visiting recreation settings are strong predictors of recreation demand.

Our position on how place attachment influences recreation demand is similar. In a previous study that incorporated place attachment into a formal model of recreation demand, Hailu et al. (2005) examined the behavior of forest campers in Alberta Canada. The authors operationalized attachment as a two-dimensional construct comprising place identity and place dependence, and their results reveal that only place identity was a significant predictor of recreation behavior. Despite this finding, the authors offer no theoretical discussion of why only the identity dimension is a significant determinant of behavior.⁴

Similar research, although not explicitly examining the effects of place attachment on behavior (i.e., recreationists' decision to take a trip), has examined the construct's effect on related preferences such as individuals' support for particular management actions and their willingness to pay user fees to support those actions (Chung, Kyle, Petrick, & Absher, 2011; Kyle, Absher, & Graefe, 2003). This previous research found individuals who were more

attached to recreation settings were more willing to pay for facilities and services, environmental protection, and environmental education. Considering the findings of this previous research, we expect that the place dependence and the place identity concepts will be significant predictors of recreation demand.

Method

Data Collection

Data for this study comes from two recreational rivers in the United States: The West Branch of the Farmington River located in northeastern Connecticut and the section of the Green River that flows through the Bureau of Land Management (BLM) Warren Bridge Special Recreation Management Area (SRMA) in western Wyoming. Data collection for the West Branch of the Farmington River and the Warren Bridge SRMA is conducted in the same manner. At both rivers, recreationists were contacted on-site during predetermined systematic sampling periods and asked to participate in a short one-page questionnaire soliciting information about their current trip as well as a mailing address where they could receive a mail-back questionnaire. A total of 483 on-site contacts were made on the West Branch of the Farmington River from April through September in 2001. Of those contacted, 433 answered the on-site questions and agreed to receive the mail-back questionnaire. A total of 247 questionnaires were returned completed for a 57% response rate. This same data collection procedure was repeated along the Green River within the Warren Bridge SRMA. A total of 346 individuals were contacted on-site from July 2006 through July 2007, of which 304 completed the on-site questionnaire and agreed to receive the mail-back follow-up. Among these willing individuals, 192 returned the questionnaires providing a 63% response rate.

Measures

The specific variables utilized here include five basic measures that are frequently present in travel costs models:

- Age, solicited by asking respondents the year they were born, is treated as a continuous measure.
- Income, assessed through categorical response options, is treated as an ordinal measure in modeling.

- Education level, measured by asking respondents to select from predefined categories, their highest level of formal education completed, was also treated as ordinal.
- Gender (0 = *male*, 1 = *female*).
- Trip costs were determined using the following equation:

$$P = ([d \times 0.533] + [w \times h \times 0.33]) \times 2 + f$$

where d = the one-way distance that a recreationist traveled to reach the site. This value is multiplied by the US\$0.533 per mile required for fuel and vehicle upkeep (American Automobile Association, 2009). An individual's hourly wage rate, w , was calculated by dividing their previous year's household income by the 2,080 work hours in a year. The time devoted to the activity, h , was calculated by dividing the one-way distance traveled to the river by the average speed of 54 mph used in Hellerstein, Woo, McCollum, and Donnelly (1993). Finally, f represents an individual's personal cost to visit the site, calculated by dividing the total expenses incurred by them during the trip in which they were contacted by the number of individuals that those expenses covered.⁵

We also incorporate two psychometric scales that have been repeatedly utilized and validated within the outdoor recreation literature to measure individuals' motivations for participating in recreation behavior and their attachment to specific recreation settings.

Motivations. Nearly all of the motivations research within the outdoor recreation literatures has been built around the aforementioned expectancy-valence model. This line of research originated in the early 1970s with the work of Driver and associates (Driver & Brown, 1986; Driver & Knopf, 1977; Driver & Tocher, 1970). These researchers, concerned primarily with understanding individuals' reasons for participating in outdoor recreation activities, developed a series of probable motivations they believed captured the psychological, social, and perceived physiological benefits from participation. After numerous applications of these Recreation Experience Preference (REP) scales, Driver and his associates identified a total of 19 possible domains, such as family togetherness and learning, thought to encapsulate individuals' motivations for recreation participation (Driver & Brown, 1986; Driver & Knopf, 1977; Driver & Tocher, 1970).

The originators of the REP scales suggest that in survey research, each of the REP domains should be represented by a series of items so that during data analysis concerns over content validity can be assuaged. However, this is not always practically feasible. In this research, the users' motivations for visiting the river were measured using 18 REP scale items that represent 17

of the domains noted by the scale's authors (Manfredo et al., 1996). Following Moore and Driver (2005) and Manning (2011), we selected scale items based on recreation experiences likely to be provided by the rivers. The attitude object of scale items was the river itself. Kyle, Graefe, Manning, and Bacon (2004b) suggest that when examining psychological commitment within the context of natural resource recreation, it is more appropriate to treat the recreation setting as the attitude object as opposed to activities or recreation management agencies (e.g., Pritchard, Havitz, & Howard, 1999).

Given that the scales utilized for this study included 17 different domains, a confirmatory factor analysis (CFA) of these "intended" domains is infeasible. Other research utilizing the scales has also performed exploratory factor analysis on the scale items (e.g., Kyle, Mowen, et al. 2004; Smith, Burr, and Reiter, 2010). Given that our analysis includes two distinct data sets across which comparisons can be made, we chose neither of these routes, instead opting to rely on previous theory and empirical results (specifically, Kyle, Mowen, et al., 2004) to create five motivation classifications around which to group the statement items (Table 1). Given these items are theoretically distinct, and very near the same as the original REP domains, CFA was employed to ensure our theoretical classification scheme "fit" the actual data well.

