

Determinants of Public Support for Threatened and Endangered Species Management: A Case Study of Cape Lookout National Seashore

Lena Le
Kenneth J. Bagstad
Philip S. Cook
Kirsten M. Leong
Eva DiDonato

EXECUTIVE SUMMARY: Gaining public support for management actions is important to the success of public land management agencies' efforts to protect threatened and endangered species. This is especially relevant at national parks, where managers balance two aspects of their conservation mission: to protect resources and to provide for public enjoyment. This study examined variables potentially associated with support for management actions at Cape Lookout National Seashore, a unit of the National Park Service. Two visitor surveys were conducted at the park at different seasons, and a resident survey was conducted for households in Carteret County, North Carolina, where the park is located. The goal of the project was to provide park managers with information that may help with the development of communication strategies concerning the park's conservation mission. These communication strategies may help to facilitate mutual understanding and garner public support for management actions. Several variables were examined as potential determinants that park managers ought to consider when developing communication strategies. Multinomial logistic regression was applied to examine the relationships between these variables and the likelihood of support for or opposition to management actions. The variables examined included perceived shared values of park resources, general environmental attitudes, level of familiarity with park resources and regulations, knowledge about threatened and endangered species, level of trust in the decision-making process, and perceived shared values with park management. In addition, demographic variables such as income level, respondent age, residency status, and visitor type were also used. The results show that perceived values of threatened and endangered species, trust in park managers and the decision-making process, and perceived share values with park managers were among the strongest indicators of support for management actions. Different user groups also exhibited different levels of support, with groups engaged in specialized recreation activities (fishers) being the most likely to oppose management

actions. While our findings are not surprising, they corroborate past research that has shown an effective communications strategy should be customized to target different audiences. In addition, management should focus on developing long-term relationships that build trust in and foster credibility of decision-making processes.

KEYWORDS: *Communication, park management, threatened and endangered species*

AUTHORS: Lena Le is with the Social and Economic Sciences Research Center, Washington State University, lena.le@wsu.edu. Kenneth J. Bagstad is with the U.S. Geological Survey, Geosciences and Environmental Change Science Center. Philip S. Cook is with the Policy Analysis Group, University of Idaho. Kirsten M. Leong is with Human Dimensions of Biological Resource Management, National Park Service. Eva DiDonato is with the Ocean and Coastal Resources Branch, Water Resource Division, National Park Service.

DISCLAIMER: The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

The statutory purpose of the National Park Service (NPS) is “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (National Park Service Organic Act of 1916, 16 U.S.C. § 1). While each unit of the NPS system was established by individual enabling legislation, park managers have the common challenge of preserving resources while providing for public enjoyment. Although NPS management policies are clear that in the event of conflict between conserving resources and providing for recreation, conservation is to be the predominant factor in decision making (National Park Service, 2006), it becomes more challenging to implement such decisions without adequate public support. This study focused on the task of managing for threatened and endangered species in which the NPS plays an important role in protection and providing critical habitats that ensure species’ survival and recovery (Stein, 2008).

Cape Lookout National Seashore, a unit of the National Park Service, was established in 1966 because of its outstanding natural and recreational values. The park comprises lands and waters along the Outer Banks of Carteret County, North Carolina, between Ocracoke Inlet and Beaufort Inlet (National Park Service, 2005). Cape Lookout National Seashore protects the southernmost section of the Outer Banks barrier island system (National Park Service, n.d.). The barrier islands portion of the park is 56 miles long and consists of mostly wide, bare beaches with low dunes, bordered by dense vegetation and large expanses of salt marsh. The Harkers Island Visitor Center and Beaufort Visitor Information Center are the only two locations that visitors can reach by paved road; other locations in the park can only be reached by ferry or private watercraft. As part of a larger barrier island system, Cape Lookout National Seashore acts as the first line of defense during major storms that threaten the communities along the North Carolina coastline, helping reduce the potentially devastating effects of wind and waves as well as absorbing storm energy. The park is also home to many plant, mammal, bird, reptile, and amphibian species (including seven species federally listed as threatened or endangered), four species of sea turtles, two species of shorebirds, and one plant species (Table 1). Seasonal beach

closures are a frequently used management strategy for threatened and endangered species at Cape Lookout National Seashore; closure notices are posted on the park's website and social media and at fishing cabins operated on the islands. Additionally, signs are posted on the beach and park rangers notify visitors about beach closures and other protective management actions.

Table 1

Federally Threatened and Endangered Species at Cape Lookout National Seashore

Common and scientific name	Status	Current management
Loggerhead sea turtle (<i>Caretta caretta</i>)	Threatened	Vehicle closures around nests following hatching (Jul-Nov)
Green sea turtle (<i>Chelonia mydas</i>)	Threatened	Vehicle closures around nests following hatching (Jul-Nov)
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Endangered	Vehicle closures around nests following hatching (Jul-Nov)
Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>)	Endangered	Vehicle closures around nests following hatching (Jul-Nov)
Piping plover (<i>Charadrius melodus</i>)	Threatened	Vehicle and pedestrian closure around nest during nesting season (Apr-Aug); additional closures around nests as necessary following fledging
Red knot (<i>Calidrus canutus rufa</i>)	Threatened	None – red knots migrate through but do not nest at Cape Lookout
Seabeach amaranth (<i>Amaranthus pumilis</i>)	Threatened	Vehicle closures around plants (Jul-Nov), though usually located in interdunal upper beach where driving doesn't occur

Coastal and marine habitat at Cape Lookout National Seashore supports biodiversity that underpins provision of recreationally and commercially important species. Some activities such as fishing and waterfowl hunting are very popular both recreationally and commercially just outside the park boundary. Within the park, Cape Lookout National Seashore accommodates a wide range of year-round recreation activities such as camping, beach-going, learning opportunities, and specialized sports such as shoreline fishing. In 2013, Cape Lookout National Seashore received over 416,000 visitors. Summer was the season with highest visitation with over 50,000 visitors each month.

