DISSERTATION

COMMUNICATING CLIMATE CHANGE THROUGH PLACE BASED ENGAGEMENT: METHODS, RESEARCH, AND APPLICATIONS TO PARKS AND PROTECTED AREA VISITORS

Submitted by

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ABSTRACT

COMMUNICATING CLIMATE CHANGE THROUGH PLACE BASED ENGAGEMENT: METHODS, RESEARCH, AND APPLICATIONS TO PARKS AND PROTCTED AREA VISITORS

This research explored the connections between place attachment and resident perceptions of tourism. Aspects of place attachment such as place identity and place dependence were tested against tourism dependence for strength of correlation and relationship to perceived impacts of tourism. Survey data were collected from residents of eight communities in Colorado. The researcher hypothesized that there would exist a positive relationship between place dependence and place identity, as well as a negative relationship between place identity and tourism impacts. Results from this research show that place dependence has a direct effect on place identity (β = .61, p <.001). Place identity was found to have a significant effect on a variety of tourism impacts.

Rapid advances in tablet technology and the increasing availability of electronic survey applications provide opportunities to streamline on-site human dimensions data col- lection. This article compares response rates and cost efficiencies of an iPad interface used for on-site survey administration to other types of human dimensions of wildlife survey administration response rates and expenses. Results also illustrate respondents' interface preference from a recent survey administered at National Wildlife Refuges and National Parks across the United States. Refuge and Park visitors enjoyed taking on-site surveys on iPads more than traditional paper surveys, and indicated a preference for taking future surveys on iPads instead of paper

($t = 21.64$, $p < .001$, $\eta = .39$); iPad survey administration was more cost efficient for large (over 1,350) survey samples, and garnered a higher than average response rate than online and mail surveys, but similar to average response rates for on-site intercept survey administration.

In this paper we present and test a theoretical framework for place-based climate change engagement. The framework is based on principles from place attachment theory, place- based education, free-choice learning, and norm activation theory. The framework, which we empirically validate here, demonstrates the power of engaging citizens in action-based learning at physical, material places, which are also symbolic sites for inspiring political action and learning about climate change impacts. Research has shown that climate change will resonate with diverse audiences when: (1) it is situated in cultural values and beliefs, (2) it is meaningful to that audience, and (3) it empowers specific action. We use data collected at 16 national parks and wildlife refuges in the USA; all of which are experiencing the impacts of climate change and struggling to develop climate change communication and outreach activities for their visitors and local communities. Thus, this framework and the empirical validation presented are the result of triangulating quantitative survey data (n =4,181) and qualitative interviews (n =359) to argue for the unparalleled potential for America's parks and refuges to inspire civic engagement in climate change through place-based communication.

People everywhere are defined in part by the places they live and the places they love. Climate change is a global challenge that threatens peoples' homes, work places and protected areas around the world. This paper explores the connection between the distance National Park visitors live from the Park and their perceived connection to that place as well as related influences on perception of climate change impacts. The researchers built upon Norton and Hannon's (1997) work hypothesizing that the closer visitors lived to the Park, the greater place

attachment they would exhibit. Based on an on-site survey of visitors to Kenai Fjords National Park (KEFJ), visitors' place attachment and proximity to the Park were mapped using ArcGIS software. Results show that regardless of distance, the majority of visitors who took the survey reported that they have a strong attachment to KEFJ. This attachment positively correlated with visitor ability to see climate change impacts ($r = .20$, $p < .001$) and their desire to learn more about climate change ($r = .26$, $p < .001$) in the Park. This study shows that National Parks have the potential to educate a vast audience on the effects climate change will have to these iconic landscapes and how they help protect these places, regardless of where they live.

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INTRODUCTION

Place attachment is defined in environmental psychology as an emotional or cognitive connection between a person and a particular place (Altman & Low, 1992). It is an important concept to consider when exploring the bonds between people and the places they love. These bonds not only define places people prefer to live and visit, but create a deeper understanding of a landscape which leads not only to a vested interest in the future of these landscapes, but also an increased desire to protect them. Physical changes to places occur for a variety of reasons, however, one of the most notable are the changes caused by development to individuals' communities as place attachment is perhaps strongest where individuals grew up during their formative years. Chapter 1 primarily explores this form of place attachment (often termed community attachment) in depth as it pertains to tourism. In addition, components of place attachment (place dependence and place identity) are defined and tested for relative importance which aids in the conception of place attachment used in the following chapters. By combining the concept of place attachment with social exchange theory, the researchers demonstrate the influence of place attachment on a variety of tourism impacts including economic, socio-cultural, and environmental impacts. These impacts are used to determine support for additional tourism in communities confronted with place disruption. Findings from this study served as encouragement to explore the connection between place attachment and the environmental impacts of climate change in parks and protected areas.

