



Murdoch
UNIVERSITY

MURDOCH RESEARCH REPOSITORY

This is the author's final version of the work, as accepted for publication following peer review but without the publisher's layout or pagination.

The definitive version is available at

<http://dx.doi.org/10.1080/10645578.2013.768070>

Tonge, J., Valesini, F.J., Moore, S.A., Beckley, L.E. and Ryan, M.M. (2013) The relation between place attachment and management preferences of visitors at remote coastal campsites in Western Australia. *Visitor Studies*, 16 (1). pp. 39-58.

<http://researchrepository.murdoch.edu.au/14825/>

Copyright: © 2013 Copyright Taylor and Francis Group, LLC.
It is posted here for your personal use. No further distribution is permitted.

The Relation Between Place Attachment and Management Preferences of Visitors at Remote
Coastal Campsites in Western Australia

Authors

Joanna Tonge¹, Fiona J. Valesini², Susan A. Moore¹, Lynnath E. Beckley¹ and Maria M. Ryan³

Affiliations

1 School of Veterinary and Life Sciences, Murdoch University

2 Center for Fish, Fisheries and Aquatic Ecosystems Research, Murdoch University

3 School of Marketing, Tourism and Leisure, Edith Cowan University

About the Authors

Corresponding author:

Joanna Tonge
School of Veterinary and Life Sciences
Murdoch University
South St, MURDOCH WA 6150
Email: j.tonge@murdoch.edu.au

Joanna Tonge was recently awarded a PhD from Murdoch University. Her research interests include place attachment, visitor satisfaction, and protected area management.

Fiona Valesini is a Senior Research Fellow at Murdoch University. Her research interests include the ecology of fish and benthic invertebrate communities in temperate coastal and estuarine waters, aquatic ecosystem health assessment and multivariate statistics in community ecology.

Susan A. Moore is an Associate Professor in environmental policy at Murdoch University. Her research interests include protected area management especially visitor management and governance, nature based tourism, perceptions of biodiversity, and associated policies.

Lynnath E. Beckley is a Professor of Marine Science at Murdoch University. Her research interests include recreational and subsistence use of marine resources, marine protected areas, and biological oceanography.

Maria M. Ryan is an Associate Professor in the School of Marketing, Tourism and Leisure at Edith Cowan University, Western Australia. Her research interests include the impact on consumption of individuals' attachment to their environment; using various research methods to examine consumption behavior; and student learning processes.

Acknowledgements

Financial support for this research was provided by Murdoch University and the Western Australian Department of Environment and Conservation. The leaseholders of the Gnaraloo and Warroora pastoral stations are thanked for access to the campsites to survey visitors. We also thank the Editor and anonymous reviewers for their constructive suggestions which improved this paper.

Abstract

Visitors who exhibit place attachment often demonstrate greater concern regarding how a place is managed. However, the extent to which the dimensions of attachment are related to management preferences has not been sufficiently investigated. Place attachment of visitors to coastal campsites along the southern Ningaloo coastline, northwestern Australia, and its relation with management preferences were examined via an on-site survey. The relation was investigated using a suite of routines in the non-parametric multivariate statistics package PRIMER v6, providing the first example of the use of these types of statistical approaches in place research. Place attachment was measured using the dimensions of place identity, place dependence and everybody's happy (a new, affective-based dimension). Within each dimension, significantly different groups of visitors were identified based on differences in their responses to the place attachment survey items. This was achieved using hierarchical agglomerative cluster analysis in conjunction with a Similarity Profile (SIMPROF) test. Subsequent analysis using the BVSTEP procedure showed that the pattern of differences among visitors in their responses to place attachment items produced significant though weak correlations with that in their level of support for various management actions. The paper concludes with a discussion of the implications of these results for future research on place and associated preferences for management actions.

Keywords: management actions, Ningaloo Marine Park, place identity, place dependence, PRIMER multivariate statistics

The Relation Between Place Attachment and Management Preferences of Visitors at Remote Coastal Campsites in Western Australia

Through visiting recreation or leisure settings, individuals can develop strong emotional ties, expressed as place attachment (Smith, Davenport, Anderson & Leahy, 2011). These attachments can result in individuals being unwilling to substitute the setting for another and having an increased level of concern regarding how it is used and managed (Farnum, Hall & Kruger, 2005; Williams, Patterson, Roggenbuck, & Watson, 1992). Therefore, managers of these settings need to consider the effects of their decisions on individual visitors as well as on the physical resources of these settings. It is the attachment to place expressed by visitors that makes such considerations essential for effective, well-informed management (Brandenburg & Carroll, 1995; Smith et al., 2011; Williams et al., 1992).

Through an understanding of how visitors perceive, choose, relate, or bond to settings, managers can obtain crucial information for providing quality experiences (Moore & Graefe, 1994; Warzecha & Lime, 2001). They can be equipped with a comprehension of the complex emotional bonds individuals form with settings and how these bonds and attachments can affect views about management of the setting. This information can then enable managers to be more proactive in the development of socially acceptable management strategies (Smith et al., 2011). Importantly, this place attachment approach directly encapsulates the bonds between individuals and a setting, rather than indirectly by establishing these connections through visit and visitor characteristics (Williams et al., 1992).

People who are more attached to a place are likely to: exhibit greater concern over the environmental well-being of a setting and act in an environmentally responsible manner towards the setting (Vorkinn & Riese, 2001); be more sensitive to recreational impacts (Williams et al., 1992); have preferences regarding environmental attributes (Kaltenborn &

Williams, 2002) and setting conditions (Kyle, Graefe, & Manning, 2004); and express particular motives, levels of acceptability of encounters with others, and support for some management actions (Warzecha & Lime, 2001). Therefore, it would seem prudent for managers of recreation and leisure settings to understand the attachment of visitors in order to effectively communicate public benefits in the planning process (Kil, Holland, & Stein, 2010; Moore & Graefe, 1994). Additionally, once plans have been established, communicating these plans by appealing to the attachment of visitors may help with the palatability or acceptance of management plans (Warzecha & Lime, 2001). The type of attachment could also provide a useful indicator of whom managers could count on for support of actions, while also identifying those who may be most affected by management decisions and actions (Kaltenborn, 1998).

Conceptualization of Place Attachment

The conceptualizations of place attachment used in this study are predominantly located in research on leisure and recreation settings in natural areas. Place attachment research in natural areas has strongly relied on the explanatory dimensions of place identity and place dependence (Kil et al., 2010; Kyle, Graefe, & Manning, 2005; Williams & Vaske, 2003). *Place identity* describes the symbolic aspects or psychological investment of a person to a place (Warzecha & Lime, 2001; Williams & Roggenbuck, 1989). It relates to the set of connections and feelings about the setting that give rise to how an individual sees the setting as part of themselves (Proshansky, 1978; Warzecha & Lime, 2001; Williams & Roggenbuck, 1989; Williams et al., 1992). Place identity has been referred to as a component of self-identity and describes how a place becomes a repository for emotions, memories, ideas, values, preferences and relations that are of importance to an individual as they give meaning and purpose to their life (Williams & Roggenbuck, 1989; Williams & Vaske, 2003).

Place dependence describes the functional aspect of place attachment (Warzecha & Lime, 2001; Williams & Roggenbuck, 1989). Specifically, it describes how the physical setting meets the needs and goals of an individual and whether it is superior to other available places in terms of the achievement of these goals (Stokols & Shumaker, 1981; Warzecha & Lime, 2001; Williams & Roggenbuck, 1989; Williams et al., 1992). It reflects the importance of the place in providing the right setting, features, or conditions to support specific goals or other desired activities (Stokols & Shumaker, 1981; Williams & Roggenbuck, 1989; Williams & Vaske, 2003).

On their own, these two dimensions have been limited in their capacity to capture the complexities of the place attachment construct. Researchers have posited social relationships as a crucial part of developing an attachment to a setting (Kyle et al., 2005; Low & Altman, 1992). Social bonding emphasizes the importance of social ties to a place, specifically in terms of establishing and maintaining meaningful social relationships in specific settings (Kyle, Mowen, & Tarrant, 2004), and is now widely accepted as an additional dimension of place attachment (Kyle et al., 2005; Kyle & Chick, 2007; Smith, Siderelis, & Moore, 2010). In some contexts, the importance of the setting is tied to the memories of experiences shared with significant others (Kyle et al., 2005). People can become attached to places that facilitate these interactions with others as well as those fostering group belonging and communal bonds (Hammitt, Backlund, & Bixler, 2006). This dimension is particularly important in understanding leisure and recreation behavior as settings facilitate and maintain social relationships (Kyle et al., 2005; Smith et al., 2010).

