
Wildlife tourism experiences are often promoted for their ability to enhance visitors’ conservation knowledge, attitudes and behaviour, yet studies exploring the long-term influence of such experiences are rare. This research explores the impact of a wildlife tourism experience and post-visit support on families’ adoption of conservation practices following their visit. In stage one, barriers and benefits associated with six conservation practices were identified and incorporated into the design of post-visit action resources. Two hundred Australian families visiting Mon Repos turtle rookery in Queensland, Australia were assigned to either a treatment group (given post-visit support) or a control group (no support). Three months after their visit, families in the treatment group were significantly more likely to report changes in their conservation knowledge; their attitudes towards protecting wildlife and the natural environment; and the frequency with which they picked up litter. Treatment families also adopted significantly more conservation practices than the control group. Implications for wildlife interpretive practice and visitor management at wildlife tourism sites are discussed.

**KEYWORDS:** Conservation learning, wildlife tourism, post-visit action resources

**INTRODUCTION**

Ecotourism or nature-based tourism activities are becoming increasingly popular world-wide, and incorporate a spectrum of activities ranging from hard-core specialist visitor activities such as scientific observation and recording of species or impacts, to ‘soft ecotourism’ activities such as whale watching and photography (Cousins, 2007; Cater and Cater, 2007). Wildlife tourism is often viewed as a subset of ecotourism as it incorporates ecotourism’s key principles of sustainability, conservation and education (Newsome, Dowling and Moore, 2004). This type of tourism includes viewing captive and non-captive wildlife, feeding wildlife, wildlife shows and exhibitions, hunting and fishing (Higginbottom, 2004). For the purpose of this study, however, wildlife tourism and wildlife interpretation refers only to non-consumptive activities such as wildlife viewing, feeding and photography.

A key focus of wildlife tourism interpretation is to raise public awareness of issues related to the protection and conservation of natural environments. This is primarily achieved by alerting visitors to the fragile state of the environment (Turley, 1999); describing the interrelationships between wildlife and habitats; and highlighting the impact of human activities upon the long-term viability of natural environments and their wildlife populations (Mason, 2000). It has been widely argued that through well-designed programs and interpretation, ecotourism experiences have the potential to enhance visitors’ environmental knowledge and foster pro-environmental attitudes and behaviour (Ham and Krumpe, 1996; Powell and Ham, 2008). While there is no doubt that such experiences are well placed to provide visitors with meaningful environmental experiences and have the potential to influence visitors’ conservation learning, to date there is limited empirical evidence to support this claim. Indeed,
Powell and Ham (2008) state that despite widespread arguments that ecotourism promotes environmental understanding, "assumptions about these effects remain largely untested…. and positive changes in tourists’ environmental knowledge, attitudes and behaviours remain largely unexplored" (p.468). Likewise, Ballantyne and Packer (in press) note that although there have been a number of studies investigating the impact of environmental interpretation on visitors’ environmental knowledge, attitudes, on-site behaviour and behavioural intentions, studies exploring whether interpretation prompts visitors to adopt conservation practices after their visit are rare.

**Short-term (on-site) impacts of wildlife tourism interpretation**

*Impacts on knowledge*

A review of visitor learning in captive and non-captive wildlife tourism settings (Ballantyne, Packer, Hughes and Dierking, 2007) suggests that tourists generally enjoy opportunities for learning and discovery and consider these to be fundamental aspects of wildlife tourism experiences. This view is shared by interpreters, many of whom believe that imaginative, well-designed interpretation can make substantial contributions to the public’s collective knowledge of environmental issues (Beckmann, 1989). Recent studies suggest that knowledge gained through wildlife tourism experiences may vary depending on whether visitors are ‘novices’ or ‘experienced’. For example, Hayward and Rothenberg’s (2004) study in the Congo Gorilla Forest exhibit at the Bronx Zoo found that visitors with little or moderate knowledge of rain forests were significantly more likely than ‘experienced’ visitors to learn something from the exhibit and more likely to report an increase in their concern about the preservation of these environments. Likewise, Falk and Adelman (2003) found that those who entered the National Aquarium in Baltimore with minimal conservation knowledge reported the greatest gains in knowledge after their visit. This was particularly evident in visitors with moderate to high interest in conservation issues. The impact of prior conservation knowledge on conservation learning was also evident at Disneyland’s Conservation Station (Dierking, Adelman, Ogden, Lehnhardt, Miller and Mellen, 2004). Visitors in the contemplation stage (lowest level of awareness/involvement) reported an increased awareness of, and interest in, seven of the eleven conservation actions studied; those in the preparation stage (generally committed and already involved in some activities) reported an increase in only three actions; and those in the action stage (already involved in a range of actions) reported no significant changes.

Other studies have made direct comparisons between visitors’ scores on pre-visit and post-visit knowledge items. Powell and Ham (2008) measured the impact of targeted conservation interpretation on the knowledge of cruise passengers visiting the Galapagos Islands. Using ten multiple choice questions and 5 true-false items, the researchers reported a ten percent increase in correct responses between pre-visit and post-visit measures. In addition, eighty-seven percent of respondents felt their knowledge of the general natural environment had increased moderately or a great deal. An Australian study by Broad and Weiler (1998) compared conservation learning at two interpretive sites featuring tigers – Tiger Island, a tiger enclosure located within the Dreamworld theme park complex at the Gold Coast in Queensland; and Western Plains Zoo, an open range zoo in New South Wales. The majority of respondents at both sites (76% at Tiger Island and 77% at the zoo) reported increases in their knowledge of tigers. However, closer inspection of responses revealed that
the learning reported by visitors to Tiger Island was more detailed and contextual, and that facts were more readily added to respondents’ understanding of tigers and wildlife. The researchers suggested that differences in the quality and quantity of responses at the two sites could be a function of the nature of the interpretation provided, as Tiger Island offered a variety of interpretive experiences whereas most visitors to the zoo only had access to an interpretive sign.

**Impacts on attitudes**

Studies exploring the short-term impact of wildlife interpretation on visitors’ environmental attitudes are also common. The majority of visitors (81%) participating in dolphin feeding tours at two sites in Queensland reported that their attitudes towards conservation were stronger as a result of participating in the tour (Mayes, Dyer and Richins, 2004). Most also expressed concern about the current state of the marine environment (66%), while 52% said the experience had strengthened their attitudes towards assisting with conservation programs. Other marine-based interactive tours report similar, albeit less dramatic, effects. For instance, Birtles, Valentine, Curnock, Arnold and Dunstan (2002) found that after swimming with dwarf minke whales, approximately one quarter of visitors were more aware of conservation issues. This included responses such as a heightened awareness, appreciation or concern about marine animals and their habitats; increased or reinforced conservation awareness; and an increased concern and appreciation for whales. Likewise, Tisdell and Wilson (2005) found that the majority of visitors to Mon Repos turtle rookery felt they would be more likely to dispose of plastics and fishing equipment correctly, switch off lights near beaches, not purchase turtle products and take care on beaches used by nesting turtles.

