

# Personal Wilderness Relationships: Building on a Transactional Approach

Robert G. Dvorak · William T. Borrie ·  
Alan E. Watson

Received: 30 January 2012 / Accepted: 1 October 2013 / Published online: 19 October 2013  
© Springer Science+Business Media New York 2013

**Abstract** Wilderness managers are charged with the challenging goal of balancing resource protection and experience quality across a broad, value-laden landscape. While research has provided insight into visitors' motivations and their meanings for wilderness, a struggle exists to implement experiential concepts within current management frameworks. This research posits the human experience of wilderness to be an evolving, enduring relationship, and that research needs can be addressed by conceptualizing and investigating an individuals' personal wilderness relationship. The purpose of this study was to explore wilderness relationships of visitors to the Boundary Waters Canoe Area Wilderness. A predictive model was proposed to investigate the internal dimensions of a visitor's wilderness relationship. A mail-back questionnaire was distributed during the summer of 2007, resulting in a sample of 564 respondents. Data were analyzed using confirmatory factor analysis and structural equation modeling. Results from testing several relationship models provided support for a multidimensional structure consisting of five factors with a single overarching relationship factor. The preferred relationship model indicated the importance of identities and attachment in place relationships. Trust and commitment

toward management were also important considerations. This research provided the preliminary evidence for a multidimensional wilderness relationship model and complements a perspective of wilderness experiences as wilderness. Findings may help to reframe decision-making and public-input processes that guide management actions to increased wilderness character protection and facilitate quality wilderness experiences.

**Keywords** Wilderness · Wilderness management · Trust · Commitment · Place attachment · Relationships

Wilderness managers are charged with the challenging goal of balancing resource protection and experience quality across a broad, value-laden landscape. While resource issues are central to many management challenges, managers are still expected to incorporate a full range of values in their decision-making. The public recognizes and demands more from any single wilderness area than only the protection of biodiversity and other ecological priorities. It is a public that values wilderness for the experiences it can provide and as a symbolic landscape that reflects the heritage of the American people. Consequently, managers may be better equipped for addressing a broader range of values if greater focus is given to understanding these values and meanings and how they might influence the wilderness experience.

Over the past 30 years, multiple approaches in recreation research (e.g., satisfaction, benefits-based, experience-based, meanings-based) have been developed to measure the quality of the wilderness experience (Borrie and Birzell 2001). These approaches have evolved to recognize that experiences accumulate over time and occur across vast

---

R. G. Dvorak (✉)  
Department of Recreation, Parks, and Leisure Services  
Administration, Central Michigan University, Finch Fieldhouse  
108, Mount Pleasant, MI 48859, USA  
e-mail: dvora1rg@cmich.edu

W. T. Borrie  
Department of Society and Conservation, The University of  
Montana, 32 Campus Drive, Missoula, MT 59812-0576, USA

A. E. Watson  
Leopold Institute, 790 E. Beckwith Ave., Missoula, MT 59801,  
USA

landscapes. Experiences are not one-time transactions between the visitor and the setting (Borrie and Roggenbuck 2001). Instead, they are complex, dynamic engagements between people and the environment that fluctuate over the course of a recreation activity (Borrie and Roggenbuck 1998; Hull et al. 1992) and as holistic, long-term phenomena (Brooks and Williams 2012).

One perspective that addresses these experiential concepts frames the wilderness experience as a long-term relationship. Cole and Williams (2012, p. 6) describe this approach to wilderness experiences as one that “emphasizes its emergent, transactional, and long-term character.” From such a perspective, the concept of relationships represents the important bonds that form between individuals, places, and landscapes. Watson (2004) suggests that by describing, monitoring, and understanding these human relationships with wilderness, protected area managers can go beyond monitoring aspects of the wilderness itself. Furthermore, Brooks et al. (2006) propose that the individual wilderness relationships can be used as a metaphor for understanding the quality of the visitor experience.

Thus, framing wilderness examinations in the context of relationships provides a specific charge for wilderness managers and researchers to consider wilderness experiences and meanings in a way that may resonate differently with the public. It asks that we adopt “a long view,” as stewards of individuals’ long-term relationships with wilderness. The significance of wilderness builds over time and, the public expects wilderness managers to be long-term stewards of the resource and also of the ongoing role and meanings that wilderness has in people’s lives. Such framing also encourages wilderness managers and researchers to think beyond the provision of recreation opportunities and setting attributes, and to a broader role of wilderness landscapes with which the public has meaningful relationships. The Wilderness Act (P.L. 88-577) states, “in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” This definition speaks more to human relationships to wilderness landscapes than it does to motivations, recreational activities, or beneficial outcomes.

For wilderness research, a relationship perspective moves from documenting experiences as snapshots of the individual or a single trip attempting to understand how experiences are changing over time within individuals and acknowledging that wilderness is an enduring resource with ongoing significance. Such a “long view” points researchers toward a goal of understanding experiences rather than a goal of prediction (Brooks and Williams 2012). Researchers also have the important role of conceptualizing and providing measurement and monitoring approaches to help wilderness managers in

their on-going stewardship of wilderness experiences and relationships. Research must aim to better understand the situational, cultural, and personal factors that shape experience narratives and the role managers have in influencing wilderness relationships (Brooks and Williams 2012).

In this article, our goal was to propose a relationship model that is an empirical representation of individual wilderness relationships. We developed a predictive model to examine the influence of place attachment, place meanings, life centrality, trust, and commitment within an overarching relationship concept. The study was conducted in the Boundary Waters Canoe Area Wilderness (BWCAW) in northern Minnesota. Using data collected from mail-back visitor surveys ( $n = 564$ ), we conducted confirmatory factor analyses (CFA) and structural equation modeling (SEM) to examine the underlying structure between dimensions. Through investigation of the linkages between these concepts, we suggest that managers can further integrate and emphasize the concepts of place attachment, place meanings, and trust in their decision-making processes and management applications.

## Theoretical Background

The term “relationship” has been quite nebulous in protected area management as related to human relationships. In psychology, a close relationship “displays interdependent interconnections in the form of frequent, diverse, and enduring interactions” (Laursen and Bukowski 1997, p. 751). Other research has explored a relationship metaphor as a framework to describe environmental and consumer experiences (Brooks et al. 2006; Fournier 1998; Manzo 2003; Peden and Schuster 2008; Williams 1989). To understand the origin and development of wilderness experiences as relationships, it is necessary to examine how the emphasis and understanding of the nature of experiences have shifted over time.

Cole and Williams (2012) suggest in a recent review of 50 years of wilderness visitor experience research that our understanding of the nature of the experience has shifted from achieving desired and expected outcomes to emergent lived experiences. They further suggest that our understanding has grown “from the seeds of relatively simple consumer satisfaction perspective into a more mature set of branching models that support one another” (p. 8). This traditional consumer satisfaction paradigm was critiqued in the consumer behavior literature by Hirschman and Holbrook (1982), who emphasized it was important not to ignore the meanings and emotional experiences tied to consumption behavior. A similar critique was made by Arnould and Price (1993), who in the examination of multi-day river rafting trips found that the experience had less to

do with expectations and satisfaction and more with the narrative of the overall experience. Thus, experience quality is less about the “product,” and more about expression and understanding of the “process” (see Schreyer et al. 1985; Williams 1989).

In some of the earliest recreation literature, Clawson and Knetsch (1966) suggested that experiences were not limited to the site or setting, but involved anticipation, travel to, travel home, and recollection. These long-term or ongoing aspects of the recreation experience were also addressed by Bryan (1977) when discussing recreation specialization among trout fisherman. Experience anglers developed relationships to the resource and a commitment to their recreational pursuit. The notion of ongoing experiences were also important in recreation conflict theory, as Jacob and Schreyer (1980) defined the concept of “resource specificity” and the importance individuals attach to the use of a particular recreation resource.

