ASKING VISITORS TO HELP
Research to Guide Strategic Communication for Protected Area Management

Sam H. Ham, Betty Weiler, Michael Hughes, Terry Brown, Jim Curtis and Mark Poll
Technical Reports

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General Manager, Communications and Industry Extension or Publishing Manager, info@crctourism.com.au

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# CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFACE</td>
<td>VI</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>VI</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>VII</td>
</tr>
<tr>
<td>CHAPTER 1 THE THEORY AND PROCEDURES</td>
<td>1</td>
</tr>
<tr>
<td>Theory of Planned Behaviour</td>
<td>1</td>
</tr>
<tr>
<td>Elaboration Likelihood Model of Persuasion</td>
<td>3</td>
</tr>
<tr>
<td>Overview of Methods</td>
<td>4</td>
</tr>
<tr>
<td>Step 1: Problem identification workshops</td>
<td>4</td>
</tr>
<tr>
<td>Step 2: Field research</td>
<td>4</td>
</tr>
<tr>
<td>Step 3: Professional development workshops</td>
<td>7</td>
</tr>
<tr>
<td>CHAPTER 2 REVIEW OF LITERATURE ON THE BEHAVIOURS OF INTEREST</td>
<td>8</td>
</tr>
<tr>
<td>Littering and Litter Pick-up by Protected Area Visitors</td>
<td>8</td>
</tr>
<tr>
<td>Reducing the incidence of littering</td>
<td>9</td>
</tr>
<tr>
<td>Encouraging visitors to pick up litter</td>
<td>9</td>
</tr>
<tr>
<td>Wildlife Feeding in Protected Areas</td>
<td>11</td>
</tr>
<tr>
<td>Impacts of wildlife feeding on animals and people</td>
<td>11</td>
</tr>
<tr>
<td>Interventions to deter wildlife feeding</td>
<td>16</td>
</tr>
<tr>
<td>Dogs Off Lead in Protected Areas</td>
<td>18</td>
</tr>
<tr>
<td>CHAPTER 3 RUSSELL FALLS: RESULTS, DISCUSSION AND IMPLICATIONS</td>
<td>20</td>
</tr>
<tr>
<td>Phase 1: Belief Elicitation</td>
<td>20</td>
</tr>
<tr>
<td>Phase 2: Belief Measurement</td>
<td>23</td>
</tr>
<tr>
<td>Intervention design</td>
<td>24</td>
</tr>
<tr>
<td>Phase 3: Evaluation of the Interventions</td>
<td>25</td>
</tr>
<tr>
<td>Results</td>
<td>26</td>
</tr>
<tr>
<td>Summary and Implications of Findings at Russell Falls</td>
<td>28</td>
</tr>
<tr>
<td>CHAPTER 4 BADGER WEIR: RESULTS, DISCUSSION AND IMPLICATIONS</td>
<td>29</td>
</tr>
<tr>
<td>Phase 1: Belief Elicitation</td>
<td>29</td>
</tr>
<tr>
<td>Phase 2: Belief Measurement</td>
<td>31</td>
</tr>
<tr>
<td>Intervention design</td>
<td>32</td>
</tr>
<tr>
<td>Phase 3: Evaluation of the Interventions</td>
<td>32</td>
</tr>
<tr>
<td>Results</td>
<td>34</td>
</tr>
<tr>
<td>Summary and Implications of Findings at Badger Weir</td>
<td>38</td>
</tr>
<tr>
<td>CHAPTER 5 YELLAGONGA: RESULTS, DISCUSSION AND IMPLICATIONS</td>
<td>39</td>
</tr>
<tr>
<td>Phase 1: Belief Elicitation</td>
<td>39</td>
</tr>
<tr>
<td>Phase 2: Belief Measurement</td>
<td>41</td>
</tr>
<tr>
<td>Intervention design</td>
<td>42</td>
</tr>
<tr>
<td>Phase 3: Evaluation of the Intervention</td>
<td>43</td>
</tr>
<tr>
<td>Results</td>
<td>46</td>
</tr>
<tr>
<td>Summary and Implications of Findings at Yellagonga</td>
<td>48</td>
</tr>
<tr>
<td>CHAPTER 6 CONCLUSIONS</td>
<td>50</td>
</tr>
<tr>
<td>Epilogue</td>
<td>51</td>
</tr>
</tbody>
</table>
Table 24: Comparison of first-time visitors’ mean cross-product and attitude scores for control and treatment groups (n = 71) .......................................................... 37
Table 25: Positive behavioural beliefs of visitors at Yellagonga Regional Park .................................................. 39
Table 26: Negative behavioural beliefs of visitors at Yellagonga Regional Park ................................................ 40
Table 27: Positive normative beliefs of visitors at Yellagonga Regional Park ................................................. 40
Table 28: Negative normative beliefs of visitors at Yellagonga Regional Park ................................................ 40
Table 29: Positive control beliefs of visitors at Yellagonga Regional Park .................................................... 40
Table 30: Negative control beliefs of visitors at Yellagonga Regional Park ................................................... 40
Table 31: Strengths, evaluations and cross-products of the salient behavioural beliefs at Yellagonga Regional Park for compliers (C) and non-compliers (NC) ........................................ 42
Table 32: Strengths, evaluations and cross-products of the salient normative beliefs at Yellagonga Regional Park for compliers (C) and non-compliers (NC) ........................................ 42
Table 33: Observed behaviour under control and treatment conditions at Yellagonga Regional Park .............. 46
Table 34: Comparison of mean cross-product and attitude scores for control and treatment groups ............ 47
Table 35: Comparison of prior intentions of compliers and non-compliers .................................................... 48
PREFACE

The purpose of this project was to help protected area managers make better decisions and to achieve greater success in their use of communication to influence visitor behaviour. Visitation to protected areas has increased steadily in recent decades, and among these visitors is a special subset of individuals who engage in behaviours that are at odds with management objectives. Yet many of their most problematic behaviours are the product of naïveté or misconception rather than malicious intent. Protected area managers have long considered interpretation an effective and appropriate strategy for dealing with these kinds of behaviours, but success in using it to influence visitor behaviour has been mixed.

One of the challenges commonly faced by managers is that they have not been given tools or guidelines for analysing visitor behaviour or about making decisions with respect to communication approaches that would be best suited to influence it. However, recent advances in communication theory and research tell us that if we understand what visitors think about a particular behaviour we will have a better chance of influencing them to adjust their actions to fall in line with management goals. A primary goal of this project was to help protected area managers see visitor behaviour through the eyes of substantiated theory and to make better strategic decisions as they develop and deliver messages aimed at encouraging or influencing park visitors to behave in particular ways.

Toward this end, three studies were undertaken in Victoria, Tasmania and Western Australia, each focusing on a different problem behaviour determined by the respective management agency to be high in priority. These studies served as a testing ground for the application of a theory-based approach to addressing visitor behaviour through persuasive communication and provided a forum in which the theory and methodology for using strategic communication could be shared with the collaborating agencies. This report presents the theoretical foundation, research procedures, and project outcomes for each study. It also describes the significant involvement of our industry partners throughout the project and the key capacity building aspects of our work.

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The Sustainable Tourism Cooperative Research Centre, established and supported under the Australian Government’s Cooperative Research Centres program, has funded this research. Without the STCRC’s commitment to industry-relevant research, this project would not have been possible. In addition, we gratefully acknowledge the cooperation and collaboration of our CRC industry partners: Parks Victoria, Parks and Wildlife Service Tasmania, and the Western Australia Department of Environment and Conservation. Sincere gratitude goes to our industry reference group for their keen interest and valuable advice during the course of the project: Ms Franca De Luca (Parks Victoria), Mr Peter Grant (Parks and Wildlife Service Tasmania), Mr Gil Field (Western Australia Department of Conservation), Ms Claire Savage (South Australia Department of Environment and Heritage), Ms Prue Daley (Parks Victoria), and Mr Rod Hillman (Ecotourism Australia). We also acknowledge the hard work and dedication of our data collectors, Jennifer Laing, Kirsty Tumes, Priscilla Holmes, Chantal Binding, Chris Schooling, Mzingisi Mqum, Rebecca Cahill, and Anthony Winter. Their attention to important details in the field research was critical to the success of the project. Finally, our thanks go to the many hundreds of anonymous visitors who agreed to participate in the research. Without the generosity of their time and goodwill, the three studies would not have been possible.
SUMMARY

Central to the mission of most protected areas is managing visitor use in such a way that visitor experiences are enhanced while fragile environments are protected. Protected area management agencies annually devote significant financial and human resources to repairing biological and physical damage resulting from uninformed visitor behaviour. Resources do not exist in most agency budgets to provide adequate personnel to monitor and manage visitor behaviour directly, particularly in large or remote areas. To the extent managers are able to harness communication to persuade visitors to voluntarily behave properly in protected areas, significant benefits will accrue both to budgets and to resource protection. Over the long term, millions of dollars that would otherwise be devoted to mitigating visitor-induced impacts could be saved or redirected to other operational priorities such as improving access and visitor services.

Objectives of Study

The overarching purpose of the project was to enhance recognition among protected area management agencies of the role of strategic communication in managing visitors in protected areas. This involved working closely with managers of terrestrial protected areas in Victoria, Tasmania and Western Australia toward developing and delivering purposeful, targeted communication interventions informed by substantiated theory and designed to reduce visitor impacts identified by those agencies as being high priority.

This project aimed to foster recognition among protected area managers and tour operators that communication backed by good research can be used strategically and effectively to address onsite visitor management problems. A key objective was to work closely with managers in Victoria, Tasmania and Western Australia to define researchable problem behaviours relevant to their states. Once these behaviours were identified, the project sought to demonstrate applications of a theory-based methodology for developing communication interventions capable of reducing those problems. A final objective was to produce both tools and capacity for protected area managers, tour operators, and university researchers to jointly undertake behaviour modification research that is directly aligned with protected area managers’ goals, particularly those relating to minimising visitors’ negative impacts on the environment and protecting visitors from hazards.

Methodology

During the course of the two-year project (2006-2007), studies in three protected areas were carried out. Each of these studies focused on a different visitor behaviour that was determined by the collaborating management agency to be of high priority. The following behaviours were selected by the respective agencies for study:

- Parks and Wildlife Service Tasmania: The goal was to persuade walkers to pick up rubbish encountered on the Russell Falls track, Mt Field National Park.
- Parks Victoria: The goal was to persuade visitors not to feed birds at Badger Weir Picnic Area, Yarra Ranges National Park.
- WA Department of Environment and Conservation: The goal was to persuade dog walkers to keep their dogs on a lead in Yellagonga Regional Park, Perth.

The design of the studies was guided by the theory of planned behaviour (TPB), a widely applied model of human behaviour that is strongly supported by research. In communication research, the TPB focuses attention on three categories of beliefs that visitors may have about a given behaviour. When communication impacts these beliefs in a way that is favourable to carrying out the behaviour, the likelihood of compliance is increased. However, since visitors may have many beliefs about a given behaviour, it is necessary to determine which subset of them is most important in each of the three categories. Once these so-called ‘salient beliefs’ have been identified, the next step is to determine which of them are most different between visitors who currently behave as managers want (the ‘compliers’) and those who behave in problematic ways (the ‘non-compliers’). Having identified these most distinguishing beliefs, messages can be designed to target them persuasively such that the beliefs necessary for compliance are strengthened and those that lead to non-compliance are weakened.

Following this reasoning, our methodology in each park was carried out in three phases:

- Phase 1: Identification of visitors’ salient beliefs underlying the target behaviour (called a ‘beliefs elicitation’) and determination of which beliefs are most prevalent in visitors’ minds.
- Phase 2: Measurement of the most prevalent salient beliefs in order to compare their strength and importance among compliers and non-compliers and to identify those that differ most between the two groups. Messages are then developed to target these most distinguishing beliefs.
• Phase 3: Evaluation of the messages in terms of their impact on visitor behaviour and the beliefs they targeted.

**Key Findings**

The primary conclusion to be drawn from the project is that the theory and methodology were successful in influencing visitor behaviour at the three study sites. At Russell Falls, the belief-based messages increased rubbish pickup by nearly 20%; more than 90% of first-time visitors at Badger Weir did not feed the birds; and at Yellagonga Regional Park the belief-based message led to a 19% increase in walkers keeping their dogs on-lead. While circumstances at Yellagonga suggest the behavioural impact might be at least partially due to non-message factors (such as the authoritative presence of researchers), the increase in dog walkers who kept their pets on a lead is encouraging since it suggests that a combination of communication and direct management has potential to address the problem.

The TPB proved to be a useful guide to the development of effective messages. Following widely applied TPB procedures, we were successful at each site in (1) identifying the salient beliefs of visitors underlying the target behaviour, (2) isolating a subset of these beliefs that had optimal persuasion potential, and (3) targeting those beliefs in messages designed to increase compliance with the target behaviour. In at least two of the three field experiments, we found that the interventions containing these messages were effective in increasing compliance with the target behaviour and were able to link this behavioural outcome to a corresponding impact on the targeted beliefs.

Results from these studies produced a number of lessons learned about the types of behaviours that lend themselves to communication treatment, and about the messages that might be used successfully to address them. In addition, protected area managers and selected tour operators in three states received practical training and plain-language ‘how-to’ guides pertaining to the research process.

**Research Products**

The two-year project produced several tangible products:

• Three problem identification workshops (PIDWOs) conducted for Parks Victoria, Tasmania Parks and Wildlife Service, and the WA Department of Environment and Conservation. The PIDWOs assisted protected area managers in identifying their priorities with respect to problem visitor behaviours. Each agency received a written report of workshop results and a description of the classification procedure, including how the data were produced. The PIDWO results led to identification of a problem behaviour that would be the focus of research at a selected protected area in each of the three states.

• Development and evaluation of theory-based communication interventions aimed at mitigating the problem behaviour identified by the PIDWO in each state. In addition to providing managerially relevant research results to each state, the projects were intended to serve as case-studies of how theory and research can augment the use of strategic communication in protected area management.

• A comprehensive plain-language manual for protected area managers detailing procedures for conducting the beginning stages of a theory-based problem behaviour analysis. The manual (*Promoting Persuasion in Protected Areas: A Guide for Managers*) is available through the STCRC online Bookshop.

• Three professional development workshops conducted for protected area managers, tour operators and researchers in each state to enable them to use *Promoting Persuasion in Protected Areas* as a guide to carrying out this type of research.

• Three manuscripts for refereed research journals are in preparation.

**Future Action**

A major foreseen benefit of this project was to produce a sharper understanding of the value of strategic communication in protected area management and to develop and disseminate research methods and results that enhance the ways protected area staff use communication to influence onsite visitor behaviour. The products generated by the project were designed primarily to facilitate better use of strategic communication by protected area managers in the three states. However, lessons learned from our research in these states will also benefit protected area managers and other stakeholders nationwide and internationally. Evidence of this is seen in the interest expressed by international organisations wanting to acquire *Promoting Persuasion in Protected Areas* and in requests for follow-up workshops on applied communication research methods. We strongly recommend that the STCRC, its partner institutions, and universities across Australia capitalise on this growing interest in using communication in protected area management. Key ways they might do this include supporting continued research that strengthens our understanding of the persuasive communication process; offering workshops focused on communication and protected area management for in-service professionals and formal subjects for
university students; and applying research results in the field where visitor behaviours threaten protected features.

Despite the encouraging results of the three studies with respect to increasing behavioural compliance through persuasive communication, none of the messages we tested completely eliminated the problem behaviour. This should tell us that there is more to do. Human behaviour and the internal psychological processes that govern it are complicated. While decades of research guided by theories like the TPB have significantly advanced our understanding of the factors involved, we still have much to learn about using persuasive communication in the complex social milieu of a protected area. The growing popularity of nature-based tourism worldwide means that pressure on fragile landscapes will not subside anytime soon. Because communication interventions have the potential to reach a broad and diverse public with compelling messages, their future role in protected area management is likely to be even more important than it is today. To that end, we are hopeful our research makes a useful contribution.
Chapter 1

THEORY AND PROCEDURES

The purpose of this project was to help protected area managers make better decisions and to achieve greater success in their use of communication to influence visitor behaviour. Visitation to protected areas has increased steadily in recent decades, and among these visitors is a special subset of individuals who engage in behaviours that are at odds with management objectives. Yet many of their most problematic behaviours are the product of naiveté or misconception rather than malicious intent. Protected area managers have long considered interpretation an effective and appropriate strategy for dealing with these kinds of behaviours, but success in using it to influence visitor behaviour has been mixed.

One of the challenges commonly faced by managers is that they have not been given theoretical frameworks for analysing visitor behaviour or for making decisions with respect to communication approaches that would be best suited to influence it. However, recent advances in communication theory and research tell us that if we understand what visitors think about a particular behaviour we will have a better chance of influencing them to adjust their actions to fall in line with management goals. A primary goal of this project was to help protected area managers see visitor behaviour through the eyes of substantiated theory and to make better strategic decisions as they develop and deliver messages aimed at encouraging or influencing park visitors to behave in particular ways.

Toward this end, three studies were undertaken in Victoria, Tasmania and Western Australia, each focusing on a different problem behaviour determined by the respective management agency to be high in priority. These studies served as a testing ground for the application of a theory-based approach to addressing visitor behaviour through persuasive communication, and provided a forum in which the theory and methodology for using strategic communication could be shared with the collaborating agencies. The research was guided primarily by the theory of planned behaviour (TPB), which provides a well-substantiated model for influencing human behaviour via persuasive communication. It also relied on the elaboration likelihood model of persuasion (ELM) in the design of messages and in understanding the results of the evaluations. The ELM has also received strong research support. Our applications of the TPB and ELM are explained in this chapter.

Theory of Planned Behaviour

The TPB grew out of its predecessor, the theory of reasoned action (TRA) which was originally formulated by Fishbein and Ajzen (1975). Ajzen (1991) extended the TRA model and renamed it the theory of planned behaviour (Figure 1). Selection of methods used to collect and analyse data at each of the three study sites was based on the TPB.

Over many years, research on the TRA and TPB has demonstrated that people make behavioural decisions that are generally consistent with three kinds of beliefs. These are behavioural beliefs, normative beliefs and control beliefs. Although a person may have many such beliefs related to a given behaviour, a small subset of truly pertinent beliefs in each category (called ‘salient’ beliefs) normally will determine whether or not the person will perform the behaviour (Fishbein & Ajzen 1975). Studies show that knowing the salient behavioural, normative and control beliefs related to a behaviour allows researchers to predict the behaviour with greater accuracy. Comprehensive reviews of this research are available in Fishbein and Ajzen (1975), Fishbein (1980), Fishbein and Manfredo (1992), and Ajzen and Fishbein (2005).

Behavioural beliefs in the TPB (Figure 1) are a person’s sense of how likely it is that certain consequences will result from engaging in a behaviour and her or his judgment about whether each consequence is good or bad. Taken together, people’s salient behavioural beliefs give rise to their ‘attitude’ about the behaviour (whether it is a good or bad thing to do).

Normative beliefs have to do with the person’s sense of what important others think about the behaviour and how much she or he is motivated to comply with their wishes. Taken together, the person’s salient normative beliefs give rise to a sense of social pressure (called ‘subjective norm’).

Control beliefs are people’s perceptions of their own capability and opportunity to engage in the behaviour (whether it is easy or difficult). Taken together, a person’s salient control beliefs determine how much control over the behaviour she or he feels (‘perceived behavioural control’).

On the right-hand side of the TPB model are behavioural intention and behaviour. As the diagram shows, the combination of attitude toward the behaviour, subjective norm, and perceived behavioural control will lead to an intention either to carry out or not carry out the behaviour. If the intention is strongly in favour of performing the behaviour, the person is likely to do just that. However, if the intention is weak or negative (i.e. the person intends not to carry out the behaviour), the behaviour is unlikely to occur. Generally speaking, strong intentions...
ASKING VISITORS TO HELP

are more predictive of actual behaviour than weak ones, and intentions that are formed just a short time before the opportunity to behave presents itself are more predictive than intentions that are made farther in advance. Obviously, the briefer the period between intention and behaviour, the less likely it is that unanticipated factors can intervene.

Figure 1: Theory of planned behaviour

In communication research, applications of the TPB generally begin with identifying the salient beliefs in each of the three categories that pertain to a desired behaviour of interest (the ‘target behaviour’). Once this pool of salient beliefs is developed, researchers attempt to isolate those that have maximum persuasion potential. These are the beliefs that are subsequently targeted by messages in a persuasive communication effort (or ‘intervention’ as it is usually called). Therefore, a key to using the TPB to design effective communication interventions for protected areas is to accurately identify visitors’ salient beliefs and to determine whether any of them have potential in a persuasive communication message. If beliefs with persuasion potential are uncovered, communication interventions containing messages that target the selected beliefs can be developed and tested.

Specific procedures used in the current research to identify target beliefs are described in Chapters 3, 4 and 5. Generally, however, they involve determining which of the salient beliefs mostly effectively distinguish compliers (visitors whose behaviour is consistent with management objectives) from non-compliers (people who behave in problematic ways). A plain language explanation of these procedures is contained in the manual, *Promoting Persuasion in Protected Areas* (Ham, Brown, Curtis, Weiler, Hughes & Poll 2007).

The TPB model has been applied successfully to a wide range of human behaviours, including visitor behaviours in parks and protected areas (e.g. Ham & Krumpe 1996; Brown 1999; Brown 2003; Lackey & Ham 2003; Beeton, Weiler & Ham 2004; Ham & Weiler 2004, Lackey & Ham 2004; Ham & Weiler 2005; Curtis 2007; Powell & Ham in press). It has also been used in hundreds of other studies to predict human behaviour in an impressive range of contexts: health, medicine, nutrition, safe sexual practices, occupational safety, environmental restoration, transportation choice, energy use, household recycling, consumer purchasing, voting, jury decision making, and in other contexts. Recent reviews and meta-analyses are available in Shepherd, Hartwick and Warshaw (1988), Kraus (1995), Notani (1998), Sheeran and Taylor (1999), Armitage and Conner (2001), Sheeran (2002), and Ajzen and Fishbein (2005).

A number of extensions of the TPB have been proposed over the years. Of particular relevance to pro-environmental communication has been the addition of a personal norm variable to account for altruistic behaviours. Personal norm consists of beliefs that emanate from a person’s sense of what is ‘right’ and ‘morally correct’ to do, a normative influence that is not captured by the subject norm (social pressure) variable in the TPB model. Unlike subjective norm, personal norm captures a self-imposed obligation people feel to ‘do the right thing’ irrespective of what other people think (Schwartz 1977; Stern & Dietz 1994; Geller 1995). A number
of studies have found that adding personal norm to the TPB model has improved predictability when altruistic behaviours are examined (Parker, Manstead, & Stradling 1995; Vermette & Godin 1996; Harland, Staats & Wilke 1999; Thøgersen 2002; Bamberg & Schmidt 2003; Conner, Smith & McMillan 2003; García, Real, Durán & Romay 2003; Corbett 2005). For this reason, some of the messages developed for the three study sites appealed in one way or another to visitors’ personal norms.

Results of the three studies build on previous STCRC research by Beeton, Weiler & Ham (2004) and two follow-up studies by Ham & Weiler (2004, 2005) which were the first studies to apply the TPB to influencing visitor behaviour in Australian national parks. Collectively, these studies have led to a number of methodological refinements and a better understanding of TPB applications in the social milieu of nature-based tourism settings.

**Elaboration Likelihood Model of Persuasion**

The ELM, originated by Petty and Cacioppo (1986), has spawned intense research activity during the past two decades, prompting communication psychologist Em Griffin (2000: 199) to call it possibly ‘the leading theory of persuasion and attitude change’. More than a hundred studies based on the ELM have revealed two main ways (or ‘routes’) through which people can be persuaded. These are the central route and the peripheral route. The two routes differ in the amount of mental effort a person gives to processing and thinking about a message. In the central route, a lot of mental effort is invested (a process is called ‘elaboration’). Elaborating on a message causes the person to consider its merits and therefore generates thoughts that are either in favour of the message or against it. When thoughts in favour of the message dominate, persuasion in the desired direction ensues.

