



## Pro-environmental behaviours and park visitors: The effect of place attachment

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### A B S T R A C T

The purpose of this study was to explore the ability of place attachment to predict place-specific and general pro-environment behavioural intentions. The study sample ( $n = 355$ ) consisted of visitors to a Canadian national park, Point Pelee National Park. The place attachment scale utilized in this study was designed to measure three subdimensions: place identity, place dependence, and place affect. Exploratory factor analysis of data measured by these scales revealed two place attachment subdimensions. Place affect, an individual's emotions and feelings for a place, acted as a more generalized or pervasive phenomenon. Place affect items loaded on both the place identity (an individual's cognitive assessment of a place) and place dependence (an individual's functional assessment of a place). Structural equation modeling confirmed the strength of place attachment's ability to predict place-related pro-environment intentions. It also identified place attachment's prediction of pro-environment behavioural intentions related to everyday life. Place identity mediated the effects of place dependence in predicting pro-environment intentions. Further research which utilizes in-depth and longitudinal case studies is suggested to explore the role of place-specific emotion and feelings, as well as place identity in fostering environmentally-responsible action as these factors are theorized to play an important role in promoting pro-environmental behaviour. Studies of place attachment to everyday settings rather than iconic national parks are also called for.

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### 1. Introduction and background

Increasingly, humans around the world demonstrate not only heightened understanding of the planet's environmental crisis but also support for the protection of nature and the conservation of resources (Fransson & Garling, 1999; Schahn & Holzer, 1990; Schultz, 2000; Schultz & Zelezny, 1998). However, most fail to make choices that benefit the environment or at least minimize negative environmental impacts. Researchers are striving to understand this disconnect between environmental attitudes, awareness, and behaviour. Some of their efforts have been devoted to the identification and study of factors that may affect pro-environment behaviour. Many variables encourage or stifle environmentally-responsible behaviour. These factors range from financial and time constraints to values and belief systems (Bamberg & Moser, 2007; Blake, 2001; Dietz, Kalof, & Stern, 2002; Hines, Hungerford, & Tomera, 1987; Kaiser & Shimoda, 1999; Newhouse, 1990; Schultz, 2000). One understudied factor that may affect individuals' engagement in environmentally-responsible behaviour is attachment to a particular place.

A place is a spatial location that is assigned meanings and values by society and individuals. Place can be tangible or intangible, and over time, its significance and meaning varies between individuals, groups, and cultures. Research can assist in predicting the actions that individuals or groups take in accordance with the feelings, meanings, and values that they assign to a place, especially when that place is under threat (Cass & Walker, 2009; Eisenhauer, Krannich, & Blahna, 2000; Wakefield, Elliott, Cole, & Eyles, 2001; Williams & Stewart, 1998). Such feelings and behaviours are most likely to occur when an individual or group is positively attached to a place (Burley, Jenkins, Laska, & Davis, 2007; Lewicka, 2005; Mesch & Manor, 1998; Stedman, 2003a; Walker & Ryan, 2008; Wheaton, 2007). This study defines *place attachment* as an emotional, cognitive, and functional bond with a place (Jorgensen & Stedman, 2001) and examines the specific effect of the relationship between place attachment and pro-environment behaviour. This responds to a call for increased study of the effects of place attachment on human behaviour (Payton, Fulton, & Anderson, 2005; Stedman, 2003a, 2003b; Vaske & Kobrin, 2001; Williams & Vaske, 2003).

Planners and managers charged with protecting cultural and natural resources are interested in determining what factors affect peoples' decisions to support the conservation of landscapes and natural resources. Positive attachments to a place may be linked to the willingness of individuals to participate in the protection of that

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place (Relph, 1976; Schultz, 2000; Tuan, 1977; Walker & Chapman, 2003). Vaske and Kobrin (2001) speculated that a positive attachment to a place, particularly a nature-based setting such as a park, may be strongly linked to an individual's performance of behaviours that benefit the global environment. Vaske and Kobrin suggested that the connection between place identity and self may result in the carry-over of specific, sustainable place-related behaviours that influence environmentally-responsible behaviour in other aspects of an individual's life. However, this carry-over effect is less clear than the relationship between place attachment and place-specific pro-environment behaviour.

In summary, the central purpose of this study is to explore the relationship between an individual's place attachment and his or her: (a) place-specific pro-environment behavioural intentions and (b) general pro-environment behavioural intentions. The former objective has rarely been studied (Kaltenborn, 1998; Stedman, 2002; Uzzell, Pol, & Badenas, 2002; Walker & Chapman, 2003), and the latter has been explored only once before (Vaske & Kobrin, 2001). This paper reports on an investigation of these relationships that utilized data from a survey of visitors to a Canadian national park in 2005.

## 2. Literature review and instrumentation

### 2.1. Place attachment

Concepts and characterizations of place attachment vary based on disciplinary perspective. For this study, literature from outdoor recreation studies and environmental psychology helped shape the definition and characterization of place attachment. As a result, in this study place attachment was defined as a bond with a particular place<sup>1</sup> (Giuliani, 2003; Low & Altman, 1992; Manzo, 2003) and characterized as having functional (place dependence), cognitive (place identity), and affective (place affect) aspects (Giuliani, 2003; Hinds & Sparks, 2008; Jorgensen & Stedman, 2001; Manzo, 2003, 2005; Williams, Patterson, Roggenbuck, & Watson, 1992). These three subdimensions of place attachment—place dependence, place identity, and place affect—are defined next.

#### 2.1.1. Place dependence

Place dependence is defined in this study as functional attachment to a place (Stokols & Shumaker, 1981). Stokols and Shumaker suggested that place dependence is determined by two elements: the qualities of a particular place and the relative quality of comparable alternative places. Groups and individuals assess places in terms of functionality, that is, the extent to which they enable the execution of certain activities. In this study, place dependence conceptually represents the conative domain and embodies the actions or behavioural tendencies of an individual regarding a place (Borden & Schettino, 1979).

#### 2.1.2. Place identity

Proshansky (1978) defined place identity as.

dimensions of self that define the individual's personal identity in relation to the physical environment by means of a complex

<sup>1</sup> It is recognized that a bond with a place can be negative and positive, and perhaps both for the same individual. For example, an individual may be stuck in a forestry community because he or she lacks the financial resources or skills to secure employment elsewhere (negative attachment). At the same time, the individual may also be positively attached to the community because he or she has a social network there that is emotionally fulfilling (Beckley, 2003; Manzo, 2003, 2005). However, because this study is focused on positive feelings held for a particular natural area or park and the pro-environment behavioural intentions that this may elicit, a characterization of place attachment that emphasizes positive emotional reactions or ties to a place is used in this study.

pattern of conscious and unconscious ideas, beliefs, preferences, feelings, values, goals, and behavioural tendencies and skills relevant to this environment. (p. 155)

In short, place identity is one factor that contributes to individuals' self-identity and helps them structure their experiences with various physical environments (Proshansky, 1978; Shumaker & Taylor, 1983). It has also been described as the symbolically important connection between an individual and a setting (Lalli, 1992; Stedman, 2002), between an individual and the natural world (i.e., environmental identity, Clayton, 2003), and as a psychological investment with a setting that has developed over time (Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani, 1999; Fried, 1963; Williams & Patterson, 1999). Extensive interaction with a place due to place dependence may lead to place identity (Moore & Graefe, 1994).