Like other NPS units, park managers at Cape Lookout National Seashore face the challenge of protecting threatened and endangered species while providing public access to park resources. When actions for protecting wildlife habitat require beach closure or otherwise limit recreational access, managers need to be able to undertake these actions in ways that maintain or build public support. The purpose of this study is to examine factors that could affect public support for management decisions related to threatened and endangered species at Cape Lookout National Seashore. The broader goal is to assist park managers in the design of public involvement and communication strategies that will increase public support for wildlife management actions.

Related Theoretical Frameworks: Theory of Planned Behavior and Advocacy Coalition Framework

Overview

Leach and Sabatier (2005) pointed out that “science progresses best by comparing and integrating the explanatory power of multiple theories rather than testing hypotheses drawn from a single theory alone” (p. 491). With an overall goal of providing practical information to help Cape Lookout National Seashore managers design suitable public engagement and communication strategies, this project followed the premise of drawing constructs from multiple theories. Among applicable theoretical frameworks both Theory of Planned Behavior (TPB) and Advocacy Coalition Framework (ACF) provide constructs that can give insight into the levels of public support for resource management.

Many researchers have attempted to understand the relationship between potential determinant factors and the level of public support for management decisions that favor environmental protection and preservation. One of the most studied relationships is the linkage between attitudes toward the environment and support for environmental protection actions (Kotchen & Reiling, 2000). TPB is a framework that stemmed from the theory of reasoned action (Ajzen, 1991; Ajzen & Fishbein, 1980). The main tenet of TPB is that environmental behaviors often have direct correlations to attitudes underlying the behavior, normative beliefs (or subjective norms) that indicate motivation, and perceived behavioral control, which describes an individual’s perceived ability to perform an action (Ham & Krumpal, 1996). TPB is widely used in recreation research covering topics such as recreation choice (Ajzen & Driver, 1991), willingness to modify behavior (Brown, Ham, & Hughes, 2010), and motivations to seek environmental information (Sinclair, Mazzotti, & Graham, 2003). Some research has focused on recreationists’ intentions to comply with environmental policies (Vagias, Powell, Moore, & Wright, 2014) and understanding public support of an environmental action (Routhe, Jones, & Feldman, 2005).

ACF, developed in the early 1990s (Sabatier & Jenkins-Smith, 1993), is a “policy-making framework developed to deal with intense public policy problems. It best serves as a lens to understand and explain belief and policy change when there is goal disagreement and technical disputes involving multiple actors” (Weible & Sabatier, 2007, p. 123). ACF particularly focuses on policy subsystems—issues in which actors can be aggregated into different groups, termed advocacy coalitions, that often have conflicting views toward public policies. Individuals would consider themselves as belonging to a certain coalition based on their perceptions toward factors such as changes in socioeconomic conditions or attributes and the nature of the natural resource issues being discussed (Sabatier, 1988). ACF is an especially useful tool to examine aspects of policy subsystems in an open political environment such as the U.S. where a high or moderate degree of consensus is needed for major policy change (Sabatier & Weible, 2007). This framework also provides researchers with opportunities to study ramifications and challenges of a policy change at any given stage (Ellison, 1998).

The two theoretical frameworks share some similarities. For example, the concept of beliefs plays a central role in both ACF and TPB. ACF distinguishes between deep core beliefs and policy beliefs. Deep core beliefs are often fundamental, normative, and ontological across all policy sectors, while policy beliefs focus more on tradeoff values among different alternatives within a policy sector (Leach & Sabatier, 2005). Similar to the concept of core beliefs, within TPB, “salient beliefs” are often found to have direct correlation to potential behavior or action (Fishbein & Ajzen, 1975). Normative beliefs address a cost-benefit analysis of performing a behavior in a particular context (Vagias, Powell, Moore, & Wright, 2014). In this sense, policy beliefs of ACF and normative beliefs of TPB are similar in that they provide some indication of whether a potential behavior is perceived as advantageous or not. While somewhat similar, the two frameworks also have key differences, with ACF focusing more on policy subsystems while TPB focuses

more on individual behaviors, and includes a third construct of control beliefs or perceived behavioral control (Hughes, Ham, & Brown, 2009).

Applying TPB and ACF to Protection of Threatened and Endangered Species at Cape Lookout

In this case study, a range of threatened and endangered species management actions were examined at Cape Lookout National Seashore. Actions ranged from a maximum level of managerial control (full seasonal closure of certain areas from public access to recreation) to a minimum level of control, such as requiring pets to be leashed. These actions are within the park's power to implement if resource protection warrants them. Thus, a short-term conflict resolution among different coalitions under ACF was not the goal of the project, nor was focusing on one specific behavior as within TPB. While the public is required to comply with regulations, over the longer term, policies that are supported by the public are less expensive to monitor and enforce (Levi, 1988). In addition, TPB research conducted prior to management action implementation could provide valuable insights into the design of a persuasive communication strategy for public policy (Hughes, Ham, & Brown, 2009; Vagias, Powell, Moore, & Wright, 2014). In this paper, we focused on only those directly affected by management actions at Cape Lookout National Seashore, including park users and residents in the local community surrounding Cape Lookout National Seashore. Comparative study of ACF and TPB was not the goal of the project, but rather we attempt to combine the explanatory power of the two theories to examine potential determinants that affect levels of public support for management actions.