Since attitudes are predominantly affective in nature, environmental education researchers often argue that any exploration of conservation attitudes should also take into account the importance of emotions (Orams, 1994a; Pooley and O’Connor, 2000). Ballantyne et al., (2007, p.374) claim that “The affective domain is particularly important in wildlife encounters because humans generally respond emotionally to viewing and/or interacting with animals”, while Ham and Weiler (2002) note that the ability to ‘connect with’ visitors both intellectually and emotionally is the cornerstone of effective wildlife interpretation. Few visitor surveys have explored this issue in depth, however. Howard’s (1999/2000) study of visitors to Mon Repos Conservation Park did report that those who found the experience arousing (pleasurable, exciting, surprising) were significantly more likely to report an intention to adopt conservation activities. Chessington World of Adventures in the UK found that adding newly born sea lions to their interpretive program to illustrate the devastating impact of El Niño on the Californian sea lion population generated considerable concern amongst visitors (Gates and Ellis, 1999). Many reported being emotionally engaged in the presentation and subsequently enquired about what they could do to assist the affected colonies. Likewise, at Brookfield Zoo, Meyers, Saunders and Birjulin (2004) found a correlation between respondents’ emotional reaction to viewing particular animals and the desire to save these animals. These emotional reactions included caring, love, sense of connection, special privilege, beauty, respect, sympathy, attraction, wonder and amusement. These studies suggest that wildlife tourism engages people on an emotional level and that this has the potential to engender positive intentions to assist with wildlife protection.
Impacts on behaviour

Attitudes towards the environment and conservation have long been considered precursors to generating environmental actions. Although it seems logical to assume that people with positive attitudes towards the environment will engage in conservation practices, empirical evidence to support this claim is limited or at best, inconclusive. Links between knowledge, attitudes and subsequent conservation behaviour are tenuous and poorly understood (Heimlich and Ardoin, 2008). As Orams (1996) points out, interpretation seeks to prompt voluntary behaviour change but cannot force visitors to comply. Rather, it encourages people to consider the possible negative impacts of their actions and asks them to behave accordingly.

Few studies have explored the impact of wildlife interpretation on short-term behaviour. Orams and Hill (1998) investigated whether the introduction of a dolphin education program at Tangalooma, Moreton Island, had an impact upon visitor behaviour and the number of cautions given by staff during dolphin feeding sessions. The researchers observed a significant reduction in deliberate touching, staff cautions and other inappropriate behaviour after the introduction of the program and concluded that interpretive messages had brought about voluntary compliance with behaviour regulations. Powell and Ham (2008) reported similar levels of compliance following participation in conservation-themed tours of the Galapagos Islands. At the end of the seven day cruise, 78% of the groups aboard donated money to the Galapagos Conservation Fund.

The studies described above suggest that education has considerable potential to assist in managing visitor-wildlife interactions on-site. However, despite considerable resources being directed towards designing and producing interpretive resources and activities in natural areas, it is still not clear whether interpretation can be used to encourage visitors to care for places other than the site being interpreted (Stewart, Hayward, Devlin and Kirby, 1998).

Long-term impacts of wildlife interpretation

The few long-term studies conducted in this area suggest there is potential for influencing visitors’ off-site conservation behaviour. Orams (1994b) surveyed two groups of visitors at a dolphin feeding site in South-east Queensland – one group prior to the establishment of an information centre and education program (the control group) and one group after the program and centre were in operation (the treatment group). Immediately after their visit both groups indicated an intention to increase their involvement in five conservation actions – telling friends about their experience; searching for more information; removing beach litter; engaging in environmental issues; and donating to environmental organisations. Telephone interviews conducted with visitors three months after their encounter revealed that those who had access to the information centre and education program (the treatment group) were significantly more likely to look for information on dolphins, pick up litter on beaches, be involved in environmental issues and donate to conservation causes than those in the control group.

More recently, Ballantyne, Packer and Falk (2009) conducted a series of studies that explored long-term changes in visitors’ conservation behaviour as a result of visiting four Queensland sites offering marine wildlife tourism experiences: an aquarium; a marine theme park; a turtle nesting and hatching experience; and a whale watching
experience. Four months after their visit, 7% of respondents were able to report a specific new environmental behaviour that they had adopted as a result of the visit. An additional 11% reported a heightened awareness of the need for such action. These actions included changing household practices; changing purchasing practices; taking responsibility for the environment beyond the home; seeking further information; discussing environmental issues; and volunteering for environmental causes.

These studies suggest that well designed nature-based interpretive experiences do have the potential to impact upon visitors’ subsequent conservation practices. The question remains though - how can management encourage the majority of visitors who do not adopt conservation behaviours to do so? What mechanisms and materials are necessary to facilitate and support visitor learning, and which messages and strategies are likely to be most effective? The present study was designed to address these issues by exploring the impact of wildlife interpretation and post-visit support materials on families’ knowledge, attitudes and long-term adoption of conservation practices. The use of post-visit support has been proposed by Ballantyne and Packer (in press) as a means of supporting learning in a free-choice learning context. They argue for the development of ‘post-visit action resources’ that enhance and reinforce on-site environmental messages. This strategy is commonly employed in formal education settings (e.g., post-visit discussions, projects and/or assignments) but is rarely used in free-choice learning environments. Post-visit action resources in a tourism context could incorporate printed and/or on-line learning materials such as fact sheets, quizzes, games, action strategies, and links to websites that are designed to actively support and facilitate visitors’ post-visit learning in relation to the topic, events and experiences they have encountered.

Research in formal education settings demonstrates that such follow-up activities help students convert conservation intentions into actual behaviour (de White and Jacobson, 1994). Studies also suggest that parental involvement in student activities facilitates the uptake of conservation activities (Bratt, 1999), and that the family environment is a powerful social force that has lasting impacts on members’ conservation knowledge, attitudes and practices (Chawla, 1999; Hungerford and Volk, 1990). Thus, it is proposed that the provision of post-visit action resources in free-choice learning environments might help families adopt conservation actions after their visit. A search of the literature suggests that to date, there have been no attempts to investigate the impact of such an approach in leisure and/or tourism settings.