Persuasion through the peripheral route involves much less mental effort. Peripheral-route processing is a type of short-cutting that people use when they aren’t motivated or capable of thinking carefully about the message. In these instances, they simply rely on some small non-message aspect of the communication to decide whether they are in favour of it or against it. Typical peripheral cues involve the credibility of the source (such as when a person votes for a candidate because of a celebrity endorsement or when someone purchases a pharmaceutical product based only on a friend’s recommendation), the number of arguments offered (e.g. a long list of reasons to do something can be visually compelling even though the person doesn’t actually read and consider all the reasons), or the observed reaction of someone else who has actually engaged with the message. In each of these cases, the person arrives at a quick-and-easy attitude without having to do the work of thinking things through. Chaiken (1980) has referred to these sorts of short-cut attitude impacts as ‘heuristic’, which literally means invented. According to Griffin (2000), most of our attitudes are based on peripheral processing since we just do not have time enough in life to carefully consider everything.

According to many studies, attitude impacts resulting from central-route persuasion are stronger, more enduring, and more predictive of future behaviour than are peripheral-route attitude impacts (see Petty, McMichael & Brannon 1992 and Petty, Haglevedt & Smith 1995 for a review). This is because elaboration requires the person’s salient beliefs to be accessed as she or he considers the merits of the message and generates internal thoughts about them. In this way, beliefs may be altered or reinforced depending on the person’s evaluation of the message. And in some cases, entirely new beliefs may result. Since peripheral-route processing does not involve elaboration, belief impacts do not readily occur, even though an immediate attitude impact might result.

However, both routes involve persuasion. Although attitudes impacted via the peripheral route are not as strong or enduring as those impacted through the central-route, it is possible for them to be sufficiently strong to influence a behaviour in the immediate time frame. In other words, even though the attitude impact will be modest and short-lived, it may endure long enough to cause an immediate behavioural response (e.g. to vote for the candidate, buy the product, stay on the designated walking track, not feed the wildlife, etc). Therefore, in evaluating the interventions at each of the three study sites, we wanted to explore whether any observed behavioural impacts were likely the result of central- or peripheral-route processing.

In combination with the TPB, the ELM helps to explain the nature of a persuasive impact. If an intervention’s message leads to a behavioural impact, the effect could be central or peripheral depending on how much thought a person gave to the message. Since impacting a belief and corresponding attitude would require a significant amount of thinking (elaboration), one way to determine whether the behavioural impact occurred through the central route would be to determine whether there had also been an effect both on the belief that was targeted by the message and on the people’s attitude toward the behaviour. If an impact on all three (the behaviour, the targeted belief, and the attitude) is found, then the persuasive effect can be assumed to be central.

Conversely, when only the behaviour and attitude are impacted, the chances are better that a peripheral-route effect occurred. As explained in Chapter 5, this in fact occurred at one of our study sites. Compliance increased significantly when the intervention was in effect, but there was no impact on the targeted belief. However, a modest but detectable change in visitors’ attitude to the behaviour did result, an indication that perhaps the visitors did not elaborate on the overall message but instead reacted enough to some other cue in the intervention that their immediate behaviour was influenced. This triad of findings (a modest attitude impact combined with a
short-term behaviour change, but in the absence of an impact on the belief) is evidence that peripheral-route persuasion might have occurred.

Overview of Methods

The specific methodologies applied at each of the three research sites are respectively detailed in Chapters 3, 4 and 5. All of them, however, were guided by the TPB and followed the same general procedures. These involved working with each protected area agency to prioritise problem visitor behaviours across the state and select one of the behaviours as a research focus. Following selection of a behaviour in each state, field research was conducted in three phases respectively aimed at identifying visitor beliefs underpinning the selected behaviour, isolating salient beliefs with maximum persuasion potential so that those beliefs could be targeted with communication interventions aimed at impacting the selected behaviour, and experimentally evaluating the efficacy of the belief-based interventions in promoting desired behaviours. A final component of the project consisted of instructing managers and tour operators in how to undertake the beginning phases of such an analysis. These various activities were carried out in three main steps as follows:

Step 1: Problem identification workshops

A problem identification workshop (PIDWO) was carried out in each state in order to reach consensus on a behaviour of interest for that state’s protected areas. Each workshop was facilitated by the research team who used a modified nominal group technique to organise discussions and gather data. A description of the procedures is included in Appendix A. Participants in each PIDWO included between 15 and 25 protected area managers and tour operators who were asked to identify the most problematic visitor behaviours in the state’s protected areas and then to rate and prioritise the problems based on their degree of urgency. Through this process, a rank-ordering of priority problem behaviours emerged.

Following discussions with key individuals in the protected area management agency of each state, one of the priority behaviours was selected as the focus for the remainder of the project: Parks Victoria chose to focus its project on persuading visitors at Badger Weir Picnic Area in Yarra Ranges National Park to refrain from feeding birds; Parks and Wildlife Service Tasmania chose persuading walkers on the Russell Falls track at Mt Field National Park to pick up rubbish encountered on the track; and Western Australia’s Department of Environment and Conservation chose persuading dog walkers at Yellagonga Regional Park in Perth to keep their dogs on a lead.

Step 2: Field research

The field research at each site was carried out in three phases: the belief elicitation phase, the belief measurement phase, and the intervention evaluation phase. The specific methodologies employed for each phase at the three research sites are respectively detailed in Chapters 3, 4 and 5. The general research procedures are described here.

Phase 1: Visitor beliefs elicitation survey

Following the TPB, the first phase of field research in each state required collection of data to identify visitors’ salient beliefs pertaining to the selected behaviour. This involved conducting elicitation surveys using a semi-structured interview procedure based on TPB principles developed by Middlestadt, Bhattacharyya, Rosenbaum, Fishbein and Shepherd (1996). The purposes of each elicitation were to:

1. Obtain a pool of visitors’ salient beliefs underpinning the desired target behaviour; and
2. Lay the groundwork for the next phase of research which would identify which of these beliefs differentiate statistically between compliers and non-compliers, and therefore, would be best to target in intervention messages.

The target behaviours in each state were defined as follows:

- Victoria: Visitors using the Badger Weir Picnic Area in Yarra Ranges National Park will not feed the birds.
- Tasmania: Visitors using the Russell Falls track at Mt Field National Park will pick up rubbish they encounter while on the track.
- Western Australia: Dog walkers in Yellagonga Regional Park will keep their dogs on a lead.

The rationale of the elicitations is that the better we understand the factors underlying visitors’ decision to engage in a desired behaviour, the more likely it is that we can design effective communication to influence the behaviour. The belief elicitation survey serves as a necessary preliminary step for developing a fixed-item questionnaire aimed at quantifying the relative importance of visitors’ salient beliefs (Phase 2) and for evaluating the impact of particular communication ‘interventions’ (Phase 3). Therefore, it is essential that the elicitations
are conducted with care and accuracy. If researchers identify beliefs that are not, in fact, salient to the behaviour they want to promote, then their messages will target erroneous beliefs and miss the mark.

Before conducting the elicitation survey at each site, the instrument and interview procedures were pretested. This included a debrief phase after each interview that asked respondents to indicate whether the questions were clear and understandable, how they actually interpreted the questions, and whether the interview was too long. Following refinement of the instrument and interview procedures, the actual elicitations were conducted.

Consistent with the TPB (see pp.1-2), behavioural beliefs were elicited by asking respondents to associate both positive and negative outcomes (advantages and disadvantages) of performing the desired target behaviour. For normative beliefs, respondents were asked who they thought would approve or disapprove if they carry out the target behaviour. In the category of control beliefs, respondents were asked what they think makes performing the target problem behaviour easier (facilitators) or more difficult (impediments).

Following the methodology of Middlestadt et al. (1996), each interview consisted of three pairs of open-ended questions corresponding to each type of belief in the TPB framework:

- For behavioural beliefs:
  - What do you see as the advantages or good things that could occur if you [do the desired behaviour]?
  - What do you see as the disadvantages or bad things that could occur if you [do the desired behaviour]?

- For normative beliefs:
  - Who (individuals or groups whose opinions you consider personally influential) do you think would support or approve if you [do the desired behaviour]?
  - Who (individuals or groups whose opinions you consider personally influential) do you think would object or disapprove if you [do the desired behaviour]?

- For control beliefs:
  - What factors or circumstances enable or make it easy for you to [do the desired behaviour]?
  - What factors or circumstances make it difficult for you to [do the desired behaviour]?

Following a methodology applied in a number of prior studies (e.g. Middlestadt et al. 1996; Beeton et al. 2004, Ham & Weiler 2004; Lackey & Ham 2004; Ham & Weiler 2005; Curtis 2007), a content analysis of responses to these open-ended questions was used to identify the salient beliefs. Initial response categories were developed and inter-rater reliability between multiple coders was tested. When coders agreed on the way a belief was categorised, it was retained. A minimum reliability threshold of 67% (agreement among at least two of three coders) was applied to determine which beliefs would form the final pool of salient beliefs entered into the fixed-response instrument. Based on each analysis, the most frequently mentioned beliefs at each site were identified. In this way, each elicitation survey resulted in an inventory of visitors’ behavioural beliefs, normative beliefs, and control beliefs salient to the target behaviour at that site. These are presented in Chapters 3, 4 and 5.

**Phase 2: Measurement of salient visitor beliefs**

Phase 2 of the field research involved the use of a fixed-response questionnaire to measure the strength and importance of each of the beliefs identified as being salient to the target behaviour. Following pre-testing at each site, the questionnaire was administered to separate random samples of observed compliers and non-compliers.

Details regarding the question wording in the fixed-item instrument used at each site are respectively provided in Chapters 3, 4 and 5, since each was based on the specific salient beliefs identified at that site. In general, however, the measurement strategy for the two components of each type of belief followed recommendations by Francis, Eccles, Johnston, Walker, Grimshaw, Foy, Kaner, Smith, & Bonetti (2004a) as follows:

- For behavioural beliefs:
  - Belief strength:
    
    *If I [do the desired behaviour], a [given outcome] is...*

    
    UNLIKELY   LIKELY

    
    Evaluation:

    [This outcome] is:

    BAD   GOOD
ASKING VISITORS TO HELP

- For normative beliefs:
  
  Belief strength:

  I believe that [a given social referent] think(s) that:

  I SHOULD NOT ______ ______ ______ ______ ______ ______ I SHOULD

do the desired behaviour.

  Motivation to comply:

  When it comes to [doing the desired behaviour]:

  I DO NOT WANT TO ______ ______ ______ ______ ______ ______
  I WANT TO DO ______ ______ ______ ______ ______ ______

  what [the social referent] think(s) I should do.

- For control beliefs:
  
  Belief strength:

  [A given factor exists that could influence whether I engage in the desired behaviour].

  FALSE ______ ______ ______ ______ ______ ______ ______ TRUE

  Power:

  The [factor] makes [doing the desired behaviour]:

  MORE DIFFICULT ______ ______ ______ ______ ______ ______
  EASIER FOR ME ______ ______ ______ ______ ______ ______

Analysis of the Phase 2 data primarily involved statistical comparisons of belief scores between compliers and non-compliers. Those that were most different between the two groups, and which seemed most amenable to persuasive influence, were selected to be targeted in intervention messages. These interventions would then be evaluated in the final phase of field research.

**Phase 3: Experimental evaluation of interventions targeting selected beliefs**

Phase 3 involved conducting field experiments at each site to test the efficacy of different versions of messages that targeted the selected beliefs. In each of these tests, the primary dependent variable was observable visitor behaviour along with the main TPB variables including each targeted belief and visitors’ attitude to the behaviour.

The interventions chosen for each site consisted of A-frame signs containing messages that targeted the selected beliefs. These were developed in close consultation with staff from each protected area management agency. The various intervention messages were designed based on findings from research on elaboration likelihood (e.g. Andrews & Shimp 1990; Petty, McMichael & Brannon 1992; Areni & Cox 1995; Petty, Haugvedt & Smith 1995; Slater & Rouner 2002), the impact of personal norms on pro-social behaviour (e.g. Schwartz 1977; Parker, Manstead & Stradling 1999; Harland, Staats & Wilke 2002; García et al. 2003), the effects of message vividness (e.g. Anderson 1983; Sherer & Rogers 1984; Haugvedt & Smith 1995; Slater & Rouner 2002), the impact of personal norms on pro-social behaviour (e.g. Schwartz 1977; Parker, Manstead & Stradling 1995; Harland, Staats & Wilke 1999; Haugvedt & Smith 2002; Garcia et al. 2003), the effects of message vividness (e.g. Anderson 1983; Sherer & Rogers 1984; Baesler & Burgoon 1994; Block & Keller 1997), and on factors affecting audience attention and information processing (e.g. Moscardo, Ballantyne & Hughes 2007). Prior to fabrication of the interventions, manipulation checks (Appendix B) were conducted with prototypes to ensure that each intervention was communicating its intended message and that the appeal it used was consistent with the theoretical basis underlying it.

Field experiments involving a post-test only design were conducted to evaluate the interventions at each site. Data collection relied on a questionnaire similar to that used in Phase 2, including identical measures of the same beliefs. The three questionnaires are contained respectively in Appendices C, D and E. An analysis comparing the interventions’ behavioural compliance rates and resultant belief scores, both against one another and a control condition, was used to evaluate effectiveness.
**Step 3: Professional development workshops**

In the final months of the project, three one-day professional development workshops were held in each of the three states. The primary goal of these workshops was to instruct protected area managers, tour operators and interested academics (up to 20 people in each state) in the theory and methodology for conducting preliminary elicitation surveys, belief measurement studies, and the empirical reasoning required to select target beliefs for interventions (i.e. in the procedures for Phase 1 and Phase 2). Because of limited time and the requirement of a background in statistical analysis, the workshops did not include instruction in experimental evaluation of interventions (Phase 3). Participants were introduced to the logic of the TPB and shown how beliefs influence behavioural choice. They subsequently were instructed in the methodology for eliciting and categorising beliefs in order to understand their influence in guiding visitors to behave as they do. In the second half of the day, they were shown how to measure salient beliefs, calculate means, and make decisions about which beliefs would be best to target in persuasive communication interventions. Exercises included practice in collecting and analysing belief data, and each participant was given take-home materials for future use (including *Promoting Persuasion in Protected Areas*).
Chapter 2

REVIEW OF LITERATURE ON THE BEHAVIOURS OF INTEREST

As explained in the introduction, the first step in our methodology was to identify and define a target behaviour for study in each of the three states. Through the previously described problem identification workshops (PIDWOs), we collaborated with the protected area management agency and selected tour operators in each state to identify and prioritise the urgency of visitor-induced management problems occurring in terrestrial protected areas. Emerging from the PIDWOs were the following three priority behaviours:

- Victoria: Visitors using the Badger Weir Picnic Area in Yarra Ranges National Park will not feed the birds.
- Tasmania: Visitors using the Russell Falls track at Mt Field National Park will pick up rubbish they encounter while on the track.
- Western Australia: Dog walkers in Yellagonga Regional Park will keep their dogs on a lead.

While the specific form of each of these behaviours is unique to the protected areas in which it occurs, they are collectively representative of a wider sphere of protected area management challenges that have been discussed or addressed in previous research. The purpose of this section is to review prior work pertinent to each problem in order to better understand its extent and severity and to provide a literature-based perspective for the present research.

Littering and Litter Pick-up by Protected Area Visitors

Worldwide, littering remains an ongoing social and environmental problem. Concern about this issue in Australia resulted in the highly successful ‘Do The Right Thing’ campaign during the 1970s and 80s that reportedly was responsible for a 70% reduction in the generation of litter nationally (Southern Waste Strategy Authority 2007). In the United States (US), a similar campaign (Keep America Beautiful) began in 1953. Longitudinal studies reveal a reduction in litter by 2% a year for the past three decades (RW Beck 2007).

Despite these successes at a national level, the problem of litter has persisted at unacceptable levels in protected areas worldwide. Recognition of this fact has led to a number of initiatives by protected area managers to deal with the problem. In Australia, the ‘Minimal Impact Bushwalking’ campaign was initially developed by the Tasmanian Parks and Wildlife Service in 1986 and was rapidly taken up by all other national park authorities in Australia (Parkin, n.d.). A similar initiative in the United States, the ‘Leave No Trace’ (LNT) program, began in 1990 as a collaborative project between the US Forest Service and the National Outdoor Leadership School. ‘Leave No Trace’ was incorporated as a non-profit educational program in 1994 and has subsequently spread its influence internationally, with a branch now active in Australia (Marion & Reid 2001). These programs essentially promote a broad code of practice for users of natural areas designed to maintain the ecological and aesthetic values of natural sites used for outdoor recreation and nature tourism. Important messages include the need to eliminate littering, as well as to minimise other impacts such as pollution, trampling of vegetation, and wildlife disturbance.

The magnitude of the littering problem in protected areas is largely a result of rapidly increasing levels of visitation in recent decades that, in turn, stem from greater public involvement in outdoor recreation and a boom in nature-based tourism to iconic natural sites. In 2001-2002, some 84 million visits were recorded in Australian protected areas, and for some of the popular World Heritage Sites, such as Uluru, Kakadu and Fraser Island, visitor numbers have increased more than 100 times since 1970 (Commonwealth of Australia 2003). Similarly, recreation visits to US national parks and national forests increased from approximately 40 million in 1950 to 1.2 billion in 1999 (Marion & Reid 2001). Many of these ‘new’ visitors to parks come from urban centres where littering and littered spaces are arguably more prevalent and tolerated (Geller, Winett & Everett 1982), and where a labour force is more readily available to clean up after them. According to Rollins, Trotter and Taylor (1998), such visitors may bring urban social values with them and may be seeking urban-park like experiences associated with partying, alcohol consumption and a reduced responsibility to pack out their own rubbish. Apart from the obvious aesthetic degradation caused by litter in natural areas (Jones 2001), evidence is mounting as to its detrimental effects on wildlife including increased mortality (Knight & Gutzwiller 1995; Shackley 1996; Ellis & Lish 1999; Thompson, Olsen, Mitchell, Davis, Rowland, John, McGonigle & Russell 2004).

Efforts to reduce the littering problem in protected areas fall into two broad categories, both of which have involved communication and education aimed at visitors, as well as other means of prompting appropriate behaviour. These include reducing the incidence of litter behaviour (which has received the lion’s share of
Reducing the incidence of littering

A growing body of research indicates that the provision of information and education to visitors can help to reduce certain types of littering behaviour in certain types of settings (Dodge 1972; Oliver, Roggenbuck & Watson 1985; Roggenbuck 1992; Manning 2003; Sibley & Liu 2003; Liu & Sibley 2004). Research by Sibley and Liu (2003) revealed that active littering (e.g. intentionally dropping rubbish on a walking track and continuing on) was more amenable to change than is passive littering (e.g. failing to clean up one’s campsite sufficiently). Other researchers (e.g. RW Beck 2007) have invoked the terms ‘unintentional’ and ‘deliberate’ to describe roughly the same two types of littering. While both categories of littering present challenges to protected area managers, reducing active (deliberate) littering on walking tracks is particularly difficult because of the amount of terrain that must be patrolled, monitored and cleaned in a given area. RW Beck (2007) reports that in US public places, active littering is almost twice as prevalent as passive littering (65% versus 35%).

According to Roggenbuck (1992), most of the published studies evaluating the use of persuasion in reducing visitor impacts in natural settings have focused explicitly on littering. Manning (2003) reviewed numerous studies that found communication to be effective in reducing littering behaviour and even cleaning up littered areas. Roggenbuck (1992) concluded that the effectiveness of such programs has varied widely depending upon the type of intervention used.

Studies suggest that messages that are specific as to the action requested (e.g. ‘please put rubbish in the bin’) will be more effective than general ones such as ‘please don’t litter’ (Geller, Witmer & Tuso 1977; Roggenbuck 1992). While both printed and oral messages have been found to be effective in some situations, interpersonal contact often emerges as a preferred, though more expensive, communication medium in natural settings (Oliver, Roggenbuck & Watson 1985; Roggenbuck 1992). In addition, studies show that activating social and personal norms, either in the physical environment (e.g. by keeping a place litter-free), through role modelling (e.g. demonstrating proper waste disposal in the presence of would-be litterers), or through other methods (such as appealing to pride) can decrease littering in certain settings (Cialdini, Reno, & Kallgren 1990; Cialdini 1996, Winter & Cialdini 1998; Kallgren, Reno & Cialdini 2000; Vining & Ebreo 2002; Cialdini 2003).

Prior research also suggests that the effects of persuasive communication will remain only as long as anti-litter messages are present (Dodge 1972; Schnelle, Gendrich, Beegle, Thomas, & McNess 1980; Geller, Winnet & Everett 1982), and that providing attractive and conveniently-located rubbish bins along with incentives and persuasive communication messages is often a key to success (Finnie 1973; Powers, Osborne, & Anderson 1973; Geller, Witmer & Orebaugh 1976; Geller, Brasted & Mann 1980; O’Neill, Blanck & Joyner 1980; Geller, Winnet & Everett 1982; Lehman & Geller 2004). A study by Liu and Sibley (2004) demonstrated that convenient placement of ashtrays and rubbish bins can reduce cigarette littering by users of public spaces even when their general attitude towards littering is unaffected. In addition, studies suggest that messages will be more effective if they are delivered in the immediate time frame prior to a person’s opportunity to behave (Geller 1975; Geller, Witmer & Tuso 1977; Oliver, Roggenbuck & Watson 1985).

Encouraging visitors to pick up litter

Litter pickup studies have examined one or both of two primary behaviour-change strategies: behavioural prompting and persuasive communication. Prompting usually has involved the use of role models who exert normative influence by exhibiting proper behaviour in the presence of experimental subjects, and sometimes it involves offering people incentives (rewards) to pick up litter (Lehman & Geller in press). A consistent finding from prompting studies is that litter pickup is more difficult to achieve than prompting proper waste disposal (Geller, Winnet & Everett 1982). This is probably due to the inconvenience of having to pick up litter that is already on the ground (Tuso & Geller 1976) and to the normative factors associated with cleaning up after others. Bickman (1972), for example, evaluated various attempts to prompt litter pickup on a university campus by having confederates role-model appropriate behaviour in the presence of other people. His results revealed that regardless of the method used almost no one picked up any litter. Similar experiments by Geller (1976) and Geller, Mann and Brasted (1977) conducted at a shopping mall, a hotel, and a university campus produced parallel findings. In none of the settings did role modelling have a significant effect on litter pickup by adults.

However, evidence exists to suggest that prompting litter pickup in a protected area may be more feasible than it is in more developed settings. Unlike studies in more urbanised environments which show a tendency to litter an area that is already littered (e.g. Finnie 1973; Robinson & Frisch 1975; Geller, Witmer & Tuso 1977), research by Crump, Nunes and Crossman (1977) found that picnickers in a US national forest were actually more likely to pick up existing litter than they were to deposit their own. This finding is in contrast to the more usual finding that existing litter breeds more litter. The natural attributes of the setting, or perhaps the kinds of visitors such a setting would attract, are possibly responsible for these results. Not only do they suggest that a person’s subjective definition of a given situation can influence behaviour, but that even a behaviour that is so...
difficult to bring about in other settings (such as university campuses, hotels, shopping malls and city streets) is more likely to occur when a person prescribes a specific definition of the setting that is conducive to the behaviour of interest. According to some, it could be that a pro-environmental personal norm is more accessible in a natural setting thereby activating altruistic behaviour such as picking up litter (e.g. Smith, Haugvedt & Petty 1994; Stern & Dietz 1994; Geller 1995; Corbett 2005) or that people feel that picking up litter in a natural setting simply allows them to have a more enjoyable experience there (Geller, Winett & Everett 1982). We applied the personal norm principle in one of the interventions tested on the Russell Falls track in Tasmania. The intervention attempted to activate a norm that maintaining the natural beauty of the place was a moral obligation, and therefore, that picking up rubbish on the track was the ‘right thing’ for all track walkers to do.