#### 2.1.3. Place affect

Many environmental psychology authors note the importance of affect as an aspect of individuals' bonds with places, be they positive or negative emotions (Giuliani, 2003; Kals & Maes, 2002; Kals, Schumacher, & Montada, 1999; Low & Altman, 1992; Manzo, 2003, 2005; Pooley & O'Connor, 2000). This affective connection has been noted in the resource management, ecology, and outdoor recreation literature as well (e.g., Beckley, 2003; Jorgensen & Stedman, 2001; Milton, 2002). Based on these researchers' observations *place affect*, the emotions and feelings of an individual towards a particular place, was proposed as a third subdimension of place attachment.

### 2.2. Pro-environment behaviours

Despite increased awareness that problems with the environment exist and that human activities are often the cause of these problems, individuals frequently fail to choose behaviours that will help lessen their impact on the environment (Bamberg & Moser, 2007; Dunlap & Scarce, 1991; Howell & Laska, 1992; Kollmuss & Agyeman, 2002; Tarrant & Cordel, 1997). Therefore, in addition to exploring the elements of place attachment, this study also examined park visitors' pro-environment behavioral intentions. In this study, *pro-environment behaviour* is defined as an action by an individual or group that promotes or results in the sustainable use of natural resources (Sivek & Hungerford, 1989/1990).

During the past several decades, researchers have attempted to understand this disconnect between environmental awareness and pro-environment behaviour. One of the focuses of this study is the relationship between environmental attitudes and behaviours. This focus is based in part upon the theory that attitudes towards objects and the behaviours that affect them shape the desire to perform the behaviour (Fishbein & Ajzen, 1975; Weigel, 1983). Unfortunately, only modest correlations between environmental attitudes and behaviours have been reported (Buttel, 1987; van Liere & Dunlap, 1981; Scott & Willits, 1994). Such results may be attributed to several factors, including a reliance on poor measurement tools, such as survey instruments characterized by a lack of congruence or specificity between the attitudinal and behavioural measures, and failure to recognize the influence of external factors on behavioural prediction (Corral-Verdugo, Bechtel, & Fraijo-Sing, 2003; Tarrant & Cordel, 1997; Tarrant & Green, 1999).

### 2.3. The relationship between place attachment and pro-environment behaviour

Place theorists speculate that a "field of care" for a place develops through ongoing interaction with it (Tuan, 1977). Relph

(1976) suggested that places can foster a sense of commitment and responsibility. Environmental behaviouralists also theorize that in addition to the emotional connection, increased knowledge about a place increases the likelihood that individuals will demonstrate place-protective behaviours (Kals et al., 1999; Pooley & O'Connor, 2000; Schultz, 2000; Walker & Chapman, 2003).

Only a few empirical studies have explored the link between place attachment and pro-environment intentions and behaviours. However, commonalities can be observed in the community attachment literature that highlights a link between place attachment and protective action. For example, Sampson and Groves (1989) found that individuals who demonstrate higher levels of neighbourhood attachment were more likely to develop a set of norms and undertake actions that reduce crime. Mesch (1996) found that residents with higher levels of neighbourhood attachment were more likely to fight against attempts to change the social and physical nature of their neighbourhood. Guest and Lee (1983) observed that sentiment, indicated by the degree to which respondents would miss an area after moving away from it, affected the probability of individuals' moving away from their community and taking political action to defend their community. Wakefield et al. (2001) found that residents with a well developed sense of belonging in a neighbourhood were more likely to engage in civic action (i.e., fight against air pollution) than individuals with lower attachment levels.

Empirical research from the field of resource management also supports the link between interaction with natural environments and care for or support of those same environments. For example, in a study exploring attitudes of forest recreationists towards oil and gas development, Langenau, Peyton, Wickham, Caverney, and Johnston (1984) found that personal contact with natural landscapes contributed to environmental sentiment. Similarly, Borrie and Roggenbuck (2001) employed experience sampling method and observed that "care for the wilderness" (p. 202) was higher amongst park visitors at the end of their visit to a U.S. wilderness area than at their entry; this result suggested that prolonged interaction with the wilderness served to raise individuals' attachment to the environment. More recently, Walker and Ryan (2008) found that Maine residents who were highly attached to the state's rural landscapes expressed greater willingness to support and engage in conservation initiatives designed to protect these landscapes.

Within the recreation literature, several studies identified a possible link between place attachment and environmental behaviour. Kyle, Graefe, Manning, and Bacon (2004), in their study of hikers on the Appalachian Trail, noted that as place identity increased, perceptions of negative environmental conditions became more pronounced. Bricker and Kerstetter (2000) reported that whereas place-dependent recreationists were generally more concerned with resource development and maintenance, recreationists displaying high tendencies towards place identity were more often associated with an interest in resource preservation and maintaining primitive settings.

Five studies from the fields of resource management and environmental psychology have moved beyond a focus on environmental sentiment and awareness to document the relationship between place attachment and pro-environment behaviours. Kaltenborn's (1998) study was one of the first to examine the link between place attachment<sup>2</sup> and pro-environment behavioural intentions. Kaltenborn studied local residents' relationships with

their home archipelago in the Norwegian Arctic. He grouped respondents into three clusters according to the intensity of their place attachment. Next, he compared the groups' self-reported environmental intentions by providing different environmental impact scenarios and asking residents to indicate how these impacts would affect their recreational choices and pro-environment actions. The study illustrated that place attachment played a role in residents' reactions to environmental impacts. A stronger attachment was associated with a lower tolerance of increased tourism, a smaller likelihood of choosing a different location to recreate in when threatened with small amounts of shoreline oil pollution, and increased likelihood of getting involved with solutions to environmental problems.

Vaske and Kobrin (2001) took a much different approach to studying the relationship between place attachment and pro-environment behaviour. They explored the effects of two place attachment subdimensions, place dependence and place identity, on general environmental behaviours. They found that: (a) as place dependence increased, place identity increased; (b) as place identity increased, self-reported pro-environment behaviour increased; and (c) place identity mediated the relationship between place dependence and general self-reported pro-environment behaviours. Vaske and Kobrin's study is the only one to date that has investigated the effect of place attachment on general pro-environment behaviour rather than place-specific behaviour. The study's sample was taken from a population of youth involved with a resource management program and should be repeated with an adult population, a task this study addresses.

Stedman (2002) treated place attachment as a single-dimensional construct and used measures from Williams and Roggenbuck's (1989) place attachment scale to examine the impact of place attachment on pro-environment behavioural intentions. Stedman found that a positive emotional and identity-based attachment to a place strongly influenced the intentions of seasonal and full-time lake district residents to engage in place-protective behaviours.

Walker and Chapman (2003) surveyed visitors to a Canadian national park. Like many other place studies situated in natural settings, they used a modified version of Williams and Roggenbuck's (1989) place attachment scale to measure place attachment. Walker and Chapman reported that nearly all pro-environment behavioural intentions appeared to be significantly affected by place attachment. These intentions ranged from "volunteer for the park" to "site-specific best practice behaviours" (p. 75). The only class of pro-environment intention indicators that did not appear to be influenced by place attachment were self-focused, non-depreciative intentions. The authors believed this may have been because these items were reverse coded.