The view of experience as relationship has also developed over time following a meaning-based approach (Brooks and Williams 2012; Fournier 1998; Mick and Buhl 1992). In a meaning-based approach, human experience is understood as an emergent narrative rather than a predictable outcome of persons in situations or relative to expectations (Brooks and Williams 2012; Patterson et al. 1998). Patterson et al. (1998, p. 449) argue “that what people are actually seeking from their recreation experiences are stories which ultimately enrich their lives.” That the meaning of experience is understood as more like interpreting texts, or narratives, than like gaining knowledge of objects in nature.

This shift in understanding about the nature of wilderness experiences has provided for the “experience as long-term relationship” perspective. Cole and Williams (2012) suggest the focus of this perspective is on meaning-making and identity affirmation, rather than benefits attainment. It is one where “the individual is seen as active participant in creating the experience” (p. 6). In the next section, we discuss how the relationship perspective was conceptualized and operationalized for this study.

## Relationship Concepts

We characterize a relationship as how individuals negotiate their personal experiences and the social world around them. In this sense, a relationship is more than a singular mood or state of mind. Instead, relationships are cumulative, more enduring, and more central to a person’s identity. They develop over time and evolve as individuals renegotiate meaning across landscapes. Ultimately, individuals construct relationships that are consistent with their own goals, cognitive abilities, and social demands (Laursen and Bukowski 1997).

Our conceptualization of a relationship has been strongly influenced by relational marketing, a field that involves all marketing activities directed toward establishing, developing, and maintaining successful relational exchanges (Morgan and Hunt 1994). That is, relational marketers are aiming to build and strengthen links between the provision of a good or service and a person’s sense of self, their commitment to various values, their sense of social responsibility and the more central role that the good or service can play in all of these. Like our hypothesized wilderness relationships, relational marketing distinguishes between discrete transactions, which have a short duration, and focuses instead on relational exchanges, which are longer in duration and reflect an ongoing process (Dwyer et al. 1987; Morgan and Hunt 1994). These exchanges occur over time and participants expect to derive complex, personal, and noneconomic satisfactions (Dwyer et al. 1987).

A central theme regarding relationships is their existence over time. They are not seen as fixed entities, but as dynamic processes that ebb and flow over an individual lifetime. Interactions between individuals may be affected by preceding ones and influenced by expectations about the future (Hinde 1995).

Within personal relationships, individuals are interdependent (Berscheid and Peplau 1983). How someone behaves within a relationship affects the subjective experiences of participants and can affect future behavior (Hinde 1995). Over time, emotional human bonds can form between participants that provide security and hold individuals together (Hazan and Shaver 1994). Engaging in a relationship may also add significant meaning to the life of the individual choosing to be a partner in the relationship (Fournier 1998). Their choices may come to represent their personal values, identity, and the social norms to which they ascribe.

Such a personal theme can be seen in a wilderness context because opportunities exist to interact with various other individuals and entities. Management and backcountry staff, traveling partners, and other wilderness users all represent possible relational entities. With some, such as traveling partners, the amount of interpersonal experience might be significant. Conversely, interactions with backcountry staff and other users may be infrequent, but a relationship may form that is normative and applied generally to future interactions and encounters. Since these personal relationships are a constant component of wilderness experiences, we can therefore expect the bonds, meanings and identities to be part of any experience of wilderness.

Furthermore, relationships also exist in a societal context. They are not independent from the social, cultural, and temporal situations. Instead, they are embedded in a

larger social network made of shifting individuals and groups (Laursen and Bukowski 1997). Social forces influence the creation, maintenance, and negotiation of these relationships over time and space. They become dynamically linked in a continuous process of reciprocity between individuals and social contexts (Hinde 1995). An understanding of the cultural and social forces that may affect a wilderness area is necessary to frame an individual's relationship and hypothesize which forces will have the greatest influence over time. It may assist researchers in delineating which social and cultural forces are hindering or helping an individual's wilderness relationship.

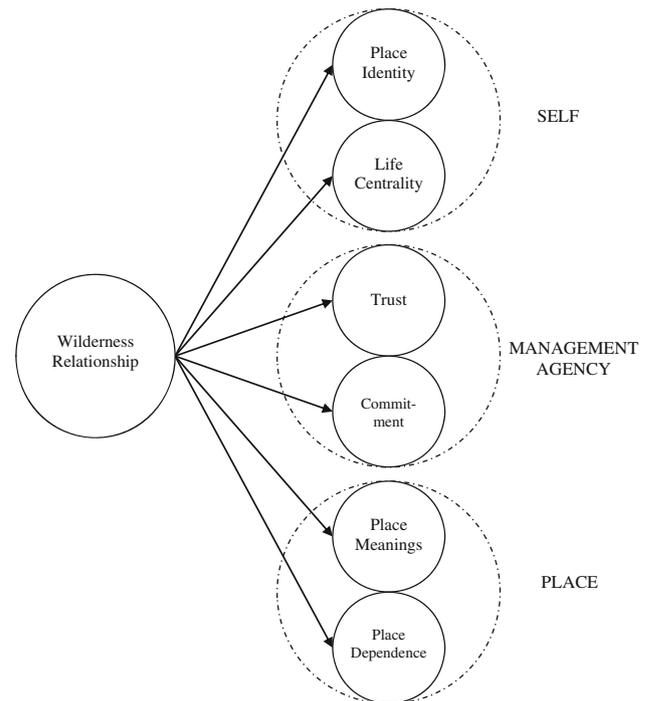
Finally, research has established that our interactions with nature are also tied to long-term attachments, meanings, and identities (see Williams et al. 1992; Greider and Garkovich 1994; Brooks et al. 2006). Our relationship to place is more than just making use of the specific attributes and opportunities of the place, but also the ties, significances and values we recognize and construct with the place.

### Hypothesized Model

Thus, from the perspectives of close personal relationships, relational marketing, and place attachment we proposed a relationship model that is a metaphor for examining emergent experiences and meanings in a wilderness setting. It builds on a self-others-place model (Brooks et al. 2007; Gustafson 2001) by conceptualizing a person's relationship to a protected area in terms of a multidimensional framework. This model consists of three theoretical dimensions: relationship to self, relationship to management agency, and relationship to place. These dimensions are considered to be multidimensional constructs, illustrated as second-order factors in Fig. 1.

#### Relationship to Self

Most people are aware that their relationships play a crucial role in shaping the character of their lives (Berscheid and Peplau 1983). These relationships add meaning to our lives, change our self concept, and become central to the core of who we are as individuals or groups (Brooks and Williams 2012; Fournier 1998). Seeking self-definition and self-understanding have a connection with how people create and maintain happiness in places (Haggard and Williams 1992; Scherl 1989). Through involvement in places, "individuals actively construct and affirm a sense of self" (Williams and Patterson 1999, p. 148). Their experiences play a role in developing aspects of their own identity (Manzo 2003). Over time, meaningful emotional connections and strong attachments develop to particular



**Fig. 1** Heuristic of proposed wilderness relationship model

places (Smaldone et al. 2008). The individual behaviors associated with these attachments are directed toward knowing the self in relation to the place, in order to develop and maintain ones' story of self (Sarbin 1983).

A self dimension, thus, provides the idiographic component of how a person identifies with a particular wilderness and how that place can represent who they are as a person. Williams et al. (1989) describe the role of wilderness in human development as a place where individuals actively seek self-definition and person identities can be affirmed by its existence. They suggest that the wilderness can affirm important beliefs in ourselves about who we are as individuals (see also Williams 2000). Over time, places like wilderness allow individual to reshape their view of "self-in-place" through introspection and a desire for personal growth (Brooks and Williams 2012). Knowing who we are relative to a place like wilderness can also provide insight into how we will react and incorporate future changes to that particular place into our identity.

