



SCIENCE FOR CONSERVATION SERIES 333

Visitors as advocates

A review of the relationship between participation in outdoor recreation and support for conservation and the environment

Michael Harbrow



Department of
Conservation
Te Papa Atawhai

Cover: Families cycling at Peters Pass, St James Walkway (near Hanmer) 2016. *Photo: Alan Clelland.*

Science for Conservation is a scientific monograph series presenting research funded by New Zealand Department of Conservation (DOC). Manuscripts are internally and externally peer-reviewed; resulting publications are considered part of the formal international scientific literature.

This report is available from the departmental website in pdf form. Titles are listed in our catalogue on the website, refer www.doc.govt.nz under *Publications*, then *Series*.

© Copyright April 2019, New Zealand Department of Conservation

ISSN 1177-9241 (web PDF)

ISBN 978-1-98-851459-8 (web PDF)

This report was prepared for publication by the Creative Services Team; editing by Amanda Todd and layout by Lynette Clelland. Publication was approved by the Manager, Strategy and Insights - Heritage and Visitors Unit, Department of Conservation, Wellington, New Zealand.

Published by Creative Services Team, Department of Conservation, PO Box 10420, The Terrace, Wellington 6143, New Zealand.

In the interest of forest conservation, we support paperless electronic publishing.

CONTENTS

Abstract	1
<hr/>	
1. Introduction	2
<hr/>	
2. New Zealand's conservation challenges	3
<hr/>	
2.1 Focus on partnerships	4
<hr/>	
3. Conservation and environmental engagement among New Zealanders and international visitors	5
<hr/>	
3.1 New Zealanders	5
3.1.1 New Zealand's changing population	6
3.2 International visitors	7
3.3 Do visitors to public conservation lands and waters have different attitudes and behaviours?	8
<hr/>	
4. Relationship between participation in outdoor recreation during childhood and engagement with the environment and conservation	9
<hr/>	
4.1 Mechanisms behind this relationship	11
4.2 Limitations of research on the effects of childhood contact with nature and the outdoors	11
4.3 Conclusions	12
<hr/>	
5. Relationship between participation in outdoor recreation in adulthood and engagement with the environment and conservation	13
<hr/>	
5.1 Environmental concern/pro-environmental attitudes	13
5.1.1 General relationship between participation in outdoor recreation and environmental concern/pro-environmental attitudes	13
5.1.2 Relationship between activity type and environmental concern/pro-environmental attitudes	15
5.1.3 Relationship between participation in outdoor activities and attitudes towards specific environmental issues	20
5.1.4 Relationship between participation in outdoor recreation and attitudes towards conservation	21
5.1.5 Limitations of attitudinal research	21
5.2 Pro-environmental behaviours	22
5.2.1 Relationship between activity type and pro-environmental behaviours	24
5.2.2 Limitations of behavioural research	27
5.3 Why is there a stronger relationship between recreation and pro-environmental behaviours than there is with environmental concern/pro-environmental attitudes?	27
5.3.1 Behavioural models	28
5.3.2 Social and personal factors	28
5.3.3 Value orientation	29
<hr/>	
6. Mechanisms through which participation in outdoor recreation is associated with environmental engagement	30
<hr/>	
6.1 Increased awareness	30
6.2 Mediating role	32
6.3 Conditioning	33
6.4 Emotional affinity	33

6.5	Place attachment	34
6.6	Recreation specialisation	37
6.7	Conclusion	38
7.	Conclusions	40
<hr/>		
8.	Recommendations	44
<hr/>		
8.1	Recommendations to increase and leverage off engagement among visitors	44
8.2	Recommendations for further research	45
9.	Acknowledgements	46
<hr/>		
10.	References	46
<hr/>		
10.	Glossary	55
<hr/>		

Visitors as advocates

A review of the relationship between participation in outdoor recreation and support for conservation and the environment

Michael Harbrow

Department of Conservation, PO Box 10420, Wellington 6143, New Zealand.

Email: mharbrow@doc.govt.nz

Abstract

Participation in outdoor recreation can lead to pro-environmental behaviours, including those that benefit conservation. This has provided one rationale to support investment by the Department of Conservation (DOC) in recreation and tourism. However, while there is a significant body of research that describes this relationship, it has not previously been considered in a New Zealand context. Moreover, the mechanisms through which participation may influence engagement with the environment or conservation, and the circumstances where this occurs are poorly understood. Therefore, this review aimed to investigate this relationship to help grow conservation engagement in New Zealand. Several studies have found that spending time in nature and the outdoors during childhood is the most important formative influence on adults with high levels of environmental engagement, and that it also brings additional benefits to children's development and health and wellbeing. This supports the range of child-and family-focussed interventions that are undertaken by DOC and its partners. However, the influence of time in nature and the outdoors in adulthood is less clear, with only a weak relationship being observed between participation in outdoor recreation in adulthood and pro-environmental attitudes. Furthermore, although there is a stronger link between participation and pro-environmental behaviours, this relationship is complex and involves several different pathways. The nature of these suggests that support for conservation among visitors is not a certainty and that it is best developed through regular or repeated participation. It is unclear whether typical patterns of participation in outdoor recreation in New Zealand are sufficient to drive significant conservation engagement, without more targeted interventions to achieve this goal. The review concludes with recommendations on approaches to increase and leverage off engagement among visitors and for further research.

Keywords: outdoor recreation, nature-based tourism, participation, visitors, conservation engagement, pro-environmental attitudes and behaviours

© Copyright April 2019, Department of Conservation. This paper may be cited as:

Harbrow, M. 2019: Visitors as advocates: a review of the relationship between participation in outdoor recreation and support for conservation and the environment. *Science for Conservation* 333. Department of Conservation, Wellington. 58 p.

1. Introduction

Participation in outdoor recreation, which can be defined as *recreation experiences that result from recreation activities that occur in and depend on the natural environment* (Moore & Driver 2005: 11), and which includes nature based tourism, can lead to individuals becoming concerned for the environment. Participation may result in greater connection with or personal investment in the natural environment, and may result in pro-environmental behaviours (Dunlap & Heffernan 1975; Bikales & Manning 1991; Peterson et al. 2008; Larson et al. 2011; Cooper et al. 2015), some of which benefit conservation.

Conservation is defined in New Zealand's Conservation Act 1987 as:

The preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations

However, the term is commonly used to encompass only natural heritage. For example, the International Union for Conservation of Nature (IUCN) defines conservation as:

The protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence (IUCN n.d.)

In New Zealand, the idea that visiting public conservation lands and waters will encourage people to support conservation, has been one justification for ongoing investment in recreation by the Department of Conservation (DOC). Indeed, in 2012, DOC's Annual Report stated:

By visiting public conservation lands and waters, people are able to better appreciate these resources and understand New Zealand's conservation challenges. (DOC 2012: 31)

An even more explicit link was made more than a decade earlier in DOC's 1996 Visitor Strategy:

Visitors can develop a better appreciation of the intrinsic natural and historic values of these places, whether these be wilderness or intensively developed sites such as Milford Sound. This appreciation should increase their support for the protection of these places and encourage some to participate in conservation work. (DOC 1996: 17)

Each year, as many as 5.3 million domestic and international visitors access public conservation lands and waters in New Zealand, thus the idea that these individuals could contribute to conservation by converting an interest in the natural environment into tangible action to support it is highly attractive.

To date, however, DOC has not been able to provide strong evidence that participation in outdoor recreation is related to conservation engagement, such that it leads to a positive change in visitors' understanding, values, awareness or behaviour. If such a link could be demonstrated, it would provide further evidence for the benefits of investing in facilities and experiences within public conservation lands and waters. Moreover, this would complement the body of knowledge that has built up over the past 15 years that links outdoor recreation to a range of benefits that are enjoyed by New Zealanders, including health and wellbeing (Blaschke 2013) and economic benefits (DOC 2006).

The possibility that there is no relationship between participation in outdoor recreation and conservation engagement, or that the relationship is more nuanced than DOC has previously assumed, is also worth considering, as there is a risk that poor investment or management decisions are being made based on incorrect assumptions about the nature of this relationship.

Regardless of its findings, a review of the relationship between participation in outdoor recreation and conservation engagement could contribute to improved decision making in a number of ways.

This review commences with a brief overview of the challenges that face conservation in New Zealand and DOC's response to those challenges, providing the context for DOC's efforts to engage visitors in conservation.

Existing knowledge about the degree of conservation and environmental engagement among New Zealanders and international visitors is then reviewed, followed by international literature on the links between participation in outdoor recreation during childhood and adulthood and the development of pro-environmental attitudes and behaviours. Although this is a wider topic than 'support for conservation', it reflects the focus of much of the existing research in this area.

The review concludes with recommendations around approaches that could be employed to increase and leverage off engagement among visitors and for further research.

2. New Zealand's conservation challenges

New Zealand faces conservation challenges that are far greater than any one organisation can manage alone (DOC 2016). Chief among these challenges is the threat to native biodiversity from possums (*Trichosurus vulpecula*), rats (*Rattus* spp.) and stoats (*Mustela erminea*). These three predators are considered to be the biggest killers of forest birds (PCE 2017) and the threat is so significant that kiwi (*Apteryx* spp.) and other iconic bird species including kākā (*Nestor meridionalis*), kōkako (*Callaeas* spp.), kākārīki (*Cyanoramphus novaezelandiae*), mōhua/yellowhead (*Mohoua ochrocephala*) and whio/blue duck (*Hymenolaimus malacorhynchos*) could virtually disappear within a generation from areas that currently lack predator control (PCE 2011). Furthermore, various insect, frog, lizard, bat and plant species face further decline and potential extinction on the New Zealand mainland, while more common species such as the kererū (*Hemiphaga novaeseelandiae*), korimako/bellbird (*Anthornis melanura*) and tūī (*Prothemadera novaeseelandiae*) also face the risk of further decline (PCE 2011). Among New Zealand's bird species alone, one third are now classified as threatened and considered to be at serious risk of extinction (PCE 2017).

New Zealanders have also become increasingly concerned about the quality of the country's rivers, lakes and wetlands (Hughey et al. 2016). Levels of total nitrogen and phosphorous increased in 77 large rivers monitored between 1989 and 2013 (Ministry for the Environment & Statistics New Zealand 2015), likely due to land use changes and increased fertiliser use. These nutrients promote algal growth in waterways which can affect biodiversity and amenity values. Furthermore, almost three quarters of New Zealand's freshwater fish species are considered threatened or at risk of extinction (Goodman et al. 2013) while New Zealand's wetlands have been reduced to only 10% of their pre-human settlement extent (Ministry for the Environment & Statistics New Zealand 2015).

The potential spread of weeds on public conservation land is also of concern. In 2014, it was estimated that c. 1.7 million ha of land in New Zealand was affected by wilding conifers at various densities (New Zealand Wilding Conifer Management Group 2014), and this area has been increasing by an average of 90 000 ha or 5–6% per year (Greenaway et al. 2015). Wilding conifers can impact on landscape, amenity and biodiversity values, increase fire risk, reduce the quantity and quality of water, and potentially result in the affected areas acting as a seed source for the invasion of adjacent land (Froude 2011; New Zealand Wilding Conifer Management Group 2014).

In addition to its responsibilities for biodiversity, DOC manages an extensive network of visitor facilities, including 962 huts, more than 330 campsites, 22 visitor centres, over 14 800 km of tracks, and 13 500 structures such as bridges and boardwalks (DOC 2017a). Over the coming years, DOC will face significant cost pressures as a result of inflation (DOC 2017b), and public pressure to retain the current extent and standard of this network.

Furthermore, New Zealand is currently experiencing significant tourism growth. The number of international visitors to New Zealand has increased sharply in recent years and is forecast to reach 4.9 million by 2023, compared with 3.5 million in 2016 (MBIE 2017b). New Zealand's natural environment is a key reason to visit the country and most international tourists visit one or more of New Zealand's national parks (MBIE: International Visitor Survey, unpublished data). Use of public conservation lands and waters by New Zealanders is also increasing (Ipsos 2016).

While international and domestic tourists spent \$26.8 billion dollars in New Zealand in 2016/17 (MBIE 2017a), tourism growth is creating pressure in some places and this may contribute to demand for new and upgraded visitor facilities. The tourism sector is also facing emerging threats to its social license as a result of this growth. In 2017 just over a third of New Zealanders surveyed believed that international tourists were putting too much pressure on New Zealand. Respondents raised concerns about pressure on infrastructure, environmental damage, traffic congestion, road safety, shortages of accommodation, freedom camping and overcrowding of scenic locations (Kantar TNS 2017).

DOC and the wider tourism sector face challenges in responding to tourism growth, ensuring that New Zealanders and international visitors continue to enjoy a quality experience and ensuring that tourism continues to have a high level of social acceptance.

2.1 Focus on partnerships

In recent years, DOC has significantly shifted its management approach to recognise these challenges by placing a greater focus on working with others to grow the overall effort and investment in conservation. Partners include businesses, iwi, community groups, volunteers, philanthropists and local councils, and a number of significant relationships have been developed. In 2016/17 DOC received \$12.4 million in contributions from partners and sponsors and recorded more than 36 000 work day equivalents from volunteers (DOC 2017a). Furthermore, Peters et al. (2015) found that more than 600 community groups across New Zealand were restoring sites and protecting habitat for native species.

Visitors to public conservation lands and waters have remained a relatively untapped source of donations and volunteer effort, although in some cases visitors may be contributing indirectly through tourism operators. A recent study of 41 New Zealand tourism businesses, including some of the Department's largest concessionaires, found that most were contributing to conservation in some form. This included providing financial contributions to conservation projects, paying for employees to undertake activities such as trapping and weeding, providing free or subsidised transport for DOC staff to undertake conservation work, and providing the opportunity for customers to contribute through proceeds from specific purchases or the donation of a percentage of fees (Mobius Research & Strategy 2017).

Some visitors are making direct contributions also. For example, a consortium of recreational trampers, hunters, mountain bikers and other outdoor users recently obtained seed funding from DOC's Community Fund to deliver a significant number of volunteer projects that were aimed at maintaining backcountry recreational facilities (Outdoor Recreation Consortium 2017).

Aside from donations and volunteering, there are several other ways in which visitors can support conservation either onsite (e.g. biosecurity, control of dogs) or at home (e.g. keeping cats inside at night, growing native plants to support birdlife, and not growing weeds and potential garden escapees).

3. Conservation and environmental engagement among New Zealanders and international visitors

3.1 New Zealanders

Historically, New Zealanders have had a strong connection with their lands and waters. Māori have traditionally been deeply connected to the environment and their tribal lands and waters in particular, drawing their identity from concepts such as whakapapa (their genealogical relationship and interaction with plants, animals, people, the land and other aspects of creation), rangatiratanga (chiefly authority) and kaitiakitanga (an intergenerational responsibility to practice guardianship) (Panelli & Tipa 2007). Furthermore, Te Ao Māori, (the Māori world) positions Māori as both part of the natural system and guardians for that system and Māori tend to value the environment more than other New Zealanders (Cowie et al. 2016).

Many New Zealanders, particularly males of European ethnicity, have historically shared a strong common identity that has been shaped in part by the country's natural environment, outdoor activities such as hunting, shooting and fishing, a strong desire to live simply on the margin between land and sea or tamed and untamed places, and a desire to preserve access to rivers, lakes and the sea (King 2003).

Research by Rinne & Fairweather (2011) typified these constructions of national identity, with study participants identifying strongly with the natural environment, and believing that the country's beautiful, clean and green landscapes were one of the factors that made New Zealand unique and set it apart from other nations. Participants also felt a close connection to the landscape, and stressed the importance of getting out and doing things in nature. Similarly, Dürr (2008) found that national and cultural identity was intertwined with New Zealand's 100% pure branding for the third and fourth generation Pākehā participants that she interviewed.

Several studies have shown that New Zealanders have relatively high levels of environmental or conservation engagement. For example, New Zealand typically rates in the top one-third of countries in international comparisons of citizens' levels of environmental concern, ranking above Australia, Great Britain and the United States (Franzen & Vogl 2013). Furthermore, recent surveys have found that New Zealanders tend to have a pro-ecological or ecocentric orientation towards the environment (Research New Zealand 2007; Lovelock et al. 2013; Versus Research 2013) and in 2016 the majority of New Zealanders (85%) felt that conservation was important to them personally (Ipsos 2016).

Rates of participation in recreation on public conservation lands and waters also remain high and appear to be increasing – in 2016, 80% of New Zealanders had visited at least one area administered by DOC in the previous 12 months (Ipsos 2016), compared with 71% in 2013 (Nielson 2013).

However, although these findings are positive, these high levels of participation and positive attitudes towards the environment have not translated into widespread, tangible support for conservation. For example, in 2016, only a minority of New Zealanders had donated money to a conservation cause (23%) or spent time helping on a conservation project (12%) in the previous 12 months (Ipsos 2016).

Hughey et al. (2016) noted that the adoption of pro-environmental behaviours by New Zealanders was highly variable. More than 70% of New Zealanders who responded to their survey engaged in various environmentally sustainable behaviours, including recycling household waste, composting, growing vegetables at home, purchasing products that were marketed as being

environmentally friendly and limiting or reducing electricity usage. However, participation in what could be termed activism behaviours was lower, with less than one-third of respondents having been involved in hearing or consent processes about the environment, donating to non-government organisations or been involved in clubs or projects that restore the natural environment.

3.1.1 New Zealand's changing population

The degree to which New Zealand's natural environment defines national identity both now and into the future is arguable. Immigration since the 1970s has given New Zealand an ethnically and culturally diverse population (Sibley et al. 2011), and as of 2013, one-quarter of New Zealanders had been born overseas (Statistics New Zealand 2014). Furthermore, population projections indicate that the country will become even more diverse in the coming years. Two key contributors to this will be growth in New Zealand's Asian and Pacific Island populations as a result of immigration and higher birth rates, and lower birth rates among the European population (Statistics New Zealand 2017a). As the population changes, New Zealanders may increasingly draw their identity from a range of different sources, and so the current values and social norms related to the environment and conservation may also change.

At present, such concerns are somewhat speculative as recent studies that have looked at differences in environmental views and practices between different ethnic groups, or between those born in New Zealand and overseas, have obtained starkly contrasting results. For example, Hughey et al. (2014) found that New Zealanders' attitudes toward the use and management of water, perceptions of water quality and engagement in pro-environmental behaviours varied significantly between different ethnic groups, with Māori and New Zealand Europeans typically having higher levels of concern about freshwater issues than those of other ethnicities. Cowie et al. (2016) also found differences in the degree of regard for the environment between different ethnic groups, but found that New Zealand Europeans valued the environment the least. Māori and Asian New Zealanders had significantly higher levels of regard for the environment than New Zealand Europeans. Milfont et al. (2006) did not look at differences in concern for the environment, but found that Asian and European New Zealanders differed in their motivation for taking environmental action (i.e. whether it was driven by biospheric, egoistic or altruistic concerns which are discussed further in Section 5.3.3), and the extent to which different motivations predicted pro-environmental behaviour.

By contrast, Lovelock et al. (2013) found no significant difference in environmental world view between immigrant and native-born New Zealanders and Cowie et al. (2016) found that individuals who migrate to New Zealand value the environment more than those who were born there. Moreover, several studies have found that New Zealand's environment is the main, or a major, reason for immigrants to come to New Zealand (Department of Labour 2009; Tabor et al. 2015; MBIE 2017c).

Along side changes in ethnic mix, New Zealand's population is also aging. The number of New Zealanders aged 65 years and older is predicted to roughly double, from 700 000 currently to between 1.3 and 1.5 million in 2046 (Statistics New Zealand 2016). The effect of these changes on New Zealanders' overall engagement with conservation is uncertain as factors such as skills and experience, health and disability, income and availability of time may all play a role. New Zealanders' attitudes towards conservation and their engagement in conservation activities do not appear to be correlated with age, however participation in recreation on public conservation lands and waters is lower among New Zealanders aged 65 and older (Ipsos: Survey of New Zealanders unpublished data).

A third area of change is that much of the population growth in the coming years is expected to occur in the upper North Island, particularly in Auckland (Statistics New Zealand 2017b). Currently, 50% of the country's population lives north of Hamilton and this trend will continue, with New Zealanders increasingly residing in areas that are removed from the majority

of the lands and waters that DOC administers. Thus, it is possible that efforts to engage New Zealanders in conservation may become less relevant, as participation in outdoor recreation on public conservation lands and waters comes to represent an increasingly less significant part of New Zealanders' everyday lives.

Aucklanders' level of participation in recreation on public conservation lands and waters is indeed lower than that of New Zealanders overall (Ipsos: Survey of New Zealanders unpublished data). However, Auckland residents have access to a large regional park network managed by Auckland Council, and their ability to access walks and easier tramping opportunities at least, is not markedly worse compared with residents of other regions (Brabyn & Sutton 2013). It is possible that these areas enable Auckland residents to maintain a connection with New Zealand's natural heritage.

The effects of ongoing demographic change and the increasing concentration of the population in the upper North Island are complex and difficult to predict, but New Zealanders' engagement with conservation is likely to look different in future years and cannot be taken for granted.

3.2 International visitors

Less is known about the attitudes and behaviours of international visitors in relation to the environment and conservation. However, New Zealand's natural environment and clean, green image evidently provides a strong motivation for visiting the country, given that among international visitors to New Zealand in the year to June 2017:

- 46% were influenced by New Zealand's spectacular landscapes and natural scenery when making their initial decision to visit the country (MBIE: International Visitor Survey, unpublished data).
- 52% visited a national park (MBIE: International Visitor Survey, unpublished data).
- 67% went for a walk, hike or trek, with much of this activity likely to have taken place on public conservation land (MBIE: International Visitor Survey, unpublished data).