Chapter 2 discusses the use of a new data collection methodology specifically employed to capture the benefits of both on-site surveying and web-based survey methods. New developments in tablet technology allow for on-site survey data collection which preserves the benefits of traditional on-site surveys, such as higher response rates and a connection to place,

while supplying many of the benefits of on-line surveys. Surveying a visitor about a park or protected area they are currently standing in preserves a connection to place which may otherwise be lost when completing an on-line survey about that same place at home a month after visiting. While preserving a connection to place was paramount for the research conducted, having data in an electronic form allowed for more efficient data organization and analysis. Future benefits of this methodology in the field of place-based research, such as GPS mapping and location, are also discussed.

The importance of place attachment is applied to the phenomena of climate change in Chapter 3. As a substantial force for change among landscapes worldwide, climate change has the ability to disrupt a sense of place for countless individuals. In addition, it has been recognized as possibly the greatest challenge ever faced by the country's land management agencies (Delach & Matson, 2010). Unfortunately, much of the American public exhibits a lack of knowledge concerning climate change which leads to further confusion, apathy, and inaction on this important environmental issue (Leiserowitz, Smith & Marlon, 2010). This chapter explores place attachment within a nationwide study of 16 different national parks and wildlife refuges. Select results from this study are set within a framework of place-based climate change engagement consisting of four theoretical threads: (1) place attachment, (2) place-based education, (3) free choice learning, and (4) norm activation theory. Full results from all 16 sites are combined and summarized in a technical report in Appendix A (individualized site reports can be found in Appendices B – Q). Throughout this chapter the concept of place is further validated as a vital component of climate change communication.

The fourth and final chapter tests the concept put forth by Norton and Hannon (1997) that the closer an individual lives to a particular place the more place attachment they will exhibit

toward that place. This study combines geographic data with social science data to map visitors' feelings of place attachment at Kenai Fjords National Park against geographic proximity. Kenai Fjords National Park was selected as the location for this case study due to the noticeable landscape changes caused by climate change evident in the area. Place attachment data is also correlated with visitors' knowledge about climate change effects within the Park to validate the connection between these two concepts in Chapter 3 (complete data for Kenai Fjords National Park can be found in Appendix K).

The goal of this compilation of studies is to forge a connection between place attachment and climate change within the context on parks and protected areas. The order of the papers should lead the reader from (1) a conceptualized understanding of place attachment, (2) new methods for achieving place-based data, to ultimately, (3) the application of place attachment data to further goals of climate change communication within the context of parks and protected areas. A more thorough introduction is given in the beginning of each chapter and discussions follow each indicating core findings, limitations, and avenues for future research.

CHAPTER 1 - THE INFLUENCE OF PLACE ATTACHMENT ON RESIDENT PERCEPTION OF TOURISM

Introduction

The use of tourism for economic development has become a popular strategy for many communities. However, many residents risk the very attributes which make their community special by accepting increasing amounts of tourism development. Without proper planning, tourism development could ultimately lead to a loss of sense of place for many community members. The purpose of this research is to explore the influence of place attachment on impacts of tourism and resident desire for additional tourism.

This research combines two theoretical perspectives currently employed in the tourism literature: community attachment and social exchange theory (Harrill & Potts, 2003). Community attachment states that the more attached residents are to their community, the more negative they are about tourism development (Um & Crompton, 1987; Harrill, 2004). Social exchange theory involves the trading of community resources. In the tourism literature, this usually takes the form of trading positive economic benefits for negative social and environmental impacts (Harrill, 2004). Social exchange theory posits that when there exists a high degree of resource exchange, impacts are viewed positively by residents. Conversely, when the rate of of resource exchange is low, impacts are viewed negatively by residents (Ap, 1992). For example, if a community received a high degree of economic stimulation via tourism as a result of a new hotel construction, even though the new construction caused a substantial amount of traffic and congestion, the impacts would still be viewed positively.