In the hypothesized relationship model, this dimension was operationalized as consisting of two factors, place identity and life centrality. The factor of place identity has been described as the emotional component of place attachment that refers to the symbolic importance of a place (Williams and Vaske 2003). It is also defined as "those dimensions of the self that define the individual's personal identity in relation to the physical environment" (Proshansky 1978, p. 155). Therefore, place identity can be considered as a cognitive structure that refers to a more

global self-identification (Jorgensen and Stedman 2001). Life centrality has previously been described as a component of leisure activity involvement. McIntyre and Pigram (1992) have theoretically conceptualized leisure involvement as consisting of three dimensions: attraction, self expression, and centrality to lifestyle. This conceptualization of involvement was adapted in this study to consider wilderness as the object of personal involvement.

#### Relationship to Management Agency

Federal agencies like the US Forest Service can influence the quality of the experience for users and subsequently their relationship with wilderness. How federal agencies place bounds on the wilderness experience (e.g., user limits, fees, prohibiting use) can become a key component in influencing how individuals prescribe meaning to a setting. The management agency dimension assumed that the factors besides what visitors encounter on a single visit influence how the visitor evaluates management policies and reacts to the agency (Watson and Borrie 2004). Their exchanges with representatives of the agency (e.g., US Forest Service) become very important and success in these exchanges can be defined by the development of an ongoing relationship with the visitor instead of short-term outcomes and satisfaction (Borrie et al. 2002). To operationalize this dimension, the factors of trust and commitment were examined.

Trust and commitment are believed to play a central role in shaping motivation and behavior in ongoing relationships (Wieselquist et al. 1999). In relational marketing, trust is often seen as the single most powerful relational marketing tool available (Berry 1995). It exists when one party has confidence in the reliability and integrity of the exchange partner (Moorman et al. 1992; Morgan and Hunt 1994). In an environment where individuals feel vulnerable, trust reduces uncertainty because they know they can rely on a trusted product or provider (Chaudhuri and Holbrook 2001). It shows that the individuals have confidence in one another and that the interactions of the relationship will result in the desired outcomes or experiences. Therefore, feelings of reliability, safety, and honesty are all important facets of an individual's operationalization of trust (Chaudhuri and Holbrook 2001).

Commitment reflects the strength of the bond between two relational partners. It describes the durability of the relationship over time and the investment that each partner has made in the other. This definition suggests commitment is “enduring” and reflects a “positive valuation” of a relationship (Moorman et al. 1992, p. 316). It involves psychological attachment where the self and the partner can become linked (Wieselquist et al. 1999).

#### Relationship to Place

As humans we live in a place-based world. Places are symbolic environments created by humans conferring meaning to nature. These meanings are about the relationships between the person and the place. Through actively engaging with places and creating meaning, people can foster relationships with places (Manzo 2003). These relationships can be life-long, transforming over time, and influenced by past experiences (Manzo 2005). Over time, these meanings are the symbols for the relationship that exists (Williams and Patterson 2007).

Place meanings are emergent, socially constructed, and transactional in nature (Williams and Patterson 1999). It is through our experiences in a place that meanings are created and the place made significant (Manzo 2008). These meanings can be both individual and sociocultural, as landscapes confer important cultural values and identities (Williams 2000). Stewart (2008) construes place meanings as embedded in the narratives of the culture. They characterize the reasons that an environment is valued, represent its uniqueness, and help us to understand the social context upon which place meanings depend (Stewart 2008).

This dimension of “relationship to place” was operationalized in the model with place dependence and place meanings factors. Place dependence is described by Williams and Vaske (2003) as a functional attachment to place. It emphasizes the necessity individuals attach to a specific place for enjoyment of a particular leisure activity or recreational pursuit (Williams et al. 1992). In this manner, individuals give value to settings based on the specificity and functionality of a place for a desired activity (Kyle et al. 2003). This makes substituting one place with another very difficult because of the unique aspects found in each context.

Individual and sociocultural place meanings can be difficult to express, and likewise challenging to operationalize within a relationship measurement model. Williams and Patterson (1999) argue that an essential characteristic of symbolic and expressive meanings is that their identification and inventory cannot be tied to environmental features or biophysical attributes. Instead, they must be revealed and understood by focusing on people–place interactions. Stewart (2008) further argues that several overlapping reasons explain the complexity in expressing place meanings. First, place meanings are derived from one's lived experience. This requires experience in, reading about, or knowing about a given place. Meanings are also multi-faceted, influenced by cultural values, and sensitive to the audience to which they are expressed. Finally, place meanings can be in a continual state of flux. They emerge and evolve through the

experiences an individual continue to have in a given context. Thus, to express a place meanings factor in the hypothesized model, one must articulate a subset of those meanings that are part of the common narrative of that place. Such a subset may not be comprehensive, but instead relevant to the individual and cultural identities expresses from that landscape.

## Methods

### Study Context

The BWCAW is a 444,557 ha (1,098,057 acres) wilderness located in the Superior National Forest of northern Minnesota. With the passage of the Wilderness Act in 1964, the BWCAW was officially designated as part of the National Wilderness Preservation System and is the second largest designated wilderness area east of the Mississippi River. Total visitation per year is estimated at over 200,000 visits, making it one of the most heavily used wilderness area in the entire country. In addition, over 90 % of users are repeat visitors to the BWCAW (Dvorak et al. 2012).

### Study Design

Data were collected using on-site contact and mail-back surveys from May 1 to September 30 in 2007. A total of 76 sampling days were stratified by both entry point and month according to the proportion of use in prior years. Sampling occurred at both wilderness entry points and permit distribution locations. Because sampling at all 74 entry points was logistically and practically impossible, the 17 most highly used points (represent over 70 % of total use during the peak summer season) were utilized. The remaining use was sampled at three US Forest Service permit stations (and a small selection of private concessionaires) through which all overnight visitors must pass. The goal of this contact method was to achieve a level of representativeness that allowed testing of the hypothesized wilderness relationship model given the situational factors of the BWCAW context. It was not intended to necessarily produce a “relationship” construct that is generalizable to all types of BWCAW users.

Intercepted groups were asked to complete a short on-site interview either before or after their trip. This interview included basic trip and demographic information (e.g., group size, type, length of stay) and contact information for each group member 15 or older. Approximately 2 weeks after the interview, individuals were mailed a survey packet including a cover letter, a study questionnaire, and a pre-paid return envelope. Packet mailings followed a modified Dillman approach, with a reminder/thank you postcard sent 1 week after the first mailing and a

replacement questionnaire sent 2 weeks after the postcard. Mailings yielded a 69 % response rate and 564 usable questionnaires. Tests for nonresponse bias using on-site interview items suggested no significant or practical differences between respondents and nonrespondents.

### Model Variables

To evaluate the three dimensions in the hypothesized model, respondents evaluated 30 Likert-type measurement items on a five-point scale (1 = “Strongly disagree”; 5 = “Strong agree”). Exact wordings for all items are shown in Table 2. These measurement items were selected by utilizing previously tested items from outdoor recreation, social psychology, and relational marketing research.

Within relationship to self, place identity was assessed using six items derived from the psychometric validation performed by Williams and Vaske (2003). McIntyre and Pigram’s (1992) theoretical conceptualization of leisure involvement was used to represent life centrality. Four items adapted by Kyle et al. (2004) for evaluating leisure involvement in an outdoor recreation context were used to measure life centrality.

For relationship to management agency, both trust and commitment were measured. Trust can be quantified in terms of the perception of shared values, direction, goals, views, actions, and thoughts (Cvetkovich and Winter 2003; Winter et al. 1999). A variety of measures for trust have been utilized in natural resource management (Borrie et al. 2002; Liljeblad et al. 2009; Winter et al. 1999). Trust was measured in this study based on the salient values similarity model by adapting four items from Winter et al. (1999) and Borrie et al. (2002). Commitment was measured using seven items from Morgan and Hunt (1994).

Relationship to place had two factors. Place dependence was assessed with five items also based on the validation by Williams and Vaske (2003). Place meanings were assessed by utilizing descriptive belief statements about the nature of the setting (Stedman 2003a, b). Four measures of place meanings were adapted from Stedman (2002, 2003a) to assess the place meanings associated with the BWCAW.