Finally, Uzzell et al.'s (2002) study differs significantly in its focus from the other studies described here, in that its operational definition of place and attachment to place was based largely on social identity. Residents of two UK communities were asked to indicate their sense of satisfaction with their neighbourhoods as places to live, to name and describe the geographic location of their communities (place identification), and to describe the social cohesion or sense of community togetherness that they felt. The researchers examined the relationships between these social identity factors and the residents' self-reported environmental knowledge, attitudes, and behaviours. Although residents claimed a degree of pro-environmental concern, their actions did not appear to always follow, especially when it came to personal sacrifice. For example, residents often made purchasing decisions based on price rather than environmentally sustainable production of a product. The authors reported that in one case study village, those with a strong sense of social cohesion and social identity with

<sup>2</sup> Like Jorgensen and Stedman (2001), Kaltenborn used the phrase *sense of place*, but for comparative purposes in this study the term *place attachment* is inserted to maintain consistency.

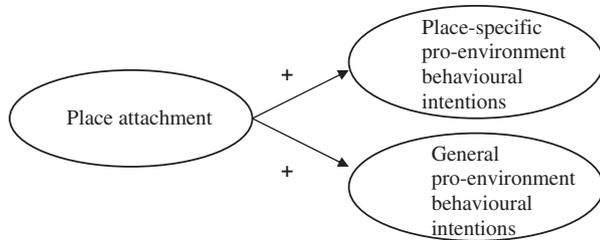


Fig. 1. The positive effect of place attachment on pro-environment behavioural intentions.

the neighbourhood expressed increased intention to engage in general pro-environment behaviours. The opposite was observed in the second case study village. One of the factors that could have contributed to the mixed results of Uzzell et al.'s study is the lack of congruence between the village-specific social identity measures and the environmental behaviour measures, which were based on general purchasing decisions unconnected with the two case-study sites.<sup>3</sup>

After reviewing these five studies and other environmental behaviour literature, it was anticipated that visitors to Point Pelee National Park who demonstrate increased place attachment would also demonstrate high levels of pro-environment behavioural intentions towards the place of attachment, in this case a park. This relationship is envisioned in Fig. 1.

One can also explore the nuances of the relationship between place attachment and pro-environment behavioural intentions by using different measures for behavioural intentions. An overview of recreation, resource management, and environmental literature reveals that most studies examine the link between attachment to a specific place and intentions or actions to protect that place. It is also important to continue the work begun by Vaske and Kobrin (2001) that explores the relationship between place attachment and behaviour towards the environment in general. This study follows Vaske and Kobrin's example, but examines environmentally-responsible intentions that will benefit a specific site as well as actions that promote general environmental well being. This proposed positive effect of place attachment on general environmental behaviour is depicted in Fig. 1.

### 3. Methodology

The present study used a number of methodological frameworks to explore the relationship between place attachment and pro-environment behavioural intentions. Rooted in the traditions of social psychology (Mannell & Kleiber, 1997) and environmental psychology (Bonnes & Secchiarioli, 1995) the research was guided in part by Fishbein and Ajzen's (1975) Theory of Reasoned Action, which posits that the best predictor of behaviour is the intention to perform the behaviour (see Fig. 2). In turn, the intention to perform the behaviour is believed to be caused, to some extent, by the individual's attitude towards performing the behaviour. This study

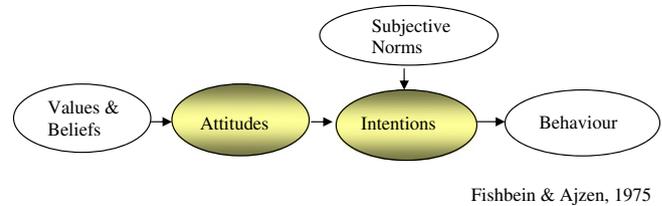


Fig. 2. Theory of Reasoned Action.

proposes that an individual's intention to perform environmentally-responsible behaviours towards (a) a specific place and (b) the environment in general can be partially predicted by an individual's previous experience with a place and the place attachment that develops from that experience. In summary, this study measures one facet of Fishbein and Ajzen's model: the effect of attitudes towards a place (i.e., place attachment) on behavioural intentions (i.e., pro-environment behavioural intentions).

#### 3.1. Operationalization

Consistent with previous research into place attachment and the relationship between environmental attitude and behaviour, data for this study was obtained through self-administered questionnaires. Babbie (1990) suggested that quantitative surveys are excellent vehicles for measuring attitudes in a large population, and he supported the use of questionnaire-based surveys for the testing of theory—two objectives of the present study. The survey instrument used in this study was guided by approaches used in previous studies and tailored to the Point Pelee National Park setting.

##### 3.1.1. Measuring place attachment

The scale used to measure place attachment in this study is based, in part, on Jorgensen and Stedman's (2001) conceptualization of place attachment as an attitude with three subdimensions: conative, cognitive, and affect (Halpenny, 2006). Their scale drew on Williams and Roggenbuck's (1989) initial attempts to measure place attachment. Williams and Roggenbuck's scale was developed in part from Proshansky's (1978) conceptualization of place identity as a cognitive connection between the self and a physical environment, and from Stokols and Shumaker's (1981) focus on the functional value of a setting for individuals. Williams and Roggenbuck's scale was also influenced by Schreyer, Jacob, and White's (1981) emphasis on the importance of place dependence and place identity. Adding to Williams and Roggenbuck's identity (cognitive) and behavioural (conative) elements of place attachment, this present study selected and modified items intended to measure an individual's affective response to a place. The place affect items were drawn from scales from Jorgensen and Stedman (2001), Walker and Chapman (2003), and Williams and Roggenbuck (1989). The final place attachment scale had three sets of items (see Appendix 1), each containing four to six items designed to measure one subdimension of place attachment. A preliminary test of the place attachment scale was administered to undergraduate students at a Canadian university ( $n = 80$ ). Results from this preliminary test and a peer review process ( $n = 7$ ) were used to ensure clarity and reliability of the survey items and scale.

##### 3.1.2. Measuring pro-environment behavioural intentions

Intentions are studied here rather than actual behaviours, as it is the encouragement of pro-environment behaviour in the future that is of interest. Additionally, studying behaviours directly is difficult and costly. Behavioural intentions have proven to be

<sup>3</sup> Although Uzzell et al. (2002) measured several place-specific attitudes and behaviours associated with each village context (e.g., sense of responsibility for and involvement in care of common environment; awareness of the life cycle of local waste), they used general purchasing patterns of respondents (i.e., what degree did respondents buy products that were low energy consumption, could be recycled, and/or reused) to represent respondents' environmental behaviours in the structural equation modeling portion of the analysis. These behaviours are not particularly place-specific and therefore may have contributed to lack of positive relationship between social identity and environmental behaviours as observed in one of the villages.

effective indicators of future behaviours (Ajzen, 1988; Fishbein & Ajzen, 1975; Kraus, 1995).

There is no standardized scale for measuring pro-environment behavioural intentions. The behavioural intentions scales used in this study were modeled after pre-existing environmental behaviour scales and modified to fit the current study objectives, setting, and population. General pro-environment behavioural intention items were drawn from several environmental behaviour studies (McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995; Schultz & Zelezny, 1998; Smith-Sabasto & D'Costa, 1995; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; van Liere & Dunlap, 1981; Vaske & Donnelly, 1999; Vaske & Kobrin, 2001). Place-specific pro-environment behavioural intention items were modified from Vaske and Kobrin (2001) and Walker and Chapman (2003). Three dominant themes guided the selection of environmental behaviour measures: universality (engagement in behavioural items was feasible for as many individuals as possible), diversity (items represented many different kinds of environmental actions), and specificity (behavioural items were congruent in scale or extent to attitudinal items). These scales, which are fully described in Appendices 2 and 3, were also pretested through administration to university students ( $n = 80$ ) and subjected to a peer review process.

