

Exploring Visitors: Using the Theory of Planned Behavior to Understand Visitor Behavior and Improve the Efficacy of Visitor Information in Haleakalā National Park

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Abstract

Resource and visitor experience degradation in Haleakalā National Park resulting from recreational use of the Pools of `Ohe`o has led park officials to discourage visitor use of the pools. This study uses the Theory of Planned Behavior (TPB) to examine relationships among visitors' attitudes, subjective norms, and perceived behavioral control with regard to exploring the pools, their intentions to explore, and their actual behaviors while visiting the pools. Further, this study examines the influence of persuasive messages on visitors' behavior at the pools. Persuasive message treatments emphasize either the dangers of exploring the Pools of `Ohe`o or resource protection and visitor experience impacts of recreational use at the pools. Through regression analysis of attitudes, norms, and perceived behavioral control with intention to explore, TPB is generally found to be an effective model for understanding visitor behavior at `Ohe`o's Pools, particularly when visitors are exposed to persuasive messages. Results of analysis of variance indicate that the TPB model components of attitudes and subjective norms with regard to traveling companions and National Park Service officials are influenced by exposure to the persuasive treatment messages. Additionally, both intention to explore the pools and observed exploration behavior are significantly lower among those visitors receiving any persuasive treatment message. Thus, results of this research generally support the individual relationships assumed within TPB. With identification of the most influential components of visitor behavior, as understood through the TPB model developed in this study, managers of Haleakalā National Park will be able to develop and apply persuasive interpretive messages that maximize safe and sensitive visitor recreational behavior at the Pools of `Ohe`o.

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Chapter 1

Introduction

Visitor education and information are commonly used to avoid or minimize social and environmental impacts of recreation in national parks and related protected natural areas (Ham et al., 2008; Marion & Reid, 2007). They are the generally preferred recreation management approach of both visitors and managers, largely because they are perceived as unobtrusive and consistent with experiential values associated with natural resource-based recreation on public lands, and are often less costly than other management tactics (Bullock & Lawson, 2007; Hendee & Dawson 2002; Manning, 1999; Martin, Marsolais & Rolloff, in press; Park, Manning, Marion, Lawson & Jacobi, 2008; Roggenbuck. 1992; Vistad 2003). Furthermore, the use of visitor education and information has proven to be effective at reducing a variety of undesirable behaviors in park settings, including off-trail hiking, feeding wildlife, theft of petrified wood, and littering (Bradford & McIntyre, 2007; Hockett & Hall, 2007; Liu & Sibley, 2004; Marion & Reid, 2007; Widner & Roggenbuck, 2000).

Although there is a general preference among visitors and managers alike for informational approaches to managing visitor behavior in parks, previous research suggests that information and education are not always effective at persuading visitors to behave in a manner that minimizes their impacts to park resources and the quality of other visitors' experiences (Vande Kamp, Johnson, & Swearingen, 1994; Park et al., 2008). Such is the case at the `Ohe`o Pools (referred to hereafter as "the pools"), a primary visitor attraction in the Kīpahulu area of Haleakalā National Park, located on the island of Maui, Hawaii. Within the Kīpahulu area of the park, a formal trail leads visitors to the rim of `Ohe`o Gulch in which the pools are located, and concrete steps descend from the trail into the gulch itself. While some visitors remain on the trail above the pools, most descend the stairs into the gulch. Many of these visitors venture further, leaving the landing at the base of the stairs to explore the pools by hopping from rock to rock along Palikea Stream, "bushwhacking" through vegetation on the steep sides of the gulch, wading through and swimming in the pools, and cliff-jumping into the water. Exploring and swimming in the pools has become a popular visitor activity, and is the

centerpiece of many tourism brochures and related promotional materials circulated to island visitors. Exploring and swimming in the pools has been a legal activity when the National Park Service (NPS) determines the stream level does not pose a threat to visitors' safety. However, the NPS discourages visitors from exploring and swimming in the pools for reasons related to visitor safety, public health, resource protection, Native Hawaiian cultural practices and values, and the quality and nature of visitors' experiences. The NPS relies exclusively on indirect management in the form of onsite signage designed to dissuade visitors from exploring the pools, except on days when the stream is closed to visitors due to unsafe water levels. Specifically, signage and interpretative information have been placed in the Visitor Center and along trails to convey the dangers and safety hazards associated with entering and exploring the pools area. Despite the NPS's current informational campaign, a large number of visitors choose to explore and/or swim in the pools.

The purpose of this study is to improve the design of visitor education and information messages to enhance their efficacy as tools to minimize the number of visitors who explore the pools. Further, the study is designed to assess whether indirect management alone is sufficient to meet NPS management objectives with respect to visitor use of the pools, or if more direct forms of management are needed to supplement visitor education and information. To do this, the study uses the Theory of Planned Behavior (TPB) to examine the cognitive factors that influence visitors' decisions about whether or not to explore the pools (Ajzen, 1991). Additionally, the study uses an experimental approach to assess the relative efficacy of two persuasive messages designed to act upon and influence the cognitive factors that are hypothesized within TPB to "drive" visitor behavior. Thus, the results of this thesis research are expected to enhance the efficacy of the NPS visitor education efforts to influence visitors' behavior and achieve natural, cultural, and experiential resource protection objectives at the pools in Haleakalā National Park.

The research presented in this thesis is organized into three chapters following this introduction. Chapter 2 reviews and integrates research on: 1) the application of visitor

education and information as tools to manage recreational impacts in parks; 2) TPB and its use for modeling human behavior; and 3) the theoretical underpinnings of persuasive communication, including consideration of moral development of message recipients. Chapter 3 outlines the method used in this thesis research to operationalize TPB, develop and administer surveys and persuasive treatment messages, and analyze the data. Chapter 4 consists of a draft manuscript prepared for submission to the *Journal of Interpretation Research*. The manuscript presents and discusses the results of this thesis research.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Bullock, S. D., & Lawson, S. R. (2007). Managing the “commons” on Cadillac Mountain: A stated choice analysis of Acadia National Park visitor preferences. *Leisure Science*, 30, 71-86.
- Ham, S., Weiler, B., Hughes, M., Brown, T., Curtis, J., & Poll, M. (2008). *Asking visitors to help: Research to guide strategic communication for protected area management* (Project #80039). Queensland, Australia: Griffith University, Sustainable Tourism Cooperative Research Center.
- Hendee, J. C., & Dawson, C. P. (2002). Wilderness visitor management: Stewardship for quality experiences. In Hendee, J.C., & Dawson, C.P., *Wilderness Management: Stewardship and Protection for Resources and Values* (pp. 461-503). Golden, CO: Fulcrum Publishing.
- Manning, R. E. (1999). *Studies in outdoor recreation: Search and research for satisfaction* (2nd ed.). Corvallis: Oregon State University Press.
- Marion, J. L., & Reid, S. E. (2007). Minimizing visitor impacts to protected areas: The efficacy of low impact education programs. *Journal of Sustainable Tourism*, 15, 5-26.
- Park, L. O., Manning, R. E., Marion, J. L., Lawson, S. R., Jacobi, C. (2008). Managing visitor impacts in parks: A multi-method study of the effectiveness of alternative management practices. *Journal of Park and Recreation Administration*, 26, 97-121.
- Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredo (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 149-208). Champaign, IL: Sagamore Publishing Inc.
- Vande Kamp, M. E., Johnson, D. R., & Swearingen, T. C. (1994). *Deterring minor acts of noncompliance: A literature review* (Tech. Rep. NPS/PNRUW/NRTR-92/08). Seattle, WA: University of Washington, College of Forest Resources, Cooperative Park Studies Unit.
- Vistad, O. I. (2003). Experience and management of recreation impacts on the ground: A study among visitors and managers. *Journal for Nature Conservation*, 11, 363-369.

Chapter 2

Literature Review

Visitor education and information are widely applied tools for management of visitor behavior in national parks and other protected natural areas where outdoor recreation occurs (Ham, et al., 2008). Preference for information-based management is shared by visitors and park managers for its indirect, unobtrusive nature and relative cost efficiency (Manning, 1999). This management approach has also proven effective in changing visitor behavior, reducing undesirable impacts to a wide variety of natural, cultural, and experiential resources in diverse park settings (Marion & Reid, 2007). However, information and education are not always effective at persuading visitors to behave in a manner that minimizes their impacts to park resources and the quality of other visitors' experiences (Vande Kamp, Johnson & Swearingen, 1994). Research suggests that there are a number of factors that influence visitor behavior and the efficacy of education and information tactics in changing visitor behavior to achieve resource protection and visitor experience objectives in national parks (Bullock & Lawson, 2007; Park, Manning, Marion, Lawson & Jacobi, 2008). For informational management campaigns to be effective at changing visitor behavior, the targeted behavior must be appropriate for management with information, the cognitive factors underlying the behavior must be understood, and persuasive information must be designed and delivered in a manner that engages such cognitive processes (Ham et al., 2008).

This chapter provides a review of literature on the application and efficacy of informational approaches to visitor management in parks. First, recreation behaviors and settings that are the most appropriate candidates for informational management are discussed. Second, the TPB is presented as a framework for understanding visitor behavior. Third, theories of communication and moral development are considered as guides for designing persuasive information with maximum leverage for influencing visitor behavior. Throughout this review, previous applications of informational management of visitor behavior in parks are discussed. This chapter seeks to integrate the theoretical contributions of these previous studies to design persuasive messages for efficacy testing and to provide context for interpretation of this study's results.

Application and Efficacy of Information as a Visitor Management Tool

Protection of natural, cultural and experiential resource integrity in outdoor recreation settings is difficult. Even at low levels, recreation use can cause impacts to resources that may be unacceptable within management objectives (Hammit & Cole, 1998). To achieve resource protection objectives, parks must often actively manage visitors. Manning (1999) outlines four basic strategies park managers can employ to maintain high resource quality in the face of recreation impacts: 1) increase the supply of recreation resources to spread use across space or time; 2) limit the demand placed upon recreation areas by restricting use; 3) modify the nature or character of recreation use to be less impactful; or 4) increase the durability of recreation resources to be more resistant to recreation impacts. Management of recreation impacts through modification of recreation use and visitor behavior can be particularly appropriate when other management strategies are impractical. Strategies that increase the supply of recreation opportunities upon a fixed resource base or harden resources against recreation impacts are often costly and permanently alter the state of recreation resources (Hendee & Dawson, 2002; Marion & Reid, 2007). Reduction of recreation demand, often achieved through direct regulation to limit use, detracts from visitors' feelings of freedom and require aggressive enforcement (Marion & Reid, 2007). Recreation management strategies that target reductions in the undesirable effect of visitor behavior have been found to be effective, perceived by park visitors to be acceptable, and widely deployed in park management (Bradford & McIntyre, 2007; Bullock & Lawson, 2007; Hendee & Dawson, 2002; Hockett & Hall, 2007; Liu & Sibley, 2004; Marion & Reid, 2007; Martin, Marsolais & Rolloff, in press; Park, et al., 2008; Vistad, 2003; Widner & Roggenbuck, 2000).

Interventions designed to address depreciative visitor behavior can be arranged along a continuum from direct to indirect action with respect to park visitors (Peterson & Lime, 1979). Direct management actions target visitor behavior specifically, minimizing the recreationist's role in decision making. These actions involve legal proscriptions and formal sanctions that are often implemented in the form of use limits and regulations with accompanying enforcement and penalty for recreationists violating regulations. Under

direct management, visitor behavior is addressed by administratively limiting choice and decision making power. Indirect management actions attempt to influence or shape the decisions recreationists make, rather than directly control behavior. They seek change in visitor behavior through the influence of informational campaigns and site design rather than regulations and sanctions (Manning, 1999).

Studies in the field of outdoor recreation suggest indirect management tactics oriented toward the strategic objective of changing visitor behavior are preferred by visitors and managers (Bullock & Lawson, 2007; Hendee & Dawson, 2002; Hockett & Hall, 2007; Liu & Sibley, 2004; Marion & Reid, 2007; Martin, et al., in press; Park, et al., 2008; Vistad, 2003; Widner & Roggenbuck, 2000). The preference for informational management is documented in the results of a survey of Norwegian park visitors and “nature” managers. Study participants were asked to indicate their preferences for a range of management actions designed to reduce natural resource impacts along hiking trails. Management interventions considered in the study included information campaigns, use limits, regulatory restrictions, site hardening, and access fees (Vistad, 2003). Both visitors and managers rated informational tactics highest in preference of all proposed management actions. Educational and interpretive messaging used as an indirect action to manage visitor behavior is preferred by visitors for its ability to preserve the decision making freedom associated with outdoor recreation and build a deeper appreciation of and sensitivity to recreation resources. Studies reviewed by Roggenbuck (1992) demonstrate pervasive support among visitors for management of impacts through the provision of information. The author theorizes that visitors prefer information tactics because they coincide with and enhance freedom of choice generally associated with leisure and outdoor recreation. Hendee & Dawson (2002) echo Roggenbuck’s conclusions within the specific context of wilderness recreation management. Information provided to visitors does not alter wilderness resources, regulate visitors, or detract from the sense of freedom many wilderness visitors seek. Similar support was found for informational management of vegetation damage along hiking trails in the frontcountry atop Cadillac Mountain in Acadia National Park, where 90% of respondents judged educational signs to be acceptable (Park, et al., 2008). Indeed, the provision of

information to visitors on recreation impacts can enhance their experiences in parks by imparting a sense of stewardship and understanding of the park's resources (Bullock & Lawson, 2007). Managers also support the use of informational campaigns for visitor management because of their reduced cost over alternative strategies and alignment with the NPS's mission to provide for the enjoyment of its lands (Ham, et al., 2008; Manning, 1999).

Although there is a general preference among visitors and managers alike for informational approaches to managing visitor behavior in parks, the acceptability and effectiveness of this tactic is dependent upon the characteristics and circumstances of informational messages, resource impacts, recreation settings, and visitor experiences and behaviors. Informational messages whose content explains the depreciative consequences of specific recreation behaviors and discusses the reasons for management policies have been found to be acceptable to visitors, even enhancing their experiences in some cases (Bullock & Lawson, 2007). In contrast, regulatory messages designed to prohibit visitors from engaging in specified behaviors can have a negative effect on visitor experiences, and in some cases, cause visitors to act in defiance of regulations. Rather than simply discouraging depreciative behavior, those messages that explain impacts of recreation behaviors and attribute them to individual visitors so they can identify with and reflect upon them have been found to be more effective (Bradford & McIntyre, 2007). Additionally, results from a study of National Association for Interpretation members suggest that interpretation professionals perceive visitor information that uses *prescriptive* messages emphasizing desired behaviors to be more effective than *proscriptive* messages that focus on discouraging or regulating against undesirable behaviors (Winter, Sagarin, Rhoads, Barrett & Cialidini, 2000). Taken together, the findings from these studies suggest that persuasive messages to reduce the depreciative effects of undesirable behavior should explicitly discuss the consequences of undesirable behaviors, attribute those consequences to specific behaviors, and describe desired behavioral alternatives.

In areas with relatively extensive and/or severe resource or experiential impacts, informational campaigns may be less acceptable and effective management alternatives (Bullock & Lawson, 2008). Under conditions of limited experiential or natural resource depreciation, visitors prefer indirect informational management to direct management. That is, when resources suffer low level degradation visitors perceive information and education campaigns to be more acceptable than more direct management actions like use limits or visitor regulation (Bullock & Lawson, 2008). However, in areas with more intense and extensive recreational impacts, visitors generally find informational campaigns to be less acceptable as a primary management tool and are more inclined to support more direct, obtrusive forms of management (Bullock & Lawson, 2008). Likewise, as recreation impacts from visitor use intensify, the effectiveness of indirect informational approaches to manage visitor behavior decreases. This principle is illustrated in studies conducted to examine the effectiveness and acceptability of various management strategies to reduce the impacts of off-trail hiking on the summit of Cadillac Mountain in Acadia National Park. Resource impacts, primarily trampling of sub-alpine vegetation, are extensive at Cadillac Mountain's highly accessible and iconic recreation site. At sites such as this, where resources are fragile and visitor use high, information campaigns alone do not reduce undesirable behaviors to levels low enough to stabilize resource degradation and recover impacted areas (Bullock & Lawson, 2007). When faced with extensive use and intense damage to fragile resources, indirect or informational management actions should be coupled with more direct and obtrusive tactics, which might include regulation, site development and/or the presence of a uniformed ranger, for parks to achieve resource protection objectives (Park, et al., 2008).

Recreation settings and the nature of the experiences they provide also have implications for the acceptability and effectiveness of informational campaigns. Generally, visitors view management through information and education as the most acceptable tool in recreation areas ranging from urbanized to primitive settings (Martin et al., in press). However, indirect management actions may not be effective at maintaining experiential and natural resource qualities at a level desired by visitors or managers of some recreation settings. Such a disconnect between desired resource conditions and the ability

of preferred management actions to maintain resource quality manifests differently between wilderness and frontcountry settings. Yet in both types of settings, alternatives to indirect management with information become more acceptable to visitors as resource and/or experiential impacts increase. Users of primitive and wilderness areas are more frequently tolerant of direct management actions, including site closures, use limits, and use regulations in light of their greater efficacy in protecting the natural resource and experiential qualities valued by these visitors (Manning, 1999; Martin, et al., in press). Such management actions do not address impacts by altering the nature of recreation resources or recreation behavior onsite. Rather, they address impacts by limiting the demand placed upon recreation resources. When information alone cannot limit recreational resource impacts to desirable levels in frontcountry settings, visitors have judged site development as a more acceptable management action than the use restrictions preferred by wilderness visitors (Cahill, Marion & Lawson, 2008). In summary, for reducing impacts to recreation resources, informational campaigns are generally the preferred management action. However, when information and visitor education alone are perceived to be ineffective at protecting resources and visitor experiences, visitors generally prefer more direct, obtrusive management to protect park resources and the quality of visitors' experiences.

For informational campaigns to be effective, targeted visitor experiences and behaviors must be of a nature that facilitates visitor exposure and receptiveness to persuasive management messages. Both the nature of depreciative behaviors and the motivations of visitors to engage in those behaviors influence the efficacy of informational management tactics (Roggenbuck, 1992). Depreciative or non-compliant visitor behaviors can be grouped into categories including those that are willfully illegal, careless, unskilled, uninformed, or unavoidable. Behaviors that are careless, unskilled, or uninformed possess greater potential for management with persuasive information, because such an approach provides visitors with a greater base of awareness and knowledge from which to act (Roggenbuck, 1992). Depreciative behaviors that are unavoidable or willfully illegal or destructive are less suitably addressed with persuasive information as they generally are not the result of insufficient visitor awareness or knowledge (Widner-Ward &

Roggenbuck, 2003). In a study of off-trail hiking on the summit of Cadillac Mountain in Acadia National Park, Park, et al. (2008) found that signage encouraging visitors to stay on trail, rather than hike off-trail, trampling fragile subalpine vegetation and soil, was ineffective. The authors suggest that this finding was due, in part, to the fact that visits to the mountain summit were relatively brief and visitors were focused on the highly attractive views, both of which generally prevented visitors from spending time reading informational signs (Park, et al., 2008). Similar studies have found signage designed to influence the decision making process of park visitors ineffective at reducing impactful recreation behavior, suggesting that some visitors simply ignore indirect management efforts or think that the stated behavioral direction does not apply to them (McAvoy & Dustin, 1983; Widner-Ward & Roggenbuck, 2003). To summarize, persuasive information campaigns will be most effective when addressing undesirable behavior in parks that is unskilled, unintentional, or uninformed, and occurs within a setting where visitors have the opportunity and inclination to engage with the presented information.