It is important to recognize several decisions made in the conceptualization, operationalization, and subsequent measurement of the proposed relationship model. The choice was made to separate the two factors of the place attachment scale (place identity and place dependence) in the measurement model. While this is not how factors of place attachment are consistently conceptualized, it was necessary to differentiate between ways that the setting integrated into an individual’s identity (relationship to self) and the meanings embedded and ascribed to the setting from human experience (relationship to place). To strengthen this distinction, place meanings were

represented and evaluated through descriptive belief statements of the setting. It is important to acknowledge that these four statements cannot comprehensively represent the emergent, lived experience, and meanings of all visitors. They are but a subset of the possible meanings ascribed to the BWCAW. So, while this operationalization of place meanings is consistent with the proposed measurement model and psychometric approach adopted toward wilderness relationships in this study, it is a potential limitation in how place meanings were represented. It is also not intended to be reductionistic in how place meanings are conceived, explored, or understood (as previously described).

### Analysis

Preliminary analysis included examining the internal consistency of the 30 item relationship scale. Place identity, life centrality, trust, commitment, place dependence, and place meanings items were evaluated for reliability using Cronbach's alpha coefficients. SPSS 13.0 was used for these analyses.

Further analysis was driven by concepts of SEM. SEM is strong in modeling relationships with multiple latent variables, a situation that existed in the operationalization of the wilderness relationship model. EQS 6.1 was selected as the program to implement SEM techniques because of its utilization of the Bentler–Weeks model for data representation (as described by Byrne 1994) and because it provides nonnormal goodness of fit indices as a part of its standard output. A CFA was the primary SEM technique used to evaluate the hypothesized wilderness relationship model. CFA gave the ability to examine the goodness of fit of the hypothesized relationships between latent variables and measured variables. Fit indices were used to evaluate the actual input data with that of the predicted model. Several fit indices were used to assess the model: model  $\chi^2$ , root mean square error of approximation (RMSEA), Bentler (1990) comparative fit index (CFI), and standardized root mean square residual (SRMR). Kline (2005) suggests  $RMSEA \leq 0.05$  for close approximate fit with a 90 % confidence interval (CI) of 0.05–0.08 for reasonable error of approximation. He also suggests  $CFI > 0.90$  and  $SRMR < 0.10$ . These fit indices were also used to initiate adjustments and respecification of the model. These adjustments and changes led to improved model fit and to a more accurate representation of the underlying structure and patterns of the data.

### Results

A summary of descriptive statistics from the sample are presented in Table 1. Respondents were predominately

**Table 1** Summary descriptive statistics for BWCAW respondents

Variable	Mean	SD
Age	44.46	13.48
Education (in years)	16.30	2.61
Gender		
Male	72.1 %	
Female	27.9 %	
Group size	4.45	2.08
Nights	4.25	1.96
Number of previous visits	14.60	22.17
Year of 1st visit	1990	14.17

male (72 %), middle-aged, and well educated. These demographics are consistent with previous wilderness user profiles (Bowker et al. 2006; Roggenbuck and Watson 1989; Watson et al. 1992). Mean group size was four individuals and the average length of stay was 4.25 nights in the BWCAW. Respondents appeared to be experienced BWCAW users. The mean number of previous BWCAW visits was approximately 15, with 1990 as the mean first year of visit. Less than 16 % of respondents were first-time visitors without any prior experience in the BWCAW.

The first step of analysis examined the reliability of the 30 item wilderness relationship scale. The overall reliability of the scale was  $\alpha = 0.95$ . Individual scale reliabilities for the hypothesized internal factors were also acceptable, ranging from 0.78 (life centrality) to 0.94 (trust) (Table 2). Means scores for the 30 items are also presented in Table 2. These scores can independently demonstrate the relative strength of each factor, but should not distract from the pattern of correlations among all proposed factors.

Confirmatory factor analysis was employed to assess fit for the measurement model for the hypothesized wilderness relationship. Although the level of nonnormality was acceptable, the Satorra–Bentler scaled statistic (a corrected normal theory method) was used to provide robust  $\chi^2$  values, standard error estimates, and adjusted fit indices. It is designed to more closely approximate  $\chi^2$  than the usual test statistic and to perform as well or better than asymptotically distribution free methods generally recommended for nonnormal multivariate data (Bentler 2006; Byrne 1994).

### Single Factor and Full Factor Models

The first model tested was the examination of a single factor model. Testing a single factor model is an important step because the inability to reject such a model suggests that the measured variables do not show discriminant validity (Kline 2005). That is, the variables would seem to

**Table 2** Measurement item reliability, standardized correlations, and  $R^2$  of relationship constructs<sup>a</sup>

Measurement items	$\alpha$	Mean	Standardized correlation	$R^2$
Place identity	0.93			
I am very attached to the boundary waters		4.14	0.816	0.666
I feel like the boundary waters is a part of me		3.63	0.872	0.761
I identify strongly with the boundary waters		3.82	0.864	0.746
The boundary waters is very special to me		4.19	0.856	0.732
The boundary waters means a lot to me		4.17	0.871	0.759
Visiting the boundary waters says a lot about who I am		3.54	0.724	0.524
Trust	0.94			
The Forest Service shares my values about how the BW should be managed		3.90	0.923	0.853
I share the Forest Service's goals for the boundary waters		3.94	0.945	0.893
The Forest Service supports my views about the boundary waters		3.85	0.922	0.851
I trust the Forest Service in their efforts to manage the boundary waters		3.95	0.803	0.644
Commitment—"The connection I have with the Forest Service"	0.92			
Is something I really care about		2.94	0.884	0.782
Is something I intend to maintain indefinitely		3.01	0.900	0.811
Deserves my maximum effort to maintain		3.04	0.872	0.761
Is very important to me		3.03	0.908	0.825
Is something I am very committed to		2.84	0.892	0.796
Is very much like being family		2.37	0.733	0.537
Is of very little significance to me		3.32	–	–
Place meanings— <i>The boundary waters wilderness is</i>	0.89			
A place to escape from civilization		4.49	0.795	0.633
The real "north woods"		4.30	0.832	0.693
A pristine wilderness		4.23	0.773	0.597
A place of high environmental quality		4.51	0.873	0.763
Place dependence	0.88			
The boundary waters is the best place for what I like to do		3.81	0.847	0.718
No other place can compare to the boundary waters		3.58	–	–
I get more satisfaction out of visiting the boundary waters than any other		3.56	0.835	0.698
Doing what I do at the BW is more important to me than doing it in any other place		3.25	0.816	0.665
I wouldn't substitute any other area for doing the type of things I do at the BW		3.18	0.713	0.508
Life centrality	0.78			
I find a lot of my life organized around the boundary waters		2.43	–	–
I enjoy discussing the boundary waters with my friends		4.01	–	–
Most of my friends are in some way connected with the boundary waters		2.35	–	–
The boundary waters has a central role in my life		2.64	–	–

<sup>a</sup> Standardized correlations and  $R^2$  values are omitted for all items removed from final preferred model

measure only one domain and not the multiple dimensions hypothesized by this study.

Results for the single factor model showed the normalized estimate of multivariate kurtosis for this model as 57.403 and indicated the presence of nonnormality. This supported the use of the Satorra–Bentler scaled statistic as a corrected normal theory method for the data. The Satorra–Bentler scaled statistic (S–B  $\chi^2$ ) was 5896.300 with 405 degrees of freedom. Examination of fit indices also suggested a poorly fit model (CFI = 0.460, RMSEA 90 % CI = 0.152–0.159, SRMR = 0.151). These results confirm

the discriminant validity of the measured variables and that individual variables are not loading on a single underlying factor.