Ateljevic (2001) suggested that push and pull factors combine to create the motivation for international tourists to visit New Zealand. The country's image of being clean, green, fresh and peaceful, and factors such as the farming lifestyle, diverse landscapes and scenery, open space and freedom, small population size, and friendliness are attractive to visitors, particularly where these contrast with the conditions that prevail in their everyday lives at home. In addition, Ateljevic (2001) identified conditions in a visitor's home country, such as the quality of the environment, as push factors that underlie their decision to visit New Zealand.

The findings of Ateljevic's (2001) study may imply that New Zealand is attractive to green or environmentally conscious tourists, and indeed, a survey of international visitors to Christchurch by Fairweather et al. (2005) showed that respondents tended to have a pro-environmental world view, with 61% of respondents holding bio-centric values. Furthermore, in 2017 almost half of international visitors to New Zealand surveyed agreed with the statement 'I consider the environment in everything I do' (MBIE: IVS unpublished data).

However, in contrast to these studies, the Regional Visitor Monitor (RVM; MED 2011), which was based on surveys of visitors to Auckland, Rotorua, Wellington, Canterbury, Queenstown and Dunedin, found that the environment was less important to visitors than other factors, and was not usually reflected in their purchasing decisions. It reported that:

- 12% of international visitors surveyed would always choose an environmentally friendly product or service over an alternative.
- 18% cited 'being environmentally friendly' among the top three factors that were most important to them when travelling. However, many other factors had greater importance to

visitors, including experiencing new or different things, having fun, feeling safe and secure, getting good value for money, feeling comfortable, and meeting people.

The study also found that:

- Protecting plants and animals (41%) was the aspect most frequently mentioned by international visitors, when they were asked to list the three most important signs of an environmentally friendly destination. The management of natural areas was listed by 32%.
- Results for international and domestic visitors were very similar overall.

Thus, in contrast to Fairweather et al. (2005), the RVM suggested that only a minority of international visitors could be considered environmentally conscious travellers and did not indicate that high environmental engagement was characteristic of visitors to New Zealand overall.

With very few studies addressing international visitors' attitudes and behaviours in relation to conservation and the environment, there is a significant knowledge gap in this area.

3.3 Do visitors to public conservation lands and waters have different attitudes and behaviours?

It is interesting to consider whether visitors to public conservation lands and waters exhibit different attitudes and behaviours from the wider New Zealand or tourist population. Data collected by DOC on New Zealanders' participation in outdoor recreation and conservation values through its Survey of New Zealanders showed that individuals who visit public conservation lands and waters have a slightly higher likelihood of considering conservation as being important to them personally (Ipsos 2016).

There are no equivalent data relating to international visitors, but a number of studies have examined the values and attitudes of international and domestic participants in specific nature-based activities at particular sites. These have included trampers and hunters on Stewart Island/Rakiura (Lovelock 2003; Reis 2007), and participants in sea kayaking, fishing, dolphin tours and a range of ecotourism activities in various locations around New Zealand (Higham et al. 2001; Lück 2003; Dawson 2003). However, the limited scope and range of methods used in these studies mean that it is not possible to reach an overall conclusion about the degree of conservation or environmental engagement among visitors to public conservation lands and waters.

4. Relationship between participation in outdoor recreation during childhood and engagement with the environment and conservation

Contact with nature and the outdoors often begins in childhood, and so it is important to explore the role that these early experiences play in shaping the attitudes and behaviours that are exhibited later in life. Over the past 35 years, various studies have described these experiences as an important, and often the most important, formative influence on individuals who have high levels of environmental engagement (Tanner 1980; Palmer 1993; Horwitz 1996; Palmer & Suggate 1996; Chawla 1999; Corcoran 1999; Palmer et al. 1999; Sward 1999; Furihata et al. 2007; Arnold et al. 2009; Hsu 2009; James et al. 2010; Farmer et al. 2011; Li & Chen 2015). Much of this research has used the Significant Life Experiences approach (Tanner 1980), whereby individuals who demonstrate environmental concern through their actions are asked to recall the experiences that contributed to their current views (Chawla 1999).

In terms of outdoor experiences, the respondents in these studies have referred to both organised activities and solitary, unstructured or free play in the outdoors, each of which may be important in different stages of childhood (Tanner 1980; Arnold et al. 2009; James et al. 2010; Farmer et al. 2011). They have also mentioned a range of outdoor spaces, from natural areas through to, in some cases, the more modified 'near outdoors' of farms, countryside and gardens (Tanner 1980; Horwitz 1996; Palmer & Suggate 1996; Chawla 1999; Sward 1999; Hsu 2009; Farmer et al. 2011; Li & Chen 2015).

Along with spending time outdoors or in nature as children, these studies repeatedly cite several other influences as being the building blocks of adult environmental engagement. These are most commonly:

- Family (parents in particular)
- Formal education
- Work
- Friends
- Experiencing environmental destruction
- Involvement in organisations (e.g. environmental, scout or youth groups)
- Books
- Teachers and other role models

These findings appear to apply across different cultures (Sward 1999; Furihata et al. 2007; Hsu 2009; Li & Chen 2015) and have been confirmed for a diverse range of groups, including:

- Environmental educators (Palmer 1993; Palmer & Suggate 1996; Corcoran 1999; Palmer et al. 1999; Furihata et al. 2007)
- Environmental activists and conservationists (Tanner 1980; Horwitz 1996; Chawla 1999; Hsu 2009)
- Environmental, natural history and leisure professionals (Sward 1999; James et al. 2010)
- Young environmental leaders and environmentally engaged citizens (Arnold et al. 2009; Li & Chen 2015)
- Landowners who have put in place conservation easements (Farmer et al. 2011)

However, although this body of research is compelling, it has predominantly employed qualitative rather than quantitative methods and there have been few comparative studies, making it difficult to generalise the results to the wider population or to rule out the possibility that individuals who are indifferent or antagonistic towards the environment also had similar formative experiences (Chawla 1998).

Where comparative studies have been carried out, they have generally supported the findings discussed above. For example, in a comparison of the life experiences of Japanese environmental educators with a control group of general citizens, Furihata et al. (2007) found that the educators were significantly more likely to report nature experiences and social activities as having influenced their attitudes or behaviours. Similarly, in a comparison of the life experiences of Taiwanese environmental activists with those of less-engaged individuals, Hsu (2009) found that there were eight significant predictors of environmental actions that explained almost 55% of the variation, which included nature experiences – although it should be noted that these related to experiences during their university years rather than childhood.

Several population studies have also provided further support for the important role that childhood recreation plays in shaping adult environmental attitudes and behaviours. For example, in a survey of members of the German public and members of environmental groups, Kals et al. (1999) found that time spent in nature between the ages of 7 and 12, often with family members, strongly predicted an individual's affinity with nature, which, in turn, predicted nature protective behaviour.

A larger-scale study was undertaken by Wells & Lekies (2006), who asked 2000 American adults living in urban areas about their childhood nature experiences and current environmental attitudes and behaviours. Structural equation modelling showed that childhood participation in both 'wild' (e.g. hiking, playing in the woods, camping, hunting and fishing) and 'domesticated' (e.g. picking flowers, fruits or vegetables from a garden, planting and caring for plants) nature activities had a significant direct effect on environmental attitudes during adulthood. Furthermore, participation in wild nature activities during childhood also had a significant direct effect on pro-environmental behaviours in adulthood along with a smaller indirect effect through its influence on attitudes.

In another study, Beery (2013) surveyed 2000 Swedish adults and found that childhood and youth participation in outdoor recreation was a predictor of environmental connectedness. This concept refers to an affective, cognitive and/or physical human relationship with nature that can be described using terms such as affinity with nature, biophilia, ecological commitment, ecological self, ecological or environmental identity, inclusion with nature, nature relatedness and environmental sensitivity (Beery & Wolf-Watz 2014). It has been shown to be an important predictor of pro-environmental behaviours (Mayer & Frantz 2004).

Surveys of university students in the United States and China have also identified a range of childhood influences that distinguish environmentally committed individuals from their peers. For example, Ewert et al. (2005) found that childhood participation in appreciative (e.g. hiking, camping or photography) or consumptive (e.g. hunting and fishing) recreational activities, media exposure and witnessing negative environmental events explained 14% of the variation in ecocentric v. anthropocentric beliefs among their sample of undergraduates at an American university. Similarly, in a study of university students in major Chinese cities, Li & Chen (2015) found that almost 30% of the variation in environmental action was explained by life principles, involvement with environmental organisations, formal education and nature experiences (during both university and childhood), along with a range of socio-demographic variables. In this study, environmental action was assessed by assigning scores to different pro-environmental behaviours that reflected levels of commitment from disinterest through to the frequent demonstration of the behaviour in question.

4.1 Mechanisms behind this relationship

Although there is now a wealth of evidence that supports a connection between childhood recreation and pro-environmental attitudes and behaviours later in life, few studies have described the mechanism through which this occurs.

Larson et al. (2011) found that childhood recreation, through its relationship with adult participation, was a significant indirect contributor to pro-environmental behaviours among visitors to three Georgia State parks.

James et al. (2010) developed a four-stage model that described a pathway from unstructured play in the outdoors during childhood, to interest in outdoor recreation activities and nature related hobbies, followed by growing awareness of environmentally oriented roles and finally to development of natural history dominant and serious leisure identities as young adults. They noted that this progression involved a sequence of different, often informal, events occurring over a 15-20-year period from childhood to young adulthood.

Finally, Ewert et al. (2005) suggested three ways in which childhood recreation could influence later environmental views: first, through the development of values, based in part on the accumulation of experience and knowledge; second, through place attachment, which is a process whereby a physical place becomes imbued with emotional, reflective or other affective feelings; and third, through the social context in which a child engages with the outdoors. They indicated that social context may play a role in forming an individual's attitudes and values through parents, family, friends and role models discussing and showing an interest in nature or environmental issues, modelling particular behaviours, or approving or disapproving of a child's ideas and actions.

4.2 Limitations of research on the effects of childhood contact with nature and the outdoors

A limitation of much of the research on the relationship between childhood experiences in nature and the outdoors and environmental engagement during adulthood is that it relies on an individual's recollection and self-reporting of past events. This means that there is the potential for recall bias (the inability to recall events completely or accurately) and for research participants to view past events through the lens of their current attitudes and beliefs (Wells & Lekies 2006). The Significant Life Experiences method, in particular, has been the subject of considerable debate, which has partly focussed on the validity and reliability of individuals' recollections of childhood (Wells & Lekies 2006). A further limitation lies in the relevance of the recollections and childhood influences of adults to the development of today's children (Gough 1999; James et al. 2010).

However, despite these reservations, a range of studies have provided confidence in the findings discussed in this section. In regard to recall bias, Chawla (1999) reviewed relevant studies and concluded that:

- Memories about the general course of events are usually accurate but the precise details of an event are often inaccurate.
- Events of high personal importance produce significantly more vivid memories than events of low importance.
- Unconstrained recall, where individuals are able to develop their own account of the past at their own pace, is much more accurate than forced recall, where people are cross-examined about an event regardless of their own sense of its significance.

Based on these findings, Chawla (1999) concluded that her own study, which used the Significant Life Experiences methodology, and others that employ a similar approach are likely to draw on the most reliable kinds of memories, reducing the influence of recall bias.

In addition, several studies that have focussed on factors influencing the environmental views of younger adults, such as students, young professionals and young environmental leaders, among whom there will be less scope for recall bias, have obtained results that are consistent with those of studies that have included a wider range of age groups (Ewert et al. 2005; Arnold et al. 2009; James et al. 2010; Li & Chen 2015).

Finally, some studies have also found links between the degree of experience in nature and the outdoors and empathy with nature among children and adolescents (Palmberg & Kuru 2000; Sivek 2002; Cheng & Monroe 2012; Stevenson et al. 2014; Zafeiroudi & Hatzigeorgiadis 2014a). Not only would recall bias and the reinterpretation of past experiences not be a concern in these studies, but this also suggests that spending time in nature and the outdoors continues to be relevant for children and young people today.

4.3 Conclusions

Overall, the research outlined above identifies that spending time in nature and the outdoors during childhood has a significant impact on environmental attitudes and behaviours during adulthood. This relationship supports the range of interventions that are commonly undertaken by park management agencies and their partners, to foster a connection to nature and a lifelong engagement with parks. It includes the provision of:

- Accessible family-friendly recreation opportunities. This includes experiences that are specifically child-focussed, or able to be enjoyed by the widest possible range of ages and abilities from young children through to grandparents. Such experiences should also be relatively low cost to maximise the number of family members who can participate.
- Interpretive nature programmes that are targeted at children
- Outdoor and environmental education programmes for schools

Furthermore, spending time in natural settings during childhood may provide additional benefits to society, including increased adult recreation participation (Bixler et al. 2002; Thompson et al. 2008; Asah et al. 2012; Lovelock et al. 2016), better functioning and reduced symptoms for children with Attention Deficit Disorder (Faber Taylor et al. 2001), improved motor development (Fjørtoft 2004), and potentially reduced childhood obesity as a result of greater physical activity (McCurdy et al. 2010).

5. Relationship between participation in outdoor recreation in adulthood and engagement with the environment and conservation

While contact with nature and the outdoors during childhood appears to predict adult environmental attitudes and behaviours, the influence of such activities in adulthood is less clear. Some studies that have investigated the significant life experiences of individuals with high environmental engagement have specifically mentioned natural or outdoor experiences in adulthood (Furihata et al. 2007; Li & Chen 2015), with a small number identifying this as a significant factor (Palmer 1993; Horwitz 1996; Hsu 2009). However, a relationship between pro-environmental attitudes and behaviours and outdoor recreation in adulthood has not been consistently found across such studies.

Although qualitative research methods have made a relatively limited contribution towards our understanding of the relationship between participation in outdoor recreation in adulthood and environmental engagement, a significant number of relevant quantitative studies have been published over the past 40 years. Much of this research has focussed on either pro-environmental attitudes or environmental concern, two terms which have been used synonymously in the literature (Berns & Simpson 2009). This research is described below, followed by a discussion of those studies that have examined the relationship between participation and pro-environmental behaviours.

5.1 Environmental concern / pro-environmental attitudes

An influential study by Dunlap & Heffernan (1975) has provided the foundation for much of the research on both attitudes and behaviours, and so the discussion below is structured around their three hypotheses:

1. There is a positive association between involvement in outdoor recreation and environmental concern.
2. This association is stronger for appreciative activities than for consumptive activities.
3. This association is stronger for concern with protecting aspects of the environment that are necessary for pursuing such activities than for other environmental issues such as air and water pollution.

5.1.1 General relationship between participation in outdoor recreation and environmental concern / pro-environmental attitudes

Dunlap & Heffernan (1975) tested their hypotheses using data from a postal survey of more than 3000 Washington State residents. They measured the strength of association between participation in five outdoor activities (camping, hunting, hiking, fishing, and visiting state parks and scenic areas) and support for public spending on eight environmental concerns. Some of these concerns, such as 'protection of forests and other natural areas for public enjoyment' and 'preserve areas of unspoiled natural beauty' were highly relevant to conservation, while others, such as 'control air pollution from motor vehicles', related to wider environmental concerns. Their study found only weak support for the first hypothesis.

In subsequent studies, participation in outdoor recreation has typically been described by measuring the frequency or intensity of respondents' engagement in particular outdoor activities

(Dunlap & Heffernan 1975; Geisler et al. 1977; Van Liere & Noe 1981; Bikales & Manning 1991; Nord et al. 1998), and environmental concern/pro-environmental attitudes have been measured in a number of different ways, including:

- Support for public expenditure on particular environmental goals or issues (Geisler et al. 1977)
- The perceived seriousness of various environmental problems (Geisler et al. 1977)
- Concern about the environment relative to other issues (Nord et al. 1998)
- Views about the value and acceptable use of natural areas (Pinhey & Grimes 1979)
- Views on environmental protection, and population and economic growth (Bikales & Manning 1991)
- The broad orientation towards the environment (Van Liere & Noe 1981), measured using the New Environmental Paradigm scale (Dunlap & Van Liere 1978)

Most of these studies have also found a weak or non-existent relationship between participation in outdoor recreation in general and environmental concern/pro-environmental attitudes (Geisler et al. 1977; Pinhey & Grimes 1979; Van Liere & Noe 1981; Bikales & Manning 1991; Nord et al. 1998). For example, in a study of Vermont residents, Bikales & Manning (1991) found that a multiple regression model that included demographic variables and an index reflecting participation in seven different activities explained only 6% of the variation in respondents' environmental concern compared with 2% when only the demographic variables were included. Furthermore, other studies have found that sociodemographic factors such as age, sex, income, education and place of residence, rather than participation in outdoor activities, largely account for observed differences in environmental concern/pro-environmental attitudes (Geisler et al. 1977; Pinhey & Grimes 1979; Nord et al. 1998). Consequently, the relationship between outdoor recreation participation in general and environmental concern/pro-environmental attitudes appears to be well understood and has received little research attention in the last 15 years.

More recently, McMullin et al. (2007) carried out an in-depth study to determine whether angling and boating improved the environmental stewardship ethic of participants. Environmental stewardship, was defined as 'taking personal responsibility to sustain, and enhance freshwater and marine resources, while accepting an obligation to the environment' (McMullin et al. 2007: 146), and included both attitudinal and behavioural components (discussed in section 5.2.1). They examined survey responses from more than 3200 active, lapsed and non-participants in angling and boating from across the United States, and highlighted differences in several stewardship indicators that were selected based on their significant relationship with pro-environmental behaviours.

The following indicators and measurement methods were used:

- Ownership (personal investment in and identification with environmental issues) was measured by respondents self-assessing the extent to which they considered themselves to be natural resource stewards.
- Commitment to environmental stewardship was assessed through respondents' willingness to volunteer time to help the environment and to pay more for products if that would improve the environment. These were rated on a five-point Likert scale and responses were combined to produce a single commitment score.
- Personal responsibility/locus of control comprised four separate items, with the ratings again being combined into a single score. These were:
 - The feeling of personal control over whether or not their daily activities harmed the environment.
 - The importance of reducing one's personal impact on the environment.
 - The perception that because one person's contribution to environmental problems is small, the individual has little personal responsibility for causing environmental problems.

- The perception that the conservation efforts of one person are insignificant as long as others refuse to conserve resources.
- Awareness of the consequences of human actions on the environment was measured through the responses to eight questions, which included questions about effects on water and air quality, the quantity of water, biodiversity, and human health.
- Environmental concern was measured using ten items from the New Environmental Paradigm scale, which were combined into a single score.

McMullin et al. (2007) found that active and lapsed participants in boating and angling were more likely than non-participants to rate highly in sense of ownership, sense of personal responsibility/locus of control and awareness of the consequences of human actions. However, there was no significant relationship between participation in angling and boating and either commitment to environmental stewardship or environmental concern. This echoed many of the earlier studies on the relationship between participation in outdoor recreation in general and environmental concern/pro-environmental attitudes.

5.1.2 Relationship between activity type and environmental concern/pro-environmental attitudes

Dunlap & Heffernan's (1975) second hypothesis suggested that environmental concern would be higher among participants who took part in appreciative rather than consumptive activities, as appreciative recreation involves enjoying the natural environment without altering it, reflecting a preservationist orientation, whereas consumptive recreation involves taking something from the environment, reflecting a utilitarian orientation.

There has generally been better support for this hypothesis, with Dunlap & Heffernan (1975) finding that instances where there were stronger associations between environmental concern and participation in outdoor recreation were almost exclusively related to appreciative, rather than consumptive, activities.

Many other studies have also examined this hypothesis. Most have used the same appreciative/consumptive typology along with a third category that has variously been called motorised, mechanised, abusive or depreciative to capture activities such as snowmobiling and the use of motor boats and off-road vehicles (Geisler et al. 1977; Pinhey & Grimes 1979; Van Liere & Noe 1981; Jackson 1986, 1987; Bikales & Manning 1991; Tarrant & Green 1999; Thapa & Graefe 2003; Thapa 2010).

Initially, these studies provided little support for Dunlap & Heffernan's (1975) findings. For example:

- Studies carried out in Wisconsin and Louisiana found no significant association between activity type and environmental concern (Geisler et al. 1977; Pinhey & Grimes 1979).
- A study at Cape Hatteras National Seashore, North Carolina, showed only a weak association between New Environmental Paradigm scores and participation in three appreciative activities (bird watching, walking and photography), and no such pattern for consumptive or abusive activities (Van Liere & Noe 1981).

Methodological improvements over time have allowed the relationship between recreation type and environmental concern/pro-environmental attitudes to become more apparent. One area of improvement has been the use of more sophisticated measures and statistical techniques to describe respondents' environmental attitudes (Jackson 1986; 1987; Tarrant & Green 1999; Thapa & Graefe 2003; Thapa 2010). A second improvement has addressed a limitation that allowed respondents in earlier studies to be double counted - for example, when respondents who participated in more than one activity were assigned to both the appreciative and consumptive groups (Geisler et al. 1977; Theodori et al. 1998; Teisl & O'Brien 2003). Studies by Jackson (1986, 1987) and Bikales & Manning (1991) addressed this issue by comparing the attitudes of participants in pairs of activities and removing those individuals who had participated in both or neither activity from the analysis.

Using these approaches, a series of further studies have provided strong support for Dunlap & Heffernan's (1975) second hypothesis. For example, in a comparison of the environmental attitudes of participants in various appreciative, consumptive and mechanised activities in Alberta, Canada, Jackson (1986) found:

- No significant difference in pro-environmental attitudes between participants in activities within the same category or between participants in consumptive and mechanised activities.
- Significantly stronger pro-environmental attitudes among participants in three appreciative activities (hiking, canoeing and cross-country skiing) than among those who undertook consumptive or mechanised activities.

Jackson (1986) also used factor analysis to break his complex 24-item Environmental Attitudes Scale down into four sub-scales that related to the negative consequences of growth and technology, the relationship between humans and nature, quality of life, and limits to the biosphere. He found that the relationship between environmental attitudes and activity type was not consistent across the four sub-scales, suggesting that different questions that focus on different aspects of the environment could generate different results. This has also been noted to varying degrees by other researchers (Tarrant & Green 1999; Teisl & O'Brien 2003; McMullin et al. 2007) and complicates attempts to compare different studies.