Theory of Planned Behavior as a Framework for Understanding Visitor Behavior

Indirect information management of visitors at the pools seems appropriate in light of the uninformed and careless nature of depreciative behavior within and around the pools and the general preference of visitors and managers for these management tactics. However, the high levels of use, intensifying resource impacts and brief nature of many visits to the Kīpahulu area of Haleakalā National Park may limit the effectiveness of indirect informational visitor management. The considerations involved with successful indirect informational management of depreciative visitor behavior (i.e., exploring the pools) require examination of both the behavior and the influences underlying the behavior to be effective (Ham, et al., 2008). TPB provides a framework for understanding visitor behavior and its cognitive precursors, and evaluating the efficacy of persuasive messages for indirectly managing visitor behavior. In defining the relationships among visitor behavior, behavioral intention, and cognitive assessments involved in decision-making, the TPB model provides a framework to evaluate and enhance the effectiveness of visitor education and information to manage visitor use of the pools. That is, by identifying the most influential cognitive factors shaping visitor behavior and measuring the scale and

direction of those influences, park managers can design persuasive messages that target the most salient cognitive precursors to visitor behavior. In doing so, park managers can minimize the limitations of information based visitor management (i.e., insufficient protection for intensive impacts at high use, attraction-based sites) and maximize their benefits (i.e., increased visitor freedom and awareness of the effects of their behavior).

TPB as an explanatory and predictive model for human behavior evolved from a precursor, the Theory of Reasoned Action (TRA; Ajzen, 1991). TRA seeks to understand individual behaviors as the implementation of behavioral intentions that are formed by the application of attitudes and subjective normative assessments to consideration of specific behaviors (Fishbein & Ajzen, 1975). This model positions behavior, the execution of behavioral intention, as purely volitional. That is, the model presumes that behavioral intentions will be carried out to behavior as long as attitudes and normative assessments are favorable. TRA does not consider the interference of administrative, personal, and/or environmental barriers in realizing intended behaviors. TRA excludes factors of personal control that influence behavioral decisions (Armitage & Conner, 2001). The omission of control factors can be particularly limiting when modeling behavioral decisions made by visitors to protected natural areas, where environmental, social, and managerial conditions can vary widely and may place constraints on visitors' ability to act on their intentions. To accommodate personal control factors, TRA was expanded to TPB, which includes measures of behavioral control, perceived and real, as precursors to behavioral intention and actual behavior (Ajzen, 1988).

The TPB model of behavior hypothesizes three cognitive relationships leading to behavior, with linked, sequential sets of independent and dependent variables (Figure 2-1). The first level of hypotheses build the dependent TPB constructs of attitudes, subjective norms, and perceived behavioral control from constituent beliefs and evaluations of the impact or influence of those beliefs. The second level hypothesis uses attitudes, subjective normative assessments, and perceived behavioral control as independent variables to predict the dependent variable, behavioral intention. The third level hypothesis uses the predicted behavioral intention and measures of behavioral

control, perceived or real, as independent variables to predict the dependent variable, actual behavior (Ajzen, 1991).

Behaviors, as understood within TPB, are specific, spatially and temporally bounded, volitional behaviors (Ajzen, 1991). In guidance for constructing questionnaires based on the TPB, Francais, et al. (2004) suggest that subject behaviors be explicitly defined in terms of target, action, context and time. Within this thesis study, the target behavior is defined as exploring the pools on the day study participants were contacted for the survey. That is, the behavior investigated through TPB in this thesis research is defined with a specific target performing the behavior (visitors to the Kīpahulu area of Haleakalā National Park), an exclusive behavioral action (exploring the pools), a consistent environmental context (the pools), and a definite time (the same day visitors were surveyed).

Behavioral intention precedes behavior within TPB, integrating the cognitive factors that lead one to intend to behave in a specific way. Behavioral intention can be seen as a measure of the level of motivation to behave in a specific way, or how willing individuals are to exert effort in achieving behavioral goals. Generally, stronger behavioral intention should lead to greater levels of behavioral engagement. Execution of such intention to behave is contingent on the presence of resources and opportunities required to engage in the behavior. Regardless of the strength of motivation or intention, if individuals do not have the money, time, knowledge, or legal permission, among other factors, to behave in the intended manner, they will not be able to execute their behavioral intention. These barriers to behavior may be real or perceived limitations of control over behavioral performance. Thus, behavior is a product of both behavioral intention and behavioral control (Ajzen, 1991). The influence of behavioral control as a mitigating or mediating factor between behavioral intention and behavior makes intuitive theoretical sense, however, it has not always been born out empirically. In a meta-analytic review of studies using both TRA and TPB, Sutton (1998) found that inclusion of both perceived behavioral control and behavioral intention yielded predictions as statistically powerful as behavioral predictions made with intention alone.

Within the TPB model, behavioral intention is both an independent variable, predicting the dependent variable actual behavior, and a dependent variable, predicted from the independent variables of attitude, subjective normative assessment, and perceived behavioral control. Attitudes are individuals' rational assessments of the costs and benefits of behavior. TPB hypothesizes that attitudes are the product of salient behavioral beliefs and evaluations of benefits or costs of behavior. Engagement in any specific behavior leads to various outcomes. Attitudes, as operationalized by TPB, are assessments of the likelihood of certain outcomes occurring (behavioral belief) and evaluations of the goodness or badness of those outcomes if they were to occur. Subjective norms can be seen as reflective assessments of the attitudes of others toward one's behavior. They are a metric of how one believes significant referent groups will view one's behavior. Within TPB, subjective norms are a combination of normative beliefs and motivations to comply. Subjective normative beliefs are one's views concerning the level of support others will give for performing a behavior. Motivation to comply indicates the importance an individual places upon having the support of others when deciding to behave. Subjective normative assessments are measured as the product of normative beliefs and motivations to comply with respect to a specific referent group. Like attitudes and subjective norms, TPB constructs perceived behavioral control from precursor beliefs of control and perceived power. Control beliefs reflect the resources, opportunities, and/or barriers individuals believe they have or face when deciding to behave in a certain manner. Perceived power measures the relative power perceived opportunities or barriers will have in facilitating or inhibiting desired behavior. Each of these cognitive constructs, attitudes, subjective norms, and perceived behavioral control, exist within the TPB model as products of salient beliefs and scaling factors of their relative influence in decision making (Ajzen, 1991). In a comprehensive meta-analysis of applications of TPB for predicting a wide variety of behaviors, antecedent beliefs were found to correspond well with their respective cognitive constructs, supporting their interpretation as informational foundations for behavioral decision making modeled within TPB (Armitage and Conner, 2001).

Beyond dimensions of salience and influence, attitudes, subjective norms and perceptions of behavioral control are understood by their dimensions of instrumentality, experience, description, injunction, efficacy and controllability (Ajzen, 2006; Francis et al., 2004). Attitudes can have either instrumental or experiential outcomes, depending upon the focus of evaluations. Instrumental attitudes focus on the utility, activity and potency of outcome benefits; is a behavior harmful or beneficial, useful or worthless. Experiential attitudes focus on the way individuals feel while performing a behavior; is it beneficial or harmful, pleasant or unpleasant. In addition to normative beliefs and motivations to comply, subjective normative beliefs have injunctive and descriptive dimensions. Injunctive normative assessments indicate impressions of the way others think an individual should behave. Descriptive normative assessments reflect the way others actually behave. When considering exploring at the pools, injunctive norms measure the support of others for one's exploring, while descriptive norms are impressions of whether or not others will explore. Self-efficacy and controllability are dimensions of perceived behavioral control. Self-efficacy is one's impression of his/her own ability to perform a behavior (i.e., Am I physically capable of exploring the pools?). Controllability reflects perceptions of external barriers to engaging in a behavior, including locus of decision control and logistical opportunities (Ajzen, 2006; Francis et al., 2004). The multiple dimensions of attitudes, subjective norms and perceived behavioral control described above build to form these cognitive constructs, which in turn, combine to influence intention to behave and subsequent behavior.

A number of studies have employed TPB as a framework for modeling recreation and environmental behavior. Initial exploration of leisure choice with TPB was conducted by Ajzen and Driver in 1992. Within the study, college students were surveyed on their attitudes, subjective norms, perceptions of control over and intentions to participate in five outdoor leisure activities: visiting the beach, running, mountain climbing, boating and biking. One year later respondents were asked about their participation in the five activities. The authors concluded that attitudes, subjective norms, and perceived behavioral control predicted intention to participate in outdoor leisure activities. Further, intentions to behave, combined with perceptions of behavioral control, were found to be

significant predictors of actual participation in leisure activities. In a similar study, Kouthouris and Spontis (2005) sought to model with TPB participation in outdoor recreation behaviors including canoeing, orienteering and archery. The researchers found that the TPB constructs of attitude and perceived behavioral control were significant predictors of intention to behave. However, subjective normative assessments, operationalized solely through normative beliefs, were not significant predictors of behavioral intention. The authors also sought to predict behavior directly from the TPB constructs of attitudes, subjective norms, and perceived behavioral control. In doing so, the authors found perceptions of behavioral control to be the only significant predictor of behavior. It should be noted that this analysis omits the aggregation of attitudes, subjective norms, and perceptions of behavioral control into behavioral intention, instead positioning each of these theoretical precursors to intention as direct antecedents of behavior. A study of participation in hunting found evidence for the influence of attitudes, subjective norms, and perceptions of behavioral control on intentions to hunt (Hrubes, Ajzen & Daigle, 2001). In the study of hunting intentions, attitudes contributed most heavily to intention formation, with subjective norms contributing somewhat less, and perceived behavioral control contributing significantly, but relatively little, to hunting intention. When the researchers sought to predict hunting behavior from intention and perceptions of control over hunting, they found that intentions were the primary predictor of behavior and perceptions of control did not add predictive power to the model beyond that of intentions alone. Bright and Burtz (2006) applied TPB to model wildland-urban interface home-owners' intentions to engage in wildfire mitigation activities. The authors explored the influences of TPB constructs on intentions to do clearing and landscaping activities around their homes. For both activities, between full-time and seasonal residents, attitudes had the strongest and most consistent influence on behavioral intentions. Subjective norms and perceptions of behavioral control were revealed to be of varying significance in predicting intention and, when significant, had less predictive power than attitudes.

When considering the discussed applications of TPB for understanding behavior some patterns can be drawn that, while not universal, may provide guidance for using TPB to

examine visitor exploration at the pools. The studies that sought to predict behavior did so with reported past behavior, using either previous behavior as an analog for future behavioral participation or post surveys. Although difficult, research seeking to use TPB to understand or predict behavior should strive to observe actual behavior, as self-reported behavior may introduce error into predictive models (Sutton, 1998).

Additionally, while all studies found attitudes to be significant and substantial predictors of intention, findings regarding the roles of subjective norms in predicting intention and behavioral control in predicting intention and behavior are far from consistent or conclusive. Such inconsistencies indicate that the relative influence of TPB constructs on behavioral intention and behavior may vary depending on the nature of the behavior being studied, the environment in which the behavior occurs, and the context of behavioral decision making.

Beyond prediction of behavior, TPB provides a framework that is useful for designing and evaluating messages aimed at influencing human behavior. Ham, et al. (2008) provide an extensive review and application of TPB to evaluation of persuasive information campaigns for management of three depreciative behaviors in recreation settings: littering, wildlife feeding and letting dogs off-leash. The authors identify behavioral beliefs that exerted greatest influence on attitude formation and behavioral decision making as hypothesized by TPB. By understanding the influence of behavioral beliefs on behavioral decisions, the authors were able to design informational interventions to target those behavioral beliefs with greatest leverage on decision-making. Two of the interventions tested by Ham, et al., those for littering and wildlife feeding, achieved behavior change through changes in behavioral beliefs and subsequent attitudes and behavioral intention. Persuasive information changed park visitors' behavioral beliefs in the intended direction and these new beliefs influenced the visitors' behavior. For these two behaviors, TPB analysis isolated salient behavioral beliefs for decision-making and guided design of information interventions that were successful at influencing visitor behavior. TPB has also been used to evaluate existing informational management campaigns. Using TPB's positioning of behavioral beliefs as a foundational influence on behavioral intention, Lackey and Ham (2003) elicited salient behavioral beliefs on bear-

wise food storage from overnight campers in Yosemite National Park and compared them to messages in current food storage informational campaigns. In doing so, the study suggested potential beliefs for targeting with persuasive information that may be more powerful in influencing visitor behavior than those previously employed by the park. The progressive and quantifiable relationships between beliefs, cognitive constructs, intention and behavior modeled by TPB allow researchers and managers to both design persuasive information targeted at influential beliefs for behavior and evaluate existing information for alignment with those salient beliefs.

TPB has successfully allowed researchers to predict participation in outdoor leisure activities by providing an understanding of the way attitudes, subjective normative assessments and perceptions of behavioral control combine to form behavioral intentions that lead to behavior (Ajzen & Drive, 1992, Hrubes, Ajzen & Daigle, 2001; Kouthouris & Spontis; 2005). Examining behaviors within the TPB framework identifies the beliefs most salient to the decisions that lead to behavior (Ham, et al., 2008). With salient beliefs identified, persuasive messages can be evaluated for their efficacy in targeting and influence in changing these beliefs (Lackey & Ham, 2003).

Communications and Moral Development Theory

Analysis of behavior and persuasive messages with TPB identifies influential beliefs and quantifies their relative power and interactions in influencing behavior. The elaboration likelihood model (ELM) and theories of moral development provide insight into how best to appeal to salient beliefs to take advantage of their power in behavioral decision making. ELM models individual information processing and interpretation as it relates to behavioral beliefs and attitudes. Theories of moral development provide a way to examine and differentiate among varying influences of individualistic, normative, and philosophical motivations for behavior. Thus, ELM and theories of moral development enhance the design of persuasive information targeted at behavioral beliefs by helping to ensure that information is processed in a way that maximizes internalization and stimulates behavioral motivations.

ELM posits that persuasive information is processed along one of two pathways, the peripheral and central routes to persuasion (Petty, McMichael & Brannon, 1992). The peripheral route to persuasion acts through simple cues within messages and their delivery contexts. Such mechanisms include messages delivered by expert, trusted, or attractive sources or containing a multitude of arguments. To interpret these cues requires relatively little ability or effort on the part of message recipients. Consequently, while attitude change can be prompted by peripheral route persuasion, it is generally short lived as a result of the superficial information processing required on the part of message recipients (Petty, et al., 1992). In contrast, the central route to persuasion requires motivation and relatively intense cognitive processing by message recipients, and consequently is more likely to yield lasting attitude change. When processing information along the central route, past experiences and knowledge are used to consider the merits of relevant arguments presented. The central route yields such power in attitude and behavior change because this reflective process leads information recipients to make considered behavioral decisions rather than simply repeating a behavior suggested by an authoritarian source (Petty, et al., 1992).

Understanding the moral motivations of individuals for changing attitudes as suggested by persuasive information provides further insight beyond the mechanistic understanding of persuasion outlined by ELM. Kohlberg (1976) and Gilligan (1982) hypothesize progressions of moral developmental stages that are characterized by differing motivations to comply with desired behaviors. Lower orders of moral development are characterized by individualistic concerns to avoid punishment, please authority, and fulfill personal needs. Central, or conventional, orders of moral development motivate behavioral compliance through normative concepts such as belief in the rule of law, mutual coercion, and individual contribution to or sacrifice for institutions. Higher order moral development is founded upon philosophical concepts of social contract, universal rights, altruism, and social justice. Individuals operating at different levels of moral development will be persuaded by different appeals corresponding to their varying motivations to comply with desired behavioral standards (Marion & Reid, 2007). Individuals motivated by developmentally high orders of morality may respond more

strongly to persuasive messages emphasizing the effects of their behavior on future environmental integrity than to regulatory messages stressing legal prohibitions. Likewise, an individual operating at a lower developmental order may respond to messages outlining dangers to the individual than to pleas invoking an individual's responsibility to communal resources (Hockett & Hall, 2007; Park, et al., 2008).

Design of persuasive information incorporating communications concepts from ELM, theories of moral development, and prescriptive messaging have proven effective in managing undesirable recreation behaviors in parks and natural settings (Marion & Reid, 2007). Bradford & MacIntyre (2007) found that persuasive messages which personally attribute the impacts of off-trail hiking directly to visitors off-trail behavior are more effective at inducing visitors to remain on trail while hiking in St. Lawrence Islands National Park, Canada, than regulatory messages simply prohibiting off-trail hiking. They conclude that this effect is largely due to greater levels of cognitive processing employed by visitors using central route processing, which was stimulated when individuals were prompted to consider the consequences of their actions by the direct attribution message. Ham, et al. (2008) echo this finding in their three-part study of behavior change in parks. They found evidence for central route processing of persuasive information in the deeper cognitive effort required to access and change behavioral beliefs they found to be at the root of behavior through their TPB analysis. In a study of off-trail hiking on Cadillac Mountain in Acadia National Park, Park, et al. (2008) found that visitors who did not walk off trail in the presence of persuasive information designed to engage central route persuasion with prescriptive messages cited reasons for doing so that aligned with characteristics of high moral development. Although the moral reasoning occurring at high orders of moral development may correspond best with resource and experiential protection objectives of many outdoor recreation settings, park visitors surely operate at a variety of moral developmental levels (Marion & Reid, 2007). In light of this, persuasive messages should focus on stimuli for multiple states of moral development (i.e., individualistic through altruistic), engage the reflective process of central route processing, and provide prescriptive descriptions of desired behaviors.

Conclusion

Indirect informational approaches to managing visitor behavior are generally preferred and potentially effective interventions when seeking to balance resource protection and visitor freedom in park and outdoor recreation settings. The efficacy and acceptability of such tactics can vary, however, depending upon message content, levels of recreation impact, and the settings and behavioral characteristics of park visits. Persuasive messages designed to manage visitor impacts can account for such variation by targeting beliefs that are salient for behavioral decision making. TPB provides a framework for identifying salient beliefs and directing managerial interventions toward those beliefs with greatest potential to elicit desired behavioral change. Using concepts from communications and moral development theory, messages targeted at salient beliefs can be framed to appeal to a broad array of visitors in ways that engage cognitive processing and describe desired behavior.

The research reported in this thesis extends the application of informational management of visitor behavior in parks by employing TPB to understand visitor behavior at the pools and design and evaluate the efficacy of persuasive messages deployed to discourage visitor exploration of the pools. The literature reviewed on the use of information to manage visitor created impacts highlights the conditions of message content, resource impact and recreation experience that may limit the acceptability or effectiveness of informational management. Using TPB to understand the factors influencing visitors' decisions to explore, persuasive messages can be targeted at the beliefs most salient to those decisions and their effects can be measured. Incorporation of the theoretical contributions of communications and moral development theory can help to ensure that targeted persuasive messages stimulate cognitive processing of visitors and provide clear examples of desired behavior. The current research integrates behavioral and communications theory to maximize the effectiveness of informational management of visitor exploration at the pools while minimizing exposure to the limitations of indirect management tactics.