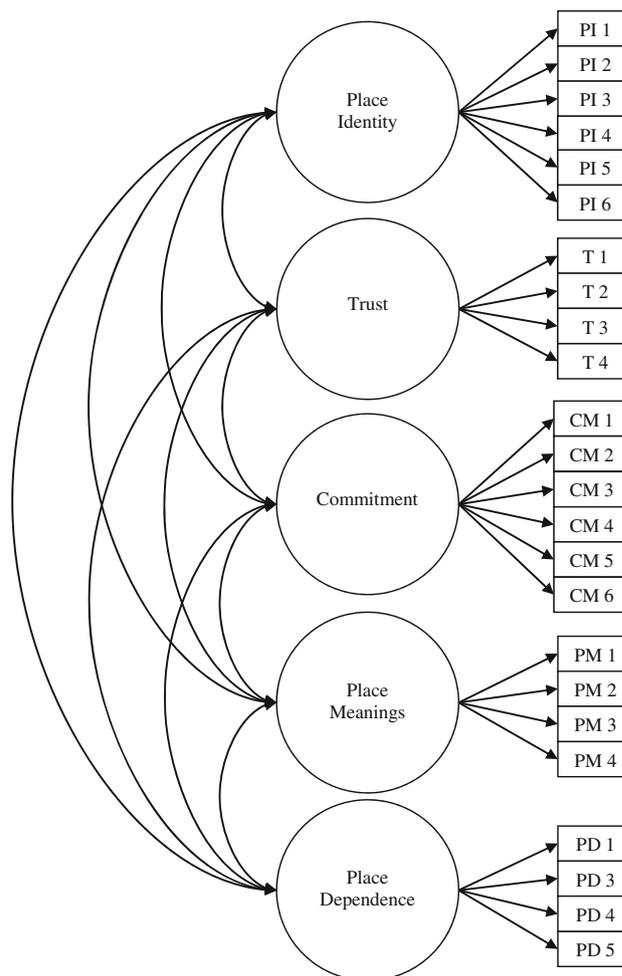
The next model tested the six hypothesized factors (place identity, life centrality, trust, commitment, place meanings, place dependence) and allowed for all factors to individually covary with each other. Values for goodness of fit indices [S–B  $\chi^2$  = 1,406.300 ( $P$  < 0.001, 390 df), CFI = 0.900 RMSEA = 0.068 (90 % CI = 0.064–0.072), SRMR = 0.064] were an acceptable approximation of model fit, but several fit indices were only marginally

within suggested cutoffs. Further, model testing suggested fit could be improved with additional respecification. The Lagrange multiplier (LM) test was conducted to determine whether specification of certain parameters as free rather than fixed would lead to a better fitting model (Byrne 1994). Results of the LM test suggested that the measured variable, “*I enjoy discussing the BW with my friends,*” should also be allowed to cross load on the place identity factor and the life centrality factor. However, the parameter estimates for this variable were only significant ( $P = 0.05$ ) for the place identity factor, not the life centrality factor, when cross loaded. The standardized regression equation for the model also indicated a very weak correlation (0.022) between the measured variable and the life centrality factor. Other suggested cross loadings included the measured item, “*Most of my friends are in some way connected with the BW*” between both place identity and life centrality, “*The connection I have with the Forest Service is of very little significance to me*” between trust and commitment, and “*No other place can compare to the BW*” between place meanings and place dependence.

While the respecification of the model demonstrated an improved goodness of fit, theoretically allowing variables to cross load on multiple factors may not make substantive sense. If indicators cross load on different factors, standardized estimates are no longer scaled as correlations, and the unique contribution from each factor cannot be as clearly interpreted. For these reasons, the crossing loading of measurement items was rejected, and items were instead dropped from further model respecification.

#### Five-Factor Model

By dropping those measured variables that showed a need to cross load on multiple variables, the life centrality factor in the full factor model was only then composed of two measured variables. Since first-order factors constructed by less than three measured variables run the risk of being underidentified in the model, the life centrality factor and its remaining measured variables were eliminated to respecify a new five-factor relationship model. Several goodness of fit indices for the new model were very similar to the full six factor model (RMSEA = 0.068, 90 % CI = 0.063–0.073, SRMR = 0.042). The CFI for the five-factor model increased modestly from 0.918 to 0.921 and the S–B  $\chi^2$  decreased to 878.090. However, the  $\Delta$ S–B  $\chi^2_{(42)} = 153.563$  was a significant decrease between the models. Based on these indices, the five-factor model was designated as the preferred first-order factor model to fit the data from the sample (Fig. 2). A summary of goodness of fit indices across all tested models is presented in Table 3.



**Fig. 2** Preferred first-order factor structure of wilderness relationship model

Additional statistical examination also supported the selection of the five-factor model as the preferred model. Individual parameter estimates were all significant ( $P = 0.05$ ) and factor loadings for measured items ranged from 0.713 to 0.945.  $R^2$  values, the proportion of explained common indicator variance (Kline 2005), were also high, ranging from 0.508 to 0.893 (Table 2).

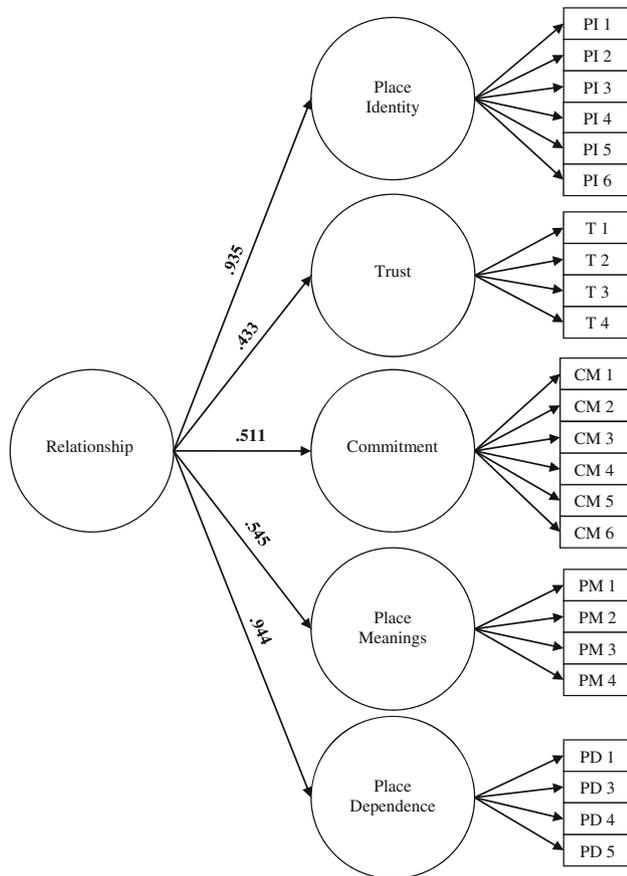
#### Second-Order Factor Analysis

Utilizing the underlying five-factor structure of the data, a second-order factor analysis was conducted to explore the presence of an overarching relationship factor. That is, the tested model contained a single second-order relationship factor measured by the five previously tested underlying first-order factors (place identity, trust, commitment, place meanings, and place dependence) (Fig. 3). The model goodness of fit statistics were as follows: S–B  $\chi^2 = 1,031.083$  ( $P < 0.001$ , 247 df), CFI = 0.903. RMSEA =

**Table 3** Summary of goodness of fit statistics for comparative wilderness relationship models

Model	Goodness of fit indices				
	S-B $\chi^2$	df	CFI	RMSEA (90 % CI)	SRMR
Single factor model	5,896.300	405	0.460	0.155 (0.152–0.159)	0.151
Full model w/complete covariance	1,406.300	390	0.900	0.068 (0.064–0.072)	0.064
Preferred five-factor model	878.090	242	0.921	0.068 (0.063–0.073)	0.042

Suggested fit indices cutoffs: CFI > 0.90–0.95, RMSEA 90 % CI = 0.05–0.08, SRMR < 0.08–0.10



**Fig. 3** Factor loadings for second-order wilderness relationship model

0.075, 90 % CI = 0.070–0.080), SRMR = 0.093. While arguably not as definitive as the first-order model goodness of fit statistics, these results were still a reasonable approximation of goodness of fit for the model based on the cutoffs suggested by Kline (2005).