Place attachment. Just as the roots of the REP scales can be traced back to expectancy-valence theory and the early works of Driver and his colleagues, the place attachment scales used (almost exclusively) in recreation behavior research can be traced to the work of Williams and Roggenbuck (1989). Drawing on the environmental psychology and geography literatures, which were then developing the theories to explain the cognitive and affective bonds formed between people and natural landscapes, Williams and Roggenbuck (1989) proposed a 15-item scale intended to measure an individual's functional dependence on the landscape and their affective/emotional bonds with it. The Williams and Roggenbuck scale has become the most frequently used within the recreation literature (e.g., Bricker & Kerstetter, 2000; Moore & Graefe, 1994; Moore & Scott, 2003; Williams & Vaske, 2003). Since the scale's introduction, it has been altered for the purposes of eliciting more information about other dimensions such as familiarity, belonging, rootedness (Hammit, Backlund, & Bixler, 2006), and social bonding (Kyle, Graefe, et al., 2004a, 2004b; Kyle et al., 2005) thought to comprise the place attachment construct. Although recent developments in the literature are tending toward a more multidimensional place attachment construct, we opted to use the original Williams and Roggenbuck scale in this research. Given the dimensions of place identity and place dependence are still believed to be requisite components of place attachment and that the primary purpose of this research is not to refine or develop a more theoretically robust attachment

Table 1. Motivation Items Used in Analysis.

REP statement	Intended domain (from Moore & Driver, 2005)	Classification for this study (adapted from Kyle, Mowen, et al., 2004)
To be on my own	Autonomy/leadership	Autonomy/introspection
To think about my personal values	Introspection	Autonomy/introspection
To experience solitude	Escape physical pressure	Autonomy/introspection
To be away from the family for a while	Escape family	Autonomy/introspection
To take risks	Risk taking	Achievement/stimulation
To be creative by doing something such as sketching, painting, taking pictures, and so on	Creativity	Achievement/stimulation
To show others I can do it	Achievement/stimulation	Achievement/stimulation
To test my endurance	Achievement/stimulation	Achievement/stimulation
To do something with my family	Family togetherness	Social
To be with members of my group	Similar people	Social
To meet new people	New people	Social
To share my skills and knowledge with others	Teaching-leading others	Social
To learn about the countryside	Learning	Nature appreciation
To enjoy the view along the river	Enjoy nature	Nature appreciation
To be close to nature	Enjoy nature	Nature appreciation
To get exercise	Physical fitness	Physiological
To relax physically	Physical rest	Physiological
To help reduce built-up tension	Escape personal/social pressures	Physiological

Note: REP = Recreation Experience Preference.

scale, we believe this is not a limitation to this article's contribution to understanding how social-psychological constructs can influence recreation demand.

Modeling Recreation Demand

The TCM utilized here builds on the basic model presented by McConnell (1985) and Freeman (2003). We assume the utility individuals derive from recreating in a particular setting is a product of the full price of a visit, an individuals' exogenous income, and their tastes. Individuals' tastes comprise their motivations for recreating and their social-psychological attachments to the recreation area. Given this, our demand model is specified as follows:

$$y_i = \mu + \beta_1 TC_i + \beta_2 INC_i + \beta_3 AGE_i + \beta_4 EDUC_i + \beta_5 GENDER_i + \beta_6 MOTIVATION_i + \beta_7 ATTACHMENT_i + \varepsilon_i$$

where the dependent variable y_i is a nonnegative trip count corresponding to the number of times each individual i has visited the river over the past 12 months. This demand is thought to be a function of an individual's average full cost of a visit to the site (TC_i), their income (INC_i), their age (AGE_i), education ($EDUC_i$), gender ($GENDER_i$), motivations for recreating ($MOTIVATION_i$), their attachment to the recreation setting ($ATTACHMENT_i$), and random error (ε_i).

Results

There are obvious geographic differences between the West Branch of the Farmington, located in Connecticut, and the portion of the Green River which flows through the Warren Bridge SRMA in Wyoming. An initial look at data on river users suggests differences between the two resource areas are not just geographical. For example, 15.4% of recreationists sampled on the West Branch of the Farmington were female, whereas nearly twice as many women (27.6%) were contacted along the Green River. Income levels also varied greatly across the study areas. The modal income category was US\$40,000 to US\$59,999 on the West Branch of the Farmington, whereas it was US\$80,000 to US\$99,999 for Warren Bridge SRMA visitors. Education levels also differed, as 55.9% of recreationists on the West Branch of the Farmington had achieved at least a 4-year degree, whereas nearly 68% of those individuals contacted along the Green River had done so. The only similar sociodemographic characteristic noticed across sites was respondents' ages. The mean age was 47.7 at the West Branch of the Farmington and only marginally higher (49.2) at the Green River.

Respondents' trip characteristics were also dramatically different across the two rivers. The mean number of trips taken to the West Branch of the Farmington River was 31.3 per year ($SD = 60.6$), whereas it was only 5.0 ($SD = 12.3$) for recreationists visiting the Green River. This variation is most likely attributable to each river's relative proximity to large population centers. The West Branch of the Farmington is only a half hour's drive from Hartford, Connecticut, whereas the nearest moderately sized cities near the Warren Bridge SRMA are Jackson and Rock Springs, both of which are more than a 2-hr drive away. Analogous to these differences in visitation patterns are the variations in individuals' average cost to visit the river; for the West Branch of the Farmington, it was US\$128 ($SD = US\311), whereas for the Warren Bridge SRMA, it was US\$393 ($SD = US\474). The average distances traveled to reach the rivers also differed in a similar fashion; for the West Branch of the Farmington, it was 53.5 miles ($SD = 140.6$), whereas it was 531.2 ($SD = 645.8$) for visitors to the Warren Bridge SRMA. Given the longer travel times required to reach the Warren Bridge SRMA, one would expect recreationists to visit longer. That proved to be the case as the mean length of stay was nearly 3 times longer for the Warren Bridge SRMA than the West Branch of the Farmington ($M = 14.0$, $SD = 9.3$ vs. $M = 4.8$, $SD = 2.8$). Given the dramatically different geographic and visitor characteristics of the two rivers, one might expect social-psychological factors like motivations and place attachment to have different effects on recreation demand across the two rivers. This assumption, however, would prove incorrect as the subsequent sections will illustrate.