Incentives have been shown in a number of studies involving children to be effective in prompting litter pickup. In probably the first published study of this type, Clark, Burgess and Hendee (1972) reported dramatic increases in litter pickup by children in a forest campground when the children were allowed to select their own “reward” (e.g. Smokey Bear patches, pins, etc.) for actively collecting and disposing of rubbish. Subsequently, Lahart and Bailey (1975) also found that providing an incentive resulted in children picking up more litter on a nature trail. Generally, however, incentive programs targeting adults have not appeared as effective as those targeting children. For example, in a program aimed at a general population of forest recreationists, Powers, Osborne & Anderson (1973) found that offering a small financial reward for litter pickup was effective in reducing on-ground litter but not in attracting visitors to participate in the program. Over a 15-week period, only 88 visitors chose to participate in the program, of which 70% were local university students. In a field experiment conducted in a residential setting, Bacon-Prue, Blount, Pickering and Drabman (1980) found that marking certain pieces of litter that were worth $1.00 each when turned in and deposited by a volunteer was more successful in reducing on-ground litter than providing rubbish bins and paying staff for litter pickup.

The few studies that have focused on the use of persuasive communication to promote litter pickup have also found positive results, both with children and adults. Roggenbuck and Passineau (1986) reported that anti-litter messages given to children prior to a school field trip led to their picking up two-thirds of litter they encountered along a trail. Similarly, Wagstaff and Wilson (1988) found that a combination of verbal requests and role modelling by commercial river guides resulted in more of their adult clients voluntarily picking up litter encountered in a remote river environment.

In what appears to be the first litter pick-up study conducted in an Australian national park, Littlefair (2004) compared five different guided walk formats in terms of their effectiveness in inducing litter pickup by visitors. These were no interpretation at all (control), interpretation but without a direct appeal or role modelling related to litter pickup, interpretation with role modelling wherein the guide visibly picked up litter at a prescribed location, interpretation that included a direct verbal appeal from the guide to pick up litter encountered during the walk, and interpretation including both role modelling and the direct appeal. Her results revealed that both the direct appeal and direct appeal + role modelling conditions increased litter pick up compared to a control group. However, role modelling was found to add little to the overall effectiveness achieved by the direct appeal alone (a finding consistent with those of Bickman 1972, Geller 1976, and Geller, Mann & Brasted 1977). The appeal asked visitors to pick up any litter they found on the track because it presented a hazard to wildlife. It further informed them that the guide had a bag to put the litter in so that they would not need to carry it out and that a disposable glove was available if they preferred not to touch it.

It is noteworthy that since almost all of the previous studies of litter pick up utilised interpersonal communication media, and none of them compared the relative effectiveness of different message delivery systems, little can be concluded about which media might be preferable in litter pick-up communication efforts. Since most protected areas are unable to allocate staff to issue verbal appeals to visitors on a regular basis, they must depend on non-personal interpretive media such as signs and wayside exhibits to reach visitors who are not part of guided tours. Although visitors who participate in an agency-sponsored guided walk or arrive with a tour operator might rely on their guide for such information, evidence from a study of commercial tour guides in Australian national parks (Armstrong & Weiler 2003) suggests that not all guides are equally inclined to impart minimal impact messages.

As previously explained, the present study at Russell Falls applied a persuasive communication theory that focused on impacting the cognitive structures underlying litter pick up as the basis for influencing the behaviour itself. So while previous studies are very useful for the situations in which they were conducted, most have not focused on identifying the cognitive determinants of picking up litter in a protected area, or on the specific messages that might be successful in bringing about the behaviour. Therefore our study could not benefit from a strong precedent of previous work applying persuasive communication theory to the behaviour of interest.
Wildlife Feeding in Protected Areas

In many places, wildlife feeding is a popular means of facilitating close and interactive encounters between humans and nature. While there is sometimes a certain level of ‘acceptance’ of this practice when it occurs in locations such as tourism resorts, picnic areas and urban backyards, it is a more contentious activity when it occurs in a national park or protected area setting. Given that the underlying premise of such settings is to permanently protect areas of significant natural, cultural or heritage value, park managers are regularly faced with the challenge of actively discouraging and prohibiting visitors from engaging in feeding practices that potentially threaten these values.

Impacts of wildlife feeding on animals and people

Orams (2002) provides an overview of the positive and negative impacts of wildlife feeding. From a wildlife perspective, supplementary feeding can influence natural behaviour by reducing foraging and hunting times, increasing breeding activity and population numbers, and altering migration patterns and home ranges. Animals that are fed regularly by visitors may lose the ability to hunt and forage for themselves, resulting in a dependency on humans for food in order to avoid starvation. A consequence of this dependency can be the habituation of wildlife to human contact, where wild animals lose their instinctive wariness of people as a danger avoidance mechanism. This can result in animals becoming easy prey or being exposed to unfamiliar dangers as they gain the confidence to enter areas of greater human activity. Furthermore, provisioned wildlife may become unnaturally aggressive towards people and other species. Unfortunately, this aggression can prove fatal, as was the case on Queensland’s Fraser Island in 2001 when a nine-year-old boy was mauled to death by a dingo (Lawrance & Higginbottom 2002; Burns & Howard 2003). And although limited empirical evidence exists as to the impacts of wildlife feeding on the long-term health and viability of provisioned animals, a number of studies suggest that feeding of wildlife can sometimes contribute to greater risks of disease, compromised nutritional and physical health, and higher mortality rates compared to animals that rely on natural food sources (Orams 2002; Mann & Kemps 2003; Ishigame, Baxter & Lisle 2006).

While the majority of these impacts can be viewed as being negative to wildlife, the fact that wildlife feeding remains such a popular activity suggests that some positives are involved. Most of these positives appear human-oriented. For example, feeding wildlife may be viewed as providing important opportunities for people to ‘commune’ with nature, especially when such opportunities are viewed as being increasingly limited (Oberbillig 2000; Orams 2002). The popularity of human engagement with nature has meant that a number of tourism operations and local communities have benefited from this activity through the fostering of reliable feeding encounters in the wild (Walpole 2001; Higginbottom, Green, Leiper, Moscardo, Tribe & Buckley 2003). However, wildlife feeding may also lead to benefits to the animals. For example, some have reasoned that provisioning can contribute to providing people with such profound wildlife experiences that they become committed to the protection of the species and other environmental causes (Shackley 1998; Higginbottom et al. 2003).

The ongoing debate surrounding the merits of wildlife feeding activities has generated a number of studies covering various aspects of the issue. A selection of these is presented in Table 1. The majority of these studies involve a tourism context, where visitors to a protected area or reserve engage in feeding activities to facilitate reliable close encounters with wildlife. In some instances, these feeding activities have been the primary reason for the emergence of local tourism enterprises, attracting growing visitor numbers and generating economic revenue for the local community. However, the consensus among these studies is that human feeding of wildlife does result in behavioural and physical changes, leading to undesirable impacts to the animals, and sometimes to humans.

In terms of management options concerning wildlife feeding, banning the activity is sometimes not feasible given its popularity among visitors, tour operators and local communities. In such cases, controlled feeding may instead be allowed under strict conditions where the ingredients, quality and quantity of food, combined with an interpretation program and accompanying safety measures, are designed to minimise the potential risks of wildlife feeding and cater to the nutritional and well-being requirements of the animal (Orams 2002). But controlled feeding is generally undesirable in national park and protected area settings, where a mandate exists to protect wildlife and their surrounding environment by minimising excessive and avoidable human interference. In this context, park managers often have to rely on onsite communication efforts to advise visitors that feeding is not permitted and to warn them of the risks associated with the activity from a wildlife and visitor perspective. Indeed, many of the publications in Table 1 cite interpretation and education strategies as potentially effective approaches to managing visitor activities and enhancing human-wildlife encounters without the need for feeding.
Table 1: Selected literature on the impacts of wildlife feeding

<table>
<thead>
<tr>
<th>Author</th>
<th>Research Focus and Location</th>
<th>Variables Measured</th>
<th>Management Measures/Conclusions</th>
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<tbody>
<tr>
<td>Burns &amp; Howard (2003)</td>
<td>Human-dingo interaction and management (Fraser Island, Australia)</td>
<td>Stakeholder perspectives towards dingoes as a form of wildlife tourism on Fraser Island</td>
<td>The dependence of dingoes on human food and their loss of human fear are largely considered the foundations for the negative interactions between humans and dingoes. While education strategies continue to be used to discourage inappropriate visitor behaviour regarding the feeding of dingoes, if such strategies are not having an impact on visitor behaviour, current management efforts may do little in mitigating the risk of aggressive incidents. Many stakeholders believe that the problems on Fraser Island are more of a human management issue rather than a wildlife management issue. If dingo attacks are largely a consequence of humans feeding the animals, then strategies for managing people are necessary in addition to strategies for managing the animals.</td>
</tr>
<tr>
<td>Higginbottom et al. (2003)</td>
<td>Kangaroo-related tourism activities (Australia)</td>
<td>Business management practices Visitor characteristics and reactions Nature of kangaroo encounters and impacts Interpretation and environmental management practices</td>
<td>Handfeeding of kangaroos occurs ‘fairly widely’ among kangaroo-related tourism activities, including in protected areas. The appropriateness of feeding activities remains an ongoing debate, with a number of positive and negative issues informing the debate. Feeding of kangaroos should be avoided. However, if feeding does occur, then the food provided should be tailored to the animals’ nutritional needs, represent only a small proportion of the kangaroos’ diet, and should not lead to aggression towards humans or other kangaroos. Interpretation and improved expertise of guides should be used to enhance ‘natural’ visitor experiences without the need for feeding to locate and interact with kangaroos.</td>
</tr>
<tr>
<td>Ishigame, Baxter &amp; Lisle (2006)</td>
<td>The biological effects of backyard feeding on Australian magpies (Brisbane, Australia)</td>
<td>Blood chemistry and body mass measures</td>
<td>Physiology of wild magpies can be affected by artificial feeding.</td>
</tr>
<tr>
<td>Author</td>
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<tr>
<td>Lawrance &amp; Higginbottom (2002)</td>
<td>Impacts of human behaviour on dingo behaviour (Fraser Island, Australia)</td>
<td>Characteristics and factors associated with aggressive incidents involving dingoes Observations of dingo behaviour in the presence of humans Dingo responses to particular human behaviours</td>
<td>The habituation of dingoes to people and human food sources appears to be the underlying cause of the observed changes in dingo behaviour and the aggressive responses to certain human behaviours. Education campaigns should continue to highlight the dangers of feeding dingoes and advise visitors not to perform certain behaviours that may trigger an aggressive response from a dingo.</td>
</tr>
<tr>
<td>Mann &amp; Kemps (2003)</td>
<td>The effects of provisioning on maternal care among wild bottlenose dolphins (Shark Bay, Australia)</td>
<td>Behavioural observations and activity of mothers and calves among provisioned and unprovisioned dolphins</td>
<td>Provisioned dolphin mothers were more preoccupied with obtaining fish and used the shallow water to prevent calves from gaining contact and nursing access. While these effects may have a negligible immediate impact on calf survival, the long-term effects are unknown. Shorter provisioning times, improved monitoring and research, and further improvements in education and interpretation are recommended. Dissemination of information on the effects of provisioning may assist in shifting human interest away from dolphin feeding towards more natural observation techniques.</td>
</tr>
<tr>
<td>Milazzo, Anastasi &amp; Willis (2006)</td>
<td>Impacts of fish feeding on the behaviour and survival of particular fish species in the wild (Ustica Island marine protected area, Italy)</td>
<td>Human-orientated behaviour of fish Predatory effects on other fish species</td>
<td>Certain fish species in feeding areas exhibited “human-positive behaviour”—losing instinctive fear in the presence of humans and surrounding people in the water even when food was not provided. Other species of fish were negatively affected by the unnatural aggregation of predatory fish, as these aggregations frequently attacked and destroyed other species and their habitat. While fish feeding may provide good public relations opportunities, it can compromise the values and natural integrity of a protected area. If the only purpose of a marine protected area is to promote marine conservation to the public, activities such as fish feeding may be desirable, as strong human-positive behaviour brought about by these activities guarantees visual spectacles and memorable encounters for visitors.</td>
</tr>
<tr>
<td>Author</td>
<td>Research Focus and Location</td>
<td>Variables Measured</td>
<td>Management Measures/Conclusions</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Newsome &amp; Moncrieff (2004)</td>
<td>Impacts of emerging stingray tourism (Hamelin Bay, Australia)</td>
<td>Stingray distribution</td>
<td>Management issues associated with shore-based feeding of stingrays include impacts on stingray health and behaviour, habituation to humans and provisioning, water pollution, user conflicts, attraction of predators and risks to humans. Stingray behaviour has changed through provisioning. Although partially habituated to humans through feeding, they are not yet entirely dependent on humans for food. More information is required onsite through the erection of signs. The activities of uninformed visitors could potentially be harmful due to ignorance of how humans may impact upon stingrays through feeding, as well as the potential risk of humans being stung. Signs can also alleviate the need to construct facilities that require capital resources and maintenance, and impinge on the area’s wilderness qualities.</td>
</tr>
<tr>
<td>O’Leary &amp; Jones (2006)</td>
<td>Foraging and breeding ecology of fed and unfed Australian magpies (Brisbane, Australia)</td>
<td>Observations of foraging and chick provisioning behaviour</td>
<td>The diet of suburban magpies, regardless of being fed or unfed, was dominated by natural foods, and provisioned their chicks predominantly with natural food. Magpies were not reliant or dependent on supplementary food at any time during the breeding season. However, magpies utilising suburban feeding stations started breeding activities significantly earlier than unfed magpies.</td>
</tr>
<tr>
<td>Orams (2002)</td>
<td>Review of the literature on (1) the positive and negative impacts of wildlife feeding on both animals and humans, and (2) approaches for managing the impacts of wildlife feeding</td>
<td>n/a</td>
<td>While wildlife feeding is a controversial issue and can pose risks to both animals and humans, it can also provide economic, social and environmental benefits. Impacts of wildlife feeding remain relatively under-researched. Difficult to find any biological justification for feeding wildlife. Common management devices include prohibiting wildlife feeding (and using strong messages in education campaigns to remind visitors), controlled feeding under strict conditions, or just ignoring the practice. Prohibiting wildlife feeding is difficult to enforce and monitor. If wildlife feeding is permitted, it should only be done if humans are willing to accept the implications and impacts of feeding.</td>
</tr>
<tr>
<td>Author</td>
<td>Research Focus and Location</td>
<td>Variables Measured</td>
<td>Management Measures/Conclusions</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Shackley (1998)</td>
<td>The growth, management and impacts of dive tourism on stingrays (Cayman Islands)</td>
<td>Stakeholder interviews and participant observations concerning the impact and management of visitors</td>
<td>Major behavioural and physical changes are showing among stingrays being fed and handled by divers. It is also possible that some behavioural modifications are being learnt and transmitted to a new generation of stingrays. Restrictions on visitor numbers may be required due to consistently high levels of visitation, in addition to long-term monitoring of the impacts on the stingrays.</td>
</tr>
<tr>
<td>Walpole (2001)</td>
<td>Benefits and costs of feeding Komodo Dragons and the subsequent cessation of the practice (Komodo National Park, Indonesia)</td>
<td>Impacts on dragon numbers, Impacts on dragon viewing opportunities, Impacts on financial benefits to the local community</td>
<td>Supplementary feeding resulted in an increase in dragon numbers to a level that was not generally found in nature. This may result in long-term and unmeasured ecological, behavioural and physiological changes. Subsequent to the cessation of supplementary feeding, the number of dragons at the viewing site declined to a level where park managers could no longer guarantee that visitors would see dragons, which translated into decreased visitor satisfaction and arrivals. The cessation of supplementary feeding also had an opportunity cost for the local community by reducing their revenue from tourism. While stopping supplementary feeding may adversely affect the visitor experience and the local community in the short-term, alternative solutions can be pursued. These include adopting less intrusive ways of attracting and viewing dragons, educating visitors about park policy and common misconceptions about the dragons, and introducing training programs for the local community as a means of finding alternative sources of income.</td>
</tr>
<tr>
<td>Warnken, Hodgkison, Wild &amp; Jones (2004)</td>
<td>The potential for wildlife feeding to artificially increase population densities of the Australian brush-turkey and the indirect impacts this may have on surrounding vegetation (Gold Coast hinterland, Australia)</td>
<td>Number and distribution of brush-turkeys relative to human visitation and bird-feeding activities, Signs of environmental impacts in vegetation communities adjacent to bird-feeding areas</td>
<td>By elevating the density of brush-turkey populations to artificially high levels, wildlife-feeding activities have the potential to indirectly cause significant negative impacts on the integrity of the surrounding environment.</td>
</tr>
</tbody>
</table>
Interventions to deter wildlife feeding

Although the majority of the research to date has focused on the impacts of feeding rather than on the efficacy of management strategies, a small number of known studies have been conducted since the mid-1980s that have evaluated interventions aimed at deterring wildlife feeding by protected area visitors (Table 2). Some of these studies have applied behaviour change and communication theories to identify the cognitive determinants of visitor behaviour and routes to persuasion. Others have adopted an approach advocated by applied behaviour analysts (e.g. Lehman & Geller in press), which focuses more directly on the behaviour and less on the cognitive processes behind it. In the applied behaviour analysis tradition, these studies utilised interventions such as prompts and visitor-signed pledges to encourage visitors not to feed wildlife.

Four recent studies have applied communication theory to test or to inform interventions aimed at discouraging wildlife feeding in protected areas. Hockett and Hall (in press) investigated the impact of printed messages on the beliefs and self-reported behaviour of visitors with respect to feeding deer. Results indicated that both a moral appeal and a fear appeal led to reduced frequencies of self-reported deer feeding. However, only the fear appeal led to an impact on previously held beliefs. This indicates that visitors engaged more with the fear appeal message than they did with the moral appeal. Ballantyne and Hughes (2006) looked at beliefs associated with misconceptions visitors have about wildlife and the consequences of feeding birds. They proposed that interventions aimed at deterring bird feeding in picnic areas should focus on these misconceptions as a basic communication strategy. Mallick and Driessen (2003) sought to evaluate the long-term impact of a signage program in Tasmanian national parks called ‘Keep Wildlife Wild’. They focused on visitors’ general attitudes to wildlife feeding. A lack of pre-exposure data on attitudes prevented the researchers from drawing conclusions about the signs’ attitude impacts, but their results did show that 90% of respondents had a negative attitude towards wildlife feeding in national parks. About half of the respondents reported that the signs reinforced their previous attitude that feeding wildlife was bad. Beckmann and Savage (2003) evaluated a theory-based dingo education strategy on Fraser Island. They reported that the strategy had been effective in reaching visitors and other key stakeholders with broad messages associated with dingo-human encounters (including feeding activities), resulting in anecdotal and documented declines in dingo-related incidents. However, a revised communication plan was recommended to hierarchically structure and prioritise dingo-related messages, as well as to establish a monitoring and evaluation framework. Improving the level of understanding among some target audiences was also recommended through the development and introduction of more effective messages and media to address certain knowledge gaps.

Two of the studies in Table 2 relied on direct observation of visitor behaviour to assess the effectiveness of interventions. Leslie (1995) implemented a ‘no feed’ pledge that was signed by visitors and then displayed publicly in a national park visitor centre. She found that signing the pledge reduced wildlife feeding in the park. Similar to the study by Hocket and Hall (in press), Schwarzkopf (1984) compared the effectiveness of a moral appeal and a fear appeal in deterring squirrel feeding in a national park. The moral appeal emphasised benefits to the squirrels of not being fed, whereas the fear appeal emphasised the danger to visitors imposed by feeding the squirrels (e.g. being bitten by one of the squirrels could cause bubonic plague). As with the Hocket and Hall study, he found that the fear appeal was superior in reducing the frequency of feeding. Taken together, these two studies suggest that ‘no feed’ interventions that stress benefits to visitors may be more effective than those that promise benefits to the animals. As described in the results section, this approach was adopted in one of the interventions tested at Badger Weir Picnic Area. The intervention appealed to a social norm that because fed birds harass other picnickers for food, people who refrain from feeding the birds are seen as being sensitive to the desires of their fellow picnickers. The benefit promised in this case referred to other picnickers (who would not be harassed) and to the individual reading the message (who would be held in higher esteem by others). The other intervention tested at Badger Weir emphasised benefits to the birds of not being fed.

Since the primary communication medium in most of the studies was signage, little can be concluded about the comparative effectiveness of other media. Nevertheless, a reliance on non-personal interpretive media is understandable given the expense of face-to-face contacts and the vast physical spaces in which visitors can encounter wildlife (Wiles & Hall 2003). Budget permitting, however, results of Beckman and Savage’s (2003) evaluation suggest the value of a multifaceted campaign when dealing with a ubiquitous wildlife feeding problem in a large geographic area.
Table 2: Studies evaluating the effectiveness of interventions aimed at deterring wildlife feeding

<table>
<thead>
<tr>
<th>Author</th>
<th>Research Focus and Location</th>
<th>Variables Measured</th>
<th>Management Measures/Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballantyne &amp; Hughes (2006)</td>
<td>The persuasiveness of warning signs to deter people from feeding birds (Brisbane Forest Park, Australia)</td>
<td>Visitor beliefs, attitudes and behaviour regarding bird feeding Visitor perspectives towards the perceived persuasiveness of warning signs that target visitors’ beliefs</td>
<td>Three signs were developed based on different theoretical frameworks. Elements of all three signs were regarded by visitors as persuasive in some way, suggesting that managers may need to use a range of approaches to target the various beliefs and attitudes of visitors. Onsite interpretation and signage is an effective approach to managing visitor-wildlife interactions.</td>
</tr>
<tr>
<td>Beckman and Savage (2003)</td>
<td>Evaluation of a dingo education strategy designed to encourage proper behaviour (including non-feeding) by visitors &amp; other stakeholders (Fraser Island World Heritage Area, Australia)</td>
<td>Target audience attitudes, beliefs and levels of knowledge relevant to their understanding and perceptions of dingo-related messages</td>
<td>A communication strategy (in the form of signs, brochures and face-to-face communication) was developed based on theoretical models of behaviour change and persuasion communication. Overall, the broad messages of the education strategy were communicated successfully, supported by stakeholder accounts of behaviour change and a decline in reported dingo incidents. Since not all target audiences were at the same level of understanding, additional and more effective messages and media are required to address knowledge gaps. Key factors of success included the identification of separate target audiences and delivery approaches, the use of behaviour change and persuasive communication theories, and support from park staff that included infrastructure provision and enforcement.</td>
</tr>
<tr>
<td>Hockett &amp; Hall (in press)</td>
<td>Effectiveness of printed communication interventions in changing visitors’ views about feeding deer (Shenandoah National Park, USA)</td>
<td>Visitor beliefs in response to persuasive communication interventions using fear and moral appeals</td>
<td>Both a moral (norm-based) appeal and a fear appeal resulted in a decrease in self-reported frequencies in deer feeding. However, only the fear appeal intervention was successful in impacting previously held beliefs associated with the dangers of feeding deer. Results suggest that fear appeals may be an effective technique for changing beliefs about feeding wildlife.</td>
</tr>
<tr>
<td>Leslie (1995)</td>
<td>Effectiveness of a signed ‘not to feed’ pledge in deterring visitors from wildlife feeding (Grand Canyon National Park, USA)</td>
<td>Observations of wildlife interaction generally, including wildlife feeding</td>
<td>A signed pledge effectively reduced wildlife feeding by visitors. The pledge was signed in a public place and then displayed in the park visitor centre. Results linked to normative influences and behavioural consistency theory.</td>
</tr>
</tbody>
</table>
Dogs Off Lead in Protected Areas

Dog-walking is a popular and common recreation activity and often occurs in protected areas managed primarily or partly for conservation. However, it is a common occurrence that either dog-walking in general or walking dogs off leads in particular is against regulations in such areas. Many dog walkers may be attracted by the natural surroundings, tracks and open areas ideal for gaining the relaxation and health benefits from walking or running. In addition to the motivation for physical exercise, Edwards and Knight (2006) and Laurier, Maze and Lundin (2006) note that dog-walking in common reserves provides a catalyst for social interaction. For example, the dog provides the dog walker with a premise to initiate conversation with other dog walkers, providing a social benefit. Both Edwards and Knight (2006) and Laurier Maze and Lundin (2006) also identified walking dogs as a means of achieving a sense of belonging within the dog walking community visiting a particular park. This indicates that dog walking has two motivational aspects; physical exercise and socialising.