### 3.2. Study context, sample selection, and questionnaire distribution

Canada's Point Pelee National Park is an internationally significant migratory site for birds and an important ecological sanctuary for Carolinian species. The park also contributes to the healthy functioning of the Great Lakes system through the protection of one of the lakes' last remaining great marshes. Located in south-western Ontario on the edge of Lake Erie, the park is within a 3 h drive of large urban populations including Detroit, Michigan and Toronto, Ontario. It is an international destination for birders and serves as a convenient recreational location for local residents. The park has no camping facilities; instead its interpretive centre, forested hiking trails, beaches and marsh board walks provide day visitors with an eclectic mix of outdoor recreation opportunities. See Photos 1 and 2 for further illustration of the park's attributes. Parks Canada, the managing agency of the park, was a cooperative partner in collecting study data (Halpenny, 2006).

Individuals who had visited Point Pelee National Park in the last four years were mailed the questionnaire. A quota sample was developed to capture a diversity of visitors, ranging from season pass holders who return to the park on a frequent basis to visitors who had only been to the park once. It was anticipated that this assortment would provide a final study sample that would demonstrate a range of high and low attachment to the park. Recipient addresses were obtained from a database maintained by park staff; the data base does not represent all visitors, only those who bought park passes, filled out a request for information card, or were members of the parks Advisory Board or Friends group.

The survey instruments were mailed with an addressed, postage-paid return envelope. A reminder post card was sent approximately two weeks later. Gift certificates to the park's gift shop and seasonal group passes were used as incentives to increase return rates (Dillman, 2000). Of the initial 1191 surveys mailed, 80 were returned because of incomplete or out-of-date mailing addresses. A response rate of 33% ( $n = 355$ ) was achieved. A nonresponse bias check was conducted by comparing early respondents ( $n = 305$ ) with late respondents ( $n = 50$ ; Linder, Murphy, & Briers, 2001; Miller & Smith, 1983), and later by telephone calls to 20 nonrespondents. Comparisons of responses to questions by these groups showed no significant difference between respondents and nonrespondents with regard to age, education, frequency of visitation, place attachment, and satisfaction with place.

## 4. Findings

### 4.1. Scale testing

The reliability of the place attachment scale was determined to be very good ( $\alpha = .92$ , 16 items; DeVillis, 1991; Nunally, 1978). The three place attachment subscales also produced reasonable reliability scores. The four-item place dependence subscale presented a coefficient alpha of  $\alpha = .75$ . Higher scores were produced by the larger six-item subscales that measured place identity ( $\alpha = .86$ ) and place affect ( $\alpha = .82$ ).

To evaluate the internal consistency of the place attachment scale, item-to-item correlations were calculated. The resulting statistic provides an indication of the degree to which each item correlates with the scale's total score (DeVillis, 1991; Pallant, 2007). The corrected item-total correlations for the 16-item scale ranged from  $r = .24$  to  $.74$ ; all but one of these correlations fell within an acceptable standard (i.e.,  $r \geq .3$ ; Nunally, 1978). The item, "The things I do at Point Pelee N.P. I would enjoy doing just as much at a similar site" was identified as a candidate for removal ( $r = .24$ ). It was speculated that this item loaded poorly with the other place attachment items because it was a negatively phrased item (Barnette, 2000; Kaiser, Wolfing, & Fuhrer, 1999). The negatively phrased item was reverse coded prior to analysis. With the elimination of this item the Cronbach's alpha score of the 15 item place attachment scale improved to  $\alpha = .93$  and the three item place dependence scale, in which this item was originally included, improved to  $\alpha = .82$ .

In response to calls in the literature to explore the dimensionality of place attachment (e.g., Hammitt, Backlund, & Bixler, 2006; Hidalgo & Hernandez, 2001; Jorgensen & Stedman, 2001; Kaltenborn, 1998; Kyle, Graefe, & Manning, 2005; Williams & Vaske, 2003), data were analysed using exploratory factor analysis (i.e., principal component analysis). Oblique rotation was performed because it was assumed the factors would be correlated (Tabachnick & Fidell, 2001). Prior to performing the factor analysis a Kaiser-Meyer-Olkin value was calculated. A value of  $.91$  was observed; this exceeded the minimum requirement of  $.6$  suggested by Kaiser (1970, 1974). Additionally Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix. A principal component analysis of the 15-item place attachment responses provided support for the existence of two factors. Kaiser's criterion, which suggests identifying factors with eigenvalues equal to or higher than 1.0, and an inspection of Catell's (1966) scree plot were consulted to assist in the identification of these two factors; however the final decision for retaining two factors was based on results of Horn's parallel analysis (Watkins, 2000) which compared the size of the eigenvalues with those obtained from a randomly generated data set of the same size (15 variables  $\times$  355 respondents; 100 replications). The parallel analysis results suggested eigenvalues equal to or over 1.36 as an appropriate score to use to identify factors from the place attachment data. Parallel analysis has been shown to be more accurate in estimating the number of factors than scree plots or Kaiser's criterion (Hubbard & Allen, 1987; Pallant, 2007; Zwick & Velicer, 1986).

The two component solution explained a total of 60% of the variance, with Factor 1 explaining 49.0% and Factor 2 contributing 10.8%. The component correlation matrix confirmed a strong negative relationship between the factors ( $r = -.57$ ). As described previously in this paper, the author originally designed the scale to measure all three facets of an attitudinal conceptualization of place attachment; however, a distinction between the three phenomena failed to materialize. The two-factor principal component analysis revealed a pattern of items that was somewhat similar to

**Table 1**  
Levels of place attachment.

Level of attachment categories	Place Attachment ( <i>n</i> = 355)	Place Affect ( <i>n</i> = 355)	Place Identity ( <i>n</i> = 354)	Place Dependence ( <i>n</i> = 351)
	<i>M</i> = 3.6	<i>M</i> = 3.8	<i>M</i> = 3.8	<i>M</i> = 2.9
	<i>SD</i> = .64	<i>SD</i> = .62	<i>SD</i> = .69	<i>SD</i> = .93
Very low to moderately low (1 & 2)	19 (5.4)	12 (3.4)	13 (3.7)	112 (31.5)
Neutral (3)	139 (39.2)	106 (29.9)	99 (27.9)	147 (41.4)
Moderately high (4)	167 (47.0)	48 (51.5)	179 (50.5)	80 (22.5)
Very high (5)	21 (5.9)	48 (13.5)	56 (15.8)	11 (3.1)

Note 1: Likert-type scale ranging from 1 = “Low attachment” to 5 “High attachment”.

Note 2: Percentages in parentheses.

Note 3: “Strongly disagree” (1) and “Somewhat disagree” (2) were collapsed into “Very low to moderately low” attachment.