CFA

Analyses were completed in three distinct steps for each of the data sets. First, the measurement models of the REP scales and the place attachment scales were examined using CFA. Second, latent variable scores were calculated. Finally, the social-psychological constructs were included with the other measures noted in Table 1 and utilized to create TCMs of recreation demand. Presentation of the results will follow the analysis procedure as opposed to presenting each study independently.

We begin with the REP items administered to recreationists on the West Branch of the Farmington River. Our hypothesized five-dimensional factor structure fit the model well⁶ after three items were removed from the model (due to low factor loadings or relatively high modification indices). Both the fit indices ($\chi^2 = 232.71$, $df = 80$, root mean square error of approximation [RMSEA] = 0.052, comparative fit index [CFI] = 0.968, Tucker–Lewis index

[TLI] = 0.905) for the comparison of the sample and the reproduced model-implied covariance matrix as well as the tests for internal consistency ($\alpha > .60$)⁷ reveal the model satisfactorily fit the data. Table 2 displays the item and scale statistics. When we applied the five-dimensional measurement model to the responses supplied by visitors to the Warren Bridge SRMA in Wyoming, we again found the correlation covariance matrix implied by the theoretical model fit the actual data well after removing three scale items, which were not significant predictors of their intended latent factors.⁸ The fit indices ($\chi^2 = 150.23$, $df = 78$, RMSEA = 0.053, CFI = 0.943, TLI = 0.898) and the internal consistency measures were again acceptable.

Using the same CFA procedures for the place attachment items from the West Branch of the Farmington River study, the theoretical two-dimensional factor structure composed of the place identity and place dependence constructs fit the data well after factors without substantively high loadings were eliminated.⁹ The model fit indices ($\chi^2 = 31.78$, $df = 13$, RMSEA = 0.053, CFI = 0.98, TLI = 0.970) and the internal consistency values (Table 2) were acceptable. The two-factor structure also yielded a good fit to the data obtained from recreationists at the Warren Bridge SRMA ($\chi^2 = 42.63$, $df = 19$, RMSEA = 0.052, CFI = 0.979, TLI = 0.969). Across both data sets, the place identity latent factor reduced to a similar set of scale items. The place dependence measure comprised four statement items for the Farmington data set and three items for the Warren Bridge data set. As Williams and Vaske (2003) surmised, these similarities indicate a high degree of construct validity within the place attachment scales enabling inferences to be made across individual studies.

Given the REP and the place attachment scales could be reduced to theoretical constructs using CFA, factor scores were calculated for each case by summing the product of individuals' responses and each scale item factor score coefficient (Thompson, 2004). These factor scores were then incorporated into the subsequent models of recreation demand.

TCM

Models of recreation demand often encounter two specification issues. The first issue arises from overdispersion of the dependent trip count variable. The majority of individuals who visit recreation settings only do so infrequently, typically less than 10 times per year; there are, however, a small minority of recreationists who visit the same setting much more frequently. Given these patterns of behavior, the trips variable's variance can frequently be greater than its mean (e.g., Bilgic & Florkowski, 2007; Martinez-Espineira & Anioako-Tuffour, 2008; Siderelis & Moore, 2006). If the

Table 2. Confirmatory Factor Analysis, Internal Consistency, and Item Statistics.

Item	West branch of the Farmington River					Warren Bridge SRMA				
	α	λ	t-value	M	SD	α	λ	t-value	M	SD
Motivations										
Autonomy/ introspection	.72					.62				
To be on my own		.68	—	2.84	1.30	.61	—	2.95	1.56	
To experience solitude		.71	6.55	3.38	1.37	.60	4.85	3.44	1.50	
To be away from the family for a while		.53	5.11	1.93	1.24	.44	3.54	1.37	0.85	
Achievement/ stimulation	.70					.66				
To take risks		.40	—	1.65	0.98	.40	—	1.32	0.72	
To show others I can do it		.75	4.81	1.62	1.07	.69	3.82	1.20	0.57	
To test my endurance		.78	5.04	1.68	1.10	.76	4.44	1.35	0.80	
Social	.61					.52				
To do something with my family		.50	—	2.72	1.76	.42	—	3.45	1.71	
To be with members of my group		.59	2.93	2.73	1.67	.62	3.49	3.50	1.61	
To meet new people		.52	2.94	1.71	1.05	.40	3.47	1.29	0.72	
To share my skills and knowledge with others		.58	2.90	2.32	1.35	.46	3.47	1.99	1.27	
Nature appreciation	.67					.56				
To learn about the countryside		.44	—	2.51	1.31	.40	—	2.63	1.55	
To enjoy the view along the river		.68	4.54	4.19	0.98	.56	3.16	4.19	0.92	
To be close to nature		.68	4.33	4.16	1.04	.55	3.17	3.93	1.14	
Physiological	.69					.73				
To relax physically		.64	—	3.88	1.15	.68	—	3.58	1.23	

(continued)

Table 2. (continued)

Item	West branch of the Farmington River					Warren Bridge SRMA					
	α	λ	<i>t</i> -value	<i>M</i>	<i>SD</i>	α	λ	<i>t</i> -value	<i>M</i>	<i>SD</i>	
To help reduce built-up tension Place attachment	.64		6.01	3.73	1.35	.68		6.02	3.02	1.44	
Place identity	.87	—				.87	—				
I identify strongly with this area	.85	—		3.41	1.33	.83	—		3.23	1.32	
I am very attached to this area	.88		17.15	3.51	1.35	.88		14.89	3.09	1.35	
I find that a lot of my life is organized around this area	.76		11.51	2.44	1.27	.78		8.54	1.86	1.11	
This area means a lot to me	—	.80		14.32	3.77	1.29	—	.84	14.41	2.76	1.25
Place dependence	.87	—				.91	—				
This area is the best place for what I like to do	.82	—		3.48	1.21	—	.85	—	3.13	1.22	
I enjoy doing the type of things I do here more than in any other area	.80		15.14	3.22	1.22	—	.85	17.06	2.76	1.25	
No other area can compare to this one	—	—	—	—	—	.84		14.67	2.64	1.29	
Doing what I do here is more important to me than doing it in any other place	.79		14.15	2.91	1.24	—	.80	12.89	2.66	1.17	