The physical health benefits of dog-walking for dogs and their owners may be self evident. However, the social norms regarding appropriate and inappropriate behaviour in relation to handling of dogs may be less clear. This includes keeping dogs on leads. Some research has found that the behaviour of keeping a dog on the lead was strongly determined by the presence or absence of other people in the proximity. Dog walkers tended to let their dog off the lead if they considered that it posed little or no threat to other park users or if there were no other park users in the vicinity. Similarly, collecting dog faeces was driven by the perceived social pressure to do so by the wider dog walking community at a particular location (Edwards & Knight 2006). It is apparent that dog walkers commonly adhere to certain social norms to feel included within a dog walking group.

The strong social component of dog walking and keeping dogs on leads in parks or protected areas may suggest that conservation concerns in relation to the natural aspects of the parks are not top of mind for dog-walkers. This was reflected in the absence of such concerns in the salient beliefs identified in the results section for the Yellagonga Regional Park dog walkers. Regular dog walkers at particular locations tend to identify as a broad group, separate from non-dog-owning park users. Within this loose social group, sub groups occurred based on perceptions of what was socially acceptable dog walking behaviour. This might include having adequate control of a dog, either through restraint by lead or through voice command and ‘good training’. Other factors for group inclusion may include appropriate disposal of dog faeces and temperament of dogs where owners of hyperactive, aggressive or otherwise ‘badly behaved’ dogs were excluded (Edwards & Knight 2006). This social dynamic represents a very strong social influence over dog walking behaviour that does not relate to how dogs impact on the biophysical environment in which they recreate.

In contrast, protected area managers tend to focus mainly on the potential negative impacts of walking dogs off leads on the conservation of natural areas (Edwards & Knight 2006). There are a number of issues associated with the presence of dogs in natural areas managed for conservation. These reportedly include dogs disturbing wildlife through direct and indirect factors. Direct impacts can include chasing or flushing of wildlife in the...
presence of dogs, disturbance of nesting sites or physical injuries or death through direct contact. Indirect impacts may include transmission of diseases and parasites, reduction in resting or feeding time and avoidance of areas in which dogs have left scent. In terms of ecological impacts, Taylor, Anderson, Taylor, Longden and Fisher (2005) report that dogs off lead have greater impact owing to a wider sphere of influence. Many of these impacts can also have a cumulative effect over time (Taylor et al. 2005; Edwards & Knight 2006; Forrest & St Clair 2006). This fact, together with the general concerns raised above regarding the potential for dogs to negatively impact on protected areas and wildlife, provides a basis from which protected area managers may seek to manage dog walking activity.

There is thus a potential gap between the focus of protected area management agencies and the factors that underpin dog walking behaviour. Incorporating an understanding of beliefs held by dog walkers in relation to keeping their dog on a lead into the design of messages is more likely to result in a positive influence in line with management policy (Hughes 2004; Chavez 2005).
Chapter 3

RUSSELL FALLS: RESULTS, DISCUSSION AND IMPLICATIONS

In this chapter we present the results of each phase of the research conducted on the Russell Falls track, Mt Field National Park, Tasmania, where the objective was to persuade walkers to pick up rubbish they encountered on the track. Results and relevant discussions are presented for the Phase 1 elicitation study, the Phase 2 beliefs measurement component (including the design of two interventions that resulted from the analysis), and the Phase 3 field experiment in which the interventions were evaluated according to their success in increasing compliance with the target behaviour and their impact on relevant TPB variables.

Description of Study Site

Mt Field is one of Tasmania’s most diverse and most popular national parks, located just over an hour’s drive from Hobart near the southeastern boundary of the Tasmanian Wilderness World Heritage Area. Managed by the Tasmanian Parks and Wildlife Service, its 15,881 ha protect a number of important ecosystems and significant cultural heritage. The park also encompasses an important water catchment which provides nearly 20% of Hobart’s water. The park can generally be divided into two visitor sections. The first is around the park entrance and includes the visitor centre, picnic facilities and Russell Falls. The second is centred at Lake Dobson which features long day walks and skiing areas. The two areas are linked by a 16km unsealed road. The wheelchair grade 10-minute walk to Russell Falls is the most heavily used track in the park. Through a forest of towering tree ferns, the level path takes walkers to the Russell Falls, one of Tasmania’s best known and most accessible scenic attractions. Intentional and unintentional littering by track walkers requires park authorities to invest hundreds of person-hours each year in monitoring and cleaning up rubbish from the track. Besides helping to maintain the visual integrity of the Russell Falls corridor, persuading track walkers to pick up rubbish they, themselves, encounter would save the park thousands of dollars that could be allocated to other visitor services. See [http://www.parks.tas.gov.au/natparks/mtfield/index.html](http://www.parks.tas.gov.au/natparks/mtfield/index.html) for additional descriptions of the park and the Russell Falls track.

Phase 1: Belief Elicitation

Data collection for the belief elicitation phase at Russell Falls occurred over two days in February 2006. Semi-structured interviews were conducted with a sample of visitors onsite that involved asking them a series of open-ended questions based on the belief categories of the TPB. For the purpose of each phase of the research at Russell Falls, a crushed aluminium can was purposely placed on the walking track as a means of identifying compliers (visitors who picked up the can) and non-compliers (visitors who did not pick up the can).

Visitors were approached after being observed walking past or picking up the can. Following widely applied TPB methods, a small convenience sample of visitors was interviewed in order to capture the range of possible salient beliefs. For this phase of the research, interviews are conducted until theoretical saturation is achieved (i.e. the point at which additional interviews provide very little further information). Saturation was reached after 29 interviews (14 compliers and 15 non-compliers).

The responses to the belief questions from each interview were transcribed into a table. Following TPB procedures, the responses were reviewed to develop universal categories or ‘codes’ that reliably collapsed the responses into fewer categories. Three coders then conducted a content analysis of the transcribed responses for the purpose of quantifying the frequency of the coded beliefs. This procedure required the coders to independently assign each response to one of the universal categories based on their prevailing meaning. Responses coded in the same category by at least two of the coders were retained in the pool of beliefs elicited from this phase of the research. Tables 3 to 8 contain the responses to each belief question and the accompanying frequencies of each response.
### Table 3: Positive behavioural beliefs of visitors at Russell Falls

<table>
<thead>
<tr>
<th>What do you see as the advantages or good things that could occur if you pick up rubbish from the track?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It keeps the park tidy (aesthetics)</td>
<td>11 (79%)</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>Avoids health hazards</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Prevents harm to wildlife</td>
<td>7 (50%)</td>
<td>11 (73%)</td>
</tr>
<tr>
<td>Prevents water contamination</td>
<td>3 (21%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>Sets a good example for others</td>
<td>7 (50%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Prevents other kinds of contamination (other than water)</td>
<td>6 (43%)</td>
<td>6 (40%)</td>
</tr>
<tr>
<td>Good for park management</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Prevents pests</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Prevents fire hazards</td>
<td>0 (0%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Keeps non-natural elements out of the park</td>
<td>0 (0%)</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Good for future generations</td>
<td>0 (0%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>I will feel good</td>
<td>0 (0%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>I will make money from recycling</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
</tbody>
</table>

### Table 4: Negative behavioural beliefs of visitors at Russell Falls

<table>
<thead>
<tr>
<th>What do you see as the disadvantages or bad things that could occur if you pick up rubbish from the track?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inconvenience of having to carry the rubbish</td>
<td>3 (21%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>I could injure myself/others (e.g. children)</td>
<td>9 (64%)</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>It’s dirty/messy</td>
<td>4 (29%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Disturbance of rubbish that has become part of the environment</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Nothing</td>
<td>1 (7%)</td>
<td>6 (40%)</td>
</tr>
</tbody>
</table>

### Table 5: Positive normative beliefs of visitors at Russell Falls

<table>
<thead>
<tr>
<th>Who (individuals or groups whose opinions you consider personally influential) do you think would support or approve if you pick up rubbish from the track?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spouse/children/grandchildren/partner/parents</td>
<td>5 (36%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Neighbours/friends (not with me)</td>
<td>2 (14%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Friends/others with me or who can see me</td>
<td>5 (36%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Parks staff</td>
<td>4 (29%)</td>
<td>6 (40%)</td>
</tr>
<tr>
<td>People I work with</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Locals</td>
<td>1 (7%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Nobody</td>
<td>4 (29%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Role model</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Avid bushwalkers</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
</tbody>
</table>
The purpose of the elicitation phase was to identify a pool of salient beliefs to be carried forward into the next phase of the research that have potential for persuasion. To this end, the beliefs in Tables 3 to 8 were initially reviewed in terms of how frequently they were mentioned by respondents, with those mentioned by only a few being discarded. While the distinction between compliers and non-compliers can provide some preliminary insights into the beliefs that distinguish the two groups, this analysis is best left for the belief measurement phase when a larger sample is involved. The remaining beliefs were then assessed in terms of their potential to be influenced by an onsite communication intervention, as not all beliefs lend themselves to being influenced by persuasive communication. For example, some beliefs were redundant or too vague to have any persuasive impact, while others based on people’s own direct experiences, capabilities or subjective assessments generally did not lend themselves to persuasive influence in a brief communication encounter (as is the case with visitors reading a sign).

Based on these selection criteria, the following beliefs were chosen for the next phase of the research:

1. If I pick up rubbish from this track, I will prevent harm to wildlife and their habitat (behavioural belief).
2. If I pick up rubbish from this track, I will prevent water pollution (behavioural belief).
3. If I pick up rubbish from this track, I will set a good example for others (behaviour belief).
4. I believe that other track walkers who can see me think that I should pick up rubbish from this track (Normative belief).

Given that the persuasive communication interventions that would be developed in a later phase would have a Tasmania Parks and Wildlife Service logo and information concerning the location of rubbish bins, it was not necessary to carry the control beliefs (relating to bins) forward into the next phase, as they will be performing a role in the intervention regardless.
Phase 2: Belief Measurement

Following the belief elicitation phase, the next step in developing a persuasive communication intervention involves measuring the strength and importance of each of the salient beliefs using a fixed-item instrument to determine those that should be targeted in the intervention. For each of the three behavioural beliefs and the one normative belief at Russell Falls, two questions were asked: one measuring the strength of each belief, while the other involved an evaluation measure for the behavioural beliefs and a motivation to comply measure for the normative belief. These dual measures were then multiplied together to form a cross-product for each belief.

Belief measurement research was undertaken at Russell Falls over two days in May 2006. This involved self-completion questionnaires that were personally administered and returned onsite. A sample of 68 visitors was surveyed (33 compliers and 35 non-compliers).

Following the coding scheme recommended by Francis, Eccles, Johnston, Walker, Grimshaw, Foy, Kaner, Smith & Bonetti (2004b), the strength of each outcome for the three behavioural beliefs was measured on a seven-point unipolar scale from +1 (‘unlikely’) to +7 (‘likely’). The accompanying outcome evaluation was measured on a bipolar scale from -3 (‘bad’) to +3 (‘good’). For the single normative belief, strength was measured on a bipolar scale from -3 (‘other track walkers who can see me think I should not pick up rubbish from this track’) to +3 (‘other track walkers who can see me think I should pick up rubbish from this track’). Visitors’ motivation to comply with the expectations of other track walkers was measured on a unipolar scale from +1 (‘I do not want to do what other track walkers who can see me think I should do’) to +7 (‘I want to do what other track walkers who can see me think I should do’). The range of the resulting cross-products was therefore -21 to +21 for each belief.

The mean strength, evaluation and cross-product for each behavioural belief at Russell Falls are shown in Table 9. The most noticeable difference in the cross-products was the behavioural belief of ‘setting a good example for others’, with compliers holding stronger beliefs than non-compliers. A similar outcome is illustrated in Table 10 that contains the mean belief strength, motivation to comply and cross-product of the normative belief concerning ‘other track walkers.’ The significant difference in the mean cross-product suggests that compliers are more influenced by the presence of other track walkers compared to non-compliers, which is consistent with the behavioural belief of setting a good example.

Given the similar underlying foundations of these beliefs, it was decided to focus only on the behavioural belief of ‘setting a good example for others’ as the target belief of the persuasive communication intervention. While there was also a significant difference in the belief ‘prevent water pollution’, it did not have as much potential for persuasion (i.e. the cross-products were already quite high in favour of the belief).

Table 9: Strengths, evaluations and cross-products of the salient behavioural beliefs at Russell Falls for compliers (C) and non-compliers (NC)

<table>
<thead>
<tr>
<th>Belief</th>
<th>Mean Belief Strength (+1 to +7)</th>
<th>Mean Evaluation (-3 to +3)</th>
<th>Mean Cross-product (-21 to +21)</th>
<th>Difference between C and NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent harm to wildlife and their habitat</td>
<td>6.41</td>
<td>6.09</td>
<td>2.38</td>
<td>2.89</td>
</tr>
<tr>
<td>Set a good example for others</td>
<td>6.00</td>
<td>4.15</td>
<td>2.82</td>
<td>2.43</td>
</tr>
<tr>
<td>Prevent water pollution</td>
<td>6.26</td>
<td>5.74</td>
<td>2.97</td>
<td>2.71</td>
</tr>
</tbody>
</table>

* The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.05).
** The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.01)

---

1 Ajzen & Fishbein (in press) and Ajzen (2007 pers. comm., 5 May) point out that sometimes it is better to use a bi-polar (-3 to +3) measurement of all belief components. They recommend scoring the belief data both ways and then using the coding scheme that produces a belief-based attitude measure that correlates more strongly with a direct measure of attitude. When this empirical criterion was applied to the Russell Falls data, the resulting correlations were statistically indistinguishable.
Table 10: Strength, motivation to comply and cross-product of the salient normative belief at Russell Falls for compliers (C) and non-compliers (NC)

<table>
<thead>
<tr>
<th>Belief</th>
<th>Mean Belief Strength (-3 to +3)</th>
<th>Mean Motivation to Comply (+1 to +7)</th>
<th>Mean Cross-product (-21 to +21)</th>
<th>Difference between C and NC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>NC</td>
<td>C</td>
<td>NC</td>
</tr>
<tr>
<td>Other walkers</td>
<td>2.26</td>
<td>0.71</td>
<td>5.15</td>
<td>4.34</td>
</tr>
</tbody>
</table>

** The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.01)

Intervention design

Two messages were developed in conjunction with staff from the Tasmania Parks and Wildlife Service that targeted the belief of ‘setting a good example for others’ (see Figure 2). Theoretical principles from the ELM were applied to guide the intervention design process, and while no ELM variables were operationalised in the study, the model nevertheless informed decisions related to titles, subtitles, message text and layout to foster opportunities for peripheral, and more importantly, central route processing.

To encourage elaboration among visitors reading the interventions, the messages were limited to a few easy-to-read sentences that were designed to be personally relevant and provocative in terms of the questions they asked of the reader. Both messages contained the logo of the Tasmania Parks and Wildlife Service to appeal to the normative influence of park authorities, and made reference to the location of a rubbish bin at the visitor centre. The messages also acknowledged that some rubbish may be ‘too disgusting’ to pick up, which came up as a behavioural belief in the elicitation phase (but was not viewed as a target belief, as it is based more on people’s own subjective assessment of what is ‘disgusting’ and is therefore less amenable to persuasion). Both messages contained main titles framed as questions to encourage visitors to elaborate and read the entire message, while a secondary title below the main text conveyed the essence of the target belief of setting a good example for others.

The different wording used for the main titles was the main point of difference between the two interventions. The message treatment with the title *What will you do when you see it?* involves an implementation intention component (Gollwitzer 1993, 1999), which attempts to stimulate a commitment to perform a specific goal-directed behaviour (in this case, picking up a piece of rubbish) when a situation to perform the behaviour is encountered (i.e. observing the crushed aluminium can on the track). In contrast, the intervention with the title *If not you, who? (It’s the right thing to do)* appealed to a personal norm, which refers to an individual’s own moral obligation to act according to his or her sense of what is the ‘right’ way to act in a given situation, irrespective of what other people might think. Previous research has demonstrated the potential of personal norms to influence behaviour (e.g. Parker, Manstead & Stradling 1995; Harland, Staats & Wilke 1999; Conner, Smith & McMillan 2003). By using these two different approaches to inform the titles of the interventions, comparisons could be made to determine if one approach was more effective in influencing behaviour.

Both messages were subjected to manipulation checks to ensure they were communicating what was intended. In both cases, the messages were found to be consistent with the theoretical basis that informed them (Appendix B). The communication media consisted of A-frame signs that allowed easy and temporary positioning of the interventions beside the Russell Falls walking track.
Phase 3: Evaluation of the Interventions

The purpose of the final phase of data collection was to determine whether the interventions were effective in increasing compliance with the behaviour of picking up rubbish from the Russell Falls track, as well as impacting on the relevant cognitive determinants underlying the behaviour. To achieve this, systematic observations were performed under alternating control (where no sign was present) and intervention (where one of the two treatments was positioned beside the track) conditions. A questionnaire (Appendix C) was also administered to visitors at the same time that contained a direct measure of attitude involving a three-item summed scale, a single item measure of prior behavioural intention concerning picking up rubbish from the Russell Falls track, and the belief-based questions that were included in the questionnaire from the previous phase.

Data collection was carried out in December 2006 and January 2007. The behaviour (compliance or non-compliance) of 571 randomly selected visitor groups was unobtrusively observed during this period. Once their behaviour had been classified, they were then requested to complete the fixed-item questionnaire. A total 259 observations were made during the control condition, 167 during What will you do when you see it?, and 145 when the If not you, who? intervention was in effect. Questionnaire response rates for the three conditions were high (94% for the control and 87% and 88% respectively for the two interventions). Therefore, bias due to non-response does not appear to be an issue in the data.

On treatment days, a single A-frame sign (with message panels inserted on both sides) was positioned by the side of the walking track about 100m away from the location of the crushed aluminium can (Figure 3). When walking to Russell Falls, visitors would initially walk past the can before being confronted with the sign. Virtually no visitor picked up the can prior to being exposed to the sign. On the return walk (using the same section of track), the same visitors would walk past the sign for the second time before approaching the can. It was at this point during the return walk that visitors were counted as compliers (those who picked up the can) or non-compliers (those who walked past the can). During the control condition, neither intervention was in place, but observations of walker behaviour were conducted in the same manner.
Results

The observational data regarding visitor groups walking past or picking up the can are contained in Table 11. The table shows the percentage of groups in which one member picked up the can under the treatment and control conditions. For the treatment, *If not you, who?*, 36.6% of visitor groups (or 1 out of every 2.7 walking groups) picked up the can, while for the treatment, *What will you do when you see it?*, 31.7% (1 out of every 3.2 groups) picked up the can. Under the control condition where no sign was used, only 17.4% (1 of every 5.7 groups) picked up the can. *If not you, who?* increased compliance by about 19% over the control, and *What will you do when you see it?* increased compliance by 14%. Both differences are statistically significant (p = .009 and .039 respectively). Thus, each of the interventions had a strong impact on visitor behaviour.

Table 11: Observed behaviour under control and treatment conditions at Russell Falls

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Number of visitor groups observed</th>
<th>Number of observed visitor groups that picked up the can</th>
<th>Percentage compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>If not you, who?</td>
<td>145</td>
<td>53</td>
<td>36.6%</td>
</tr>
<tr>
<td>What will you do</td>
<td>167</td>
<td>53</td>
<td>31.7%</td>
</tr>
<tr>
<td>when you see it?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (no sign)</td>
<td>259</td>
<td>45</td>
<td>17.4%</td>
</tr>
</tbody>
</table>

Having established that the two interventions had a significant impact on visitor behaviour, we wanted to explore the nature of this persuasive effect. To do this, we examined each intervention’s impact on the cross-products of the four salient beliefs, including the primary target belief (‘picking up rubbish sets a good example’). Comparisons were also made with respect to two different measures of respondents’ overall attitudes toward picking up rubbish. One of these was the direct measure (respondents’ replies to three separate attitude statements were summed to obtain this measure) and the other was a belief-based measure (which was the sum of their cross-products for each of the salient beliefs). According to the ELM, persuasion can occur either through a central route (in which effortful thought about the message causes impacts on respondents’ beliefs and attitudes related to the behaviour) or via a peripheral route (in which respondents do comparatively less thinking but are nevertheless influenced to comply by non-message factors, such as the credibility or likeability of the source). Therefore, if either intervention achieved persuasion through the central route, significant differences in the targeted belief and one or both of the attitude measures ought to ensue. If an impact on the targeted belief did not occur, then the observed effect on attitude and behaviour presumably would have occurred through the peripheral route (Ham 2007). The difference between the two is important for protected area managers since it is
well established that persuasion achieved through the central route is stronger, more enduring, and more predictive of message-relevant behaviour in the future (Petty & Cacioppo 1986).

Results of these comparisons (Table 12) suggest that respondents in both intervention groups were persuaded through the central route and that in both cases an impact on the targeted belief was responsible for this effect. In both interventions, the cross-product of the targeted belief (‘sets a good example’) was significantly higher than in the control group. As expected, none of the other measured beliefs was impacted. Additionally, both the direct and belief-based attitudes were significantly higher for the two intervention groups than for the control. These findings suggest that each of the two interventions was successful in provoking respondents to think about the respective messages and that an impact on the target belief occurred as a result. Furthermore, changes in the targeted belief appear responsible for a favourable shift in respondents’ attitude toward picking up rubbish.

Table 12: Comparison of mean cross-product and attitude scores for control and treatment groups

<table>
<thead>
<tr>
<th>Belief</th>
<th>Control: No sign (n = 105)</th>
<th>Sign 1: What will you do when you see it? (n = 126)</th>
<th>Sign 2: If not you, who? (n = 125)</th>
<th>Statistically significant differences (sig. level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sets a good example for others (cross-product)</td>
<td>13.02</td>
<td>16.70</td>
<td>16.50</td>
<td>Sign 1 &gt; Control (p = .000) Sign 2 &gt; Control (p = .000)</td>
</tr>
<tr>
<td>Prevent harm to wildlife and their habitat (cross-product)</td>
<td>17.63</td>
<td>19.03</td>
<td>17.87</td>
<td>No differences</td>
</tr>
<tr>
<td>Prevent water pollution (cross-product)</td>
<td>17.61</td>
<td>18.27</td>
<td>18.90</td>
<td>No differences</td>
</tr>
<tr>
<td>Influence of other walkers (cross-product)</td>
<td>9.21</td>
<td>11.02</td>
<td>10.00</td>
<td>No differences</td>
</tr>
<tr>
<td>Belief-based attitude</td>
<td>48.35</td>
<td>54.00</td>
<td>53.26</td>
<td>Sign 1 &gt; Control (p = .000) Sign 2 &gt; Control (p = .001)</td>
</tr>
<tr>
<td>Direct attitude</td>
<td>5.33</td>
<td>7.62</td>
<td>7.78</td>
<td>Sign 1 &gt; Control (p = .000) Sign 2 &gt; Control (p = .000)</td>
</tr>
</tbody>
</table>

Since the persuasive impact on the targeted belief could be rooted either in a change in the belief strength component (i.e. the likelihood of setting a good example) or a change in the evaluation component (i.e. whether setting a good example is good or bad), we further analysed the results to more specifically identify the sources of influence achieve by the two interventions. Results (Table 13) reveal that the persuasive effect of the two interventions resulted from an impact on both belief components. Compared to the control group, respondents in the intervention conditions were significantly stronger in their belief that picking up rubbish sets a good example for other walkers as well as having a significantly more positive evaluation of this outcome.