Variable Measurements

Perceived value is one of the main concepts of the core-beliefs construct addressed within ACF. Values are believed to "act as general guiding principles in life, and as such they are likely guideposts for action" (Stern, Dietz, Kalof, & Guagnano, 1995, p. 1615). Research in both ACF and TPB had shown strong correlations between values and willingness to support environmental actions (Nordlund & Garvill, 2002; Steg, Dreijerink, & Abrahamse, 2005; Stern & Dietz, 1994). The types of resources being protected at Cape Lookout National Seashore include cultural/historical, natural resources, and the overall landscape/seascape. Values measurement in this project focused on the level at which these resources are valued highly enough to warrant a prescribed level of conservation and protection.

Within ACF, values are seen as filters on beliefs, and are operationalized using very general measures of beliefs (Henry & Dietz, 2012). In this study, we adopted general environmental attitudes with a focus on wildlife and their habitats as an operationalized measurement of general beliefs in the context of threatened and endangered species management. The measurement scale items were originally used in studies by Sriramech, Moghan, and Wei (2007) and Voss (2009) and later in a national survey of visitors to U.S. national wildlife refuges (Sexton et al., 2012). Perceived values of park resources and general attitude toward the environment were used in this study to operationalize the core and salient beliefs.

In terms of normative beliefs within TPB, Lubell (2003, 2007) found that actors are more likely to have favorable views about a policy when it is produced by a governance institution that is congruent with their belief system. ACF also hypothesizes that public trust in a government agency is associated with whether individuals perceive that the agency shares beliefs and interests similar to their own (Leach & Sabatier, 2005). Social trust from sharing values with park managers, in turn, correlates to public support of land management agency decisions (Beierle & Konisky, 2000; McComas & Trumbo, 2001; Needham & Vaske, 2008; Wynveen, Kyle, & Theodori, 2008). A management decision made through a process of shared values and transparency is likely to be perceived as fair and thus will gain public support (Smith & McDonough, 2001).

NPS's joint mission to protect park resources and to provide recreational opportunities can sometimes conflict depending on park users' viewpoints. Individuals with an

anthropocentric value viewpoint feel that natural resources should be protected because of their value in enhancing or maintaining human lives (Thompson & Barton, 1994). Those individuals would feel that park managers share values with them when natural resource management policies reflect economic or recreation values. An ecocentric orientation, on the other hand, reflects a belief that the environment should be valued and protected over human consumption (Stern & Dietz, 1994). Individuals with an ecocentric orientation would view that park managers share their values if actions were perceived as ecologically oriented. In this study, policy beliefs were measured using a modified Meyer's credibility index, which were previously used in studies by McComas and Trumbo (2001) and Needham and Vaske (2008). The measurement scale items included trust in managers, credibility of the process, and perceived shared values.

Within TPB, control beliefs indicate the perceived ability to perform actions based on available resources (Ajzen & Madden, 1986). Generally, individuals are more comfortable performing an action if they understand the resource management process and have experience with it in the past (Han & Kim, 2010). Knowledge and understanding about an environmental action can be important factors in predicting environmental behavior or intention as they are a proxy for control beliefs (Ajzen, Joyce, Sheikh, & Cote, 2011; De Groot & Steg, 2007). Cornelisse and Duane (2013) found that recreationists' knowledge about threatened and endangered species led to an increase in compliance with rules and regulations at a conservation area. In this study, five items were used to measure participants' levels of familiarity with the park's resources and rules and regulations. Familiarity indices were adopted from studies by Spotts and Stynes (1985) and Prentice (2004).

Survey Procedures

Three surveys were conducted: two of systematic random samples of visitors to Cape Lookout National Seashore, and one of a random sample of residents of Carteret County, North Carolina, where the park is located. A fall visitor survey was conducted from October 25 to November 23, 2013. A summer visitor survey was conducted from June 20 to 28, 2014. The Carteret County resident survey was conducted in February and March 2014. The timeframes of the two visitor surveys were selected to target different types of park visitors. Visitors to Cape Lookout National Seashore in the fall are largely shoreline fishers while summer visitors participate in a wider variety of recreational activities.

The survey method for the visitor surveys was on-site intercept and mail-back with an online option. Visitors were selected at random using a systematic sampling scheme at various park access points including ferry docks and along the barrier island beaches. Visitor groups were greeted, briefly introduced to the purpose of the study, and asked to participate. If the visitor group agreed to participate, the individual with the next birthday was selected as the study participant for the group. Participants' names and contact information were collected for follow-up purposes. Visitors who agreed to participate in the survey were handed a postcard as a reminder that a questionnaire would be received via mail. The postcard also contained information about how to complete the questionnaire online with a web address and unique access code. Approximately one week after the visitor interview, paper questionnaires were mailed to participants who had not yet responded online. Two weeks following the initial mailing of the questionnaire, a reminder/thank-you postcard was mailed or e-mailed to all participants. A replacement questionnaire or an additional e-mail reminder was sent to participants who had not returned their questionnaires two weeks after the reminder postcard or e-mail was sent.