The study was designed in accordance with Community-Based Social Marketing (CBSM) theory, an approach that has shown promise in facilitating community uptake of conservation practices such as energy conservation, water consumption, public transport usage and recycling (McKenzie-Mohr and Smith, 1999). CBSM states that the key to changing behaviour is to understand and address perceived barriers and benefits associated with particular conservation actions, and to support the adoption of conservation behaviours through strategies such as prompts, feedback, incentives, examples of social norms, and providing opportunities for individuals to publicly declare their commitment. Thus, studies using CBSM strategies first identify why individuals do or do not adopt particular behaviours; secondly, design messages and materials that target perceived barriers and highlight benefits associated with the
particular behaviour; and finally, use a range of techniques to facilitate uptake of conservation practices.

**METHOD**

This study used an experimental design to investigate the impact of post-visit action resources on families’ long-term conservation learning (knowledge, attitudes and behaviour) following a wildlife tourism experience. The decision to sample families was guided by three factors: a) most visitors to Mon Repos come in family groups; b) families influence the nature and extent of participation in leisure and learning activities; and c) research suggests that the family unit has the potential to ‘shape’ the environmental attitudes and behaviour of family members (Chawla, 1999; Ellenbogen, Luke and Dierking, 2004; Hungerford and Volk, 1990). It was hypothesised that levels of conservation knowledge, attitudes and behaviour in the treatment group (those who received the resources) would be sustained or increase as a result of receiving post-visit support during the follow-up phase, while levels in the control group would remain the same or decline.

The research was conducted at Mon Repos Conservation Park, a world renowned turtle rookery on the Queensland coast. The site offers nightly turtle viewing experiences between November and March, and attracts approximately 60,000 visitors each season. Mon Repos is managed by the Queensland Parks and Wildlife Service under the umbrella of the Environmental Protection Agency (EPA) and consists of three components – an interpretive centre, an amphitheatre for video and oral presentations, and turtle viewing on the beach. The key underlying messages delivered through interpretive panels and presentations are that only one turtle in a thousand survives to maturity and that the biggest threat to their long-term survival is human activity. Interpretive panels include data on turtle mortality rates; photographs of dead and injured animals strangled by plastic; and detailed information about the impacts of habitat destruction, marine and beach pollution, coastal lighting, boat strikes and feral animals.

Turtle viewing occurs between the hours of 7pm and 2am, with Group 1 being taken down to the beach to view the first turtle or clutch of hatchlings, Group 2 to view the second and so on. There is a limit of five groups per night, with sixty people per group. Visitors spend approximately one hour on the beach watching either nesting or hatching turtles (see Figure 1).

**Stage One**

First, the interpretation provided at Mon Repos Conservation Park (signs, talks and tours) was reviewed to obtain an overview of the conservation practices and actions targeted by the wildlife tourism site. The researchers selected six conservation practices they felt applied to a wide range of visitors – selecting common, easy practices was seen as critical in order to maximise the chances of the conservation practices being adopted after the visit. To illustrate, picking up litter was included because this could be adopted by all respondents whereas turtle-friendly boating practices were rejected because their relevance would be limited to respondents who owned or regularly operated a boat. The six practices selected were as follows:

1. Re-using plastic containers. This reduces landfill as well as the chances of light-weight plastic items being blown or thrown into waterways and the
Ingestion of plastic items such as shards of plastic containers is one of the main factors contributing to turtle mortality.

2. Buying products with minimal packaging. Consciously selecting items with minimal packaging reduces landfill and again, reduces the chances of rubbish ending up in waterways and oceans. Marine animals are often found washed up on shore in a tangle of plastic and other non-biodegradable packaging.

3. Using ‘green’ non-plastic bags. Plastic bags are often blown out of landfills into natural areas, waterways and oceans posing serious threats to turtles and other wildlife. Turtles often eat plastic bags mistaking them for jellyfish. They are unable to digest the plastic, causing their stomachs to fill with gas. This prevents them from diving below the surface and eventually they die of starvation.

4. Picking up litter. As with the examples above, litter (particularly non-biodegradable litter) poses threats to terrestrial and marine wildlife. Animals can become entangled in discarded plastic, fishing lines, wire and other non-biodegradable rubbish. Removing litter reduces this threat and prevents the materials entering drains, waterways and oceans.

5. Recycling. This practice reduces landfill and the chances of rubbish being blown or washed into natural areas, waterways and oceans.

6. Composting. Composting household biodegradable rubbish reduces landfill and prevents wildlife scavenging from municipal rubbish disposal sites. This limits the expansion of feral animal populations such as pigs and foxes which feed on turtle eggs and hatchlings.

Second, these conservation practices were incorporated into a self-administered questionnaire designed to elicit common barriers and benefits associated with each practice and to ascertain current engagement in these practices. For each practice, respondents were asked to indicate a) how often they engaged in the behaviour on a five point scale from never to always; b) what benefits were associated with engaging in the behaviour; and c) what they felt prevented people from engaging in the behaviour. These questionnaires were distributed to one hundred people in the main pavilion of the Brisbane Royal National Association Showgrounds during the Brisbane Exhibition (agricultural show). This venue was chosen because it attracts people from a wide range of socio-economic backgrounds - sampling a variety of respondents was considered important to ensure survey questions elicited a full range of barriers and benefits associated with the targeted conservation behaviours. It is acknowledged, however, that this may have biased the sample in favour of those likely to frequent these types of events, and that sampling from a range of sites may have produced different results. One person per couple or family was asked to complete the questionnaire on behalf of the household.

Responses were analysed using content analysis. The majority of benefits associated with adopting conservation practices related to impacts on the environment. Most respondents associated using ‘green’ (non-plastic) bags, recycling, re-using plastic containers and buying minimal packaging with less land fill, less reliance on natural resources and ‘saving’ the environment. Benefits associated with re-using containers were predominantly economic (saves money) or practical (useful for storage), though reducing impacts on the environment were also mentioned. Respondents felt that the main reasons people didn’t adopt these conservation actions were apathy,
forgetfulness (particularly in relation to using green bags), lack of knowledge, and lack of time/space. For picking up litter, concerns about health risks were paramount.

These results informed the development of post-visit action resources for stage two. In accordance with CBSM theory, particular effort was made to a) highlight the benefits of engaging in each conservation practice and b) provide strategies for overcoming perceived barriers. To illustrate, many respondents felt that using green bags helped to reduce the negative environmental impacts of plastic ones but that people did not use them because they tended to forget. Consequently, messages in the post-visit action resources emphasised the environmental dangers posed by current levels of plastic bag production and usage (threats to wildlife, use of non-renewable resources such as oil) and provided strategies to support increased use of green bags (e.g., keeping green bags in the car). A full description of the development of the post-visit action resources is provided in Hughes (in press).