Note: SRMA = Special Recreation Management Area.

response variable does exhibit such overdispersion, a negative binomial distribution is preferred over the more traditional Poisson (Hilbe, 2007). A second model specification issue that often arises is the need to account for

the truncated nature of the dependent variable. By virtue of collecting data via on-site interviews, the dependent trips variable by default has a lower bound of one. To account for this truncation, the probability functions and their respective log likelihood functions need to be amended to exclude zeros (Hilbe, 2007). Given this, our modeling approach utilizes the zero-truncated negative binomial regression model discussed in more detail elsewhere (Cameron & Trivedi, 1998; Englin & Shonkwiler, 1995; Hilbe, 2007; Shaw, 1988). We also compute the marginal effects of each social-psychological construct influencing individuals' trip-taking behavior. These effects can be interpreted as the change (positive or negative) in the predicted number of trips an individual takes to the river given an increase of one standard deviation in the reference variable.

We first turned our attention to visitation on the West Branch of the Farmington River. The trip response variable was highly overdispersed with a mean of 30.3 trips per year and a standard deviation of 60.6. Given this overdispersion, the TCM was estimated using the aforementioned zero-truncated negative binomial model (Hilbe, 2007). The Wald test on the dispersion coefficient α , which accounts for greater variation, confirmed overdispersion, enabling us to reject the hypothesis that the data are Poisson distributed.

To develop our model of recreation demand, we incorporated all seven social-psychological constructs into the same model and tested for significant interactions across the independent variables. We also tested the exogeneity of the social-psychological constructs through the Wu-Hausman test, which compares a model where all independent variables are treated as exogenous with an alternative specification where the social-psychological constructs are instrumented against income and trip costs (Baum, Schaffer, and Stillman, 2003, 2007). For the West Branch of the Farmington River data set, the Wu-Hausman statistic, $F_{(1, 134)}$, was not significant ($p = .714$), which fails to reject the null of exogeneity and suggests we should treat all of the independent variables as exogenous.

Results from the West Branch of the Farmington River (Table 3) revealed that age was significantly and positively related to demand ($\beta = 0.0223$, $p = .010$). Older individuals tended to visit more frequently. Conversely, income ($\beta = -4.95e^{-06}$, $p = .026$) and average personal trip costs ($\beta = -0.0033$, $p \leq .001$) were negatively related to trip-taking behavior. Regarding income, this finding simply implies the more an individual earns, the less likely they are to repeatedly visit the West Branch of the Farmington.

Regarding the social-psychological constructs, only place identity exhibited a significant and positive influence on demand ($\beta = 0.5079$, $p \leq .001$). A

Table 3. Estimates From Zero-Truncated Negative Binomial Regression Models (West Branch of the Farmington River).

Variable	Marginal effects dy/dx	β	SE	Z-value
Place attachment				
Place identity	9.7645	0.5079**	0.1976	2.57
Place dependence	3.8544	0.2005	0.1923	1.04
Motivations				
Autonomy/ introspection	5.6001	0.2913	0.1600	1.82
Achievement/ stimulation	-0.8420	-0.0438	0.1734	-0.25
Social	-12.0494	-0.6268***	0.1772	-3.54
Nature enjoyment	-2.5620	-0.1332	0.1693	-0.79
Physiological	4.8765	0.2536	0.1738	1.46
Interactions				
Place identity \times Social	4.1390	0.3790**	0.1476	2.57
Other factors				
Age	0.4289	0.0223**	0.0087	2.56
Income	-0.0001	-4.95e ⁻⁰⁶ *	2.22e ⁻⁰⁶	-2.23
Education	-0.7912	-0.0411	0.0547	-0.75
Gender	0.1550	0.0080	0.3047	0.03
Average trip costs	-0.0643	-0.0033***	0.0009	-3.15
Constant	—	2.8582***	0.5028	5.68
Summary statistics				
Wald χ^2		(13) = 96.24		
Log likelihood		-498.62		

Note: *Significant at .05. **Significant at .01. ***Significant at .001.

significant, but negative, relationship between the factor of social motivations and demand was also found ($\beta = -0.6268, p \leq .001$). The analysis also identified a significant and positive interaction between place identity and social motivations ($\beta = 0.3790, p = .010$) suggesting a reciprocal relationship between these two variables. The more an individual's identity is defined by the river, the greater the effect of social motivations on recreation behavior. Similarly, the more motivated individuals were by social reasons, the greater the effect of place identity on behavior.

Table 4. Estimates From Zero-Truncated Negative Binomial Regression Models (Green River Within the Warren Bridge SRMA).

Variable	Marginal effects dy/dx	β	SE	Z-value
Place attachment				
Place identity	2.5606	0.7795***	0.1636	4.76
Place dependence	-0.5389	-0.1640	0.1603	-1.02
Motivations				
Autonomy/introspection	0.1056	0.0321	0.1386	0.23
Achievement/stimulation	-0.5670	-0.1726	0.1012	-1.70
Social	-1.2192	-0.3711***	0.1140	-3.26
Nature enjoyment	0.1263	0.0384	0.1343	0.29
Physiological	0.7037	0.2142	0.1350	1.59
Interactions				
Place identity \times Social	0.4240	0.1290***	0.0496	2.60
Other factors				
Age	-0.0534	-0.0162*	0.0074	-2.18
Income	5.64e ⁻⁰⁶	1.72e ⁻⁰⁶	1.71e ⁻⁰⁶	1.00
Education	0.3745	0.1140	0.0646	1.76
Gender	-0.1228	-0.0377	0.1877	-0.20
Average trip costs	-0.0009	-0.0003***	0.0001	-3.82
Constant	—	1.3821***	0.4381	
Summary statistics				
Wald χ^2		(13) = 103.22		
Log likelihood		-334.70693		

Note: SRMA = Special Recreation Management Area.