For the resident survey, a random sample of 3,600 addresses of households within Carteret County was purchased from Survey Sampling International. The sample was stratified proportionally with the population of Carteret County by ZIP codes as identified by census data. The survey procedure included an introductory postcard sent to all addresses on the list. The postcard contained a message from the park superintendent introducing the project and included a web address and unique access code if the resident preferred to complete the survey online. A paper copy of the survey was sent one week after the notification postcard to all valid addresses with a prepaid postage and pre-addressed

envelope for returning the completed questionnaire. Three weeks after the initial mailing, a reminder postcard was sent to those who had not yet responded. Final reminders were sent five weeks after the initial notification postcards and contained a replacement questionnaire and return envelope. To prevent double sampling, the resident list was compared with the fall park visitors list; if an address matched it was removed from the resident sampling frame.

Data Analysis

Variables used in this survey were drawn from both TPB and ACF, and included variables measured using both categorical and interval scales. Because the survey included a wide range of participants, the data were not expected to have a normal distribution. Logistic regression was applied as the most suitable method for mixed, non-normally distributed data (Hosme, Lemeshow, & Sturdivant, 2013). Dependent variables in the questionnaire included possible management actions to protect threatened and endangered species. Some actions such as “pets on leash” are permanent regulations while full or partial closures of certain recreational areas are seasonal actions taken when needed to protect threatened or endangered species. Survey participants were asked whether they would oppose or support each of the management actions using a 5-point Likert-type scale with a neutral option. The variables were later recoded to aggregate the Likert-type scale items into three categories including “oppose,” “support,” and “neutral” responses. A multinomial logistic regression was run for each of the five management actions using “oppose” as the base category.

Constructs investigated in this study were drawn from TPB and ACF, and included core/salient beliefs, policy beliefs, and control beliefs. Core/salient belief constructs were operationalized using scale items that measured the perceived value of park resources and general environmental attitudes. Variables that measure policy beliefs included level of perceived shared values with park managers, trust in park managers, and trust in the regulatory process. Control beliefs were operationalized by level of familiarity with park resources, rules and regulations, and knowledge about threatened and endangered species at Cape Lookout National Seashore. Due to the complexity of these concepts, they were measured using several variables with multiple scale items.

Perceived values of park resources were measured by asking participants to rate the level of importance of protecting different resources using a 5-point Likert-type scale. The resources included vegetation, viewscapes, sea turtles, shorebirds, historic structures, the Cape Lookout Lighthouse, natural conditions, and wild horses. Factor analysis showed that the questionnaire items loaded into three factors: wildlife and natural resource values, cultural/historical resource values, and overall landscape values.

Other variables measured by multiple scale items were adopted from previous studies (McComas & Trumbo 2001; Needham & Vaske 2008; Prentice, 2004; Sexton et al., 2012 Spotts & Stynes, 1985; Sriramesh, Moghan, & Wei, 2007; Voss, 2009). Cronbach's Alpha tests were conducted to ensure the reliability of measurement. The Cronbach's Alpha was 0.79 for the environmental attitude scale and 0.925 for the familiarity index. The test results showed that the adopted scale items were reliable in this particular context.

Several variables were used to reflect demographic information, including respondents' age, income level, residency status, and visitor type. Residency status was established using respondents' ZIP codes to determine whether the person resided within or outside Carteret County. Visitor type was determined by respondents' answers to a question about the number of times they had visited the park and about their primary activity at the park. Three distinct types of visitors were found, including non-visitors (resident survey respondents who had never visited Cape Lookout National Seashore), shoreline fishers (respondents who came to the park for the purpose of shoreline fishing), and general visitors (respondents who came to the park for other recreational activities).

Finally, multinomial logistic regression models were used to examine the likelihood of support of each management action in relation to core beliefs, policy beliefs, control beliefs, and other demographic variables. Variables that measure core and salient beliefs

included general attitude toward the environment, perceived value of wildlife and natural resources, perceived value of cultural/historical resources, and perceived value of overall landscape at Cape Lookout National Seashore. Variables used to assess policy beliefs included trust in park managers and their decision making process, and perceived shared ecocentric and anthropocentric values with park managers. Control beliefs were measured by level of knowledge about threatened and endangered species at Cape Lookout National Seashore and level of familiarity with the Cape Lookout area. Demographic variables include type (nonusers, fishers, general visitors), residency status (Carteret County resident or nonresident), income level, and respondent age.

Results

Responses were received from 573 of the 1,033 visitors interviewed during the fall visitor survey, a 55.5% response rate, and from 459 of the 1,043 visitors interviewed during the summer visitor survey, a 44.0% response rate. Of the 3,600 initial addresses for the resident survey, 727 were invalid due to being undeliverable or overlapping with the visitor survey. Responses were received from 794 of the 2,893 Carteret County residents with valid addresses in the resident survey, resulting in a 27.4% response rate. Several variables such as respondent age, gender, residency status (Carteret County resident or non-resident), and number of visits to Cape Lookout National Seashore (nonvisitor, first time, repeat visitor) were used to compare survey respondents to nonrespondents. No significant differences were found within each survey wave, thus nonresponse bias was not a concern.

Table 2

Percentage of Respondents Supporting or Opposing Threatened and Endangered Species Management Actions

Management action	Oppose		Support		Neutral	
	n	%	n	%	n	%
Action 1: Creation of pedestrian-only areas on beaches	634	36	770	44	351	20
Action 2: Full access closure, including pedestrian access, for bird nesting	723	41	724	41	307	18
Action 3: Prohibit camping and beach fires on areas close to protected turtle nests	396	23	1141	65	218	12
Action 4: Requiring pet to be leashed	313	19	1143	65	304	17
Action 5: Temporary closures of beaches and/or rerouting off-road vehicles for bird and turtle nesting	344	20	1203	69	209	12

Public support for and opposition to the different proposed management actions varied by action (Table 2). “Temporary closures of beaches and/or rerouting off-road vehicles for bird and turtle nesting” received the highest level of support, at 69%. “Full access closure, including pedestrian access, for bird nesting” received the greatest opposition, at 41%. However, this action also received the same percentage of “support” at 41%. Actions requiring greater control and restriction of recreational activities tended to have a higher percentage of “oppose” responses. Full closures are currently only required for piping plovers during their nesting and fledging season (generally April-August). These closures are most likely to affect summer visitors but not those in other seasons. Vehicle closures for sea turtles and seabeach amaranth typically run from July to November. These closures are more likely to affect both summer and fall visitors.