Table 13: Strengths, evaluations and cross-products of the targeted behavioural belief at Russell Falls (control versus interventions)

<table>
<thead>
<tr>
<th>Belief</th>
<th>Mean Belief Strength (+1 to +7)</th>
<th>Mean Evaluation (-3 to +3)</th>
<th>Mean Cross-product (-21 to +21)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Sign 1 Sign 2 Control Sign 1 Sign 2 Control Sign 1 Sign 2</td>
<td>Control Sign 1 Sign 2 Control Sign 1 Sign 2</td>
<td>Control Sign 1 Sign 2 Control Sign 1 Sign 2</td>
</tr>
<tr>
<td>Set a good example for others</td>
<td>5.33 5.92* 5.97* 2.33 2.80* 2.74* 13.02 16.70* 16.50*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significantly higher than the control (p < .001). Sign 1 and Sign 2 scores were not significantly different.
A final test of the persuasive effect of the interventions examined their impact on visitors’ prior intentions with respect to picking up rubbish. In particular, we wanted to know whether respondents who arrived at Russell Falls with either a negative intention (i.e. intending not to pick up rubbish they encountered on the track) or a neutral intention (i.e. having no intention either way) would be persuaded by the interventions to pick up rubbish when they encountered it. Of the 356 overall respondents, 247 fell into the category of having a negative or neutral intention. Of these, 42% were observed picking up the can when they encountered it on the track. When these acts of compliance are broken out according to the experimental condition in effect on the day (Table 14), it is clear that both interventions outperformed the control in terms of changing pre-walk behavioural intentions. Whereas 20 out of 67 respondents in the control condition picked up the can (30%), about 44% picked up the can when either intervention was in effect. These results suggest that the two interventions effectively changed respondents’ intention with respect to picking up rubbish.

Table 14: Impact on behaviour of respondents with negative or neutral prior intentions (n = 247)

<table>
<thead>
<tr>
<th>Observed behaviour of respondents who arrived intending not to pick up the can or with no prior intention</th>
<th>Control</th>
<th>What will you do when you see it?</th>
<th>If not you, who?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picked up the can</td>
<td>20 (29.9%)</td>
<td>38 (44.2%)</td>
<td>41 (43.6%)</td>
</tr>
<tr>
<td>Did not pick up the can</td>
<td>47 (70.1%)</td>
<td>48 (55.8%)</td>
<td>53 (56.4%)</td>
</tr>
</tbody>
</table>

Summary and Implications of Findings at Russell Falls

In summary, the three phases of research at Russell Falls were successful in (1) identifying the salient beliefs of Russell Falls track walkers with respect to picking up rubbish found on the track, (2) isolating the belief that ‘picking up rubbish sets a good example for others’ as having optimal persuasion potential, and (3) targeting this belief in messages designed to increase the likelihood that track walkers would pick up rubbish they encountered on the trail.

As predicted by the TPB, if the interventions were successful in impacting the targeted belief, more positive attitudes to the desired behaviour ought to result. Our finding that these impacts occurred indicates that respondents processed the interventions via the central route to persuasion. Similarly, such an attitudinal impact would be expected in the TPB to manifest itself in pro-behaviour intentions and actual overt behaviour. These findings also emerged from the analysis.

Although both interventions led to significant impacts on their relevant target beliefs and attitudes, If not who? (which appealed to a personal norm) led to 5% greater compliance than What will you do when you see it? (which attempted to activate an implementation intention). The value of appealing to personal norms in certain kinds of environmental communication has been discussed in a numbers of studies (e.g. Smith, Hugdtedt & Petty 1994; Stern & Dietz 1994; Geller 1995; Lackey, Ham & Hall 2002; Vining & Ebree 2002; Corbett 2005; Ham & Weiler 2005; Morgan & Hughes 2006). Although activating an individual’s altruistic side in a natural environment has not proven especially effective in deterring wildlife feeding wildlife (Hocket & Hall in press; Schwarzkopf 1984), it has shown merit in a range of other environmental behaviours including involvement in riparian restoration programs (Corbett 2002), staying on designated trails in protected areas (Ham & Weiler 2005), willingness to support environmental action (Stern & Dietz 1994; household recycling (Smith, Hugdtedt & Petty 1994), and organic food consumption (Thøgersen 2002). From this study’s findings, appealing to a personal norm appears also to have potential in persuading visitors to pick up rubbish in certain kinds of natural settings.

A conclusion is that both interventions proved effective in persuading Russell Falls track walkers to pick up rubbish. Each was successful in impacting the cognitive determinants of the behaviour as well as the behaviour itself. While If not you, who? led to about 5% more compliance than What will you do when you see it?, both messages significantly outperformed the control in terms of behavioural influence. In addition, both interventions succeeded in impacting the targeted belief and producing strong favourable attitude impacts with respect to picking up rubbish.
Chapter 4

BADGER WEIR: RESULTS, DISCUSSION AND IMPLICATIONS

In this chapter we present the results of each phase of the research conducted at Badger Weir Picnic Area, Yarra Ranges National Park, Victoria, where the objective was to persuade picnickers not to feed birds. Results and relevant discussions are presented for the Phase 1 elicitation study, the Phase 2 beliefs measurement component (including the design of two interventions that resulted from the analysis), and the Phase 3 field experiment in which the interventions were evaluated according to their success in increasing compliance with the target behaviour and their impact on relevant TPB variables.

Description of Study Site

Yarra Ranges National Park is located 92km east of Melbourne. Its 76,000 ha contain the upper reaches of the Yarra River and protect the catchment for Melbourne’s domestic water supply. Within the park is a site called the Badger Weir Picnic Area, which is located 7km from the township of Healesville. Facilities in the Badger Weir Picnic Area include old-style shingle roof rotundas, wood barbecues and toilets. In addition, three well known walking tracks emanate from the area. The picnic area is surrounded by a protected water catchment sheltered by mature ash and gum forest. The hollows in the old trees provide homes and nesting sites for many native birds and mammals. Picnicking at Badger Weir is a popular activity for local and interstate visitors. Food either left behind or openly offered to gregarious birds is viewed by Parks Victoria as one of the key management issues at the site. Additional information about Badger Weir can be found online at http://www.parkweb.vic.gov.au/resources05/05_0504.pdf

Phase 1: Belief Elicitation

Data collection for the belief elicitation phase at Badger Weir occurred over a series of days in January and February 2006, and used the same research and analysis procedures described in the previous section on Russell Falls. Compliers were visitors who were observed not feeding the birds at the Badger Weir Picnic Area, while non-compliers were visitors who were observed intentionally (as opposed to accidentally) feeding the birds with either food scraps or bird seed brought onsite. Saturation was reached after 22 compliers and 14 non-compliers were interviewed.

Tables 15 to 18 contain the frequency of the coded responses to the belief questions. Only behavioural and normative beliefs are shown, as no relevant control beliefs emerged.

<table>
<thead>
<tr>
<th>What do you see as the advantages or good things that could occur if you did not feed the birds?</th>
<th>Compliers (n=22)</th>
<th>Non-compliers (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds won’t become pests (e.g. harassing visitors for food)</td>
<td>6 (28%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>Birds would be healthier (dietary well-being)</td>
<td>11 (50%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>It would keep the birds wild</td>
<td>8 (36%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>Birds would be safer from human dangers (e.g. being injured by cars or people trying to grab them)</td>
<td>3 (14%)</td>
<td>4 (29%)</td>
</tr>
<tr>
<td>Birds won’t rely on humans for their survival</td>
<td>14 (64%)</td>
<td>6 (43%)</td>
</tr>
<tr>
<td>Birds won’t be a health hazard to humans (e.g. they may pass on disease)</td>
<td>1 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Nothing</td>
<td>0 (0%)</td>
<td>3 (21%)</td>
</tr>
</tbody>
</table>
ASKING VISITORS TO HELP

Table 16: Negative behavioural beliefs of visitors at Badger Weir

<table>
<thead>
<tr>
<th>What do you see as the disadvantages or bad things that could occur if you did not feed the birds?</th>
<th>Compliers (n=22)</th>
<th>Non-compliers (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The birds won’t come so close</td>
<td>7 (32%)</td>
<td>10 (71%)</td>
</tr>
<tr>
<td>It would not be good for the well-being of the birds (e.g. they won’t have enough to eat without us feeding them)</td>
<td>5 (23%)</td>
<td>6 (43%)</td>
</tr>
<tr>
<td>There would be a decline in the conspicuous presence of the birds</td>
<td>2 (9%)</td>
<td>5 (36%)</td>
</tr>
<tr>
<td>It would reduce the tourism appeal of the site</td>
<td>1 (5%)</td>
<td>4 (29%)</td>
</tr>
<tr>
<td>Kids would not learn to appreciate nature (e.g. by not having a close interaction with the birds)</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>The park would become untidy (e.g. food scraps can be given to the birds that would otherwise become waste)</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Nothing</td>
<td>10 (45%)</td>
<td>1 (7%)</td>
</tr>
</tbody>
</table>

Table 17: Positive normative beliefs of visitors at Badger Weir

<table>
<thead>
<tr>
<th>Who (individuals or groups whose opinions you consider personally influential) do you think would support or approve if you did not feed the birds?</th>
<th>Compliers (n=22)</th>
<th>Non-compliers (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spouse</td>
<td>2 (9%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Park authorities</td>
<td>2 (9%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>Accompanying adult family or friends who don’t like feeding the birds</td>
<td>4 (18%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Environmentally-minded people</td>
<td>3 (14%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>Nobody</td>
<td>10 (45%)</td>
<td>10 (71%)</td>
</tr>
</tbody>
</table>

Table 18: Negative normative beliefs of visitors at Badger Weir

<table>
<thead>
<tr>
<th>Who (individuals or groups whose opinions you consider personally influential) do you think would object or disapprove if you did not feed the birds?</th>
<th>Compliers (n=22)</th>
<th>Non-compliers (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accompanying adult family or friends who wanted or anticipated feeding the birds</td>
<td>2 (9%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>My children/grandchildren</td>
<td>1 (5%)</td>
<td>3 (21%)</td>
</tr>
<tr>
<td>Other people who feed the birds</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Nobody</td>
<td>20 (91%)</td>
<td>10 (71%)</td>
</tr>
</tbody>
</table>

Analysis of the frequency of the beliefs and their potential for persuasion (as per the methods detailed in the previous section on Russell Falls) resulted in the following beliefs (all behavioural) being chosen for the next phase of the research:

1. If I do not feed the birds, I will miss out on having a close interaction with them (behavioural belief).
2. If I do not feed the birds, they will not have enough to eat (behavioural belief).
3. If I do not feed the birds, they will not rely on humans for their survival (behavioural belief).
4. If I do not feed the birds, it will keep them wild (behavioural belief).
5. If I do not feed the birds, they will be healthier (behavioural belief).
6. If I do not feed the birds, people will not see them as much (behavioural belief).
7. If I do not feed the birds, they will not harass people for food (behavioural belief).
8. If I do not feed the birds, they will be safer from visitors who might disturb or harm them (behavioural belief).

Phase 2: Belief Measurement
Belief measurement research was undertaken at Badger Weir over a number of weekends during April and August 2006 to determine which of the salient elicited beliefs distinguished non-feeders from feeders. This involved self-completion questionnaires that were personally administered and returned onsite. Fifty compliers and 47 non-compliers were surveyed.

Using the same scoring system as the Russell Falls belief measurement instrument, the mean strength, evaluation and cross-product for each behavioural belief are shown in Table 19. From the eight behavioural beliefs, significant mean differences existed in the cross-products of compliers and non-compliers for all but two (‘Birds not having enough to eat’ and ‘Birds will be kept wild’). Given that it was not feasible (in time and resource terms) to target all of the remaining beliefs in a series of onsite communication interventions, further analysis of the results and considerations of the persuasion potential of certain beliefs (e.g. ‘I will miss out on having a close interaction with the birds’ is a belief based more on direct experience and therefore potentially difficult to influence) condensed the number of target beliefs to two: ‘If I do not feed the birds, they will not rely on humans for their survival’ and ‘If I do not feed the birds, they will not harass people for food’ (these beliefs also had the greatest mean difference in the cross-products between compliers and non-compliers).

Table 19: Strengths, evaluations and cross-products of the salient behavioural beliefs at Badger Weir for compliers (C) and non-compliers (NC)

<table>
<thead>
<tr>
<th>Belief</th>
<th>Mean Belief Strength (+1 to +7)</th>
<th>Mean Evaluation (-3 to +3)</th>
<th>Mean Cross-product (-21 to +21)</th>
<th>Difference between C and NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miss out on having a close interaction with the birds</td>
<td>3.24</td>
<td>-0.66</td>
<td>-3.08</td>
<td>4.28*</td>
</tr>
<tr>
<td>Birds not having enough to eat</td>
<td>1.44</td>
<td>-1.96</td>
<td>-2.34</td>
<td>1.92</td>
</tr>
<tr>
<td>Birds not relying on humans for their survival</td>
<td>5.74</td>
<td>2.68</td>
<td>16.08</td>
<td>6.51**</td>
</tr>
<tr>
<td>Birds will be kept wild</td>
<td>5.62</td>
<td>2.12</td>
<td>13.16</td>
<td>3.67</td>
</tr>
<tr>
<td>Birds will be healthier</td>
<td>6.30</td>
<td>2.72</td>
<td>17.18</td>
<td>6.05**</td>
</tr>
<tr>
<td>People will not see the birds as much</td>
<td>3.74</td>
<td>-1.14</td>
<td>-4.52</td>
<td>5.69**</td>
</tr>
<tr>
<td>Birds will not harass people for food</td>
<td>5.54</td>
<td>2.52</td>
<td>14.30</td>
<td>9.75**</td>
</tr>
<tr>
<td>Birds will be safer from visitors who might disturb or harm them</td>
<td>5.88</td>
<td>2.48</td>
<td>15.82</td>
<td>5.86**</td>
</tr>
</tbody>
</table>

* The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.05)
** The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.01)

2 Ajzen & Fishbein (in press) and Ajzen (2007 pers. comm., 5 May) point out that sometimes it is better to use a bi-polar (-3 to +3) measurement of all belief components. They recommend scoring the belief data both ways and then using the coding scheme that produces a belief-based attitude measure that correlates more strongly with a direct measure of attitude. When this empirical criterion was applied to the Badger Weir data, the resulting correlations were statistically indistinguishable. As at Russell Falls, the unipolar scheme recommended by Francis et al. (2004b) was used because its interpretation is more straightforward.
**Intervention design**

Two interventions were developed in conjunction with staff at Parks Victoria (see Figure 4). In contrast to Russell Falls, where the same belief was targeted in both messages (but delivered using different theoretical approaches), the treatments at Badger Weir targeted separate beliefs. Again, the ELM was applied to inform decisions related to titles, subtitles, message text and layout.

Both intervention messages contained provocative titles to encourage visitors to elaborate and read the entire message, while a secondary title below the main text conveyed the essence of the target belief. The intervention with the title, *Your choice matters. Birds, tame or wild?*, targeted the belief related to birds not relying on humans for their survival. In targeting this belief, the message acknowledged the prevalence and popularity of bird feeding, but reminded visitors that the birds at Badger Weir should not be treated like domestic pets and that national parks are places where wildlife should be allowed to exist naturally (including finding their own food). In contrast, the intervention with the title, *How to ruin someone else’s picnic*, targeted the belief related to the birds not harassing people for food by suggesting that other park visitors have been complaining about people feeding the birds and ruining their national park experience. A Parks Victoria logo was positioned at the bottom of each of the messages.

The two messages were subjected to manipulation checks to ensure they were communicating what was intended. In both cases, the messages were found to be consistent with the theoretical basis that informed them (Appendix B). The communication media consisted of A-frame signs that allowed easy and temporary positioning of the interventions in the Badger Weir picnic area.

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**Figure 4: Badger Weir interventions**

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**Phase 3: Evaluation of the Interventions**

The purpose of the final phase of data collection was to determine whether the interventions were effective in increasing visitor compliance with the no feeding policy at Badger Weir Picnic Area. If a change in behaviour was achieved, a further aim was to determine whether it was a result of a persuasive impact on the relevant cognitive determinants underlying the behaviour. To achieve this, observations of visitor behaviour were performed under alternating control and intervention conditions. A sub-sample of these visitors was also administered a belief-measurement questionnaire. The questionnaire (Appendix D) contained a direct measure of
attitude involving a three-item summed scale, a single-item measure of prior behavioural intention concerning
feeding birds at Badger Weir, and the belief-measurement questions that were included in the questionnaire from
the previous phase of research.

Data collection was undertaken in January and April 2007. The behaviour (compliance or non-compliance)
of 273 randomly selected visitor groups was unobtrusively observed during this period. Once their behaviour had
been classified (as complier or non-complier), a systematically-selected sub-sample comprising 151 of these
visitors completed the fixed-item questionnaire. Eighty-seven observations were made during the control
condition, 118 during Your choice matters, and 68 when the How to ruin someone else’s picnic intervention was
in effect. Questionnaire response rates for the three conditions were high (93% for the control and 85% and 91%
respectively for the two interventions). Therefore, bias due to non-response does not appear to be an issue in the
data.

Given the large size and complex configuration of the Badger Weir Picnic Area (which involves multiple car
parks, access points, and picnic locations), it was not practical to fabricate enough signs to ensure message
exposure throughout the entire site. It was therefore decided to restrict data collection to specific locations within
the Badger Weir Picnic Area, which also made the task of observing compliance more manageable for data
collectors.

During treatment days, two A-frame signs containing the prescribed intervention message were positioned in
each data collection location alongside popular walking paths and thoroughfares to ensure message coverage and
visitor exposure to the interventions (see Figure 5). The behaviour of visitor groups in these locations (feeding or
not feeding birds) was observed and recorded.

![A-frame sign at the Badger Weir Picnic Area](image)

Figure 5: A-frame sign at the Badger Weir Picnic Area

During control days, neither intervention was in view of visitors and the normal pre-existing communication
environment prevailed. The pre-existing communication environment consisted of two permanent signs
pertaining to wildlife feeding that could not be removed (Figure 6). Since these were in view of visitors both
during treatment and control conditions, they were a constant throughout the field experiment. Thus, our
evaluation of the two interventions involved determining whether either of them performed better than the pre-
existing communication environment.
Results

The observational data regarding visitor groups feeding or not feeding the birds are contained in Table 20. Under the control condition (in which the pre-existing signage was the only communication in place), 69% of visitor groups did not feed the birds. When *Your choice matters* was in effect, the percentage of compliers increased to 79%. Conversely, *How to ruin someone else’s picnic* resulted in 59% compliance. While this 20% difference in compliance rates of the two interventions was statistically significant (p < .05), neither was significantly higher than the control condition compliance rate. Thus, our observations of behaviour suggest that neither intervention outperformed the existing signage in terms of achieving compliance.

Table 20: Observed behaviour under control and treatment conditions at Badger Weir

<table>
<thead>
<tr>
<th>Experimental condition</th>
<th>Number of visitor groups observed</th>
<th>Number of observed visitor groups that did not feed birds</th>
<th>Percentage compliance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your choice matters</td>
<td>118</td>
<td>93</td>
<td>78.8%*</td>
</tr>
<tr>
<td>How to ruin someone else’s picnic</td>
<td>68</td>
<td>40</td>
<td>58.8%*</td>
</tr>
<tr>
<td>Control (existing signage)</td>
<td>87</td>
<td>60</td>
<td>69.0%*</td>
</tr>
</tbody>
</table>

* Significantly different from the other intervention (p < .05)

These results could be due to a numbers of factors. One is that the messages contained in the interventions were not persuasive enough. This could be due to shortcomings in the design, content or placement of the signs, or it could be due to the way in which Badger Weir picnickers perceive and process the messages. Because the area attracts a significant proportion of repeat local users, there is the possibility that feeding birds at Badger Weir falls into the category of “habitual” behaviour, which has sometimes been found difficult to predict using the TPB (Aarts, Verplanken & van Knippenberg 1998; Albarracin, Johnson, Fishbein & Muellerleile 2001; Orbell, Blair, Sherlock, & Conner 2001; Bamberg, Ajzen & Schmidt 2003). Another plausible explanation for the interventions’ lack of behavioural impact is that the current signage at Badger Weir is already having maximum success and that achieving compliance beyond the current level of about 70% will require more direct management interventions such as patrolling and monitoring visitor behaviour at the site. Whether such actions are prudent and necessary, of course, would depend on Parks Victoria’s determination of whether current levels of compliance are adequate.

The persuasiveness of the interventions was assessed by comparing each intervention’s impact on the cross-products of the eight salient beliefs, including the respective primary target beliefs (that “not feeding birds will mean that they won’t rely on humans for their survival” and “not feeding birds will lead them to not harass people for food”). Comparisons were also made with respect to two different measures of respondents’ overall attitudes toward not feeding the birds. One of these was the direct measure (respondents’ replies to three separate attitude statements were summed to obtain this measure) and the other was a belief-based measure (which was the sum of their cross-products for each of the salient beliefs). According to the ELM, persuasion can occur either through a central route (in which effortful thought about the message causes impacts on respondents’
beliefs and attitudes related to the behaviour) or via a peripheral route (in which respondents do comparatively less thinking but are nevertheless influenced to comply by non-message factors, such as the credibility or likeability of the source). Therefore, if either intervention achieved persuasion through the central route, significant differences in the targeted belief and one or both of the attitude measures would be expected. However, since a corresponding impact on bird-feeding behaviour did not result from either intervention, a conclusion would be that the intervention’s central-route impact on the targeted belief and attitude was simply not sufficient to induce the desired behaviour. Conversely, if an attitude impact occurred in the absence of a corresponding impact on the targeted belief, we would conclude that a peripheral-route effect was achieved, but as is often the case with peripheral-route persuasion, it was too weak to induce behaviour (Chaiken 1980; Petty & Cacioppo 1986).

Results of these comparisons (Table 21) suggest that neither intervention was successful in achieving any kind of persuasive effect. This is consistent with the finding that neither produced an improvement in compliance behaviour over the control. In both interventions, the cross-product of the belief it targeted was not statistically different from the control group. In *Your choice matters* this was the belief that ‘not feeding birds will mean that they won’t rely on humans for their survival’, and in *How to ruin someone else’s picnic* the targeted belief was that ‘not feeding birds will lead them to not harass people for food’. As expected, none of the other measured beliefs was impacted either. Additionally, no differences were found between the control and interventions in either the direct or belief-based attitude. These findings suggest that despite the 20% greater success of *Your choice matters* in terms of compliance rates (79% versus 59%), neither intervention had an impact on the target belief or respondents’ attitude to the behaviour of not feeding birds.

### Table 21: Comparison of mean cross-product and attitude scores for control and treatment groups

<table>
<thead>
<tr>
<th>Belief</th>
<th>Control: Existing signage (n = 32)</th>
<th>Sign 1: Your choice matters (n = 55)</th>
<th>Sign 2: How to ruin someone else’s picnic (n = 63)</th>
<th>Statistically significant differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds not relying on humans for their survival (cross-product)</td>
<td>13.59</td>
<td>9.44</td>
<td>12.60</td>
<td>No differences</td>
</tr>
<tr>
<td>Birds will not harass people for food (cross-product)</td>
<td>10.03</td>
<td>8.07</td>
<td>11.11</td>
<td>No differences</td>
</tr>
<tr>
<td>Miss out on having a close interaction with the birds (cross-product)</td>
<td>-5.53</td>
<td>-4.08</td>
<td>-5.25</td>
<td>No differences</td>
</tr>
<tr>
<td>Birds not having enough to eat (cross-product)</td>
<td>-4.20</td>
<td>-3.06</td>
<td>-3.06</td>
<td>No differences</td>
</tr>
<tr>
<td>Birds will be kept wild (cross-product)</td>
<td>12.69</td>
<td>12.24</td>
<td>14.66</td>
<td>No differences</td>
</tr>
<tr>
<td>Birds will be healthier (cross-product)</td>
<td>15.38</td>
<td>15.67</td>
<td>15.64</td>
<td>No differences</td>
</tr>
<tr>
<td>People will not see the birds as much (cross-product)</td>
<td>-5.53</td>
<td>-6.98</td>
<td>-8.40</td>
<td>No differences</td>
</tr>
<tr>
<td>Birds will be safer from visitors who might disturb or harm them (cross-product)</td>
<td>13.94</td>
<td>14.06</td>
<td>15.73</td>
<td>No differences</td>
</tr>
<tr>
<td>Belief-based attitude</td>
<td>50.87</td>
<td>46.69</td>
<td>52.87</td>
<td>No differences</td>
</tr>
<tr>
<td>Direct attitude</td>
<td>14.21</td>
<td>15.18</td>
<td>15.13</td>
<td>No differences</td>
</tr>
</tbody>
</table>

NOTE: N = 151
To assess the degree to which bird feeding at Badger Weir might be subject to habit, we compared the frequency of compliers among first-time and repeat visitors, reasoning that if repeat visitors were more likely to feed the birds than first-time visitors, the behaviour might be more ingrained from their traditional use of the Badger Weir picnic site, and therefore less amenable to persuasive influence. In addition, we compared the mean prior intentions of repeat and first-time visitors. If bird feeding is habitual among repeat visitors, their prior intentions should lean more toward non-compliance (feeding) as compared to first-time visitors.