Literature Review

The bonds that form between people and places have often been studied from a variety of perspectives. The connection has been termed ‘sense of place’ (Tuan, 1977), ‘place bonding’ (Hammitt, Backlund, & Bixler, 2004), ‘community attachment’ (McCool & Martin, 1994) and ‘place attachment’ (Moore & Graefe, 1994; Williams & Roggenbuck, 1989). Place attachment is defined in environmental psychology as an emotional or cognitive connection between a person and a particular place (Altman & Low, 1992). Place attachment is typically broken down into two separate concepts of place identity and place dependence (Williams & Vaske, 2003, Williams & Roggenbuck, 1992, and Williams & Roggenbuck, 1989).

The concept of place identity refers to an emotional attachment to a specific area (Williams & Roggenbuck, 1989). The specific feeling one gets from returning home after a long journey serves as an adequet example. In this study, place identity is similiarly conceptualized by how strongly residents feel attached to and identify with their community.

The concept of place dependence refers to the importance of a place for supplying an outlet for goal accomplishment (Williams & Roggenbuck, 1989). For example, a rock climber may depend on access to a certain challenging crag in order to fulfill the goal of climbing a certain route. In this study, place dependence is similarly conceptualized by how well a community supplies a resident with what they like to do as well as the satisfaction a resident receives by being in the community.

The concept of tourism dependence is similar to that of place dependence. Instead of depending on a place for one’s goal attainment, however, an individual would depend on tourism for their livelihood. Tourism dependence differs in the fact that it possesses a primarily economic view of dependence, whereas place dependence encompasses a variety of goal oriented

attributes. Tourism dependence is traditionally operationalized using ratios involving per capita lodging receipts (Smith & Krannich, 1998). However, this measurement does not take into account how residents may depend on tourism for social, cultural, and recreational opportunities. Therefore, in this study tourism dependence is conceptualized as residents' dependence on tourism to fulfill economic, social, cultural, and recreational goals.

Community attachment is a similar concept to place attachment found in tourism literature. One critical difference is that community attachment is geographically bound around a community. McCool and Martin (1994) define community attachment as, "the extent and pattern of social participation and integration into the community, and sentiment or affect toward the community" (p. 30).

Community attachment has been measured in a variety of ways. The concept has been operationalized simply as length of residency (Williams, McDonald, Riden, & Uysal, 1995), combined with birthplace and heritage (Um & Crompton, 1987), combined with community sentiment (McCool & Martin, 1994), or as a combination of all of the above with reported number of friends and social connections (Harril & Potts, 2003). In this study, community attachment is conceptualized as a combined measure of place identity and place dependence.

Previous research measuring the influence of communtiy attachment on perceptions of tourism impacts and the desire for additional tourism present mixed results. In an exploratory study in Charleston, North Carolina, researchers found no significant relationship between community attachment and resident support for additional tourism (Harril & Potts, 2003). However, this study did reveal significant model paths between cultural and economic benefits and community attachment. In a study conducted in southwestern Virgina, researchers found that residents who were more attached to their community viewed tourism impacts more favorably

(Williams et al., 1995). McCool and Martin (1994) found that strongly attached respondents rated positive impacts of tourism higher than unattached respondents, however, more attached respondents were also more concerned with sharing the cost of tourism. This indicates that attached residents were more concerned at both ends of the postive/negative impacts spectrum.

The influence tourism impacts have on support for additional tourism growth has been studied extensively in the tourism literature (Andereck & Vogt, 2000; Gursoy, Jurowski, & Uysa, 2002; Gursoy & Rutherford, 2004; Jurowski, Uysal, & Daniel, 1997; Long, Perdue, & Allen, 1990; Perdue, Long, & Allen, 1990; Perdue, Long, & Allen, 1987). Most findings indicate that as percieved negative impacts increase, the desire for additional tourism decreases (Andereck & Vogt, 2000; Gursoy et al., 2002; Gursoy & Rutherford, 2004; Jurowski et al., 1997; Perdue et al., 1990). Impacts have been viewed in a variety of ways across studies, most typically including economic impacts, social impacts, cultural impacts and environmental impacts.