Summaries of results for statistical models analyzing each management action are shown in Tables 3 and 4. In logistic regression, the interpretation of pseudo r-square measurements (Cox and Snell’s and Nagelkerke) is not as straightforward as that of r-square in a regression model (Zheng & Agresti, 2000). However, the general concept remains the same: models with an r-square value closer to 1 provide a better fit. The Cox and Snell’s r-squares of the five models ranged from 0.154 to 0.448; the model for Action 4, requiring pets to be leashed, had the lowest predictive value.

Table 3

Model Summary for Different Threatened and Endangered Species Management Actions

Management action	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Model p-value
Action 1: Creation of pedestrian-only areas on beaches	1981.997	0.410	0.467	0.000
Action 2: Full access closure, including pedestrian access, for bird nesting	1850.364	0.448	0.512	0.000
Action 3: Prohibit camping and beach fires on areas close to protected turtle nests	1619.142	0.359	0.436	0.000
Action 4: Requiring pet to be leashed	1994.644	0.154	0.186	0.000
Action 5: Temporary closures of beaches and/or rerouting off-road vehicles for bird and turtle nesting	1459.389	0.408	0.501	0.000

Different variables had significant correlation with the level of public support in the logistic regression models for each management action (Table 4). Cells with significant correlation are marked ($p \leq 0.05$); blank cells indicate non-significant correlation. All variables were significant in at least one regression model. Variables that measured policy beliefs (trust and perceived shared values) appear to have the strongest influence as they have significant correlation with level of support in almost every model. Among perceived value of park resources, wildlife and natural resources were significantly correlated to level of support of all five management actions. Perceived values of historical/cultural resources and overall landscape were only significant in one model. This was not surprising given the study context of threatened and endangered species protection.

Table 4*Significant Variables in the Models ($p < 0.05$)*

Independent variable	Action 1	Action 2	Action 3	Action 4	Action 5
Knowledge about endangered or threatened species at Cape Lookout	x	x			x
Familiarity with Cape Lookout area	x				
General attitude toward the environment	x	x	x		x
Trust in park managers	x	x	x	x	x
Perceived shared ecocentric value	x	x	x	x	x
Perceived shared anthropocentric value	x	x	x	x	
Trust in the decision-making process	x				x
Perceived value of cultural/historical resources		x			
Perceived value of wildlife and natural resources	x	x	x	x	x
Perceived value of overall landscape					x
Type of visitor (categorical)	x	x	x		x
Residency status (categorical)	x			x	
Income level (categorical)				x	
Respondent age		x	x	x	x

While odd ratios are equivalent to correlation coefficients in multinomial regression models, their interpretation is not as straightforward. Thus, instead of reporting out all Beta values, only correlations that were significant ($p \leq 0.05$) and the directions of relationships were reported (Table 5). Correlation coefficients in multinomial regression models are often addressed in a relative term compared to the base response value, which is “oppose” in this case. For example, in the multinomial regression model for Action 1—creation of pedestrian-only areas on beaches, familiarity with the area, general attitude toward the environment, trust in the park manager, perceived shared ecocentric and anthropocentric values with park managers, trust in the decision-making process, perceived value of wildlife and natural resources, visitor type, and residency status were significant when compared between the “support” and “oppose” answer choices. Respondents with a higher level of familiarity with the Cape Lookout area, or a greater level of perceived shared anthropocentric value with park managers, were more likely to select an “oppose” response over “support” response for Action 1. Respondents with a higher score on general attitude toward the environment, greater trust in park managers and in decision making, higher perceived shared ecocentric value, and higher perceived value of wildlife and natural resources were more likely to support Action 1. With regard to visitor type, fishers were more likely to oppose management Action 1 compared to nonusers or general visitors. Similarly, non-residents of Carteret County were more likely to support management Action 1 compared to residents.

Table 5

Correlational Relationships (+/-) in Multinomial Regression Model with "Oppose" as Base Value (Significant at p-value ≤0.05)

Independent variable	Action 1		Action 2		Action 3		Action 4		Action 5	
	Neutral	Support	Neutral	Support	Neutral	Support	Neutral	Support	Neutral	Support
Knowledge about endangered or threatened species at Cape Lookout	-		-						-	
Familiarity with Cape Lookout area		-								
General attitude toward the environment		+		+		+		+		+
Trust in park managers	+	+	+	+	+	+	+	+	+	+
Perceived shared ecocentric value	+	+	+	+	+	+	+	+	+	+
Perceived shared anthropocentric value	-	-	-	-	-	-	-	-	-	-
Trust in the decision-making process	+	+							+	+
Perceived value of cultural/historical resources			-							
Perceived value of wildlife and natural resources	+	+	+	+	+	+	+	+	+	+
Perceived value of overall landscape					+					
Type of visitor (categorical)	Fisher (-)	Fisher (-)	Fisher (-)	Fisher (-)		Fisher (-)			Non-user, fisher (+)	Non-user (+)
Residency status (categorical)		Non-resident (-)						Non-resident (+)	Non-resident (+)	
Income level (categorical)								Lower income (+)		
Respondent age			+		+		+		+	+

Trust in park managers appeared to be the strongest indicator, as it was significant in every model. Respondents with higher trust levels were less likely to oppose any management action. The results also showed the strong influence of opposing ecocentric and anthropocentric values. Respondents who believed management actions leaned toward anthropocentric values were more likely to oppose the proposed actions. In contrast, respondents who believed management leaned toward ecocentric values were more likely to select “neutral” or “support” responses.