Parameter estimates of the second-order relationship factor were all significant ( $P < 0.05$ ). Factor loadings between the relationship factor and both the place identity (0.935) and place dependence (0.944) factors were high.  $R^2$  values were also high (0.874 = place identity, 0.891 = place dependence) for both factors. Factor loadings of the remaining factors, trust (0.433), commitment (0.511), and place meanings (0.545), were all of a similar magnitude, but

substantially lower compared to place identity and place dependence.  $R^2$  values were also much lower (0.187 = trust, 0.261 = commitment, 0.297 = place meanings) for these factors. These results suggest that place identity and place dependence are both highly correlated with the relationship factor. While trust, commitment, and place meanings did not have as strong of connections with the relationship factor or explain as large a proportion of the variance, these parameters estimates were still significant. These results may have questionable practical significance from a management perspective, but do extend theoretical considerations even if practical significance is less than desired.

**Discussion**

Examination of the underlying structure of the data provides statistical support for a multidimensional relationship model, with the preferred model consisting of five first-order factors. That is, a unidimensional relationship model was found to be inadequate and both models with hypothesized dimensions and a model with an overarching relationship factor were preferred. We, thus, have empirical evidence that not only do relationships to wilderness exist, but support for the inclusion the hypothesized dimensions of self, management agency, and place in its measurement.

However, the elimination of the life centrality factor from the model is noteworthy and deserves further interpretation. Several reasons may explain the misspecification of life centrality. First, this concept was borrowed from leisure activity involvement, which is defined as how we think about our recreation and its effects on our behavior (Havitz and Dimanche 1997). Its intent was to tap into how central a role the BWCAW plays in visitors’ lives. However, the selected life centrality measurement items (Table 2) do not appear to adequately focus on this intent. Problematic items focused on an individual’s friends and their shared connection to the BWCAW. While these measurement items may be sufficient when discussing various types of activities (e.g., fishing), they do not appear to translate well to the BWCAW. This may be because the BWCAW is not the only thing that connects individuals to their friends (e.g., work, neighborhood, family) to the same

extent as everyday leisure activities might do. Another potential explanation is that theoretical similarity exists between the conceptualizations of life centrality and place identity. Both have origins that can trace back to the Jacob and Schreyer (1980) conflict model where activity style is operationalized as central life interest and the personal meanings attached to the activity. This redundancy could be responsible for the cross loading measurement items in the model and the reason why goodness of fit indices improved with the removal of the factor.

Another rationale for the omission of the life centrality factor from the model is that it specifies a less complex and more parsimonious model. By removing possible cross loadings between factors, problematic interpretation of factor loadings and standardized correlations were avoided. This is not to say that the challenging interpretations in model testing should always be addressed by the path of least resistance. It still remains important to temper decisions within the context of improvement in model goodness of fit. Thus, the achievement of a more parsimonious model in Fig. 3 provides rationale for accepting the model when considered in concert with the improvement in goodness of fit indices demonstrated in Table 3.

The underlying structure of the data also suggests that the proposed relationship model was highly influenced by the traditional elements of place attachment. Both place identity (0.935) and place dependence (0.944) showed strong standardized factor loadings in the model. Therefore, understanding how an individual functionally and emotionally connects with the BWCAW appeared to have an important role in the relationships that exists with that place. These findings also provide further supportive evidence for place identity and place dependence as important sub-dimensions of a place attachment construct.

To a certain extent though, we would suggest that the recent place research may have become stagnant, with researchers and managers struggling to apply this concept into natural resource and wilderness planning frameworks. This may be in part due to researchers relying on measuring the physical features and attributes of a given place. Such reliance ignores work that is increasingly focused on the social and psychological processes involved in developing relationships with wilderness areas (see Cole and Williams 2012). Our research supports such work that emphasizes the importance that place and a wilderness context play in individual relationships. That wilderness is a social construction that represents meanings, values, and personal experiences. It is influenced by external social, political, and managerial forces that affect the connections between the person, the place, and the individuals responsible for its management and protection. The concepts of trust and commitment in the model are intended to illustrate these influences. They represent the human

element of a relationship with wilderness and provide insight into how the image of the BWCAW is socially constructed between managers and visitors. This understanding encourages further investigation into the role that place and its meanings play in interpersonal relationships for a natural resource management and wilderness context. Thus, a more holistic conceptualization and understanding of the nature of human experiences with places (e.g., wilderness), which includes dimensions of meanings, trust, and commitment as proposed by this research may have utility in future research and management application.

#### Implications for Management and Research

Although development of a wilderness relationship framework is still in its early stages, the findings of this study contribute to the foundation that has emerged (see Brooks and Williams 2012; Cole and Williams 2012) for incorporating the concept of long-term human relationships into management strategies. An important insight in the wilderness relationships perspective is that understanding relationships is possible and that managers can use this understanding to foster and strengthen the lived experience with wilderness. For example, these relationships can be facilitated and fostered by placing emphasis on building trust and commitment with users. These factors can be promoted through open communication between the Forest Service and users through a transparent decision-making process. Barnes (1994) believes that creating a relationship leads to the individual taking more responsibility toward an organization. In this case, a relationship could lead to BWCAW users taking more ownership of the place and the management decisions and actions being implemented there. This increased level of involvement could be through the public participation process for forest planning, volunteering, or in educational efforts. With increased commitment, it is likely BWCAW managers would have increased support and understanding of their management decisions. In effect, building trust and commitment through wilderness relationships becomes a way to build a constituency of advocates for the protection and maintenance of the wilderness.

Front line Forest Service employees also play a critical role in the development of trust and commitment. It is their interactions with the public that may most directly influence the user's relationship to the agency and the BWCAW. Therefore, communication effectiveness and reliability is a key. Permit staff and law enforcement must strive to consistently explain rules and regulations and to some extent the values and rationale behind policy and management decisions. The information they provide, the public is going to be taken as the authoritative source. All employees do not have to only "tow the party line," but

staff should be made aware of the amount of responsibility and influence they have in affecting an individual's trust and commitment to the Forest Service and their stewardship of the BWCAW. Effective front-line management, both direct and indirect, along with open and transparent decision-making processes ultimately impacts visitors' relationships with wilderness as a whole.

A wilderness relationship perspective also allows managers to achieve the goal of elevating wilderness experiences to the realm of human life and well-being reflected in place identities (Brooks and Williams 2012). The pursuit of this goal presents the opportunity for managers to reinvent planning and decision-making as ways to work with partners in a community of practice. Both Stewart (2008) and Brooks and Williams (2012) see this reinvention as matching the nature of the phenomenon that is visitor experiences. This means positing place meanings and the lived experience at the forefront of land use decisions. Dialogs between stakeholders and managers that are structured to build community and document the place meanings across the landscape. As this study has suggested, the individual identities and attachments of users to the BWCAW were extremely important. Thus, managers can reframe processes to account for these meanings, values, and identities. They can track their existence and formation over time through the shared stories and narratives of stakeholders. They can link these narratives to the experiences individuals receive and potentially implement management actions that foster or protect those experiences.

For a shift in focus to managing relationships both directly and indirectly, future study is needed in measuring and monitoring relationships. However, such effort are less predicted and prescribed of experiences and relationships, and more toward monitoring and strengthening the relationships that exist within a community for a wilderness. Specifically, do individuals demonstrate a strong, enduring relationship to the wilderness area, or is their connection weak or indifferent? Do community narratives and historical dialog point to shifts in the relationship that resulted from management decisions? Answers to these questions could assist in the development of management recommendations that aim to foster enduring relationships in wilderness visitors. Such characterization of the relative strengths, for instance, could provide a scorecard for managers and targets for strengthening individual factors underlying relationships to wilderness.

Improvements in the measurement and modeling of wilderness relationships may also make it possible to classify users into relationship segments (e.g., new relationships, veterans, disgruntled users) in a fashion similar to previous public purpose marketing, experience use history, and trust studies (see Borrie et al. 2002; Liljeblad et al. 2007; Schreyer et al. 1984). These segments could

possibly be used by wilderness managers to prioritize management actions where relationships are threatened and to continue to facilitate strong relationships where present. Other actions related to resource and social conditions could also be influenced by the spectrum of relationship segments that are present across a wilderness landscape.