*Significant at .05. **Significant at .01. ***Significant at .001.

Concurrent to the West Branch of the Farmington River analysis, we utilized the same process to examine recreation demand on the Warren Bridge SRMA. Again the dependent variable is a trip count that should be modeled assuming either a Poisson or a negative binomial distribution. Analogous to the analysis above, the trip count variable was overdispersed ($M = 5.0$; $SD = 12.3$), leading us to favor a negative binomial model. The Wald test on the

estimated dispersion coefficient confirmed overdispersion and allowed us to reject the assumption the data have a Poisson distribution.

Analysis of data collected from the Warren Bridge SRMA is consistent with the findings from the West Branch of the Farmington River in numerous respects (Table 4). First, our exogeneity test of the independent variables yielded a Wu-Hausman statistic ($F_{1, 118}$) that was not significant ($p = .261$), meaning we failed to reject the null of exogeneity and subsequently treated all of the independent variables as exogeneous. Second, average personal trip costs had significant negative effects on trip-taking behavior ($\beta = -0.0003$, $p \leq .001$). Third, place identity was significantly, and positively, related to behavior ($\beta = 0.7795$, $p \leq .001$). Fourth, the social motivation factor was a negative and significant predictor of demand ($\beta = 0.3711$, $p \leq .001$). Finally, the same significant and reciprocal relationship was seen between the place identity construct and social motivations ($\beta = 0.1290$, $p \leq .001$). Findings from the Warren Bridge SRMA analysis did differ from the West Branch of the Farmington on one variable, however. Age was found to be significantly and negatively related to demand ($\beta = -0.0162$, $p \leq .001$); younger individuals are more likely to recreate on the Green River.

Discussion

Effective management of natural areas used for recreation is dependent on resource managers and recreation planners providing recreation settings that facilitate the attainment of desired recreation experiences (Moore & Driver, 2005). The focus of relatively recent research and management actions indicate that not only do resource managers need to be cognizant of desired recreation experiences, but they also need to understand the significance of specific recreational settings to users (Anderson & Fulton, 2008; Eisenhauer, Krannich, & Blahna, 2000). In this research, we have incorporated the various dimensions of motivations and individuals' attachment to the resource into a formal model of recreation demand. We have contended that shifting the focus from how motivations and attachments are formed to how they actually influence resource use allows resource managers to have a more explicit understanding of how social-psychological constructs influence behavior and therefore have a direct impact on management's goals and objectives. We have also contended that by modeling the influence of social-psychological influences on recreation demand, three distinct contributions can be made to the allied fields related to natural resource-based recreation management. In the subsequent discussion, we expound on the results of this study and the contributions we believe it makes.

Previous research (Hailu et al., 2005) has shown that incorporating social-psychological constructs such as place attachment into recreation demand models can improve their theoretical and empirical robustness. If TCMs are using the individual as the unit of analysis, it seems to follow the logic of utility theory to incorporate the most influential factors that influence behavior; this includes, as we have shown here, individuals' affective and functional attachments to the setting as well as their motivations for visiting. This study illustrates that models of recreation demand can be more theoretically and empirically robust if researchers incorporate not just the purely behavioral measures of utility such as average trip costs, but also the social-psychological factors that are known to be directly related to the value individuals place on specific settings.

Although the literature on motivations for engaging in recreation behavior is now expansive, being studied consistently for the past four decades, relatively little research has formally linked motivations to demand. Traditionally, motivations are analyzed across groups or settings or with respect to other social-psychological variables (Manfredo et al., 1996). Here, we suggest that experience preferences can be operationalized as predictors of recreation behavior. Given that different recreation settings can facilitate different outcomes, making any generalizable statements about the effect of specific motivations on demand would be unwise. It has not been our thesis in this research to generate such findings, rather we only wish to illustrate how the decades of motivational research have implied that behavior is directly intertwined with the experiences individuals wish to achieve at recreation settings, but these motivations have been ignored or marginalized in formal models of recreation demand.

By analyzing two distinct recreational rivers with different geographical settings and patterns of use, we have indirectly tested the hypothesis that specific outcomes facilitated by a particular resource will be more positively related to recreation demand than others. This may be the case as only the social motivation was consistently negatively related to use across both rivers. This finding suggests that, at least for the two recreational rivers examined in this study, those individuals desiring a social experience with friends and family were less likely to visit these settings. Given the primary recreational activity on these rivers is fly-fishing, which is typically a relatively singular recreational engagement, this finding would be expected. It is interesting, however, that there was a significant and positive statistical interaction between the place identity construct and the social motivations factor for users of the West Branch of the Farmington and the Warren Bridge SRMA. Finding this across both rivers indicates how coupled the experiences

provided by specific recreation settings and the attachments that individuals form to those resources are. Kyle, Mowen, et al. (2004) argued that individuals are drawn to settings by the specific experiences they provide, and that over time, those individuals develop attachments to the setting. The findings presented here lend support for this hypothesis and suggest there may be interdependencies that exist between attachment formation and individuals' motivations for visiting a setting. That is, as the attachments individuals have with settings increase, the less likely they are to visit the setting for reasons that do not meet their needs.

Hailu et al. (2005) found that only place identity, and not place dependence, had a significant influence on recreation behavior. The data from the West Branch of the Farmington River and the Warren Bridge SRMA reveal the apparent dominance of place identity in influencing behavior, whereas dependence appears to play a negligible role. We suggest that there may be two distinct explanations for this pattern. First, place dependence reflects the ability of a site to meet the functional demands of a specific activity. Therefore, place dependence is inherently a function of the availability of other recreation areas that are available to fulfill individuals' needs. In large river systems, recreationists may simply believe that a whole suite of river segments, and not just the one they were on during the day of the interview, could facilitate their participation in the activity. This assumption is supported by previous research on the relative predictive power of the place identity and place dependence constructs (Williams & Vaske, 2003). The second plausible factor in explaining why place identity is such a stronger predictor of recreation behavior is that it could take longer to develop, is more closely tied to an individual's beliefs and values, and is therefore more closely linked to their actual behavior. Moore and Graefe (1994) suggested that place identity may be a much stronger indicator of individuals' preferences as "a person who participates in a recreation activity frequently at a particular site would tend to become dependent on that site and value it more highly" (p. 21). It appears that just as place identity has a consistently high predictive validity when regressed on other constructs (Williams & Vaske, 2003), it also has a significant influence on recreation behavior.