Note 4: Means and standard deviation calculated after single items were removed from place identity, place affect and place dependence scales due to scale reliability and principal components analysis results. Item totals for each scale were reduced to 13 (place attachment), 5 (place identity), 5 (place affect), and 3 (place dependence).

the findings of a majority of previous place attachment research that has utilized Williams and Roggenbuck's (1989) scale items (Williams & Vaske, 2003). Two factors, one dominated by place identity items and the second by place dependence items, were identified. However, the distinctions between these subdimensions were far less clear than in previously reported studies. Both were characterized by items that were initially designed to measure place affect. Additionally, one place identity and one place affect item loaded with near equal strength on both factors. These items were subsequently dropped during the structural equation modeling (SEM) portion of the study. (See Appendix 1 for a list of the final place attachment items used).

A similar process was conducted for the pro-environment behavioural intentions scale items. Reliability was examined first. A Cronbach's alpha value of  $\alpha = .85$  (11 items) was achieved for the general behavioural intentions scale after one item, “Sort garbage into recyclable materials and non-recyclables,” was removed. The removal of the item was based on its corrected item–total correlation score (it was less than  $r = .3$ , the statistical threshold traditionally employed to evaluate relationships between scale items; Nunally, 1978) and its demonstrated lack of discriminatory power (i.e., nearly every survey respondent agreed they would engage in waste sorting in the near future). The suitability of the data for factor analysis was first examined; a Kaiser-Meyer-Olkin value of .87 and statistical significance achieved with the Bartlett's Test of Sphericity supported the factorability of the correlation matrix (Pallant, 2007). Exploratory factor analysis using principal component analysis revealed that the 11 park intentions items loaded largely on one factor. The identification of a single factor was based on Horn's parallel analysis (Watkins, 2000) (11 variables  $\times$  355 respondents; 100 replications) which recommended selecting factors with eigenvalues equal to or over 1.29. The single factor solution generated by the general pro-environment behavioral intentions scale data explained 41% of the variance.

**Table 2**  
Likelihood of engaging in park-specific and general pro-environment behaviours within the next 12 months.

Likelihood of pro-environment behavioural intentions categories	Park-specific intentions ( <i>M</i> = 3.8, <i>n</i> = 344, <i>SD</i> = .70)	General environment intentions ( <i>M</i> = 3.7, <i>n</i> = 349, <i>SD</i> = .68)
Very low to mod. low (1 & 2)	16 (4.5)	17 (4.8)
Neutral (3)	75 (21.1)	102 (28.7)
Moderately high (4)	193 (54.4)	184 (51.8)
Very high (5)	60 (16.9)	46 (13)

Note 1: Percentages in parentheses.

Note 2: Likert-type scale ranging from 1 = “Not probable” to 5 “Highly probable”.

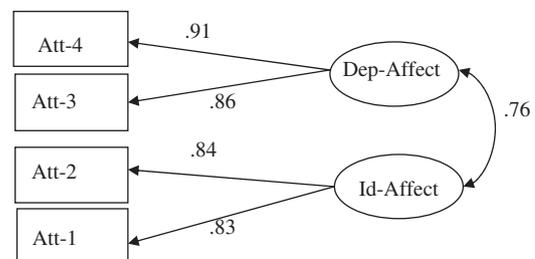
Note 3: “Not probable” (1) and “Somewhat improbable” (2) were collapsed into “Very low to moderate probability” due to low numbers.

A Cronbach's alpha value of  $\alpha = .87$  (12 items) was achieved for the park-specific pro-environment behavioural intentions scale, indicating good scale reliability. Prior to principal component analysis a Kaiser-Meyer-Olkin value of .84 and statistical significance achieved with the Bartlett's Test of Sphericity supported the factorability of the correlation matrix (Pallant, 2007). Exploratory factor analysis revealed that the 12 park intentions items loaded on two factors. The identification of two factors was based on Horn's parallel analysis (Watkins, 2000) (12 variables  $\times$  355 respondents; 100 replications) which recommended selecting factors with eigenvalues equal to or over 1.32. The two factor solution generated by the park-specific intentions scale data explained 53.7% of the variance; Factor 1 explained 41.7% and Factor 2 explained 12%. An Oblimin with Kaiser Normalization rotation was performed; a moderately strong positive relationship between these two factors was observed ( $r = .438$ ). Analysis of the two factors revealed the environmental intentions items in Factor 2 appeared to be more difficult to perform, requiring geographic proximity to the park or increased commitments of time or money.

#### 4.2. Descriptive statistics

Based on a scale of 1 (*low place attachment*) to 5 (*high place attachment*), the composite mean score for place attachment intensity specified by the participants was 3.6 (*SD* = .64, *n* = 355). These findings are not surprising in light of previous place attachment research that has documented positive feelings towards parks (Korpela, Hartig, Kaiser, & Fuhrer, 2001) and the positive attitudes that segments of the sample population (e.g., members of the park's Friends group and repeat visitors) were anticipated to demonstrate. A mean score of 3.8 was achieved for place affect (*SD* = .62, *n* = 355) and place identity (*SD* = .69, *n* = 354). The functional relationship with the park, or place dependence, was characterized by a smaller mean of 2.9 (*SD* = .93, *n* = 351; see Table 1).

Pro-environment behavioural intentions amongst survey participants were measured using a Likert-type scale, where a 1



**Fig. 3.** Place attachment measurement model.

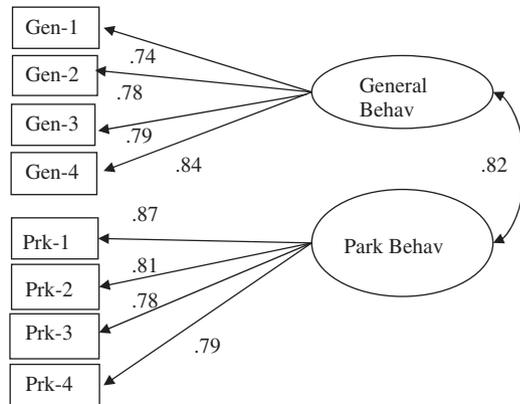


Fig. 4. Behavioural intentions measurement model.

indicated that it was “Not probable” that the survey participant intended to participate in the selected environmental behaviours within the next 12 months, and a 5 indicated that it was “Highly probable.” Interestingly, little difference was evident between the composite mean score for pro-environment behavioural intentions related to the general environment ( $M = 3.7$ ,  $SD = .68$ ,  $n = 349$ ) and the mean score for pro-environment behavioural intentions related to the park ( $M = 3.8$ ,  $SD = .70$ ,  $n = 344$ ; see Table 2).

#### 4.3. Measurement and structural equation models development

In preparation for SEM, the data was examined for multicollinearity, outliers, and missing values. The structural equation model software AMOS 5.0 was instructed to fill in missing data, inputting means using maximum likelihood means estimation. This approach is viewed as one of the best for dealing with missing values in SEM (Allison, 2003; Kline, 2006).

Measurement models were then created and tested prior to their inclusion into a larger structural model designed to explore the relationship between place attachment and pro-environment behaviour. The remaining 13 place attachment items were assigned to two parcels that acted as indicators for the newly created Place Identity-Affect factor (8 items) and the Place Dependence-Affect factor (5 items) (see Fig. 3). Four parcels were created as indicators for park-specific (12 items) and general (11 items) behavioural intentions and input into the behavioural intentions measurement model (see Fig. 4).