Affect is known to be at the center of place attachment, however, affective-based dimensions are under-represented in place attachment research (Kil et al., 2010; Ramkissoon, Weiler & Smith, 2012). Potential dimensions to fill this gap have been suggested in recent research, including familiarity, belongingness and affective attachment (Hammitt et al., 2006;

Kyle, Mowen, & Tarrant, 2004; Ramkissoon et al., 2012). Recent place-based qualitative research at Ningaloo Reef, Western Australia has suggested a further aspect to assist in the understanding of affective-based dimensions, “everybody’s happy” (Tonge, 2012). Happiness is becoming an increasing focus of leisure research (Nawijn, 2011) with links also being made to wellbeing (Duncan, 2005). “Everybody’s happy” centered on visitors being happy knowing that all members of their group were enjoying staying and participating in recreational and other activities at the setting. This aspect is predominantly emotionally-based focusing on the positive emotions expressed by an individual in being able to achieve recreational, leisure, and other personal goals concurrently with others. It also includes elements of social bonding, with members of a group spending time together, and an activity focus, with many activities available for participation (Tonge, 2012).

Place Attachment and Management Actions

Research into the relationship of place attachment with management actions has generally clustered visitors based on their level or strength of attachment and then examined differences between these clusters using ANOVA. For example, Kyle, Graefe, and Manning (2004) examined the relation between place attachment and management actions through a survey of hikers on the Appalachian National Scenic Trail and divided their respondents into clusters based on whether they exhibited high, moderate, or low attachment. The authors found that hikers in the high attachment cluster were more inclined to support actions restricting other uses or impacts of other users on the trail. Hikers in the low attachment cluster were supportive of actions that sought to charge a fee for trail maintenance, require a permit to be obtained for overnight use of the trail, or required campers to use shelters and designated campsites. Warzecha and Lime’s (2001) study of visitors undertaking boating trips on the Colorado and Green Rivers similarly found that highly attached visitors were more inclined to support restrictions, in this case the prohibition of motorized rafts on the

rivers. They were less supportive of curbs on their own access and choices such as having to reserve a campsite and maintain a predetermined itinerary. Kil et al. (2010) surveyed visitors to a national forest in Canada and found that the higher attached group was more likely to rate scenery, peacefulness, and abundance of flora and fauna more positively, and that they placed greater importance on natural features and natural areas with few signs of development. Less attached respondents were more sensitive to recreation fee costs and preferred facilities for comfort and convenience.

Some of this previous research has explored place attachment as a single construct (e.g., Kil et al., 2010; Kyle, Graefe, & Manning, 2004) with others, such as Warzecha and Lime (2001), looked at differences in preferences by analyzing high and low cluster groups for both place identity and place dependence dimensions. There is extensive research (see Kyle et al., 2005; Williams & Vaske, 2003) indicating that place attachment is a complex construct with a number of dimensions. Given the increasing robustness of these dimensions and their contributions to explaining attachment, investigating the relation between the individual dimensions and support for management actions is timely and warranted.

As such, this paper aims to identify (1) how visitors are best separated into groups that reflect significant differences in their responses to any given place attachment dimension and (2) whether for any given place attachment dimension, significant relations exist between visitor responses to place attachment items and their level of support for any combination of a set of management actions. Rather than simply determining the relation between one or more management actions and a composite place attachment construct, the intention of this study is to provide a deeper description through exploring multiple dimensions of place attachment. The statistical tests used to examine these aims are unique to PRIMER v6 (Clarke & Gorley, 2006), a non-parametric multivariate statistical package that has been widely used in ecology but not previously applied in place research.

Methods

Study Site

The study site is the coastline adjacent to the iconic Ningaloo Reef, located off the northwest coast of Australia. In 2011 it was World Heritage listed for its outstanding natural values including the annual migration to the area of whale sharks and other iconic fauna such as turtles, whales, and sharks; unique geological formations; and the 300 km coral reef itself (CALM & MPRA, 2005; UNESCO World Heritage Centre, 2011). Its choice as a study location was based on recent research that identified high repeat levels of visitation (55%) (Beckley, Smallwood, Moore, & Kobryn, 2010), suggesting place attachment may be evident. Ningaloo Marine Park, which encompasses the entire 300 km length of the fringing reef, attracts about 200,000 visitors annually who participate in a wide variety of activities which include fishing, swimming, snorkelling and sunbathing on the beach (Smallwood, Beckley, Moore & Kobryn, 2011; Wood & Glasson, 2005).

Due to the logistics required to survey the whole coastline of the Marine Park, three coastal campsites were chosen in the southern section (see Figure 1). This section was selected as a number of studies have already examined the management of the Cape Range National Park (located adjacent to the northern section of the Marine Park) and surrounding areas (e.g., Mason & Moore, 1998; Moore & Polley, 2007; Wood, 2003), but the southern section has not been subject to the same research intensity. The three sites include campsites within the small township of Coral Bay and two camping areas on the adjacent pastoral stations (rangeland grazing) – 3 Mile Camp at Gnaraloo Station and 14 Mile Camp at Warroora Station. Coral Bay has a range of accommodations available from unpowered campsites to chalets and a small resort. The camping areas on the pastoral stations consist of unpowered coastal campsites with minimal facilities.

** Insert Figure 1 about here **

Survey Development and Distribution

A survey based on place identity, place dependence, social bonding, and everybody's happy was the principal data collection method for this study. The items to measure place identity and place dependence were those developed by Williams and Roggenbuck (1989), which have been validated and used in a numerous place attachment studies (Kyle, Graefe, & Manning, 2004, 2005; Kyle, Mowen, & Tarrant, 2004; Warzecha & Lime, 2001; Williams & Vaske, 2003). The items for social bonding were derived from Kyle, Mowen, and Tarrant (2004) and Wilkinson (2008) to reflect the community feel and friendship aspects described by respondents during the qualitative study of place meanings at Ningaloo (Tonge, 2012). Items for everybody's happy were developed by the authors from an analysis of interview transcripts from respondents in the same qualitative study (Tonge, 2012). In this qualitative study, everybody's happy, along with place identity, place dependence and social bonding meanings, encapsulated the place attachment of visitors. All place attachment items were measured on a five-point Likert scale with 1 representing *strongly disagree* and 5 *strongly agree*. The scale items were developed in accordance with standard scale development procedures (Churchill, 1979). In addition, the survey was pretested to ensure wording and comprehension acceptability.

The list of potential management actions was derived from current policy and management documents for the Ningaloo coast and the surrounding region. Documents included the management plan for the Ningaloo Marine Park (CALM & MPRA, 2005), the Ningaloo Coast Regional Strategy (WAPC, 2004), and relevant literature pertaining to management actions in marine and coastal protected areas (Mangi & Austen, 2008; Shafer & Inglis, 2000). Most of the listed management actions were kept non-site specific to ensure applicability to all three survey sites. Two management actions were retained as site specific to reflect the intentions of the Ningaloo Coast Regional Strategy. Respondents were asked to indicate their level of agreement with the management actions via a five-point Likert scale

anchored with 1 representing *strongly disagree* and 5 *strongly agree*. Other questions within the survey included visitation frequency and visitor socio-demographics.

Surveys were distributed to visitors during a four week period over June and July 2010, which is peak visitation for the Ningaloo coast (Smallwood et al., 2011). The next available visitor was approached at each of the three campsites (for Coral Bay, only visitors staying at campsites were surveyed), however this approach was modified as appropriate to obtain a representative cross-section (in relation to age, gender, and group type) of visitors present at each site at the time of the survey. Willing participants were provided with a survey and a researcher returned after a 10-15 minute period to collect the completed surveys. Each of the three sites was visited at least once per week with greater sampling effort at 3 Mile Campsite and Coral Bay due to larger camp size and higher turnover of visitors.

Data Analysis

The validity of the place attachment dimensions was tested via exploratory factor analysis (EFA) using maximum likelihood extraction and oblique rotation. EFA was used here because items included to measure everybody's happy were developed by the authors and had not been previously tested, and the social bonding items were adapted from two separate studies. As such, while not necessary for the place identity and place dependence items which have been well tested previously by other authors (e.g., Williams & Vaske 2003), EFA was used primarily to check the validity of the social and affective items. The minimum accepted factor loading for items was set at 0.5 and the maximum cross-loading was 0.25 (DeVellis, 1991; Hair, Black, Babin, Anderson, & Tatham, 2006).