References

- Ajzen, I. (1988). *Attitudes, personality and behavior*. Chicago: Dorsey Press.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Ajzen, I. (2006). *Constructing a TPB questionnaire: Conceptual and methodological considerations*. Retrieved May 26, 2008, from University of Massachusetts, Icek Ajzen Theory of Planned Behavior Web Site: <http://people.umass.edu/aizen/tpb.html>.
- Ajzen, I., & Driver, B. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, 24, 207-224.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of social Psychology*, 40, 471-499.
- Bradford, L. E. A., & McIntyre, N. (2007). Off the beaten track: Messages as a means of reducing social trail use at St. Lawrence Islands National Park. *Journal of Park and Recreation Administration*, 25, 1-21.
- Bright, A. D., & Burtz, R. T. (2006). Firewise activities of full-time versus seasonal residents in the wildland-urban interface. *Journal of Forestry*, 106, 307-315.
- Bullock, S. D., & Lawson, S. R. (2007). Managing the “commons” on Cadillac Mountain: A stated choice analysis of Acadia National Park visitor preferences. *Leisure Science*, 30, 71-86.
- Bullock, S. D., & Lawson, S. R. (2008). Examining the potential effects of management actions on visitor experiences on the summit of Cadillac Mountain, Acadia National Park. *Research in Human Ecology*, 14, 140-156.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention & behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Francais, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., Kaner, E. F. S., Smith, L., & Bonetti, D. (2004). *Constructing questionnaires based on the theory of planned behavior: A manual for health services researchers*. Newcastle upon Tyne, United Kingdom: University of Newcastle, Center for Health Services Research.
- Gilligan, C. (1982). *In a different voice: A psychological theory and women's development*. Cambridge, MA: Harvard University Press.
- Ham, S., Weiler, B., Hughes, M., Brown, T., Curtis, J., & Poll, M. (2008). *Asking visitors to help: Research to guide strategic communication for protected area*

- management* (Project #80039). Queensland, Australia: Griffith University, Sustainable Tourism Cooperative Research Center.
- Hammitt, W., & Cole, D. (1998). *Wildland recreation: Ecology and management*. New York: John Wiley.
- Hendee, J. C., & Dawson, C. P. (2002). Wilderness visitor management: Stewardship for quality experiences. In Hendee, J.C., & Dawson, C.P., *Wilderness Management: Stewardship and Protection for Resources and Values* (pp. 461-503). Golden, CO: Fulcrum Publishing.
- Hockett, K. S., & Hall, T. E. (2007). The effect of moral and fear appeals on park visitors' beliefs about feeding wildlife. *Journal of Interpretation Research*, 12, 5-27.
- Hrubes, D., Ajzen, I., & Daigle, J. (2001). Predicting hunting intentions and behavior: An application of the theory of planned behavior. *Leisure Science*, 23, 165-178.
- Kohlberg, L. (1976). *Moral development and behavior: Theory, research and social issues*. New York: Holt, Rinehart and Winston.
- Kouthouris, C., & Spontis, A., (2005). Outdoor recreation participation: An application of the theory of planned behavior. *The Sport Journal*, 8. Retrieved May 26, 2008 from <http://thesportjournal.org/article/outdoor-recreation-participation-application-theory-planned-behavior>.
- Lackey, B. K., and Ham, S. H. (2003). Contextual analysis of interpretation focused on human-black bear conflicts in Yosemite National Park. *Applied Environmental Education and Communication*, 2, 11-21.
- Liu, J.H., & Sibley, C.G. (2004). Attitudes and behavior in social space: Public good interventions based on shared representations and environmental influences. *Journal of Environmental Psychology*, 2, 373-384.
- McAvoy, L., & Dustin, D. (1983). Indirect versus direct regulation of recreation behavior. *Journal of Park and Recreation Administration*, 1, 12-17.
- Manning, R. E. (1999). *Studies in outdoor recreation: Search and research for satisfaction* (2nd ed.). Corvallis: Oregon State University Press.
- Marion, J. L., & Reid, S. E. (2007). Minimizing visitor impacts to protected areas: The efficacy of low impact education programs. *Journal of Sustainable Tourism*, 15, 5-26.
- Martin, S. R., Marsolais, J., & Rolloff, D., (in press) Visitor perceptions of appropriate management actions across the recreation opportunity spectrum. *Journal of Park and Recreation Administration*.

- Park, L. O., Manning, R. E., Marion, J. L., Lawson, S. R., Jacobi, C. (2008). Managing visitor impacts in parks: A multi-method study of the effectiveness of alternative management practices. *Journal of Park and Recreation Administration*, 26, 97-121.
- Peterson, G., & Lime, D. (1979). People and their behavior: A challenge for recreation management. *Journal of Forestry*, 77, 343-346.
- Petty, R. E., McMichael, S., & Brannon, L. (1992). The elaboration likelihood model of persuasion: Application in recreation and tourism. In M. J. Manfredo (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 77-102). Champaign, IL: Sagamore Publishing Inc.
- Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredo (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 149-208). Champaign, IL: Sagamore Publishing Inc.
- Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing?. *Journal of Applied Social Psychology*, 28, 1317-1338.
- Vande Kamp, M. E., Johnson, D. R., & Swearingen, T. C. (1994). *Deterring minor acts of noncompliance: A literature review* (Tech. Rep. NPS/PNRUW/NRTR-92/08). Seattle, WA: University of Washington, College of Forest Resources, Cooperative Park Studies Unit.
- Vistad, O. I. (2003). Experience and management of recreation impacts on the ground: A study among visitors and managers. *Journal for Nature Conservation*, 11, 363-369.
- Widner, C. J., & Roggenbuck, J. (2000). Reducing theft of petrified wood at petrified forest national park. *Journal of Interpretation Research*, 5, 1-18.
- Widner-Ward, C. J., & Roggenbuck, J. (2003). Understanding park visitors' responses to interventions to reduce petrified wood theft. *Journal of Interpretation Research*, 8, 67-82.
- Winter, P. L., Sagarin, B. J., Rhoads, K., Barrett, D. W., & Caildini, R. B. (2000). Choosing to encourage or discourage: Perceived effectiveness of prescriptive versus proscriptive messages. *Environmental Management*, 26, 589-594.

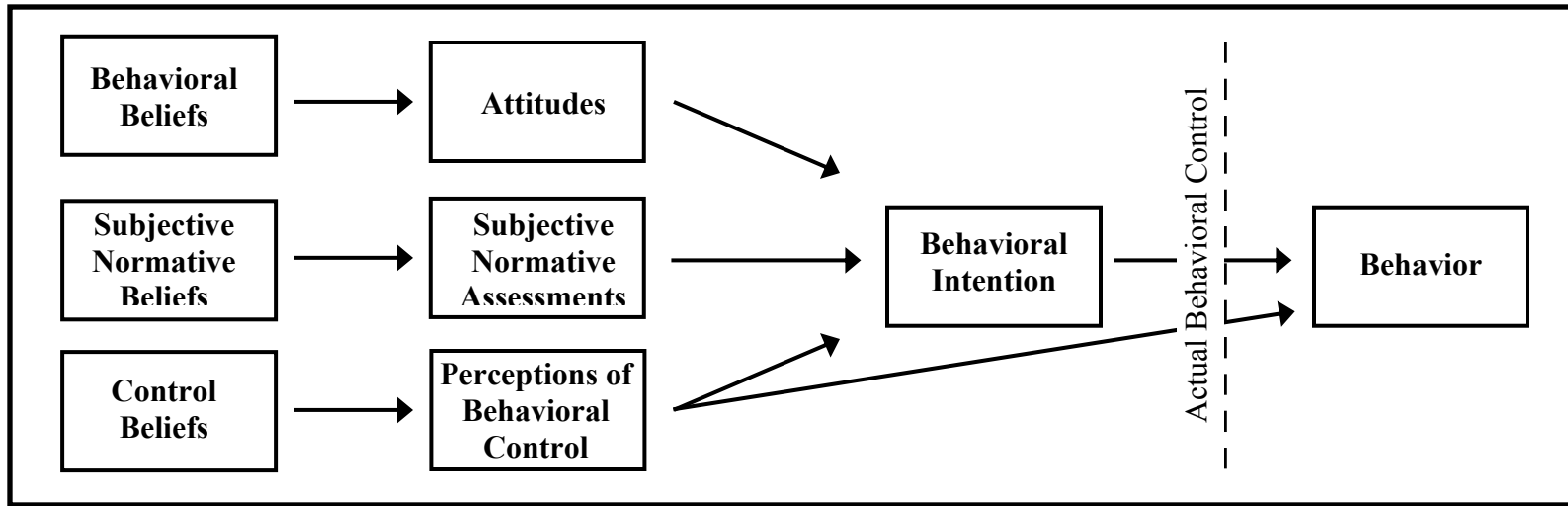


Figure 2-1: The Theory of Planned Behavior (Ajzen, 1991 & 2006)

Chapter 3

Methods

Research presented in this thesis seeks to use TPB to understand visitor exploration behavior at the pools in Haleakalā National Park and to evaluate the efficacy of persuasive information designed to dissuade visitors from exploring the pools. This chapter presents the theoretical framework and empirical methods used in this thesis research to apply TPB to study visitor behavior at the pools. Specifically, this chapter provides detailed discussion of: 1) adaptations made to TPB to theoretically frame the study; 2) development of questionnaire items to measure TPB model constructs; 3) design of persuasive treatment messages incorporating communications and moral development theory; 4) on-site visitor survey and observation procedures; and 5) data analytic hypothesis testing.

Theoretical Framework

TPB provides a theoretical framework that is potentially useful in understanding visitor behavior at the pools. Behaviors, as understood within TPB are specific, spatially and temporally bounded, volitional behaviors (Ajzen, 1991). This study defines its behavior of interest as *exploring the `Ohe`o Pools in Haleakalā National Park*. The behavior *exploring* addresses the visitor activity of management concern to the NPS and can be understood as an explicit behavior by visitors. TPB posits that an individual's behavior is largely determined by one's intention to behave and perceived control over behaving in the intended manner. The theory further explains behavioral intention as the product of one's attitudes, subjective normative assessments and perceived behavioral control (PBC). These constructs are themselves the product of behavioral, normative and control beliefs, corresponding to attitudes, subjective norms, and PBC, respectively (Ajzen, 1991). Attitudes, and their associated behavioral beliefs, are the rational assessments individuals make with respect to the behavior of interest. In this case, where the behavior of interest is exploring the pools, attitudes are visitors' own beliefs about and evaluations of potential outcomes of exploring the pools. Examples of potential outcomes of exploring the pools considered in this study include falling and getting hurt on rocks and having a true Hawaiian experience. Subjective normative assessments, and their associated normative beliefs, are individual evaluations of the normative judgments of others. In this study, they are

visitors' perceptions of the extent to which others approve or disapprove of them exploring the pools, and the importance of others' approval of their behavior. PBC, and its associated control beliefs, reflects individuals' perceptions of their ability and autonomy to engage in a behavior. At the pools, PBC addresses visitors' perceptions of their physical ability and autonomy to explore the pools.

This study modifies Ajzen's (1991) TPB model to better fit the behavior of interest, exploring the pools, and to more directly address the management interests of Haleakalā National Park. The TPB model presented here positions behavioral intention as the sole predictor of behavior, and behavioral beliefs, two measures of normative belief, and PBC as the influences on behavioral intention (Figure 3-1). Most visitors to the pools come with an expectation and intention to explore the pools (Lawson, et al., 2007). Thus, PBC is not thought to be a barrier mitigating behavioral intention from being fulfilled and is subsequently only addressed as an influence on behavioral intention, rather than directly on behavior. This decision is supported by research on the hunting intentions and behaviors by Hrubes, Ajzen & Daigle (2001), who found that PBC did not contribute directly to the prediction of behavior, and by Sutton (1998), who notes that rates of explained variation in behavior made from both behavioral intention and PBC are similar to rate of behavioral variation explained only by behavioral intention, with PBC as a precursor to intention.

Ajzen's original TPB model is further modified in its application in this study by measuring attitudes and subjective norms through their constituent beliefs. Several studies have found that the informational foundation of behavioral beliefs and subjective normative beliefs correlate highly with and directly form attitudes and subjective normative assessments (Armitage & Conner, 2001; Hrubes et al., 2001). In this study, behavioral belief measures are used to form the attitude construct, and subjective normative belief measures are used to form subjective normative assessment constructs. To specifically address NPS management interests, two subjective normative assessments are included as influences on behavioral intention, one for traveling companions and one for NPS officials.

Survey Design to Measure TPB Constructs

The behavioral, normative and control beliefs theorized to shape visitors' behavioral intentions and actual behavior, with respect to exploring the pools, were measured using a survey administered to visitors prior to their visit to the pools. Further, the survey was designed to measure visitors' behavioral intentions regarding exploration of the pools. The survey was designed in a manner to capture multiple measures for each of the cognitive constructs (Ajzen, 2006). Individual measures for each construct within the survey were compiled into a set of five composite measures, corresponding to: 1) attitudes, with respect to visitor safety, resource protection, and visitor experience outcomes; 2) subjective norms, with respect to the NPS; 3) subjective norms, with respect to traveling companions; 4) PBC; and 5) behavioral intention (Table 3-1). The questionnaire items and methods used to compute these composite measures are described below.

Attitudes and subjective normative assessments, as operationalized in this study, are measured from beliefs and accompanying scaling evaluations. To measure attitudes and normative assessments toward exploring in this manner requires identification of beliefs that are salient to the decision to explore. It is recommended that such beliefs are elicited from the study population through preliminary research (Ajzen, 2006; Francis, et al., 2004). This study's remote location and resource constraints prevented eliciting salient behavioral or normative beliefs from the study population (i.e., park visitors) prior to developing questionnaire items to measure attitudes and subjective norms. However, a systematic approach was used to identify beliefs thought to be salient to visitors at the pools for inclusion as attitude and subjective norm measurement items. In particular, an informal survey was conducted of NPS officials and university scientists familiar with the study area and management issues associated with the pools. Participants were asked to list positive and negative outcomes they perceived visitors might associate with exploring the pools. Responses from NPS officials and university scientists were compiled and circulated to study participants for peer review and prioritizing. The results of this process was a set of behavioral and normative belief items included in the survey instrument.

Attitude is a combination of behavioral beliefs about and evaluations of potential outcomes from exploring the pools. Attitude was measured as $\sum b_i e_i$, where b represents behavioral belief

strength and e represents outcome evaluations (Francis, et al., 2004). Questions designed to measure behavioral belief strength and outcome evaluations for nine potential outcomes were included in the survey. The nine potential outcomes address the visitor safety and health risks, resource and cultural impacts, and visitor experiences associated with exploring the pools. Danger outcomes from exploring include getting caught in a flash flood, contracting a rash, and falling and getting hurt on slippery rocks. Resource and cultural impact outcomes include harming native plants and animals, devaluing the area for traditional use by Native Hawaiians, and preventing others from enjoying the pools' natural quiet and beauty. Experiential outcomes of exploring include having a true Hawaiian experience, having a fun adventure, and having a story to tell when back at home. Behavioral belief strength, b , is an assessment of the likelihood of potential a outcome of exploring the pools and is measured in the survey instrument on a scale of 1, *not at all likely*, to 7, *extremely likely*. Outcome evaluations, e , are assessments of the *goodness or badness* of potential outcomes of exploring the pools and were measured on a scale of 1, *extremely bad*, to 7, *extremely good*. For analysis, outcome evaluations were recoded to -3, *extremely bad*, to +3, *extremely good* (Ajzen, 2002). The composite attitude score for each respondent was calculated as $(\sum b_i e_i)/9$, and ranges in value from -21 to +21. Positive values represent favorable attitudes toward exploring the pools, while negative values represent unfavorable attitudes toward exploring.

In this study, subjective normative assessments of two referent groups were considered: 1) NPS officials, and 2) traveling companions. Subjective normative assessments were measured as $\sum n_i m_i$, where n is normative belief strength and m is motivation to comply (Francis, et al., 2004). Normative belief strength, n , is an evaluation of the referent group attitude toward the behavior (in this case, exploring the pools). Respondents were asked in two questionnaire items if they believed that their traveling companions or NPS officials would approve or disapprove of their exploring the pools. Each question was measured in the survey instrument on a scale from 1, *disapprove*, to 7, *approve*. For analysis, normative belief strength was recoded into a scale ranging from -3, *disapprove*, to +3, *approve* (Ajzen, 2002). Motivation to comply, m , is the importance of referent group approval of one's behavior. This was measured in the survey instrument by two questions asking visitors to evaluate if the approval of traveling companions and NPS officials was 1, *not at all important*, to 7, *extremely important*, when making the

decision to explore. The subjective norm composite measure was computed as $\sum n_i m_i$, and ranges in value from -21 to +21. Positive values represent a perception that the corresponding referent group would approve of one's exploring the pools, while negative values represent a perception that the corresponding referent group would not approve of one's exploration of the pools. Respondents traveling alone were excluded from subjective normative measures with respect to traveling companions.

PBC is the level of control an individual believes they have over engaging in a specific behavior. PBC is understood to include self-efficacy and controllability components (Ajzen, 1991). Self-efficacy is one's inherent ability to engage in a behavior (i.e., Are you able to perform the behavior?). Controllability is one's volitional ability to engage in or locus of control over a behavior (i.e., Are you permitted to engage in the behavior?). In this study, the survey instrument was used to measure self-efficacy as respondents' perceived physical ease or difficulty of exploring the pools on a scale from 1, *extremely easy*, to 7, *extremely difficult*. Controllability was evaluated through two variables measuring visitor agreement with statements that visitors, and not NPS officials, should be responsible for deciding whether or not to explore and evaluating the danger of exploring on a scale ranging from 1, *strongly agree*, to 7, *strongly disagree*. For analysis, all PBC scores were reversed coded to a scale from 1, *strongly disagree*, to 7, *strongly agree*. Reverse-coded responses to each of the three PBC questions were averaged to provide an overall PBC score ranging from 1 to 7. High PBC scores (5 to 7) represent strong perceptions of control over to exploring the pools, and low values (1 to 3) represent a lack of perceived control with respect to exploring the pools.

In this study, behavioral intention was measured using two questions. In particular, visitors were asked to rate whether they *intended* to explore the pools on a scale from 1, *extremely unlikely*, to 7, *extremely likely*, and whether they *expected* to explore the pools on a scale ranging from 1, *strongly agree*, to 7, *strongly disagree* (Francis, et al., 2004). For analysis, responses to the expectation measure were reverse-coded to a scale ranging from 1, *strongly disagree*, to 7, *strongly agree*. Responses from the intention and expectation measures were averaged to form a behavioral intention composite score ranging from 1 to 7 - high values (5 to 7) represent intentions to explore, while low values (1 to 3) represent behavioral intentions to not explore. For

some analyses, a binary behavior intention variable was formed from the behavioral intention composite scores. Values of 4.5 through 7 were recoded to 1 and treated as indicating intention to explore. Values 1 through 3.5 were recoded 0 and treated as an intention to *not* explore. Records with behavioral intention composite scores of 4 (the neutral point on the scale) were excluded from the behavioral intention binary variable, as they cannot be classified as either intending or not intending to explore the pools.

The study questionnaire was reviewed and approved by the Virginia Polytechnic Institute and State University Internal Review Board and the federal Office of Management and Budget. Furthermore, the survey instrument used to measure TPB constructs was developed in accordance with the recommendations of Dillman (2000). Questionnaire items were written to facilitate consistent visitor understanding and interpretation by using clear and basic language to address only one TPB concept at a time. Responses to items employed seven point scales with binary, contrasting endpoints (agree/disagree, easy/difficult, likely/unlikely, etc.) and midpoints representing neutral values (i.e., neither agree or disagree). The survey was printed in booklet format with questions presented in a single column. Questions were ordered in a manner intended to minimize effects of question order on responses and ease survey completion. Questionnaire items measuring TPB components were grouped by construct to leverage cognitive connections among the items. The questionnaire item measuring behavioral beliefs (Appendices A&B, Question 17) was placed near the end of the survey as it involved a relatively high degree of respondent burden to complete.

Treatment Message Development

Two persuasive treatment messages were developed for evaluation within the TPB framework as potential informational management interventions at the pools. One message, designated the “fear message,” states that the NPS discourages exploration of the pools because of visitor safety concerns, including dangers from flash floods, falling on slippery rocks, and bacterial pathogens in the water (Figure 3-2). The other message, designated the “warm glow message,” states that the NPS discourages exploration because of resource protection concerns, including impacts to native flora and fauna, cultural resources, and visitors’ experiences (Figure 3-3). The messages were designed to target visitor behavioral beliefs as they are incorporated in this study’s TPB

model by specifically addressing potential danger and resource impact related outcomes from exploring the pools that are believed by the NPS and the study's researchers to be salient behavioral beliefs.