Upon testing, the measurement models demonstrated good fit with the data<sup>4</sup> (see Table 3). The indicators (Att-1 to Att-4, Prk-1 to Prk-4, and Gen-1 to Gen-4) on both measurement models were characterized by factor loadings of .7 or higher on their latent

<sup>4</sup> Good fit was evaluated using the following guidelines: *CMIN/df*. The relative model chi square or normal chi square attempts to make the model fit less dependent on sample size (which is a fault of model chi-square). This statistic should be less than 2 or 3 to be considered a good fit (Kline, 2006), although some researchers have allowed values as large as 5. *CFI*. The comparative fit index is used to compare the proposed model with a baseline or “independent” model in which all variables are assumed to be uncorrelated with the dependent variable, and therefore the poorest possible fit. This statistic should be .90 or higher (Hu & Bentler, 1999). *RMSEA*. The root mean square error of approximation examines differences between observed and predicted covariances. An RMSEA of less than .08 is deemed to be adequate, and less than .05 is considered very good (Kline, 2006). A strength of this fit statistic is that it tends to be free of sampling bias (McDonald & Ho, 2002). *AIC*. The Akaike information criterion is a parsimony adjusted predictive fit index (i.e., it favours simpler models) that is most often used to identify the best model amongst competing nonhierarchical models (Kline, 2006). The model with the best fit (and fewest parameters) has the smallest AIC value.

Table 3

Fit indices for place attachment and pro-environment behavioural intentions measurement models.

Model	$\chi^2_M$	df	p	CMIN/df	CFI	RMSEA	AIC
Place attachment measurement model	1.433	1	.231	1.433	.999	.035	27.433
Behavioural intentions measurement model	51.245	19	.000	2.697	.981	.069	101.245

factors, confirming the validity of each measurement model (Garson, 2008).

To explore relations between the study’s main constructs, correlation analyses were conducted to confirm that key variables did demonstrate relationships with each other.<sup>5</sup> Table 4 summarizes the correlation between the newly created place attachment subdimensions and the park-specific and general behavioural intentions. The new factors, Identity-Affect (8 items) and Dependence-Affect (5 items) demonstrated positive and significant relationships with the two behavioural intentions indicators. As anticipated, both attachment factors demonstrated high correlations with park-specific behavioural intentions, but they also displayed a modest positive relationship with general environmental intentions.

On the basis of these results, the two models were combined to form a structural model to test the relationship between place attachment and pro-environment behavioural intentions. Three different theoretical scenarios were examined. Model A of the structural model treated Identity-Affect and Dependence-Affect as equal yet correlated predictors of park-specific and general behavioural intentions (see Fig. 5). Model B’s paths allowed for Identity-Affect to mediate the predictive ability of Dependence-Affect. This rendition of the relationship between place attachment and pro-environment behaviour was based on previous research that suggests place identity is formed, in part, as a result of place dependence and subsequently mediates the effects of place dependence (Moore & Graefe, 1994; Vaske & Kobrin, 2001). The two behavioural intentions variables were allowed to correlate in the model as they represented similar phenomena. The most important finding arising from Model B was that place attachment, and more specifically its subdimensions, demonstrated strong<sup>6</sup> prediction of place-specific pro-environment behavioural intentions ( $\beta = .54$ ,  $p \leq .01$ ) and slightly less predictive power for general, everyday pro-environment behavioural intentions ( $\beta = .41$ ,  $p \leq .01$ ; see Fig. 5). The place attachment subdimensions explained more of the place-specific behavioural intentions variance ( $R^2 = .38$ ) than the general intentions variance ( $R^2 = .19$ ).

In Model C the effect of place attachment on general behavioural intentions was mediated by place-specific behavioural intentions. This modeling of the relationship between place attachment and general intentions controlled for the impact of place-specific intentions and enabled a more direct examination of carry-over effects. In this model significant relationships between all four

<sup>5</sup> Initial analysis that examined correlations between place attachment and behavioural intentions revealed that place identity ( $r = .51$ ,  $p \leq .001$ ) followed by place affect ( $r = .49$ ,  $p \leq .001$ ) demonstrated much stronger correlations with place-specific pro-environment behavioural intentions than place dependence ( $r = .43$ ,  $p \leq .001$ ). Similar, but much weaker correlations were observed between general pro-environment behavioural intentions and the place attachment subdimensions: place identity ( $r = .34$ ,  $p \leq .001$ ), place affect ( $r = .33$ ,  $p \leq .001$ ), and place dependence ( $r = .31$ ,  $p \leq .001$ ).

<sup>6</sup> According to recommendations by J. Cohen (1988), standard path coefficients with absolute values less than .10 may indicate small effect; values around .30 a “typical” or “medium” effect; and “large” effects may be indicated by coefficients with absolute values of  $\geq .50$  (Kline, 2006).

**Table 4**

Observed correlations and centrality measures for place identity-affect, place dependence-affect and pro-environment behavioural intentions.

	Identity- Affect	Depend- Affect	Park Intentions	General Intentions
Identity-Affect	1			
Depend-Affect	.64**	1		
Park Intentions	.43**	.53**	1	
General Intentions	.28**	.38**	.72**	1
M	2.97	3.98	3.8	3.7
SD	.857	.604	.696	.680
N	353	355	344	349

Note 1: Variables were analyzed using Pearson's correlation coefficient; Note 2: \*\* $p < .001$ .

variables as well as non-significant direct paths between the place attachment subdimensions and general intentions suggested support for carry-over effects on general pro-environment behavioural intentions (Baron & Kenny, 1986; Kenny, Kashy, & Bolger, 1998; McKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Shrout & Bolger, 2002). Indirect effects of Dependence-Affect (.39) and Identity-Affect (.49) on general intentions were observed. Indirect effects of Dependence-Affect on park-specific behavioural intentions (.41) were also observed. In Model C 38% of park-specific behavioural intentions and 69% of general pro-environment behavioural intentions were explained.

All models generated reasonable fit indices, therefore demonstrating that the causal processes specified by the hypothesized models were consistent with the data (McKinnon et al., 2002) ( $\chi^2_M$

110.947,  $df = 48$ ,  $p = .000$ ; CMIN/ $df = 2.311$ ; CFI = .975; RMSEA = .061; AIC = 194.947).

## 5. Discussion and conclusion

### 5.1. Intensity of attachment and mediation of the effects of place dependence

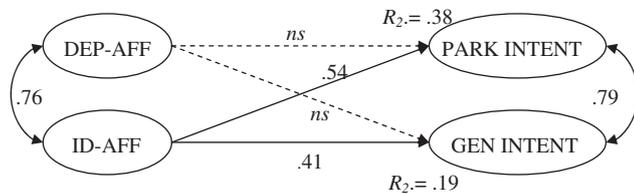
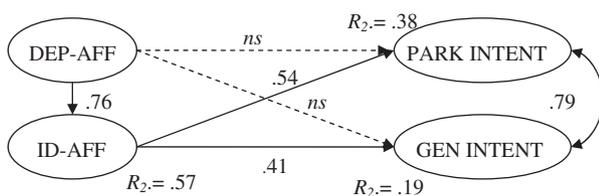
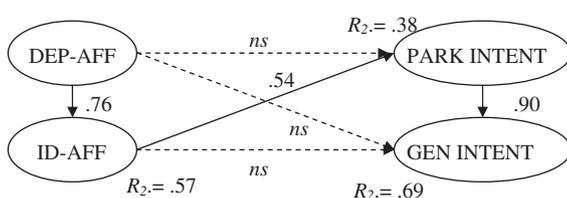
High levels of place identity and the mediation of place dependence by place identity are two important results of this study. During the early stages of analysis higher levels of respondents' expressed place identity rather than place dependence were identified (see Table 1). In the case of Point Pelee National Park, this may be explained by a number of factors. For example, one-fifth of the visitors sampled for this study were first-time visitors to the park; this may have reduced the mean score for place dependence. First-time and infrequent visitors to the park may simply be park collectors (Urry, 2003) visiting once or rarely to consume the destination, then moving onto other parks and protected areas for their next tourist experience. The region surrounding Point Pelee also offers a number of alternative bird watching locations that may satisfy birders' viewing needs, thus further reducing the intensity of place dependence expressed by survey respondents.