Cultural impacts refer to residents' feelings of either positive or negative cultural change. They are also conceptualized as a community's ability to preserve and participate in its unique culture. Social impacts refer to positive and negative interactions with tourists, including perceptions of crowding, and creation of recreational opportunities. The emphasis here is on interactions with other people. Economic impacts are conceptualized as costs such as an increase cost of living and benefits such as more employment opportunities being available. Environmental impacts include both positive and negative impacts such as the incentive to conserve natural areas and the perceived increase in pollution.

Based on the literature, the following hypotheses were tested (Figure 1.1):

H_1: As place dependence increases, place identity will increase.

H_2: As tourism dependence increases, place identity will increase.

H_3: As place identity increases, reported negative impacts will decrease.

H_4: As reported negative impacts increases, the desire for more tourism will decrease.

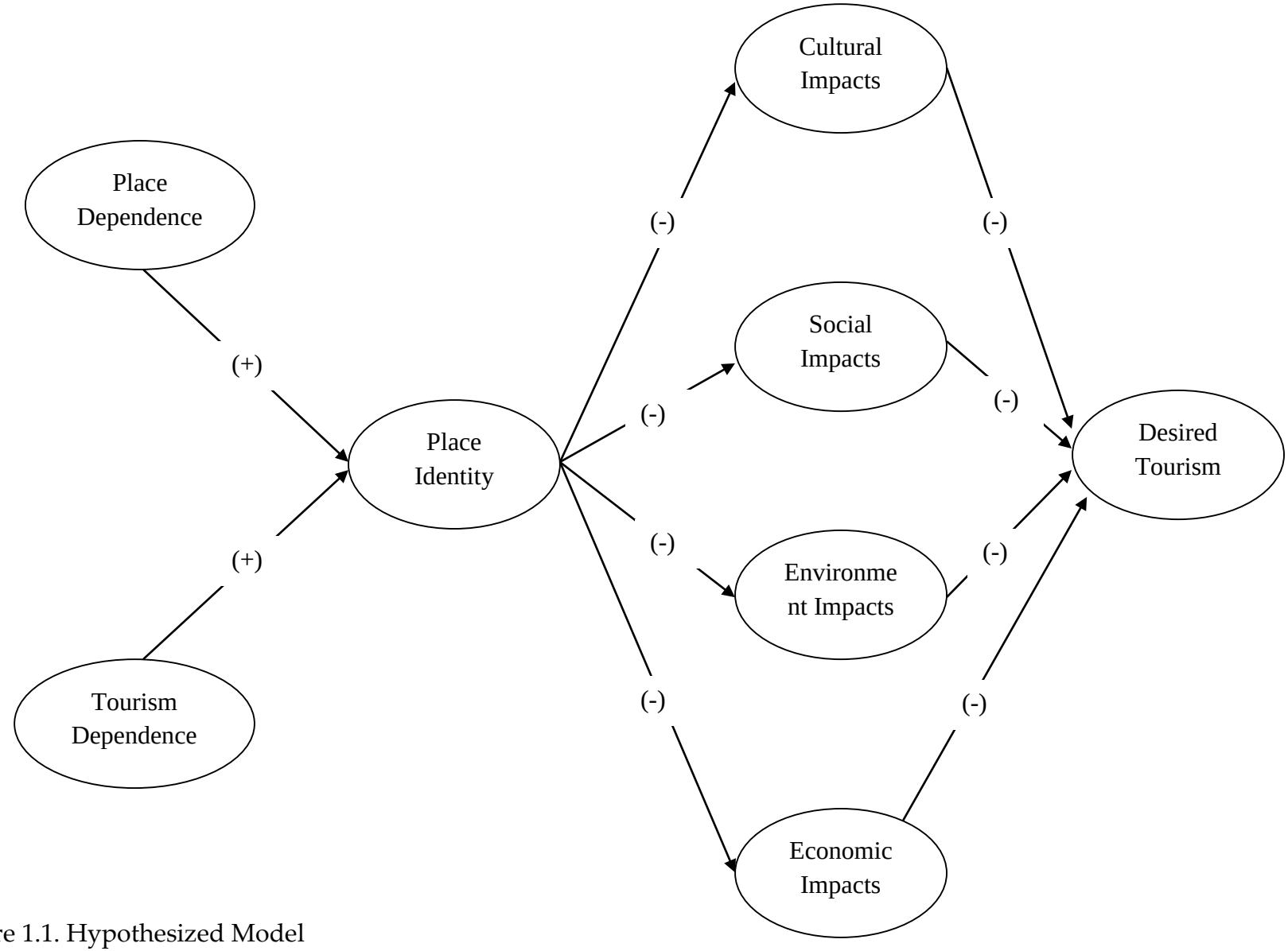

Figure 1.1. Hypothesized Model

Methodology

In April 2010, 364 on-site surveys were distributed to residents of eight communities in Colorado. The communities in the study included Walden, Fort Collins, Golden, Idaho Springs, Black Hawk, Frisco, Breckenridge, and Manitou Springs. Surveys were distributed to residents in community centers and public areas using a convenience sample. Dates and times of implementation were kept flexible, though most surveys were distributed over weekends. Residents were asked if they would like to participate by taking a survey after the study was explained and confidentiality was assured. Of the 364 surveys distributed, a total of 323 surveys were returned (response rate = 89%).

The survey consisted of 43 statements focusing on tourism impacts, place attachment, tourism attachment, and desired tourism. Statements were based on attitudinal responses and rated on a 5-point scale ranging from 1 "strongly agree" to 5 "strongly disagree." Perceptions of tourism impacts consisted of four separate categories including environmental impacts, cultural impacts, social impacts, and economic impacts. Each impact category consisted of four statements (two positively worded and two negatively worded) with the exception of environmental impacts which consisted of eight statements. Place attachment consisted of two separate categories: place identity and place dependence. These variables consisted of four and three statements respectively. Tourism dependence and desired tourism concept consisted of four statements each. Statements for the survey were developed from existing literature, including Lankford and Howard, 1994; Long et al, 1990; McCool and Martin, 1994; and Williams and Vaske, 2003. See Table 1.1 for a list of survey statements.