The post-visit action resources comprised a printed kit (fact sheets, trivia sheets, activities, colouring pages, quizzes etc.); weekly email updates of turtle activity at Mon Repos (number of nesting turtles, number of hatchlings and hatching success rates); email reminders about the project and conservation issues; and a password-protected website with further information on conservation issues, suggestions for nature-based family activities and links to environmentally-themed websites. Newspaper articles, research articles and links to relevant websites were regularly added to the front page of the project website.

**Stage Two**

**Procedure**

Families were approached in December and January 2007/8 as they queued for entry into the Mon Repos turtle rookery. Those who met the selection criteria (Australian citizens with regular access to the Internet) were invited to participate in the study. It was emphasised that this required a commitment to completing three questionnaires – one prior to entry (pre-visit questionnaire), one immediately after their visit (post-visit questionnaire) and one three months after their visit (follow-up questionnaire). Over the twenty-two nights of data collection, there were sixteen families who declined to be involved in the research (7% of the total number of people approached). The reasons given were lack of interest (10 families); unreliable internet access (4 families); and moving overseas (2 families).

Stage two used a predominantly quantitative experimental design. The key assumption of experimental designs is that assignment of respondents into groups is random. This process increases the likelihood that any differences between the groups can be attributed to the intervention rather than pre-existing differences or external causes (Trochim, 2006). Random assignment was achieved in the present study by drafting respondents to control or treatment groups on alternate nights. Other approaches such as assigning alternate families to each group or randomly assigning families to each group were not considered feasible as families often visit in groups. If one family in the group had received action resources, there was a high risk that other families in that group (who may have been assigned to the control condition) would also view the materials. Such access would contaminate the control condition by breaching the ‘no post-visit support or contact’ criterion.
Sampling continued until one hundred treatment and one hundred control families were obtained. Families in the treatment condition were given the printed kit at the site and received emails, access to a password protected website and Mon Repos updates from the researcher during the treatment phase. Those in the control group received no further contact for the three months of the treatment phase.

Three months after their visit, respondents in both groups were emailed on-line follow-up questionnaires. Reminders were sent two weeks later in an attempt to maximise response rates. The research procedure for Stage Two is illustrated in Table 1.

[Insert Table 1 here]

**Instruments**

Families in both the treatment and control conditions completed pre-visit, post-visit and follow-up questionnaires. The pre-visit questionnaire was designed to ascertain respondents’ base-line conservation knowledge, attitudes and behaviour. The post-visit questionnaire measured the immediate impact of the Mon Repos experience on families’ conservation knowledge, attitudes and behavioural intentions. The follow-up questionnaire was designed to explore the long-term impact of the Mon Repos experience and post-visit action resources on respondents’ conservation knowledge, attitudes and behaviour.

Five measures (three objective and two subjective) were used to assess changes in families’ conservation knowledge: (1) pre-post-follow up differences in number of threats listed in response to the question: “What does your family think are the main threats to turtle survival?”; (2) pre-post-follow up differences in types of threats to turtles able to be recalled (types was determined by coding responses into categories such as ‘human development in coastal regions’); (3) pre-post-follow up differences in level of agreement with the statement ‘our family understands the impact of our actions on the environment’; (4) the extent to which participants felt their conservation knowledge had increased since their visit (measured at follow-up only, rated on a 7-point scale); and (5) descriptions of how they felt their knowledge had changed.

Three measures of changes in conservation attitudes were used: (1) pre-post-follow up differences in ratings of eight conservation attitude statements on a 5-point scale (see Table 3); (2) the extent to which participants felt their conservation attitudes had changed since their visit (measured at follow-up only, rated on a 7-point scale) and (3) descriptions of how their attitudes had changed. These measures were adapted from studies by Falk, Reinhard, Vernon, Bronnenkant, Deans, and Heimlich (2007) and Ballantyne, Packer and Falk, (2009).

Three measures were used to assess changes in conservation behaviours: (1) pre-follow up differences in frequency of engagement in 13 individual conservation practices, rated on a 5-point scale (taken from the scale developed by Ballantyne et al., 2009); and (2) the number of new actions participants mentioned when asked to describe ways in which their engagement in conservation practices had changed since visiting Mon Repos (in response to the question “If you feel your family’s involvement in conservation practices has increased, please describe in what way.” This was measured at follow-up only). Unlike knowledge and attitudes, behaviour
was not measured at the post-visit point because there was insufficient time between the experience and post-visit measurement for families to increase their engagement in conservation behaviours. Thus, assessment of behaviour change was predominantly based on direct comparisons between pre-visit measures and follow-up measures. The points at which questions were asked (pre-visit, post-visit and follow-up) are summarised in Table 2; a full copy of the questionnaires can be accessed by contacting the lead author.

Repeated Measures ANOVA was used to identify differences between the treatment and control groups in terms of long-term changes in their conservation knowledge, attitudes and behaviour. The principal statistic reported is the interaction effect as this indicates whether the two groups (treatment versus control) differed in the way they changed over time.

Additional qualitative data included the treatment group’s documentation of their use and perceptions of the post-visit action resources. Finally, telephone interviews were held with twenty families (ten in the ‘treatment’ group and ten in the ‘control’ group) who reported substantial changes in their conservation practices. Interview questions were specifically designed to identify and probe factors that prompted the uptake of conservation practices.

Participants
The initial sample comprised two hundred Australian families visiting Mon Repos Conservation Park during the months of December and January, 2007/8 (one hundred in the treatment group and one hundred in the control). T-tests revealed there were no significant pre-visit differences between the treatment and control groups in terms of previous visits; ratings of family interest in finding out about conservation issues and increasing their conservation efforts (measured on a seven-point scale ranging from ‘doesn’t describe us at all’ to ‘describes us perfectly’); ratings of family commitment to conservation (measured by asking families to indicate their commitment to adopting environmentally friendly practices on a 10-point scale from ‘not at all committed’ to ‘totally committed’); family attitudes towards wildlife and conservation; and involvement in household conservation practices. Three months after their visit, all 200 families were sent an online follow-up survey. As the key research questions involved comparing responses across the three time frames (pre-visit, post-visit and follow-up), it was decided to limit the final sample to families who had completed all three questionnaires. Thus, the final sample comprised 100 of the original 200 families, an attrition rate of 50%. T-tests for independent samples and chi-square tests for independence showed no significant differences on the pre-visit responses of the 100 families who completed all three questionnaires and the 100 who did not, suggesting that the final sample of 100 families was representative of the original 200 families sampled. Fifty-five of the final 100 families were in the control group and 45 in the treatment group.