In a second study, Jackson (1987) looked at differences in views on the preservation of natural resources versus their development for recreation in Alberta. Here, responses were sought on the importance of various land uses, including providing recreation opportunities and facilities, protecting plants, animals and natural areas, protecting history, and setting aside areas as wilderness. He found that:

- Participation in appreciative activities was associated with a significantly stronger preservationist orientation than participation in mechanised and consumptive activities, which were instead associated with stronger pro-development views.
- There were few significant differences between appreciative activities or between activities within the mechanised and consumptive categories. However, hunters were a notable exception as they tended to show stronger pro-preservation and weaker pro-development views compared with participants in mechanised activities.
- The greatest difference in environmental views was between participants in canoeing and motorised boating. For these respondents, almost 10% of the variation in their views on development was explained by their recreation activity.

Bikales & Manning (1991) examined differences in environmental concern between cross-country and downhill skiers, where cross-country skiing was considered to be an appreciative activity while downhill skiing was considered more depreciative due to its infrastructure and transport requirements. They then examined differences in environmental concern among participants in a range of activities and found that:

- Cross-country skiers tended to be more environmentally concerned than downhill skiers.
- Participation in four appreciative activities was positively associated with environmental concern while participation in three consumptive or depreciative activities was not.

In an investigation into the effect of recreation type on the attitude-behaviour consistency of 1220 residents of the Southern Appalachians in the United States, Tarrant & Green (1999) used several different measures of environmental attitude and regressed five different attitude scales against participation. They found that:

- Participation in appreciative activities was positively correlated with environmental attitudes across all five scales, explaining 2-10% of the variation in attitude.
- Participation in motorised activities was not correlated with environmental attitudes.

- Participation in consumptive activities was generally not correlated with environmental attitudes, with a significant positive correlation only being found for one of the five scales.

Thapa & Graefe (2003) used the New Ecological Paradigm scale, an updated and expanded version of the New Environmental Paradigm (Dunlap et al. 2000), to measure the environmental attitudes of visitors to Bald Eagle State Forest, Pennsylvania, and identified three distinct world views among respondents:

- Ecocentric – reflecting the view that the environment is in a precarious position and the impact of humans is detrimental to their survival.
- Dual-centric – reflecting the view that there is a balance between humans and the earth.
- Techno-centric – reflecting the view that the exploitation of nature and its resources is inevitable for the progress of humankind, and that technological and social progress can solve all problems.

They also found clear differences in the environmental world view of participants in appreciative, consumptive and motorised activities:

- Respondents who were classified as appreciative were more likely to exhibit ecocentric and dual-centric attitudes than those who were classified into the motorised or consumptive groups.
- Respondents in the motorised group were the most likely to have techno-centric attitudes followed by consumptive and then appreciative.

A follow-up study by Thapa (2010) further found that the most important recreation activity for respondents with ecocentric attitudes was more likely to fall in the appreciative category and less likely to fall in the motorised category.

Peterson et al. (2008) also found a relationship between activity type and New Ecological Paradigm scores in their study of residents of the Teton Valley (Wyoming and Colorado, USA), lending some support to Dunlap & Heffernan's (1975) second hypothesis. However, this relationship also appeared to be influenced by the characteristics of the respondents' households, so that:

- Participation in three appreciative activities (bird watching, hiking and camping) was positively correlated with pro-environmental attitudes among respondents who lived with others, explaining 3–6% of the variation in environmental views.
- Riding all-terrain vehicles was negatively correlated with pro-environmental attitudes among respondents who lived with others.
- For those living alone, participation in hiking was more strongly correlated with pro-environmental attitudes, explaining 14% of the variation in attitude, whereas there were no significant relationships with participation in other activities.

Limitations of this research

Various other socio-demographic variables are also known to be associated with pro-environmental attitudes and behaviours (Kollmuss & Agyeman 2002; Gifford & Nilsson 2014), and some studies have found that variation in these factors also helps to explain the relationship between environmental concern/pro-environmental attitudes and participation in outdoor recreation (Geisler et al. 1977; Pinhey & Grimes 1979; Nord et al. 1998). Socio-demographic variables may be masking variables in that their observed effect is based on other underlying constructs. However, failure to control for them is a key limitation of some studies that have supported Dunlap & Heffernan's (1975) second hypothesis.

Some research has also challenged the simple categorisation of activities that was used by Dunlap & Heffernan (1975) and others. For example, in an analysis of data from the National Survey on Recreation and the Environment, a nationwide survey that is based on interviews with 50 000 Americans, Cordell et al. (2002) noted four associations between participation and an individual's ecological world view, measured using the New Ecological Paradigm scale:

- People who felt that humans are not above nature and that an environmental crisis is imminent or possible were associated with walking and surfing.
- People who felt that humans are not above nature but no environmental crisis is imminent were associated with swimming, motor boating, driving off road, canoeing and downhill skiing.
- People who felt that humans are above nature and an environmental crisis is possible were only associated with hiking.
- People who felt that no environmental crisis is imminent and who either felt humans were above nature or had no clear view on the relationship between humans and nature, were associated with participation in outdoor team sports and big game hunting.

The findings of this study are notable as participants in the appreciative activities of swimming and canoeing held similar views to those who participated in three motorised or depreciative activities – however, this study may also have suffered from limitations around double counting and a failure to control for socio-demographic variables.

Research by Beery (2013) that examined the relationship between environmental connectedness (discussed in section 4) and participation in 44 different recreation activities also failed to support the categorisation used in other studies, showing that:

- Four different walking activities along with nature picnicking and grilling, garden work, plant animal study/bird watching, and meditation/yoga in nature were positively correlated with environmental connectedness, while waterskiing/wakeboarding were significantly negatively correlated with environmental connectedness.
- There was no grouping among activities despite participants showing clear differences in environmental connectedness based on factor analysis.
- The activities that were most strongly associated with environmental connectedness were those that were close to home, inexpensive and required low technical skill.

Rather than looking at participation, Bjerke et al. (2006) examined the relationship between New Ecological Paradigm scores and interest in outdoor recreation activities. Their survey of almost 2500 Norwegians found that:

- New Ecological Paradigm scores were a predictor of interest for 10 out of 15 activities.
- Respondents who were interested in different types of activities did not necessarily relate differently to the environment. The strongest positive relationships between ecocentric views and an interest in recreation activities were for two appreciative activities (mountaineering and photographing scenery) and several consumptive activities (mushroom picking, berry picking and two types of fishing).
- Different types of hunting (e.g. big and small game) and fishing (e.g. fly and net) had quite different associations with environmental attitudes, despite being superficially similar and being classed as consumptive activities.

Based on these findings, Bjerke et al. (2006) concluded that appreciative and consumptive recreation are not homogenous categories that relate to environmental attitudes in opposing ways.

Other studies have used more complex ways of categorising different recreation activities or have taken a different approach entirely. For example, in a study of attitudes towards oil and gas development among visitors to Pigeon River Country State Forest, Michigan, Langenau et al. (1984) identified seven different categories or dimensions of participation through factor analysis that related to:

- Visual recreation (photography, scenic driving)
- Water-oriented activities (fishing, boating, canoeing and swimming)
- High site experience (backpacking, hiking and camping)
- Hunting
- Motorised activities (trail bike riding, snowmobiling)

- Cross-country skiing
- Other activities (predominantly horse riding)

Scores for the first three factors were negatively associated with approval of the oil and gas development, despite these representing a range of appreciative, consumptive and motorised activities. By contrast, the factor that related specifically to participation in motorised trail bike riding and snowmobiling was positively correlated with support for the development. Furthermore, all of these relationships were found to be indirect, arising from a correlation between activity type, beliefs about the impacts of oil and gas development, and general views on development and preservation, and so the authors did not conclude that respondents held their particular views because of participation in their chosen activity.

A complex study by Bright & Porter (2001) looked at the underlying motivation or meaning of an activity to an individual and its role as a mediator between recreation participation and environmental concern - where mediation refers to the situation where a third variable accounts for the relationship between a dependent variable and a predictor (Baron & Kenny 1986). They collected data from a survey of hunting and fishing license holders in Washington State that asked questions about their participation in, length of involvement in and the importance given to various recreation activities. The New Ecological Paradigm scale was used to measure respondents' environmental concern, and respondents were also asked to rate the importance of 45 different recreation experience preferences. The experience preferences fell within 16 preference domains each representing different motivations or meanings for activities including enjoying nature, physical fitness, family togetherness, learning, risk taking and nostalgia. Bright & Porter (2001) then derived five categories of wildlife-related recreation activities (firearm hunting, bow hunting, fly fishing, artificial lure and bait fishing, and wildlife and nature viewing) from a factor analysis of the respondents' participation data.

Bright & Porter (2001) found that for three types of recreation activities, the meaning of the activity was a better predictor of environmental concern than participation in the activity itself, with the following relationships being detected:

- Wildlife and nature viewing was associated with a biocentric world view, which was mediated by preferences for enjoying nature (including the concepts of viewing scenic beauty and enjoying the smells and sounds of nature) and physical fitness.
- Fly fishing was also associated with a biocentric world view through its relationship with enjoying nature and preferences related to enjoying and talking about using equipment. This activity was also related to anthropocentric views through a relationship with teaching and leading.
- The relationship between bow hunting and environmental concern was complex and was mediated by five different experience preference domains. The strongest predictor of environmental concern among bow hunters was the extent to which they participated for learning experiences, which was associated with biocentric views on the environment. By contrast, the domains of autonomy leadership (feeling independent, free to make one's own choices and being in control of things) and achievement/stimulation (a complex domain that involved gaining a sense of self confidence, testing skills and abilities, experiencing excitement, telling others about the trip, and demonstrating competence to others) were associated with anthropocentric views. There was also a relationship between environmental concern and domains relating to equipment and teaching/leading.
- The relationship between firearm hunting and environmental concern was partially mediated by seven different experience preference domains. Hunting for achievement/stimulation, using equipment and nostalgia were all associated with biocentric views, while participating for autonomy/leadership and due to a desire to be with similar people were associated with an anthropocentric world view, as was participation in firearm hunting itself.
- Artificial lure and bait fishing was weakly associated with an anthropocentric world view with no mediation.

Bright & Porter's (2001) findings show that people who engage in the same activity can do so for different reasons and can hold quite different environmental orientations. They also noted that most of the meaning/motivation factors that were included in their study were associated with particular environmental world views regardless of a participant's chosen recreation activity. Thus, the validity of studies that attempt to predict environmental concern on the basis of participation alone is called into question.

One further area of caution regarding the relationship between the type of activity and environmental concern/pro-environmental attitudes is the different context in which recreation can occur in different countries. The separation of activities into appreciative, consumptive or other categories may be less applicable to New Zealand, where the context of some consumptive activities is markedly different. For example, hunting and fishing in New Zealand are largely focussed on introduced rather than native species, and so hunters may feel that they are providing a conservation benefit by reducing the numbers of animals that are considered pests. This context differs significantly from locations in North America and Scandinavia, where much of the research around Dunlap & Heffernan's (1975) second hypothesis has been carried out.

5.1.3 Relationship between participation in outdoor activities and attitudes towards specific environmental issues

Dunlap & Heffernan's (1975) third hypothesis, which stated that environmental concern would be stronger when it related to aspects of the environment that were necessary for pursuing an individual's recreation experience, has received far less research attention. In their study, Dunlap & Heffernan (1975) noted that:

- Hiking, camping, visiting parks and fishing were most strongly associated with support for the protection of forests and other natural areas for public enjoyment.
- Hunting was most strongly associated with support for measures to protect endangered species of wildlife.

Each of these associations reflected the experiential needs of the respondents' chosen activities.

Three subsequent studies have lent further support to Dunlap & Heffernan's (1975) findings. In a comparison of participants' environmental attitudes with responses to a Recreation Attitudes Scale and two sub-scales that related to the control of activities and wilderness and resource development, Jackson (1986) found that recreation participants generally cared more about recreation-specific issues, such as mining and energy development in wilderness, or environmentally based restrictions on recreation activities than they did about wider environmental concerns.

In another study, Jackson (1987) also reported that participants' views on wilderness development tended to align with the needs of their chosen activity, showing that:

- Participants whose satisfaction depended on a relatively unspoiled natural environment preferred resources to be maintained in their unaltered state.
- Participants who engaged in mechanised activities more strongly supported the development of resources for recreational purposes.

Finally, Thapa & Graefe (2003) found that responses to four questions about local forest management issues tended to reflect individuals' self-interest arising from their chosen recreation activity, with:

- Participants in consumptive activities being the most supportive of stocking streams and lakes to increase opportunities for sport fishing.
- Participants in motorised activities being the least supportive of setting aside additional land as wild and natural areas (and thereby restricting motorised access).
- Appreciative recreationists being the most supportive of setting additional land aside, and the least supportive of encouraging more timber harvesting and stocking lakes and streams.

Thus, based on the limited number of studies that have been carried out to date, it appears that Dunlap & Heffernan's (1975) third hypothesis is well supported, with all four studies suggesting that the self-interest of recreation participants can be a driver of pro-environmental attitudes for specific issues that relate to their chosen activity.

5.1.4 Relationship between participation in outdoor recreation and attitudes towards conservation

Most studies that have investigated the relationship between participation in outdoor recreation and environmental concern/pro-environmental attitudes have focussed on general environmental issues or used broad measures of environmental world view such as the New Environmental Paradigm. However, a small number of studies have looked at conservation issues either exclusively or alongside other concerns.

Two of these studies failed to support a relationship between these factors: Pinhey & Grimes (1979) found no relationship between participation in outdoor recreation and respondents' views on the use and value of coastal wetlands in Louisiana; and Geisler et al. (1977) found little or no relationship between participation and respondents' support for a range of conservation management interventions, including preserving more wetlands and marshes, and funding public forest lands and wildlife protection areas. Furthermore, Holsman (2000) reviewed several studies of American hunters and concluded that, compared with other recreationists, hunters often had attitudes that opposed the conservation of biodiversity.

In contrast, four studies that highlighted the role of self-interest in generating concern for the environment among outdoor recreation participants (Dunlap & Heffernan 1975; Jackson 1986, 1987; Thapa & Graefe 2003) are highly relevant to conservation. These studies found clear relationships between participation in particular activities and support for conservation issues, such as the protection and preservation of lands, forests and wildlife. Moreover, Langenau et al. (1984) found that almost 90% of forest recreationists in their study supported preserving some areas despite the potential for loss of economic benefits.

There is also no reason to assume that the findings of studies that consider more general environmental concerns are not applicable to conservation – indeed, for some activities, there may be a stronger link with attitudes towards conservation. Self-interest can be a driver of environmental concern/pro-environmental attitudes, and the preservation and protection of natural settings, plants and wildlife is important in providing many of the experiences that outdoor recreation participants are seeking.

5.1.5 Limitations of attitudinal research

It is clear that participation in outdoor recreation is related to environmental concern/pro-environmental attitudes for some activities, with this relationship being stronger for some environmental issues than others. However, none of the associations that were discussed in this section were particularly strong and the results of the studies discussed above are not compelling.

Two limitations apply to many of these studies, regardless of whether they looked specifically at conservation or at more general environmental issues.

The first limitation is that only a minority of studies (Pinhey & Grimes 1979; Bikales & Manning 1991; Nord et al. 1998; McMullin et al. 2007; Beery 2013) have directly compared outdoor recreation participants with non-participants, with most studies typically comparing participants in different outdoor activities.

The second limitation is that these studies have generally failed to employ methods that provide certainty about the direction of the cause-and-effect relationship. While participation in outdoor recreation may cause environmental concern or stronger pro-environmental attitudes, it is also possible that people choose to participate in these activities because of their concern for conservation or the environment (Jackson 1986; Luzar et al. 1998; Nord et al. 1998; Bright & Porter

2001; Thapa & Graefe 2003; Beery 2013; Kil et al. 2014) – as Wright & Matthews (2015) pointed out, people bring their existing world views to the park. Several different pathways that link participation in outdoor recreation, attitudes and behaviours are discussed in section 6.

5.2 Pro-environmental behaviours

The relatively weak association that was found between participation in outdoor recreation and environmental concern/pro-environmental attitudes led some researchers to examine the relationship with pro-environmental behaviours.

Pro-environmental behaviours can be defined as actions by individuals or groups that promote or result in the sustainable use of natural resources (Sivek & Hungerford 1989/1990). They are behaviours that minimise harm to, or benefit, the environment (Kollmuss & Agyeman 2002; Steg & Vlek 2009) and can be identified by either their impact or their intent (Stern 2000). A wide variety of other terms are used in the research literature to describe these actions. Behaviours may also be described as ecological, environmentally responsible, environmentally significant, or sustainable.

Studies of pro-environmental behaviours are potentially of greater interest to environmental and conservation agencies than attitudinal studies because the adoption of such behaviours can make a difference to environmental outcomes as people assume personal responsibility and take action themselves. This effectively increases the resources available to achieve environmental and conservation goals. Furthermore, in some cases adoption of one pro-environmental behaviour may create a positive ‘spillover’ effect leading to adoption of other behaviours. This may be most likely where the additional behaviours are similar, require relatively low effort, and where adopting them reduces inconsistency in behaviour or dissonance between an individual’s actions and their environmental identity or self-image (Truelove et al. 2014; Nilsson, Bergquist & Schultz 2017). Cognitive dissonance (the discomfort that people feel when they hold two conflicting beliefs) may also lead to an individual’s attitudes shifting to align with their adopted behaviours.

In general, participation in outdoor recreation has been found to be much more strongly associated with pro-environmental behaviours than environmental concern/pro-environmental attitudes.

Most of the studies discussed in this section relate to general pro-environmental behaviours rather than those that specifically relate to conservation issues. Exceptions are provided by McMullin et al. (2007), who discussed environmental stewardship behaviour by participants in boating and fishing, and by Cooper et al. (2015), who studied conservation behaviours among hunters, bird watchers and non-participants.

One of the first studies to investigate the relationship between participation in outdoor recreation and pro-environmental behaviours was carried out by Nord et al. (1998) in Pennsylvania. They asked approximately 1200 forest owners and non-owners whether they, or members of their household, had participated in a list of eight pro-environmental behaviours in the past year. These related to the use of garden chemicals, volunteering and donating to environment or conservation groups, consumer behaviours, attending public meetings and contacting government agencies about environmental issues, reading and watching material related to the environment and voting behaviour.

They then used factor analysis to simplify the responses to a single pro-environmental behaviour measure for subsequent analysis. They found that:

- 18% of the variation in pro-environmental behaviours was explained by the frequency of visits to forest areas and the degree of participation in eight different recreation activities.
- The addition of socio-demographic variables increased this explanatory power to 25%.

This represented a stronger association than had been found in any of the earlier studies examining the relationship between participation in outdoor recreation and environmental concern/pro-environmental attitudes. Furthermore, these findings contrasted strongly with findings from the same study that suggested that participation in outdoor recreation had virtually no effect on environmental concern.

A second study of almost 1500 residents of rural Pennsylvania by Theodori et al. (1998) employed seven of the eight behavioural measures used by Nord et al. (1998) and again reduced these to a single environmental behaviour score, in this case representing the number of 'yes' responses from each individual. Respondents also indicated whether they had participated in any of nine listed recreation activities: picnicking, camping, bird watching, hiking/backpacking, mountain biking, downhill or cross-country skiing, fishing, hunting and riding off-road vehicles. They found that:

- Participation in each of the outdoor activities was weakly positively correlated with pro-environmental behaviours, explaining up to 6% of the variation.
- There was little change in the results when socio-demographic variables and political ideology were controlled for.

Although the correlations between participation in outdoor recreation and pro-environmental behaviours were relatively weak in this study, they were generally stronger than had been previously found in attitudinal studies.

A different approach was taken by Teisl & O'Brien (2003), who surveyed 1948 American adults and examined the relationship between participation in a range of forest recreation activities and two pro-environmental behaviours – donating or belonging to environmental groups and purchasing an environmentally labelled wood product. Two of their key findings were that:

- With the exception of snowmobiling, participation in forest activities was associated with respondents being two to three times more likely to support an environmental organisation.
- Participants in three activities (wildlife watching, boating and hiking) were more likely to purchase an environmentally labelled wood product than those who did not participate in any activity.

Thus, Teisl & O'Brien's (2003) study supported the idea that participation in outdoor recreation was positively correlated with pro-environmental behaviours. However, the strength of the relationships varied considerably between different activities and the two behavioural measures.

The study of Larson et al. (2011) is one of the few that has claimed a direct causative link between participation in outdoor recreation and pro-environmental behaviours. In this study, structural equation modelling was used to examine the effects of socio-demographic variables and participation in outdoor recreation on three behaviours: recycling, reading environmental articles and belonging to an environmental group. Respondents were asked to rate the amount of time that they had spent participating in outdoor nature activities in the last year on a scale of never to very often, as well as their level of participation during childhood. It was found that:

- 40% of the variation in pro-environmental behaviours was explained by a model that included participation in outdoor recreation in adulthood, and biocentric and, surprisingly, anthropocentric value orientations as direct predictors, along with gender, ethnicity, income and childhood participation as indirect factors.
- Participation in outdoor recreation in adulthood was found to be the strongest direct predictor of pro-environmental behaviours.

Thus, Larson et al. (2011) found a very strong link between participation in outdoor recreation and pro-environmental behaviours among park visitors, and their study is particularly notable because it used a method that could provide greater certainty about the direction of any cause-and-effect relationships.

Finally, Zafeiroudi & Hatzigeorgiadis (2014b) studied the relationship between the frequency of participation in outdoor recreation and scores on a Responsible Environmental Behaviour Scale among residents of Attica, Greece. They found that respondents who participated more frequently in outdoor recreation scored higher in both group and individual actions compared with those who did not participate in these activities. Here, group actions related to participation in activities such as environmental group meetings, tree plantings, and beach and forest clean ups, while individual actions included seeking information, making consumer decisions in support of the environment, reducing energy use and supporting politicians who were strongly concerned about environmental issues.