The resulting dimensions of place attachment were examined separately for all subsequent analyses to provide a comprehensive analysis of the relation between the dimensions and various management actions, while acknowledging the likelihood of correlation among the dimensions.

The following suite of analyses, carried out using the non-parametric multivariate statistics package PRIMER v6 (Clarke & Gorley, 2006), were undertaken to explore the aims of this paper through a series of data analysis questions that were examined separately for each place attachment dimension (see Figure 2). First time visitors were removed prior to analysis, as these respondents were considered unlikely to have formed a significant level of place attachment during their initial visit and would be less familiar with the management regimes along the Ningaloo coast. Visitors who did not provide a response to every place item also were removed to provide a consistent, workable data set.

**** Insert Figure 2 about here****

To address the first question in Figure 2, a Euclidean distance matrix was initially calculated from the multivariate data matrix containing the scored statements for each respondent across each place attachment item (“respondent x item” data matrix). The resulting distance matrix thus contained the pairwise dissimilarities between all respondents based on the composition of their place attachment statements. This matrix was then subjected to hierarchical agglomerative clustering with group-average linkage (CLUSTER) to produce a dendrogram (“tree diagram”) that summarized the level of dissimilarity between all respondents. Those splitting away at the highest levels of the tree have the most dissimilar composition of responses to the place items, and those branching off at the lowest levels are the most similar.

A Similarity Profile permutation test (SIMPROF; Clarke et al., 2008) was used in conjunction with CLUSTER to statistically identify those points in the clustering procedure at which further subdivision of respondents is unwarranted, given a lack of significant differences in their place statements. Thus, SIMPROF performs a test for any significant grouping structure (place attachment differences) at each successive node of the cluster dendrogram, terminating at those points where there is insufficient evidence to support

significant differences within any particular group. It thus identifies the true “natural groupings” of respondents across the full distribution without imposing any a priori grouping structure on the data. The null hypothesis that there were no significant differences in the responses to the place items between respondents was rejected if the significance level (P-value) was < 0.01 . Any groups containing fewer than 10 respondents were considered to be outliers and removed from subsequent analyses.

To more easily visualize the dissimilarities between respondents, and also the significantly different SIMPROF groups to which they were assigned, the above Euclidean distance matrix was subjected to 2D non-metric multidimensional scaling (nMDS) ordination and the samples (respondents) on the resultant plot coded for their respective SIMPROF group. The interpretation of these plots depends only on the relative location of respondents, with those located closer together being similar in their place attachment responses, and those located far apart being dissimilar.

The second question in Figure 2 was addressed by subjecting the respondent x item data matrix to the Similarity Percentages (SIMPER) routine (Clarke, 1993). This routine calculates the average dissimilarity between all pairs of groups (the respondent groups identified by SIMPROF in this case) and decomposes it into the percentage contributions made by each variable (or place attachment item).

The BVSTEP routine in the BEST procedure (Clarke et al., 2008) was used to explore the last of the data analysis questions shown in Figure 2. This routine performs a comprehensive stepwise search of a sample x variable data matrix (constructed from each respondent’s scores for various management actions, i.e., the “respondent x management action” data matrix) to find the subset of variables (management actions) that provide the “best” match with the among-sample (respondent) patterns in a complementary resemblance matrix (the above Euclidean distance matrix constructed from each respondent’s scores for

the place items). During this matching procedure, dissimilarities among respondents in their scores for the management actions were calculated using Euclidean distance. The null hypothesis that there were no similarities in the underlying patterns between these two complementary matrices was rejected if the P-value for the global BEST test was < 0.05 . The relative extent of any significant correlations was determined by the magnitude of the “matching” statistic, Spearman’s rank correlation coefficient (ρ). Values close to 0 indicate little correlation, and those close to +1 indicate a near perfect agreement.

Results

Visit and Visitor Characteristics

A total of 389 visitors were approached with 372 agreeing to complete the survey, resulting in a response rate of 95%. Of these, 74% were repeat visitors and 60% were female (Table 1). The 35-44 year age group had the highest percentage of respondents (29%) with respondents aged 65 or older the lowest percentage (10%). Over half (55%) of all respondents had a tertiary or university level of education.

Table 1

Visitor and Visit Characteristics of Survey Respondents (n = 372)

Visitor Characteristics	(%)	Visit Characteristics	(%)
Gender		Travel Group	
Male	40	By yourself	3
Female	60	Family	51
Age Group		Friends	13
18-24	11	Family and Friends	33
25-34	14	Visitation Frequency	
35-44	29	First visit	26
45-54	25	Once every 3-5 years	19
55-54	11	Once every 1 to 2 years	18.5
65 or older	10	Once a year	28
Education		2 to 5 times per year	3
Primary/some secondary	3	More than 5 times per year	0
Secondary	24	On a weekly basis	0.5
Vocational/Technical	18	Other	5
Tertiary/University	55		

Analysis of Place Attachment Dimensions and Management Actions

The means and standard deviations for the place attachment items and construct validity results (Cronbach alpha) are presented in Table 2. The exploratory factor analysis identified a three-factor solution (Table 2). The first factor contained five place identity items and was labelled Place Identity. The second factor had five place dependence items and one item from everybody's happy, and was labelled Place Dependence. The final factor contained one social bonding and two everybody's happy items, and this factor retained the name Everybody's Happy. The discriminant validity of the three factors was confirmed using Chi-squared difference tests (See Appendix) (Bagozzi, Yi, & Phillips, 1991).

Table 2

Results from Exploratory Factor Analysis of Place Attachment Items (n = 372).

Place attachment item	<i>M</i>	<i>SD</i>	Factor 1	Factor 2	Factor 3
Place Identity (Cronbach alpha = 0.92)					
Ningaloo means a lot to me	3.38	1.16	0.68		
Ningaloo is very special to me	3.32	1.15	0.65		
I identify strongly with Ningaloo	3.02	1.10	0.69		
I am very attached to Ningaloo	2.98	1.16	0.79		
<i>Visiting Ningaloo says a lot about who I am</i>	2.82	1.19			
I feel that Ningaloo is a part of me	2.80	1.10	0.89		
Place Dependence (Cronbach alpha = 0.86)					
<i>Ningaloo is the best place for what I like to do</i>	3.74	0.90			
No other place can compare to Ningaloo	3.20	1.27		0.60	
The things I do at Ningaloo I would enjoy doing just as much at a similar place	2.71	1.18		0.54	
Doing what I do here is more important to me than doing it at any other place	2.67	1.17		0.61	
I get more satisfaction from visiting Ningaloo than any other place	2.60	1.20		0.81	
I wouldn't substitute any other area for doing the type of things I do at Ningaloo	2.59	1.25		0.87	
Social Bonding (Cronbach alpha = 0.75)					
<i>A feeling of community runs between me and the other campers here at Ningaloo</i>	3.34	1.11			
The friendships and associations I have with other people here at Ningaloo mean a lot to me	2.77	1.16			0.53
<i>My family and friends would be disappointed if I were to start visiting other coastal places rather than Ningaloo</i>	1.96	1.17			
<i>If I were to stop coming here to Ningaloo, I would lose contact with a number of friends</i>	1.85	1.18			
Everybody's Happy (Cronbach alpha = 0.84)					
Holidays to Ningaloo are important to us as a family/group of friends because everyone can enjoy themselves	3.57	1.14			0.76
Ningaloo is important to me because my family/group of friends enjoy it	3.43	1.14			0.70
<i>I rely on Ningaloo to provide an enjoyable experience for my family/group of friends</i>	3.06	1.27			
There is no place like Ningaloo where member of my family/group of friends can enjoy their own experiences in the one place	2.75	1.27		0.69	

Note. Factor 1 = Place Identity; Factor 2 = Place Dependence; Factor 3 = Everybody's Happy. Italicized items were omitted during exploratory factor analysis.

Additionally, the mean and standard deviation were calculated for each management action (Table 3). The action that received the highest level of support (4.16) was Action 1 –

“Provide signs and information to educate visitors about how to snorkel with minimum impact”. The action receiving the lowest level of support (2.36) was Action 13 – “Develop an eco-resort at Gnaraloo Bay”. Those actions related to restrictive zoning for motorized watercraft and the provision of additional infrastructure or facilities were not widely supported with means below 3 (Table 3, actions 10-13).