The messages were designed to incorporate elements of communications and moral development theory to maximize their effect in influencing visitor attitudes toward exploring the pools. As such, the messages prescribe desired behavior, explain why the prescribed behavior is desired, and address motivations for compliance at a variety of moral developmental levels (Marion & Reid, 2007; Petty, McMichael & Brannon, 1992; Winter, Sagarin, Rhoads, Barrett & Cialdini, 2000). Each message explicitly discourages exploring the pools and suggests that visitors consider the information presented in the message when making the decision whether or not to explore the pools. The messages simultaneously proscribe undesirable exploring while prescribing a desired behavior, considering the information presented while deciding whether or not to explore. Persuasive messages are also designed to exploit the central route to persuasion as proposed by the Elaboration Likelihood Model (Petty, et al 1992). That is, the messages are intended to change behavior through visitor comprehension, self-attribution of consequences, and internalization of information, as opposed to the emphasis on message delivery associated with the peripheral route. The central route to persuasion is found to be effective and appropriate for delivering persuasive messages when targeting recreation behavior that is unintentionally depreciative, as exploring the pools is understood to be (Roggenbuck, 1992). While both messages are designed to address the same route to persuasion, they are targeted at different levels of moral development. The fear message is designed to address the lower levels of moral development, focusing on the potential negative outcomes of exploring for the individual visitor. The warm glow message is designed to address the higher orders of moral development, focusing on the potential of one's actions to impact communal resources and the experiences of others.

Survey Administration

The survey instrument (Appendix A) was administered on 15 randomly selected days between May 23 and July 13, 2007 to visitors, aged 18 and older, *at the start* of their hikes on the trail to the pools, in the Kīpahulu area of Haleakalā National Park (Table 3-2). On each sampling day,

trained survey administrators were stationed at the trailhead for the trail to the pools, approximately 70 meters from the park's Kīpahulu area parking lot (Figure 3-4). At this location, the survey administrators approached the first visitor group to pass the survey station at the start of the sampling period and requested a randomly selected member of the group (i.e., group member with date of birth closest to the current date) to participate in the study. Recruitment occurred during the *start* of visitors' hikes on the trail to the pools, before visitors had a chance to see most of the on-site information provided by the park regarding visiting the pools. In particular, while traveling from the parking lot to the survey station, visitors could have seen only 2 of 31 onsite signs concerning visitor use of the pools. The primary focus of these two signs was on interpreting the cultural history of the park, however, one of the signs contained a photocopied collage of news clippings describing accidents that had befallen visitors to the pools. Intercepted individuals who were unwilling or unable to participate in the survey were thanked for their consideration, and those who agreed to participate were directed to a picnic table to complete the questionnaire. After completing the visitor contact, the survey administrator contacted the next arriving visitor group to request their participation in the survey.

The randomly selected member of each visitor group who agreed to participate in the survey was shown a poster depicting the pools from the perspective of the landing area at the bottom of the stairs leading into the `Ohe`o Gulch (Figure 3-5). As respondents viewed the poster, the survey administrator explained to respondents that they would be asked questions about "exploring the `Ohe`o Pools" and used a script to provide a precise definition of the types of behaviors that constitute exploring the pools (Figure 3-6). After viewing the poster and being provided with a definition of behaviors that constitute exploring the pools, respondents were then randomly assigned to one of three respondent groups: 1) control group; 2) fear treatment group; and 3) warm glow treatment group. The three treatment groups differed in terms of the information respondents were provided about issues associated with visitors' exploring the pools. In particular, the fear treatment group of respondents received the message describing potential risks of exploring the pools to visitors' safety and public health (Figure 3-2). The warm glow treatment group of respondents received the message describing impacts of exploring the pools to natural resources, visitors' experiences, and Native Hawaiian cultural values and practices (Figure 3-3). The control group of respondents received no message about issues associated with

visitors' exploring the pools. Treatment messages were administered between questions six and seven in the survey (Appendix A). The version of the questionnaire administered to members of the fear or warm glow respondent groups contained instructions, inserted between questions six and seven, directing visitors to "see the survey attendant for a brief message about Haleakalā National Park." When respondents reached this point in the survey, they were asked to read either the fear or warm glow treatment message to themselves. The control group version of the questionnaire did not contain these instructions.

The questions within survey administered to the three treatment groups were identical, with the message respondents received about exploring the pools being the only difference among the groups. The questionnaire contained three major sections. The first section of the questionnaire, entitled "Trip Description," included questions concerning visitors' group size, group type, number of previous visits to Haleakalā National Park, activities engaged in during previous visits, and sources of information used in trip planning. The second section of the questionnaire was entitled "The `Ohe`o Pools" and included items designed to measure TPB components. Respondents who were assigned to the fear or warm glow treatment groups were instructed to read their persuasive message (Figures 2-2 & 2-3, respectively) before completing this section of the questionnaire. Respondents who were assigned to the "control" group did not read any persuasive message about the pools before completing this section of the questionnaire. The third section of the survey, entitled "Background Information," included questions concerning visitors' travel time to the Kīpahulu area of Haleakalā National Park, gender, age, state or country of residence, level of formal education, ethnicity and race.

Overall, 57.9% of solicited respondents agreed to participate in the study. Fifteen solicited park visitors did not speak English well enough to participate in the survey. A substantial number of solicited visitors (n=173) declined to participate because they were members of commercial tour groups with limited time in the park. When refusals due to language barriers and commercial tour groups are removed from response rate calculation, 66.3% of solicited visitors agreed to respond (Table 3-3).

Behavioral Observation

Unobtrusive observation of visitor behavior at the pools was conducted in tandem with the visitor survey on a subset of sampling days. The visitor observations were conducted on 7 days in July, 2007 (Table 3-2). The purpose of the unobtrusive observations was to assess whether survey respondents' actual behavior was consistent with their stated behavioral intentions, with respect to exploring the pools. Observations were conducted by researchers dressed in clothing similar to that worn by most visitors. Randomly selected survey respondents were unobtrusively followed to the pools area from the survey location. Upon crossing through the gate near the top of the stairs descending into the `Ohe`o Gulch, selected respondents were observed for a maximum of 10 minutes. If the observed visitor entered the "exploration zone" of the `Ohe`o Gulch (as depicted in Figure 3-5) within 10 minutes, they were designated as having explored the pools and the observation was concluded. If the observed visitor: 1) did not explore the pools within 10 minutes of having crossed through the gate at the top of the stairs; 2) did not cross through the gate within 25 minutes of having completed the questionnaire; or 3) left the pools area within 10 minutes or less without having explored the pools, the observation was concluded and the visitor was designated as having not explored the pools. Information characterizing the observed visitor's group size, group composition, and clothing was also recorded to assist in matching observation and survey data (Appendix B). In addition, survey logs were used to collect information about respondents to facilitate accurate pairing of observation and survey data (Appendix C). Information recorded on the survey logs and used to match observation data to survey data included group size, the gender of group members, and respondent's clothing. The decision rules developed to end behavioral observation present a limitation to this study. Visitors were commonly observed by survey administrators to travel to the pools within 25 minutes and begin exploring within 10 minutes of arrival. Further, these times combine with a return hike of 5 minutes to form a maximum observation period of 40 minutes. This protocol facilitated economical behavioral observation, however it may have introduced error into the study's results. In particular, visitors who did explore, but not until the allotted observation time had expired, were recorded as non-explorers rather than explorers. Thus, those survey respondents who reported an intention to explore may have behaved more consistently with their stated intention than the observation data would suggest. Similarly, those who reported in the

survey that they did not intend to explore may have acted less consistently than our observation data would suggest.

A binary variable was created for each observed respondent's behavior, and assigned a value of 1 for *explorers* and a value of 0 for *non-explorers*. An additional variable, intention-behavior consistency, was created, and coded as 1 in cases where respondents' observed behavior was consistent with stated behavioral intention, and 0 otherwise. The intention-behavior consistency variable was computed only for those survey respondents whose behavior was observed by the research team and had a behavioral intention composite score of 1 to 3.5 or 4.5 to 7. As with the binary behavior intention variable, the intention-behavior consistency variable was not computed for respondents with behavioral intention composite scores of 4 because this value represents the neutral point on the intention scale, not a distinct intention to explore or not explore.

Data Analysis

Analyses of survey response and observation data were conducted to examine several hypotheses. The hypothesis tests were designed to assess the validity of the TPB model as a framework for understanding visitor behavior with respect to exploring the pools, and provide insight into the relative efficacy of the fear and warm glow messages in minimizing the number of visitors who choose to explore. Data analysis was conducted with SPSS 15.0 in a stepwise fashion, corresponding to the progression of hypothesized relationships within the TPB model.

- H1: In comparison to the control group respondents, respondents who receive either the fear or warm glow persuasive message will have less favorable attitudes, normative assessments, and PBC with respect to exploring the pools. MANOVA conducted through a general linear model, and ANOVA with Tukey's HSD post-hoc tests were used to evaluate Hypothesis 1.
- H2: Visitors' attitudes, subjective normative assessments, and PBC with respect to exploring are significant predictors of intention to explore the pools. Linear regression models were used to evaluate Hypothesis 2.
- H3: Exposure to either the fear or warm glow persuasive message will reduce visitors' intentions to explore the pools. This hypothesis was

examined with two statistical tests, ANOVA and Chi-square, both of which used respondent group (i.e., control, fear treatment, or warm glow treatment) as the independent variable. Behavioral intention served as the dependent variable for the ANOVA test, while the binary version of behavioral intention was the dependent variable for the Chi-square test.

H4: Visitors' stated behavioral intention with respect to exploring is a statistically significant predictor of actual exploring behavior. A Chi-square test was used to compare the intention-behavior consistency variable with stated behavioral intention.

H5: Exposure to either the fear or warm glow persuasive messages will reduce exploration behavior at the pools. A Chi-square test was used to compare observed behavior, by respondent group, to evaluate Hypothesis 5.

Conclusion

In summary, this chapter presents the methods used in this thesis research to understand visitor exploration behavior at the pools and to evaluate the efficacy of persuasive information designed to dissuade visitors from exploring the pools. TPB provided the theoretical framework in this study for identifying salient cognitive assessments made by visitors when deciding whether or not to explore. A questionnaire designed to measure the TPB cognitive assessments was administered to visitors at the beginning of their visit to the Kīpahulu area of Haleakalā National Park. During the survey, messages discouraging visitors from exploring were administered to treatment groups, while control group respondents received no message from survey administrators about exploring the pools. The effects of the persuasive message treatments on cognitive assessments and subsequent behavior were tested through hypothesized TPB relationships. Application of the TPB model to visitor behavior at the pools, as described here, is designed to identify the salient factors underlying visitors' decisions regarding whether or not to explore. Identification of salient behavioral factors provides empirical guidance for park managers to more effectively target persuasive messages contained in park signage and at the Visitor Center to influence visitor behavior to minimize resource, cultural, and experiential

impacts at the pools (Marion & Reid, 2007; Petty, McMichael & Brannon, 1992; Roggenbuck, 1992; Winter, Sagarin, Rhoads, Barrett & Cialdini, 2000).

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Ajzen, I. (2006). *Constructing a TPB questionnaire: Conceptual and methodological considerations*. Retrieved May 26, 2008, from University of Massachusetts, Icek Ajzen Theory of Planned Behavior Web Site: <http://people.umass.edu/aizen/tpb.html>.
- Ajzen, I., & Driver, B. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, 24, 207-224.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of social Psychology*, 40, 471-499.
- Bright, A. D., & Burtz, R. T. (2006). Firewise activities of full-time versus seasonal residents in the wildland-urban interface. *Journal of Forestry*, 106, 307-315.
- Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York: John Wiley & Sons, Inc.
- Francais, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., Kaner, E. F. S., Smith, L., & Bonetti, D. (2004). *Constructing questionnaires based on the theory of planned behavior: A manual for health services researchers*. Newcastle upon Tyne, United Kingdom: University of Newcastle, Center for Health Services Research.
- Hrubes, D., Ajzen, I., & Daigle, J. (2001). Predicting hunting intentions and behavior: An application of the theory of planned behavior. *Leisure Science*, 23, 165-178.
- Kouthouris, C., & Spontis, A., (2005). Outdoor recreation participation: An application of the theory of planned behavior. *The Sport Journal*, 8. Retrieved May 26, 2008 from <http://thesportjournal.org/article/outdoor-recreation-participation-application-theory-planned-behavior>.
- Lawson, S. R. , Kiser, B. C., Hockett, K., Reigner, N. R., Howard, J. and Dymond, S. F. (2007). *Social science research to support visitor experience and resource protection (VERP) planning in Haleakalā National Park*. Virginia Polytechnic Institute and State University, Department of Forestry.
- Marion, J. L., & Reid, S. E. (2007). Minimizing visitor impacts to protected areas: The efficacy of low impact education programs. *Journal of Sustainable Tourism*, 15, 5-26.
- Petty, R. E., McMichael, S., & Brannon, L. (1992). The elaboration likelihood model of persuasion: Application in recreation and tourism. In M. J. Manfredi (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 77-102). Champaign, IL: Sagamore Publishing Inc.

- Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredo (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 149-208). Champaign, IL: Sagamore Publishing Inc.
- Rossi, A. N., & Armstrong, J. B., (1999). Theory of reasoned action vs. theory of planned behavior: Testing the suitability and sufficiency of a popular behavioral model using hunting intentions. *Human Dimensions of Wildlife*, 4, 40-56.
- Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing?. *Journal of Applied Social Psychology*, 28, 1317-1338.
- Winter, P. L., Sagarin, B. J., Rhoads, K., Barrett, D. W., & Cialdini, R. B. (2000). Choosing to encourage or discourage: Perceived effectiveness of prescriptive versus proscriptive messages. *Environmental Management*, 26, 589-594.

Table 3-1: TPB Construct Composite Score Formation from Survey Items					
Attitude $\sum b_i e_i$		My exploring the `Ohe`o Pools area today would result in me...			
		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:50%; text-align:center;">Behavioral Belief Strength <i>b</i></th> <th style="width:50%; text-align:center;">Outcome Evaluations <i>e</i></th> </tr> <tr> <td style="text-align:center;"><i>not at all likely 1 → 7 extremely likely</i></td> <td style="text-align:center;"><i>extremely bad -3 → +3 extremely good</i></td> </tr> </table>	Behavioral Belief Strength <i>b</i>	Outcome Evaluations <i>e</i>	<i>not at all likely 1 → 7 extremely likely</i>
	Behavioral Belief Strength <i>b</i>	Outcome Evaluations <i>e</i>			
	<i>not at all likely 1 → 7 extremely likely</i>	<i>extremely bad -3 → +3 extremely good</i>			
	Danger	...getting caught in a flash flood	...getting caught in a flash flood		
		...getting a rash	...getting a rash		
		...falling on rocks and getting hurt	...falling on rocks and getting hurt		
	Resource	...harming native plants and animals	...harming native plants and animals		
		...reducing the area's value for native Hawaiians	...reducing the area's value for native Hawaiians		
		...preventing others from experiencing the natural beauty of the `Ohe`o Gulch	...preventing others from experiencing the natural beauty of the `Ohe`o Gulch		
Experiential	...having a true Hawaiian experience	...having a true Hawaiian experience			
	...having a fun adventure	...having a fun adventure			
	...having a story to tell when I get home	...having a story to tell when I get home			
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:50%; text-align:center;">Normative Beliefs <i>n</i></th> <th style="width:50%; text-align:center;">Motivation to Comply <i>m</i></th> </tr> <tr> <td style="text-align:center;"><i>disapprove 1 → 7 approve</i></td> <td style="text-align:center;"><i>not at all important -3 → +3 extremely important</i></td> </tr> </table>	Normative Beliefs <i>n</i>	Motivation to Comply <i>m</i>	<i>disapprove 1 → 7 approve</i>	<i>not at all important -3 → +3 extremely important</i>
Normative Beliefs <i>n</i>	Motivation to Comply <i>m</i>				
<i>disapprove 1 → 7 approve</i>	<i>not at all important -3 → +3 extremely important</i>				
Subjective Norm <i>Traveling Companion</i> $n_i m_i$	If I were to explore the `Ohe`o Pools today, the people I am traveling with would...	How important is it to you that the people you are visiting the park with today approve of what you do?			
Subjective Norm <i>NPS Officials</i> $n_i m_i$	If I were to explore the `Ohe`o Pools today, National Park Service Officials would...	How important is it to you that National Park Service officials approve of what you do?			
Perceived Behavioral Control $\sum x_i/3$	Control Beliefs <i>x</i>				
	Self-Efficacy <i>extremely difficult 1 → 7 extremely easy</i>				
	My physical ability would make exploring the `Ohe`o Pools area today...				
	Controllability <i>strongly disagree 1 → 7 strongly agree</i>				
	It is entirely up to me and not National Park Service officials whether or not I explore the `Ohe`o Pools area today.				
	It should be up to each visitor to evaluate how dangerous it is to explore the `Ohe`o Pools area.				

Table 3-2. Visitor Survey Sampling Dates

Date	Solicitations	Accept	Refuse	Unusable ^a	LB Refuse ^b	Tour Refuse ^c	Behavior Observations
5/23/2007	36	21	15	0	0	3	0
5/24/2007	40	16	24	0	0	16	0
6/2/2007	102	26	76	38	3	11	0
6/3/2007	81	50	31	0	2	17	0
6/11/2007	178	92	86	0	4	29	0
6/20/2007	126	71	55	0	1	17	0
6/21/2007	124	72	52	1	1	23	0
7/1/2007	130	74	56	0	0	14	0
7/7/2007	149	93	56	4	1	13	17
7/8/2007	131	88	43	3	0	7	16
7/9/2007	122	85	37	1	9	7	20
7/10/2007	126	79	47	0	0	4	25
7/11/2007	63	44	19	3	0	4	14
7/12/2007	123	71	52	0	1	9	16
7/13/2007	104	65	39	0	0	10	26
Total	1635	947	688	50	22	184	134

^a Denotes surveys that were administered to respondents, but were incomplete; unusable surveys were considered refusals.

^b LB Refuse were refusals due to a language barrier with the potential respondent.

^c Tour Refuse were refusals due to time constraints from being a member of a commercial tour.

Table 3-3. Visitor Survey Response Dates

	Overall ^a	Minus LB ^b	Minus Tour ^c	Minus LB & Tour
Acceptance Rate	57.9%	58.7%	65.3%	66.3%
Refusal Rate	42.1%	41.3%	34.7%	33.7%

^a Unusable surveys were considered refusals for calculating acceptance rates.

^b LB were refusals due to a language barrier with the potential respondent.

^c Tour were refusals due to time constraints from being a member of a commercial tour.

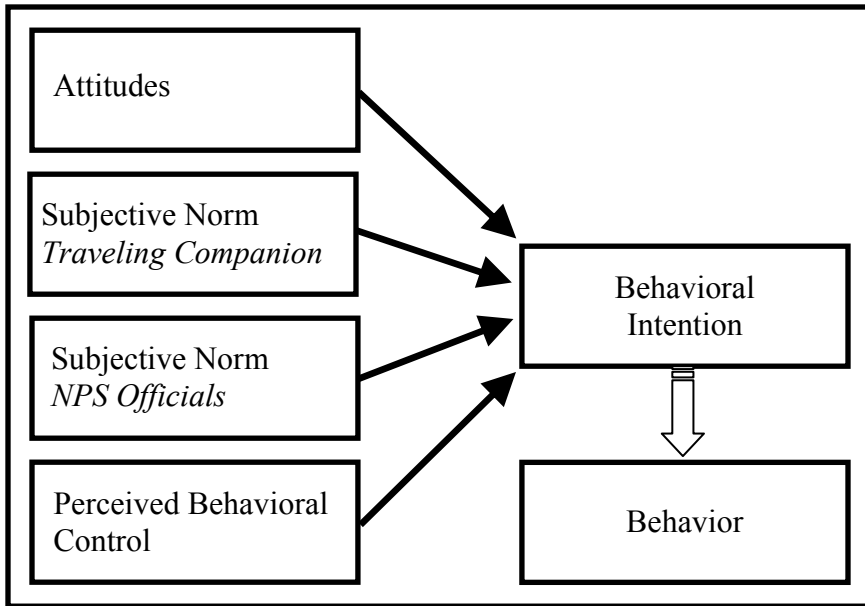


Figure 3-1: The Theory of Planned Behavior
(adapted from Ajzen, 1991)

`Ohe`o Pools Area

The National Park Service discourages people from exploring the `Ohe`o Pools area because of the risk of injury or death. Falls on slippery rocks and from steep cliffs can result in serious injury to even the most sure-footed of visitors. Submerged rocks pose dangers to cliff jumpers and sudden flash floods have washed people to sea. A water-borne bacterial disease known to exist in the stream can cause rashes and more serious symptoms such as vomiting and diarrhea, which could lead to death. Please consider these potential health and safety issues when you decide whether or not to explore the `Ohe`o Pools area today.