In addition to classifying relationship, future research should continue to investigate how relationships change over time. While this study posited relationships as ebbing and flowing over a life course, it was not sufficiently operationalized or measured in the current model. True longitudinal studies that tracked changes in a cohort or individual wilderness relationships would provide great insight to how external forces influence the elements of meaning, trust, commitment, and attachment. Ideally, a cohort study would be conducted that included a diversity of wilderness relationships within a context similar to the BWCAW. While such a research project is difficult to conduct and fund, it still represents a future goal of relationship research.

Lastly, an important outcome of this research was the integration of concepts from the fields of close interpersonal relationships and relational marketing into a wilderness context. While each of these fields has individually provided their own insights, their combination adds to the theoretical foundations provided in previous works. Integrating these disciplines into the relationship model moves thinking beyond the consumer–buyer aspects of relationships to a more personal and interpersonal connection between individuals. Opportunities still exists for further investigation, and application of these disciplines to natural resource and wilderness management in future research.

## Conclusions

This study posits the human experience of wilderness to be an evolving, enduring relationship. Its purpose was to explore the relationships with wilderness that users develop in the BWCAW and suggest a plausible wilderness relationship model that was adapted and tested in the BWCAW context. This relationship model is a conglomeration of identities, meanings, trust, and commitment. Arguably, this model can be used as a platform for further understanding the nature of experiences and meanings humans associate to varying wilderness contexts. It is a platform that allows and encourages integration across a variety of accepted paradigms in wilderness and natural resource management. Whether examining individual outcomes from wilderness experiences, or attempting to understand the cultural meanings attached to a wilderness landscape (see Watson et al. 2011), the notion of relationships with wilderness resonate with wilderness users and advocates. In the future,

these relationships may even come to represent our commitment to environmental well-being, and become indicators of our quality of life (Watson 2011).

Finally, this research approach complements the ongoing process of protected area management. It is an attempt to find new ways to address and implement actions that influence experience quality and foster ongoing connections between people, places, and management. By using relationships as a metaphor for understanding the human experience of wilderness, progress may be made in continuing to understand how individuals interact with wilderness settings and prescribe meaning to them. If wilderness managers can learn how to foster these relationships and retain a wilderness constituency, they may be more successful in achieving user compliance and protecting wilderness experiences, quality, and character.

**Acknowledgments** This research was funded by a Research Joint Venture Agreement (06-JV-11221644-177) between the USDA Forest Service, Rocky Mountain Research Station and The University of Montana, College of Forestry and Conservation. The authors would like to thank Ann Schwaller of the Superior National Forest, and Dr. Ingrid Schneider of the University of Minnesota for their support and many contributions to this project.

## References

- Arnould EJ, Price LL (1993) River magic: extraordinary experience and the extended service encounter. *J Consum Res* 20(1):24–45
- Barnes JG (1994) Close to the customer: but is it really a relationship? *J Mark Manag* 10:561–570
- Bentler PM (1990) Comparative fit indexes in structural models. *Psychol Bull* 107(2):238–246
- Bentler PM (2006) EQS 6 structural equations program manual. Multivariate Software Inc, Encino
- Berry LL (1995) Relationship marketing of services: growing interest, emerging perspectives. *J Acad Mark Sci* 23(4):236–245
- Berscheid E, Peplau LA (1983) The emerging science of relationships. In: Harold HK et al (eds) *Close relationships*. W. H. Freeman, New York, pp 1–19
- Borrie WT, Birtzell RM (2001) Approaches to measuring quality of the wilderness experience. In: Freimund WA, Cole DN (eds) *Visitor use density and wilderness experience: Proceedings 2000, 1–3 June, Missoula, MT*. USDA Forest Service, Rocky Mountain Research Station, Ogden, pp 29–38
- Borrie WT, Roggenbuck JW (1998) Describing the wilderness experience at Juniper Prairie Wilderness using experience sampling methods. In: Kulhavy DL, Legg MH (eds) *Wilderness and natural areas in the eastern North America: research, management, and planning*. Stephen F. Austin State University, Arthur Temple College of Forestry, Center for Applied Studies, Nacogdoches, pp 165–172
- Borrie WT, Roggenbuck JW (2001) The dynamic, emergent, and multi-phasic nature of on-site wilderness experiences. *J Leisure Res* 33(2):202–228
- Borrie WT, Christensen N, Watson AE, Miller TA, McCollum DW (2002) Public purpose recreation marketing: a focus on the relationships between the public and public lands. *J Park Recreat Adm* 20(2):49–68
- Bowker JM, Murphy D, Cordell HK, English DBK, Bergstrom JC, Starbuck CM, Betz CJ, Green GT (2006) Wilderness and primitive area recreation participation and consumption: an examination of demographic and spatial factors. *J Agric Appl Econ* 38(2):317–326
- Brooks JJ, Williams DR (2012). Continued wilderness participation: experience and identity as long-term relational phenomena. In: Cole DN (comp) *Wilderness visitor experiences: progress in research and management*. Proceedings of RMRS-P-66. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, pp 21–36
- Brooks JJ, Wallace GN, Williams DR (2006) Place as relationship partner: an alternative metaphor for understanding the quality of visitor experience in a backcountry setting. *Leisure Sci* 28: 331–349
- Brooks JJ, Wallace GN, Williams DR (2007) Is this a one-night stand or the start of something meaningful? Developing relationships to place in national park backcountry. In: Watson AE, Sproull J, Dean L (comps) *Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium*. Proceedings of RMRS-P-49. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, pp 451–459
- Bryan H (1977) Leisure value systems and recreation specialization: the case of trout fishermen. *J Leisure Res* 9:174–187
- Byrne BM (1994) *Structural equation modeling with EQS and EQS/Windows: basic concepts, applications, and programming*. Sage Publications, Thousand Oaks
- Chaudhuri A, Holbrook MB (2001) The chain of effects from brand trust and brand affect to brand performance: the role of brand loyalty. *J Mark* 65(April):81–93
- Clawson M, Knetsch JL (1966) *Economics of outdoor recreation*. Johns Hopkins Press, Baltimore
- Cole DN, Williams DR (2012). Wilderness visitor experiences: a review of 50 years of research. In: Cole DN (comp) *Wilderness visitor experiences: progress in research and management*. Proceedings of RMRS-P-66. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, pp 3–20
- Cvetkovich G, Winter PL (2003) Trust and social representations of the management of threatened and endangered species. *Environ Behav* 35(2):286–307
- Dvorak RG, Watson AE, Christensen N, Borrie WT, Schwaller A (2012). The boundary waters canoe area wilderness: examining changes in use, users, and management challenges. Research paper RMRS-RP-91. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, p 46
- Dwyer FR, Schurr PH, Oh SS (1987) Developing buyer–seller relationships. *J Mark* 51(2):11–27
- Fournier S (1998) Consumer and their brands: developing relationship theory in consumer research. *J Consum Res* 24(4):343–373
- Greider T, Garkovich L (1994) Landscapes: the social construction of nature and the environment. *Rural Sociol* 59(1):1–24
- Gustafson P (2001) Meanings of place: everyday experiences and theoretical conceptualizations. *J Environ Psychol* 21:5–16
- Haggard LM, Williams DR (1992) Identify affirmation through leisure activities: leisure symbols of the self. *J Leisure Res* 24: 1–18
- Havitz ME, Dimanche F (1997) Leisure involvement revisited: conceptual conundrums and measurement advances. *J Leisure Res* 29:245–278
- Hazan C, Shaver PR (1994) Attachment as an organizational framework for research on close relationships. *Psychol Inq* 5(1): 1–22
- Hinde RA (1995) A suggested structure for a science of relationships. *Pers Relationsh* 2:1–15
- Hirschman EC, Holbrook MB (1982) Hedonic consumption: emergent concepts, methods, and propositions. *J Mark* 46(3):92–101