Table 3

List of Management Actions and Mean Level of Agreement (n = 372)

No	Management action	<i>M</i>	<i>SD</i>
1.	Provide signs and information to educate visitors about how to snorkel with minimal impact	4.16	0.96
2.	Provide signs with information on the marine and terrestrial environment of Ningaloo Reef	4.01	0.97
3.	Provide clearer markers for the sanctuary zone boundaries	3.98	1.03
4.	Access to certain turtle-nesting beaches during the breeding season is by guided tour only	3.72	1.37
5.	Appoint honorary rangers to help with education	3.57	1.16
6.	Increase the frequency of visits by rangers to sites along Ningaloo Reef	3.44	1.23
7.	Create designated zones for no interaction between humans and manta rays	3.36	1.27
8.	Develop sea-kayaking trails along Ningaloo Reef	3.24	1.24
9.	Create designated zones for non-motorised recreational activities such as windsurfing and kitesurfing	3.28	1.32
10.	Create designated zones for motorised recreation water craft such as jetskis	2.97	1.59
11.	Provide moorings for recreational boats over 5m at specific sites	2.61	1.39
12.	Provide 2WD access to Warroora and/or Gnaraloo	2.46	1.43
13.	Develop an eco-resort at Gnaraloo Bay	2.36	1.37

Differences in Attachment for Derived Dimensions

For each of the three identified place attachment dimensions, the SIMPROF test used in conjunction with CLUSTER detected several significantly different groups of respondents, reflecting natural breaks in the composition of their responses to the place items. Following the removal of those groups with fewer than 10 respondents (the final data set contained 219 respondents), five significantly different groups were detected in each of the Place Identity

and Place Dependence dimensions (groups A-E, Figures 3a and 3b), while three were identified for Everybody's Happy (groups A-C, Figure 3c).

****Insert Figure 3 about here****

When the same place item data were subjected to nMDS ordination and the samples (respondents) on the resultant plots coded for their respective SIMPROF groups, the relations between each of those groups were clearly discernible, with Group A in each dimension (located on the far left of the plots in Figure 4) having the most dissimilar place item responses to the group on the opposite side of the plot (i.e., Groups E, E and C in Figures 4a, 4b, and 4c, respectively). SIMPER showed that, within each dimension, the underlying cause of these group differences was a gradient in the strength of respondent place attachment. Thus, respondents in Group A on the left gave the highest scores across the place items, and those in the groups on the far right gave the lowest scores.

****Insert Figure 4 about here****

Relation Between Place Attachment Dimensions and Proposed Management Actions

The BVSTEP routine showed that, for each place attachment dimension, a significant match could be detected between the pattern of respondent differences in place attachment (i.e., those illustrated in Figure 4), and that defined by their answers to particular subsets of management actions ($P = 0.01$). However, in each case, the extent of the correlation was weak ($\rho = 0.166 - 0.182$). The particular subsets of management actions that were selected as part of the “best” subset for each place attachment dimension are given in Table 4. Common to all three dimensions were the management actions “Provide clearer markers for the sanctuary zone boundaries” (Action 3, Table 3), “Create designated zones for no interaction between humans and manta rays” (Action 7) and “Develop sea-kayaking trails along Ningaloo Reef” (Action 8). These actions predominantly relate to the provision of additional infrastructure or facilities and increased management presence.

Table 4

Significance Levels, ρ Values and the “Best” Subset of Management Actions Derived from the BVSTEP Analysis Undertaken for Each Place Attachment Dimension.

Place attachment dimension	P value	ρ value	Management action(s) in “best” subset ^a
Place Identity	0.01	0.171	1,2,3,5,7,8,11
Place Dependence	0.01	0.166	3,4,6,7,8,9
Everybody’s Happy	0.01	0.182	3,5,7,8

^a The management action number refer to the Action No. in first column in Table 3.

Despite the low correlations between the two complementary data sets, the relations between each selected management action and the place item data were further examined by overlaying the management action scores, as circles of proportionate sizes, on each respondent in the nMDS ordination plots shown in Figure 4. These so-called “bubble-plots” predictably showed little discernible relationship between the two data sets (plots not shown). Moreover, a SIMPER analysis of the management action data demonstrated that there were no clear differences in scores between any pair of the respondent groups shown by SIMPROF to differ significantly in their responses to the place attachment items (data not shown).

Discussion

Relation Between Place Attachment Groupings and Management Actions

For the three place attachment dimensions – Place Identity, Place Dependence and Everybody’s Happy – this study provided distinct groupings based on the strength of respondent’s place attachment. In contrast to other studies (e.g. Kil et al., 2010; Warzecha & Lime, 2001), the breaks between these groups were developed a posteriori; they were emergent from the data and associated analyses, rather than as a set number of groups imposed a priori by the researchers. The resultant groups, five each for Place Identity and Place Dependence and three for Everybody’s Happy, provides a detailed, nuanced insight into the differences in how attachment is expressed and realized.

The three place attachment dimensions investigated in this study produced significant, though weak, correlations with a subset of the management actions listed. Common to all three subsets of significantly correlated management actions were actions relating to the provision of additional infrastructure or facilities (e.g., signage, moorings, sea-kayak trails) and an increased management presence (e.g., sanctuary zone markers, zoning for human-manta ray interactions, increasing ranger visit frequency). Conversely, three actions were not found in any of the subsets: two site specific actions Action 12 (“Provide 2WD access to Warroora and/or Gnaraloo”) and Action 13 (“Develop an eco-resort at Gnaraloo Bay”) and one action independent of site - Action 10 (“Create designated zones for motorized recreation water craft such as jetskis”). These results suggest management should at least consider visitors’ attachment to place in the development and implementation of management actions relating to the provision of additional infrastructure and facilities.

Place identity had the most actions within the correlating subset of management actions. These included actions relating to the provision of additional information, sanctuary zone markers, provision of sea-kayak trails, and additional moorings. Essentially, these actions seem to relate to how individuals might express their sense of identity at Ningaloo, for example, by learning more about and appreciating the natural environment. Therefore, providing additional information on the natural environment and further protecting it (through zoning and sanctuary zone markers) could potentially positively impact their sense of place identity. There is also the potential for a negative effect through restricting access, possibly impacting how these individuals are able to express themselves.

Similar management actions were found in the subset of significantly correlated actions for place dependence. A number of these related to access to certain areas (e.g., access to turtle nesting beaches by guided tour only) and provision of additional infrastructure (e.g., moorings). Place dependence is related to participation in desired

recreational activities, so any action changing an individual's ability to undertake these activities is likely to have an effect on their place dependence. This could be a positive effect through zoning that separates conflicting activities, or a negative effect through restricting access to a particular beach due to the nesting activities of turtles. Providing additional facilities and infrastructure that assist recreational activities could have a positive effect on place dependence.

Central to everybody's happy are the positive emotions resulting from all members of a group being able to achieve their desired goals, resulting in an enjoyable experience for all. Providing additional information and restrictive zoning to make it clearer regarding the acceptable activities and where they can be undertaken were two of the management actions correlated with this dimension. These probably allow group members to better determine the collective options available to them and their group members and therefore enhance the collective quality of the group members' experiences at Ningaloo.

Other studies focusing on the level of place attachment and support for management actions have also produced complex results. Kyle, Graefe, and Manning (2004) analyzed the level of support for 25 management actions based on whether respondents were assigned to high, medium, or low place attachment clusters. For the 10 actions that were found to be statistically different between the attachment clusters, none had a changed in the level of support between the groups, with the mean level of support still within the same scale interval across the three clusters. Warzecha and Lime (2001) differentiated between high and low clusters for both place identity and place dependence dimensions and their level of support for two management actions relating to prohibiting motorized craft from the Colorado and Green Rivers, and reserving campsites and maintaining a pre-determined itinerary. While no significant differences were found in the responses for the high and low place dependence clusters and support for the management actions, differences were identified for place

identity. The low place identity cluster opposed prohibiting motorized rafts (mean of 2.5 on 4-point scale with 1 indicating strongly oppose and 4 indicating strongly support) and the high cluster supporting this action (mean of 3.5, p. 71). It is likely that further clarity regarding this complexity will be achieved as conceptualization and measurement issues are increasingly resolved (see next section).