Discussion

While the study results were not surprising, they confirmed the importance of beliefs in predicting levels of support for management actions as addressed in both TPB and ACF. At the core beliefs level, general attitude toward the environment and perceived value of wildlife and natural resources had a strong positive correlation to the likelihood of support for management actions. It is plausible that cultural, historical, and overall landscape values were not perceived as relevant in the context of threatened and endangered species protection. While it was not surprising that respondents with higher scores for environmental attitudes would be more likely to support management actions to protect threatened and endangered species, this also presents a challenge. In a review of research within ACF, many studies found that core beliefs are often resistant to change (Sotirov & Memmler, 2012). While the management actions to protect threatened and endangered species would more likely gain support from environmentally conscious groups, resistance is expected from people on the other end of that spectrum. At the core-beliefs level, communication from the park would thus be expected to have a minimal effect. Several venues can be explored to increase the level of support or acceptance of policy changes at the core-beliefs level, including learning over long periods of time from the gradual accumulation of information, such as a scientific study, policy analysis, and experiences of various local stakeholders (Weible, 2006).

Policy-oriented learning rarely takes place in the core element of belief systems; more often it occurs at the policy-beliefs level (Sotirov & Memmler, 2012). The tasks involved in the protection and recovery of threatened or endangered species are neither simple nor easy, especially when necessary management actions for species conservation conflict with other public uses of resources such as recreational activities. An effective communication strategy to gain public support may be a crucial element of wildlife management (Ham & Krumpke, 1996).

This study focused on the park visitors and the local community surrounding Cape Lookout National Seashore as the groups most impacted by management actions. The results show that for this coalition, trust in park managers, credibility of the management decision-making process, and perceived shared anthropocentric and ecocentric values with managers were the strongest indicators of support for management actions. These variables measured the policy beliefs level. This finding is congruent with conclusions by Blake (1999) that the focus of environmental policy communication should be placed on building relationships with stakeholders. It is important to the audience to know that park managers are listening to their opinions and needs throughout the decision-making process. To achieve this goal, several communication strategies that the park could consider include conducting public opinion surveys, organizing community meetings to disseminate scientific study results, or open public forums where local residents and visitors can provide their input. By establishing a continuous and transparent relationship with local communities, the agency will be able to establish credibility in the process (Lawrence, Daniels, & Stankey, 1997). With this mechanism, the agency can show the relevancy of management policies, including those dictated from the national level. Through this process, different viewpoints and values can be exchanged, creating a foundation for understanding shared values.

One of the limitations of this study was the potentially inappropriate measurement of control beliefs. As Henry and Dietz (2012) pointed out, “one limitation of the ACF’s view of belief systems is that it is difficult to know precisely which cognitive elements should, and should not, be included in a belief system” (p. 246). TPB also provided a wide range of cognitive measurements for beliefs, which are often content specific, meaning that there

is no standardized scale of items for them (Ajzen, 2011). In this study, familiarity with the Cape Lookout area and knowledge about threatened and endangered species were used as operationalized variables for control beliefs. The correlations of these variables with level of support were relatively weak and were significant in multinomial regression models only for Actions 1, 2, and 5. Further, knowledge about threatened and endangered species at Cape Lookout National Seashore was only helpful in depicting the likelihood of the “neutral” answer choice in relation to “oppose” choices. One potential problem was that these variables may be confounded with visitor type. Fishers as a group tended to be repeat park visitors and had more experience with the park area and its resources. This group also had a higher likelihood of opposing threatened and endangered species management actions (Table 4). It is thus plausible that the negative correlation with knowledge and familiarity scores was confounded with visitor type rather than these being independent indicators.

From the ACF standpoint, there is potential for future research to further explore the policy subsystems. Both visitors and local residents are directly affected by management policies and both are using the park resources directly and indirectly. In that sense, they present one coalition. However, we were not able to examine the policy subsystem within this study due to the limited focus of an exploratory research. It would be beneficial for future research to determine whether there are subsystems within the coalition. Perhaps, several subsystems that have conflicting views on specific policy would be found and thus help better explain the relationship with control beliefs.

Another plausible explanation for this weak relationship was that the test for level of knowledge about threatened and endangered species in this study was too simplistic, containing only a series of yes/no questions. Ajzen, Joyce, Sheikh, and Cote (2011) found that simple knowledge tests often become insignificant in statistical models. When measured more rigorously, knowledge can be a strong indicator of intention or behavior. In addition, the questions to measure familiarity with park resources were not specific enough to particular management actions. Within the TPB, control beliefs often refer to one’s perceived ability to perform a specific behavior. In this regard, the scales we used did not provide strong measurements of control belief. It is thus possible that familiarity and knowledge about the park’s threatened and endangered species were not significant in the models due to measurement error rather than truly insignificant relationships. For this reason, long-term education and communication strategies about park policies and resources for the purpose of increasing public awareness should always be considered an important component of management actions.