Together, the findings of these studies indicate that there is a strong relationship between participation in outdoor recreation and individuals undertaking pro-environmental behaviours.

5.2.1 Relationship between activity type and pro-environmental behaviours

A small number of studies have looked at the relationship between participation in different types of activities and pro-environmental behaviours (Theodori et al. 1998; Tarrant & Green 1999; Teisl & O'Brien 2003; Thapa & Graefe 2003), which, unlike the research on environmental concern / pro-environmental attitudes discussed previously, obtained varied and conflicting results.

Tarrant & Green (1999) recorded various behaviours that had been undertaken by respondents in the previous 2 years and then used factor analysis to create a single pro-environmental behaviour score for each respondent. These behaviours included contacting a public official about an environmental issue, subscribing to environmental publications, reading literature or watching TV shows about the environment, attending meetings on an environmental issue, donating to an environmental group, voting behaviour, recycling, carpooling and consumer behaviours.

They found that participation in appreciative activities was associated with pro-environmental behaviours while participation in motorised activities and typically consumptive activities was not. However, even where relationships were evident, they were only weak.

Thapa & Graefe (2003) included 15 behavioural questions in their study, which were reduced to five broad domains by factor analysis. These related to political activism, recycling, education, green consumerism and community activism. Like Tarrant & Green (1999), they also found clear differences in the extent of pro-environmental behaviours between participants in appreciative, consumptive and mechanised activities. However, in this case, pro-environmental behaviours were not consistently more prevalent among participants in appreciative activities but rather the relationship with activity type varied depending on the behaviour in question, with:

- Participants in appreciative activities being more likely to engage in green consumerism behaviours, such as buying products made from recycled materials, switching products for environmental reasons and taking the amount of packaging into account when purchasing goods.
- Participants in consumptive activities being significantly more likely to engage in political activism, such as donating or belonging to environmental organisations, writing to elected officials, or voting for environmental reasons.
- Participants in motorised activities being significantly less likely to engage in educational behaviours, which included watching television programmes and reading books about the environment.

Similarly, although Teisl & O'Brien (2003) found some differences in the prevalence of pro-environmental behaviours between different activities, they did not find that pro-environmental behaviours were consistently more prevalent among those who undertook appreciative pursuits.

Rather:

- Wildlife watching had the strongest association with donating money to or belonging to an environmental organisation, and two other appreciative activities (cross-country skiing and

nature photography) had similar results. However, results for wildlife watching were not significantly different from those for hunting.

- Wildlife watching, hiking and boating were associated with an increased likelihood of purchasing an environmentally labelled wood product, but there was no significant difference compared with participation in two other appreciative activities (camping and photography) or with non-participation in forest activities.

By contrast, Theodori et al. (1998) did not find any difference in the prevalence of pro-environmental behaviours between participants in different types of activities that were separated into two categories: 'appreciative - slight resource utilisation' and 'moderate to intensive resource utilisation', with the latter including consumptive and motorised activities. They found that:

- Differences in pro-environmental behaviours between participants in different activity types could be discounted because most respondents were found to have participated in both types of activities.
- Paired comparisons between activities (similar to those carried out by Jackson (1986, 1987) and Bikales & Manning (1991)) found no relationship between activity type and pro-environmental behaviours once socio-demographic variables were controlled for.

In addition to these studies, McMullin et al. (2007) and Cooper et al. (2015) examined the behaviours of participants in specific activities.

McMullin et al. (2007) assessed the relationship between angling and boating participation and pro-environmental behaviours relating to five lifestyle and seven activism behaviours. The lifestyle behaviours were recycling and encouraging others to recycle, conserving water and electricity in the home, picking up other people's litter, purchasing recycled products, and trying to purchase and use products that were less harmful to the environment), while the activism behaviours were ceasing to buy products that cause environmental problems, contributing money or time to environmental organisations or projects, assisting in stream or beach clean ups, contacting a government official in support of an environmental issue, actively opposing an environmentally damaging project and voting for a candidate largely because of their pro-environmental views. Each of the lifestyle behaviours was scored on a scale from 0 (never) to 2 (always) and responses were averaged to provide an overall lifestyle behaviour score. Activism behaviours were assessed with yes/no questions and each positive response contributed to an overall activism behaviour score from 0 to 7. This showed that:

- Active participants in angling or boating were more likely than non-participants to engage in almost all activism behaviours, with the exception of their likelihood of voting based on a candidate's pro-environment views and ceasing to buy products that cause environmental problems.
- Current participants engaged in the most activism behaviours (mean = 2.77), followed by lapsed participants (2.29) and non-participants (2.07). However, although these differences were statistically significant, they were not particularly large, with survey respondents generally only being engaged in a small number of these behaviours regardless of their recreation habits.
- There was no significant difference between the three groups in their average lifestyle behaviour scores or in the distribution of responses for two of the stewardship indicators, environmental concern and commitment to environmental stewardship.

Based on these findings, and those relating to environmental concern/pro-environmental attitudes (discussed in section 5.1.1), McMullin et al. (2007) concluded that the relationship between participation in angling and boating and stewardship was complex and recommended caution in touting a link. While there was an association between active participation and stewardship behaviour, they did not demonstrate a causal relationship or a link to a broader environmental ethic that influenced other behaviours such as recycling or purchasing decisions.

Therefore, they suggested that recruiting new participants would not guarantee a greater level of stewardship behaviour. They did, however, note that their findings were aligned with Dunlap & Heffernan's (1975) third hypothesis that participants are more willing to support the protection of resources that are necessary for their chosen recreation activity than to engage with broader environmental issues.

Finally, in a more recent study, Cooper et al. (2015) surveyed rural New York State residents to compare the engagement of participants and non-participants in wildlife recreation in pro-environmental behaviours. The respondents were classified as hunters, birders, hunter-birders (those who undertook both activities) or non-recreationists based on their participation levels and activity preferences. The survey assessed the frequency of engagement in nine pro-environmental behaviours, which were separated by factor analysis into environmental lifestyle behaviours (recycling, home energy and water conservation, and green purchasing) and conservation behaviours (habitat enhancement on private land, voting behaviour, donating money to support local environmental protection, recruiting others to participate in wildlife recreation, volunteering to improve wildlife habitat and participating in an environmental group). In addition, they measured three types of beliefs about the environment – self-efficacy, environmental norms and environmental concern, with the latter being measured using components of the New Ecological Paradigm scale. In this study, Cooper et al. (2015) used logistic regression models to predict the likelihood of individuals carrying out pro-environmental behaviours whilst controlling for respondents' beliefs and socio-demographic variables. They found that wildlife recreation was strongly positively associated with conservation behaviours, with:

- Hunters and birdwatchers being four to five times more likely to participate in conservation behaviours than non-recreationists.
- Respondents who had significant participation in both activities being eight times more likely to engage in conservation behaviours than non-recreationists.

However, there was no significant correlation between participation in wildlife recreation and engaging in environmental lifestyle behaviours.

Thus, the findings of studies to date indicate that pro-environmental behaviours are correlated with participation in outdoor recreation and that this link is considerably stronger than that with environmental concern/pro-environmental attitudes (Nord et al. 1998; Theodori et al. 1998; Larson et al. 2011; Zafeiroudi & Hatzigeorgiadis 2014b). However, it should be noted that these relationships appear to vary depending on the behaviour being observed, making studies that combine a diverse range of behaviours into a single measure (e.g. Nord et al. 1998; Theodori et al. 1998; Tarrant & Green 1999; Larson et al. 2011) problematic.

Several studies have investigated the level of variation in the strength or nature of the relationship between different types of behaviours and recreation activities, and have generally found a link between activism or conservation behaviours and participation in specific outdoor recreation activities (Teisl & O'Brien 2003; Thapa & Graefe 2003; McMullin et al. 2007; Cooper et al. 2015). Cooper et al. (2015), in particular, noted a very strong relationship between hunting and bird watching and conservation behaviours, while Teisl & O'Brien (2003) found a strong relationship between participation in a range of activities and donations to or membership of environmental organisations.

It has been less common for studies to find links between participation in outdoor recreation and consumer or lifestyle behaviours, however. For example, although McMullin et al. (2007) noted a relationship between active participation in boating and angling and environmental stewardship behaviour, they failed to find a relationship with a broader environmental ethic that would take in behaviours such as recycling, consumer decisions or water and electricity conservation.

Some of the behaviours that are of most interest to conservation agencies, including DOC, are activism behaviours, particularly those that relate to individuals donating time or money to conservation. It is clear from the research literature that outdoor recreation participants are

likely to form a pool of individuals who have a greater chance of contributing to conservation and who should therefore be a focus for public engagement efforts.

A range of other behaviours are also of interest to DOC, including individuals undertaking biosecurity measures when visiting sensitive areas, controlling dogs around wildlife, avoiding growing weeds and potential garden escapees, growing native plants to support birdlife, and keeping cats inside at night. However, there appears to have been little or no specific research relating to these behaviours and their prevalence among outdoor recreation participants.

5.2.2 Limitations of behavioural research

Like the research on attitudes described earlier, the behavioural research described above also has a number of limitations. In addition to issues around understanding the direction of causality and the limitation of combining different behaviours into a single measure, a further issue is that actual behaviours are seldom observed in these studies. Instead, researchers usually study reported behaviours or behavioural intentions. Therefore, there remains the potential that the behaviours in question have not actually been carried out.

There has also been considerable variation in the way in which studies have described and measured pro-environmental behaviours. While many attitudinal studies have employed the New Environmental Paradigm or New Ecological Paradigm, allowing for some comparison between them, each behavioural study has tended to employ different measures. Therefore, it is likely that we could gain a better understanding of the relationship between different types of outdoor recreation activities and behaviours if a consistent method of defining and measuring pro-environmental behaviours was applied across studies.

In contrast to the attitudinal research, however, most behavioural studies have considered both participants and non-participants and almost all have controlled for any effects of socio-demographic variables.

5.3 Why is there a stronger relationship between recreation and pro-environmental behaviours than there is with environmental concern / pro-environmental attitudes?

At first glance, the stronger relationship between participation in outdoor recreation and pro-environmental behaviours compared with environmental concern/pro-environmental attitudes is somewhat perplexing. Likewise, the association of activism behaviours with participation in activities such as hunting, fishing and boating also appears counterintuitive as participants may be less likely to hold attitudes that align with these behaviours.

Dunlap & Heffernan (1975) speculated that participation in outdoor recreation would create an awareness of environmental problems by exposing individuals to examples of environmental degradation and to information and education programmes provided by management agencies. They suggested that this would foster a commitment to the protection of valued recreation sites, an aesthetic taste for a natural environment and a general opposition to environmental degradation. In the years since Dunlap & Heffernan's (1975) study, however, the idea that there is a linear progression from knowledge to attitudes to behaviour has become outdated (Beaumont 2001; Kollmuss & Agyeman 2002).

Researchers often cite a discrepancy between attitudes and behaviour – the so-called attitude-behaviour gap (Finger 1994; Kollmuss & Agyeman 2002) – and have proposed various explanations for this. One way this can occur is when the measures of attitude that are used in studies are broader in scope than the corresponding measures of behaviour (Kollmuss & Agyeman 2002). General attitudes are known to be good predictors of behaviour patterns or multiple actions, and attitudes towards specific behaviours are good predictors of those

behaviours. However, weaker links tend to be found when general attitudes are used to try to predict specific behaviours (Tarrant & Green 1999; Ajzen & Fishbein 2005).

Behavioural models, social and personal factors (psychographics), and underlying value orientations may also explain why the relationship between participation in outdoor recreation and environmental concern/pro-environmental attitudes differs from that of pro-environmental behaviours, each of which is outlined in the following sections.

5.3.1 Behavioural models

One model that illustrates the predictors of behaviour is the Theory of Planned Behaviour (Ajzen 1991), which is shown in Fig. 1. This model suggests that a particular behaviour is best predicted by an individual's intention to engage in that behaviour and that this, in turn, is influenced by their attitude towards the behaviour, their perceived behavioural control (an individual's perception of whether or not they can successfully carry out the behaviour) and subjective or social norms (social expectations about what behaviour is appropriate). Thus, this model makes it clear that pro-environmental behaviours are unlikely to be triggered by pro-environmental attitudes alone. More importantly, the Theory of Planned Behaviour is one of several such models that suggest that general attitudes do not actually directly influence behaviour (Hines et al. 1987; Ajzen 1991; Stern & Dietz 1994).

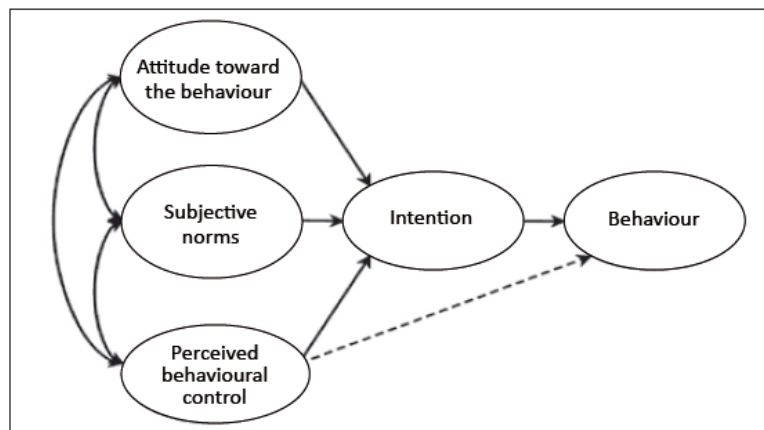


Figure 1. The Theory of Planned Behaviour. Reproduced (with permission from Elsevier) from Ajzen J. 1991: The theory of planned behaviour. *Organizational Behavior and Human Decision Processes* 50/2: 179–211.

5.3.2 Social and personal factors

Behavioural models simplify what is actually a very complex picture that is made up of a vast number of, sometimes interacting, factors that are known to influence pro-environmental attitudes and behaviours.

Some studies have highlighted the role of barriers that could prevent individuals from acting on their pro-environmental attitudes. For example, Diekmann & Preisendörfer (2003) proposed and tested a 'low cost hypothesis', whereby environmental concern influenced ecological behaviour primarily in situations of low cost and little inconvenience for individuals, whereas attitudes had less influence on behaviours when these barriers were high. In addition, in a meta-analysis of almost 800 studies, Wallace et al. (2005) found that both perceived social pressure and perceived difficulty weakened the relationship between attitudes and behaviours; and in one specific example, Gifford (2011) identified nearly 30 psychological barriers to individuals undertaking behaviours to mitigate and adapt to climate change.

A variety of social and personal factors have also been shown to influence environmental attitudes and behaviours. A recent review by Gifford & Nilsson (2014) listed no fewer than 18 such factors, which were divided into:

- Social factors – religion, culture and ethnicity, social class, urban v. rural residence, social norms, and the proximity of individuals to problem sites.
- Personal factors – age, gender, knowledge and education, place attachment, values, political and world views, goals, perceived responsibility, cognitive biases, childhood experience and choice of activity, sense of control, and personality and self-construal.

Among these, the last two personal factors are particularly important. Sense of control includes the concept of locus of control, which is the extent to which people attribute control over events in their life to themselves or to external sources. It also includes self-efficacy, which is an individual's beliefs about whether they can successfully carry out a behaviour (Bandura 1977). Thus, sense of control may be important as individuals may need to feel that their actions can make a difference before undertaking pro-environmental behaviours. Personality and self-construal covers a range of concepts, including personality traits, the extent to which individuals consider future consequences, the degree to which they feel a connection with the environment and the way in which they relate themselves to others.

Kollmuss & Agyeman (2002) identified a similar range of influences on pro-environmental attitudes and behaviours. Gender and education were noted as the two most influential demographic factors, while other factors were conceptualised as either:

- Internal – motivation, values, emotional connection or involvement, locus of control, and an individual's personal priorities and sense of responsibility.
- External – institutional barriers, economic (incentives, perceptions about financial return), social or cultural (e.g. norms), environmental attitudes, knowledge and awareness.

Milfont & Markowitz (2016) suggested in relation to sustainable consumer behaviours, that various predictors of pro-environmental behaviours operate and interact at different levels. Factors such as attitudes and values, political orientation and gender may predict behaviours at the individual level but, decisions about pro-environmental behaviours also occur in the context of a household or family unit and are influenced by regional and national level enablers and constraints. These include cultural norms, regulations and national income. Behaviours are also influenced by situational and contextual factors.

5.3.3 Value orientation

A further issue when considering the relationship between attitudes and behaviours is that people may choose to engage in behaviours that benefit the environment for reasons that have nothing to do with their overall attitude towards it. Gifford & Nilsson (2014) provided the examples of individuals insulating their houses to save money or choosing to cycle rather than drive a car to benefit their health.

The value basis of environmental concern proposed by Stern & Dietz (1994) describes how the 'unconverted' can engage in pro-environmental behaviours. It stresses the importance of three underlying value orientations (egoistic, social-altruistic and biospheric), which, alongside an individual's beliefs about the consequences of environmental changes on the things they value, are drivers of behavioural intentions.

Individuals with an egoistic orientation may care about environmental problems because of the effects on themselves, while those with socio-altruistic and biospheric orientations care because of the effects on other people and all living things, respectively (Schultz et al. 2005). Any of these value orientations could contribute to behaviours that benefit the environment.

Thus, the value orientation of individuals may be an important factor that contributes to the stronger links between participation in outdoor recreation and pro-environmental behaviours as compared with pro-environmental attitudes, particularly in the case of behaviours that are exhibited by some participants in non-appreciative activities.

6. Mechanisms through which participation in outdoor recreation is associated with environmental engagement

A number of mechanisms could explain the relationship between participation in outdoor recreation and environmental engagement, each of which may have different management implications. Several of these mechanisms are discussed below.

6.1 Increased awareness

Dunlap & Heffernan (1975) proposed that participants in outdoor recreation develop an increased awareness of environmental problems through personal experience and by being exposed to information and education programmes provided by park management agencies, which leads to a greater concern for the environment (see section 5.3).

A number of studies have recorded short-term changes in both attitudes and behaviours that have been attributed to park, ecotourism or nature-based experiences and their associated interpretation or education programmes (Orams 1997; Beaumont 2001; Tisdell & Wilson 2001, 2005; Hughes & Morrison-Saunders 2005; Starmation et al. 2007; Powell & Ham 2008; Powell et al. 2008, 2009; Ballantyne et al. 2011a, b; Hughes et al. 2011; Cheng et al. 2014; Wheaton et al. 2015). However, a key question that has arisen from these studies is whether this increased engagement persists in the longer term.

Only a handful of studies have examined the potential for longer-term changes in attitudes and behaviours, and their findings have been inconsistent. Beaumont (2001) assessed changes in environmental engagement among visitors to Lamington National Park, Queensland, by surveying respondents before and 3 months after their visit. She found no significant difference in their responses to statements relating to general ecological beliefs and values, and no change in the frequency with which they performed specific environmentally friendly behaviours. However, despite this, almost 30% of the respondents felt that the experience had influenced their conservation views and 14% said that they had made behavioural changes since returning home.

Hughes et al. (2011) found that the short-term changes in attitudes that occurred among visitors to an Australian turtle rookery were sustained 3 months after their visit – although this only occurred among families who continued to receive post-visit information and support. This support was in the form of a printed kit containing fact sheets and children’s activities along with weekly email updates about activity at the turtle rookery, email reminders about the site and related conservation issues, and access to a website containing information about conservation and suggestions for nature based family activities. Similarly, several other studies of visitors to captive and non-captive marine wildlife experiences have documented changes in engagement up to 4 months after their visit. Orams (1997) examined differences in learning and engagement between individuals who visited a dolphin feeding experience before and after the establishment of an education and interpretation programme. The programme involved the development of an education centre with static displays, movies and a researcher and volunteer staff onsite, and introduction of an expert commentary during dolphin feeding. The commentary was provided by the researcher and was designed to elicit behaviour change through the inclusion of techniques such as the use of curiosity, appeals to emotion, the creation of motivation to act and the suggestion of action strategies. It included information about dolphin behaviour and biology and encouragement to adopt particular pro-environmental behaviours.

Visitors to the dolphin feeding experience completed a post visit questionnaire and were contacted for follow up interviews 2–3 months later. Orams (1997) found no significant differences in either pro-environmental attitudes or behaviours in the post visit survey. However, in the follow-up interviews visitors who had been exposed to the education and interpretation programme were more likely to say that they had sought further information about dolphins, removed litter during subsequent beach visits, donated to an environmental organisation and become more involved in environmental issues.

Ballantyne et al. (2011a, b) surveyed individuals pre and post visit, and again 4 months after they had visited one of four Australian marine wildlife tourism experiences – an aquarium, a marine-based theme park, a turtle viewing experience and a whale watching tour. Short term changes in environmental attitudes were noted, however the long-term impact from visits to marine-based wildlife tourism experiences was relatively low. 4 months after their visit, only 7% of visitors were able to report a specific new pro-environmental behaviour that they had adopted as a result of their experience and only 5% reported having questioned their values or changed their personal attitudes (Ballantyne et al. 2011a).

By contrast, a diverse range of studies, including those on participants in Antarctic cruises (Powell et al. 2008), marine mammal viewings (Starmation et al. 2007; Wheaton et al. 2015) and commercial whitewater rafting (Powell et al. 2009), have found that the increases in engagement that were recorded immediately after a visit were no longer present in follow-up surveys up to 12 months later.

Several factors appear to be related to increases in engagement, where these have been observed. Many researchers have highlighted the importance of creating affective or emotional bonds between visitors and wildlife (Orams 1997; Starmation et al. 2007; Ardoin et al. 2015; Ballantyne et al. 2011b; Hughes et al. 2011; Wheaton et al. 2015) and, in particular, the potential to create these connections through interactions with charismatic species (Tisdell & Wilson 2005; Ardoin et al. 2015; Ballantyne et al. 2011a; Hughes et al. 2011; Wheaton et al. 2015).