- Hull RB, Stewart WP, Yi YK (1992) Experience patterns: capturing the dynamic nature of a recreation experience. *J Leisure Res* 24(3):240–252
- Jacob GR, Schreyer R (1980) Conflict in outdoor recreation: a theoretical perspective. *J Leisure Res* 12:368–380
- Jorgensen BS, Stedman RC (2001) Sense of place as an attitude: lakeshore owner's attitudes toward their properties. *J Environ Psychol* 21:233–248
- Kline RB (2005) Principles and practice of structural equation modeling, 2nd edn. The Guilford Press, New York
- Kyle G, 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. *J Leisure Res* 35(3):249–273
- Kyle G, Graefe A, Manning R, Bacon J (2004) Effect of activity involvement and place attachment on recreationists' perceptions of setting density. *J Leisure Res* 36(2):209–231
- Laursen B, Bukowski WM (1997) A developmental guide to the organisation of close relationships. *Int J Behav Dev* 21(4):747–770
- Liljeblad A, Watson AE, Borrie WT (2007) A look inside the dynamics of trust: a guide for managers. In: Watson A et al (eds) Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium, 30 September– 6 October, 2005, Anchorage, AK. Proceedings RMRS-P-49. USDA Forest Service, Rocky Mountain Research Station, Fort Collins
- Liljeblad A, Borrie WT, Watson AE (2009) Determinants of trust for public lands: fire and fuels management on the Bitterroot National Forest. *Environ Manag* 43:571–584
- Manzo LC (2003) Beyond house and haven: toward a revisioning of emotional relationships with places. *J Environ Psychol* 23:47–61
- Manzo LC (2005) For better or worse: exploring multiple dimensions of place meaning. *J Environ Psychol* 25:67–86
- Manzo LC (2008) Understanding human relationships to place and their significance for outdoor recreation and tourism. In: Kruger LE, Hall TE, Stiefel MC (eds) Understanding concepts of place in recreation research and management. General technical report PNW-GTR-744. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, pp 83–108
- McIntyre N, Pigram JJ (1992) Recreation specialization reexamined: the case of vehicle-based campers. *Leisure Sci* 14:3–15
- Mick DG, Buhl C (1992) A meaning-based model of advertising experiences. *J Consum Res* 19(3):317–338
- Moorman G, Zaltman G, Deshpande R (1992) Relationships between providers and users of market research: the dynamics of trust within and between organizations. *J Mark Res* 29(3):314–328
- Morgan RM, Hunt SD (1994) The commitment–trust theory of relationship marketing. *J Mark* 58(3):20–38
- Patterson ME, Watson AE, Williams DR, Roggenbuck JR (1998) A hermeneutic approach to studying the nature of wilderness experiences. *J Leisure Res* 30(4):423–452
- Peden J, Schuster R (2008) Assessing the transactional nature of wilderness experiences: construct validation of the wilderness-hassles appraisal scale. *Environ Manag* 42:497–510
- Proshansky HM (1978) The city and self-identity. *Environ Behav* 10:147–169
- Roggenbuck JW, Watson AE (1989) Wilderness recreation use: the current situation. In: Outdoor recreation benchmark 1988: proceedings of the National Outdoor Recreation Forum, 13–14 January, Tampa, Florida. U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, Asheville, pp 394–398
- Sarbin TR (1983) Place identity as a component of self; an addendum. *J Environ Psychol* 3:337–342
- Scherl LM (1989) Self in wilderness: understanding the psychological benefits of individual–wilderness interaction through self control. *Leisure Sci* 11:123–135
- Schreyer R, Lime DW, Williams DR (1984) Characterizing the influence of past experience on recreation behavior. *J Leisure Res* 16:34–50
- Schreyer R, Knopf RC, Williams DR (1985) Reconceptualizing the motive/environment link in recreation choice behavior. In: Stankey G, McCool SF (comps) Proceedings: symposium on recreation choice behavior. General technical report INT-184. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, pp 9–18
- Smaldone D, Harris C, Sanyal N (2008) The role of time in developing place meanings. *J Leisure Res* 40(4):479–504
- Stedman RC (2002) Toward a social psychology of place: predicting behavior from place-based cognitions, attitude, and identity. *Environ Behav* 34(5):561–581
- Stedman RC (2003a) Is it really just a social construction? The contribution of the physical environment to sense of place. *Soc Nat Res* 16:671–685
- Stedman RC (2003b) Sense of place and forest science: toward a program of quantitative research. *Forest Sci* 49(6):822–829
- Stewart WP (2008) Place meanings in stories of lived experience. In: Kruger LE, Hall TE, Stiefel MC (eds) Understanding concepts of place in recreation research and management. General technical report PNW-GTR-744. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, pp 83–108
- Watson AE (2004) Human relationships with wilderness: the fundamental definition of wilderness character. *Int J Wilderness* 10(3):4–7
- Watson AE (2011). The role of wilderness protection and societal engagement as indicators of well-being: an examination of change at the boundary waters canoe, area wilderness. *Soc Indic Res*. doi:10.1007/s11205-011-9947-x
- Watson AE, Borrie WT (2004) Monitoring the relationship between the public and public lands: applications to wilderness stewardship in the U.S. In: Aguirre-Bravo C et al (ed) Monitoring science and technology symposium: unifying knowledge for sustainability in the western hemisphere, proceedings RMRS-P-37-CD, September 20–24, 2004, Denver, CO. USDA, Forest Service, Rocky Mountain Research Station, Ogden
- Watson AE, Williams DR, Roggenbuck JW, Daigle JJ (1992) Visitor characteristics and preferences for three national forest wildernesses in the south (no. INT-RP-455). USDA Forest Service, Intermountain Research Station, Ogden
- Watson AE, Matt R, Knotek K, Williams DR, Yung L (2011) Traditional wisdom: protecting relationships with wilderness as a cultural landscape. *Ecol Soc* 16(1):36
- Wieselquist J, Rusbult CE, Foster CA, Agnew CR (1999) Commitment, pro-relationship behavior, and trust in close relationships. *J Personal Soc Psychol* 77(5):942–966
- Williams DR (1989) Great expectations and the limits to satisfaction: a review of recreation and consumer satisfaction research. In: Watson AE (ed) Outdoor recreation benchmark 1988: Proceedings of the National Outdoor Recreation Forum. USDA Forest Service general technical report SE-52. USDA Forest Service, Ogden, pp 422–438
- Williams DR (2000) Personal and social meanings of wilderness: constructing and contesting place in a global village. In: Watson AE, Aplet G, Hendee JC (eds) Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocations, vol II. USDA Forest Service Proceedings RMRS-P-14. Rocky Mountain Research Station, Ogden, pp 77–82

- Williams DR, Patterson ME (1999) Environmental psychology: mapping landscape meanings for ecosystem management. In: Cordell HK, Bergstrom JC (eds) Integrating social sciences and ecosystem management: human dimensions in assessment, policy and management. Sagamore, Champaign, pp 141–160
- Williams DR, Patterson ME (2007) Snapshots of what, exactly? A comment on methodological experimentation and conceptual foundations in place research. *Soc Nat Res* 20(10):931–937
- Williams DR, Vaske JJ (2003) The measurement of place attachment: validity and generalizability of a psychometric approach. *Forest Sci* 49(6):830–840
- Williams DR, Haggard L, Schreyer R (1989). The role of wilderness in human development. In: Freilich H (comp) Wilderness benchmark 1988: proceedings of the National Wilderness Colloquium, General technical report SE-51. U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station, Asheville, pp 169–180
- Williams DR, Patterson ME, Roggenbuck JW, Watson AE (1992) Beyond the commodity metaphor: examining emotional and symbolic attachment to place. *Leisure Sci* 14:29–46
- Winter PL, Palucki LJ, Burkhardt RL (1999) Anticipated responses to a fee program: the key is trust. *J Leisure Res* 31(3):207–226