Figure 3-2: Fear Treatment Message

`Ohe`o Pools Area

The National Park Service discourages people from exploring the `Ohe`o Pools area because visitor use along the banks of the stream tramples native vegetation, and wading and swimming may harm rare native fish, shrimp, and snails that live in the stream. The often loud and large crowds also detract from the experience of those visitors who wish to appreciate the natural beauty of the area in a more quiet and peaceful way. These crowds can also diminish the area's value for traditional use by Native Hawaiians. Please consider these potential impacts to the natural resources and experiences of Native Hawaiians and park visitors when you decide whether or not to explore the `Ohe`o Pools area today.

Figure 3-3: Warm Glow Treatment Message



Figure 3-4. Visitor Survey Sampling Location

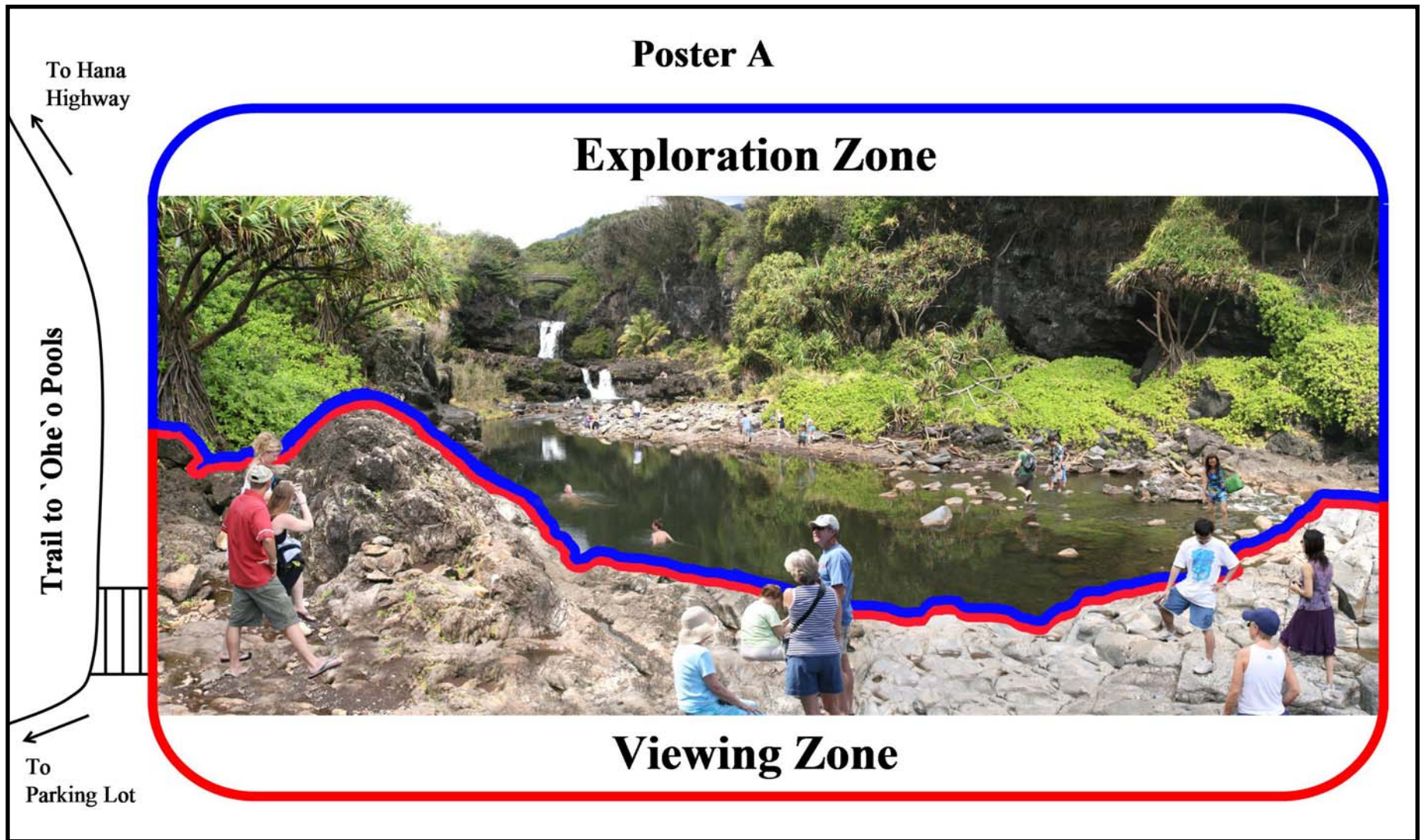


Figure 3-5: Exploration Zone Diagram

`Ohe`o Pools Area

Please take a look at the photograph of the `Ohe`o Pools area on Poster A. The trail to the `Ohe`o Pools leads visitors to a concrete staircase that descends into the gorge. Some visitors, like those depicted in the *Viewing Zone* of the photo, choose to descend the staircase and view the Ohe`o Pools from the rock landing at the base of the stairs. Other visitors, like those depicted in the *Exploration Zone* of the photo, choose to leave the rock landing and cross the stream to explore the `Ohe`o Pools area. In the remainder of the questionnaire, the term “*explore the `Ohe`o Pools area*” refers to any activity, including swimming, for which visitors enter the *Exploration Zone*.

Figure 3-6: Exploration Zone Description

Chapter 4

Journal Manuscript

Exploring Visitors: Using the Theory of Planned Behavior to Understand Visitor Behavior and Improve the Efficacy of Visitor Information in Haleakalā National Park

Introduction

Visitor education and information are commonly used to minimize and prevent social and environmental impacts of recreation in national parks and related protected natural areas (Ham et al., 2008; Marion & Reid, 2007). They are the generally preferred recreation management approach of both visitors and managers, largely because they are perceived as unobtrusive and consistent with experiential values associated with natural resource-based recreation on public lands, and are often less costly than other management tactics (Bullock & Lawson, 2007; Hendee & Dawson 2002; Manning, 1999; Martin, Marsolais & Rolloff, in press; Park, Manning, Marion, Lawson & Jacobi, 2008; Roggenbuck. 1992; Vistad 2003). Furthermore, the use of visitor education and information has proven to be effective at reducing a variety of undesirable behaviors in park settings, including off-trail hiking, animal feeding, theft of petrified wood, and littering (Bradford & McIntyre, 2007; Hockett & Hall, 2007; Liu & Sibley, 2004; Marion & Reid, 2007; Widner & Roggenbuck, 2000).

Although there is a general preference among visitors and managers alike for informational approaches to managing visitor behavior in parks, previous research suggests that information and education are not always effective at persuading visitors to behave in a manner that minimizes their impacts to park resources and the quality of other visitors' experiences (Vande Kamp, Johnson, & Swearingen, 1994; Park et al., 2008). Such is the case at the `Ohe`o Pools (referred to hereafter as "the pools"), a primary visitor attraction in the Kīpahulu area of Haleakalā National Park. Within the Kīpahulu area of the park, a formal trail leads visitors to the rim of `Ohe`o Gulch in which the pools are located, and concrete steps descend from the trail into the gulch

itself. While some visitors remain on the trail above the pools, most descend the stairs into the gulch. Many of these visitors venture further, leaving the landing at the base of the stairs to explore the pools by hopping from rock to rock along Palikea Stream, “bushwhacking” through vegetation on the steep sides of the gulch, wading through and swimming in the pools, and cliff-jumping into the water. Exploring and swimming in the pools has become a popular visitor activity, and is the centerpiece of many tourism brochures and related promotional materials circulated to island visitors. Exploring and swimming in the pools has been a legal activity when the National Park Service (NPS) determines the stream level does not pose a threat to visitors’ safety. However, the NPS discourages visitors from exploring and swimming in the pools for reasons related to visitor safety, public health, resource protection, Native Hawaiian cultural practices and values, and the quality and nature of visitors’ experiences. The NPS relies exclusively on indirect management in the form of onsite signage designed to dissuade visitors from exploring the pools, except on days when the stream is closed to visitors due to unsafe water levels. In particular, the NPS employs signage and interpretative information in the Visitor Center and along trails that focuses primarily on the dangers and safety hazards associated with entering and exploring the pools area. Despite the NPS’s current informational campaign, a large number of visitors choose to explore and/or swim in the pools.

The purpose of this study is to improve the design of visitor education and information messages to enhance their efficacy as tools to minimize the number of visitors who explore the pools. Further, the study is designed to assess whether indirect management alone is sufficient to meet NPS management objectives with respect to visitor use of the pools, or if more direct forms of management are needed to supplement visitor education and information. To do this, the study uses the Theory of Planned Behavior (TPB) to examine the cognitive factors that influence visitors’ decisions about whether or not to explore the pools. Additionally, the study uses an experimental approach to assess the relative efficacy of two persuasive messages designed to act upon and influence the cognitive factors that are hypothesized within TPB to “drive” visitor behavior. The following section of the paper reviews previous studies concerning the efficacy of visitor

use management through education and information. This is followed by a presentation of TPB, which provides the theoretical framework for the study. Results of the study are presented, and the paper concludes with a discussion of findings and their implications for research and management.

Previous Research on the Efficacy of Visitor Education and Information

Previous research suggests that the efficacy of visitor education and information is dependent upon the characteristics and circumstances of informational messages, resource impacts, recreation settings, and visitor experiences and behaviors. Informational messages whose content explains the depreciative consequences of specific recreation behaviors and discusses the reasons for management policies have been found to effectively capture visitors' attention, influence their behavior, and even enhance their experience, in some cases (Bullock & Lawson, 2007). In contrast, regulatory messages that do not include a rationale for rules and regulations can have a negative effect on visitor experiences and be less effective at persuading visitors to adopt desired behaviors. Further, messages that attribute impacts of recreation behaviors to visitors so they can identify with and reflect upon them have been found to be more effective at reducing depreciative behavior than those that only instruct visitors to refrain from engaging in specific behaviors (Bradford & McIntyre, 2007). Additionally, results from a study of National Association for Interpretation members suggest that interpretation professionals perceive visitor information that uses *prescriptive* messages emphasizing desired behaviors to be more effective than *proscriptive* messages that focus on discouraging undesirable behaviors (Winter, Sagarin, Rhoads, Barrett & Cialdini, 2000).

For visitor education and information to be effective, targeted visitor experiences and behaviors must be of a nature that facilitates visitor exposure and receptiveness to persuasive messages (Park et al., 2008). Managerially undesirable recreation behaviors that are careless, unskilled or uninformed have potential for management with information that educates visitors about and connects them with their impacts (Roggenbuck, 1992). Recreation impacts to resources that are wantonly illegal, such as theft from cultural sites, or unavoidable, such as disposal of human waste, are unlikely to

be influenced by informational tactics (Roggenbuck, 1992; Widner-Ward & Roggenbuck, 2003) Results of a study of off-trail hiking on the summit of Cadillac Mountain in Acadia National Park found that signage encouraging visitors to stay on trail, rather than hiking off-trail and trampling alpine vegetation, was ineffective (Park, et al., 2008). The authors concluded that this result could be explained, in part, by the fact that site visits were brief and visitors, focused on highly attractive and accessible recreation amenities of the site, generally did not wish to spend time reading informational signs.

Persuasive messages have been found to be most successful when they exploit the central route to persuasion as described by the Elaboration Likelihood Model of human behavior (Ham et al., 2008; Petty, McMichael & Brannon, 1992). This route to persuasion is accessed when messages prompt individuals to consider the message's arguments, elaborate on the meaning of those arguments for individual behavior, and then respond by changing basic behavioral beliefs to align beliefs, attitudes, and behavior with the message. These behavior changes are suggested to be deeper and more lasting than those achieved with peripheral route persuasion. Peripheral route persuasion relies on cues within the message and its delivery, including the credibility of the messenger and the number of arguments offered. This route to persuasion may result in behavior change, but change is often temporary and not reflective of actual change in underlying behavioral beliefs (Ham, et al., 2008).

Findings from studies of the efficacy of visitor education and information as management tools in national parks suggest that theories of moral development can inform the design of persuasive messages based on the targeted audience and behaviors (Ham, et al., 2008; Hockett & Hall, 2007; Marion & Reid, 2007; Park, et al., 2008). Kohlberg (1976) and Gilligan (1982) developed spectra of moral development that posit individual concerns progress in orientation from self through others to a highest level of development characterized as justice, responsibly, and integration of caring for self and others. Within this spectrum of moral development, persuasive messages emphasizing the dangers of or punishment for engaging in a behavior are directed toward individuals at lower orders of development, focusing on the negative effects of specific behaviors to the *self*. Messages

presenting the negative effects of behavior to *communal* or *mutually valued* resources appeal to higher levels of moral development by encouraging behavior change for reasons of justice and equity.

This review of literature suggests that there are a number of factors that influence the efficacy of visitor education and information tactics in achieving resource protection and visitor use management objectives in national parks. Another factor considered in the literature on the efficacy of visitor education and information is the extent to which persuasive messages target and effectively access the most salient (i.e., influential) cognitive precursors to behavior, as theorized in TPB. TPB posits that prior to engaging in a behavior, individuals form an intention to behavior, and that this intention is constructed from cognitive assessments with respect to the behavior (Ajzen, 1991). Ham and others (2008) provide an extensive review and application of TPB to the evaluation of persuasive information campaigns for management of three depreciative behaviors in recreation settings: littering, wildlife feeding, and allowing dogs to run off-leash. The authors identified behavioral beliefs that had the greatest influence on attitude formation and behavioral decision making as hypothesized by TPB. By understanding the influence of behavioral beliefs on behavioral decisions, the authors were able to design informational interventions to target those behavioral beliefs with greatest leverage on decision-making. Two of the interventions tested by Ham and others (2008) for littering and wildlife feeding achieved behavior change through changes in behavioral beliefs and subsequent attitudes and behavioral intentions. Persuasive information changed park visitors' behavioral beliefs in the intended direction, and these new beliefs were found to influence visitors' behavior. For these two behaviors, TPB analysis isolated salient behavioral beliefs for decision-making and guided design of information interventions to optimize their influence on visitor behavior. TPB has also been used to evaluate existing programs of visitor education and information. Using TPB's positioning of behavioral beliefs as a foundational influence on behavioral intention, Lackey and Ham (2003) elicited salient behavioral beliefs on bear-wise food storage from overnight campers in Yosemite National Park. Salient beliefs identified in the study were compared to messages in current food storage informational campaigns, which provided a basis for

suggesting improvements to message design to target beliefs with the greatest potential to influence visitor behavior. As the studies reviewed here illustrate, the progressive and quantifiable relationships among beliefs, intention, and behavior modeled by TPB provide a theoretical and empirical basis to optimize the design of persuasive messages.

This study builds on research reviewed here by applying TPB to identify the salient cognitive precursors to visitor behavior at the pools, and evaluate the relative influence of alternative messages on those cognitive factors. Thus, the study is designed to assess and enhance the efficacy of the NPS' visitor education efforts to influence visitors' behavior and achieve natural, cultural, and experiential resource protection objectives at the pools in Haleakalā National Park.

Theoretical Framework

TPB provides a theoretical framework that is potentially useful in understanding visitor behavior at the pools. Behaviors, as understood within TPB are specific, spatially and temporally bounded, and volitional (Ajzen, 1991). This study defines its behavior of interest as *exploring the 'Ohe'o Pools in Haleakalā National Park*. The behavior *exploring* addresses the visitor activity of management concern to the NPS and can be understood as an explicit behavior by visitors. TPB posits that an individual's behavior is largely determined by one's intention to behave and perceived control over behaving in the intended manner. The theory further explains behavioral intention as the product of one's attitudes, subjective normative assessments, and perceived behavioral control (PBC). These constructs are themselves the product of behavioral, normative, and control beliefs, corresponding to attitudes, subjective norms, and PBC, respectively (Ajzen, 1991). Attitudes, and their associated behavioral beliefs, are the rational assessments individuals make with respect to the behavior of interest. In this case, where the behavior of interest is exploring the pools, attitudes are visitors' own beliefs about and evaluations of potential outcomes of exploring the pools. Examples of potential outcomes of exploring the pools considered in this study include falling and getting hurt on rocks and having a true Hawaiian experience. Subjective normative assessments, and their associated normative beliefs, are individual evaluations of the normative judgments of

others. In this study, subjective normative assessments are visitors' perceptions of the extent to which others approve or disapprove of them exploring the pools, and the importance of others' approval of their behavior. PBC, and its associated control beliefs, reflects individuals' perceptions of their ability and autonomy to engage in a behavior. At the pools, PBC addresses visitors' perceptions of their physical ability and autonomy to explore the pools.

This study modifies Ajzen's (1991) TPB model to better fit the behavior of interest, exploring the pools, and to more directly address the management interests of Haleakalā National Park. The TPB model presented here positions behavioral intention as the sole predictor of behavior, and behavioral beliefs, two measures of normative belief, and PBC as the influences on behavioral intention (Figure 1). Most visitors to the pools come with an expectation and intention to explore the pools. Thus, PBC is not thought to be a barrier mitigating behavioral intention from being fulfilled and is subsequently only addressed as an influence on behavioral intention, rather than directly on behavior. This decision is supported by research on hunting intentions and behaviors by Hrubes, Ajzen & Daigle (2001), who found that PBC did not contribute directly to the prediction of behavior, and by Sutton (1998), who notes that rates of explained variation in behavior made from both behavioral intention and PBC are similar to the rate of behavioral variation explained only by behavioral intention, with PBC as a precursor to intention.

Ajzen's original TPB model is further modified in its application in this study by measuring attitudes and subjective norms through their constituent beliefs. Several studies have found that the informational foundation of behavioral beliefs and subjective normative beliefs correlate highly with and directly form attitudes and subjective normative assessments (Armitage & Conner, 2001; Hrubes, et al., 2001). In this study, behavioral belief measures are used to form the attitude construct, and subjective normative belief measures are used to form subjective normative assessment constructs. To specifically address NPS management interests, two subjective normative assessments are included as influences on behavioral intention, one for study participants' traveling companions and one for NPS officials.

Several studies have applied TPB to model behavior in the context of outdoor recreation and natural resources management. Examples include the prediction of hunting behavior, participation in outdoor recreation activities, and engagement in wild fire preparation and mitigation activities by private land owners (Ajzen & Driver 1992; Bright & Burtz, 2006; Hrubes, et al., 2001; Kouthouris & Spontis 2005; Rossi & Armstrong, 1999). While previous TPB studies have used behavioral surrogates including reported past behavior as the dependent variable or “end point” of the TPB model, our study includes a measure of actual behavior, which allows us to examine the validity of stated behavioral intention as a precursor to actual behavior (Ajzen & Driver, 1992; Bright & Burtz, 2006; Hrubes, et al., 2001).