A partial explanation for the weak relationship between place attachment and management actions in this study may be the confounding influence of self-displacement. Visitors to Ningaloo may have sufficient self-efficacy that they will voluntarily displace to other sites if they do not like proposed management changes. Arnberger and Haider (2007), in their study of trail users in a recreational area in Vienna, Austria, described the complex influences on visitors' intention to displace, including high visitor numbers and face-to-face encounters. The responses of visitors in this study at Ningaloo to the proposed management actions may be more of a reflection of self-efficacy, a response potentially weakening any apparent relation between place attachment and management preferences. Displacement intentions offer a fruitful research area when combined with place studies to better understand what visitors do when attachment is no longer desirable or possible.

Statistical Approach

The statistical methods adopted in this study represent an entirely new approach to the way in which multivariate place data have been explored. They allowed the data to "tell the story" rather than imposing subjective or arbitrary decision rules, did not require the multivariate format to be condensed to a univariate format at any stage, and made minimal (if any) assumptions about the data characteristics.

In particular, the SIMPROF and BVSTEP tests, unique to PRIMER v6 (Clarke & Gorley, 2006; Clarke et al., 2008), provided robust and fully objective approaches for exploring the study aims. The former test provided a way of addressing the first aim -

separating visitors into groups reflecting significant differences in their responses to the place attachment items - that could not have been achieved as comprehensively by other methods. By testing for significant group structure at each node of the dendrogram, SIMPROF provides a particularly thorough method of locating group differences when, as in this study, there is no clear a priori grouping hypothesis. It represents a considerable alternative to other approaches for partitioning samples into meaningful groups a posteriori, and particularly those that have involved some form of subjective assessments and/or imposing predetermined numbers or types of clusters (e.g. low, medium, high place attachment clusters).

Conclusion

Analyses of the emotional bonds or attachments individuals form with recreational places can enhance understanding of their aspirations and requirements. Knowledge of the attachment individuals hold for particular places is useful for managers in understanding why some actions are contentious or when conflict is likely to emerge (Young, Freimund, & Belsky, 2003). In this study, PRIMER provided the means to identify and describe the differences in respondents' attachment according to three identified dimensions of place attachment: Place Identity, Place Dependence and Everybody's Happy. The pattern of differences among visitors' responses to the place attachment items within each of these dimensions were significantly, though weakly, correlated with subsets of management actions, providing insights as to how place attachment may relate to future responses to management actions.

Given the diversity in results regarding the place attachment–management actions relation, further research is warranted. The contribution made by PRIMER as a non-parametric multivariate statistical package would benefit from wider application, specifically in the way it does not need to condense or convert the data into a univariate form and allows the full range of multivariate data to be explored. Additionally it allows for determination of

the natural groupings within the data without imposing pre-determined categorization (e.g. three groups of high, medium and low attachment).

Such development could be complemented by further attention to scale items used to develop and test management actions. Based on the non-significant results of the site-specific actions presented here, using these types of actions seems best avoided. The use of predominantly generic items such as those used by Warzecha and Lime (2001) and Kyle, Graefe, and Manning (2004) could provide a valuable starting point for generating items for future research. These quantitative efforts should be accompanied by qualitative research investigating how visitors perceive proposed management actions and the extent to which their perceptions influence their professed future behavior. Thus, this paper, its unique method of data analysis, and suggestions for future research, adds to the richness of our knowledge and understanding of place, a fundamental concept in providing meaningful experiences for visitors while at the same time protecting the natural environment.

References

- Arnberger, A., & Haider, W. (2007). Would you displace? It depends! A multivariate visual approach to intended displacement from an urban forest trail. *Journal of Leisure Research, 39*(2), 345-365.
- Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organisational research. *Administrative Science Quarterly, 36*(3), 421-458.
- Beckley, L. E., Smallwood, C. B., Moore, S. A., & Kobryn, H. T. (2010). *Ningaloo Collaboration Cluster: Human use of Ningaloo Marine Park*. Hobart, Australia: Commonwealth Scientific and Industrial Research Organization (CSIRO).
- Brandenburg, A. M., & Carroll, M. S. (1995). Your place or mine?: The effect of place creation on environmental values and landscape meaning. *Society and Natural Resources, 8*(5), 381-398.
- Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research, 16*(1), 64-73.
- Clarke, K. R. (1993). Non-parametric multivariate analysis of changes in community structure. *Australian Journal of Ecology, 18*, 117-143.
- Clarke, K. R., & Gorley, R. N. (2006). *PRIMER: User manual and tutorial (Version 6)*. Plymouth, England: PRIMER-E.
- Clarke, K. R., Somerfield, P. J., & Gorley, R. N. (2008). Testing of null hypotheses in exploratory community analysis: Similarity profiles and biota-environment linkage. *Journal of Experimental Marine Biology and Ecology, 366*, 56-69.
- Department of Conservation and Land Management, & Marine Parks and Reserves Authority (CALM & MPRA). (2005). *Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area 2005-2015 (Management Plan No 52)*. Perth, Western Australia: Department of Conservation and Land Management.

- DeVellis, R. F. (1991). *Scale development: Theory and applications*. Newbury Park, California: Sage.
- Duncan, G. (2005). What do we mean by "happiness"? The relevance of subjective wellbeing to social policy. *Social Policy Journal of New Zealand*, 25, 16-31.
- Farnum, J., Hall, T., & Kruger, L. E. (2005). *Sense of place in natural resource recreation and tourism: An evaluation and assessment of research findings* (PNW-GTR-660). Portland, Oregon: US Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Hair, J. F. J., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, New Jersey: Pearson Prentice-Hall.
- Hammit, W. E., Backlund, E. A., & Bixler, R. D. (2006). Place bonding for recreational places: Conceptual and empirical development. *Leisure Studies*, 25(1), 17-41.
- Kaltenborn, B. P. (1998). Effects of sense of place on responses to environmental impacts: A study among residents in Svalbard in the Norwegian High Arctic. *Applied Geography*, 18(2), 169-189.
- Kaltenborn, B. P., & Williams, D. R. (2002). The meaning of place: Attachments to Femundsmarka National Park, Norway, among tourists and locals. *Norwegian Journal of Geography*, 56(3), 189-198.
- Kil, N., Holland, S. M., & Stein, T. (2010). Improving the management of natural resources recreation areas through understanding place-attached visitor segments. *Journal of Park and Recreation Administration*, 28(3), 16-41.
- Kyle, G., & Chick, G. (2007). The social construction of a sense of place. *Leisure Sciences*, 29(3), 209-225.

- Kyle, G., Graefe, A., & Manning, R. (2004). Attached recreationists...Who are they? *Journal of Park and Recreation Administration*, 22(2), 65-84.
- Kyle, G., Graefe, A., & Manning, R. (2005). Testing dimensionality of place attachment in recreational settings. *Environment and Behavior*, 37(2), 153-177.
- Kyle, G., Mowen, A. J., & Tarrant, M. (2004). Linking place preferences with place meaning: An examination of the relationship between place motivation and place attachment. *Journal of Environmental Psychology*, 24(4), 439-454.
- Low, S. M., & Altman, I. (1992). Chapter 1: Place attachment-A conceptual inquiry. In S. M. Low & I. Altman (Eds.), *Place attachment* (pp. 1-12). New York, New York: Plenum Press.
- Mangi, S. C., & Austen, M. C. (2008). Perceptions of stakeholders towards objectives and zoning of marine-protected areas in southern Europe. *Journal for Nature Conservation*, 16(4), 271-280.
- Mason, S.-A., & Moore, S. A. (1998). Using the Sorensen Network to assess the potential effects of ecotourism on two Australian marine environments. *Journal of Sustainable Tourism*, 6(2), 143-154.
- Moore, R. L., & Graefe, A. R. (1994). Attachments to recreation settings: The case of rail-trail users. *Leisure Sciences*, 16(1), 17-31.
- Moore, S. A., & Polley, A. (2007). Defining indicators and standards for tourism impacts in protected areas: Cape Range National Park, Australia. *Environmental Management*, 39(3), 291-300.
- Nawijn, J. (2011). Determinants of daily happiness on vacation. *Journal of Travel Research*, 50(5), 559-566.
- Proshansky, H. M. (1978). The city and self-identity. *Environment and Behavior*, 10, 147-169.