Several studies have also cited the importance of interpretation and education programmes but stress that these need to be well designed and theoretically based (Orams 1997; Powell & Ham 2008; Powell et al. 2008; Ardoin et al. 2015). This may include aspects such as the use of trained interpreters (Ardoin et al. 2015) and incorporation of socio-psychological theories (such as the Theory of Planned Behaviour and other theories) into the design of interpretation programmes (Powell et al. 2008).

Moreover, Orams (1997) cautioned that due to the complexity of learning processes and the difficulty in changing attitudes and behaviours, programmes that do not deliberately set out to achieve these changes are unlikely to be successful. He further noted that educating people is difficult in most tourism situations where the diverse range of ages, educational backgrounds, cultures and languages among tourists may make communication difficult. Likewise, the limited duration of trips, frequent distractions and the inability to compel tourists to listen to environmental messages may also inhibit the ability to educate participants.

The quality of the experience is also considered to be important. Experiences that are satisfying (Powell & Ham 2008), invoke curiosity (Orams 1997), or create a sense of wonder, awe, excitement or privilege (Ballantyne et al. 2011b) are thought to contribute to greater conservation engagement, perhaps because they create more vivid and enduring memories (Ballantyne et al. 2011b).

Some studies have stressed the importance of visitors having the motivation and opportunity to act (Orams 1997; Beaumont 2001; Ballantyne et al. 2011a; Wheaton et al. 2015), and the need for post-visit prompts, triggers or ongoing support (Ardoin et al. 2015; Ballantyne et al. 2011b; Hughes et al. 2011; Wheaton et al. 2015) in order for them to adopt pro-environmental behaviours. In addition, the need for visitors to have time to reflect on their experience has also been mentioned in some studies (Ardoin et al. 2015; Ballantyne et al. 2011a, b).

It is likely that many outdoor experiences lack some or even all of these attributes. Furthermore, since the studies outlined above almost exclusively described wildlife experiences, and those with a strong interpretive or educational component and facilitation by guides or rangers, they may have only limited relevance to self-directed experiences, those where no charismatic wildlife species are present and where there is only passive uptake of any environmental messages. To date, there has been no strong evidence for changes in attitudes or behaviours after participation in these kinds of experiences, which would include many experiences in the New Zealand outdoors.

6.2 Mediating role

Personal experiences in nature may also act as a mediator of the relationship between attitudes and behaviours. Several studies have noted the tendency for personal experiences to have a stronger influence on behaviours than non-personal experiences, such as watching a nature documentary (Manfredo et al. 1992; Tarrant & Green 1999; Kollmuss & Agyeman 2002; Thapa 2010). Tarrant & Green (1999) noted that attitudes that are based on personal experiences tend to be more deeply held and more likely to evoke a consistent behavioural response than those based on non-personal experiences. Thus, they suggested that experiencing the natural environment in person evokes a sense of personal meaning, whereas experiencing it through other means increases awareness and understanding but does not have personal meaning, leading to a relatively weak relationship between attitudes and related behaviours. Manfredo et al. (1992) suggested that one explanation for the sometimes weak relationship between attitudes and behaviours is that the attitudes held by an individual may not necessarily be accessed or activated at a given point in time, with situational factors and social norms instead taking precedence and guiding behaviour. This so-called 'attitude accessibility' could be improved through personal experience and repeated pairing of an attitude with an object (the subject of that attitude), such as through repeated visits to natural areas.

Several studies have demonstrated that outdoor recreation can play a mediating role (Manfredo et al. 1992; Tarrant & Green 1999; Thapa 2010). Tarrant & Green (1999) found that participation in appreciative, but not motorised or consumptive, activities mediated the attitude-behaviour relationship, explaining up to 13% of the variation in respondents' pro-environmental behaviours depending on the attitudinal measure that was used.

Thapa (2010) also found that participation partially mediated the relationship between environmental attitudes and behaviours, but that this was limited to particular types of behaviours and recreation activities. Thus, mediation occurred for:

- Appreciative activities and green consumerism behaviours
- Motorised activities, and both political activism and education behaviours

However, these relationships were less powerful than the direct effect of attitudes on behaviours.

Manfredo et al. (1992) investigated the effect of visiting Yellowstone National Park on attitude-behaviour consistency in relation to support for controlled burning policies in parks. They found that:

- Behavioural intentions matched attitudes 84% of the time among respondents who had visited the Park more than once, and these individuals also tended to have more extreme attitudes, either positive or negative.
- Behavioural intentions matched attitudes only 72% of the time for those who had not visited the Park within the previous 5 years.
- Frequent visitation appeared to be necessary for this attitude-behaviour consistency to occur, as respondents who had visited the Park only once in the previous 5 years did not differ significantly from either regular or non-visitors.

Thus, overall, attitudes were a relatively good predictor of support for controlled burn policies regardless of previous visitation; however, regular visitation clearly played a mediating role.

The findings of these studies suggest that participation in outdoor recreation may not necessarily lead to pro-environmental attitudes. However, it may play an important role in reinforcing existing attitudes and ensuring that attitudes and behaviours are consistent. This pathway may be particularly important in influencing the behaviour of regular users of the outdoors.

In this context, visits to public conservation lands and waters would not turn previously disinterested people into advocates for conservation. However, given that many New Zealanders hold an ecocentric world view (Research New Zealand 2007; Lovelock et al. 2013; Versus Research 2013), it may increase the likelihood that they will undertake specific pro-conservation behaviours when given the opportunity to do so.

This is not to say that non-personal experiences cannot also play a role in increasing environmental engagement. Kil (2016) found that general environmental education activities (reading books/magazines and watching television programmes about the environment, and subscribing to environmental publications) positively influenced New Ecological Paradigm scores among hikers on the Florida National Scenic Trail. Furthermore, Holbert et al. (2003) showed that viewing television news and nature documentaries was associated with a greater likelihood of individuals reporting that they carried out pro-environmental behaviours, although environmental concern and demographic factors had a much greater effect.

6.3 Conditioning

Beaumont (2001) speculated that the link between participation and pro-environmental attitudes could be related to conditioning theory. Thus, enjoyable experiences in the natural environment would produce a positive response, which, over time, would result in the natural environment alone creating the same response. This would result in an individual holding a positive attitude towards nature and its conservation. No published studies appear to have directly tested this pathway, however.

6.4 Emotional affinity

The development of an emotional affinity with nature has already been briefly discussed in section 4 in relation to the time spent in nature and the outdoors during childhood.

The extent to which this pathway may operate in adults is unclear, but several studies have discussed it without explicitly limiting it to an individual's early years.

Emotional affinity or attachment differs conceptionally from an individual having a strong positive attitude toward a particular object (e.g. nature or its conservation). It is an emotional bond with an object that influences an individual's allocation of emotional, cognitive and behavioural resources towards it and is evidenced by psychological and behavioural outcomes that are not typically associated with attitudes. These may include strong linkages between the object and an individual's self-identity, proximity seeking behaviours, a feeling of distress when separated from the object or of safety when close to it, and a willingness to invest financial or mental resources in the object of attachment or to protect it from harm (Park & MacInnis 2006).

Researchers have suggested that time spent in the outdoors creates an emotional affinity with nature (Kals et al. 1999; Goralnik & Nelson 2011). This connection then contributes to a person's identity or sense of self, and their inclination to care about and protect nature (Schultz 2002; Hinds & Sparks 2009; Beery & Wolf-Watz 2014).

Summarising the philosophies of the ecologist Aldo Leopold, Goralnik & Nelson (2011) suggested that this may occur through the following process:

- Our experiences with the natural environment as our biotic community will prompt an emotional attachment to, and sense of value for, that community.
- We act to preserve those things that we are emotionally attached to and in which we posit value.
- Thus, we will act on behalf of the environment if our experiences with it portray it as a community to which we belong.

In addition, Hinds & Sparks (2009) discussed the concept of environmental identity and demonstrated its positive association with time spent in the outdoors. They developed a model that included the frequency of experiences in natural environments, personal meaning and rural upbringing, which explained more than 30% of the variation in environmental identity.

Beery (2013) examined the relationship between environmental connectedness and the Swedish concept of 'friluftsliv', which was translated as 'nature-based outdoor recreation' – although Beery (2013) stressed that it carried a broader cultural meaning beyond participation that included nature experience, philosophy, lifestyle and a connection with allemansrätt, the right of public access to nature. In this study, environmental connectedness was measured using the Connectedness to Nature Scale (Mayer & Frantz 2004), while participation in nature-based outdoor recreation was measured simply by asking respondents how often they were out in nature on weekdays. In line with the attitudinal studies discussed earlier, Beery (2013) found that:

- 4% of the variation in the Connectedness to Nature scores was accounted for by the respondents' levels of participation in nature-based recreation.
- Socio-demographic variables, support for access and childhood participation were also significant predictors of Connectedness to Nature scores.

Kals et al. (1999) found a stronger relationship between participation and emotional affinity with nature, so that:

- 39% of the variation in the respondents' emotional affinity with nature was explained by four variables that described past and present nature experiences and the company of others during these visits.
- The strongest predictor of respondents' emotional affinity with nature was the amount of time they currently spent in nature.
- The same four variables also predicted the respondents' interest in nature, while a weaker correlation was found between three of these factors and the respondents' indignation about there being insufficient nature protection.

Thus, the studies of both Kals et al. (1999) and Hinds & Sparks (2009) found a relatively strong correlation between the amount of time respondents spent in natural environments and their affinity or ability to identify with nature. However, like the attitudinal studies discussed earlier, the direction of the cause-and-effect relationship is unclear. Therefore, further research is needed to establish the degree to which this pathway operates.

6.5 Place attachment

There appears to be less doubt about the role of place attachment, or sense of place, as an important precursor of pro-environmental behaviours (Vaske & Kobrin 2001; Stedman 2002; Halpenny 2010; Lee 2011; Cheng et al. 2013). Furthermore, this may also be linked to environmental concern/pro-environmental attitudes.

Place attachment refers to an affective bond or link between people and specific places (Hidalgo & Hernández 2001). It arises when settings are imbued with meanings that create or enhance an

emotional tie to a natural resource (Cuba & Hammon 1993) and often emerges as individuals become familiar with a setting and endow it with value (Kyle et al. 2005). Cheng et al. (2013) suggested that when individuals develop such an attachment to a specific destination, they express care and concern for its environmental protection and gain awareness of contemporary environmental issues.

Place attachment has functional, cognitive and affective aspects (Halpenny 2010), and is typically broken down into at least two dimensions: place dependence and place identity (Bricker & Kerstetter 2000; Vaske & Kobrin 2001; Walker & Chapman 2003; Kyle et al. 2005; Halpenny 2010; Lee 2011; Cheng et al. 2013; Ramkissoon et al. 2013).

Place dependence is a functional attachment to a place (Bricker & Kerstetter 2000; Vaske & Kobrin 2001; Ramkissoon et al. 2013), and reflects the extent to which a place enables or facilitates particular activities and the pursuit of an individual's goals relative to other places (Moore & Graefe 1994; Halpenny 2010). Place dependence can describe particular behaviours and actions towards a place (Halpenny 2010; Cheng et al. 2013), and reflects and is embodied in the physical characteristics of the setting (Vaske & Kobrin 2001).

Place identity can be described as a psychological feeling and an affective and symbolic meaning that is created through the accumulation of experience (Cheng et al. 2013). It is seen by some authors as being linked with self-identity (Proshansky et al. 1983; Halpenny 2010; Cheng et al. 2013; Ramkissoon et al. 2013), and is characterised by the combination of attitudes, values, thoughts, beliefs, meanings and behavioural tendencies that are associated with particular places (Proshansky et al. 1983). Place identity is not thought to occur as a result of any one particular experience (Proshansky et al. 1983) but rather occurs over a long period of time, and may develop through extensive interaction and repeat visitation (Moore & Graefe 1994).

Some researchers have identified additional dimensions of place attachment, known as place affect and place social bonding (Kyle et al. 2005; Halpenny 2010; Ramkissoon et al. 2013). Place affect is described as the emotions and feelings of an individual towards a particular place (Halpenny 2010), while place social bonding refers to the way in which a place can be valued because it facilitates interpersonal relationships and fosters group belonging (Ramkissoon et al. 2013).

Several studies have demonstrated links between place attachment and pro-environmental behaviours in a recreation, tourism or park context. Vaske & Kobrin (2001) surveyed youth participants after their 5-7-week-long park-based natural resource work programmes in Colorado. They assessed a range of general behaviours (e.g. talking to others about environmental issues) and specific behaviours (e.g. joining community cleanup efforts, sorting recyclables, conserving water), and then combined these into a single behavioural measure. Structural equation modelling showed that place dependence strongly influenced place identity and that this, in turn, explained 40% of the variation in engagement in environmentally responsible behaviours, representing a very strong link. Thus, Vaske & Kobrin (2001) concluded that the development of environmentally responsible behaviours was facilitated by a connection to a natural setting.

Halpenny (2010) examined the relationships between place attachment and place-specific and general pro-environmental behaviours among visitors to Point Pelee National Park, Ontario. She found that the intention to carry out place-specific behaviours was strongly predicted by place attachment, with:

- Place identity mediating the relationship between place dependency and place-specific behavioural intentions.
- This relationship explaining 38% of the variation in the intention to carry out these behaviours.

Halpenny (2010) also found evidence of a 'spill-over' effect, whereby engagement in one type of pro-environmental behaviour appeared to inspire engagement in other, unrelated behaviours. Consequently, she suggested that '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' (Halpenny 2010: 417). This process may then contribute to an individual's environmental identity. However, Halpenny (2010) expressed caution, noting that this apparent link could be caused by other factors (e.g. education or social norms) that may also influence pro-environmental behaviours, visitation and support for parks.

Other studies have shown that behaviours can be driven by a complex relationship between place attachment and a range of factors, including meanings and beliefs (Stedman 2002), destination attractiveness (Cheng et al. 2013), place satisfaction (Stedman 2002; Ramkissoon et al. 2013), recreation involvement and conservation commitment (Lee 2011).

Stedman (2002) illustrated how attachment and other factors interacted to influence homeowners' intentions to protect lakes in Vilas County, Wisconsin, showing that:

- Symbolic meaning, evaluative beliefs, place attachment and place satisfaction were strongly linked to respondents' intentions to act to address changes to their local lake, collectively explaining 21% of the variation in the respondents' behavioural intentions.
- Beliefs and meanings influenced both satisfaction and attachment, with beliefs about whether a respondent's local lake was impacted or pristine being particularly influential. In addition, the area holding a meaning encompassing wilderness, escape from civilisation, high environmental quality and representing the 'real up north' were also important.
- Place attachment and satisfaction influenced behavioural intentions, with respondents who had high attachment and low satisfaction being more willing to act to address environmental changes to their lake.

Consequently, Stedman (2002) suggested that individuals tend to be more willing to fight for areas that are more central to their identities and which they perceived as being in less than optimal condition, especially when important symbolic meaning is threatened by change.

Ramkissoon et al. (2013) studied the relationship between place attachment, place satisfaction and pro-environmental behaviours among visitors to Dandenong Ranges National Park, Australia. Their study differentiated between high-effort behaviours (volunteering, writing letters and participating in public meetings in support of the Park) and low-effort behaviours (telling friends not to feed animals, signing petitions in support of the Park and voluntarily reducing the use of favourite spots to promote recovery from environmental damage), and found that:

- Place attachment had a strong and direct effect on both types of behaviours.
- Satisfaction was positively correlated with low-effort behaviours and negatively correlated with high-effort behaviours.

Based on these findings, Ramkissoon et al. (2013) suggested that individuals who were satisfied with their decision to visit the Park may not see the need to improve the Park's environment – possibly because there is less of a call to action in these situations.

While Stedman (2002) and Ramkissoon et al. (2013) suggested that it may be more difficult to persuade visitors to engage in pro-environmental behaviours at locations where satisfaction is high, Powell & Ham (2008) found a positive correlation between satisfaction and willingness to engage in philanthropy among tourists in the Galapagos Islands.

Similarly, Cheng et al. (2013), who examined the relationship between environmentally responsible behaviours, place attachment and destination attractiveness for overnight visitors to the Penghu Islands in Taiwan, found that:

- Destination attractiveness (defined as the perceived ability of a destination to deliver satisfaction and benefits to tourists; Hu & Ritchie 1993) was a strong predictor of place attachment but had no direct relationship with environmentally responsible behaviours.

- Place attachment was positively associated with stronger environmentally responsible behaviours that were related to the Penghu Islands, mediating the relationship between attractiveness and environmentally responsible behaviours and explaining almost half of the variation in the respondents' intentions to undertake those behaviours.

Thus, their findings suggest that high-quality experiences are important in forming attachment to places, which, in turn, drives care for these places.

Another study among visitors to three Taiwanese wetlands by Lee (2011) further demonstrated how place attachment can interact with recreation involvement and conservation commitment to predict environmentally responsible behaviours. This study assessed various activism and consumer behaviours, and measured conservation commitment by asking respondents about their willingness to donate time or money to environmental organisations and to actively search for information about environmental conservation. Recreation involvement was assessed through a range of questions that reflected the extent to which visiting wetlands was central to the respondents' lifestyles and levels of self-expression. Unsurprisingly, Lee (2011) found that conservation commitment strongly predicted environmentally responsible behaviours. Furthermore, place attachment and recreation involvement affected these behaviours both directly and indirectly through their relationship with conservation commitment. Thus, these three factors combined were very strong predictors of environmentally responsible behaviours, with the model predicting 58% of the variation.

Together, the findings of these studies indicate that place attachment is strongly linked to pro-environmental behaviours, but that the relationship is also complex. The relationship with satisfaction, in particular, requires further exploration.

6.6 Recreation specialisation

Some researchers have suggested that there is a link between recreation specialisation (Bryan 1977) and pro-environmental attitudes and behaviours (McFarlane & Boxall 1996; Hvenegaard 2002; Dyck et al. 2003; Thapa et al. 2006; Oh & Ditton 2006, 2008).

Recreation specialisation refers to the idea that participants in an activity acquire specialised skills, knowledge, attitudes and norms over time as they progress from beginner to expert (Manning 1999). This results in a continuum of behaviours around the techniques and equipment they use and the preferred setting for their activity (Bryan 1977).

Recreation specialisation can be viewed as a multidimensional construct that incorporates factors such as behaviour, level of experience, skill and ability, centrality to lifestyle, enduring involvement, and equipment and investment (McFarlane & Boxall 1996; Bricker & Kerstetter 2000; Hvenegaard 2002; Dyck et al. 2003; Oh & Ditton 2008; Smith et al. 2010).

Of particular interest to park management agencies is a concept that was first introduced by Bryan (1977) in relation to fishing, whereby as specialisation increases, participants' concerns shift away from the activity (e.g. the catching and consumption of fish) towards preservation, with an increased emphasis on the nature and setting in which the activity takes place. For example, Oh & Ditton (2008) suggested that as anglers' specialisation increases and they become more socialised into fishing and more reliant on particular resources for their activity, they will become more perceptive of resource degradation than those who are less specialised. It has also been suggested that highly specialised anglers will have more to lose from resource degradation due to their more frequent participation and high level of commitment to the activity (Oh et al. 2005). Thus, both factors would lead to more highly specialised anglers holding more of an ecological view of natural resources and their management (Oh & Ditton 2006).

Recreation specialisation may mean that an expert participant could exhibit stronger environmental attitudes and behaviours than a novice participant within the same activity. This has implications for where efforts would be best placed to encourage visitors to contribute to conservation.

Several studies have demonstrated a positive relationship between the level of involvement in an activity and an individual's concern for the resources on which their activity depends. For example, Thapa et al. (2006) found a positive association between SCUBA divers' increasing level of specialisation and the extent to which they reported engaging in marine-based environmental behaviours; Oh & Ditton (2006, 2008) indicated that higher levels of specialisation among Texas anglers were associated with greater support for the regulation of fisheries; and McFarlane & Boxall (1996) found that birders in Alberta, Canada, made substantial contributions to conservation through volunteering, joining or donating money to conservation organisations and spending money to support wildlife habitat, all of which increased with greater levels of specialisation.

In a study on the relationship between specialisation and conservation involvement among birders in Doi Inthanon National Park, Thailand, Hvenegaard (2002) found that:

- Specialised birders were more likely to have been a member of a conservation or wildlife group in the previous year and were likely to have paid more in annual fees.
- There was no relationship between specialisation and the number of groups individuals belonged to, their willingness to donate to the National Park, or their actual donation behaviour both in Thailand and elsewhere.

Similarly, Cheung et al. (2017) found a positive association between the degree of specialisation among Chinese birders in Hong Kong and wildlife-related pro-environmental attitudes, which, in turn, were positively associated with a measure of birding-specific ecologically responsible behaviours such as maintaining an appropriate distance from the birds, attracting or interacting with the birds, modifying the habitat, and complying with the rules and regulations.

There is less evidence that specialisation is associated with support for wider environmental goals, however. For example, in a study of visitors to Mount Rogers National Recreation Area, Virginia, Mowen et al. (1997) found that specialisation was more strongly linked to site-specific environmental concerns than to a general concern for the global ecosystem, and that both relationships were relatively weak. Similarly, Smith et al. (2010) found that differing levels of specialisation among off-highway vehicle users in Utah were associated with differences in beliefs about the environment but were unrelated to the level of environmental concern; and Dyck et al. (2003) found that specialisation in mountaineering was significantly related to attitudes towards low-impact behaviours but unrelated to general environmental attitudes, measured through the New Ecological Paradigm scale.

6.7 Conclusion

The relationship between outdoor recreation and support for the environment and conservation appears to be complex, and so growing participation does not by itself guarantee greater support.