In providing an understanding of visitor behavior, behavioral intention, and the cognitive assessments that lead visitors to explore or not explore the pools, the TPB model developed in this study provides a framework to evaluate and enhance the effectiveness of visitor education and information to manage visitor use of the pools. That is, by identifying the most influential cognitive factors shaping visitor behavior and measuring the scale and direction of those influences, park managers can design persuasive messages that target the most salient cognitive precursors to visitor behavior. In doing so, park managers can minimize the limitations of information-based visitor management (i.e., insufficient protection for intensive impacts at high use, attraction-based sites) and maximize their benefits (i.e., increased visitor freedom and awareness of the effects of their behavior).

Treatment Messages

In conjunction with the measurement of TPB constructs in this study, an experimental approach was used to assess the relative influence of two persuasive messages on the cognitive factors hypothesized to most significantly shape visitors’ decisions about whether or not to explore the pools. One message, designated the “fear message,” states explicitly that the NPS discourages exploration of the pools because of visitor safety concerns, including dangers from flash floods, falling on slippery rocks, and bacterial

pathogens in the water (Figure 2). The other message, designated the “warm glow message,” states explicitly that the NPS discourages exploration because of resource protection concerns, including impacts to native flora and fauna, cultural resources, and visitors’ experiences (Figure 3). The messages were designed to target visitor attitudes as they are incorporated in this study’s model of behavior by specifically addressing potential danger and resource impact-related outcomes from exploring the pools. The messages are also designed to invoke the central route to persuasion as proposed by the Elaboration Likelihood Model (Petty, et al., 1992). That is, the messages are intended to change behavior through visitor comprehension and internalization of information, as opposed to the emphasis on message delivery associated with the peripheral route. The central route to persuasion is found to be effective and appropriate for delivering persuasive messages when targeting recreation behavior that is unintentionally deprecative, as exploring the pools is understood to be (Roggenbuck, 1992). While both messages are designed to address the central route to persuasion, they are targeted at different levels of moral development. The fear message is designed to address the lower levels of moral development, focusing on the potential negative outcomes of exploring for the individual visitor. The warm glow message is designed to address the higher orders of moral development, focusing on the potential of one’s actions to impact communal resources and the experiences of others. The efficacy of these experimental messages to persuade visitors not to explore the pools is examined through analysis of their effects on the cognitive precursors to and actual behavior of study participants.

Methods

TPB Implementation in the Survey

The behavioral, normative, and control beliefs theorized to shape visitors’ behavioral intentions and actual behavior, with respect to exploring the pools, were measured using a survey administered to visitors prior to their visit to the pools. Further, the survey was designed to measure visitors’ behavioral intentions regarding exploration of the pools. The survey was designed in a manner to capture multiple measures for each of the cognitive constructs (Ajzen, 2006). Individual measures for each construct within the survey were compiled into a set of five composite measures, corresponding to: 1)

attitudes, with respect to visitor safety, resource protection, and visitor experience outcomes; 2) subjective norms, with respect to the NPS; 3) subjective norms, with respect to traveling companions; 4) PBC; and 5) behavioral intention (Table 1). The methods used to compute these composite measures from survey responses are described below.

Attitude is a combination of behavioral beliefs about and evaluations of potential outcomes from exploring the pools. Attitude was measured as $\sum b_i e_i$, where b represents behavioral belief strength and e represents outcome evaluations (Francis, et al., 2004). Questions designed to measure behavioral belief strength and outcome evaluations for nine potential outcomes were included in the survey. Behavioral belief strength, b , is an assessment of the likelihood of potential outcomes of exploring the pools and were measured in the survey instrument on a scale of 1 *not at all likely* to 7 *extremely likely*. Outcome evaluations, e , are assessments of the *goodness or badness* of potential outcomes of exploring the pools and were measured on a scale of 1 *extremely bad* to 7 *extremely good*. For analysis, outcome evaluations were recoded to -3 *extremely bad* to +3 *extremely good* (Ajzen, 2006). The composite attitude score for each respondent was calculated as $(\sum b_i e_i)/9$, and ranges in value from -21 to +21. Positive values represent favorable attitudes toward exploring the pools, while negative values represent unfavorable attitudes toward exploring.

Subjective normative assessments of two referent groups were considered: 1) NPS officials; and 2) study participants' traveling companions. Subjective normative assessments were measured as $\sum n_i m_i$, where n is normative belief strength and m is motivation to comply (Francis, et al., 2004). Normative belief strength, n , is an evaluation of the referent group's attitude toward the behavior (in this case, exploring the pools) and was measured in the survey instrument on a scale from 1 *disapprove* to 7 *approve*. For analysis, normative belief strength was recoded into a scale ranging from -3 *disapprove* to +3 *approve* (Ajzen, 2006). Motivation to comply, m , is the importance of referent group approval of one's behavior and was measured in the survey instrument on a scale ranging from 1 *not at all important* to 7 *extremely important*. The subjective norm composite measure was computed as $\sum n_i m_i$, and ranges in value from -21 to +21. Positive

values represent a perception that the corresponding referent group would approve of one's exploring the pools, while negative values represent a perception that the corresponding referent group would not approve of one's exploration of the pools.

PBC is the level of control an individual believes they have over engaging in a specific behavior. PBC is understood to include self-efficacy and controllability components (Ajzen, 1991). Self-efficacy is one's inherent ability to engage in a behavior (i.e., Are you able to perform the behavior?). Controllability is one's volitional ability to engage in a behavior (i.e., Are you permitted to engage in the behavior?). In this study, the survey instrument was used to measure self-efficacy as respondents' perceived physical ease or difficulty of exploring the pools on a scale from 1 *extremely easy* to 7 *extremely difficult*. Controllability was evaluated through two variables measuring visitor agreement with statements that visitors, and not NPS officials, should be responsible for deciding whether or not to explore and evaluating the danger of exploring on a scale ranging from 1 *strongly agree* to 7 *strongly disagree*. For analysis, all PBC scores were reversed coded to a scale from 1 *strongly disagree* to 7 *strongly agree*. Reverse-coded responses to each of the three PBC questions were averaged to provide an overall PBC score ranging from 1 to 7. High PBC scores (5 to 7) represent strong perceptions of control with respect to exploring the pools, and low values (1 to 3) represent a lack of perceived control with respect to exploring the pools.

Behavioral intention was measured using two questions. In particular, visitors were asked to rate whether they *intended* to explore the pools on a scale from 1 *extremely unlikely* to 7 *extremely likely*, and whether they *expected* to explore the pools on a scale ranging from 1 *strongly agree* to 7 *strongly disagree*. For analysis, responses to the expectation measure were reverse-coded to a scale ranging from 1 *strongly disagree* to 7 *strongly agree*. Responses from the intention and expectation measures were averaged to form a behavioral intention composite score ranging from 1 to 7 - high values (5 to 7) represent intentions to explore, while low values (1 to 3) represent behavioral intentions to not explore. For some analyses, a binary behavior intention variable was formed from the behavioral intention composite scores. Values of 4.5 through 7 were recoded to 1 and

treated as indicating intention to explore. Values of 1 through 3.5 were recoded to 0 and treated as indicating intention to *not* explore. Records with behavioral intention composite scores of 4 (the neutral point on the scale) were excluded from the behavioral intention binary variable coding, as they cannot be classified as either intending or not intending to explore the pools.

Sampling & Survey Administration

The survey instrument was administered on 15 randomly selected days between May 23 and July 13, 2007 to visitors at the start of their hikes on the trail to the pools, in the Kīpahulu area of Haleakalā National Park. Sampling was conducted between 9:00 a.m. and 4:00 p.m. All visitors on the trail to the pools over the age of 18 were eligible for participation in the study.

Respondents were recruited approximately 70 meters from the Kīpahulu area parking lot as they walked toward the pools along the main trail, prior to viewing most signs and on-site information about exploring the pools. Visitors who agreed to participate were shown a poster depicting the pools and read a description of the area and definition of *exploring* the pools that stressed a distinction between *viewing* and *exploring* the pools (Figure 4). *Viewing* the pools was described as going no further than the rock landing at the base of the stairs into `Ohe`o Gulch to view the pools. In contrast, *exploring* the pools was described as leaving the rocks at the base of the stairs to wade or swim in the water, or walk or climb on the shores and cliffs surrounding the pools. The distinction between viewing and exploring the pools was designed to establish a common understanding among respondents of the concept of *exploring* the pools before asking them to complete the questionnaire.

After receiving the description of exploring the pools, respondents were randomly assigned to one of three respondent groups: 1) a control group that received no message about exploring the pools; 2) a “fear” treatment group that was asked to read the fear message before answering questions in the survey designed to measure TPB constructs;

or 3) a “warm glow” treatment group that was asked to read the warm glow message before answering questions in the survey designed to measure TPB constructs.

Behavioral Observation

Unobtrusive observation of visitor behavior at the pools was conducted in tandem with the visitor survey on a subset of sampling days. The purpose of the unobtrusive observations was to assess whether survey respondents’ actual behavior was consistent with their stated behavioral intentions, with respect to exploring the pools. Observations were conducted by researchers dressed in clothing similar to that worn by most visitors. Randomly selected survey respondents were unobtrusively followed to the pools area from the survey location. Upon crossing through the gate near the top of the stairs descending into the ‘Ohe’o Gulch, selected respondents were observed for a maximum of 10 minutes. If the observed visitor entered the “exploration zone” of the ‘Ohe’o Gulch (as depicted in Figure 4) within 10 minutes, they were designated as having explored the pools and the observation was concluded. If the observed visitor: 1) did not explore the pools within 10 minutes of having crossed through the gate at the top of the stairs; 2) did not cross through the gate within 25 minutes of having completed the questionnaire; or 3) left the pools area within 10 minutes or less without having explored the pools, the observation was concluded and the visitor was designated as having not explored the pools. Information characterizing the observed visitor’s group size, group composition, and clothing was also recorded to assist in matching observation and survey data. A binary variable was created for each observed respondent’s behavior, and assigned a value of 1 for *explorers* and a value of 0 for *non-explorers*. An additional variable, intention-behavior consistency, was created, and coded as 1 in cases where respondents’ observed behavior was consistent with stated behavioral intention, and 0 otherwise. The intention-behavior consistency variable was computed only for those survey respondents whose behavior was observed by the research team and had a behavioral intention composite score of 1 to 3.5 or 4.5 to 7. As with the binary behavior intention variable, the intention-behavior consistency variable was not computed for respondents with behavioral intention composite scores of 4 because this value represents the neutral point on the intention scale, not a distinct intention to explore or not explore.

Data Analysis

Analyses of survey response and observation data were conducted to examine several hypotheses. The hypothesis tests were designed to assess the validity of the TPB model as a framework for understanding visitor behavior with respect to exploring the pools, and provide insight into the relative efficacy of the fear and warm glow messages in minimizing the number of visitors who choose to explore. Data analysis was conducted with SPSS 15.0 in a stepwise fashion, corresponding to the progression of hypothesized relationships within the TPB model as outlined here:

- H1: In comparison to the control group respondents, respondents who receive either the fear or warm glow persuasive message will have less favorable attitudes, normative assessments, and PBC with respect to exploring the pools. MANOVA conducted through a general linear model, and ANOVA with Tukey's HSD post-hoc tests were used to evaluate Hypothesis 1.
- H2: Visitors' attitudes, subjective normative assessments, and PBC with respect to exploring are significant predictors of intention to explore the pools. Linear regression models were used to evaluate Hypothesis 2.
- H3: Exposure to either the fear or warm glow persuasive message will reduce visitors' intentions to explore the pools. This hypothesis was examined with two statistical tests, ANOVA and Chi-square, both of which used respondent group (i.e., control, fear treatment, or warm glow treatment) as the independent variable. Behavioral intention served as the dependent variable for the ANOVA test, while the binary version of behavioral intention was the dependent variable for the Chi-square test.
- H4: Visitors' stated behavioral intention with respect to exploring is a statistically significant predictor of actual exploring behavior. A Chi-square test was used to compare the intention-behavior consistency variable with stated behavioral intention.

H5: Exposure to either the fear or warm glow persuasive messages will reduce exploration behavior at the pools. A Chi-square test was used to compare observed behavior, by respondent group, to evaluate Hypothesis 5.

Results

Response Rates

Of the 1,635 individuals solicited to participate in the study, 997 (63.1%) agreed to do so. Usable surveys were obtained from 947 (95.3%) study participants, resulting in an effective response rate of 57.9%. Respondents were evenly distributed among respondent groups, with 315 (33.3%) in the control group, (33.3%), 316 (33.4%) in the fear treatment group, and 316 (33.4%) in the warm glow treatment group.

Visitor & Trip Characteristics

Most respondents (68.8%) spent two or more hours traveling to the Kīpahulu area of Haleakalā National Park on the day of their visit. Men and women are equally represented in the study (49.7% and 50.3%, respectively). A substantial majority of visitors to the pools were residents of the United States (92.7%); completed some college or more formal education (92.6%); did not consider themselves to be Hispanic or Latino (94.1%); and identified themselves as White (81.8%). Very few (1.4%) visitors to the pools identified themselves as Native Hawaiian. Thirty-one percent of respondents are between the ages of 25 and 54, with nearly half (44.2%) between the ages of 35 and 54. When planning their visits, a minority of respondents (7.1%) used information from the NPS, while a majority of respondents (81.2%) used information from previous experiences, word-of-mouth sources, tourist activity outlets, and tourism brochures and guidebooks.

A series of statistical tests was performed to assess whether respondent group sub-samples differed significantly with respect to visitor and/or trip characteristics. The purpose of the tests was to confirm that differences found among respondent groups with respect to the study's hypothesis tests could not be attributed to differences in

demographics and/or trip characteristics among the respondent groups. No significant differences were found among the three respondent groups with respect to commercial tour status ($\chi^2 = 1.840$, $p = 0.398$), previous vs. first-time visit ($\chi^2 = 4.495$, $p = 0.106$), time spent traveling to the park ($\chi^2 = 10.154$, $p = 0.254$), gender ($\chi^2 = 2.072$, $p = 0.355$), age ($\chi^2 = 9.746$, $p = 0.283$), and education ($\chi^2 = 4.143$, $p = 0.387$). These results support a high degree of confidence that differences among respondent groups with respect to results of the study's hypothesis tests are not the result of sampling bias with respect to personal and/or trip characteristics among control and treatment groups.

TPB Model Analysis

The hypothesized influence of treatment messages on first level TPB model constructs (H1) is supported for attitude and subjective norms, but not PBC (Table 2). In particular, the control group had attitudes and subjective normative assessments that were statistically more favorable toward exploring than either group who received a persuasive message discouraging exploration. However, no statistical difference in the mean composite scores for PBC was found among respondent groups. Results of statistical comparisons of respondent groups for individual items used to measure each TPB construct are reported in Table 3. Of the 18 survey items included in the attitude construct score, 11 items were influenced by one or both of the persuasive treatment messages in comparison with the control group, 10 of which vary from the control in the direction intended by the persuasive messages. Six measured belief strengths and outcome evaluations for experiential dimensions of exploring the pools not specifically targeted by the persuasive treatment messages including having a fun adventure, a true Hawaiian experience, and a fun story to tell. Three varying items measured behavioral belief strengths regarding resource impacts of exploring specifically targeted by the warm glow message including harming native biota, reducing the area's value to native Hawaiians, and preventing others from enjoying the natural beauty of the pools. One measured a behavioral belief strength, the likelihood of getting a rash from exploring, targeted by the fear message. The fear group differed from the control group primarily with respect to the experiential outcome items, but not with respect to targeted danger related outcomes. In contrast, the warm glow group differed from the control group among both the

experiential and resource related items, the latter of which were specifically targeted by the warm glow treatment message. In the fear treatment group's attitude composite score, most of the variation from the control group is contributed by the 6 items addressing experiential outcomes from exploring. Within the warm glow treatment group, variation from the control groups occurs mainly within potential experiential outcomes, with resource impact belief strengths contributing additional, although less, variation. While both treatment messages influenced attitudes toward exploring, the warm glow message, emphasizing the fact that exploring causes impacts to natural, cultural, and experiential resources in the park, led to significantly less favorable attitudes than the fear treatment, which focused on dangers and safety issues associated with exploring. All respondent groups generally believed that their traveling companions would approve of them if they explored the pools. However, respondents who received persuasive messages discouraging exploration of the pools were less certain than control group respondents that their traveling companions would approve of them exploring. Differences between control and treatment groups, with respect to normative assessments of NPS officials, were more pronounced. In particular, control group respondents believed NPS officials would approve of them if they explored the pools, while treatment group respondents generally believed NPS officials would not approve of them exploring the pools. However, subjective normative assessment scores for the two treatment groups were near the center of the measurement scale, suggesting some uncertainty among treatment group respondents about NPS officials' subjective normative assessments. There was no statistical difference between the two treatment groups with respect to subjective normative assessments for traveling companions or NPS officials.

Results of regression analyses to examine H2 suggest that, for all respondent groups, attitudes, subjective norms, and PBC were significant, positively related predictors of behavioral intention (Table 4). That is, respondents with more favorable attitudes toward exploring, greater perceptions that traveling companions and NPS officials approve of their exploring, and stronger senses of personal control over exploring were more likely to state intentions to explore the pools. Greater levels of variation in intention composite scores were explained within groups that received a persuasive message than within the

control group. Within each regression model, traveling companion subjective norms was the strongest predictor of behavioral intention.

Respondents who were exposed to either the fear or warm glow treatment messages were significantly less likely than control group respondents to report an intention to explore, thus supporting H3 (Table 5). The fourth hypothesis (H4) posited behavioral intention as a predictor of actual behavior. Relatively low numbers of behavioral observations prevent tests of this hypothesis from being conducted by respondent group. Of all survey respondents who were observed by the research team, close to two-thirds (60.3%) behaved in a manner consistent with their behavioral intention, as stated in their responses to the survey questions. Respondents who indicated in the survey that they did not intend to explore the pools acted more consistently than those who intended to explore – 87.0% of “non-intenders” acted consistently, while 53.8% of “intenders” acted consistently by actually exploring the pools during the observation period. The hypothesized effect of treatment message on actual behavior (H5) was supported by the higher proportion of control group respondents observed exploring the pools (59.1%), compared to the proportion of treatment group respondents who were observed exploring (40.0%; Table 5).

Discussion

Visitor education and information are generally preferred tools for managing visitor use in national parks, however, their acceptability to managers and visitors alike depend on their effectiveness at protecting park resources and visitors’ experiences. This study illustrates the use of TPB as a tool to assess and improve the efficacy of visitor education and information through an empirical understanding of visitor behavior and its cognitive precursors, and the influence of persuasive messages on them. The results of the study have implications for the validity of TPB as a model of human behavior and the efficacy of visitor education and information as tools to manage visitor use at the pools in Haleakalā National Park and other similar protected natural areas contexts.

TPB proves to be a useful model for understanding visitor behavior at the pools and for evaluating the efficacy of persuasive messages designed to discourage visitors from exploring the pools. In general, hypothesized relationships among constructs within the TPB model were supported: attitudes, subjective normative assessments, and PBC shape behavioral intention, behavioral intention predicts behavior, behavior and the cognitive factors that shape behavior were influenced with persuasive messages. More specifically, the study results suggest that visitors' subjective normative assessments with respect to traveling companions was the best predictor of intention to explore the pools, across control and treatment respondent groups. The results also suggest visitors' attitudes regarding exploration of the pools were a markedly more robust predictor of behavioral intention among warm glow treatment group respondents than either the fear treatment or control respondent groups. These findings are somewhat in conflict with the findings of other studies using TPB to understand outdoor recreation and wildland behaviors. Studies of participation in hunting, outdoor leisure activities, and adoption of wild fire mitigation strategies by wildland-urban interface homeowners have concluded that PBC and attitudes are the greatest predictors of behavioral intentions, and that subjective normative assessments are of lesser importance (Hrubec, et al., 2001; Ajzen & Driver, 1992; Burtz & Bright, 2006). It may be that the use of specific referent groups in this study to elicit subjective normative assessments increased the relevance of this cognitive factor in shaping behavioral intention. Additionally, the other TPB studies referenced examined behavioral intentions for activities occurring in and around the communities where respondents live. Most visitors to the pools were there as part of vacations and were a long distance from home (Lawson, et al., 2007). Visitors may use a different balance of cognitive assessments when making decisions regarding their behavior while on vacation in distant places than they do within their communities. Although the relative contribution of TPB constructs found in this study differs somewhat from applications of TPB to presumably similar contexts, the study model's power to predict variation in behavioral intention (26.3% control, 57.5% fear, 55.3% warm glow) compares favorably with the findings of a meta-analytic review of 185 TPB studies published before 1997 (mean = 39%; Armitage & Conner, 2001). Using Cohen's guidelines for calculating

effects sizes, the predictions of behavioral intention found in this study can be interpreted as being of large effect size (Cohen, 1992).