- Ramkissoon, H., Weiler, B., & Smith, L. D. G. (2012). Place attachment and pro-environmental behaviour in national parks: The development of a conceptual framework. *Journal of Sustainable Tourism*, 20(2), 257-276.
- Shafer, S., & Inglis, G. (2000). Influence of social, biophysical, and managerial conditions on tourism experiences within the Great Barrier Reef World Heritage Area. *Environmental Management*, 26(1), 73-87.
- Smallwood, C. B., Beckley, L. E., Moore, S. A., & Kobryn, H. T. (2011). Assessing patterns of recreational use in large marine parks: A case study from Ningaloo Marine Park, Australia. *Ocean and Coastal Management*, 54(4), 330-340.
- Smith, J. W., Davenport, M. A., Anderson, D. H., & Leahy, J. E. (2011). Place meanings and desired management outcomes. *Landscape and Urban Planning*, 101(4), 359-370.
- Smith, J. W., Siderelis, C., & Moore, R. L. (2010). The effects of place attachment, hypothetical site modifications and use levels on recreation behavior. *Journal of Leisure Research*, 42(4), 621-640.
- Stokols, D., & Shumaker, S. A. (1981). People in places: A transactional view of settings. In J. H. Harvey (Ed.), *Cognition, Social Behavior, and the Environment* (pp. 441-488). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Tonge, J. (2012). *Understanding the place attachment of campers along the southern Ningaloo Coast, Australia*. Unpublished PhD Dissertation, Murdoch University, Perth, Western Australia.
- UNESCO World Heritage Centre. (2011). Decision - 35COM8B.7 - Natural Properties - Ningaloo Coast (Australia). Retrieved from <http://whc.unesco.org/en/decisions/4278>
- Vorkinn, M., & Riese, H. (2001). Environmental concern in a local context: The significance of place attachment. *Environment and Behavior*, 33(2), 249-263.

Warzecha, C. A., & Lime, D. W. (2001). Place attachment in Canyonlands National Park:

Visitors' assessment of setting attributes on the Colorado and Green Rivers. *Journal of Park and Recreation Administration*, 19(1), 59-78.

Western Australian Planning Commission (WAPC). (2004). *Ningaloo coast regional strategy:*

Carnarvon to Exmouth. Perth: Western Australian Planning Commission.

Wilkinson, D. (2008). Individual and community factors affecting psychological sense of

community, attraction, and neighboring in rural communities. *Canadian Review of Sociology*, 45(3), 305-329.

Williams, D. R., Patterson, M. E., Roggenbuck, J. W., & Watson, A. E. (1992). Beyond the

commodity metaphor: Examining emotional and symbolic attachment to place.

Leisure Sciences, 14(1), 29-46.

Williams, D. R., & Roggenbuck, J. W. (1989, October). *Measuring place attachment: Some*

preliminary results. Paper presented at the NRPA Symposium on Leisure Research, San Antonio, Texas.

Williams, D. R., & Vaske, J. J. (2003). The measurement of place attachment: Validity and

generalizability of a psychometric approach. *Forest Science*, 49(6), 830-840.

Wood, D., & Glasson, J. (2005). Giving the environment a voice: The transformation

potential of valuing tourism in sensitive natural environments: The case of the

Ningaloo Coastal Region, Western Australia. *Planning Practice and Research*, 20(4), 391-407.

Wood, D. S. (2003). *Tourism on the Carnarvon-Ningaloo Coast Between Quobba Station*

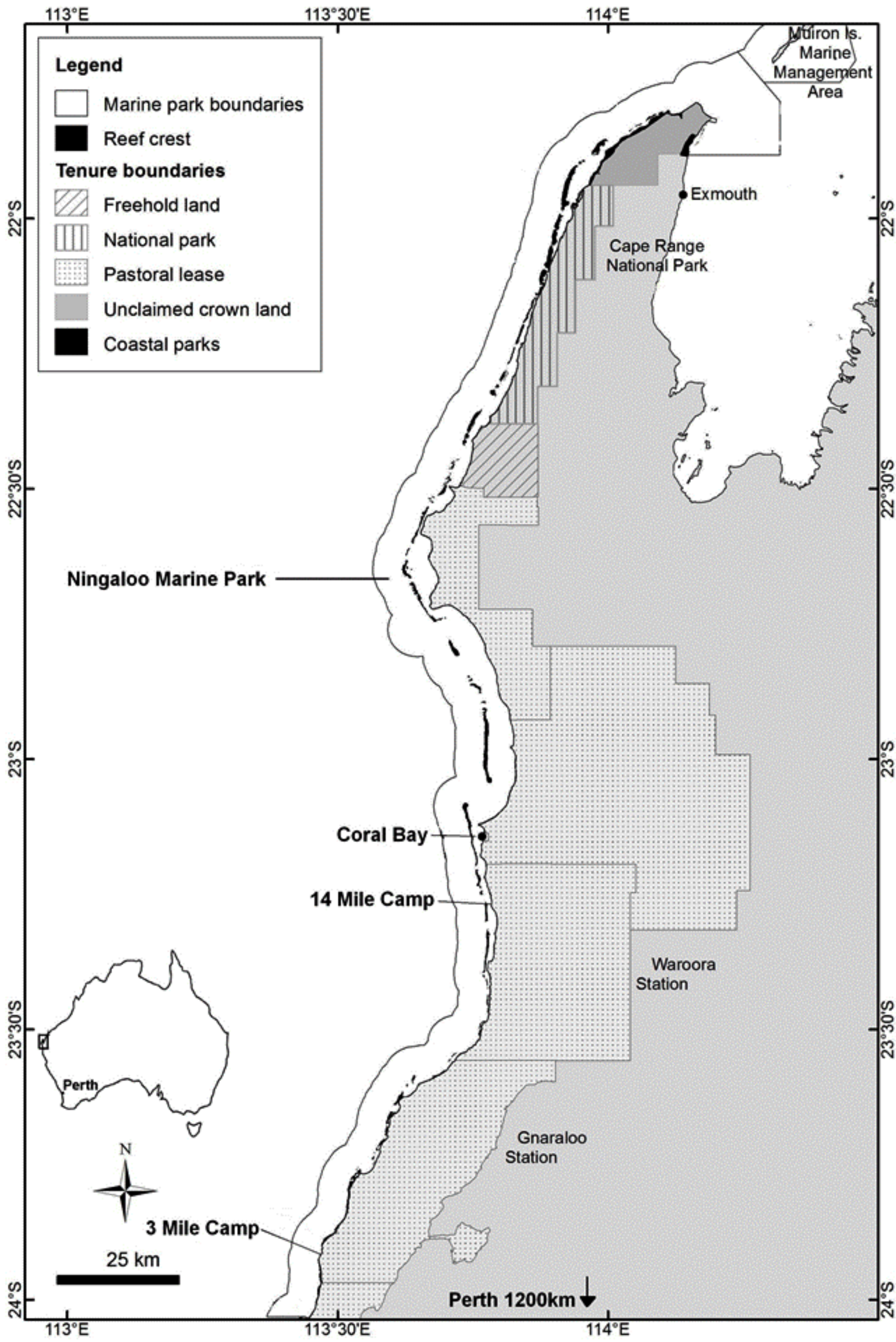
and Exmouth and its implications for sustainability of the coast. Perth, Western Australia: Western Australian Planning Commission.

Yung, L., Freimund, W. A., & Belsky, J. M. (2003). The politics of place: Understanding meaning, common ground, and political difference on the Rocky Mountain Front. *Forest Science*, 49(6), 855-866.