Given the findings of our analysis, future research should continue to explore the relationship between social-psychological constructs and recreation behavior. On this point, we offer two suggestions. First, our analysis involved the use of only two place attachment dimensions; future research may find it beneficial to explore other dimensions already discussed in the literature. Second, future research also should explicitly and empirically examine the causal structure behind various motivations and place constructs, and then in turn, the effect that

changes in place attachment have on desired recreation experiences in a variety of settings. Although some research, such as Kyle, Graefe, et al. (2004b), has addressed this issue, more research in these areas would be fruitful.

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Notes

1. Exceptions include the following: Hailu, Boxall, and McFarlane (2005) who incorporated the concept into a traditional recreational travel cost model; Smith, Siderelis, and Moore (2010) who integrated it into a field experiment of contingent recreation behavior; and Kyle, Graefe, Manning, and Bacon (2004) who utilized the analogous concepts of "position involvement" (place identity) and "setting resistance" (place dependence) to predict recreationists' behavioral loyalty to a specific setting.
2. However, Manfredi, Driver, and Tarrant (1996) noted that Lawler's expectancy-valence framework "never materialized as a strong focus of empirical investigation using the experiential approach in recreation" (p. 190).
3. Several researchers have also suggested that place attachment, place dependence, and place identity are all relatively distinct dimensions, which comprise a broad, encompassing attitudinal construct called "sense of place" (e.g., Jorgensen & Stedman, 2001, 2006).
4. Hailu et al. (2005) also utilized a structural equation modeling procedure that assumes a multivariate normal distribution of the regression residuals. In noting that models of recreation demand are frequently characterized by nonnormal distributions, they acknowledge the assumption of their model as a limitation. This research directly addresses those issues by modeling demand through negative binomial regressions that are built to account for the nonnormality of regression residuals in overdispersed count data models (Hilbe, 2007).
5. Champ and Bishop (1996) found that recreationists are able to accurately report trip expenditures in ex-post mail surveys.
6. Model fit was based on the following fit indices: the maximum likelihood χ^2 , the relative χ^2 (χ^2/df), the root mean-square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). The maximum likelihood χ^2 is a statistic of discrepancy between the sample and model covariance

matrices; larger values indicate greater discrepancies and therefore poorer model fit. Because the maximum likelihood χ^2 is sensitive to large sample sizes, the relative χ^2 divides by the model's total number of degrees of freedom. Kline (2005) suggested that a relative χ^2 value of three or less indicates acceptable model fit. However, other authors suggest values of up to five may be acceptable (Schumacker & Lomax, 2004). The RMSEA assesses model fit while penalizing model complexity (large *df*). RMSEA values of 0.06 to 0.08 are acceptable if the upper bound of the RMSEAs confidence interval is below 0.10 (Hu & Bentler, 1999). The CFI and the TLI indicate the extent to which the model fits better than a null model with uncorrelated indicator variables. The values of the CFI and the TLI range from 0 to 1 with values nearer to 1 indicating a better fit.

7. Hair, Black, Babin, and Anderson (2010) suggested loadings of 0.60 are "high" and acceptable.
8. The three items removed were "to be creative by doing something such as sketching, painting, taking pictures, etc.," "to think about my personal values," and "to learn about the countryside."
9. For the place attachment scales, we follow Raubheimer's (2004) suggestion of using .70 as the criteria for scales where numerous indicators are available and a substantive body of theory supports the use of specific items. Raubheimer also suggests using .40 as a critical value when the research is exploratory or the number of observed variables is limited; we use these criteria for the Recreation Experience Preference (REP) scale items.

References

- American Automobile Association. (2009, January 20). *2007 Your driving costs*. Retrieved from <http://www.aaexchange.com/>
- Anderson, D. H., & Fulton, D. C. (2008). Experience preferences as mediators of the wildlife related recreation participation: Place attachment relationship. *Human Dimensions of Wildlife, 13*, 73-88.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata Journal, 3*(1), 1-31.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2007). Enhanced routines for instrumental variables/generalized method of moments estimation and testing. *Stata Journal, 7*(4), 465-506.
- Bilgic, A., & Florkowski, W. (2007). Application of a hurdle negative binomial count data model to demand for bass fishing in the southeastern United States. *Journal of Environmental Management, 83*, 478-490.
- Bixler, R. D., Floyd, M. F., & Hammitt, W. E. (2002). Environmental socialization: Quantitative tests of the childhood play hypothesis. *Environment & Behavior, 34*, 795-818.