The results of this study can be characterized as describing the cognitive factors that influence the behaviors of two populations of park visitors: 1) current visitors to the park, whose decisions about whether or not to explore the pools were based solely on the information they gathered prior to arriving onsite (i.e., control group respondents); and 2) potential future visitors, represented by the fear and warm glow treatment groups, whose pre-trip planning information is supplemented with onsite information they received from the NPS designed to discourage exploration of the pools. Results of this study suggest that current visitors, as represented by the control group respondents, arrive at the park with the impression that exploring the pools is a desirable and sanctioned way to experience the Kīpahulu area of the park. They have favorable attitudes toward exploring, believe that both the NPS and their traveling companions support exploring, believe that it is within their power and ability to explore, and generally intend to explore the pools during their visit. Upon arriving at the pools, most visitors who received no message discouraging exploration did indeed explore. When making the decision to explore with only currently available off-site information, results of regression analysis suggest visitors relied equally on perceptions of behavioral control and subjective norms with respect to traveling companions and the NPS, all of which were judged to support decisions to explore. Context to help explain these findings is provided by the results of a separate survey conducted in the Kīpahulu area of the park in tandem with this study's survey. Results of the companion study suggest that the vast majority of current visitors planned their visit to the park based on information they obtained through guidebooks, word of mouth, and tourism brochures (Lawson, et al., 2007). These information sources emphasize the appeal of exploring the pools as a primary reason for visiting the Kīpahulu area of the park, and they do not discuss the NPS's desire to discourage visitors from exploring the pools or the reasons why they have adopted such a policy.

Visitors exposed to either treatment message had less favorable attitudes about exploring the pools than control group respondents. This finding suggests that the persuasive

messages modified visitors' rational assessments of the personal and social costs and benefits of exploring the pools. Additionally, treatment group respondents, who were specifically informed that the NPS discourages exploring the pools, were less likely than control group respondents to believe the NPS would approve of them exploring. Consequently, treatment group respondents were less likely to express an intention to explore and actually explored less than control group respondents. In this general sense, the results of the study suggest that visitor education and information can be an effective approach for reducing the number of visitors who choose to explore the pools. However, like the control group, treatment group respondents believed that their traveling companions would support a decision to explore and that exploring was within their power. Furthermore, although treatment group respondents' cognitive assessments were generally less favorable toward exploring than those of the control group, more than two-thirds (68.8%) indicated that they intended to explore the pools (though less than half – 40.0% – actually did). These results suggest that even with exposure to persuasive messages like those used in this study, a substantial proportion of visitors will choose to explore the pools. This may be due, in part, to visitors' reliance on normative assessments with respect to traveling companions when deciding to explore, as illustrated by results from this study's regression analyses. For both treatment groups, visitors' traveling companions were judged to support exploring and these judgments contributed greatest to prediction of behavioral intention. The perception that traveling companions support exploring was perhaps an artifact of the generally pro-exploring information visitors used to plan for and form expectations of their visits.

Differences in the cognitive precursors of exploring behavior, and exploring itself, observed between control group respondents and those who received a treatment message support the use of visitor education and information as at least part of the strategy for dissuading visitors from exploring the pools. Study findings also provide a basis for evaluating the relative effectiveness of an education approach aimed at public health and visitor safety considerations, versus an approach focused on resource stewardship and protecting the quality of visitors' experiences. Results of the study's hypothesis testing suggest that the warm glow message may be more effective than the fear appeal at

discouraging exploration of the pools. Visitor attitudes, as measured in this study by behavioral beliefs, were influenced to a greater degree by the warm glow appeal than by the fear appeal. This is reflected in the differences between treatment and control group attitude measures for each potential outcome assessed. The mean scores for the three potential outcomes specifically addressed by the warm glow message (i.e., harming native plants and animals, reducing the area's value for native Hawaiians, and preventing others from experiencing the natural beauty of the 'Ohe'o Gulch) were all significantly lower for the warm glow treatment group than the control and fear groups. That is, visitors who received the warm glow treatment message internalized the resource, experiential, and cultural impacts emphasized and consequently believed more strongly than the other respondent groups that their exploring would cause such impacts. A similar effect was not seen for the fear message, which was designed to emphasize the public health and visitor safety risks associated with exploring the pools. Within the fear treatment group results, only one mean score of the three behavioral beliefs for potential outcomes specifically addressed by the fear message was lower than that of the control group. The fear message did not prompt overall change in most of the behavioral beliefs it was designed to influence. These findings suggest that visitors' attitudes regarding exploration of the pools are more effectively influenced by appealing to a sense of resource stewardship and social responsibility than to fears about the potential dangers of exploring the pools. Further, the results of this study suggest that warm glow treatment group respondents' behavioral intentions were shaped to a larger degree than those of either of the other two respondent groups by their attitudes about exploring the pools. These findings are particularly noteworthy, given that virtually all of the onsite information provided by the NPS to visitors concerning the pools is designed to emphasize the public health and visitor safety risks associated with exploring the pools. The results of this study suggest that re-focusing onsite information provided to visitors to emphasize themes contained in the warm glow message may allow the NPS to more effectively exploit the central persuasion route to capitalize on lasting and fundamental behavior change at the pools.

The warm glow message's greater influence than the fear message in reducing impactful visitor behavior at the pools is consistent with conclusions from a study in Acadia National Park in which visitors remained on trails for reasons of social altruism and justice associated with higher levels of moral development (Park, et al., 2008). The warm glow message was written to stimulate just such cognitive processing. This study's findings also align with those of anti-littering and other pro-environmental behavior reviewed and investigated by Ham and others (2008). However, fear messages appealing to more individualistic motivations that can be classified within lower orders of moral development have been found to be more effective at reducing wildlife feeding in recreation settings (Hockett & Hall, 2007). Thus, the results from this and similar studies are mixed with respect to the relative efficacy of persuasive messages appealing to higher or lower orders of moral development, suggesting that message efficacy is context-sensitive. The results of this study provide an empirical basis to support an approach that targets higher orders of moral development in the case of exploring the pools in Haleakalā National Park.

Results of this study with respect to visitors' normative assessments of NPS officials add further insight into how visitors' decisions to explore can be more effectively influenced. The control group's subjective normative assessments with respect to NPS officials suggest that current visitors to the pools generally believe the NPS approves of them exploring the pools. This is presumed to be a result of the prevalence of pro-exploration information contained in guidebooks and tourism brochures used by visitors to plan their trips to the Kīpahulu area of the park. When, after having established pro-exploration expectations for the pools, visitors are exposed to messages explicitly stating that the NPS discourages exploring, they are uncertain whether or not the NPS approves of visitors exploring the pools. Evidence of this confusion is found in mean normative belief scores for treatment group respondents near the neutral point of the measurement scale. Comparison of the treatment groups' near neutral normative belief scores to their relatively high motivation to comply scores, suggests that the uncertainty induced by expectation-message conflict constitutes a missed opportunity to use informational messages that leverage visitors' desire to comply. These findings are significant, in light

of the fact that none of the onsite signage at the time of the study explicitly stated that the NPS discourages visitors from exploring the pools. Our study suggests that using messages that explicitly state the NPS discourages exploring the pools would be a relatively easy and effective improvement to current efforts. These results also suggest that it is important for the NPS to contribute, to the extent possible, to the design and content of messages contained in the primary information sources visitors use to plan their trips prior to arriving at the park. This, coupled with increased efforts to direct visitors planning their trips to the park's official website, is a key element of a strategy to inform visitors' expectations and begin to shape their behavior in advance of their arrival onsite.

In summary, results of this study suggest TPB provides a valid model of visitor behavior at the pools and a useful framework for assessing the efficacy of persuasive messages designed to influence visitors' choices about whether or not to explore the pools. Further, the study findings support several recommendations regarding the NPS' use of visitor education and information to dissuade visitors from exploring the pools. In particular, the results of this study suggest the NPS should re-focus information delivered to visitors through onsite signage and park staff to emphasize themes associated with the warm glow message. That is, the information provided to visitors onsite at the time of the study emphasizing the public health and visitor safety risks of exploring the pools should be supplemented, if not largely replaced, with messages that emphasize the resource, cultural, and experiential consequences of visitors exploring the pools. Communication with visitors about the pools should be designed to explicitly inform them that exploring the pools is discouraged by the NPS. Research on persuasive communications to manage visitor impacts in parks suggests the effectiveness of such visitor information may be further enhanced, beyond that of the messages tested in this study, by fully incorporating principles of attribution and prescription (Bradford & McIntyre, 2007; Winter, et al., 2000). Messages tested in this study included an explicit statement discouraging exploring and describing the undesirable consequences of that behavior. Their content, particularly the absence of language personally attributing those consequences to individual visitors and description alternative desired behaviors, can be seen as a

limitation to their effectiveness. Future tests of persuasive messaging for management of park visitors should more fully integrate attribution and prescription in message design. Efforts on the part of the NPS to improve communication with visitors onsite should be accompanied by more effective dissemination of NPS-designed information to visitors prior to their arrival (i.e., when they are planning their trip and forming expectations about their visit). Key components of this include influencing, to the extent possible, the content of information about the pools contained in tourism-related brochures and guidebooks, and increasing the public's use of the park's website as a source of information to plan their visits.

A potential limitation of this study arises from the fact that survey administrators did not systematically control whether or not traveling companions accompanied respondents while they were participating in the study or whether or not the companions were exposed to the treatment messages. Thus, subjective normative assessments made by respondents in the company of normative referents (i.e., their traveling companions) may be systematically different than those made by respondents whose traveling companions were not with them when they were exposed to treatment messages and/or completed the questionnaire. While these unaccounted for interactions may influence normative assessments and behavioral decision-making, subjective normative assessments with respect to traveling companions have consistent and powerful positive influence on exploration. Further, the circumstantial, rather than systematic manner, in which traveling companions did or did not accompany respondents during treatment message and survey administration is arguably similar to the manner in which visitors do or do not read onsite signage in the company of their traveling companions.

Efforts to improve visitor education and information about exploring the pools, as described here, should be implemented within the framework of adaptive management. That is, changes to the NPS' visitor education and information strategies should be accompanied with monitoring to assess the extent to which such changes are effective at reducing the actual number of visitors who explore the pools and the associated resource, cultural, and experiential impacts of concern. If monitoring results suggest continued

problems, this would imply the need to supplement or replace visitor education and information with more direct forms of management. Such efforts might include requiring visitors to venture no further than the rock landing at the base of the stairs into `Ohe`o Gulch, or closing the stairs into the gulch and only allowing visitors to view the pools from the trail above the gulch. These more direct management approaches are likely to be less popular with visitors than the current use of visitor education, require costly changes to park infrastructure, and depend on the presence of park staff to enforce closure of the pools. Thus, it would be advisable to adopt such strategies only if improvements to visitor education and information like those describe above fail to produce the results required to adequately protect park resources and the quality of visitors' experiences. Further, if more direct management strategies are ultimately adopted, it is recommended that they be coupled with increased information, both onsite and in information sources used by visitors to plan their trips, about other recreation opportunities in the Kīpahulu area of Haleakalā National Park.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50, 179-211.
- Ajzen, I. (2006). *Constructing a TPB questionnaire: Conceptual and methodological considerations*. Retrieved May 26, 2008, from University of Massachusetts, Icek Ajzen Theory of Planned Behavior Web Site: <http://people.umass.edu/aizen/tpb.html>.
- Ajzen, I., & Driver, B. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, 24, 207-224.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of social Psychology*, 40, 471-499.
- Bradford, L. E. A., & McIntyre, N. (2007). Off the beaten track: Messages as a means of reducing social trail use at St. Lawrence Islands National Park. *Journal of Park and Recreation Administration*, 25, 1-21.
- Bright, A. D., & Burtz, R. T. (2006). Firewise activities of full-time versus seasonal residents in the wildland-urban interface. *Journal of Forestry*, 106, 307-315.
- Bullock, S. D., & Lawson, S. R. (2007). Managing the “commons” on Cadillac Mountain: A stated choice analysis of Acadia National Park visitor preferences. *Leisure Science*, 30, 71-86.
- Bullock, S. D., & Lawson, S. R. (2008). Examining the potential effects of management actions on visitor experiences on the summit of Cadillac Mountain, Acadia National Park. *Research in Human Ecology*, 14, 140-156.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.
- Gilligan, C. (1982). *In a different voice: A psychological theory and women's development*. Cambridge, MA: Harvard University Press.
- Ham, S., Weiler, B., Hughes, M., Brown, T., Curtis, J., & Poll, M. (2008). *Asking visitors to help: Research to guide strategic communication for protected area management* (Project #80039). Queensland, Australia: Griffith University, Sustainable Tourism Cooperative Research Center.
- Hendee, J. C., & Dawson, C. P. (2002). Wilderness visitor management: Stewardship for quality experiences. In Hendee, J.C., & Dawson, C.P., *Wilderness Management: Stewardship and Protection for Resources and Values* (pp. 461-503). Golden, CO: Fulcrum Publishing.
- Hockett, K. S., & Hall, T. E. (2007). The effect of moral and fear appeals on park visitors' beliefs about feeding wildlife. *Journal of Interpretation Research*, 12, 5-27.

- Hrubes, D., Ajzen, I., & Daigle, J. (2001). Predicting hunting intentions and behavior: An application of the theory of planned behavior. *Leisure Science*, 23, 165-178.
- Kohlberg, L. (1976). *Moral development and behavior: Theory, research and social issues*. New York: Holt, Rinehart and Winston.
- Kouthouris, C., & Spontis, A., (2005). Outdoor recreation participation: An application of the theory of planned behavior. *The Sport Journal*, 8. Retrieved May 26, 2008 from <http://thesportjournal.org/article/outdoor-recreation-participation-application-theory-planned-behavior>.
- Lackey, B. K., and Ham, S. H. (2003). Contextual analysis of interpretation focused on human-black bear conflicts in Yosemite National Park. *Applied Environmental Education and Communication*, 2, 11-21.
- Lawson, S. R. , Kiser, B. C., Hockett, K., Reigner, N. R., Howard, J. and Dymond, S. F. (2007). *Social science research to support visitor experience and resource protection (VERP) planning in Haleakalā National Park*. Virginia Polytechnic Institute and State University, Department of Forestry.
- Liu, J.H., & Sibley, C.G. (2004). Attitudes and behavior in social space: Public good interventions based on shared representations and environmental influences. *Journal of Environmental Psychology*, 2, 373-384.
- McAvoy, L., & Dustin, D. (1983). Indirect versus direct regulation of recreation behavior. *Journal of Park and Recreation Administration*, 1, 12-17.
- Manning, R. E. (1999). *Studies in outdoor recreation: Search and research for satisfaction* (2nd ed.). Corvallis: Oregon State University Press.
- Marion, J. L., & Reid, S. E. (2007). Minimizing visitor impacts to protected areas: The efficacy of low impact education programs. *Journal of Sustainable Tourism*, 15, 5-26.
- Martin, S. R., Marsolais, J., & Rolloff, D., (in press) Visitor perceptions of appropriate management actions across the recreation opportunity spectrum. *Journal of Park and Recreation Administration*.
- Park, L. O., Manning, R. E., Marion, J. L., Lawson, S. R., Jacobi, C. (2008). Managing visitor impacts in parks: A multi-method study of the effectiveness of alternative management practices. *Journal of Park and Recreation Administration*, 26, 97-121.
- Petty, R. E., McMichael, S., & Brannon, L. (1992). The elaboration likelihood model of persuasion: Application in recreation and tourism. In M. J. Manfreda (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 77-102). Champaign, IL: Sagamore Publishing Inc.

- Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredo (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 149-208). Champaign, IL: Sagamore Publishing Inc.
- Rossi, A. N., & Armstrong, J. B., (1999). Theory of reasoned action vs. theory of planned behavior: Testing the suitability and sufficiency of a popular behavioral model using hunting intentions. *Human Dimensions of Wildlife*, 4, 40-56.
- Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing?. *Journal of Applied Social Psychology*, 28, 1317-1338.
- Vande Kamp, M. E., Johnson, D. R., & Swearingen, T. C. (1994). *Deterring minor acts of noncompliance: A literature review* (Tech. Rep. NPS/PNRUW/NRTR-92/08). Seattle, WA: University of Washington, College of Forest Resources, Cooperative Park Studies Unit.
- Vistad, O. I. (2003). Experience and management of recreation impacts on the ground: A study among visitors and managers. *Journal for Nature Conservation*, 11, 363-369.
- Widner, C. J., & Roggenbuck, J. (2000). Reducing theft of petrified wood at petrified forest national park. *Journal of Interpretation Research*, 5, 1-18.
- Widner-Ward, C. J., & Roggenbuck, J. (2003). Understanding park visitors' responses to interventions to reduce petrified wood theft. *Journal of Interpretation Research*, 8, 67-82.
- Winter, P. L., Sagarin, B. J., Rhoads, K., Barrett, D. W., & Cialdini, R. B. (2000). Choosing to encourage or discourage: Perceived effectiveness of prescriptive versus proscriptive messages. *Environmental Management*, 26, 589-594.

Table 1: TPB Construct Composite Score Formation from Survey Items

Attitude $\sum b_i e_i$		My exploring the 'Ohe'o Pools area today would result in me...	
		Behavioral Belief Strength <i>b</i>	Outcome Evaluations <i>e</i>
		<i>not at all likely 1 → 7 extremely likely</i>	<i>extremely bad -3 → +3 extremely good</i>
	Danger	...getting caught in a flash flood	...getting caught in a flash flood
		...getting a rash	...getting a rash
		...falling on rocks and getting hurt	...falling on rocks and getting hurt
	Resource	...harming native plants and animals	...harming native plants and animals
		...reducing the area's value for native Hawaiians	...reducing the area's value for native Hawaiians
		...preventing others from experiencing the natural beauty of the 'Ohe'o Gulch	...preventing others from experiencing the natural beauty of the 'Ohe'o Gulch
	Experiential	...having a true Hawaiian experience	...having a true Hawaiian experience
...having a fun adventure		...having a fun adventure	
...having a story to tell when I get home		...having a story to tell when I get home	
	Normative Beliefs <i>n</i>	Motivation to Comply <i>m</i>	
	<i>disapprove 1 → 7 approve</i>	<i>not at all important -3 → +3 extremely important</i>	
Subjective Norm <i>Traveling Companion</i> $n_i m_i$	If I were to explore the 'Ohe'o Pools today, the people I am traveling with would...	How important is it to you that the people you are visiting the park with today approve of what you do?	
Subjective Norm <i>NPS Officials</i> $n_i m_i$	If I were to explore the 'Ohe'o Pools today, National Park Service Officials would...	How important is it to you that National Park Service officials approve of what you do?	
Perceived Behavioral Control $\sum x_i/3$	Control Beliefs <i>x</i>		
	Self-Efficacy <i>extremely difficult 1 → 7 extremely easy</i>		
	My physical ability would make exploring the 'Ohe'o Pools area today...		
	Controllability <i>strongly disagree 1 → 7 strongly agree</i>		
	It is entirely up to me and not National Park Service officials whether or not I explore the 'Ohe'o Pools area today.		
	It should be up to each visitor to evaluate how dangerous it is to explore the 'Ohe'o Pools area.		