Appendix

Results of Chi-Squared Difference Tests Demonstrating Discriminant Validity

Place attachment dimension correlation	Chi squared (df)	Difference in Chi squared (df)	p-value of difference in Chi squared
Full model	93.5(30)	-	-
Place Identity and Place Dependence	97.2 (29)	3.7 (1)	0.05
Place Identity and Everybody's Happy	104.3 (30)	10.8 (1)	0.00
Place Dependence and Everybody's Happy	99.6 (30)	6.1 (1)	0.01



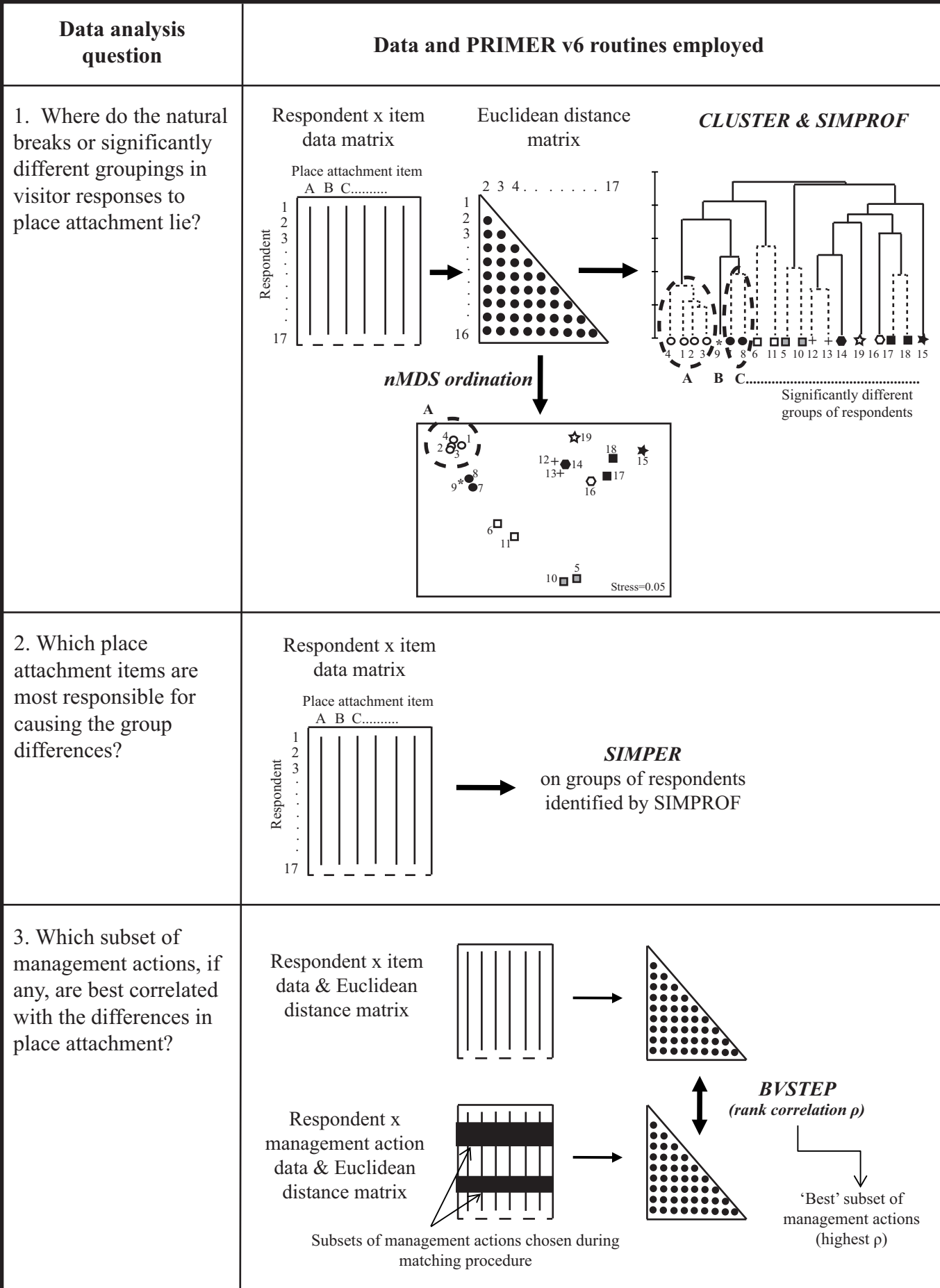


Figure 2. Summary of analyses undertaken in PRIMER v6 (adapted from Clarke, Somerfield & Gorley, 2008).

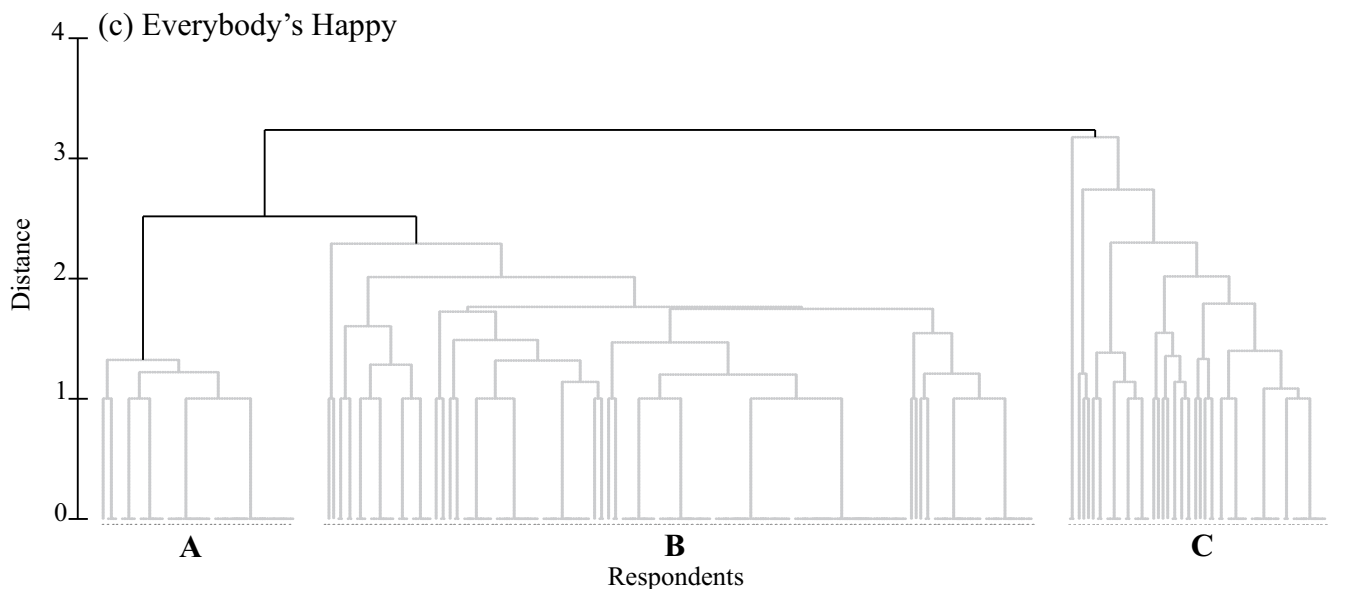
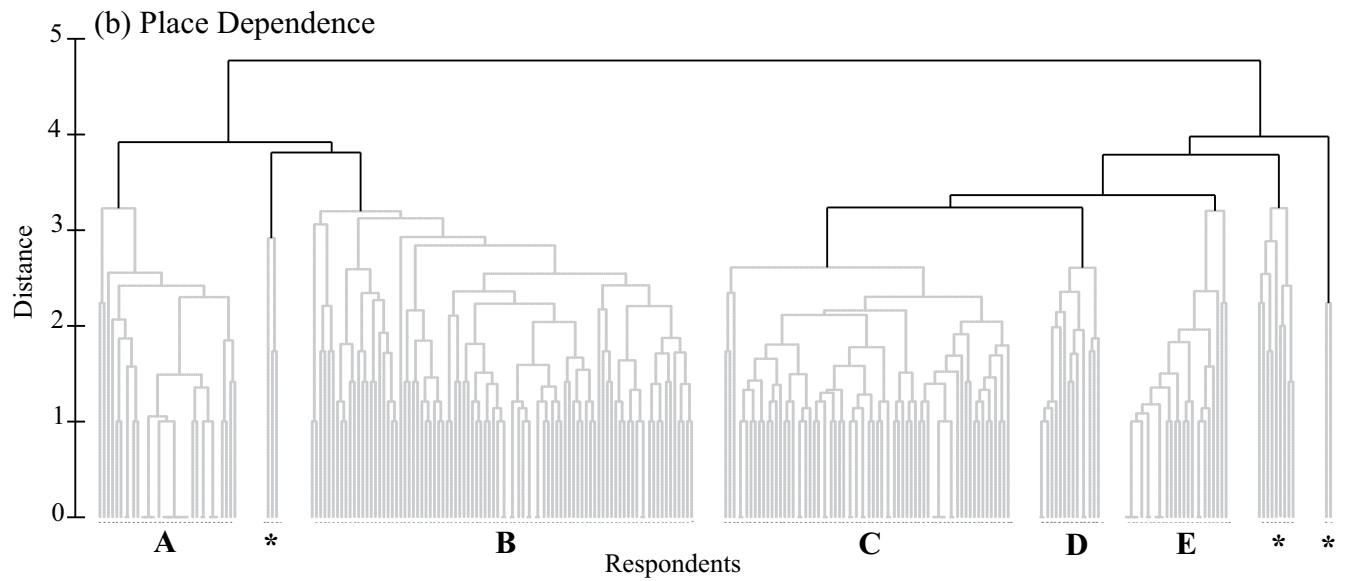
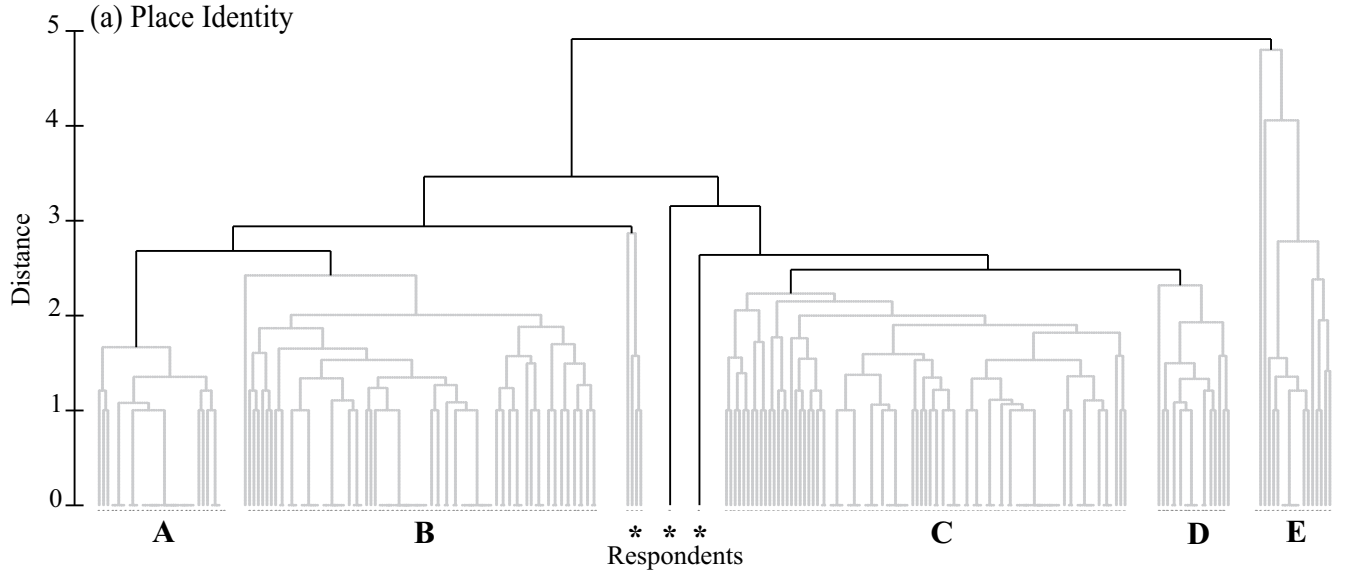