Results of both analyses support the case for habitual feeding by repeat visitors. A comparison of the compliance rates of first-time and repeat visitors (Table 22) shows that first-time visitors were significantly more likely not to feed the birds (94% versus 71%). In addition, first-time visitors had a significantly stronger intention to refrain from feeding the birds compared to repeat visitors (Table 23). Specifically, the prior intention of repeat visitors’ leaned in favour of feeding the birds whereas the intention of first-time visitors was decidedly in favour of not feeding the birds. Taken together, these findings provide evidence that feeding the birds at Badger Weir may be a comparatively entrenched use pattern by frequent repeat visitors that is not amenable to persuasive influence.

Table 22: Comparison of compliance rates for first-time and repeat visitors (n = 151)*

<table>
<thead>
<tr>
<th></th>
<th>First-time visitors</th>
<th>Repeat visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliers</td>
<td>67 (94.4%)</td>
<td>57 (71.3%)</td>
</tr>
<tr>
<td>Non-compliers</td>
<td>4 (5.6%)</td>
<td>23 (28.7%)</td>
</tr>
<tr>
<td>Totals</td>
<td>71 (100%)</td>
<td>80 (100%)</td>
</tr>
</tbody>
</table>

* Chi-square is significant (p = .000)

Table 23: Comparison of prior intentions of first-time and repeat visitors (n = 151)*

<table>
<thead>
<tr>
<th></th>
<th>First-time visitors</th>
<th>Repeat visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean prior intention</td>
<td>5.14</td>
<td>3.91</td>
</tr>
</tbody>
</table>

* Difference is significant (F = 13.66; p = .000)

As a preliminary test of this hypothesis, the original analysis of the impact of each intervention on the key belief cross-products and attitude measures was re-conducted using just first-time visitors and again for just repeat visitors. Although sub-sample sizes are relatively small, results for first-time visitors only (Table 24) show a pattern of outcomes that is different from the one depicted in Table 21 when all respondents were lumped together. When only first-time visitors are considered, How to ruin someone else’s picnic outperformed the control condition in its impact on the target belief (‘not feeding birds will lead them to not harass people for food’), and it appears the more persuasive of the two interventions in terms of its impact on three other beliefs and the direct attitude. Notably, How to ruin someone else’s picnic also outperformed Your choice matters on the belief that ‘not feeding birds will mean that they won’t rely on humans for their survival’, even though this belief was targeted by the other intervention. This result suggests a type of effect Fishbein and Ajzen (1981) termed ‘impact’ in which a strong persuasive effect on a salient belief can lead to impacts on other beliefs not specifically mentioned in the message. Neither intervention produced a significant change in the belief-based attitude, possibly because so many salient beliefs were involved that a change in more than half of them would be required to make a significant difference in overall attitude, particularly considering the small and unequal sub-sample sizes.

Notably, when the same analyses were performed on the sub-sample of repeat visitors, no significant differences between the interventions and control emerged for any belief or attitude. These findings point to a significant difference between first-time visitors and repeat visitors, possibly because of a habitual influence on the latter.
Table 24: Comparison of first-time visitors’ mean cross-product and attitude scores for control and treatment groups (n = 71)

<table>
<thead>
<tr>
<th>Belief</th>
<th>Control: Existing signage (n = 17)</th>
<th>Sign 1: Your choice matters (n = 31)</th>
<th>Sign 2: How to ruin someone else’s picnic (n = 23)</th>
<th>Statistically significant differences</th>
<th>significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds not relying on humans for their survival (cross-product)</td>
<td>13.06</td>
<td>7.65</td>
<td>15.30</td>
<td>Sign 2 &gt; Sign 1 (p = .01)</td>
<td></td>
</tr>
<tr>
<td>Birds will not harass people for food (cross-product)</td>
<td>6.76</td>
<td>1.16</td>
<td>13.52</td>
<td>Sign 2 &gt; Control (p = .000)</td>
<td>Sign 2 &gt; Sign 1 (p = .000)</td>
</tr>
<tr>
<td>Miss out on having a close interaction with the birds (cross-product)</td>
<td>-3.41</td>
<td>-2.35</td>
<td>-1.86</td>
<td>No differences</td>
<td></td>
</tr>
<tr>
<td>Birds not having enough to eat (cross-product)</td>
<td>-5.13</td>
<td>-3.52</td>
<td>-1.48</td>
<td>Sign 2 &gt; Control (p = .046)</td>
<td></td>
</tr>
<tr>
<td>Birds will be kept wild (cross-product)</td>
<td>11.82</td>
<td>11.29</td>
<td>18.26</td>
<td>Sign 2 &gt; Control (p = .029)</td>
<td>Sign 2 &gt; Sign 1 (p = .006)</td>
</tr>
<tr>
<td>Birds will be healthier (cross-product)</td>
<td>14.41</td>
<td>16.55</td>
<td>15.13</td>
<td>No differences</td>
<td></td>
</tr>
<tr>
<td>People will not see the birds as much (cross-product)</td>
<td>-3.18</td>
<td>-6.42</td>
<td>-3.00</td>
<td>No differences</td>
<td></td>
</tr>
<tr>
<td>Birds will be safer from visitors who might disturb or harm them (cross-product)</td>
<td>14.65</td>
<td>13.83</td>
<td>16.77</td>
<td>No differences</td>
<td></td>
</tr>
<tr>
<td>Belief-based attitude</td>
<td>60.06</td>
<td>39.70</td>
<td>55.36</td>
<td>No differences</td>
<td></td>
</tr>
<tr>
<td>Direct attitude</td>
<td>13.76</td>
<td>15.74</td>
<td>17.32</td>
<td>Sign 2 &gt; Control (p = .016)</td>
<td></td>
</tr>
</tbody>
</table>

The combined implication of these results is that Badger Weir picnickers may comprise two different audiences with respect to the target behaviour of not feeding birds. One of these is first-time visitors who appear amenable to persuasive influence via onsite interpretation carrying messages such as the two we tested. For these relatively inexperienced visitors, *How to ruin someone else’s picnic* seems to be the better intervention of the two because of its success in influencing both its target belief and visitors’ direct attitude toward not feeding birds. It is possible that first-time visitors are more sensitive to normative influences because they are new to the site and feel an extra obligation to be good citizens.

The second audience consists of repeat visitors who appear more resistant to onsite persuasive communication. For these visitors, neither intervention performed well. It is noteworthy that *How to ruin someone else’s picnic* actually performed worse than the control condition in terms of observed compliance of the overall study sample, an indication that perhaps such a strong normative appeal angered or annoyed them. But the same intervention was effective with first-time visitors. To the extent that repeat visitors come mainly from the local area or region, Parks Victoria might consider community outreach programs a key strategy for reaching them. Presentations at civic gatherings, in schools and at community events such as fairs and festivals might prove particularly useful in the mid to long term.

However, a point raised by a number of psychologists is that evidence of frequent past behaviour does not necessarily imply habit (Eagly & Chaiken 1993; Verplanken & Orbell 2003; Ajzen & Fishbein 2005). According to Ajzen and Fishbein (2005), to establish a behaviour as habitual would require an independent measure of the
strength of habit which did not exist at the time of this study. Nevertheless, the differences described above between first-time visitors and repeat visitors do suggest that the two groups are amenable to different types of influences and that targeting them with different types of messages and delivery systems would be wise.

**Summary and Implications of Findings at Badger Weir**

In summary, the three phases of research at Badger Weir Picnic Area were successful in (1) identifying the salient beliefs of picnickers with respect to not feeding the birds, (2) isolating the beliefs that ‘not feeding birds will mean that they won’t rely on humans for their survival’ and that ‘not feeding birds will lead them to not harass people for food’ as having optimal persuasion potential, and (3) targeting these beliefs in messages designed to increase the likelihood that picnickers would refrain from feeding the birds.

As predicted by the TPB, if each intervention was successful in impacting its target belief, a more positive attitude to the desired behaviour ought to result. Our finding that these impacts did not occur within the overall sample corroborated the finding that neither intervention outperformed the control in terms of observed compliance. However, when first-time and repeat visitors were examined separately, we found that one of the interventions performed better for first-time visitors. Specifically, *How to ruin someone else’s picnic* produced impacts not only on its target belief but in respondents’ direct attitude to the behaviour. This suggests that a central-route persuasive effect occurred with the first-time visitors. The behavioural effect of these impacts was evident in the finding that first-time visitors were significantly more likely not to feed birds than repeat visitors.

For first-time visitors, the comparatively superior performance of *How to ruin someone else’s picnic* might be partially due to its emphasis on benefits to picnickers as opposed to stressing benefits to the birds (which were emphasised in *Your choice matters*). Similar findings have been reported in two other wildlife feeding studies (Hocket & Hall in press; Schwarzkopf 1984).

A conclusion is that both interventions proved effective in persuading first-time visitors not to feed the birds at Badger Weir. In particular, the strong normative appeal of *How to ruin someone else’s picnic* was successful in impacting the cognitive determinants of the behaviour as well as the behaviour itself. Results, however, suggest that alternative messages and delivery systems need to be considered for reaching repeat visitors.
In this chapter we present the results of each phase of the research conducted at Yellagonga Regional Park, Perth, Western Australia, where the objective was to persuade dog walkers to keep their dogs on a lead. Results and relevant discussions are presented for the Phase 1 elicitation study, the Phase 2 beliefs measurement component (including the design of a single intervention that resulted from the analysis), and the Phase 3 field experiment in which the intervention was evaluated according to their success in increasing compliance with the target behaviour and their impact on relevant TPB variables.

Description of Study Site

Yellagonga Regional Park is a 1400 ha recreation and conservation reserve located within the metropolitan area of Perth, Western Australia, approximately 20km north of the CBD. The park is a narrow corridor about 13km in length and varying from 1-1.5km in width. Yellagonga Regional Park encompasses a chain of lakes and wetlands, remnant bushland and recreational open space and is bordered by residential and commercial use areas. It was established to protect an area considered to have significant cultural, ecological, recreational and landscape value. The park is managed by the Department of Environment and Conservation for conservation and recreation purposes in a rapidly expanding urban area. It contains popular areas for picnicking and walking dogs. Although regulations require dog walkers to keep their dogs on a lead while in the park, many visitors do not comply. Dogs off lead not only harass other dogs and their owners, they also chase local wildlife. Convincing greater numbers of dog walkers to keep their pets on a lead is a major management goal at Yellagonga. See http://www.naturebase.net/component/option.com_hotproperty/task/view/id,7/Itemid,755/ for additional descriptions of the park.

Phase 1: Belief Elicitation

Data collection for the belief elicitation phase at Yellagonga Regional Park occurred over a series of days in April 2006 and used the same research and analysis procedures described in the previous sections on Russell Falls and Badger Weir. Compliers were visitors who were observed to keep their dogs on a lead while walking through the park. Non-compliers were visitors who were observed walking with their dog off the lead at any time in the park. Saturation was reached after 14 compliers and 17 non-compliers were interviewed. Tables 25 to 30 contain the frequency of the coded responses to the belief questions for behavioural, normative and control beliefs.

Table 25: Positive behavioural beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>What do you see as the advantages or good things that could occur if you kept the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog will be safer from snakes/other dogs</td>
<td>6 (43%)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Dog will be less of a nuisance to other people and dogs in the park</td>
<td>11 (79%)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Dog will be better controlled</td>
<td>8 (57%)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Nothing</td>
<td>3 (21%)</td>
<td>4 (24%)</td>
</tr>
</tbody>
</table>
Table 26: Negative behavioural beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>What do you see as the disadvantages or bad things that could occur if you kept the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>6 (43%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Dog won’t get enough exercise</td>
<td>5 (36%)</td>
<td>15 (88%)</td>
</tr>
<tr>
<td>Dog won’t have the freedom to run/explore/sniff around</td>
<td>3 (21%)</td>
<td>9 (53%)</td>
</tr>
<tr>
<td>Dog will be vulnerable to being attacked</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Less convenient/comfortable/enjoyable to walk the dog (it’s tiring to keep the dog on the lead)</td>
<td>0 (0%)</td>
<td>7 (41%)</td>
</tr>
<tr>
<td>Dog gets upset/restless</td>
<td>0 (0%)</td>
<td>3 (18%)</td>
</tr>
</tbody>
</table>

Table 27: Positive normative beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>Who (individuals or groups whose opinions you consider personally influential) do you think would support or approve if you kept the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerable/threatened park users (families with small kids, elderly people)</td>
<td>6 (43%)</td>
<td>6 (35%)</td>
</tr>
<tr>
<td>Joggers, cyclists (recreational conflict issues—reactions occur on the path during conflict situations)</td>
<td>4 (29%)</td>
<td>3 (18%)</td>
</tr>
<tr>
<td>Other park users</td>
<td>8 (57%)</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Other dog owners</td>
<td>8 (57%)</td>
<td>5 (29%)</td>
</tr>
<tr>
<td>People who don’t like dogs</td>
<td>3 (21%)</td>
<td>3 (18%)</td>
</tr>
<tr>
<td>People in the park without dogs</td>
<td>3 (21%)</td>
<td>10 (59%)</td>
</tr>
</tbody>
</table>

Table 28: Negative normative beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>Who (individuals or groups whose opinions you consider personally influential) do you think would object or disapprove if you kept the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nobody</td>
<td>12 (86%)</td>
<td>13 (76%)</td>
</tr>
</tbody>
</table>

Table 29: Positive control beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>What factors or circumstances enable or make it easy for you to keep the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good walking paths (no obstacles)</td>
<td>6 (43%)</td>
<td>3 (18%)</td>
</tr>
<tr>
<td>Having a well-trained dog</td>
<td>2 (14%)</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Nothing</td>
<td>2 (14%)</td>
<td>13 (76%)</td>
</tr>
</tbody>
</table>

Table 30: Negative control beliefs of visitors at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>What factors or circumstances make it difficult for you to keep the dog on a lead?</th>
<th>Compliers (n=14)</th>
<th>Non-compliers (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>8 (57%)</td>
<td>3 (18%)</td>
</tr>
<tr>
<td>Lead getting caught on obstacles/wrapped around my legs</td>
<td>3 (21%)</td>
<td>4 (24%)</td>
</tr>
<tr>
<td>Dog pulling/tugging on the lead</td>
<td>5 (36%)</td>
<td>13 (76%)</td>
</tr>
</tbody>
</table>
Analysis of the frequency of the beliefs and their potential for persuasion was conducted as per the methods detailed in the previous sections on Russell Falls and Badger Weir. The control beliefs were deemed to have little persuasion potential as they were primarily based on visitors’ direct experience in the park and were unlikely to be influenced by a message on a sign. An analysis of the remaining normative and behavioural beliefs resulted in the following being chosen for the next phase of the research (four behavioural and two normative):

1. If I keep my dog on a lead, it will not get enough exercise (behavioural belief).
2. If I keep my dog on a lead, it will be safer (behavioural belief).
3. If I keep my dog on a lead, it will not have the freedom to run and explore (behavioural belief).
4. If I keep my dog on a lead, it will be less of a nuisance to other people and dogs in the park (behavioural belief).
5. I believe that park users who fear dogs think that I should/should not keep my dog on a lead (normative belief).
6. I believe that other dog owners in the park think that I should/should not keep my dog on a lead (normative belief).

Phase 2: Belief Measurement

Belief measurement research was undertaken at Yellagonga Regional Park over a number of weekends and week days during August 2006 to determine which of the salient elicited beliefs distinguished compliers from non-compliers in walking dogs on and off the lead. This involved self-completion questionnaires that were personally administered and returned onsite. Sixty-six compliers and 39 non-compliers were surveyed.

Using the same scoring system as the Russell Falls and Badger Weir belief measurement instrument, the mean strength, evaluation and cross-product for each belief are shown in Tables 31 (behavioural) and 32 (normative). Of the behavioural beliefs, significant mean differences existed between the cross-products of compliers and non-compliers for two (‘Dogs won’t get enough exercise’ and ‘Dogs less of a nuisance’). The cross-products for both of the normative beliefs were found to be significantly different between compliers and non-compliers.

Much of the existing communication effort at Yellagonga focuses on encouraging dog walker compliance in terms of keeping the dog safe and minimising harm to the natural environment. Interestingly, there was no significant difference between the complier and non-complier belief measures regarding the belief (if I keep my dog on the lead it will be safer) while ecologically related beliefs did not even factor as salient. Of the beliefs that were significantly different between groups, we eliminated ‘dog won’t get enough exercise’ and ‘dog won’t have the freedom to run and explore’ due to a considered lack of persuasion potential. It was determined that the dog walkers direct experience of walking the dog on a lead would contradict and overpower any message based on these beliefs installed in the park. A fleeting onsite communication intervention that is inconsistent with the immediate and direct experience of the visitor is likely to have no influence on beliefs and subsequent behaviour. This left one behavioural belief that was determined to have the greatest persuasion potential in this intervention (‘Dog kept on a lead less of a nuisance to other people and dogs’).

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3 Ajzen & Fishbein (in press) and Ajzen (2007 pers. comm., 5 May) point out that sometimes it is better to use a bi-polar (-3 to +3) measurement of all belief components. They recommend scoring the belief data both ways and then using the coding scheme that produces a belief-based attitude measure that correlates more strongly with a direct measure of attitude. When this empirical criterion was applied to the Phase 2 data from Yellagonga, the resulting correlations were statistically indistinguishable. As at Russell Falls and Badger Weir, the unipolar scheme recommended by Francis et al. (2004b) was used because of its ease of interpretation.
Table 31: Strengths, evaluations and cross-products of the salient behavioural beliefs at Yellagonga Regional Park for compliers (C) and non-compliers (NC)

<table>
<thead>
<tr>
<th>Behavioural Belief</th>
<th>Mean Belief Strength (+1 to +7)</th>
<th>Mean Evaluation (-3 to +3)</th>
<th>Mean Cross-product (-21 to +21)</th>
<th>Difference between C and NC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Dog won't get enough exercise</td>
<td>3.03</td>
<td>-2.15</td>
<td>-6.36</td>
<td>6.40**</td>
</tr>
<tr>
<td>Dog will be safer</td>
<td>4.74</td>
<td>2.56</td>
<td>12.46</td>
<td>2.37</td>
</tr>
<tr>
<td>Dog won’t have freedom to run and explore</td>
<td>5.00</td>
<td>-1.03</td>
<td>-5.77</td>
<td>9.38**</td>
</tr>
<tr>
<td>Dog less of a nuisance to other people and dogs</td>
<td>5.08</td>
<td>2.28</td>
<td>12.51</td>
<td>3.12*</td>
</tr>
</tbody>
</table>

* The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.05)
** The difference between the mean cross-products of compliers and non-compliers is statistically significant (p<.01)

Both measured normative beliefs demonstrated significant differences between complier and non-complier cross products. However, it was apparent that the belief strength and evaluation for compliers and non-compliers for the belief ‘other park users who fear dogs think I should keep my dog on a lead’ were already toward the high end of the positive response scale. That is, both compliers and non-compliers already believed that this was highly likely and very undesirable. We thus considered that this belief could not be positively strengthened further through a message intervention in any significant way that might subsequently influence behaviour and increase compliance. Measurement of the strength of the belief ‘other dog owners think I should keep my dog on a lead’ revealed that while compliers had a moderately positive mean response, the mean response of non-compliers was close to neutral, although slightly negative. This indicated a possibility that the beliefs of non-compliers could be influenced using a message intervention. There was no significant difference in the evaluation component of this belief.

Thus, one behavioural and one normative belief were selected for inclusion in the message intervention:
1. If I keep my keep my dog on a lead it will be less of a nuisance to other people and dogs in the park.
2. Other dog owners think that I should keep my dog on a lead.

At the time of the study, neither of these beliefs was targeted by any current signs or other media at Yellagonga Regional Park.

Intervention design

A single message intervention was developed in conjunction with staff at the Department of Environment and Conservation (see Figure 7). In contrast to Russell Falls, where the same belief was targeted in two messages and Badger Weir where two messages were developed targeting separate beliefs, a single message at Yellagonga incorporated two separate but related beliefs. Again, the ELM was applied to inform decisions related to titles, subtitles, message text and layout.
The intervention message contained a provocative title with a strong personal norm to encourage visitors to elaborate and read the entire message, while a secondary title below the main text conveyed the essence of the target beliefs. The intervention combined normative and behavioural beliefs relating to the opinion of other dog walkers that dogs should be kept on a lead and likelihood of dogs off the lead irritating other dogs and people. This was counter pointed with mild humour relating to the common perception that many dog owners consider their dog to be perfectly safe and likeable irrespective of the opinions of others. This is closely associated with the dog walker perception that any trouble involving their dog is most likely to be the fault of the second party. This belief has been found in other dog walker research (e.g. Edwards & Knight 2006). A reference to Yellagonga’s protected area status was also included based on anecdotal evidence (collected during the surveys) that many dog walkers were unaware the area they were accessing was a regional park.

The message was subjected to manipulation checks to ensure it was communicating what was intended. It was found to be consistent with the theoretical basis that informed it (Appendix B). The communication media consisted of A-frame signs that allowed easy and temporary positioning of the interventions in the Yellagonga Regional Park study area.

![Image of Yellagonga Regional Park intervention]

**Figure 7: Yellagonga Regional Park intervention**

**Phase 3: Evaluation of the Intervention**

The purpose of the final phase of the data collection was to determine whether the intervention was effective in increasing visitor compliance with the dogs on lead policy at Yellagonga Regional Park. If a change in behaviour was achieved, a further aim was to determine whether it was a result of a persuasive impact on the relevant cognitive determinants underlying the behaviour. To achieve this, observations of visitor behaviour were performed under alternating control and intervention conditions. Following observation of their behaviour (compliance or non-compliance) these visitors were also administered a belief-measurement questionnaire. The questionnaire (Appendix E) contained a single-item direct measure of attitude, a single-item direct measure of subjective norm, a single-item measure of prior behavioural intention concerning dog walking at Yellagonga Regional Park, and the belief-measurement questions that were included in the questionnaire from the previous phase of research.

Data collection was undertaken in January, February and March 2007. The number of dog walkers frequenting the study area within Yellagonga regional Park was such that a census was possible where all dog walkers were observed and approached for involvement in the survey. The behaviour (compliance or non-
compliance) of 230 dog walkers was observed during this period. Of this group, 150 agreed to participate in the survey. This included 105 dog walkers (61 compliers, 44 non-compliers) surveyed in the control phase and 45 dog walkers during the treatment phase (34 compliers, 11 non-compliers). The large reduction in participation during the treatment phase was likely a result of the high repeat visitor rate. Most dog walkers were from the local area and walked their dog daily or weekly through the study site. As the regular dog walkers had participated in the survey during the control phase, they were unwilling to repeat the exercise during the treatment phase as ‘they had already done the survey’. Explanation that the treatment survey was different had little influence on participation. Introduction of an incentive (a bag of dog treats) for completion of the survey also had little influence on participation.

Given the large size and complex configuration of Yellagonga Regional Park (which extends for about 10km and is a kilometre or more wide in parts), it was not practical to fabricate enough signs to ensure message exposure throughout the entire park. It was therefore decided to restrict data collection to a specific location identified as the primary site for dog walking, known as Perry’s Paddock (see Figure 8). As the park had a very high repeat visitation rate, the control and treatment phases were conducted consecutively. That is, a 2-3 week control period was followed by a 2-3 week treatment period. This ensured regular dog walkers had not been exposed to the treatment during the control data collection period.

During the control period, no intervention was in view of visitors and the normal pre-existing communication environment prevailed. The pre-existing communication environment consisted of several permanent signs pertaining to dog walking that could not be removed (Figure 9). The signs generally indicated dogs must be on a lead with no further explanation. One sign in the display shelter explained the potential impacts on wildlife of dogs off lead. Since these were in view of visitors both during treatment and control conditions they were a constant throughout the field experiment. Thus, our evaluation of the intervention involved determining whether it performed better than the pre-existing communication environment.