- Booth, K., & Edginton, M. (2008). Challenges of adopting the outcomes approach: New Zealand's Department of Conservation. In B. L. Driver (Ed.), *Managing to optimize the beneficial outcomes of recreation* (pp. 157-168). State College, PA: Venture.
- Bowlby, J. (1969). *Attachment and loss: Attachment* (Vols. 1-3). New York, NY: Basic Books.
- Bowlby, J. (1973). *Attachment and loss: Separation* (Vols. 1-3). New York, NY: Basic Books.
- Bowlby, J. (1980). *Attachment and loss: Loss, sadness and depression*. (Vols. 1-3). New York, NY: Basic Books.
- Bricker, K. S., & Kerstetter, D. L. (2000). Level of specialization and place attachment: An exploratory study of whitewater recreationists. *Leisure Sciences, 22*, 233-257.
- Burch, W. (1969). The social circles of leisure: Competing explanations. *Journal of Leisure Research, 1*, 125-147.
- Cameron, A. C., & Trivedi, P. K. (1998). *Regression analysis of count data*. Cambridge, UK: Cambridge University Press.
- Champ, P. A., & Bishop, R. C. (1996). Evidence on the accuracy of expenditures reported in recreational surveys. *Journal of Agricultural and Resource Economics, 21*, 150-159.
- Chung, J. Y., Kyle, G. T., Petrick, J. F., & Absher, J. D. (2011). Fairness of prices, user fee policy and willingness to pay among visitors to a national forest. *Tourism Management, 32*, 1038-1046.
- Driver, B. L. (1976). Quantification of outdoor recreationists' preferences. In B. Van der Smissen (Ed.), *Research on camping and environmental education* (pp. 165-188). State College, PA: The Pennsylvania State University, College of Health, Physical Education, and Recreation.
- Driver, B. L. (Ed.). (2008). *Managing to optimize the beneficial outcomes of recreation*. State College, PA: Venture.
- Driver, B. L., & Brown, P. J. (1975). A sociopsychological definition of recreation demand, with implications for recreation resource planning. In *Assessing demand for outdoor recreation* (pp. 64-68). Washington, DC: National Academy of Sciences.
- Driver, B. L., & Brown, P. J. (1986). Probable personal benefits of outdoor recreational engagements. In *President's commission on American outdoors: A literature review* (pp. 63-67). Washington, DC: US Government Printing Office.
- Driver, B. L., & Knopf, R. C. (1976). Temporary escape: One product of sport fisheries management. *Fisheries, 1*, 2-29.
- Driver, B. L., & Knopf, R. C. (1977). Personality, outdoor recreation, and expected consequences. *Environment & Behavior, 9*, 169-193.

- Driver, B. L., & Tocher, S. R. (1970). Toward a behavioral interpretation of recreational engagements, with implications for planning. In B. L. Driver (Ed.), *Elements of outdoor recreation planning* (pp. 9-31). Ann Arbor, MI: University Microfilms International.
- Eisenhauer, B. W., Krannich, R. S., & Blahna, D. J. (2000). Attachments to special places on public lands: An analysis of activities, reason for attachments, and community connections. *Society & Natural Resources, 13*, 421-441.
- Englin, J., & Shonkwiler, J. S. (1995). Estimating social welfare using count data models: An application to long-run recreation demand under conditions of endogenous stratification and truncation. *Review of Economics and Statistics, 77*, 104-112.
- Fletcher, J. J., Adamowicz, W. L., & Graham-Tomasi, T. (1990). The travel cost model of recreation demand: Theoretical and empirical issues. *Leisure Sciences, 12*, 119-147.
- Freeman III, A. M. (2003). *The measurement of environmental and resource values* (2nd ed.). Washington, DC: Resources for the Future.
- Hailu, G., Boxall, P. C., & McFarlane, B. L. (2005). The influence of place attachment on recreation demand. *Journal of Economic Psychology, 26*, 581-598.
- Hair, J. F., Black, B., Babin, B., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hammit, W. E., Backlund, E. A., & Bixler, R. D. (2006). Place bonding for recreation places: Conceptual and empirical development. *Leisure Studies, 25*, 17-41.
- Hammit, W. E., Kyle, G. T., & Oh, C.-O. (2009). Comparison of place bonding models in recreation resource management. *Journal of Leisure Research, 41*, 57-72.
- Hellerstein, D., Woo, D., McCollum, D., & Donnelly, D. (1993). *ZIPFIP: A zip and fips database*. Washington, DC: USDA, Economic Research Service-Resources and Technology Division.
- Hidalgo, M. C., & Hernández, B. (2001). Place attachment: Conceptual and empirical questions. *Journal of Environmental Psychology, 21*, 273-281.
- Hilbe, J. M. (2007). *Negative binomial regression*. Cambridge, UK: Cambridge University Press.
- Holcomb, B. (1977). The perception of natural vs. built environments by young children (Gen. Tech. Rep. No. NE-30). In *Children, nature, and the urban environment* (pp. 33-38). Upper Darby, PA: USDA Forest Service, Northeastern Experiment Station.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.
- Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners' attitude toward their properties. *Journal of Environmental Psychology, 21*, 233-248.

- Jorgensen, B. S., & Stedman, R. C. (2006). A comparative analysis of predictors of sense of place dimensions: Attachment to, dependence on, and identification with lakeshore properties. *Journal of Environmental Management, 79*, 316-327.
- Kline, R. B. (2005). *Principles and practices of structural equation modeling* (2nd ed.). New York, NY: Guilford.
- Knopf, R. C. (1987). Human behavior, cognition, and affect in the natural environment. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (Vol. 1, pp. 783-825). New York, NY: Wiley.
- Kyle, G. T., Absher, J. D., & Graefe, A. R. (2003). The moderating role of place attachment on the relationship between attitudes toward fees and spending preferences. *Leisure Sciences, 25*, 33-50.
- Kyle, G. T., Bricker, K., Graefe, A., & Wickham, T. (2004). An examination of recreationists' relationships with activities and settings. *Leisure Sciences, 26*, 123-142.
- Kyle, G. T., & Chick, G. E. (2002). The social nature of leisure involvement. *Journal of Leisure Research, 35*, 426-448.
- Kyle, G. T., Graefe, A., & Manning, R. (2005). Testing the dimensionality of place attachment in recreational settings. *Environment & Behavior, 37*, 153-177.
- Kyle, G. T., Graefe, A., Manning, R., & Bacon, J. (2003). An examination of the relationship between leisure activity involvement and place attachment among hikers along the Appalachian Trail. *Journal of Leisure Research, 35*, 249-273.
- Kyle, G. T., Graefe, A., Manning, R., & Bacon, J. (2004a). Effect of activity involvement and place attachment on recreationists' perceptions of setting density. *Journal of Leisure Research, 36*, 209-231.
- Kyle, G. T., Graefe, A., Manning, R., & Bacon, J. (2004b). Predictors of behavioral loyalty among hikers along the Appalachian Trail. *Leisure Sciences, 26*, 99-118.
- Kyle, G. T., Mowen, A. J., & Tarrant, M. (2004). Linking place preferences with place meaning: An examination of the relationship between place motivation and place attachment. *Journal of Environmental Psychology, 24*, 439-454.
- Lawler, E. E. (1973). *Motivations in work organizations*. Monterey, CA: Brooks/Cole.
- Manfredo, M. J., Driver, B. L., & Tarrant, M. A. (1996). Measuring leisure motivation: A meta-analysis of the recreation experience preference scales. *Journal of Leisure Research, 28*, 188-213.
- Manning, R. E. (2011). *Studies in outdoor recreation: Search and research for satisfaction* (3rd ed.). Corvallis: Oregon State University Press.
- Martinez-Espineira, R., & Anioako-Tuffour, J. (2008). Recreation demand analysis under truncation, overdispersion, and endogenous stratification: An application to Gros Morne National Park. *Journal of Environmental Management, 88*, 1320-1332.
- McConnell, K. E. (1985). The economics of outdoor recreation. In A. V. Kneese & J. L. Sweeney (Eds.), *Handbook of Natural Resource and Energy Economics* (Vol. 2, pp. 677-722). Amsterdam, Netherlands: North-Holland.