Table 2: Persuasive Message Treatment Effects on TPB Constructs					
	<i>Respondent Group Means</i>			<i>ANOVA</i>	
	Control (n = 207)	Fear (n = 210)	Warm Glow (n = 203)	F-value	p-value
Attitude	0.487 _a	-0.739 _b	-1.856 _c	557.05*	<0.001
Subjective Norm <i>Traveling Companions</i>	11.416 _a	4.780 _b	6.286 _b	4,727.90*	<0.001
Subjective Norm <i>NPS Officials</i>	11.272 _a	-2.037 _b	-3.332 _b	26,057.29*	<0.001
Perceived Behavioral Control	4.471	4.669	4.540	4.21	0.266

NOTE: Within each row, means with different subscripts are statistically different ($\alpha = 0.05$).

Table 3. Comparison of TPB Survey Items, by Respondent Group

Attitude <i>Potential Outcome from Exploring the Pools</i>		Control (n= 269-308)	Fear (n= 258-314)	Warm Glow (n= 254-316)	ANOVA	
		Mean	Mean	Mean	F-value	p-value
<i>Danger</i>	Getting caught in a flash flood					
	behavioral belief strength <i>b</i>	2.5	2.4	2.5	0.304	0.738
	outcome evaluation <i>e</i>	-2.2	-2.3	-2.3	0.806	0.447
	Getting a rash					
	<i>b</i>	3.1 _a	3.5 _b	3.4 _{a,b}	5.475*	0.004
	<i>e</i>	-1.7	-1.7	-1.7	0.018	0.982
<i>Resource</i>	Falling on rocks and getting hurt					
	<i>b</i>	3.6	3.5	3.8	2.904	0.055
	<i>e</i>	-1.9	-1.8	-2.0	1.236	0.291
	Harming native plants and animals					
	<i>b</i>	3.1 _a	3.4 _a	4.2 _b	27.825*	<0.001
	<i>e</i>	-1.9	-1.8	-1.9	0.463	0.629
<i>Resource</i>	Reducing the area's value for native Hawaiians					
	<i>b</i>	3.2 _a	3.5 _a	4.0 _b	19.304*	<0.001
	<i>e</i>	-1.7	-1.6	-1.7	0.898	0.408
	Preventing others from experiencing the natural beauty of the 'Ohe'o Gulch					
	<i>b</i>	2.6 _a	3.0 _b	3.5 _c	22.878*	<0.001
	<i>e</i>	-1.6 _a	-1.2 _b	-1.6 _a	7.632*	0.001
<i>Experiential</i>	Having a true Hawaiian experience					
	<i>b</i>	5.2 _a	4.7 _b	4.3 _c	17.879*	<0.001
	<i>e</i>	1.9 _a	1.5 _b	1.3 _b	10.297*	<0.001
	Having a fun adventure					
	<i>b</i>	5.9 _a	5.4 _b	5.3 _b	13.487*	<0.001
	<i>e</i>	2.1 _a	1.7 _b	1.5 _b	14.113*	<0.001
<i>Experiential</i>	Having a story to tell when I get home					
	<i>b</i>	5.6 _a	5.2 _b	5.0 _b	9.657*	<0.001
	<i>e</i>	1.7 _a	1.1 _b	1.1 _b	11.993*	<0.001
	Subjective Norm					
	<i>Traveling Companions</i>					
	normative belief strength <i>n</i>	2.4 _a	1.3 _b	1.4 _b	40.891*	<0.001
motivation to comply <i>m</i>	4.7 _a	4.3 _b	4.6 _{a,b}	3.906*	0.020	
<i>National Park Service Officials</i>						
<i>n</i>	2.0 _a	0.4 _b	0.7 _b	176.993*	<0.001	
<i>m</i>	5.6 _a	4.8 _b	5.1 _b	18.981*	<0.001	
Perceived Behavioral Control						
My physical ability would make exploring difficult/easy for me	6.0 _a	5.7 _b	5.9 _a	4.335*	0.013	
It is up to me, not NPS, to decide to explore...	3.9	3.9	4.3	3.287	0.038'	
It is up to each visitor, not NPS, to evaluate dangers of exploring...	3.8	3.7	4.1	2.298	0.101	
Behavioral Intention						
I intend to explore the pools	5.8 _a	4.7 _b	4.6 _b	32.387*	<0.001	
I expect to explore the pools	5.9 _a	5.0 _b	4.9 _b	27.052*	<0.001	

NOTE: Within each row, subscripts denote statistically different means ($\alpha = 0.05$).

Table 4: Regression Model Coefficients for Prediction of Behavioral Intention from TPB Constructs (Standard Errors in Parentheses)			
	Treatment		
	Control	Fear	Warm Glow
Constant	4.002*** (0.369)	3.389*** (0.362)	3.378*** (0.407)
Attitude	0.135* (0.030)	0.212*** (0.029)	0.284*** (0.026)
Subjective Norm <i>Traveling Companion</i>	0.237*** (0.012)	0.459*** (0.010)	0.409*** (0.010)
Subjective Norm <i>NPS Officials</i>	0.208** (0.010)	0.188*** (0.009)	0.150** (0.008)
Perceived Behavioral Control	0.215** (0.070)	0.188*** (0.074)	0.175** (0.081)
r^2	0.263	0.575	0.553

* 0.05 > p-value ≥ 0.01; ** 0.01 > p-value ≥ 0.001; *** p-value < 0.001

Table 5: Persuasive Message Treatment Effects on Intention to Explore and Actual Exploring					
	<i>N</i>	<i>Control</i>	<i>Fear and Warm Glow Groups Combined</i>	χ^2	<i>p</i>
Intend to Explore	825	89.7%	68.8%	44.346	< 0.001
Observed Exploring	134	59.1%	40.0%	4.332	0.037

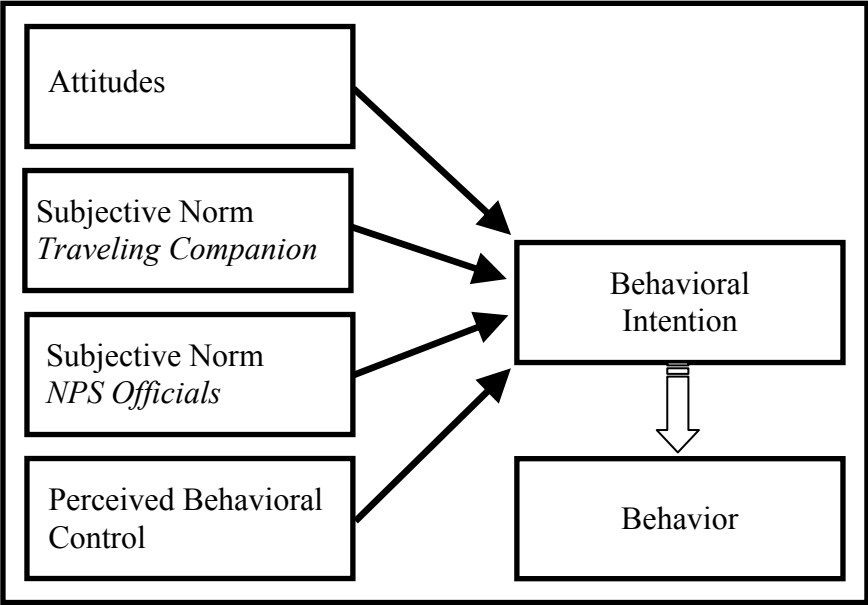


Figure 1: The Theory of Planned Behavior
(adapted from Ajzen, 1991)

`Ohe`o Pools Area

The National Park Service discourages people from exploring the `Ohe`o Pools area because of the risk of injury or death. Falls on slippery rocks and from steep cliffs can result in serious injury to even the most sure-footed of visitors. Submerged rocks pose dangers to cliff jumpers and sudden flash floods have washed people to sea. A water-borne bacterial disease known to exist in the stream can cause rashes and more serious symptoms such as vomiting and diarrhea, which could lead to death. Please consider these potential health and safety issues when you decide whether or not to explore the `Ohe`o Pools area today.

Figure 2: Fear Treatment Message

`Ohe`o Pools Area

The National Park Service discourages people from exploring the `Ohe`o Pools area because visitor use along the banks of the stream tramples native vegetation, and wading and swimming may harm rare native fish, shrimp, and snails that live in the stream. The often loud and large crowds also detract from the experience of those visitors who wish to appreciate the natural beauty of the area in a more quiet and peaceful way. These crowds can also diminish the area's value for traditional use by Native Hawaiians. Please consider these potential impacts to the natural resources and experiences of Native Hawaiians and park visitors when you decide whether or not to explore the `Ohe`o Pools area today.

Figure 3: Warm Glow Treatment Message

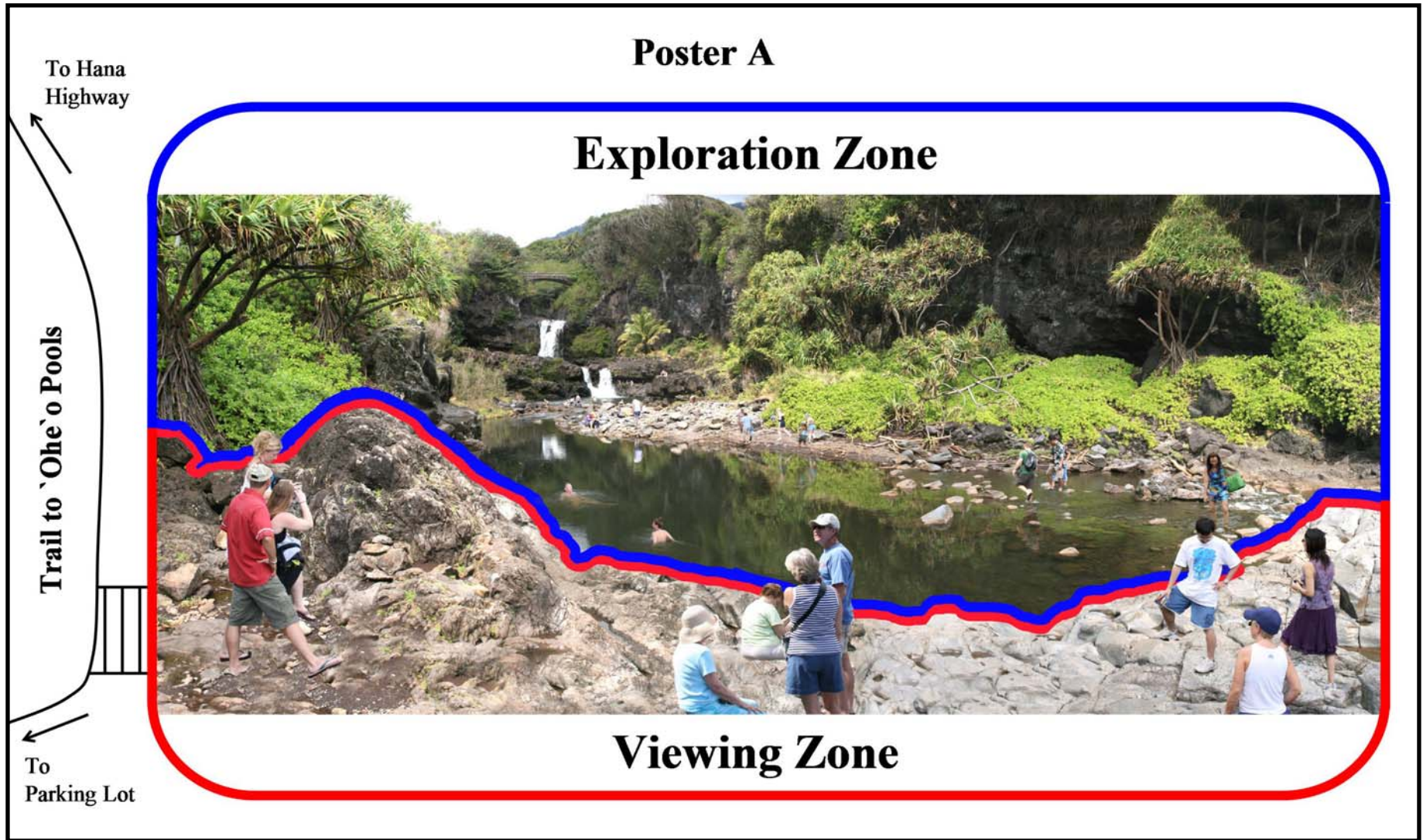


Figure 4: Exploration Zone Diagram

Appendix A

`Ohe`o Pools Visitor Questionnaire

`Ohe`o Pools Message Efficacy

2007

ID: _____

Version 2 3

Date: _____

Time: _____ AM/PM

A. Trip Description

1. How many people are in your personal group (family/friends) today?

Number of people in group: _____

2. Is your personal group part of a commercial tour in the park today? (Check one.)

- Yes
- No

3. Have you visited this part of Haleakalā National Park before? (Check one.)

- Yes (CONTINUE TO QUESTION 4)
- No (SKIP TO QUESTION 6)

4. Approximately how many times have you visited this part of the park before today?

Approximate number of previous visits: _____

5. Have you ever engaged in the following activities in this part of the park? (Check one response for each item.)

	Yes	No	Don't Know
Visited the Visitor Center?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Explored the `Ohe`o Pools area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swam in `Ohe`o Pools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hiked to Waimoku Falls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Prior to today's visit, how did you obtain information to plan today's trip to this part of Haleakalā National Park? (Check all that apply.)

- Obtained no information (GO TO QUESTION 7)
- Previous visit
- Haleakalā National Park website (www.nps.gov/hale)
- Family/friends/word of mouth
- Guidebook
- National Park Service brochure/newsletter
- Tourism brochure
- Local TV channel 7/Visitor Channel
- Local Maui Activity outlet
- Roadside sign/display
- Chamber of Commerce/ Tourism Board
- Travel agent
- Hotel/lodging establishment
- Other (Please specify): _____

**BEFORE CONTINUING TO THE NEXT SECTION OF THIS QUESTIONNAIRE, PLEASE
SEE THE SURVEY ATTENDANT FOR A BRIEF MESSAGE ABOUT HALEAKALĀ
NATIONAL PARK.**

B. The `Ohe`o Pools

For each of the following statements please check a box for the response that fits you best, keeping in mind our definition of “exploring” the `Ohe`o Pools are

7. I intend to explore the `Ohe`o Pools area today.								
extremely unlikely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	extremely likely
	1	2	3	4	5	6	7	
8. For me to explore the `Ohe`o Pools area today would be...								
enjoyable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	unenjoyable
	1	2	3	4	5	6	7	
9. If I were to explore the `Ohe`o Pools area today, the people I am visiting the park with would...								
disapprove	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	approve
	1	2	3	4	5	6	7	
OR <input type="checkbox"/> I am visiting the park alone today.								
10. How important is it to you that the people you are visiting the park with today approve of what you do?								
not at all important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	extremely important
	1	2	3	4	5	6	7	
OR <input type="checkbox"/> I am visiting the park alone today.								
11. Many other visitors to the park will explore the `Ohe`o Pools area today.								
extremely unlikely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	extremely likely
	1	2	3	4	5	6	7	
12. My physical ability would make exploring the `Ohe`o Pools area today...								
extremely easy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	extremely difficult
	1	2	3	4	5	6	7	

13. If I were to explore the `Ohe`o Pools area today, National Park Service officials would...								
approve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	disapprove
	1	2	3	4	5	6	7	
14. How important is it to you that National Park Service officials approve of what you do?								
not at all important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	extremely important
	1	2	3	4	5	6	7	
15. For me to explore the `Ohe`o Pools area today would be...								
harmful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	beneficial
	1	2	3	4	5	6	7	

16. For each of the following statements, please circle one number for the response that fits you best.

	Strongly Agree		Neutral			Strongly Disagree	
The time I spent traveling to this part of Maui would have been wasted if I do not explore the `Ohe`o Pools area today.	1	2	3	4	5	6	7
I expect to explore the `Ohe`o pools area today.	1	2	3	4	5	6	7
It is entirely up to me and not National Park Service officials whether or not I explore the `Ohe`o Pools area today.	1	2	3	4	5	6	7
Exploring the `Ohe`o Pools area today is the most important thing for me to do in this part of Haleakalā National Park.	1	2	3	4	5	6	7
It should be up to each visitor to evaluate how dangerous it is to explore the `Ohe`o Pools area.	1	2	3	4	5	5	7

17. Please indicate how **LIKELY** you think it would be for each of the following outcomes to occur if you were to explore the 'Ohe'o Pools area today. Also, please indicate how **BAD** or **GOOD** you would feel about each possible outcome. For each item, please circle one number in Section A AND one number in Section B.

	Section A				Section B		
	Not At All Likely	Uncertain	Extremely Likely	Extremely Bad	Neutral	Extremely Good	
My exploring the 'Ohe'o Pools area today would result in me...	1	2	3	4	5	6	7
...getting caught in a flash flood.	1	2	3	4	5	6	7
...having a true Hawaiian experience.	1	2	3	4	5	6	7
...harming native plants and animals.	1	2	3	4	5	6	7
...having a fun adventure.	1	2	3	4	5	6	7
...reducing the area's value for Native Hawaiians.	1	2	3	4	5	6	7
...getting a rash.	1	2	3	4	5	6	7
...having a story to tell when I get home.	1	2	3	4	5	6	7
...falling on rocks and getting hurt.	1	2	3	4	5	6	7
...preventing others from experiencing the natural beauty of the 'Ohe'o Gulch.	1	2	3	4	5	6	7

C. Background Information

18. Approximately how much time did you spend traveling to this part of Haleakalā National Park today? (Check one.)

- Less than 30 minutes
- Between 30 minutes and 1 hour
- Between 1 and 2 hours
- Between 2 and 3 hours
- More than 3 hours
- Don't know/not sure

19. What is your gender? (Check one.)

- Male
- Female

20. In what year were you born?

Year born: _____

21. Do you live in the United States? (Check one.)

- Yes (What is your zip code? _____)
- No (What country do you live in? _____)

22. What is the highest level of formal education you have completed? (Check one.)

- Some high school
- High school graduate or GED
- Some college, business or trade school
- College, business or trade school graduate
- Some graduate school
- Master's, doctoral or professional degree

23. Are you Hispanic or Latino? (Check one.)

- Yes
- No

24. What is your race? (Check all that apply.)

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian
- Pacific Islander other than Native Hawaiian
- White

Thank you for your help with this survey!

Please return the completed questionnaire to the survey administrator.

PRIVACY ACT and PAPERWORK REDUCTION ACT statement: 16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. The permanent data will be anonymous. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. BURDEN ESTIMATE statement: Public reporting burden for this form is estimated to average 10 minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to

Superintendent
Haleakalā National Park
P.O. Box 369
Makawao, HI 96768
HALE_Superintendent@nps.gov

Appendix B

Survey Administrator Log

Kīpahulu Area Survey Log

- Indicators & Standards *(exit)*
- Message Efficacy *(entrance)*

- On-Site Information *(exit)*
- Kīpahulu Area Activities *(exit)*

Date: _____

Name: _____

Participated? (Y or N)	Time	Group Size	Survey ID # <i>If Yes</i>	Swimmer? (Y/N/?)	Comments

Comment Codes: T-Tour Group Member, LD-Refused Long Drive,
 NT-Refused No Time Tour Member, LB-Refused/Incomplete Language Barrier

Appendix C

Behavioral Observation Log

Initials

Date

Observation

Start Time

Viewer _____ # Tot Explr.

Explorer Read Signs

Gate Time

Hiker

Explore/End Time

Comments:

Weather: _____

Water Quality: _____

Group Demographics		
	<i>Men</i>	<i>Women</i>
0-12		
12-18		
18-35		
35-60		
60+		