During the treatment period, three A-frame signs containing the prescribed intervention message were positioned in the study area. One was positioned at each end of the study site along the main walking track used by dog walkers and one positioned in the middle of the site close to a popular informal access point (see Figures 8 and 10). The behaviour of dog walkers within this study area (dogs on or off lead) was observed and recorded. All dog walkers passing through the area were approached for involvement in the belief survey.

![Pre-existing permanent signs and Location of A-frame signs with intervention](Image © 2008 DigitalGlobe © 2006 Europa Technologies)

*Figure 8: Aerial view of Yellagonga study site showing positioning of experimental signs*
Figure 9: Pre-existing signage at Yellagonga Regional Park

As viewed from walking track
Results

Following the coding scheme recommended by Ajzen (1991)\(^4\), all belief components were measured on a seven-point bipolar scale, as follows. The strength of each outcome for the four behavioural beliefs was measured on a scale from -3 (‘unlikely’) to +3 (‘likely’). The scale for the accompanying outcome evaluation ranged from -3 (‘bad’) to +3 (‘good’). For the two normative beliefs, strength was measured on a bipolar scale from -3 (‘other dog owners in the park think I should not keep my dog on a lead’) to +3 (‘other dog owners in the park think I should keep my dog on a lead’). The scale for visitors’ motivation to comply with the expectations of other track walkers ranged from -3 (‘I do not want to do what other dog owners in the park think I should do’) to +3 (‘I want to do what other dog owners in the park think I should do’). The range of the resulting cross-products was therefore -9 to +9 for each belief. For behavioural beliefs, the four cross-products were summed to calculate a belief-based attitude measure. In addition, a single-item direct (global) measure of attitude was included in the questionnaire. For the two normative beliefs, the cross-products were summed to calculate a belief-based measure of subjective norm, in addition to a single-item global measure included in the questionnaire.

The observational data regarding dog walkers with dogs on- and off-lead are contained in Table 33. Under the control condition (in which the pre-existing signage was the only communication in place), about 58% of walkers in the study area kept their dog on the lead. When the treatment (My dog a nuisance?) was in place, observed compliance within the study area was around 77%. The 19% difference in compliance rates between the control and treatment was significantly different (p < .05). Thus, the intervention had some impact on compliance rates over and above that of the pre-existing signs.

Table 33: Observed behaviour under control and treatment conditions at Yellagonga Regional Park

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Number of observed dog walkers</th>
<th>Number of observed dog walkers with dogs on lead</th>
<th>Percentage compliance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>My dog a nuisance?</td>
<td>125</td>
<td>96</td>
<td>76.8%</td>
</tr>
<tr>
<td>Control (existing signage)</td>
<td>105</td>
<td>61</td>
<td>58.1%</td>
</tr>
</tbody>
</table>

*Difference between treatment and control is significant (p < .05)

\(^4\) Ajzen & Fishbein (in press) and Ajzen (2007 pers. comm., 5 May) point out that sometimes it is better to use a bi-polar (-3 to +3) measurement of all belief components. They recommend scoring the belief data both ways and then using the coding scheme that produces a belief-based attitude measure that correlates more strongly with a direct measure of attitude. When this empirical criterion was applied to the Phase 3 data from Yellagonga, the correlation produced by the bipolar coding scheme (r = .675, p < .01) was the higher of the two. Therefore, the bipolar scheme described by Ajzen (1991) was used.
As with the Badger Weir and Russell Falls data, persuasiveness of the interventions was assessed by comparing the intervention’s impact on the cross-products of the measured salient beliefs, including the two primary target beliefs: ‘If I keep my keep my dog on a lead it will be less of a nuisance to other people and dogs in the park’ and ‘Other dog owners think that I should keep my dog on a lead’. Comparisons were also made with respect to the two different measures of respondents’ overall attitudes toward walking their dog on the lead; the direct measure and the belief-based measure, as well as the direct and belief-based measures of subjective norm.

Results of these comparisons (Table 34) suggest that the intervention was not successful in achieving any kind of persuasive effect in relation to the target salient beliefs (in bold). In addition, neither measure of subjective norm (direct or belief-based) nor attitude (direct or belief-based) changed significantly as a result of the intervention. Although the belief-based attitude for the treatment condition was more than twice that of the control group, it fell short of significance (p = .167) possibly due to the unequal sizes of the two samples. This combination of results (a significant impact on immediate behaviour accompanied by a modest impact on the belief-based attitude in the absence of an impact on targeted beliefs) suggests that the 19% increase in compliance was possibly due to a peripheral-route persuasive effect. That is, respondents may have engaged little with the intervention message but instead reacted to a non-message cue such as the authoritative source of the message (DEC) or the presence of the data collectors. However, this cannot be verified without additional data.

Table 34: Comparison of mean cross-product and attitude scores for control and treatment groups

<table>
<thead>
<tr>
<th></th>
<th>Control: Existing signage (n = 105)</th>
<th>My dog a nuisance? (n = 45)</th>
<th>Statistically significant differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog will not get enough exercise (cross-product)</td>
<td>.54</td>
<td>1.24</td>
<td>No difference</td>
</tr>
<tr>
<td>Dog will be safer (cross-product)</td>
<td>3.03</td>
<td>4.33</td>
<td>No difference</td>
</tr>
<tr>
<td><strong>Dog will be less of a nuisance</strong> (cross-product)</td>
<td><strong>2.90</strong></td>
<td><strong>3.62</strong></td>
<td>No difference</td>
</tr>
<tr>
<td>Dog will not have the freedom to run and explore (cross-product)</td>
<td>-2.95</td>
<td>-2.18</td>
<td>No difference</td>
</tr>
<tr>
<td>Park users who fear dogs think I should keep dog on lead (cross-product)</td>
<td>3.75</td>
<td>4.29</td>
<td>No difference</td>
</tr>
<tr>
<td><strong>Other dog owners think should I keep dog on lead</strong> (cross-product)</td>
<td><strong>2.17</strong></td>
<td><strong>2.88</strong></td>
<td>No difference</td>
</tr>
<tr>
<td>Direct subjective norm measure</td>
<td>5.00</td>
<td>4.64</td>
<td>No difference</td>
</tr>
<tr>
<td>Belief-based subjective norm</td>
<td>6.05</td>
<td>6.95</td>
<td>No difference</td>
</tr>
<tr>
<td>Direct attitude measure</td>
<td>4.98</td>
<td>5.31</td>
<td>No difference</td>
</tr>
<tr>
<td>Belief-based attitude</td>
<td>3.47</td>
<td>7.02</td>
<td>No difference</td>
</tr>
</tbody>
</table>

Note: N = 150

Note also, however, that since the range of the four-item belief-based attitude was -36 to +36, these rather small means (3.47 and 7.02, respectively) show that neither group’s attitude toward keeping their dogs on a lead was very positive. So while a peripheral-route persuasive effect might have occurred in the immediate time frame (as evidenced by a 19% difference in compliance between the treatment and control group and an observable effect on the belief-based attitude), the intervention’s lack of impact on any relevant belief, combined with its failure to produce a stronger attitude impact, suggests that the observed difference in compliance rates is probably ephemeral. This is consistent with ELM studies that have found peripheral-route impacts to be short-

Thus, it is very possible that in some cases the same respondents who complied on the day they were interviewed might well have let their dogs run free the next day. Observations by the data collectors corroborate this interpretation. They reported that some respondents’ might have kept their dogs on lead only as long as they felt they were in view of the researchers. In some cases, respondents who were initially recorded as compliers by a data collector were later observed letting their dog off-lead.

The apparent contradiction between observed behaviour and belief measures might alternatively be a function of the influence of the experiment itself rather than the treatment applied to the park. That is, the differences in results between observed behaviour and measured beliefs may be explained in terms of dislocation of behaviour or avoidance behaviour on the part of non-compliers. Dog walkers at Yellagonga are primarily locally resident repeat visitors (94%) who visit the park on a daily or weekly basis (91%). As previously described, the study was confined to a limited area of the park for practical research reasons. Observations and surveys were conducted on dog walkers entering this defined area. The majority of the dog walking visitors to the park would have been familiar with the presence of the researchers and the nature of the survey during the control phase and prior to the treatment being in place. Many were on greeting terms with the researchers distributing the surveys as they walked past survey points on a daily basis. Placement of the signs and the presence of researchers distributing surveys about walking dogs on a lead may have resulted in non-compliers modifying their behaviour and walking dogs off the lead out of sight of the study area. On approach to the study area, non-compliers may have put their dog on the lead, or avoided the area, using extensive nearby bushland and paths out of view of the researchers.

As with Badger Weir picnickers (Chapter 4), Yellagonga Regional Park attracts a significant proportion of repeat users who walk their dogs in the park. Thus there is the possibility that repeatedly walking dogs at Yellagonga Regional Park falls into the category of ‘habitual’ behaviour as noted with bird feeding at Badger Weir. Of the 150 dog walkers surveyed, 94% were repeat visitors who lived adjacent to the park and primarily walked their dog in the area on a daily or weekly basis. Owing to the dominance of repeat visitors in the sample, relational statistical comparisons between repeat and first time visitor behaviours were not possible. However, we were able to compare the mean prior intentions of compliers and non-compliers to gain some insight into the strength of their pre-arrival dispositions.

Results of this analysis indicate that walking the dog on or off the lead is associated with a strong prior intention to do so (Table 35). Non-compliers arrived with a strong intention in favour of walking their dog off the lead while compliers leaned decidedly toward the intention to walk with their dog on the lead. Given the very high repeat visitation by local resident dog walkers to Yellagonga, their daily or weekly frequency of repeat visitation, and their strong intentions toward non-compliance, it may be assumed that dog walking behaviour at Yellagonga Regional Park is habitual in nature. Thus, dog walking behaviour at Yellagonga may not be very amenable to onsite persuasive influence. Dog walkers at Yellagonga Regional Park appear committed to compliance or non-compliance prior to arriving at the site, possibly out of habit and possibly because they do not think viable alternatives exist.

### Table 35: Comparison of prior intentions of compliers and non-compliers

<table>
<thead>
<tr>
<th></th>
<th>Compliers</th>
<th>Non-compliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean prior intention</td>
<td>5.69</td>
<td>2.47</td>
</tr>
</tbody>
</table>

NOTE: (n = 150)—difference is significant (F = 111.99; p = 0.000)

**Summary and Implications of Findings at Yellagonga**

In summary, the three phases of research at Yellagonga Regional Park were successful in (1) identifying the salient beliefs of dog walkers in respect to walking dogs on a lead, (2) isolating the beliefs that ‘if I keep my dog on a lead it will be less of a nuisance to other people and dogs in the park’ and that ‘other dog owners think that I should keep my dog on a lead’ as having optimal persuasion potential, and (3) targeting these beliefs in a message designed to increase the likelihood that dog walkers would keep their dogs on a lead.

As predicted by the TPB, if each intervention was successful in impacting its target belief, a more positive attitude to the desired behaviour ought to result. Our finding was that these attitudinal impacts did not occur despite a significant increase in compliance. The increased observed compliance was possibly a function of a peripheral-route persuasive impact or non-compliers awareness of the experiment and altering behaviour to avoid non-compliance within the vicinity of the study area. Consideration of the high repeat visitation rate by local resident dog walkers, along with their strong prior intentions to let their dogs run free, suggests that off-lead dog walking may be habitual in nature. This indicates that onsite persuasive communication may not, alone, be effective in increasing compliance.
While the research indicated that persuasive communication, alone, may not be the most effective option for influencing dog walking behaviour, it did provide some useful insights into dog walking behaviour in the park. These findings may provide useful directions for management of the behaviour. The existing signage in the park focuses on the ecological consequences of walking dogs off the lead and safety issues associated with this behaviour. Our research indicates that the behaviour is more associated with beliefs influenced by what other dog walkers and people in the park think and the likelihood of their dog being a nuisance to these groups. This is supported by dog walker research in the UK (Edwards & Knight 2006). In addition, anecdotal evidence based on comments by dog walkers participating in the survey suggest there is a lack of awareness regarding the conservation status of Yellagonga Regional Park and its management by the WA Department of Environment and Conservation.

Based on these observations, some recommendations can be offered:

- Meeting with local residents to present the conservation challenges of off-lead dog walking and to enlist their collaboration in exploring solutions and viable alternatives.
- Raising awareness of the Perry’s Paddock area as a conservation reserve managed by DEC.
- Taking a more regulatory approach to encouraging keeping dogs on leads either through more obvious onsite signs stating that this is a requirement and/or the intermittent visible presence of rangers.
- Promoting nearby alternative sites where off-lead dog walking is permitted. This may be done in cooperation with local government.
- Delivering campaign style messages (e.g. pamphlets) to the local households near the park may serve to raise awareness about appropriate behaviour prior to visitors leaving their house.

As the dog walker population seems to be localised to the park and have a high level of repeat visitation, it presents a well defined and contained target group for future communication.
Chapter 6

CONCLUSIONS

The primary conclusion to be drawn from the two-year project is that the theory and methodology were successful in influencing visitor behaviour at the three study sites. At Russell Falls, the theory-based interventions increased rubbish pickup by nearly 20%; more than 90% of first-time visitors at Badger Weir did not feed the birds; and at Yellagonga Regional Park the intervention led to a 19% increase in walkers keeping their dogs on-lead. While circumstances at Yellagonga suggest the behavioural impact might be at least partially due to non-message factors (such as a peripheral-route persuasive effect or the authoritative presence of the research team), the increase in dog walkers who kept their pets on a lead is encouraging since it suggests that a combination of communication and direct management has potential to address the problem.

The theory of planned behaviour (TPB) emerges from this research as a robust guide to the development of effective communication interventions in protected area management. Following widely applied TPB procedures, we were successful at each site in (1) identifying the salient beliefs of visitors underlying the target behaviour, (2) isolating a subset of these beliefs that had optimal persuasion potential, and (3) targeting those beliefs in messages designed to increase compliance with the target behaviour. In at least two of the three field experiments, we found that the interventions containing these messages were effective in increasing compliance with the target behaviour and were able to link this behavioural outcome to a corresponding impact on the targeted beliefs and attitude to the behaviour.

One key to the success of the interventions were the elicitations that effectively identified the salient beliefs underlying each of the target behaviours. Without these careful analyses in advance of designing the interventions, the selection of beliefs to target, and ultimately the messages themselves, likely would have missed the mark. A strong recommendation for future TPB research aimed at informing persuasive communication interventions is to begin with a careful beliefs elicitation phase in order to identity the salient beliefs that actually underlie the behaviour in the specific setting, and with the specific research population of interest. Intuiting the beliefs, or guessing at them based on the results of studies conducted elsewhere, will almost certainly render the messages based on them error prone if not completely ineffective.

The elaboration likelihood model of persuasion (ELM) also proved useful both in designing the interventions and in explaining results of their respective evaluations. If an intervention was associated with an increase in compliance behaviour, reasoning via the TPB and ELM helped elucidate the nature of the persuasive effect. At Russell Falls and Badger Weir, where an impact on both the targeted belief and corresponding attitude to the behaviour was found, we were able to reason that a central-route impact (via message elaboration) had occurred since a degree of mental effort to process the message would be required to access the beliefs it targeted. When an impact on these cognitive structures was not found (as with the Yellagonga dog walkers), the increased compliance could be assumed to be the result of non-message factors, including possibly peripheral cues associated with the intervention. The question raised by this possibility leads to an obvious implication for further inquiry. If peripheral-route persuasion is capable of producing even modest short-term attitude impacts on dog walkers, and if such impacts are sufficiently strong to prompt compliance in the immediate time frame, then research into the kinds of cues that work best would be a valuable next step, especially if viable alternatives can be offered to dog walkers who insist on letting their dogs run free.

Evidence of habitual or entrenched behaviour was uncovered both with Badger Weir picnickers and Yellagonga dog walkers. At both sites, repeat visitors were found to have strong prior intentions toward non-compliance. Despite overall increases in compliance at the two sites, in neither case were the tested interventions successful in influencing the salient beliefs or corresponding attitudes of these highly experienced visitors. Generally, behaviours that are habitual or otherwise ingrained in strong tradition tend to be less amenable to onsite communication influence than those that are newer to the actors. Protected area visitors who engage in habitual behaviour likely will require an alternative approach involving different messages and different message delivery systems than those that might be persuasive for less habitual visitors. Such efforts might begin in the communities where local repeat visitors live. In some cases, direct management techniques such as patrolling and actively enforcing policy violations also might be necessary.

Future researchers must exercise care in generalising the results of the three studies to other contexts and behaviours, regardless of how similar they might seem. While the theoretical basis and procedures adopted by this research are transferable to a wide range of protected area settings, the specific findings of the three field experiments are not. Because the beliefs identified at each site are peculiar to the setting and visitor populations of that particular protected area, generalising the results or assuming that the beliefs apply elsewhere is not advised.
One of the most important aims of this project was to strengthen the capacity of the collaborating protected area management agencies to use persuasive communication more strategically, and more effectively, in their management programs. Toward this end, key officials from each agency were involved integrally in almost every major decision throughout the life of the project. In addition, the problem identification workshops in each state instructed protected area staff and selected tour operators in a method for prioritising visitor-induced management problems and deciding which ones could best be addressed with persuasive communication. Key interpretation and communication staff and site managers from these agencies were centrally involved in crafting messages for each intervention in accordance with the theoretical basis behind it. The two-year project culminated with three intensive professional development workshops in which about 20 staff from each agency were instructed in the theory, data collection and data analysis procedures necessary for identifying target beliefs and designing effective communication interventions. The plain-language manual, *Promoting Persuasion in Protected Areas: A Guide for Managers*, was given to each participant and the manual has since been made available more widely via the STCRC online bookshop.

To add further value to the capacity building aspect of the project, the research team invited each agency to name a ‘research counterpart’ who would be thoroughly versed in the theory and methodology and participate as an integral member of the research team throughout the project. Two individuals were ultimately chosen for this role, with one (Dr. Mark Poll of Parks and Wildlife Service Tasmania) being able to participate for the life of the project. Efforts such as these go well beyond the typical requirements of a research project, but they can pay long-term dividends in the motivation and capacity of protected area managers to make better use of strategic communication in their management programs. Indeed, to the extent managers are effective in influencing visitor behaviour with persuasive communication, they will view it as an integral arm of management, thereby expanding their range of options and ultimately achieving greater success in carrying out their missions. Continuation of these kinds of capacity building efforts elsewhere in Australia is therefore strongly advised.

**Epilogue**

Despite the encouraging results of the three studies with respect to increasing behavioural compliance through persuasive communication, none of the interventions completely eliminated the problem behaviour. Compliance, even when increased by the interventions, could have been higher in every case. Human behaviour and the internal psychological processes that govern it are complicated. While decades of research guided by theories like the TPB and ELM have significantly advanced our understanding of the factors involved, we still have much to learn about using persuasive communication in the complex social milieu of a protected area. The growing popularity of nature-based tourism worldwide means that pressure on fragile landscapes will not subside any time soon. Because communication interventions have the potential of reaching a diverse public with compelling messages, and because they are often less expensive than more costly direct management measures, their future role in protected area management is likely to be even more important than it is today. Toward that end, we are hopeful the research reported here makes a useful contribution.
APPENDIX A: PROBLEM IDENTIFICATION WORKSHOP PROCEDURES

Problem Identification Workshop Procedure

Agenda
Overview and framing of workshop (20 minutes)
Step 1 – Individual identification of problems (30 minutes)
Step 2 – Listing of problems and group discussion (1 hour)
Morning Tea (20 minutes)
Step 3 – Points allocation and group discussion (30 minutes)
Step 4 – finalisation of problem ratings (20 minutes)

Workshop to start with a general introduction and description of the purpose of the project and over view of the workshop exercise: 'Our purpose is to gather informed input from real experts about the range of visitor-induced management problems your field staff have to manage. Your input will be used along with other information (not alone) to select a site and problem behaviour to address with the rest of our two-year project.' We also need to remind all the participants on the day, 'That there is no hierarchy in the room today. We are all equal, and it doesn’t matter during our discussion who’s the boss or who answers to whom. We want to capture the wisdom of what the whole group thinks, and that means getting everyone’s ideas on the table.'

The workshop will then proceed in the following four stages:

Silent generation of visitor-induced problems (20-30 minutes):

Participants are requested to create a list of visitor induced management problems, without group discussion, in response to the following scenario regarding terrestrial protected areas only:

The Department is to conduct a new five-year education initiative to reduce visitor-induced management problems in terrestrial protected areas. Prior to application of the program, decisions have to be made about which problems to target in the program’s FIRST YEAR. You’ve been asked to submit a list of the most pressing visitor-induced management problems that are the result of visitor misconceptions or lack of information. Remembering that the program will have a five-year life and that you are only recommending the most pressing problems to be targeted in Year 1, please complete the following sentence and fill out the table provided as you go:

‘I think the first year of the new visitor education initiative should direct itself to reducing the following visitor-induced management problems...’

NOTE: It is important that workshop participants understand that the listed problems must stem from uninformed or misguided action or inaction on the part of the visitor. Malicious or criminal actions fall outside the scope of this project.
Using the table provided, each workshop participant is requested to state the problems s/he sees as most important, and for each problem, provide examples of:

- Specific parks where the problem occurs
- What type(s) of visitors cause the problem (e.g. some observable characteristic)
- What visitors do or do not do that causes the problem

FACILITATORS’ ROLE IN STEP 1: the facilitators may be required to clarify the task or confirm the validity/ clarity of nominated problems as the individuals writes their list.

**Group sharing of individual thoughts with discussion (60 minutes approx.):**

Once workshop participants have completed their list of visitor-induced problems, the facilitators request that each individual shares ONE of her/his ideas with the group in turn. This is best conducted in an order determined by the workshop facilitator (e.g. order of seating clockwise around a table, left to right along a row). The workshop facilitators will write the problems and associated details on a template of the table drawn up on butcher’ paper or a white board for the group to view.

If an individual was planning to select a problem for the group table that somebody else has already mentioned, they have the following options:

(a) they can just cross it off their list and give a different one that no one else has mentioned;
(b) they can request to amend or modify what a previous person has listed, but the previous person has to agree to the amendment; or
(c) if the previous person won’t accept the amendment, the individual can list her/his idea as a new one (albeit similar to the previous one).

FACILITATORS’ ROLE IN STEP 2: Throughout this discussion, the facilitators should encourage questions and discussion to clarify what each person means when stating her/his identified visitor-induced problem. This will help individuals refine and clarify the issue for ease of later analysis by the project team. Group discussion will also help amalgamate multiple descriptions of visitor-induced problems that essentially describe a single issue. Facilitators will also need to be mindful of workshop time restraints and the need to progress discussion if it dwells for a long period on a minor point or single issue. Facilitators may also need to act as mediators if any arguments occur between participants.

The most important task is to make sure that each problem listed by the group is clearly linked to a visitor behaviour that is, in turn, amenable to communication treatment—that is, it must clearly stem from uninformed or misguided action or inaction. Behaviours that stem from malicious intent (crime, vandalism, poaching, irreversible lack of preparation at home, etc.) will not be very useful for the purposes of this project.

**Individual ratings of each listed problem (30 minutes approx.):**

Individuals are given 100 points to distribute among the problems listed on the group table as they see fit. They can choose to allocate or not allocate points to any of the problems listed according to the following rules:
• Participants must assign exactly 100 points in total
• Any single problem may only receive a maximum of 50 points
• Participants do not have to allocate points to every item on the list. They may choose to distribute points among a subset of problems in the list.

Once participants have allocated their points, they will be requested to provide their ratings to be written on the group table. Each participant will provide their points distribution in turn.

FACILITATORS’ ROLE IN STEP 3: Facilitators will need to remind participants that the scenario is dealing with the first year of a five-year program. Denying points to a problem doesn’t mean it won’t be addressed in years two to five.

Facilitators will write the points allocated to each problem by each individual on the group table. This will make calculating the sum easier and ensure transparency in the rating process. At the end of this step, the sum for each problem that results from the individual ratings is calculated and written next to the respective problems.