The majority of the final sample (79 families – 44 in the control group and 35 in the treatment group) were first-time visitors to Mon Repos. In terms of composition, family groups predominantly comprised two adults (77% of the sample) and either two or three children (43% and 30% of the sample respectively). Seventy-five of the
100 families sampled had children who were all under 12 years old. In most cases questionnaires were completed by the mother on behalf of the family, producing a sample that was heavily biased towards female respondents (74% of the sample). Given that the research focused on families with children aged between 5 and 18, it was not surprising that respondents were predominantly aged between 30 and 49.

**RESULTS AND DISCUSSION**

The impact of wildlife tourism experiences and post-visit action resources on visitors’ conservation learning was measured by comparing the control and treatment groups in terms of changes in their conservation knowledge, attitudes and behaviour. As this research was primarily designed to explore the impact of post-visit support, discussion will focus on long-term changes. It should be noted, however, that immediately after the visit there were no significant differences between the treatment and control group families on measures of short-term learning (changes in conservation knowledge, attitudes and behavioural intentions).

To explore the impact of the post-visit action resources on families’ long-term knowledge, attitudes and behaviour, analyses will predominantly focus on comparing responses given in the post-visit phase with those given three months later (follow-up). Where appropriate, however, responses obtained across all three phases will also be discussed.

*Long-term changes in conservation knowledge*

Conservation knowledge was assessed by asking respondents to list threats to turtle survival and to reflect on perceived changes in their conservation knowledge. When asked to list threats, responses ranged from human activities (litter, pollution, development) to predators and climate change. In the control group, the mean number of threats listed increased after the visit but then decreased in the follow-up phase to below pre-visit levels (2.9 to 3.2 to 2.6). In the treatment group, the mean number of threats also increased in the post-visit phase but remained stable in the follow-up phase (2.7 to 2.9 to 2.9). The interaction effect on this variable was not statistically significant. Likewise, chi-square tests for independence showed there were no significant differences between the two groups at the follow-up stage in relation to the types of threats listed, suggesting that the post-visit action resources did not augment respondents’ knowledge of threats to turtles.

When asked to indicate their level of agreement with the statement ‘our family understands the impact of our actions on the environment’, the control group’s scores rose after the visit then declined slightly (5.7 to 6.0 to 5.9). In the treatment group, levels rose in the post-visit phase then increased again in the follow-up phase (5.8 to 6.0 to 6.3). A mixed design repeated measures ANOVA revealed that although respondents had increased their scores overall, $F(1,95) = 4.754, p = .032$, there was no significant difference between the treatment and the control groups in this regard.

The fact that there were no significant differences between the treatment and control groups on their changes over time in these measures of conservation knowledge is not particularly surprising as the post-visit action resources reiterated messages about threats facing turtles but did not present new or additional information. It is argued that the similarity of the control and treatment groups’ responses could be because the Mon Repos experience provided so much information on threats to turtles, the post-
visit action resources were unable to add to this effect. This proposal is further supported by the finding that families in both groups predominantly attributed changes in their knowledge to aspects of the on-site experience. Specifically, respondents in both groups felt their knowledge had changed due to reflecting upon the content of interpretive displays (mentioned by 31% of the treatment group and 27% of the control group), thinking about the turtles they had observed (mentioned by 31% of the treatment group and 18% of the control group), and absorbing information given by rangers at the site (mentioned by 11% of the control group).

Long-term changes in conservation knowledge were also measured by asking families to reflect upon whether and by how much their conservation knowledge had increased since their visit (measured on a seven-point numbered scale from ‘not at all’ to ‘a great deal’). The mean score for the control group on this item was 3.41 (SD=1.72) while the mean of the treatment group was 4.07 (SD=1.87). This difference was statistically significant, $t(97) = 1.822$, $p = .036$ (1-tailed), indicating that at the follow-up stage the treatment group’s perceived change in conservation knowledge was significantly higher than that of the control group.

In the treatment group, changes mainly related to increased knowledge of strategies that could alleviate or assist with local environmental problems (mentioned by 56%); and a greater understanding of how human actions impact on the natural environment and wildlife (also mentioned by 56%). This enhanced knowledge referred to both marine and terrestrial wildlife. Responses of the control group also revolved around an increased understanding of the fragile balance of nature and the negative impact of human activities on that balance. Thirty-one percent expressed a concern for the planet’s future and a heightened awareness of the importance of acting responsibly. As in the treatment group, families in the control group also felt they were more aware of individual actions that could be taken to alleviate environmental problems, however, the proportion mentioning this was significantly less in the control group (31% as opposed to 56% in the treatment group) ($\chi^2 [1, n = 100] = 6.17, p = .007$, 1-tailed). These responses suggest that while the Mon Repos experience enhanced families’ knowledge of turtle threats and the inter-relatedness of environmental issues, the post-visit action resources significantly increased their perceived knowledge of strategies that could be used to combat negative environmental impacts. This is an important achievement as visitors need to know about the ‘where, when and how’ of desired responses before they can change their behaviour (Knudson, Cable and Beck, 2003; Moscardo, 1994).

The discrepancy between the non-significant results obtained on three of the measures of knowledge (number of turtle threats listed; types of threats listed; increased understanding of environmental impacts) and the significant results obtained on the item measuring perceived increases in conservation knowledge suggests that perceived changes in knowledge and understanding may relate to concepts other than ‘threats to turtles’. As a range of information was presented during the wildlife encounter (e.g., turtle biology and reproduction, strategies for preventing marine pollution, conservation activities at the site), perceived knowledge change could relate to any or all of these. It may be, as Rennie and Johnston (2007) argue, that perceived knowledge gain is a better indicator of change than comparative pre-visit/post-visit scores obtained through objective recall items. If so, the finding that the treatment
families’ perceived knowledge gain is significantly higher than that of the control families is encouraging.

**Long-term changes in conservation attitudes**

For seven of the eight statements listed in Table 3, mean scores for the control group followed the common pattern of decreasing in the follow-up phase. For the treatment group, however, levels of agreement increased for all statements except ‘There is a lot our family can do to help nature’.

Insert Table 3 about here

A mixed design Repeated Measures ANOVA found a significant interaction effect for five of the eight attitude statements. On all of these measures, the mean score for the treatment group was higher in the follow-up phase than for the control group. This suggests that the post-visit action resources reinforced and augmented respondents’ attitudes in relation to protecting animals, conserving wildlife, protecting animal habitats, feeling part of the solution to nature’s problems, and viewing nature as a place to renew the spirit.