Figure 3. Dendrograms derived from subjecting the Euclidean distance matrix constructed from the place attachment scores for each respondent to CLUSTER and SIMPROF, undertaken separately for the (a) Place Identity, (b) Place Dependence and (c) Everybody's Happy dimensions. Groups of respondents marked by grey lines and labelled "A", "B" etc are those shown by SIMPROF not to contain any significant place attachment differences and thus represent distinct groups. Groups marked by an asterisk are considered outliers.

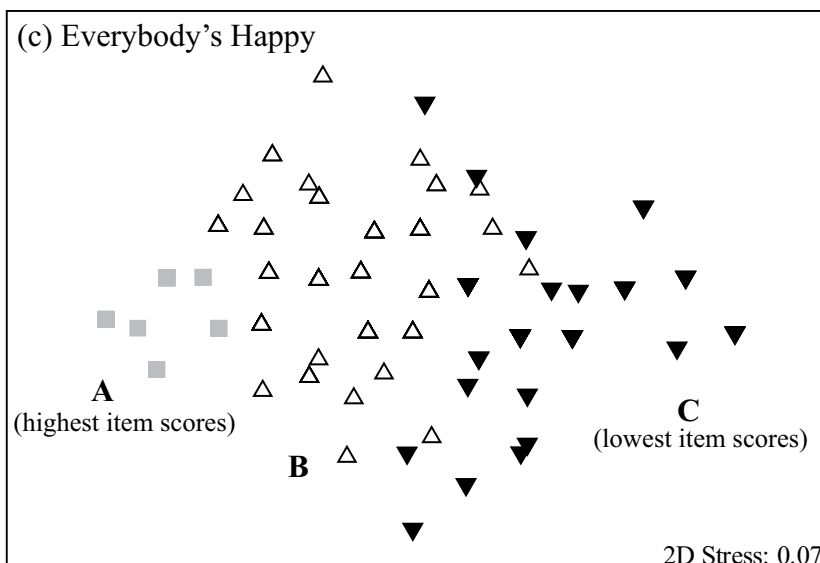
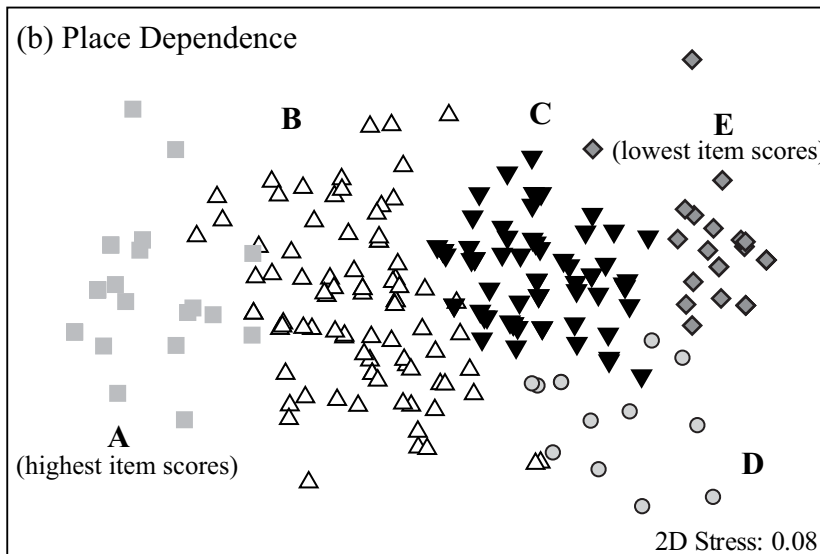
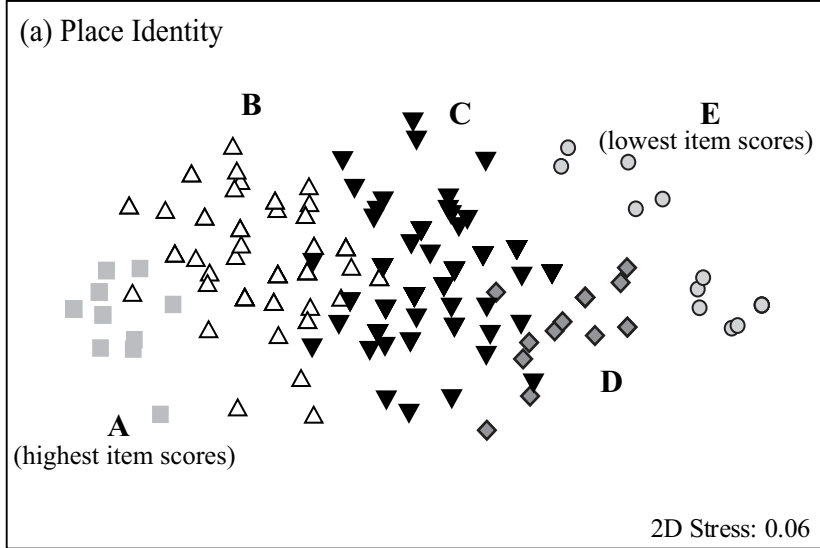


Figure 4. Ordination plots derived from subjecting the Euclidean distance matrix constructed from the place attachment scores for each respondent to non-metric multidimensional scaling ordination, undertaken separately for the (a) Place Identity, (b) Place Dependence and (c) Everybody's Happy dimensions. Each respondent has been coded for the group to which it was assigned by the SIMPROF routine (see Figure 3). Outliers have been removed from these analyses.