There appear to be at least six pathways through which participation in outdoor recreation is associated with pro-environmental behaviours. The strongest evidence relates to the role of participation as a mediator between attitudes and behaviours, and the direct relationship between participation and both place attachment and recreation specialisation.

In some cases, personal experience and exposure to information and education programmes may also lead to increased awareness and subsequent action. This is most likely to occur where programmes are specifically designed to achieve this outcome, where experiences charismatic wildlife are present or where visits are facilitated by rangers or guides. However, such

experiences may not be typical of many visits to natural areas in New Zealand and this pathway may be less relevant to visits that are self-directed, where no charismatic wildlife species are present and where there is only passive uptake of any environmental messages.

Conditioning and emotional affinity have also been suggested as pathways. However, conditioning does not appear to have been extensively studied, and the extent to which emotional attachment and the development of identity occurs in adults is unclear.

Finally, recreation specialisation and place attachment are processes through which both activities and places become central to an individual's life and identity, making it possible that individuals will undertake behaviours that protect or enhance places that are used for their chosen activity.

Two common themes are apparent among these various pathways to engagement: participation in outdoor recreation appears to be more likely to influence an individual's behaviour if it is repeated or frequent and if the place or activity has an emotional connection or personal meaning for the individual.

It is likely that DOC will be able to grow support for conservation among visitors if managers become aware of the different pathways to engagement and target interventions at appropriate audiences with these pathways in mind. A number of possible interventions to achieve this are recommended in section 8.1.

7. Conclusions

Many New Zealanders have a strong connection to their lands and waters, which are a key component of their national and cultural identity (King 2003; Dürr 2008; Rinne & Fairweather 2011; Cowie et al. 2016), as highlighted by the fact that 80% of New Zealand adults visited public conservation lands and waters during 2015/16 (Ipsos 2016).

Studies have shown that New Zealanders generally have positive attitudes towards the environment and conservation (Franzen & Vogl 2013; Ipsos 2016), and a pro-ecological or ecocentric world view (Research New Zealand 2007; Lovelock et al. 2013; Versus Research 2013). However, to date, this has not translated into widespread tangible support for conservation in the form of donations or volunteer behaviour (Ipsos 2016). Furthermore, future support for conservation cannot be taken for granted given uncertainty about the effect of increasing ethnic diversity and an aging population in New Zealand in the coming years, and the concentration of the country's population in places that are distant from many of the areas administered by DOC.

Less is known about the attitudes and behaviours of international tourists and their potential to support conservation. Many international visitors are motivated to visit New Zealand because of its landscapes, natural scenery and clean green image (Ateljevic 2001; MBIE: International Visitor Survey, unpublished data). However, there is little information available on whether individuals who access public conservation lands and waters exhibit different attitudes and behaviours from those who do not.

A review of the international literature on links between participation in outdoor recreation and environmental and conservation engagement showed that spending time in nature and the outdoors during childhood was often the most important formative influence on individuals with high levels of environmental engagement during adulthood, likely through the development of an emotional connection with nature (Kals et al. 1999; Ewert et al. 2005; Goralnik & Nelson 2011).

In addition, several other influences were repeatedly cited as being the building blocks of adult environmental engagement, particularly family (and especially parents), formal education, work, friends, experiencing environmental destruction, involvement in organisations (e.g. environmental, scout or youth groups), books, and teachers and other role models.

These findings appear to apply across different cultures (Sward 1999; Furihata et al. 2007; Hsu 2009; Li & Chen 2015) and have been confirmed for a diverse range of groups that exhibit high levels of environmental engagement, including environmental educators (Palmer 1993; Palmer & Suggate 1996; Corcoran 1999; Palmer et al. 1999; Furihata et al. 2007), environmental activists and conservationists (Tanner 1980; Horwitz 1996; Chawla 1999; Hsu 2009).

Spending time in nature and the outdoors has also been shown to provide benefits to children's development (Fjørtoft 2004) and to influence recreation participation in adulthood (Bixler et al. 2002; Thompson et al. 2008; Asah et al. 2012; Lovelock et al. 2016). It may also play a role in reducing childhood obesity (McCurdy et al. 2010).

Therefore, the findings of this review support the range of child- and family-focussed interventions that are commonly undertaken by DOC and other park management agencies to foster a connection to nature and a lifelong engagement with parks. These include the provision of accessible family-friendly recreation opportunities, interpretive nature programmes for children, and the involvement of schools in outdoor and environmental education. However, further research is required to determine whether the specific interventions that are carried out by DOC and its partners are making a difference, and to find out which interventions make the most difference for the least cost.

By contrast, the relationship between participation in outdoor recreation in adulthood and environmental and conservation engagement was found to be complex and much less clear. Only

a small number of attitudinal studies have focussed on or included conservation-related themes, with most having focussed on a range of general environmental issues instead.

Participation in outdoor recreation appears to be only weakly associated with environmental concern/pro-environmental attitudes, if at all (Geisler et al. 1977; Pinhey & Grimes 1979; Van Liere & Noe 1981; Bikales & Manning 1991; Nord et al. 1998; McMullin et al. 2007). However, stronger associations have been found with participation in specific activities (Dunlap & Heffernan 1975; Van Liere & Noe 1981; Jackson 1986, 1987; Bikales & Manning 1991; Tarrant & Green 1999; Thapa & Graefe 2003; Peterson et al. 2008; Thapa 2010) and when attitudes relate to aspects of the environment that are necessary for pursuing an individual's chosen recreation experience (Dunlap & Heffernan 1975; Jackson 1987; Thapa & Graefe 2003). These aspects are often related to conservation and show that self-interest can be a driver of concern for the environment among participants in outdoor recreation. Therefore, understanding how to leverage this self-interest for conservation gain is key to obtaining a greater contribution to conservation from visitors.

Research literature suggests that a focus on changing attitudes through increasing participation in outdoor recreation on public conservation lands and waters may not be enough to deliver significant conservation gains. Not only are there often only weak links between attitudes and participation, but some researchers have also speculated that the cause-and-effect relationship may run in the opposite direction from what is often assumed, i.e. people may choose to participate in outdoor recreation because they are already concerned about conservation or the environment (Jackson 1986; Luzar et al. 1998; Nord et al. 1998; Bright & Porter 2001; Thapa & Graefe 2003; Beery 2013; Kil et al. 2014; Wright & Matthews 2015). It has also been suggested that other factors could contribute to participation in outdoor recreation and pro-environmental attitudes and behaviours (Van Liere & Noe 1981; Langenau et al. 1984; Nord et al. 1998).

More importantly, researchers have often found that environmental attitudes are a poor predictor of pro-environmental behaviours (Finger 1994; Kollmuss & Agyeman 2002), with several behavioural models suggesting that attitudes do not directly influence behaviours (Hines et al. 1987; Ajzen 1991; Stern & Dietz 1994). Instead, a wide range of factors or barriers can influence this relationship, which can lead to misalignment between an individual's attitudes and behaviours (Kollmuss & Agyeman 2002; Gifford & Nilsson 2014). Some of these barriers could be directly influenced by DOC to grow conservation.

The widely used Theory of Planned Behaviour singles out social norms and perceived behavioural control (an individual's perception of whether or not they can successfully carry out the behaviour) as being the key determinants of behavioural intentions (Ajzen 1991). Furthermore, individuals can choose to engage in pro-environmental behaviours for reasons that have nothing to do with their attitudes towards the environment (Stern & Dietz 1994; Schultz et al. 2005; Gifford & Nilsson 2014). Therefore, people do not have to be 'converted' to conservation for them to contribute.

A stronger relationship has been found between participation in outdoor recreation and pro-environmental behaviours (Nord et al. 1998; Theodori et al. 1998; Larson et al. 2011; Zafeiroudi & Hatzigeorgiadis 2014b), including some conservation behaviours (McMullin et al. 2007; Cooper et al. 2015). However, the strength and nature of this link differs depending on the type of behaviour as well as potentially the type of recreation activity (Tarrant & Green 1999; Teisl & O'Brien 2003; Thapa & Graefe 2003; McMullin et al. 2007; Cooper et al. 2015).

Several studies have demonstrated a link between participation in specific recreation activities and activism or conservation behaviours, including donating money and time to environmental causes, environmental advocacy and membership of environmental groups (Teisl & O'Brien 2003; Thapa & Graefe 2003; McMullin et al. 2007; Cooper et al. 2015). However, it has been less common for studies to find links with consumer or lifestyle behaviours.

There appears to be have been little or no specific research relating to a range of other conservation behaviours that are of interest to DOC and their prevalence among outdoor

recreation participants. These include individuals undertaking biosecurity measures when visiting sensitive areas, controlling dogs around wildlife, keeping cats inside at night, growing native plants to support birdlife, and avoiding growing weeds and potential garden escapees at home. Therefore, research that is specific to these behaviours would make a useful contribution in this field.

The relationship between participation and behaviour appears to be complex, involving at least six different pathways. Three of these involve a direct association between participation and behaviour:

- *Mediating role*: Personal contact with nature evokes a sense of personal meaning, and results in attitudes that are more deeply held and more likely to be recalled and to consistently influence behaviour. This increases the likelihood that individuals will act in a way that is consistent with their existing attitudes.
- *Personal experience*: Time in nature and exposure to information and education programmes leads to increased awareness, concern and subsequent action.
- *Conditioning*: Enjoyable experiences in nature and the outdoors produce a positive response so that over time the natural environment alone creates the same response. This will result in an individual holding a positive attitude towards nature and its conservation.

The remainder involve an indirect association whereby the relationship between outdoor recreation participation and pro-environmental behaviours is mediated by a third variable:

- *Place attachment*: Repeated visits to a place may lead to the development of an emotional bond. People are more likely to act to protect places that have personal meaning to them.
- *Recreation specialisation*: Ongoing participation in an activity leads to individuals acquiring specialised skills, knowledge, attitudes and norms as they progress from beginner to expert. The activity becomes more central to their life and identity, and involves a greater investment of time and money. Consequently, there is more to lose if a place or experience is threatened and so individuals become more likely to take personal action.
- *Emotional affinity*: Spending time in the outdoors builds an emotional connection or reinforces nature as a source of identity. People are more likely to take action to protect things that they feel connected to or part of.

The role of participation as a mediator between attitudes and behaviours, and the direct relationship with both place attachment and recreation specialisation are the most strongly supported pathways in the literature.

Personal experience may also be an important pathway for a limited range of experiences, including wildlife experiences, experiences with a strong interpretive or educational component, and experiences that are facilitated by guides or rangers. However, this pathway may have less relevance to experiences in the New Zealand outdoors that are self-directed, where no charismatic wildlife species are present and where there is only passive uptake of any environmental messages.

Conditioning and emotional affinity are both thought to influence the development of environmental engagement during childhood. However, conditioning does not appear to have been extensively studied and the extent to which an emotional attachment to nature occurs in adults remains unclear.

All of these pathways suggest that spending time in the outdoors can result in support for the environment and conservation, however, this is far from an automatic result. For instance, several of the pathways rely on there being a personal or emotional connection between an individual and an activity, a place or nature in general. Another common theme is that participation appears more likely to influence an individual's behaviour if it is repeated or frequent.

Given this, it remains to be seen whether typical patterns of participation in outdoor recreation in New Zealand are sufficient to drive significant conservation engagement beyond a minority of visitors. Although 80% of New Zealand adults visit public conservation lands and waters (Ipsos 2016), only a fraction (11% in 2014) visit on at least a monthly basis (Nielson 2014) – and it can be assumed that most international tourists are one-off or, at best, irregular visitors to the country. Therefore, there may be little opportunity for these infrequent visitors to develop the strength of connection to nature, place or activity that would motivate them to contribute to conservation in New Zealand.

It should also be noted that growing the number of visitors to public conservation lands and waters will not necessarily translate into greater support for conservation if this increase comes from those who only undertake one-off or infrequent visits. Compulsory fees or levies, such as a proposed border charge, may be a more effective way of gaining contributions to conservation from visitors. It should be noted however, that the ability to charge visitors to access public conservation lands and waters is constrained under current legislation. A further option would be to seek further contributions from tourism operators rather than the visitors themselves. Many New Zealand tourism businesses already contribute to conservation and are motivated to do this by the desire to look after the environment that they operate in, recognition that their business is dependent on the natural environment, and as a way of motivating and rewarding their employees (Mobius Research & Strategy 2017).

Increasing the number of visitors to public conservation lands and waters may still be a desirable outcome for other reasons, such as improving New Zealanders' health and wellbeing (Blaschke 2013) and providing economic benefits (DOC 2006). However, this needs to be balanced with the need to maintain the quality of experience for New Zealanders and international visitors, and to avoid exacerbating any existing pressures on infrastructure and the environment.

8. Recommendations

8.1 Recommendations to increase and leverage off engagement among visitors

The pathways described in this report indicate several strategies that DOC and its partners could employ to grow conservation:

1. Increasing children's contact with nature and the outdoors is an investment in future conservation engagement and recreation behaviour that also has the potential to provide present and future health benefits. Therefore, it is recommended that child-focussed interventions are prioritised, such as:
 - Provision of accessible, low-cost, family-friendly experiences
 - Interpretive nature programmes
 - Environmental and outdoor education
2. Attitudes are often poorly linked to behaviours and by themselves do not make a tangible difference to conservation. Therefore, efforts to engage the public (including visitors) should focus on encouraging pro-conservation behaviours rather than changing attitudes.
3. Several of the pathways for outdoor recreation to influence pro-environmental behaviours rely on a personal or emotional connection with nature, a place or a particular activity and on regular or repeated visits to natural areas. To grow these connections and increase contributions to conservation, efforts to engage visitors should focus on:
 - Encouraging regular and repeat visits to the outdoors alongside efforts to attract new participants. This approach is also likely to increase the health, wellbeing and economic benefits of visits to the outdoors as well as those that relate to national, personal or cultural identity and social cohesion.
 - Seeking contributions from visitors that strongly relate to the specific locations that they are using and that will enhance the quality of the experience or setting at site. This is likely to be more effective than seeking contributions relating to other locations or to more general or unrelated conservation issues. This could include asking fishers or jet boaters to contribute to freshwater conservation or trampers to contribute to facility maintenance or enhancing birdlife along a track.
 - Working with experienced users of the outdoors and reducing the barriers (e.g. cost, administrative) for them to contribute. DOC's Community Fund and the work of the Outdoor Recreation Consortium provides one model for how this can be achieved.
 - Identifying and developing programmes for locations where place attachment may provide motivation for visitors to contribute to conservation. This is most likely to occur at sites where there is frequent repeat use and where visitors spend significant time onsite. Coastal campgrounds are one such location where visitors may return to the same campground or site year after year and the connection to place may even be multigenerational. Other locations may include favoured recreation sites close to where people live.
4. Appeals to visitors who may lack a strong connection to public conservation lands and waters (e.g. infrequent/first-time visitors, visitors from overseas) are less likely to be successful, as they may not have a strong motivation to act. Therefore, when seeking support for conservation from inexperienced, infrequent or one-off visitors in particular, it is recommended that there is a focus on sites and issues that fit the following criteria:
 - Experiences that are truly iconic and/or awe-inspiring
 - Sites that offer encounters with charismatic wildlife

- High-use sites where the visitor volume compensates for the lower level of engagement
- Sites where visits are facilitated by rangers or guides and that offer a strong, theoretically based educational/interpretive experience

It is important to acknowledge that not all sites provide the opportunity to engage these visitors.

5. Contributions should be sought from visitors that are relatively low effort, able to be provided immediately and linked to the experience at a site. Where contributions or a behavioural change are sought post visit, prompts or follow-ups should be provided.
6. Given the high number of infrequent/first-time visitors, alternatives to seeking voluntary contributions to conservation should be considered. These include:
 - Compulsory levies or fees for visitors where the resulting funds are available to be used for conservation
 - Further contributions from tourism operators that build on the support that these businesses are already providing
7. DOC should work with a broad range of partners to promote the pathways that lead to engagement with the environment and conservation.

8.2 Recommendations for further research

Several research needs are listed below based on knowledge gaps that were identified in the literature review:

1. A better understanding of the environmental attitudes and behaviours of international visitors to New Zealand, and visitors to public conservation lands and waters.
2. The evaluation of different child- and family-focussed interventions to understand which approaches make the most difference and are most cost-effective.
3. More conservation-specific studies that investigate both attitudes and behaviours. There is a particular gap around some behaviours that are relevant to New Zealand conservation and their prevalence among visitors, such as:
 - Undertaking biosecurity measures when visiting sensitive areas
 - Controlling dogs around wildlife
 - Keeping cats inside at night
 - Growing native plants to support birdlife
 - Avoiding growing weeds and potential garden escapees at home
4. More studies that compare outdoor recreation participants with non-participants.
5. A better understanding of the cause-and-effect relationship between environmental concern/pro-environmental attitudes and participation in outdoor recreation.
6. Long-term New Zealand studies that record behavioural changes after visiting natural areas.
7. Studies of changes in engagement following self-directed visits to natural areas.
8. A better understanding of the role of satisfaction in developing place attachment, and of high or low satisfaction as a call to action or a barrier to pro-environmental behaviours.

9. Acknowledgements

The author would like to thank Edy MacDonald and Jovana Balanovic (DOC) and two external peer reviewers whose comments greatly improved this report. Thank you also to Amanda Todd (contract editor) and Lynette Clelland (DOC) for their work editing and formatting the manuscript, and the Information Services team at DOC for their consistently prompt and efficient service obtaining references. A number of other individuals provided suggestions and feedback as this report was being developed and their assistance is gratefully acknowledged.

10. References

- Ajzen, I. 1991: The theory of planned behaviour. *Organizational Behavior and Human Decision Processes* 50: 179-211.
- Ajzen, I.; Fishbein, M. 2005: The influence of attitudes on behavior. Pp. 173-222 in Albarracín, D.; Johnson, B.T.; Zanna, M.P. (Eds): *The handbook of attitudes*. Erlbaum, Mahwah, NJ. 826 p.
- Ardoin, N.M.; Wheaton, M.; Bowers, A.W.; Hunt, C.A.; Durham, W.H. 2015: Nature-based tourism's impact on environmental knowledge, attitudes and behaviour: a review and analysis of the literature and potential future research. *Journal of Sustainable Tourism* 23(6): 838-858.
- Arnold, H.E.; Cohen, F.G.; Warner, A. 2009: Youth and environmental action: perspectives of young environmental leaders on their formative influences. *Journal of Environmental Education* 40(3): 27-36.
- Asah, S.T.; Bengston, D.N.; Westphal, L.M. 2012: The influence of childhood: operational pathways to adulthood participation in nature based activities. *Environment and Behavior* 44(4): 545-569.
- Ateljjevic, I. 2001: Searching for nature and imaging New Zealand. *Journal of Travel & Tourism Marketing* 10(1): 115-122.
- Ballantyne, R.; Packer, J.; Falk, J. 2011a: Visitors' learning for environmental sustainability: testing short- and long-term impacts of wildlife tourism experiences using structural equation modelling. *Tourism Management* 32(6): 1243-1252.
- Ballantyne, R.; Packer, J.; Sutherland, L.A. 2011b: Visitors' memories of wildlife tourism: implications for the design of powerful interpretive experiences. *Tourism Management* 32(4): 770-779.
- Bandura, A. 1977: Self-efficacy: toward a unified theory of behavioral change. *Psychological Review* 84(2): 191-215.
- Baron, R.M.; Kenny, D.A. 1986: The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51(6): 1173-1182.
- Beaumont, N. 2001: Ecotourism and the conservation ethic: recruiting the uninitiated or preaching to the converted? *Journal of Sustainable Tourism* 9(4): 317-341.
- Beery, T.H. 2013: Nordic in nature: friluftsliv and environmental connectedness. *Environmental Education Research* 19(1): 94-117.
- Beery, T.H.; Wolf-Watz, D. 2014: Nature to place: rethinking the environmental connectedness perspective. *Journal of Environmental Psychology* 40: 198-215.
- Berns, G.N.; Simpson, S. 2009: Outdoor recreation participation and environmental concern: a research summary. *Journal of Experiential Education* 32(1): 79-91.
- Bikales, E.A.; Manning, R.E. 1991: Outdoor recreation and environmental concern: a further exploration. Pp. 13-18 in More, T.A.; Donnelly, M.P.; Graefe, A.R.; Vaske, J.J. (Eds): *Proceedings of the 1990 Northeastern Recreation Research Symposium*. February 25-28, 1990, Saratoga Springs, NY. *General Technical Report NE-145*. United States Department of Agriculture Forest Service, Northeastern Forest Experiment Station, Radnor, PA.
- Bixler, R.D.; Floyd, M.F.; Hammitt, W.E. 2002: Environmental socialization quantitative tests of the childhood play hypothesis. *Environment and Behavior* 34(6): 795-818.
- Bjerke, T.; Thrane, C.; Kleiven, J. 2006: Outdoor recreation interests and environmental attitudes in Norway. *Managing Leisure* 11: 116-128.