Environmental attitudes were also examined by asking respondents to reflect upon whether their attitudes had changed since returning home from Mon Repos. Eighty-five families (85%) indicated that their conservation attitudes had changed to some degree in the period following their visit. The mean score for the control group was 3.75 (SD=1.619) while the mean of the treatment group was 4.33 (SD=1.809). This difference was significant, t (95) = 1.676, p = .049 (1 tailed), indicating that three months after their visit, the treatment group’s perceived attitude change was significantly higher than that of the control group. Again, this underscores the potential of post-visit action resources to maintain and enhance visitors’ enthusiasm and support for environmental conservation, and concurs with studies in formal environmental education settings that show provision of activities after field trips helps to reinforce messages and learning (Ballantyne and Packer, 2009; de White and Jacobson, 1994; Hungerford and Volk, 1990).

Attitude changes were further examined by asking respondents to describe the ways in which their attitudes had changed. In the treatment group, the most common changes related to an increased concern for the survival of local wildlife (cited by 27% of the treatment group). These included responses such as “We are more aware of wildlife issues in our local area, particularly destruction of koala habitats” and “We are definitely more concerned about local wildlife and have been making changes around our house to make it more wildlife friendly for the birds and reptiles which live around our home”. Eighteen percent of the treatment group reported that they had reflected upon their role in both contributing to and remedying global environmental issues and consequently, wanted to be part of the solution to environmental problems. Eighteen percent stated that they were more concerned about wildlife in general. In the control group, the most common response also related to an increased concern for the survival of local wildlife (mentioned by 24% of the group). A further 13% indicated they were more concerned about wildlife in general but only one respondent (2%) mentioned that they had reflected upon global environmental issues and ways in which they could make a positive contribution to environmental problems. These
differences were significant only in relation to reflecting on their role in contributing to and remedying global environmental issues, $\chi^2 (1, n=100) = 7.70$, $p=.006$.

These findings suggest that the provision of post-visit support maintained visitors’ interest and prompted them to consider how they could make a contribution to the health of wildlife and habitats in their local area. They also validate arguments that iconic or popular species can be used to engender support for protecting other, less popular or well-known species (Orams, 1994a; Shackley, 1996). This, together with the findings that post-visit support enhanced families’ knowledge of strategies and solutions, suggests that post-visit support is a powerful method of encouraging visitors to think about environmental issues and ‘priming’ them to take action. These findings highlight the potential of post-visit action resources to encourage and guide visitors in the reflective process. This is important, as previous studies have found an association between reflection and positive changes in conservation knowledge, attitudes and behaviour (Ballantyne et al., 2009).

**Long-term change in conservation behaviour**

Eighty families (80%) felt that their involvement in the thirteen conservation behaviours measured in this study had increased to some degree in the three months following their visit to Mon Repos. The mean score on this item for the control group was 3.17 (SD=1.602) while the mean of the treatment group was 3.48 (SD=1.532). An independent samples t-test found the difference between the treatment and control groups was not significant.

Changes in individual conservation behaviours between pre-visit and follow-up measures were examined using a mixed design Repeated Measures ANOVA, the results of which are presented in Table 4.

[Insert Table 4 about here]

There was a significant difference between the control and treatment group in relation to one of the practices, picking up litter ($p = .003$), with the treatment group’s involvement increasing during the follow-up phase and the control group’s decreasing. The decrease in the control group is particularly interesting given that much of the interpretation at Mon Repos focused on the negative impacts of litter and the importance of removing it. These results suggest that the post-visit action resources prompted families in the treatment group to increase their engagement in this conservation action.

The finding that both groups reported a significantly increased level of engagement between pre-visit and follow-up measures on eight of the thirteen behaviours was contrary to expectations. There are two possible reasons why significant differences were found in relation to picking up litter but not the other conservation behaviours measured. First, a substantial proportion of the post-visit reminder emails and online updates related directly to litter. This continual reinforcement is likely to have prompted families in the treatment group to pick up litter. While it could be argued that this behaviour was adopted because it has direct relevance to turtle survival, this explanation would not account for the levels of adoption being significantly higher in the treatment group than in the control group.
Second, there could have been factors other than the post-visit action resources that prompted the uptake of the other eight conservation behaviours. Studies suggest that messages learnt in zoo and aquarium environments can persist over time, especially when reinforced by events such as watching television shows and reading media releases (Ballantyne et al., 2007). As this research was conducted during a severe drought, considerable media attention was given to the importance of conserving natural resources. A range of public education campaigns focused on the importance of composting, mulching, reusing and recycling to reduce society’s impact on the natural environment. This means that in effect, the condition of the control group, namely ‘no contact and no further information’, was breached by media campaigns targeting the same behaviours as those featured in the post-visit action resources. It is possible that the publicity surrounding these behaviours prompted families in the control group to engage in conservation practices that they would not have otherwise considered. In support of this viewpoint, the one behaviour on which the post-visit resources did have a significant effect, ‘picking up litter’, was not targeted in this community education campaign.

To explore the adoption of conservation practices further, families were asked to describe ways in which their engagement in conservation practices had changed since visiting Mon Repos. These could be in relation to the thirteen practices discussed above as well as additional practices. Thirty-nine families in the treatment group (87%) and thirty-nine families in the control group (71%) listed at least one conservation action in which their family’s engagement had increased since their visit. There was, however, a significant difference between the groups, \( t (72) = 4.397, p = .000 \), in the number of actions mentioned, with the mean number of conservation actions mentioned by the treatment group (2.34) being significantly higher than the mean number mentioned by the control group (1.27).

Not surprisingly, the most common responses in the treatment families related to the six waste reduction practices featured in the post-visit action resources. Families in the treatment group also indicated that they had introduced changes to help wildlife in their local region. In several instances, habitats and animals were very different from those observed at Mon Repos, suggesting that reinforcing wildlife tourism experiences with post-visit support can engender concern and actions to save other, non-related species. Examples include “We have learnt about looking after the frogs in our back yard and have watched their numbers grow significantly this season” and “We keep our cats indoors much more, as well as putting bells on them so they can’t catch possums, lizards, birds or snakes”. In the control group the most common actions were recycling, using fewer plastic bags and picking up litter. Unlike the treatment group, comments from the control group provided little evidence that concern for turtles had ‘transferred’ to other wildlife species or that respondents had instigated actions to protect wildlife and habitats in their local area.

The finding that treatment families had reported adopting strategies to protect wildlife and habitats in their local environment suggests that post-visit reinforcement may be able to prompt action across a full spectrum of conservation practices. It is argued that the main reason this approach was successful was that it reiterated Mon Repos’ conservation messages but also provided families with strategies for action on a local level (e.g., regular reminders not to discard plastics near beaches, drains or waterways and strategies for replacing plastic bags with ‘green’ alternatives). These specific
examples would help families form a connection between the desired behaviour (removing litter; reducing use of plastic bags) and its outcome (reducing threats to wildlife), and thereby prompt the uptake of the desired response. Indeed, seven families in the treatment group (19%) specifically attributed their increased actions to the strategies and solutions outlined in the post-visit action resources, and described how the resource materials empowered them to introduce new practices in their local environment.