In public policy communication, it is important to segment audiences and provide targeted messages (Blake, 1999; Ham & Krumpke, 1996; Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011). This is an especially important strategy at Cape Lookout National Seashore given the results of this study. While demographic variables such as income level, residency status, and age did not have a strong correlation with attitudes regarding possible management actions, visitor type was significant in four out of five models. Further, fishers had the strongest tendency to oppose management actions compared to non-visitors or general visitors. Action 2, which requires (seasonal) full closure of recreation access, received the greatest opposition across all groups (Table 2). Further examination of the demographic data also showed that fishers were the group that had the most experience with park resources. The results indicate that park managers should have a different communication strategy for visitors who engage in specialized recreation activities such as fishers. Hughes, Ham, and Brown (2009) provided a very similar suggestion that more experienced visitors require more complex management approaches involving not only a communication strategy but also other interventions such as incentives and disincentives. While mass communication strategies can be applied to all visitors, specialized recreation groups may need a more specific messages and strategies tailored to their activities. For example, some practices that park managers could use to reach out to fishers and raise awareness about endangered and threatened species include posting interpretive signage at popular fishing areas and tackle shops, incentives and disincentives related to fishing,

public relations strategies, including use of social media directed at sport groups, and or hosting fishing tournaments to benefit conservation.

Among management actions examined in this study, Action 4—keep pets on a leash while visiting the park—is a simple, uniformly applicable action. “Support” for this action was relatively high, at 65%. However, its model fit produced the weakest pseudo *r*-square. This indicates that other variables not examined in this study may be better predictors of support of or opposition to this action, including perhaps whether the respondent is a pet owner. For example, a study by Hughes, Ham, and Brown (2009) showed that keeping dogs on a leash at a protected area is strongly associated with prior intention and habitual behavior; thus on-site communication may not have much persuasive influence. This finding again emphasizes the value of long-term communication and relationship building with the local community to increase understanding of management actions.

Results of this study confirmed and corroborated other studies conducted within TPB and ACF that showed building trust and demonstrating shared values through public communication strategies are keys to earning public support. In this particular case, the study also helped to identify appropriate segmentation of target audiences and potential factors that would affect public support of management actions to protect threatened and endangered species. These types of studies are especially important in NPS’s context, in which the two aspects of the agency’s conservation mission, protecting resources and providing for public enjoyment may be challenging to achieve simultaneously. To protect its resources in perpetuity so that the public may enjoy them, NPS must inform the public as to why and by what means those resources and visitor experiences can be conserved. Our results should encourage a multi-disciplinary approach to park management in which administrators, resource managers, enforcement personnel, scientists, and education/communication specialists contribute to a concerted effort to identify management issues, develop actions, and educate and communicate to enable a stronger partnership with the parks’ true owners—the public.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211.
- Ajzen, I. (2011). The theory of planned behavior. In P. A. Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology: Vol. I* (pp. 438–459). London: Sage Publication.
- Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences: An Interdisciplinary Journal*, *13*(3), 185–204.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. New York: Prentice Hall.
- Ajzen, I., & Madden, T. (1986). Prediction of goal-oriented behavior: Attitude, intention and perceived behavioral control. *Journal of Experimental Social Psychology*, *22*, 453–474.
- Ajzen, I., Joyce, N., Sheikh, S., & Cote, N. G. (2011). Knowledge and the prediction of behavior: The role of information accuracy in the theory of planned behavior. *Basic and Applied Social Psychology*, *33*, 101–117.
- Beierle, T. C., & Konisky, D. C. (2000). Values, conflict, and trust in participatory environmental planning. *Journal of Policy Analysis and Management*, *19*(4), 587–602.
- Blake, J. (1999). Overcoming the ‘value-action gap’ in environmental policy: Tensions between national policy and local experience. *Journal of Justice and Sustainability*, *4*(3), 257–278.
- Brown, T. J., Ham, S. H., & Hughes, M. (2010). Picking up litter: An application of theory-based communication to influence tourist behaviour in protected areas. *Journal of Sustainable Tourism*, *18*(7), 879–900.