- Blaschke, P. 2013: Health and wellbeing benefits of conservation in New Zealand. *Science for Conservation* 321. Department of Conservation, Wellington. 37 p.
- Brabyn, L.; Sutton, S. 2013: A population based assessment of the geographical accessibility of outdoor recreation opportunities in New Zealand. *Applied Geography* 41: 124-131.
- Bricker, K.S.; Kerstetter, D.L. 2000: Level of specialization and place attachment: an exploratory study of whitewater recreationists. *Leisure Sciences* 22: 233-257.
- Bright, A.D.; Porter, R. 2001: Wildlife-related recreation, meaning, and environmental concern. *Human Dimensions of Wildlife* 6: 259-276.
- Bryan, H. 1977: Leisure value systems and recreational specialization: the case of trout fishermen. *Journal of Leisure Research* 9: 174-187.
- Chawla, L. 1998: Significant life experiences revisited: a review of research on sources of environmental sensitivity. *Environmental Education Research* 4(4): 369-382.
- Chawla, L. 1999: Life paths into effective environmental action. *Journal of Environmental Education* 31(1): 15-26.
- Cheng, J.C.; Monroe, M.C. 2012: Connection to nature: children's affective attitudes toward nature. *Environment and Behavior* 44(1): 31-49.
- Cheng, M.; Jin, X.; Wong, I.A. 2014: Ecotourism site in relation to tourist attitude and further behavioural changes. *Current Issues in Tourism* 17(4): 303-311.
- Cheng, T.; Wu, H.C.; Lo-Min, H. 2013: The influence of place attachment on the relationship between destination attractiveness and environmentally responsible behaviour for island tourism in Penghu, Taiwan. *Journal of Sustainable Tourism* 21(8): 1166-1187.
- Cheung, L.T.; Lo, A. Y.; Fok, L. 2017: Recreational specialization and ecologically responsible behaviour of Chinese birdwatchers in Hong Kong. *Journal of Sustainable Tourism* 25: 817-831.
- Cooper, C.; Larson, L.; Dayer, A.; Stedman, R.; Daniel, D. 2015: Are wildlife recreationists conservationists? Linking hunting, birdwatching and, pro-environmental behaviour. *Journal of Wildlife Management* 79(3): 446-457.
- Corcoran, P.B. 1999: Formative influences in the lives of environmental educators in the United States. *Environmental Education Research* 5(2): 207-220.
- Cordell, H.K.; Betz, C.J.; Green, G.T. 2002: Recreation and the environment as cultural dimensions in contemporary American society. *Leisure Sciences* 24(1): 3-41.
- Cowie, L.J.; Greaves, L.M.; Milfont, T.L.; Houkamau, C.A.; Sibley, C.G. 2016: Indigenous identity and environmental values: do spirituality and political consciousness predict environmental regard among Māori? *International Perspectives in Psychology: Research, Practice, Consultation* 5(4): 228-244.
- Cuba, L.; Hammon, D.M. 1993: A place to call home: identification with dwelling, community and region. *Sociological Quarterly* 34(1): 111-131.
- Dawson, J. 2003: Environmental values of consumptive and non-consumptive marine tourists in the South Island of New Zealand. Unpublished Masters of Tourism thesis, University of Otago, Dunedin. 133 p. <https://ourarchive.otago.ac.nz/bitstream/handle/10523/1314/DawsonJacquelineP2003MTour.pdf?sequence=5&isAllowed=y> (viewed 14 October 2015).
- Diekmann, A.; Preisendörfer, P. 2003: Green and greenback: the behavioural effects of environmental attitudes in low-cost and high-cost situations. *Rationality and Society* 15(4): 441-472.
- Department of Labour 2009: New faces new futures. Department of Labour, Wellington. 238 p. Accessed via <http://thehub.superu.govt.nz/project/new-faces-new-futures> (viewed 15 August 2017).
- DOC (Department of Conservation) 1996: Visitor strategy. Department of Conservation, Wellington. 60 p. www.doc.govt.nz/Documents/about-doc/role/policies-and-plans/visitor-strategy.pdf (viewed 9 November 2015).
- DOC (Department of Conservation) 2006: The value of conservation. What does conservation contribute to the economy? The economic impacts of public conservation lands in New Zealand with case studies on the West Coast of the South Island, Fiordland National Park, Abel Tasman National Park, Queen Charlotte Track, Tongariro National Park including the Mt Ruapehu ski fields, Southern Lakes Ski Areas, Te Papanui Conservation Park, and Cape Rodney - Okaraki Pt marine reserve. Department of Conservation, Wellington. 19 p. www.doc.govt.nz/Documents/conservation/value-of-conservation.pdf (viewed 9 November 2015).

- DOC (Department of Conservation) 2012: Department of Conservation Annual Report for the year ended 30 June 2012. Department of Conservation, Wellington. 116 p. www.doc.govt.nz/Documents/about-doc/annual-report-2012/doc-annual-report-year-ended-30-june-2012.pdf (viewed 9 November 2015).
- DOC (Department of Conservation) 2016: Department of Conservation Statement of Intent 2016–2020, Annual Report for the year ended 30 June 2016. Department of Conservation, Wellington. 146 p. <http://www.doc.govt.nz/about-us/our-role/corporate-publications/annual-reports-archive/annual-report-for-year-ended-30-june-2016/> (viewed 18 August 2017).
- DOC (Department of Conservation) 2017: Department of Conservation annual report for the year ended 30 June 2017. Department of Conservation, Wellington. 113 p. <http://www.doc.govt.nz/Documents/about-doc/annual-report-2016/annual-report-2017.pdf> (viewed 19 January 2018).
- DOC (Department of Conservation) 2017b: Department of Conservation four-year plan. Budget 2017. Department of Conservation, Wellington. 57 p. <http://www.doc.govt.nz/Documents/about-doc/four-year-plan/doc-four-year-plan-2017.pdf> (viewed 19 January 2018).
- Dunlap, R.E.; Heffernan, R.B. 1975: Outdoor recreation and environmental concern: an empirical examination. *Journal of Rural Sociology* 40(1): 18–30.
- Dunlap, R.E.; Van Liere, K.D. 1978: The “New Environmental Paradigm”: a proposed measuring instrument and preliminary results. *Journal of Environmental Education* 9: 10–19.
- Dunlap, R.E.; Van Liere, K.D.; Mertig, A.G.; Jones, R.E. 2000: Measuring endorsement of the New Ecological Paradigm: a revised NEP scale. *Journal of Social Issues* 56(3): 425–442.
- Dürr, E. 2008: Reinforcing cultural hegemony: Pākehā perceptions of brand New Zealand. *Journal of New Zealand Studies* 6/7: 59–76.
- Dyck, C.; Schneider, I.; Thompson, M.; Virden, R. 2003: Specialization among mountaineers and its relationship to environmental attitudes. *Journal of Parks and Recreation Administration* 21(2): 44–62.
- Eagly, A.H.; Chaiken, S. 1993: The psychology of attitudes. Harcourt Brace Jovanovich, Fort Worth, TX. 794 p.
- Ewert, A.; Place, G.; Sibthorp, J. 2005: Early-life outdoor experiences and an individual's environmental attitudes. *Leisure Sciences* 27: 225–239.
- Faber Taylor, A.; Kuo, F.E.; Sullivan, W.C. 2001: Coping with ADD: the surprising connection to green play settings. *Environment and Behavior* 33(1): 54–77.
- Fairweather, J.R.; Maslin, C.; Simmons, D.G. 2005: Environmental values and response to ecolabels among international visitors to New Zealand. *Journal of Sustainable Tourism* 13(1): 82–98.
- Farmer, J.R.; Chancellor, C.; Fischer, B.C. 2011: Space to romp and roam and how it may promote land conservation. *Natural Areas Journal* 31(4): 340–348.
- Finger, M. 1994: From knowledge to action? Exploring the relationships between environmental experiences, learning and behaviour. *Journal of Social Issues* 50(3): 141–160.
- Fjørtoft, I. 2004: Landscape as playscape: the effects of natural environment on children's play and motor development. *Children, Youth and Environments* 14(2): 21–44.
- Franzen, A.; Vogl, D. 2013: Two decades of measuring environmental attitudes: a comparative analysis of 33 countries. *Global Environmental Change* 23(5): 1001–1008.
- Froude, V.A. 2011: Wilding conifers in New Zealand: status report. Report prepared for the Ministry of Agriculture and Forestry. Pacific Eco-Logic Ltd, Far North. 207 p. www.wildingconifers.org.nz/files/Wilding_Conifer_Status_Report.pdf (viewed 10 November 2015).
- Furihata, S.; Ishizaka, T.; Hatakeyama, M.; Hitsumoto, M.; Ito, S. 2007: Potentials and challenges of research on “significant life experiences” in Japan. *Children, Youth and Environments* 17(4): 207–226.
- Geisler, C.C.; Martinson, O.B.; Wilkening, E.A. 1977: Outdoor recreation and environmental concern: a restudy. *Rural Sociology* 42(2): 241–249.
- Gifford, R. 2011: The dragons of inaction. Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist* 66(4): 290–302.
- Gifford, R.; Nilsson, A. 2014: Personal and social factors that influence pro-environmental concern and behaviour: a review. *International Journal of Psychology* 49(3): 141–157.

- Goodman, J.M.; Dunn, N.R.; Ravenscroft, P.J. Allibone, R.M.; Boubee, J.A.T.; Bruno, O.D.; Griffiths, M.; Ling, N.; Hitchmough, R.A.; Rolfe, J.R. 2013: Conservation status of New Zealand freshwater fish, 2013. *New Zealand Threat Classification Series* 7: 12 p.
- Goralnik, L.; Nelson, M.P. 2011: Framing a philosophy of environmental action: Aldo Leopold, John Muir, and the importance of community. *Journal of Environmental Education* 42(3): 181-192.
- Gough, A. 1999: Kids don't like wearing the same jeans as their mums and dads: so whose 'life' should be in significant life experiences research? *Environmental Education Research* 5(4): 383-394.
- Greenaway, A.; Bayne, K.; Velarde, S.J.; Heaphy, M.; Kravchenko, A.; Paul, T.; Samarasinghe, O.; Rees, T. 2015: Evaluating the (non-market) impacts of wilding conifers on cultural values. *Landcare Research contract report LC2396*. Landcare Research/Scion, Auckland. 83 p.
- Halpenny, E. 2010: Pro-environmental behaviours and park visitors: the effect of place attachment. *Journal of Environmental Psychology* 30: 409-421.
- Hidalgo, M.C.; Hernández, B. 2001: Place attachment: conceptual and empirical questions. *Journal of Environmental Psychology* 21: 273-281.
- Higham, J.E.S.; Carr, A.M.; Gale, S. 2001: Ecotourism in New Zealand: profiling visitors to New Zealand ecotourism operations. Research Paper Number Ten. Department of Tourism, University of Otago, Dunedin. 56 p.
- Hinds, J.; Sparks, P. 2009: Investigating environmental identity, wellbeing and meaning. *Ecopsychology* 1(4): 181-186.
- Hines, J.M.; Hungerford, H.R.; Tomera, A.N. 1987: Analysis and synthesis of research on responsible environmental behaviour: a meta-analysis. *Journal of Environmental Education* 18(2): 1-8.
- Holbert, R.L.; Kwak, N.; Shah, D.V. 2003: Environmental concern, patterns of television viewing, and pro-environmental behaviors: integrating models of media consumption and effects. *Journal of Broadcasting & Electronic Media* 47(2): 177-196.
- Holsman, R.H. 2000: Goodwill hunting? Exploring the role of hunters as ecosystem stewards. *Wildlife Society Bulletin* 28(4): 808-816.
- Horwitz, W.A. 1996: Developmental origins of environmental ethics: the life experiences of activists. *Ethics & Behavior* 6(1): 29-54.
- Hsu, S. 2009: Significant life experiences affect environmental action: a confirmation study in eastern Taiwan. *Environmental Education Research* 15(4): 497-517.
- Hu, Y.; Ritchie, J.R.B. 1993: Measuring destination attractiveness: a contextual approach. *Journal of Travel Research* 32(2): 25-34.
- Hughes, K.; Packer, J.; Ballantyne, R. 2011: Using post-visit action resources to support family conservation learning following a wildlife tourism experience. *Environmental Education Research* 17(3): 307-328.
- Hughes, M.; Morrison-Saunders, A. 2005: Interpretation, activity participation, and environmental attitudes of visitors to Penguin Island, Western Australia. *Society and Natural Resources* 18(7): 611-624.
- Hughey, K.F.D.; Kerr, G.N.; Cullen, R. 2014: Ethnicity and views about the New Zealand environment. Paper prepared for presentation at the EAAE 2014 congress 'Agri-food and rural innovations for healthier societies', 26-29 August 2014, Ljubljana, Slovenia. 11 p.
- Hughey, K.F.D.; Kerr, G.N.; Cullen, R. 2016: Public perceptions of New Zealand's environment: 2016. EOS Ecology, Christchurch. 82 p.
- Hvenegaard, G.T. 2002: Birder specialization differences in conservation involvement, demographics, and motivations. *Human Dimensions of Wildlife* 7: 21-36.
- Ipsos 2016: Full report: Survey of New Zealanders. Report prepared for the Department of Conservation. Ipsos, Auckland. 101 p. www.doc.govt.nz/Documents/about-doc/role/visitor-research/survey-of-new-zealanders-2016.pdf (viewed 12 December 2016).
- IUCN (International Union for Conservation of Nature) n.d. IUCN definitions - English. Accessed via https://www.iucn.org/downloads/en_iucn_glossary_definitions.pdf (viewed 22 September 2017).
- Jackson, E.L. 1986: Outdoor recreation participation and attitudes to the environment. *Leisure Studies* 5: 1-23.
- Jackson, E.L. 1987: Outdoor recreation participation and views on resource development and preservation. *Leisure Sciences* 9: 235-250.

- James, J.J.; Bixler, R.D.; Vadala, C.E. 2010: From play in nature, to recreation then vocation: a developmental model for natural history-oriented environmental professionals. *Children, Youth and Environments* 20(1): 231-256.
- Kals, E.; Schumacher, D.; Montada, L. 1999: Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior* 31(2): 178-202.
- Kantar TNS 2017: Mood of the Nation: New Zealanders' perceptions of international tourism March 2017. Unpublished report prepared for Tourism Industry Aotearoa and Tourism New Zealand. Kantar TNS, Auckland. 34p. <https://tia.org.nz/assets/Uploads/Mood-of-the-Nation-March-2019.pdf> (viewed 25 August 2017).
- Kil, N. 2016: Effects of vicarious experiences of nature, environmental attitudes, and outdoor recreation benefits on support for increased funding allocations. *Journal of Environmental Education* 47(3): 222-236.
- Kil, N.; Holland, S.M.; Stein, T.V. 2014: Structural relationships between environmental attitudes, recreation motivations and environmentally responsible behaviors. *Journal of Outdoor Recreation and Tourism* 7-8: 16-25.
- King, M. 2003: The Penguin history of New Zealand. Penguin, Auckland. 576 p.
- Kollmuss, A.; Agyeman, J. 2002: Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research* 8(3): 239-260.
- Kyle, G.; Graefe, A.; Manning, R. 2005: Testing the dimensionality of place attachment in recreational settings. *Environment and Behavior* 37(2): 153-177.
- Langenau, E.E.; Peyton, R.B.; Wickham, J.M.; Caveney, E.W.; Johnston, D.W. 1984: Attitudes toward oil and gas development among forest recreationists. *Journal of Leisure Research* 16(2): 161-177.
- Larson, L.R.; Whiting, J.W.; Green, G.T. 2011: Exploring the influence of outdoor recreation participation on pro-environmental behaviour in a demographically diverse population. *Local Environment* 16(1): 67-86.
- Lee, T. 2011: How recreation involvement, place attachment and conservation commitment affect environmentally responsible behaviour. *Journal of Sustainable Tourism* 19(7): 895-915.
- Li, D.; Chen, J. 2015: Significant life experiences on the formation of environmental action among Chinese college students. *Environmental Education Research* 21(4): 612-630.
- Lovelock, B. 2003: International and domestic visitors' attitudes as constraints to hunting in New Zealand. *Journal of Sport Tourism* 8(3): 197-203.
- Lovelock, B.; Jellum, C.; Thompson, A.; Lovelock, K. 2013: Could immigrants care less about the environment? A comparison of the environmental values of immigrant and native-born New Zealanders. *Society & Natural Resources* 26: 402-419.
- Lovelock, B.; Walters, T.; Jellum, C.; Thompson-Carr, A. 2016: The participation of children, adolescents, and young adults in nature-based recreation. *Leisure Sciences* 38(5): 441-460.
- Lück, M. 2003: The 'New Environmental Paradigm': is the scale of Dunlap and Van Liere applicable in a tourism context? *Tourism Geographies* 5(2): 228-240.
- Luzar, E.J.; Diagne, A.; Gan, C.E.C.; Henning, B.R. 1998: profiling the nature-based tourist: a multinomial logit approach. *Journal of Travel Research* 37: 48-55.
- Manfredo, M.J.; Yuan, S.M.; McGuire, F.A. 1992: The influence of attitude accessibility on attitude-behavior relationships: implications for recreation research. *Journal of Leisure Research* 24(2): 157-170.
- Manfredo, M.J.; Brukstotter, J.T.; Teel, T.L.; Fulton, D.; Schwartz, S. H.; Arlinghaus, R.; Oishi, S.; Uskul, A.K.; Redford, K.; Kitayama, S.; Sullivan, L. 2016: Why social values cannot be changed for the sake of conservation. *Biological Conservation* 31(4): 772-780.
- Manning, R.E. 1999: Studies in outdoor recreation search and research for satisfaction. 2nd Ed. Oregon State University Press, Corvallis, OR. 374 p.
- Marcus, H.R.; Kitayama, S. 1991: Culture and the self: implications for cognition, emotion, and motivation. *Psychological Review* 98(2): 224-253.
- Mayer, F.S.; Frantz, C.M. 2004: The connectedness to nature scale: a measure of individuals' feeling in community with nature. *Journal of Environmental Psychology* 24: 503-515.
- MBIE (Ministry of Business, Innovation and Employment) 2017a: Monthly regional tourism estimates June 2017. Accessed via <http://www.mbie.govt.nz/info-services/sectors-industries/tourism/tourism-research-data/monthly-regional-tourism-estimates> (viewed 25 August 2017).

- MBIE (Ministry of Business, Innovation and Employment) 2017b: New Zealand Tourism Forecasts 2017–2023. Ministry of Business, Innovation and Employment, Wellington. 48 p. <http://www.mbie.govt.nz/info-services/sectors-industries/tourism/tourism-research-data/international-tourism-forecasts/documents-image-library/forecasts-2017-report-final.pdf> (viewed 18 August 2017).
- MBIE (Ministry of Business, Innovation and Employment) 2017c: Settling in New Zealand Migrants' perceptions of their experience: 2015 Migrant Survey. Ministry of Business, Innovation and Employment, Wellington. 24 p. <http://www.mbie.govt.nz/publications-research/research/migrants--monitoring/migrant-survey-report-2015.pdf> (viewed 15 August 2017).
- McCurdy, L.E.; Winterbottom, K.E.; Mehta, S.S.; Roberts, J.R. 2010: Using nature and outdoor activity to improve children's health. *Current Problems in Pediatric and Adolescent Health Care* 40(5): 102–117.
- McFarlane, B.L.; Boxall, P.C. 1996: Participation in wildlife conservation by birdwatchers. *Human Dimensions of Wildlife* 1(3): 1–14.
- McMullin, S.L.; Hockett, K.S.; McClafferty, J.A. 2007: Does angling or boating improve the stewardship ethic of participants. *American Fisheries Society Symposium* 55: 145–155.
- MED (Ministry of Economic Development) 2011: RVM Regional Visitor Monitor (results to 30 June 2011). Ministry of Economic Development, Wellington. 89 p.
- Milfont, T.L.; Duckitt, J.; Cameron, L.D. 2006: A cross-cultural study of environmental motive concerns and their implications for proenvironmental behavior. *Environment and Behavior* 38(6): 745–767.
- Milfont, T.L.; Markowitz, E. 2016: Sustainable consumer behaviour: a multilevel perspective. *Current Opinion in Psychology* 10: 112–117.
- Ministry for the Environment, Statistics New Zealand 2015: New Zealand's Environmental Reporting Series: Environment Aotearoa 2015. Ministry for the Environment and Statistics New Zealand, Wellington. 131 p. <http://www.mfe.govt.nz/sites/default/files/media/Environmental%20reporting/Environment-Aotearoa-2015.pdf> (viewed 25 August 2017).
- Mobius Research & Strategy 2017: Department of Conservation tourism insights research report: September 2017. Unpublished report prepared for the Department of Conservation. Mobius Research & Strategy. Auckland 25 p.
- Moore, R.L.; Driver, B.L. 2005: Introduction to outdoor recreation: providing and managing natural resource based opportunities. Venture publishing, State College, PA. 339 p.
- Moore, R.L.; Graefe, A.R. 1994: Attachments to recreation settings: the case of rail-trail users. *Leisure Sciences* 16(1): 17–31.
- Mowen, A.J.; Williams, D.R.; Graefe, A.R. 1997: Specialized participants and their environmental attitudes: re-examining the role of "traditional" and psychological specialization. Pp. 134–138 in Kuentzel, W.F. (Ed.): Proceedings of the 1996 Northeastern Recreation Research Symposium. 31 March – 2 April 1996, Bolton Landing, NY. *General Technical Report NE-232*. United States Department of Agriculture Forest Service, Northeastern Forest Experiment Station, Radnor, PA.
- New Zealand Wilding Conifer Management Group 2014: The right tree in the right place. New Zealand Wilding Conifer Management Strategy 2015–2030. New Zealand Wilding Conifer Management Group. 35 p. www.wildingconifers.org.nz/images/wilding/articles/2014_new_zealand_wilding_conifer_management_strategy_2.pdf (viewed 10 November 2015).
- Nielson 2013: Survey of New Zealanders. Prepared for the Department of Conservation: June 2013. Nielson, Wellington. 102 p. www.doc.govt.nz/Documents/about-doc/role/visitor-research/survey-of-new-zealanders-2013.pdf (viewed 10 November 2015).
- Nielson 2014: Survey of New Zealanders. Prepared for the Department of Conservation: June 2014. Nielson, Wellington. 92 p. www.doc.govt.nz/Documents/about-doc/role/visitor-research/survey-of-new-zealanders-2014.pdf (viewed 10 November 2015).
- Nilsson, A.; Bergquist, M.; Schultz, W.P. 2017: Spillover effects in environmental behaviors, across time and context: a review and research agenda. *Environmental Education Research* 23(4): 573–589.
- Nord, M.; Luloff, A.E.; Bridger, J.C. 1998: The association of forest recreation with environmentalism. *Environment and Behavior* 30(2): 235–246.
- Oh, C.; Ditton, R.B. 2006: Using recreation specialization to understand multi-attribute management preferences. *Leisure Sciences* 28: 369–384.
- Oh, C.; Ditton, R.B. 2008: Using recreation specialization to understand conservation support. *Journal of Leisure Research* 40(4): 556–573.