- McIntyre, N. (1989). The personal meaning of participation: Enduring involvement. *Journal of Leisure Research, 21*, 167-179.
- Mesch, G. S., & Manor, O. (1998). Social ties, environmental perception, and local attachment. *Environment & Behavior, 30*(4), 504-519.
- Milligan, M. J. (1998). Interactional past and potential: The social construction of place attachment, *21*, 1-33.
- Moore, R. L., & Driver, B. L. (2005). *Introduction to outdoor recreation: Providing and managing natural resource based opportunities*. State College, PA: Venture.
- Moore, R. L., & Graefe, A. R. (1994). Attachments to recreation settings: The case of rail-trail users. *Leisure Sciences, 16*, 17-31.
- Moore, R. L., & Scott, D. (2003). Place attachment and context: Comparing a park and a trail within. *Forest science, 49*, 877-884.
- Nilsen, P. (2008). Adopting the outcomes-focused approach in Parks Canada. In B. L. Driver (Ed.), *Managing to optimize the beneficial outcomes of recreation* (pp. 169-176). State College, PA: Venture.
- Parsons, G. R. (2003). The travel cost model. In I. Bateman (Series Ed.), P. A. Champ, K. J. Boyle, & T. C. Brown (Vol. Ed.), *A primer on nonmarket valuation* (pp. 269-330). Dordrecht, Netherlands: Kluwer Academic.
- Pritchard, M. P., Havitz, M. E., & Howard, D. R. (1999). Analyzing the commitment-loyalty link in service contexts. *Journal of the Academy of Marketing Science, 27*, 333-348.
- Proshansky, H. M. (1978). The city and self-identity. *Environment & Behavior, 10*, 147-169.
- Raubenheimer, J. E. (2004). An item selection procedure to maximize scale reliability and validity. *South African Journal of Industrial Psychology, 30*, 59-64.
- Roberts, E. (1996). Place and spirit in public land management. In B. L. Driver, D. Dustin, T. Baltic, G. Elsner, & G. Peterson (Eds.), *Nature and the human spirit: Toward an expanded land management ethic* (pp. 61-80). State College, PA: Venture.
- Schreyer, R., Jacob, G., & White, R. (1981). Environmental meanings as a determinant of spatial behavior in recreation. In J. Frazier & B. Epstein (Eds.), *Proceedings of the applied geography conferences* (Vol. IV, pp. 294-300). Kent, OH: Kent State University.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (2nd ed.). New York, NY: Psychology Press.
- Shaw, D. (1988). On-site samples' regression: Problems of non-negative integers, truncation and endogenous stratification. *Journal of Econometrics, 37*, 211-223.
- Siderelis, C., & Moore, R. L. (2006). Examining the effects of hypothetical modifications in permitting procedures and river conditions on whitewater boating behavior. *Journal of Leisure Research, 38*, 558-574.

- Smith, J. W., Burr, S. W., & Reiter, D. K. (2010). Specialization among off-highway vehicle owners and its relationship to environmental worldviews and motivations. *Journal of Park and Recreation Administration, 28*, 57-73.
- Smith, J. W., Siderelis, C., & Moore, R. L. (2010). The effects of place attachment, hypothetical site modifications, and use levels on recreation behavior. *Journal of Leisure Research, 42*, 621-640.
- Stokols, D., & Shumaker, S. A. (1981). People in places: A transactional view of settings. In J. H. Harvey (Ed.), *Cognition, social behavior, and the environment* (pp. 441-488). Hillsdale, NJ: Lawrence Erlbaum.
- Stokowski, P. (2002). Languages of place and discourses of power: Constructing new senses of place. *Journal of Leisure Research, 34*, 368-382.
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.
- Tuan, Y. F. (1977). Experience and appreciation (Gen. Tech. Rep. No. NE-30). In *Children, nature, and the urban environment* (pp. 26-32). Upper Darby, PA: USDA Forest Service, Northeastern Experiment Station.
- Tuan, Y. F. (1980). Rootedness versus sense of place. *Landscape, 24*, 3-8.
- Wagar, J. A. (1966). Quality in outdoor recreation. *Trends in Parks and Recreation, 3*, 9-12.
- Weber, D. L., Senior, J., Zanon, D., & Anderson, D. (2008). Healthy parks, healthy people: Assessing the benefits gained by Australian park visitors. In B. L. Driver (Ed.), *Managing to optimize the beneficial outcomes of recreation* (pp. 177-188). State College, PA: Venture.
- Williams, D. R., Patterson, M. E., Roggenbuck, J. W., & Watson, A. E. (1992). Beyond the commodity metaphor: Examining emotional and symbolic attachment to place. *Leisure Sciences, 14*, 29-46.
- Williams, D. R., & Roggenbuck, J. W. (1989). *Measuring place attachment: Some preliminary results*. Paper presented at the Symposium on Outdoor Recreation Planning and Management, National Recreation and Park Association Research Symposium on Leisure Research, San Antonio, TX.
- Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science, 49*, 830-840.

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