- Cornelisse, T. M., & Duane, T. P. (2013). Effect of knowledge of an endangered species on recreationists' attitudes and stated behaviors and the significance of management compliance for Ohlone Tiger Beetle Conservation. *Conservation Biology*, 27(6), 1449–1457.
- De Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology*, 37(8), 1817–1836.
- Ellison, B. A. (1998). The Advocacy Coalition Framework and implementation of the Endangered Species Act: A case study in Western Water Politics. *Policy Studies Journal*, 26(1), 11–29.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Ham, S. H., & Krumpal, E. E. (1996). Identifying audiences and messages for nonformal environmental education: A theoretical framework for interpreters. *Journal of Interpretation Research*, 1(1), 11–23.
- Han, H., & Kim, Y. (2010). An investigation of green hotel customers' decision formation: Developing an extended model of the theory of planned behavior. *International Journal of Hospitality Management*, 29, 659–668.
- Henry, A. D., & Dietz, T. (2012). Understanding environmental cognition. *Organization and Environment*, 25(3), 238–258.
- Hosme, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). Hoboken, NJ: John Wiley & Sons.
- Hughes, M., Ham, S. H., & Brown, T. (2009). Influencing park visitor behavior: A belief-based approach. *Journal of Park and Recreation Administration*, 27(4), 38–53.
- Kotchen, M. J., & Reiling, S. D. (2000). Environmental attitudes, motivations, and contingent valuation of nonuse values: A case study involving endangered species. *Ecological Economics*, 32(1), 98–107.
- Lawrence, R. L., Daniels, S. E., & Stankey, G. H. (1997). Procedural justice and public involvement in natural resource decision making. *Society and Natural Resources: An International Journal*, 10, 577–589.
- Leach, W. D., & Sabatier, P. A. (2005). To trust an adversary: Integrating rational and psychological models of collaborative policymaking. *American Political Science Review*, 99(4), 491–503.
- Levi, M. (1988). *Of rule and revenue*. Berkeley: University of California Press.
- Lubell, M. (2003). Collaborative institutions, belief systems, and perceived policy effectiveness. *Political Research Quarterly*, 56(3), 309–323.
- Lubell, M. (2007). Familiarity breeds trust: collective action in a policy domain. *The Journal of Politics*, 69(1), 237–250.
- Maibach, E. W., Leiserowitz, A., Roser-Renouf, C., & Mertz, C. K. (2011). Identifying like-minded audiences for global warming public engagement campaigns: An audience segmentation analysis and tool development. *PloS One: an Open Access Journal*, 6(3), 1–9.
- McComas, K. A., & Trumbo, C. W. (2001). Source credibility in environmental health-risk controversies: Application of Meyer's credibility index. *Risk Analysis*, 21(3), 467–480.
- National Park Service. (2005, September 23). *Management*. Retrieved from Cape Lookout National Seashore: <http://www.nps.gov/caloparkmgmt/upload/CALO%20enabling%20legislation.pdf>
- National Park Service. (2006). *Management Policies 2006*. National Park Service Office of Policy. Retrieved from <http://www.nps.gov/policy/mp2006.pdf>
- National Park Service. (n.d.). *Nature and Science*. Cape Lookout National Seashore. Retrieved from www.nps.gov/calo
- Needham, M. D., & Vaske, J. J. (2008). Hunter perceptions of similarity and trust in wildlife agencies and personal risk associated with chronic wasting disease. *Society and Natural Resources*, 21, 197–214.
- Nordlund, A. M., & Garvill, J. (2002). Value structure behind proenvironmental behavior. *Environment and Behavior*, 34, 740–756.

- Prentice, R. (2004). Tourism familiarity and imagery. *Annals of Tourism Research*, 31(4), 923–945.
- Routhe, A. S., Jones, R. E., & Feldman, D. L. (2005). Using theory to understand public support for collective actions that impact the environment: Alleviating water supply problems in a nonarid biome. *Social Science Quarterly*, 86(4), 874–897.
- Sabatier, P. A. (1988). An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences*, 21, 129–168.
- Sabatier, P. A., & Jenkins-Smith, H. C. (1993). *Policy change and learning: An advocacy coalition approach*. Boulder, CO: Westview Press.
- Sabatier, P. A., & Weible, C. M. (2007). The advocacy coalition framework: Innovation and clarifications. In P. A. Sabatier (Ed.), *Theories of the policy process* (2nd ed., pp. 189–220). Boulder, CO: Westview Press.
- Sexton, N. R., Dietsch, A. M., Don Carlos, A. W., Miller, H. M., Koontz, L., & Solomon, A. N. (2012). *National wildlife refuge visitor survey results-2010/2011*. U.S. Geological Survey Data Series 685.
- Sinclair, J., Mazzotti, F., & Graham, J. (2003). Motives to seek threatened and endangered species information for land-use decisions. *Science Communication*, 25(1), 39–55.
- Smith, P., & McDonough, M. H. (2001). Beyond public participation: Fairness in natural resource decision making. *Society and Natural Resources: An International Journal*, 14, 239–249.
- Sotirov, M., & Memmler, M. (2012). The Advocacy Coalition Framework in natural resource policy studies: Recent experiences and further prospects. *Forest Policy and Economics*, 16, 51–94.
- Spotts, D. M., & Stynes, J. D. (1985). Measuring the public's familiarity with recreation areas. *Journal of Leisure Research*, 17(4), 253–265.
- Sriramesh, K., Mghan, S., & Wei, D. L. (2007). The situational theory of publics in a different cultural setting: Consumer publics in Singapore. *Journal of Public Relations Research*, 19(4), 307–332.
- Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology*, 25, 415–425.
- Stein, B. C. (2008). Federal lands and endangered species: the role of military and other federal lands in sustaining biodiversity. *Bioscience*, 58(4), 339–347.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, 50(3), 65–84.
- Stern, P. C., Dietz, T., Kalof, L., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, 25(18), 1611–1636.
- Thompson, S. C., & Barton, M. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14, 149–157.
- Vagias, W. M., Powell, R. B., Moore, D. D., & Wright, B. A. (2014). Predicting behavior intentions to comply with recommended leave no trace practices. *Leisure Sciences*, 36, 439–457.
- Voss, J. (2009). An empirical analysis of public perception of reclaimed water applying the situational theory of publics. *Theses and Dissertation*. University of South Florida.
- Weible, C. (2006). An advocacy coalition framework approach to stakeholder analysis: Understanding the political context of California Marine Protected Area Policy. *Journal of Public Administration Research and Theory*, 17, 95–117.
- Weible, C. M., & Sabatier, P. A. (2007). A guide to the Advocacy Coalition Framework. In M. S. Sidney (Ed.), *Handbook of public policy analysis* (pp. 123–136). Boca Raton, FL: CRC Press.
- Wynveen, C. J., Kyle, G. T., & Theodori, G. L. (2008). The relationship between place bonding and social trust, as explored in a study in the Big Thicket National Preserve, Texas. *Northeastern Recreation Research Symposium* (pp. 200–208). Newtown Square, PA: U.S Forest Service.
- Zheng, B., & Agresti, A. (2000). Summarizing the predictive power of a generalized linear model. *Statistics in Medicine*, 19, 1771–1778.