Although the on-site interpretive displays and presentations do give visitors information about threats to marine animals and their habitats, there tends to be little practical advice about actions that can be taken to help. Immediately after their visit, a substantial proportion of control group families indicated that they were more concerned about local wildlife and were considering actions they could take. However, results indicate that they failed to convert these positive attitudes into conservation behaviours. It seems that while the Mon Repos experience enhanced families’ perceived knowledge of turtle threats and environmental issues, it was the post-visit action resources that increased their knowledge of strategies that could be used to combat local environmental problems. This supports earlier discussions that highlight the role of post-visit action resources in prompting and sustaining changes in visitors’ post-visit knowledge. It also highlights the importance of designing resources that target particular conservation actions and providing visitors with strategies that can be implemented in a variety of settings and situations. As Hungerford and Volk (1990) and Heimlich and Ardoin (2008) propose, individuals need an understanding of the relevant environmental issues as well as the actions required before they are likely to engage in conservation behaviours.

LIMITATIONS
As this study was only conducted at one site, responses obtained may be unique to that particular wildlife experience. Furthermore, this research only sampled Australian families with children aged between five and eighteen, a sampling procedure that automatically excluded older adults, couples with younger or no children, people visiting on their own, and international visitors. It is possible that the long-term impact of the wildlife viewing experience on conservation behaviour may be different at other sites and for different visitors. This study would need to be replicated in a range of wildlife tourism sites to ascertain whether visitors’ intentions and uptake of behaviour vary depending upon the animals observed, the type and nature of the wildlife-visitor interaction, the style and content of the on-site interpretation, and the demographic characteristics of the respondents sampled.

Secondly, ‘long-term’ conservation learning was defined as changes in conservation knowledge, attitudes and behaviour that occurred within three months of the visit. While research exploring the optimum time at which to measure long-term learning has yet to be conducted, it is possible that having a longer period between post-visit and follow-up measures may have produced different results. The design of the present study precludes exploration of this point; however, this would be a fruitful area for further research.

Thirdly, throughout this study measures of conservation behaviour were based on self-reports. There has been considerable debate about how closely self-reported measures reflect actual behaviour, particularly if research explores socially desirable
behaviour such as conservation practices. Nevertheless, it is argued that self reports were the only viable option for the present study because respondents were from all areas of Australia - it would have been impractical, expensive and virtually impossible to observe and record respondents’ actual behaviour in their home environments.

Fourthly, the format and content of the post-visit support materials may have affected results. This is addressed in more detail in Hughes (in press), but further research using a range of materials would be necessary to ascertain their effectiveness.

Finally, as with many longitudinal studies in ‘real world’ settings, it is difficult to pinpoint the exact cause of changes in respondents’ knowledge, attitudes and behaviour. Although respondents may have attributed their increased conservation commitment and involvement to their Mon Repos visit and/or the post-visit action resources, intervening factors may also have reiterated and reinforced environmental messages.

CONCLUSIONS AND IMPLICATIONS
This research was designed to explore whether the provision of post-visit resources encourages, facilitates and supports families’ conservation learning. It should be noted that despite their initial commitment to accepting and evaluating the post-visit action resources, only forty-five percent of the treatment group responded to the follow-up survey. It is not possible to determine the extent to which non-respondents had accessed the resources. This suggests that post-visit action resources may only appeal to a proportion of visitors.

Responses obtained in the present study suggest that in tandem, interpretive wildlife experiences and post-visit action resources are a powerful mechanism for prompting changes in families’ conservation knowledge, attitudes and behaviour. It seems that the wildlife tourism experience draws attention to the plight of wildlife and related environmental issues, providing visitors with an ‘anchor point’ or reason to care about conservation, while the post-visit action resources prompt respondents to reflect upon their role in environmental issues; provide respondents with strategies for action; and empower them to adopt actions to assist local wildlife and habitats.

One of the key areas of interest was the identification of strategies and materials that are likely to be effective in prompting conservation learning. From a practical viewpoint, results suggest that all aspects of the experience (on-site interpretation, wildlife viewing and post-visit action resources) should focus on enhancing visitors’ understanding and appreciation of the impacts of their behaviour on animals and their habitat; offering opportunities and activities that promote reflection on such impacts on animals; and providing strategies for action. In particular, the wildlife tourism experience should aim to raise awareness and concern about wildlife and habitats through close encounters with wildlife and the provision of interpretive displays, presentations and statistics relating to the survival prospects of the animal/s being observed. Post-visit action resources should reiterate the site’s conservation messages, remind visitors about the importance of each person taking action, and provide specific strategies and suggestions that can be incorporated into everyday routines. It is particularly important that strategies for action relate to conservation
practices visitors can undertake in their local environment as this places the onus for protecting wildlife and habitats firmly on the visitor.

It should be noted that designing the post-visit action resources did require an initial outlay of time and effort and that not all sites will be able to allocate sufficient resources to this process. However, once developed, materials would only require updating and refreshing every so often. Furthermore, sites such as Mon Repos Conservation Park collect statistics on turtle nesting and hatching as part of their daily routine, therefore posting these to an email list on a weekly basis would require very little effort. It is argued that the benefits of such an approach far outweigh the initial cost and that if a ‘proforma’ for such resources were developed, the time and effort required could be substantially reduced.

More studies focusing on a range of wildlife tourism experiences are required to further test the effectiveness of post-visit action resource, however, it is evident that wildlife tourism and post-visit action resources ‘connect’ with visitors on a number of intellectual and emotional levels; that they raise awareness and concern for environmental issues; and that they have the potential to promote wide-spread adoption of conservation practices.

REFERENCES


Rennie, L.J. and Johnston, D.J. (2007). Visitors’ perceptions of changes in their thinking about science and technology following a visit to Science Center. *Visitor Studies, 10*(2), 168-177.