Higher levels of expressed place identity may be partly explained by Point Pelee's national park status. Visiting a national park allowed respondents' to affiliate with a prestigious institution (i.e., a national park) that most Westerners hold in great affection and esteem (Korpela et al., 2001). Visiting a park also allowed individuals' to reinforce and express their sense of identity as environmentalists and as supporters of conservation ideals. National park status may also be tied to Canadian visitors' (85% of sample) sense of national identity.

Structural Models B and C (Fig. 5) illustrate the mediating affect of Identity-Affect on Dependence-Affect. Moore and Graefe (1994) documented place dependence's role in contributing to place identity in a study of recreationists' trail use. Hailu, Boxall, and McFarlane (2005) also proposed place dependence as a positive predictor of place identity and that its effects could be mediated by place identity, but their model failed to fit their data. A good fit was achieved when place dependence was dropped from their model. Place identity was a positive predictor of future visits to a campground. They suggested place dependence did not contribute to predicting visitor intentions because of an absence of variability in site-specific attributes or activities. In other words, little choice in alternative campgrounds created inadequate variability across their sample of visitors. In contrast, Vaske and Kobrin (2001) found support for place identity's mediation of place dependence's effect on pro-environmental behaviours. Based on these contrasting findings, further exploration of the relationship between different subdimensions of place attachment is needed.

### 5.2. Place-specific intentions and place attachment relationship

The strong prediction of place-specific intentions by place attachment supports the proposition that affective, functional, and cognitive bonds with a place may be important precursors to individuals' choosing to protect or fight for that particular place. This lends support to early place theorists' speculation that direct experience with a place, over time, will lead to attachments, which in turn may lead to place-specific stewardship behaviours (Relph, 1976; Schultz, 2000; Tuan, 1977). It also corroborates empirical findings detailed by Kals et al. (1999), Kaltenborn (1998), Lewicka (2005), Mesch (1996), Sampson and Groves (1989), Stedman (2002), Wakefield et al. (2001), Walker and Chapman (2003), and

**Model A****Model B****Model C**

Note: For all three models the fit indices were as follows:  $\chi^2_M = 110.947$ ;  $df = 48$ ;  $p = .000$ ; CMIN/ $df = 2.311$ ; CFI = .975; RMSEA = .061; AIC = 194.947

Fig. 5. Predicting pro-environment behaviour with place attachment.

Walker and Ryan (2008) that attachments to specific settings are likely indicators of protective behaviours of that place.

### 5.3. Carry-over effects of place attachment

Environmental behaviour researchers have explored spill-over effects, namely how engagement in one type of pro-environment behaviour inspires engagement in an unrelated pro-environment behaviour (see Vining & Ebreo, 2002 for overview; Thorgersen & Olander, 2003). To date, researchers have found little evidence of this. Rather than examining how one set of behaviours may influence engagement in another set of behaviours, Model C examined how an individual's attachment to a particular site may affect pro-environment behaviours unrelated to the site of attachment. To explain the significant, positive prediction of general pro-environment behaviours by place attachment, it is suggested that as individuals build increased awareness, understanding, and attachments to nature-based contexts, which may form and confirm their sense of identity associated with these places, their attachment to natural settings may convert to a commitment to the environment in general (Vaske & Kobrin, 2001). In addition to cognitive attachments, affective ties are also theorized to play a role in this process. In short, individuals may transfer the importance they assign to the place they love and value to the more abstract concept of the environment, increasing the possibility of their engagement in environmentally-responsible behaviours as a result. This process may contribute to what Clayton (2003) calls one's environmental identity.

Park practitioners are interested in knowing whether visiting parks inspires individuals to support the environment in their daily behaviours. Some suggest that the very act of creating parks, which are demarcated by borders, rules, and prestige, differentiates parks too greatly from everyday contexts. This 'otherness,' some would argue, does little to inspire individuals to engage in pro-environment behaviours in their daily routines and may actually retard environmental stewardship of local contexts once the visitors return home (Clayton, 2006; Uzzell, 2000). Haluza-Delay (2001) highlighted this possible outcome when he observed the ineffectiveness of wilderness-based environmental education programs in promoting pro-environment attitudes and behaviours.

Contrary to this theory that the 'othering' of nature may retard pro-environment sentiments and actions, the results in this paper lend support to the notion that carry-over effects may occur, that park visitors may transfer their attachment for a particular park to the environment in general. The key vehicle for this effect may be an individual's sense of identity, as supported by SEM and correlation analysis results reported in this study. This study does not supply conclusive evidence of this carry-over effect. The significant prediction of general pro-environment behaviour could be the result of a number of other factors that have not been included in the model but that affect the model's main constructs. For example, if an individual is already predisposed to engage in pro-environment behaviour, he or she may also be a supporter of protected areas and a visitor to parks. The catalyst for engaging in pro-environment behaviour may have arisen from other influences such as social norms, formal education, or convenience of engaging in environmentally-responsible behaviour, and not because of unique affection for and attraction to a natural area, such as Point Pelee National Park. An additional weakness of the findings observed through this modeling is that the data is cross sectional in nature; a one-time snap shot of individuals' thoughts and feelings carries little conclusive weight. A longitudinal study would be much more appropriate to exploring the carry-over effects of place attachment on pro-environmental behaviours.

### 5.4. The role of place affect and place identity in fostering pro-environment behaviours

Preliminary descriptive statistical analysis of the relationship between place affect, identity, and dependence with behavioural intentions (see Footnote 5), as well as the SEM results, suggest that place identity and place affect have stronger relationships with place-specific pro-environment intentions. This finding reinforces observations regarding the importance of identity and affect in explaining and promoting pro-environment attitudes and behaviours made by several researchers; their studies are discussed briefly below.

Giuliani (2003) suggested that "[t]he study of affect is even today the most problem-fraught sector of contemporary psychology, not only with reference to places, but also [in] regards [to] interpersonal relationships" (p. 139). Previous research supports the idea that emotion has a strong influence in determining people's actions towards attitude objects. For example, researchers in the field of environmental education found that messages that build emotive ties to a setting or object have a greater chance of increasing environmentally-responsible behaviour and environmental activism than do knowledge-based messages on their own (Pooley & O'Connor, 2000). Emotion appears to assist with retrieval of information (e.g., environmental knowledge) and also in motivating individuals to work for an issue that is important to them (e.g., the protection of a favourite park; Vining & Tyler, 1999). Kals et al. (1999) found that environmentally-responsible behaviour can be motivated by positive feelings towards nature. Further research is needed to explore the role of feelings and emotions in "effecting the transition from caring *about* to caring *for* the environment" (Russel & Hodson, 2002, p. 485). Hinds and Sparks (2008) also call for further clarification of the importance of affective connections, both within a natural-environment context and when employing a Theory of Planned Behaviour framework.