- Oh, C.; Ditton, R.B.; Anderson, D.K.; Scott, D.; Stoll, J.R. 2005: Understanding differences in nonmarket valuation by angler specialization level. *Leisure Sciences* 27: 263–277.
- Orams, M.B. 1997: The effectiveness of environmental education: can we turn tourists into greenies? *Progress in Tourism and Hospitality Research* 3: 295–306.
- Outdoor Recreation Consortium 2017: Outdoor recreation consortium. Accessed via <http://hutsandtracks.org.nz/> (viewed 21 August 2017).
- Palmberg, I.E.; Kuru, J. 2000: Outdoor activities as a basis for environmental responsibility. *Journal of Environmental Education* 31(4): 32–36.
- Palmer, J.A. 1993: Development of concern for the environment and formative experiences of educators. *Journal of Environmental Education* 24(3): 26–30.
- Palmer, J.A.; Suggate, J. 1996: Influences and experiences affecting the pro-environmental behaviour of educators. *Environmental Education Research* 2(1): 109–121.
- Palmer, J.A.; Suggate, J.; Robottom, I.; Hart, P. 1999: Significant life experiences and formative influences in the development of adults' environmental awareness in the UK, Australia and Canada. *Environmental Education Research* 5(2): 181–200.
- Panelli, R.; Tipa, G. 2007: Placing well-being: a Māori case study of cultural and environmental specificity. *EcoHealth* 4: 445–460.
- Park, C.W.; MacInnis, D.J. 2006: What's in and what's out: questions on the boundaries of the attitude construct. *Journal of Consumer Research* 33: 16–18.
- PCE (Parliamentary Commissioner for the Environment) 2011: Evaluating the use of 1080: predators, poisons and silent forests. Parliamentary Commissioner for the Environment, Wellington. 85 p.
- PCE (Parliamentary Commissioner for the Environment) 2017: Taonga of an island nation: Saving New Zealand's birds. Parliamentary Commissioner for the Environment, Wellington. 139 p. <http://www.pce.parliament.nz/media/1695/taonga-of-an-island-nation-web-final-small.pdf> (viewed 18 August 2017). Peters, M.A.; Hamilton, D.; Eames, C. 2015: Action on the ground: a review of community environmental groups' restoration objectives, activities and partnerships in New Zealand. *New Zealand Journal of Ecology* 39(2): 179–189.
- Peterson, M.N.; Hull, V.; Mertig, A.G.; Liu, J. 2008: Evaluating household-level relationships between environmental views and outdoor recreation: the Teton Valley case. *Leisure Sciences* 30: 293–305.
- Pinhey, T.K.; Grimes, M.D. 1979: Outdoor recreation and environmental concern: a reexamination of the Dunlap-Heffernan thesis. *Leisure Sciences* 2(1): 1–11.
- Poortinga, W.; Steg, L.; Vlek, C. 2004: Values, environmental concern, and environmental behaviour: a study into household energy use. *Environment and Behavior* 36(1): 70–93.
- Powell, R.B.; Ham, S.H. 2008: Can ecotourism interpretation really lead to pro-conservation knowledge, attitudes and behaviour? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism* 16(4): 467–489.
- Powell, R.B.; Kellert, S.R.; Ham, S.H. 2008: Antarctic tourists: ambassadors or consumers? *Polar Record* 230: 233–241.
- Powell, R.B.; Kellert, S.R.; Ham, S.H. 2009: Interactional theory and the sustainable nature-based tourism experience. *Society & Natural Resources* 22: 761–776.
- Proshansky, H.M.; Fabian, A.K.; Kaminoff, R. 1983: Place-identity: physical world socialization of the self. *Journal of Environmental Psychology* 3: 57–83.
- Ramkissoon, H.; Smith, L.D.G.; Weiler, B. 2013: Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: a structural equation modelling approach. *Tourism Management* 36: 552–566.
- Reis, A.C. 2007: An empirical study of visitor conflicts in New Zealand's Southland Conservancy. The case of hunters and trampers on Stewart Island. Unpublished report prepared for the Department of Conservation. 115 p.
- Research New Zealand 2007: Final report public and staff conservation values. Unpublished report prepared for the Department of Conservation. Research New Zealand, Wellington. 104 p.
- Rinne, T.A.; Fairweather, J. 2011: Modelling cultural, national and innovation identities in order to understand New Zealand's modest innovation performance. *SITES: New Series* 8(2): 77–105.
- Schultz, P.W. 2002: Inclusion with nature: the psychology of human-nature relations. Pp. 61–78 in Schmuck, P.; Schultz, P.W. (Eds): *Psychology of sustainable development*. Springer US, New York. 337 p.

- Schultz, P.W.; Gouveia, V.V.; Cameron, L.D.; Tankha, G.; Schmuck, P.; Franěk, M. 2005: Values and their relationship to environmental concern and conservation behaviour. *Journal of Cross Cultural Psychology* 36(4): 457-475.
- Schwartz, S.H. 1994: Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology* 25: 1-65.
- Sibley, C.G.; Hoeverd, W.J.; Liu, J.H. 2011: Pluralistic and monocultural facets of New Zealand national character and identity. *New Zealand Journal of Psychology* 40(3): 19-29.
- Sivek, D.K. 2002: Environmental sensitivity among Wisconsin high school students. *Environmental Education Research* 8(2): 155-170.
- Sivek, D.K.; Hungerford, H.R. 1990: Predictors of responsible behavior in members of three Wisconsin conservation organizations. *Journal of Environmental Education* 21(2): 35-40.
- Smith, J.W.; Burr, S.W.; Reiter, D.K. 2010: Specialization among off-highway vehicle owners and its relationship to environmental worldviews and motivations. *Journal of Park and Recreation Administration* 28(2): 57-73.
- Starmation, K.A.; Croft, D.B.; Shaughnessy, P.D.; Waples, K.A.; Briggs, S.V. 2007: Educational and conservation value of whale watching. *Tourism in Marine Environments* 4(1): 41-55.
- Statistics New Zealand 2014: 2013 Census QuickStats: about culture and identity. Statistics New Zealand, Wellington. 35 p. www.stats.govt.nz/~media/Statistics/Census/2013%20Census/profile-and-summary-reports/quickstats-culture-identity/quickstats-culture-identity.pdf (viewed 10 November 2015).
- Statistics New Zealand 2016: Population heads for 5 million. Accessed via <https://www.stats.govt.nz/news/population-heads-for-5-million> (Viewed 24 January 2018).
- Statistics New Zealand 2017a: National Ethnic Population Projections: 2013(base)-2038 (update). Statistics New Zealand, Wellington. 34 p. <http://www.stats.govt.nz/~media/Statistics/Browse%20for%20stats/NationalEthnicPopulationProjections/HOTP2013-2038/NationalEthnicPopulationProjections2013-2038HOTP.pdf> (viewed 28 August 2017).
- Statistics New Zealand 2017b: Subnational Population Projections: 2013(base)-2043 update - tables. Accessed via <http://www.stats.govt.nz/~media/Statistics/Browse%20for%20stats/SubnationalPopulationProjections/HOTP2013base-2043/spp-2013-43-update-tables.xlsx> (viewed 28 August 2017).
- Stedman, R.C. 2002: Toward a social psychology of place. Predicting behaviour from place-based cognitions, attitude and identity. *Environment and Behavior* 34(5): 561-581.
- Steg, L.; Vlek, C. 2009: Encouraging pro-environmental behaviour: an integrative review and research agenda. *Journal of Environmental Psychology* 29: 309-317.
- Stern, P.C.; Dietz, T. 1994: The value basis of environmental concern. *Journal of Social Issues* 50(3): 65-84.
- Stern, P.C.; Dietz, T.; Guagnano, G.A. 1995: The new ecological paradigm in social-psychological context. *Environment and Behavior* 27(6): 723-743.
- Stevenson, K.T.; Peterson, M.N.; Carrier, S.J.; Strnad, R.L.; Bondell, H.D.; Kirby-Hathaway, T.; Moore, S.E. 2014: Role of significant life experiences in building environmental knowledge among middle school students. *Journal of Environmental Education* 45(3): 163-177.
- Sustainable Business Council 2013: Social licence to operate paper. Sustainable Business Council, Wellington. 27 p. https://www.sbc.org.nz/_data/assets/pdf_file/0005/99437/Social-Licence-to-Operate-Paper.pdf (viewed 29 November 2017).
- Sward, L.L. 1999: Significant life experiences affecting the environmental sensitivity of El Salvadoran environmental professionals. *Environmental Education Research* 5(2): 201-206.
- Resource Management Act 1991 (NZ) No 69. 796 p.
- Tabor, A. S.; Milfont, T. L.; Ward, C. (2015). International migration decision-making and destination selection among skilled migrants. *Journal of Pacific Rim Psychology* 9: 28-41.
- Tanner, T. 1980: Significant life experiences: a new research area in environmental education. *Journal of Environmental Education* 11(4): 20-24.
- Tarrant, M.A.; Green, G.T. 1999: Outdoor recreation and the predictive validity of environmental attitudes. *Leisure Sciences* 21: 17-30.
- Teisl, M.F.; O'Brien, K. 2003: Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behaviour. *Environment and Behavior* 35(4): 506-522.

- Thapa, B. 2010: The mediation effect of outdoor recreation participation on environmental attitude-behavior correspondence. *Journal of Environmental Education* 41(3): 133-150.
- Thapa, B.; Graefe, A.R. 2003: Forest recreationists and environmentalism. *Journal of Park and Recreation Administration* 21(1): 75-103.
- Thapa, B.; Graefe, A.R.; Meyer, L.A. 2006: Specialization and marine based environmental behaviours among SCUBA divers. *Journal of Leisure Research* 38(4): 601-615.
- Theodori, G.L.; Luloff, A.E.; Willits, F.K. 1998: The association of outdoor recreation and environmental concern: reexamining the Dunlap-Heffernan thesis. *Rural Sociology* 63(1): 94-108.
- Thompson, C.A.W.; Aspinall, P.; Montarzino, A. 2008: The childhood factor. Adult visits to green places and the significance of childhood experience. *Environment and Behavior* 40(1): 111-143.
- Tisdell, C.; Wilson, C. 2001: Wildlife-based tourism and increased support for nature conservation financially and otherwise: evidence from sea turtle ecotourism at Mon Repos. *Tourism Economics* 7(3): 233-249.
- Tisdell, C.; Wilson, C. 2005: Perceived impacts of ecotourism on environmental learning and conservation: turtle watching as a case study. *Environment, Development and Sustainability* 7: 291-302.
- Truelove, H.B.; Carrico, A.R.; Weber, E.U.; Raimi, K.T.; Vandenberg, M.P. 2014: Positive and negative spillover of pro-environmental behavior: an integrative review and theoretical framework. *Global Environmental Change* 29: 127-138.
- Van Liere, K.D.; Noe, F.P. 1981: Outdoor recreation and environmental attitudes: further examination of the Dunlap-Heffernan thesis. *Rural Sociology* 46(3): 505-513.
- Vaske, J.J.; Kobrin, K.C. 2001: Place attachment and environmentally responsible behaviour. *Journal of Environmental Education* 32(4): 16-21.
- Versus Research 2013: Environmental awareness, attitudes and actions and new ecological paradigm combined survey: a survey of residents of the Waikato Region. Waikato Regional Council Technical Report 2013/41. Waikato Regional Council, Hamilton. 282 p. www.waikatoregion.govt.nz/assets/PageFiles/28058/TR201341.pdf (viewed 10 November 2015).
- Wallace, D.S.; Paulson, R.M.; Lord, C.G.; Bond, C.F. 2005: Which behaviors do attitudes predict? Meta-analyzing the effects of social pressure and perceived difficulty. *Review of General Psychology* 9(3): 214-227.
- Walker, G.J.; Chapman, R. 2003: Thinking like a park: the effects of sense of place perspective-taking, and empathy on pro-environmental intentions. *Journal of Park and Recreation Administration* 21(4): 71-86.
- Wells, N.M.; Lekies, K.S. 2006: Nature and the life course: pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments* 16(1): 1-24.
- Wheaton, M.; Ardoin, N.M.; Hunt, C.; Schuh, J.S.; Kresse, M.; Menke, C.; Durham, W. 2015: Using web and mobile technology to motivate pro-environmental action after a nature-based tourism experience. *Journal of Sustainable Tourism* 24: 594-615.
- Wright, P.A.; Matthews, C. 2015: Building a culture of conservation: research findings and research priorities on connecting people to nature in parks. *Parks* 21(2): 11-24.
- Zafeiroudi, A.; Hatzigeorgiadis, A. 2014a: The effects of an outdoor pursuits intervention program on adolescents' environmental beliefs. *International Journal on Advances in Education Research* 1(3): 106-118.
- Zafeiroudi, A.; Hatzigeorgiadis, A. 2014b: Validation of the Responsible Environmental Behavior Scale and relationships with participation in outdoor activities. *International Journal of Sport Management, Recreation & Tourism* 13: 20-37.

10. Glossary

Activism behaviours

A broad category of behaviours that is often used to refer to a variety of political and civic actions such as signing petitions, lobbying and advocacy, protesting and voting behaviours. It can also encompass volunteer activities (e.g. participating in a beach clean up) and some consumer behaviours (e.g. choosing not to buy a particular product because of a company's environmental record). A general premise of seeking to service broader societal interests can be seen as underlying this concept.

Altruistic

Expressions of attitudes and/or values which demonstrate a concern for others over and above self-interest (often used interchangeably with 'selfless' or 'unselfish').

Amenity values

The natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes (Resource Management Act 1991: section 2).

Anthropo-centric

Human-centred. In the context of environmental attitudes and values this refers to views that are based on valuing the environment for its utility to humans.

Appreciative recreation

Recreation activities that involve enjoying the natural environment without altering it and that may reflect a preservationist orientation toward it (Dunlap & Heffernan 1975). Examples include walking, camping and photography.

Attitude accessibility

The ability of an individual to retrieve or activate an attitude from memory such that it can influence perceptions and behaviours when the object of that attitude is encountered (Manfredo et al. 1992).

Attitude-behaviour consistency

The extent to which attitudes predict behaviour.

Concessionaire

A person granted a concession by the Minister of Conservation for a lease, licence, permit or easement.

Conservation

The Department defines Conservation in terms of the Conservation Act 1987, which is: *the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations.*

However, the term is widely used to refer only to natural heritage values (e.g. in the research literature) and the following definition is more appropriate: *The protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence* (IUCN n.d.)

Conservation engagement

A broad term that encompasses people's awareness, understanding and valuing of, and positive attitudes toward, conservation and the behaviours that support it.

Consumer behaviours

Behaviours that relate to an individual's decisions to purchase or use particular products (e.g. purchasing products that are environmentally friendly or that can be recycled or making purchases based on a company's environmental record).

Consumptive recreation

Recreation activities that involve taking something from the environment and that may reflect a utilitarian orientation towards it. Examples include fishing and hunting (Dunlap & Heffernan 1975).

Ecocentric

Ecocentric attitudes and values that are driven by concern for the natural environment. 'Biospheric' may also be used in this context.

Egoistic

Expression of attitudes and/or values which demonstrate a concern for oneself over and above the interests of others (often used interchangeably with 'self-interested' or 'self-serving').

Environmental concern

In this report 'environmental concern' is used interchangeably with 'pro-environmental attitudes' (below), reflecting the way the term has often been used in the literature (Berns & Simpson 2009). Some authors make a distinction between these and related concepts. Schultz et al. (2005), for example, uses 'environmental concern' in relation to affect associated with environmental problems, while 'environmental attitudes' is used to describe beliefs, affect and behavioural intentions toward environmentally related activities or issues. 'Environmental worldview' is used to describe an individual's beliefs about the relationship between humans and nature.

Environmental connectedness

An affective, cognitive and/or physical human relationship with nature that is often described using terms such as 'affinity with nature', 'biophilia', 'ecological commitment', 'ecological self', 'ecological or environmental identity', 'inclusion with nature', 'nature relatedness' and 'environmental sensitivity' (Beery & Wolf-Watz 2014).

Environmental values

Environmental values are broad, abstract beliefs about the environment that relate to desirable end states or modes of conduct (Schwartz 1994). They are standards used by individuals and groups to evaluate whether actions, events and people are desirable or undesirable (Manfredo et al. 2016).

Family friendly

Experiences may be described as 'family friendly' if they are specifically child-focussed, or able to be enjoyed by the widest possible range of ages and abilities, from young children through to grandparents. Such experiences may also be relatively low cost.

Lifestyle behaviours

A group of behaviours that typically relates to water and energy conservation, recycling and disposal of waste. It can also include 'consumer behaviours' (described above).

Locus of control

A personality trait that represents an individual's perception about whether or not they have the ability to bring about change through their own behaviour. It may be described as internal (people who believe their actions are likely to have an impact) or external (people who attribute

change to powerful others, or factors such as luck and circumstance, rather than their own behaviour.) (Hines et al. 1987).

Mediation

A relationship between two variables is said to be mediated where a third variable accounts for some (partial) or all (complete) of the relationship or the variance explained (see 'variance explained' below) (Baron & Kenny 1986).

Non-personal experience

Experiences that do not involve being in physical proximity to nature, such as experiencing it via books, TV or online. These are sometimes referred to as vicarious or indirect experiences; however, the latter may cause confusion with personal experiences, (see 'personal experiences' below).

Outdoor recreation

Recreation experiences that result from recreation activities that occur in and depend on the natural environment (Moore & Driver 2005: 11). This definition includes nature-based tourism.

Personal experience

People's experiences that are undertaken within physical proximity to nature. These are sometimes described as direct (undertaken in natural settings) and indirect (undertaken in built environments such as zoos, aquariums and gardens); however, usage of these terms in the literature is inconsistent and 'indirect' can also refer to vicarious experiences (see 'non-personal experience' above).

Place attachment

An affective bond or link between people and specific places. 'Place attachment' arises from familiarity with a setting when it is imbued with value or meanings that create or enhance an individual's emotional ties to a natural resource (Cuba & Hammon 1993; Hidalgo & Hernández 2001; Kyle et al. 2005).

Pro-environmental attitudes

Attitudes are a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Eagly & Chaiken 1993:1). Individuals can have general attitudes relating to physical objects, people, groups, institutions, policies or other general targets and can also hold attitudes toward behaviours (Ajzen & Fishbein 2005). Pro-environmental attitudes may relate to support for the environment itself, to specific components of the environment, or towards specific pro-environmental behaviours. In this report, 'pro-environmental attitudes' has been used synonymously with 'environmental concern'.

Pro-environmental behaviours

Actions by individuals or groups that promote or result in the sustainable use of natural resources (Sivek & Hungerford 1989/1990). They are behaviours that minimise harm to, or benefit, the environment (Kollmuss & Agyeman 2002; Steg & Vlek 2009) and can be identified by either their impact or their intent (Stern 2000). A wide variety of other terms are used in the research literature to describe these actions, including 'ecological', 'environmentally responsible', 'environmentally significant' or 'sustainable behaviours'.

Relationship

A relationship exists between two variables or attributes when a change in one coincides with a change in the other. If the direction of change is the same in both variables (i.e. both increase or decrease) then the relationship is said to be positive. If the direction of change is different (i.e. when one decreases, the other one increases and vice versa), the relationship is said to be negative. The existence of a relationship by itself, does not mean that one variable causes the change in the other (i.e. it cannot determine cause and effect).

Self-construal

A concept that describes how individuals view themselves, others and the interdependence between themselves and others. Self-construal may be described in a number of ways including independent (differentiating themselves from others), interdependent (defining themselves by their relationships to other people or a wider social unit) or meta-personal (feeling fundamentally connected with all living things) (Markus & Kitayama 1991; Gifford & Nilsson 2014).

Social license

The ability of an organisation to carry on its business because of the confidence society has that it will behave in a legitimate, accountable, and socially and environmentally acceptable way (Sustainable Business Council 2013: Forword). This concept can equally be applied to sectors of the economy such as tourism.

Spillover effect

An effect of an intervention on subsequent behaviours that were not targeted by the intervention. Such effects may be both negative (an increase in one behaviour is associated with a reduction in one or more other behaviours) or positive (an increase in the target behaviour and one or more others) (Truelove et al. 2014).

Stewardship

A sense of moral obligation to care for the environment and the actions undertaken that provide that care, which implies the existence of an ethic of personal responsibility, an ethic of behaviour based on reverence for the earth and a sense of obligation to future generations. Stewardship is demonstrated by the wise and efficient use of resources and by individuals imposing limits on their own personal consumption, altering personal expectations, habits and values and taking actions that respect the integrity of natural systems (Dixon et al. 1995 cited in Holsman 2000).

Values

Values may form a basis for the formation of attitudes, act as guidelines for behaviour (Poortinga et al. 2004) and act as filters affecting how individuals perceive, interact with and receive information about the world around them (Stern et al. 1995; Manfredi et al. 2016). Values are likely to be relatively stable in adults (Stern & Dietz 1994; Manfredi et al. 2016) and difficult to influence.

Variance explained

Where a statistical relationship has been observed, this refers to the amount of change in one variable (often reported in the form of a percentage) that can be attributed to changes in one or more other variables.

Visitor

The term 'visitor' used in several ways throughout this report. The Department of Conservation uses the term to describe people using the areas and facilities that it manages. This includes adults and children from both New Zealand and overseas, and those who arrange their own visit or use the services of a concessionaire. More generally, 'visitor' may refer to a person who is accessing a location for the purpose of recreation. They may be differentiated from 'non-visitors', who may access the location because they work or reside there. In relation to international visitors to New Zealand, Statistics New Zealand defines a 'visitor' as an overseas resident arriving in New Zealand for a stay of less than 12 months.