Table 1
Stage Two research process

Table 2
Point at which measures were taken

Table 3
Differences between conservation attitude scores of the treatment and control groups

Table 4
Differences between pre-visit and follow-up engagement in conservation actions

Figure 1

Visitors arranged in a viewing circle around a nesting turtle
<table>
<thead>
<tr>
<th></th>
<th>Entering site</th>
<th>Leaving site</th>
<th>Treatment Stage (3 mths)</th>
<th>Follow-up</th>
</tr>
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<tbody>
<tr>
<td><strong>Treatment group</strong></td>
<td>Pre-visit questionnaire</td>
<td>Post-visit questionnaire</td>
<td>Access to materials Online support and contact (emails, forums)</td>
<td>Follow-up questionnaire Extra questions about support materials</td>
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<tr>
<td>(100 families)</td>
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<td>Receive support materials</td>
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<td></td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td>Pre-visit questionnaire</td>
<td>Post-visit questionnaire</td>
<td>No contact</td>
<td>Follow-up questionnaire</td>
</tr>
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<td>(100 families)</td>
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<td>No materials</td>
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<tr>
<td>Table 2</td>
<td>*Point at which measures were taken*</td>
<td></td>
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<td>-----------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>F/up</td>
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<tr>
<td><strong>Knowledge</strong></td>
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<td>• Types of threats mentioned</td>
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<td>✔</td>
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<tr>
<td>• Understanding of human impacts on the environment</td>
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<td>✔</td>
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<tr>
<td>• Perceived knowledge change</td>
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<tr>
<td>• Categorisation of qualitative responses</td>
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<td><strong>Attitudes</strong></td>
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<td>• Individual conservation attitude statements</td>
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<tr>
<td>• Commitment to adopting conservation practices</td>
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<tr>
<td>• Perceived attitude change</td>
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<td></td>
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<td>• Categorisation of qualitative responses</td>
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<td><strong>Behaviour</strong></td>
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<td>• Involvement in nature-orientated leisure activities</td>
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<td>• Categorisation of qualitative responses</td>
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### Table 3

<table>
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<tr>
<th>Item</th>
<th>Mean scores</th>
<th>ANOVA output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post</td>
<td>F/up</td>
</tr>
<tr>
<td>We need to help protect animals</td>
<td>C</td>
<td>6.53</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>6.48</td>
</tr>
<tr>
<td>There is a lot our family can do to help</td>
<td>C</td>
<td>5.93</td>
</tr>
<tr>
<td>nature</td>
<td>T</td>
<td>6.02</td>
</tr>
<tr>
<td>We have the responsibility to leave</td>
<td>C</td>
<td>6.47</td>
</tr>
<tr>
<td>healthy ecosystems for our families and</td>
<td>T</td>
<td>6.39</td>
</tr>
<tr>
<td>future generations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our family wants to do everything we can to protect and conserve</td>
<td>C</td>
<td>5.93</td>
</tr>
<tr>
<td>wildlife</td>
<td>T</td>
<td>5.95</td>
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<tr>
<td>Our family feels we need to help protect</td>
<td>C</td>
<td>6.11</td>
</tr>
<tr>
<td>animal habitats</td>
<td>T</td>
<td>6.09</td>
</tr>
<tr>
<td>Our family does it best to avoid doing</td>
<td>C</td>
<td>6.24</td>
</tr>
<tr>
<td>things that might hurt or destroy an animal’s habitat</td>
<td>T</td>
<td>6.25</td>
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<td>Our family feels we are part of the</td>
<td>C</td>
<td>5.73</td>
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<td>solution to nature’s problems</td>
<td>T</td>
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<td>Our family sees nature as a place to</td>
<td>C</td>
<td>5.65</td>
</tr>
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<td>renew the human spirit</td>
<td>T</td>
<td>5.14</td>
</tr>
<tr>
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</tbody>
</table>

<sup>a</sup> The main effect of “Time” refers to the extent to which respondents’ scores changed from post-visit to follow-up, for both groups combined.

<sup>b</sup> The main effect of “Group” refers to the overall difference between the treatment group and the control group, for both post-visit and follow-up surveys combined.

<sup>c</sup> The interaction effect refers to the difference between the treatment group and control group in the extent to which they changed over time, and is the test of most interest to the aims of the research. (Because the direction of the effect was important, i.e., it is only of interest if the treatment group increases more than the control group, one-tailed probabilities are reported in relation to the interaction effect.)
<table>
<thead>
<tr>
<th>Item</th>
<th>Mean scores</th>
<th>ANOVA output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>F/up</td>
</tr>
<tr>
<td>Recycle</td>
<td>C 4.44</td>
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</tr>
<tr>
<td></td>
<td>T 4.65</td>
<td>4.75</td>
</tr>
<tr>
<td>Pick up other people’s litter</td>
<td>C 3.65</td>
<td>3.47</td>
</tr>
<tr>
<td></td>
<td>T 3.44</td>
<td>3.69</td>
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<tr>
<td>Use ‘green’ (non-plastic) shopping bags</td>
<td>C 3.42</td>
<td>3.87</td>
</tr>
<tr>
<td></td>
<td>T 3.51</td>
<td>3.93</td>
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<tr>
<td>Talk to others about environmental issues</td>
<td>C 3.02</td>
<td>3.29</td>
</tr>
<tr>
<td></td>
<td>T 2.95</td>
<td>3.02</td>
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<tr>
<td>Actively purchase products that have minimal packaging</td>
<td>C 2.96</td>
<td>3.42</td>
</tr>
<tr>
<td></td>
<td>T 2.98</td>
<td>3.44</td>
</tr>
<tr>
<td>Look for information about the environment on TV, in print or on the Internet</td>
<td>C 3.15</td>
<td>3.40</td>
</tr>
<tr>
<td></td>
<td>T 3.05</td>
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<td>Conserve energy in the home</td>
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<tr>
<td></td>
<td>T 3.91</td>
<td>4.16</td>
</tr>
<tr>
<td>Take public transport</td>
<td>C 2.32</td>
<td>2.62</td>
</tr>
<tr>
<td></td>
<td>T 2.26</td>
<td>2.40</td>
</tr>
<tr>
<td>Participate in public land/water clean up activities</td>
<td>C 2.05</td>
<td>2.38</td>
</tr>
<tr>
<td></td>
<td>T 1.84</td>
<td>2.24</td>
</tr>
<tr>
<td>Donate money to a nature or conservation organisation</td>
<td>C 2.56</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td>T 2.40</td>
<td>2.71</td>
</tr>
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<td>Do volunteer work for a group that helps the environment</td>
<td>C 2.09</td>
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<tr>
<td></td>
<td>T 1.77</td>
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<td>Reuse containers</td>
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</tr>
<tr>
<td></td>
<td>T 3.67</td>
<td>3.91</td>
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<tr>
<td>Compost</td>
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<tr>
<td></td>
<td>T 3.16</td>
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</table>

*The main effect of “Time” refers to the extent to which respondents’ scores changed from pre-visit to follow-up, for both groups combined.

b The main effect of “Group” refers to the overall difference between the treatment group and the control group, for both pre-visit and follow-up surveys combined.

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