Due to the importance of emotion as a tool in efforts to promote more environmentally-responsible behaviour individuals' affective attachment to the study setting was measured separately in this study from other attachment factors. Affect failed to demonstrate singular prediction of pro-environment behaviour; rather, it appears to have a more amorphous and pervasive influence. This concurs with Stedman's (2003a) study that suggested affect may play a more generalized role in the prediction of behaviours. Richard, de Vries, and Pligt (1998) offered a related caveat; when affective reactions and attitude measures remained distinct in questionnaire protocols, the effectiveness of the attitude measures could be made redundant in its predictive ability. This was demonstrated in Hinds and Sparks (2008) study, where the authors found that affective connections towards the natural environment were a significant independent predictor of intentions to engage with the natural environment. Environmental identity was only a significant predictor in the absence of the affective connection in a regression model. Further investigation of the interaction between affect and identity is needed to explore how they may impact pro-environment behaviours.

As mentioned in the previous discussion about carry-over effects, place identity may be an important factor in explaining pro-environment behaviour. Devine-Wright (2005) noted that those who identify a place with their sense of self or identity respond to negative place change (i.e., the construction of wind farms) as a form of identity threat and are likely to engage in public opposition against proposed change. Kyle, Absher, and Graefe (2003) found that as place identity increased and recreationists' attitudes towards park user fee programs became more positive, support for spending fee revenue on programs such as environmental

protection also increased. Uzzell et al. (2002) found that place-related social identity positively predicted green purchasing decisions amongst respondents living in one village included in their study, but not in the second.

In addition to predicting behaviours, several other studies have linked high levels of place identity with increased concern for the places which individuals' are attached (Bricker & Kerstetter, 2000; Kyle et al., 2004). In contrast, White, Virden, and van Riper (2008) did not find place identity to be a significant predictor of concern related to depreciative behaviour, environmental impacts, and recreation conflict amongst visitors to a park. They included prior experience with the park as an antecedent variable in their model; this variable did significantly predict visitors' concern. Bonaiuto, Carrus, Martorella, and Bonnes (2002) found that locals living inside an Italian park expressed higher levels of place attachment and regional identity than non-locals (respondents living in a city 200 km from the park), however, they demonstrated lower levels of support for the protected area in which they lived and for parks in general than the non-local residents. The authors proposed that the park posed a threat to community autonomy and local identity. Local residents expressed greater concern for maintaining the status quo of their region without the imposition of a pro-environmental institution, namely a park. These studies demonstrate the ambiguous role that place identity plays in encouraging pro-environment attitudes and behaviours and the need for further investigation of place identity's role. This ambiguity may be explained in part by the conceptualization and measurement of environmentally-responsible behaviours and place identity, as well as the inclusion of specific variables (e.g., use history) in the models used by these researchers.

##### 5.5. Study limitations and additional avenues for research

As stated previously, more research is necessary to explore the formation and effects of place identity and place affect which appear to be especially important in promoting pro-environment attitudes and behaviours. These phenomena may be better studied through longitudinal and in-depth case studies of groups and individuals.

Further efforts could also be assigned to developing more robust measures of place attachment (Scannell & Gifford, 2010; Williams & Vaske, 2003). As stated earlier, place attachment is defined in many different ways and shaped by a variety of disciplinary perspectives. Drawing on some of these traditions, the conceptualization of place attachment could be expanded beyond affect, identity, and dependence to include other facets of attachment such as belongingness (Hammit, Backlund, & Bixler, 2004; Wakefield et al., 2001), social bonding (Hammit et al., 2004), local bonds and social ties (Mesch & Manor, 1998; Riger & Lavrakas, 1981; Taylor, Gottfredson, & Brower, 1985; Uzzell et al., 2002); lifestyle enabling (Bricker & Kerstetter, 2000); rootedness and involvement (Chawla, 1992; Hammit et al., 2004; Hay, 1998; Lalli, 1992; McAndrew, 1998; Riger & Lavrakas, 1981; Taylor et al., 1985), insidedness and out-sidedness (Relph, 1976; Rowles, 1980); familiarity (Hammit et al., 2004; Lalli, 1992); and ancestral and cultural connections (Hay, 1998; Lewicka, 2005).

Each nuance of place attachment may reveal different factors that affect individuals' intentions to engage place-protective behaviours. Additionally, the measures used in this study to examine place affect could be significantly improved, both in content and format. Alternative approaches which could be drawn on to improve the measurement of place affect include studies that have explored peoples' engagement with nature (Hinds & Sparks, 2008) and environmental education programs (Pooley & O'Connor, 2000), as well as explain responses to forest management plans (Vining & Tyler, 1999) and predict nature protective-behaviour (Kals et al., 1999).

This study examined recreationists and tourists who visited a national park. Continued exploration of the role of leisure and recreation experience in shaping individuals' attitudes and behaviours towards the environment, and especially the places where they engage in leisure and recreation pursuits, is needed. However, a move away from studies conducted in iconic settings such as national parks and towards studies conducted in everyday recreation settings may reveal further the nuances between pro-environment behaviour, place identity, place affect, and, most notably, place dependence. The latter phenomenon may be more salient to recreationists who rely on nearby natural areas as convenient contexts for leisure and recreation pursuits. This approach would answer Riley's (1992) call to examine peoples' attachment to "ordinary places."

Point Pelee's status as a national park may also have elevated respondents' reported degrees of attachment and intentions. This is an acknowledged limitation of this study. Additionally, no measure was utilized in the survey instrument to examine respondents' predisposition to engage in socially desirable responses. This would have enhanced understanding of the likelihood of respondents' elevating their pro-environment intention scores. This study examined place attachment's prediction of place-specific and more general pro-environmental intentions. Measurement limitations may have arisen from this approach, namely the lack of congruency between place attachment, conceptualized as a bond with a particular place and professed intentions towards environments external to this context. Despite this lack of congruency, place attachment predicted general pro-environmental intentions.

Finally, the use of self-reported and future intentions measures are also recognized as a potential limitation of this study. Homburg and Stolberg (2006) noted their concern of using self-reports across their four studies of environmental behaviour. Corral-Verdugo and Figueredo (1999) also expressed doubts about the validity of self-reports. However, Schahn, Damian, Schurig, and Fuchsle (2000) suggested that people are only marginally inclined to give socially desirable answers, and Kaiser, Frick, and Stoll-Kleemann (2001) demonstrated the validity of self-reports in predicting pro-environmental behaviours by comparing subjective and objective indicators (cited in Homburg & Stolberg, 2006).

A practitioner charged with the management of a site such as Point Pelee National Park is interested in determining whether visits to parks inspire pro-environment action, particularly stewardship of that specific site. In this case, there appears to be a strong relationship between visitation and attachment to the park, as well as professed intentions to contribute to its protection. A comparison of visitors' attitudes and intentions with those of non-visitors, both local and distant, would be useful in revealing the magnitude of this affect. What is especially important about this question is the impact of direct versus indirect experience in fostering place-protective behaviours as well as the effects on general environmental attitudes and behaviours (Hinds & Sparks, 2008). This is particularly important for the development of environmental education programs and social marketing campaigns designed to promote pro-environment behaviours.

In summation, this study has confirmed the importance of place attachment in affecting pro-environment behavioural intentions. This has especially important implications for managers of landscapes and natural resources, but also for practitioners charged with encouraging environmentally-responsible behaviours in settings where individuals recreate, work and live.

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## Appendix. Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jenvp.2010.04.006.

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