**Group consensus on priority of problems (20 minutes approx.):**

In this final step of the process, participants are allowed one opportunity to change their point distributions based on opinions within the group and after seeing how the overall list of priorities looks. This is done visibly so that everyone can see the changes that are being made and the impact they have on the relative priorities of the listed problems.

The points distribution rules in Step 3 must be adhered to.

FACILITATORS’ ROLE IN STEP 4: It is very possible that no one will want to change their original distribution, which indicates the completion of the exercise.

Be aware that if one person makes a change that in turn changes the priority of the problems, it is possible that someone else will want to make a ‘counter change’. During the discussion, keep reminding the group that this is acceptable and part of the process. So if one person changes his point distribution, you might say, ‘OK. Now does anyone want to make a change to theirs?’

As individuals change or counter-change numbers, the facilitator writes the new numbers in the template table and enters the new sum for each item affected. Leave adequate space for this in the last column of the template table.

Continue this process until there are no more changes. When Step 4 is completed, we should have a completely filled out behaviour classification table that looks something like the example on the next page. You are done at this point.

Thank the group for its time and hard work. Close the session.
**TEMPLATE FOR A PIDWO OUTPUT TABLE**

<table>
<thead>
<tr>
<th>Visitor-induced problem</th>
<th>Parks or protected areas where the problem occurs</th>
<th>Which visitors cause this problem? (Be as specific as possible)</th>
<th>What do they do or not do that causes the problem?</th>
<th>Points (each person’s total must sum to 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human waste in the backcountry</td>
<td>Overland Track, Cradle Mtn. NP</td>
<td>Bushwalkers</td>
<td>They don’t…</td>
<td>110</td>
</tr>
<tr>
<td>Dogs chasing wildlife, attacking nests</td>
<td>All parks with bushwalking</td>
<td>Bushwalkers with dogs</td>
<td>They allow the dog to run free. They ignore posted rules…</td>
<td>130</td>
</tr>
<tr>
<td>Wildfire</td>
<td>All parks with bushwalking and camping areas</td>
<td>Overnight campers/bushwalkers</td>
<td>They build bigger fires than needed. They don’t…</td>
<td>240</td>
</tr>
<tr>
<td>Trampled vegetation</td>
<td>Park X (Track Y)</td>
<td>Track walkers</td>
<td>They walk off designated track</td>
<td>430</td>
</tr>
<tr>
<td>Noise</td>
<td>Freycinet NP</td>
<td>Overnight campers and lodge guests</td>
<td>They play music too loud. They don’t…</td>
<td>90</td>
</tr>
<tr>
<td>Etc</td>
<td>Etc</td>
<td>Etc</td>
<td>They do, they don’t…etc.</td>
<td></td>
</tr>
</tbody>
</table>

NOTE TO RESEARCH TEAM: At the end of the day, we should be able to prepare a summary table that captures the combined thinking of the group. It will help if we take detailed notes. This will be much easier to do if there are two people involved, one to facilitate the discussion and one to capture key elements of the discussion in notes. In the summary table, the details of each cell would be captured in a paragraph that would allow us to describe fully the intent and thinking of the group. See the example on the next page.

**EXAMPLE OF A COMPLETED PIDWO OUTPUT TABLE**

**Tasmania Parks & Wildlife Service Identification of Visitor-Induced Problems (10 participants = 1000 points possible)**

<table>
<thead>
<tr>
<th>Visitor-induced problem</th>
<th>Parks or protected areas where the problem occurs</th>
<th>Which visitors cause this problem? (Be as specific as possible)</th>
<th>What do they do or not do that causes the problem?</th>
<th>Total points (must sum to 1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human waste in the backcountry</td>
<td>Overland Track, Cradle Mtn. NP</td>
<td>Bushwalkers</td>
<td>They don’t…</td>
<td>110</td>
</tr>
<tr>
<td>Dogs chasing wildlife, attacking nests</td>
<td>All parks with bushwalking</td>
<td>Bushwalkers with dogs</td>
<td>They allow the dog to run free. They ignore posted rules…</td>
<td>130</td>
</tr>
<tr>
<td>Wildfire</td>
<td>All parks with bushwalking and camping areas</td>
<td>Overnight campers/bushwalkers</td>
<td>They build bigger fires than needed. They don’t…</td>
<td>240</td>
</tr>
<tr>
<td>Trampled vegetation</td>
<td>Park X (Track Y)</td>
<td>Track walkers</td>
<td>They walk off designated track</td>
<td>430</td>
</tr>
<tr>
<td>Noise</td>
<td>Freycinet NP</td>
<td>Overnight campers and lodge guests</td>
<td>They play music too loud. They don’t…</td>
<td>90</td>
</tr>
<tr>
<td>Etc</td>
<td>Etc</td>
<td>Etc</td>
<td>They do, they don’t…etc.</td>
<td></td>
</tr>
</tbody>
</table>

NOTE TO RESEARCH TEAM: The details of each cell would need to be captured (as specifically as possible) in a paragraph that would allow us to describe fully the intent and thinking of the group. For example:
Prioritised Behavioural Impacts

Trampled vegetation: PIDWO participants felt this was the most pressing visitor-induced problem. While it occurs system-wide, the main park identified was the heavily-used Track Y in X National Park. Participants felt that track walkers stray from the trail because they think they’ll get a better view or escape the crowds. Impacts occur on plants and soil, and wildlife that are driven from their habitat.

Wildfire: Participants rated wildfire as the second most serious problem. Etc., etc.

Etc.
# APPENDIX B: RESULTS OF MANIPULATION CHECKS

## Russell Falls: Results of Manipulation Checks (N =24)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>V1 Mean</th>
<th>Std. Deviation</th>
<th>Treatment</th>
<th>V2 Mean</th>
<th>Std. Deviation</th>
<th>Expected Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The title catches my attention.</td>
<td>7.8</td>
<td>2.0</td>
<td>8.3</td>
<td>7.9</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>B. The title appeals directly to my conscience.</td>
<td>6.2</td>
<td>2.8</td>
<td>8.8</td>
<td>7.3</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>C. The title asks me to think ahead of time about what I will do if I encounter a piece of rubbish along the track.</td>
<td>7.1</td>
<td>2.4</td>
<td>5.5</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. The message tells me something new.</td>
<td>4.9</td>
<td>2.7</td>
<td>5.0</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. The message appeals to my desire to be a positive role model.</td>
<td>8.1</td>
<td>2.0</td>
<td>8.7</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. The message makes me think about what is being asked of me.</td>
<td>7.3</td>
<td>2.8</td>
<td>7.6</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. The message is persuasive.</td>
<td>7.8</td>
<td>1.6</td>
<td>8.1</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rating scale used for each item (mid-point is 5.5):

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 9 8 7 6 5 4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>
Badger Weir: Results of Manipulation Checks (N = 15)

<table>
<thead>
<tr>
<th></th>
<th>Treatment 1 Mean</th>
<th>Std. Deviation</th>
<th>Treatment 2 Mean</th>
<th>Std. Deviation</th>
<th>Expected Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The title catches my attention.</td>
<td>6.7</td>
<td>1.5</td>
<td>8.8</td>
<td>1.7</td>
<td>Both treatments should be above 5.5</td>
</tr>
<tr>
<td>B. The title refers to doing something a good person would not want to do.</td>
<td>4.7</td>
<td>3.3</td>
<td>8.4</td>
<td>2.4</td>
<td>Only T2 should be above 5.5</td>
</tr>
<tr>
<td>C. The title confronts me with a decision about birds.</td>
<td>7.9</td>
<td>1.6</td>
<td>3.1</td>
<td>2.5</td>
<td>Only T1 should be above 5.5</td>
</tr>
<tr>
<td>D. The message suggests that it is bad for birds if they depend on humans for food.</td>
<td>9.7</td>
<td>.7</td>
<td>3.8</td>
<td>2.7</td>
<td>Only T1 should be above 5.5</td>
</tr>
<tr>
<td>E. The message suggests that birds who are fed can become a nuisance to other people.</td>
<td>3.1</td>
<td>2.4</td>
<td>9.2</td>
<td>1.6</td>
<td>Only T2 should be above 5.5</td>
</tr>
<tr>
<td>F. The message tells me something new.</td>
<td>4.7</td>
<td>2.9</td>
<td>5.2</td>
<td>3.0</td>
<td>Both treatments should be above 5.5</td>
</tr>
<tr>
<td>G. The message appeals to my respect for other people.</td>
<td>2.3</td>
<td>1.4</td>
<td>9.3</td>
<td>1.1</td>
<td>Only T2 should be above 5.5</td>
</tr>
<tr>
<td>H. The message emphasises the well-being of birds.</td>
<td>8.5</td>
<td>2.0</td>
<td>2.7</td>
<td>1.9</td>
<td>Only T1 should be above 5.5</td>
</tr>
<tr>
<td>I. The message makes me think about what is being asked of me.</td>
<td>7.2</td>
<td>2.9</td>
<td>7.0</td>
<td>2.8</td>
<td>Both treatments should be above 5.5</td>
</tr>
<tr>
<td>J. The message is persuasive.</td>
<td>8.0</td>
<td>1.6</td>
<td>7.5</td>
<td>2.2</td>
<td>Both treatments should be above 5.5</td>
</tr>
</tbody>
</table>

Rating scale used for each item (mid-point is 5.5):  

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>
## Yellagonga: Results of Manipulation Checks (N =16)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Expected Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Title catches my attention</td>
<td>7.9</td>
<td>1.4</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>B: Title appeals to an issue I care about</td>
<td>7.8</td>
<td>1.2</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>C: message suggests dogs off the lead can become a nuisance to other dogs and people</td>
<td>9.3</td>
<td>0.9</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>D: Message suggests that it is bad for dogs to be off the lead in this park</td>
<td>9.4</td>
<td>0.8</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>E: Message tells me something new</td>
<td>5.9</td>
<td>2.8</td>
<td>Mean should be above 5.5? OK</td>
</tr>
<tr>
<td>F: Message appeals to my respect for other dog walkers</td>
<td>8.8</td>
<td>0.9</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>G: Message makes me think about what is being asked of me</td>
<td>8.8</td>
<td>0.9</td>
<td>Mean should be above 5.5 OK</td>
</tr>
<tr>
<td>H: Message is persuasive</td>
<td>8.2</td>
<td>1.0</td>
<td>Mean should be above 5.5 OK</td>
</tr>
</tbody>
</table>

Rating scale used for each item (mid-point is 5.5):

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>
Russell Falls
Visitor Survey

Your opinions matter to us!

A study about rubbish removal at the park

MONASH University
Tourism Research Unit
The purpose of these questions is to find out what you believe about picking up rubbish from the track at Russell Falls. **Place an ‘X’** on the line that represents how strongly you believe the statement.

1. For me to pick up rubbish from this track is:
   

2. If I pick up rubbish from this track, I will prevent harm to wildlife and their habitat.
   

3. Preventing harm to wildlife and their habitat is:
   

4. For me to pick up rubbish from this track is:
   
   GOOD TO DO : : : : : : : BAD TO DO

5. If I pick up rubbish from this track, I will set a good example for others.
   

6. Setting a good example for others is:
   

7. I believe that other walkers who can see me think that:

   I SHOULD pick up rubbish from this track : : : : : : : I SHOULD NOT pick up rubbish from this track
8. When it comes to me picking up rubbish from this track:

I DO NOT WANT TO DO I WANT TO DO what other walkers think I should do
who can see me think I should do

9. If I pick up rubbish from this track, I will prevent water pollution.

LIKELY UNLIKELY

10. Preventing water pollution is:

BAD GOOD

11. For me to pick up rubbish from this track is:

BENEFICIAL HARMFUL

12. When you arrived at Russell Falls today, how much were you intending either to pick up or not pick up any rubbish you might see along the track?

Strongly intending NOT TO PICK UP Strongly intending TO PICK UP
rubbish

13. What is your age? _____ Years

14. Which best describes the highest level of education you have completed? Mark ONE only

- Primary/Some Secondary - Completed Secondary - Completed Tertiary

15. Where do you live? Mark ONE only

- Tasmania - Interstate - Overseas

16. In which country were you born? ____________________________
17. Is this your first visit to Russell Falls? Mark \(\checkmark\) ONE only

☐ Yes  \(\rightarrow\) Questionnaire Finished

☐ No

18. (If No) How many times have you visited Russell Falls over the past 12 months, including this visit?

______ Number of times

Finish Here

Please use this space to tell us anything else we should know about your experience at Russell Falls today.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

RESEARCHER USE ONLY:

1. Did you read the sandwich board sign by the side of the track today?

☐ No

☐ Yes

2. (If Yes) How much of the sign did you read?

☐ Read some  ☐ Read most  ☐ Read all

ID:  

Gender:  

Complier/Non-complier:  

Date:  

Treatment:  

63
Badger Weir Picnic Area
Visitor Survey

Your opinions matter to us!

A study about wildlife interactions at the
Badger Weir Picnic Area

MONASH University
Tourism Research Unit
The purpose of these questions is to find out what you believe about feeding the birds at the Badger Weir Picnic Area. Place an ‘X’ on the line that represents how strongly you believe the statement.

19. If I do not feed the birds, I will miss out on having a close interaction with them.


20. Missing out on having a close interaction with the birds is:


21. If I do not feed the birds, they will not have enough to eat.


22. The birds not having enough to eat is:


23. If I do not feed the birds, they won’t rely on humans for their survival.


24. The birds not relying on humans for their survival is:


25. If I do not feed the birds, it will keep them wild.


26. Keeping the birds wild is:


27. If I do not feed the birds, they will be healthier.


28. The birds being healthier is:


29. If I do not feed the birds, people won’t see them as much.

30. People not seeing the birds as much is:

31. If I do not feed the birds, they won’t harass people for food.

32. The birds not harassing people for food is:

33. If I do not feed the birds, they will be safer from visitors who might disturb or harm them.

34. The birds being safer from visitors who might disturb or harm them is:

35. Overall, I believe that not feeding the birds is:

36. When you arrived at the Badger Weir Picnic Area today, how much were you intending either to feed or not feed the birds?
   Strongly intending NOT TO FEED the birds: : : : : : :
   Strongly intending TO FEED the birds: : : : : : : :
   Neither

37. What is your age? _____ Years

38. Which best describes the highest level of education you have completed?
   Mark ONE only
   □ Primary/Some Secondary  □ Completed Secondary  □ Completed Tertiary

39. Where do you live? Mark ONE only
   □ Victoria  □ Interstate  □ Overseas

40. In which country were you born? ______________________________
41. Is this your first visit to the Badger Weir Picnic Area? **Mark ONE only**

- [ ] Yes  
- [x] No  

*Questionnaire Finished*

42. (If No) How many times have you visited the Badger Weir Picnic Area over the past 12 months, **including this visit**?

_____ Number of times

**Finish Here**

Please use this space to tell us anything else we should know about your experience at the Badger Weir Picnic Area today.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**RESEARCHER USE ONLY:**

3. Did you read any of the sandwich board signs or the smaller laminated signs in the picnic area today?

- [ ] No  
- [x] Yes  

4. (If Yes) How much of the signs did you read?

- [ ] Read some  
- [ ] Read most  
- [ ] Read all

**ID:**
- Male/Female [Circle One]
- Complier/Non-complier [Circle One]

**Date:**

**Treatment:**
Yellagonga Regional Park Visitor Survey

Your opinions matter to us!

A study about walking dogs in the park

MONASH University
Tourism Research Unit
Start Here

The purpose of these questions is to find out what you believe about walking dogs on a lead at Yellagonga Regional Park. **Place an 'X'** on the line that represents how strongly you believe the statement.

43. If I keep my dog on a lead, it will not get enough exercise.

   LIKELY: _____: _____: _____: _____: _____: _____: UNLIKELY

44. My dog not getting enough exercise is:

   BAD: _____: _____: _____: _____: _____: _____: GOOD

45. I believe that park users who fear dogs think that:

   I SHOULD NOT keep my dog on a lead: _____: _____: _____: _____: _____: _____: I SHOULD keep my dog on a lead

46. When it comes to me keeping my dog on a lead:

   I WANT TO DO what park users who fear dogs think I should do: _____: _____: _____: _____: _____: _____: I DO NOT WANT TO DO what park users who fear dogs think I should do:

47. If I keep my dog on a lead, it will be safer.

   UNLIKELY: _____: _____: _____: _____: _____: _____: LIKELY

48. My dog being safer is:

   GOOD: _____: _____: _____: _____: _____: _____: BAD

49. I believe that other dog owners in the park think that:

   I SHOULD keep my dog on a lead: _____: _____: _____: _____: _____: _____: I SHOULD NOT keep my dog on a lead

50. When it comes to me keeping my dog on a lead:

   I DO NOT WANT TO DO what other dog owners in the park think I should do: _____: _____: _____: _____: _____: _____: I WANT TO DO what other dog owners in the park think I should do:

69
51. If I keep my dog on a lead, it will not have the freedom to run and explore.


52. My dog not having the freedom to run and explore is:


53. If I keep my dog on a lead, it will be less of a nuisance to other people and dogs in the park.


54. My dog being less of a nuisance to other people and dogs in the park is:


55. Overall, I believe that most people or groups whose opinions I consider personally influential think that:


56. Overall, I believe that keeping my dog on a lead is:


57. When you arrived at Yellagonga Regional Park today, how much were you intending either to keep your dog on or off a lead?


   Neither

58. What is your age? _______ Years

59. Which best describes the highest level of education you have completed?

   Mark ONE only

   □ Primary/Some Secondary  □ Completed Secondary  □ Completed Tertiary

60. Where do you live? Mark ONE only

   □ Western Australia  □ Interstate  □ Overseas

61. In which country were you born? ________________________________
62. Is this your first visit to Yellagonga Regional Park? Mark ONE only

☐ Yes  →  Questionnaire Finished
☐ No

63. (If No) How often have you visited Yellagonga Regional Park over the past 12 months?

☐ Daily    ☐ Weekly    ☐ Monthly    ☐ Other

Finish Here

Please use this space to tell us anything else we should know about your experience at Yellagonga Regional Park today.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

RESEARCHER USE ONLY:

5. Did you read any of the sandwich board signs located in the park today?

☐ No
☐ Yes

6. (If Yes) How much of the signs did you read?

☐ Read some    ☐ Read most    ☐ Read all

ID:  Male/Female [Circle One]  Complier/Non-complier [Circle One]  Date:
REFERENCES


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75


AUTHORS

Prof Sam H Ham
Sam Ham is Deputy Director of Monash University’s Tourism Research Unit and Director of the Centre for International Training and Outreach and Professor of Environmental Communication and International Conservation in the University of Idaho’s Department of Conservation Social Sciences (USA). He teaches postgraduate courses in communication psychology, international issues in nature conservation, and recreation and tourism management. Sam’s research has focused on interpretation and strategic communication, particularly in the context of enhancing tourist experiences, influencing visitor behaviour, and stimulating travellers’ philanthropy. He has authored more than 350 publications including two widely acclaimed books on interpretive methods and has presented 36 invited keynote addresses at international conferences and symposia. Email: sham@uidaho.edu

Prof Betty Weiler
Betty Weiler is Director of Monash University’s Tourism Research Unit where she provides leadership in visitor management and strategic communication research. She has been teaching, researching and writing in the area of tourism planning, management and marketing for 25 years and has published over 100 journal articles and book chapters. She has managed or co-managed 25 major funded research projects and nine international and national consultancy projects related to ecotourism, heritage and nature interpretation/communication. Betty has served as principal investigator on many nationally competitive grant-funded projects, including two ARC Linkage grants and five STCRC projects. She is known for her industry-relevant and applied research focus, with much of her current work being undertaken in collaboration with industry and government partners. Email: betty.weiler@buseco.monash.edu.au

Dr Michael Hughes
Michael Hughes is a Research Fellow with the Tourism Program at Curtin University, working in the Curtin Sustainable Tourism Centre. He completed a PhD on the influence of natural area site design and interpretation on visitor attitudes, perceptions and knowledge in relation to natural environments. He also has a background in Environmental Biology and Natural Resource Management. Mike currently conducts a range of research projects revolving around the development of tourism and sustainability principles. This includes broader regional development issues relating to environmental, economic and social concerns as well as locally focussed research into the beliefs, attitudes and perceptions of residents and visitors. He has previously lectured and tutored in environmental and tourism related university courses and worked as a consultant for the Western Australian Department of Environment and Conservation. Email: m.hughes@curtin.edu.au

Dr Terry Brown
Terry Brown is a lecturer in the Department of Tourism, Leisure, Hotel and Sport Management at Griffith University where he teaches in the areas of Outdoor Recreation, Park Management and Ecotourism. His research interests are aligned with protected area visitor management and include studies in cultural tourism, interpretation, behaviour management, and visitor risk assessment. He has been published in a number of journals, and has also written two book chapters addressing elements of outdoor recreation visitor management. Dr Brown has practical involvement with protected area and World Heritage management issues through various research projects conducted at Uluru—Kata Tjuta National Park and his position as recreation representative and former Chair of the Fraser Island World Heritage Area Scientific Advisory Committee. Email: t.j.brown@griffith.edu.au

Mr Jim Curtis
Jim Curtis is a PhD student and researcher at the Monash Tourism Research Unit. His PhD project examines the use of strategic communication to increase visitor use of alternative transportation systems in Australian national parks. Prior to embarking on his PhD, Jim worked as an environmental planner and tour guide in the marine-based tourism industry, held a number of positions on environmental and tourism advisory committees concerning sustainable tourism practices, and worked as a research assistant on university-park agency collaborative projects related to visitor management in protected areas. Email: James.Curtis@buseco.monash.edu.au.
Dr Mark Poll

Mark Poll worked for the Tasmanian Parks and Wildlife Service for seven years as a Visitor Research Officer. He completed a PhD during this time which focussed on social and environmental issues on the Overland Track. Marks research provided a foundation for recent changes to the management of visitors on the Overland Track. These changes have resulted in a significant improvement to the overall visitor experience for those walkers undertaking the Overland track journey. In addition, Mark helped implement the Limits of Acceptable Change planning framework as part the TPWS Track Assessment Group and developed the reserve standards framework as part of the TPWS planning and asset system. Most recently Mark wrote the business case for the Three Capes Track feasibility, a proposal to develop a new high standard six-day walk in the Tasman National Park.

Mark.Poll@parks.tas.gov.au
Chairman: Stephen Gregg
Chief Executive: Ian Kean
Director of Research: Prof. David Simmons

CRC For Sustainable Tourism Pty Ltd
Gold Coast Campus Griffith University
Queensland 4222  Australia    ABN 53 077 407 286
Telephone: +61 7 5552 8172   Facsimile: +61 7 5552 8171
Website: www.crctourism.com.au

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CRC For Sustainable Tourism Pty Ltd
Gold Coast Campus Griffith University
Queensland 4222  Australia    ABN 53 077 407 286
Telephone: +61 7 5552 8172   Facsimile: +61 7 5552 8171
Website: www.crctourism.com.au
Email: info@crctourism.com.au
The Sustainable Tourism Cooperative Research Centre (STCRC) is established under the Australian Government’s Cooperative Research Centres Program. STCRC is the world’s leading scientific institution delivering research to support the sustainability of travel and tourism – one of the world’s largest and fastest growing industries.

Introduction

The STCRC has grown to be the largest, dedicated tourism research organisation in the world, with $187 million invested in tourism research programs, commercialisation and education since 1997.

The STCRC was established in July 2003 under the Commonwealth Government’s CRC program and is an extension of the previous Tourism CRC, which operated from 1997 to 2003.

Role and responsibilities

The Commonwealth CRC program aims to turn research outcomes into successful new products, services and technologies. This enables Australian industries to be more efficient, productive and competitive.

The program emphasises collaboration between businesses and researchers to maximise the benefits of research through utilisation, commercialisation and technology transfer.

An education component focuses on producing graduates with skills relevant to industry needs.

STCRC’s objectives are to enhance:

- the contribution of long-term scientific and technological research and innovation to Australia’s sustainable economic and social development;
- the transfer of research outputs into outcomes of economic, environmental or social benefit to Australia;
- the value of graduate researchers to Australia;
- collaboration among researchers, between researchers and industry or other users; and efficiency in the use of intellectual and other research outcomes.