Table 1.1
Reliability analysis of variables

Scale Items	Cronbach alpha	Item total correlation	*M*	SD
Place Dependence	.80			
This community is the best place for what I like to do		.58	2.29	.97
I get more satisfaction out of being in this community than any other		.74	2.30	.98
No other community can compare to our community		.63	2.65	1.08
Tourism Dependence	.77			
I depend on tourism for a majority of my income		.65	2.24	1.29
I depend on tourism for cultural or social activities		.52	3.15	1.11
I rely on tourism development to provide recreation opportunities for locals		.46	2.88	1.16
My job depends on tourism		.66	2.29	1.30
Place Identity	.84			
I identify strongly with this community		.72	2.11	.90
This community is very special to me		.81	1.91	.82
I feel a strong personal attachment to this community		.57	2.07	1.46
This community means a lot to me		.79	1.96	.85
Cultural Impacts	.70			
Tourism promotes cultural exchange between tourists and residents		.49	3.66	.89
Tourism has negatively changed our traditional community culture		.53	3.60	.92
Tourism encourages participation in a variety of cultural activities by local residents		.45	3.38	.94
Tourists negatively affect our community's way of life		.48	3.74	.96
Social Impacts	.69			
I enjoy meeting tourists that visit our area		.53	4.01	.93
Tourism in my area has caused local tension toward tourists		.49	3.24	1.08
Tourism growth has increased crowding in our community		.45	3.08	1.10
Economic Impacts	.88			
Tourism has resulted in an increased cost of living in our community		.78	2.73	1.09
I feel that prices have increased due to tourism		.78	2.84	1.08
Environmental Impacts	.87			
Tourism in my community has caused an increase in litter		.66	2.54	1.08

Tourism in my community has caused an increase in noise pollution		.74	2.81	1.06
Tourism in my community has caused an increase in air pollution		.74	2.88	1.03
Tourism in my community has caused an increase in light pollution		.66	3.09	1.00
Tourism in my community has caused an increase in water pollution		.72	2.88	1.03
The presence of tourists has led to conflicts with local wildlife populations		.56	2.88	1.06
Tourism development has not detracted from the beauty of the natural environment		.46	3.25	1.13
Desire for Tourism	.89			
There are too many tourists in this area		.79	2.24	1.01
I hope the amount of tourists will gradually decrease in this community		.72	2.11	1.00
I would like to see more tourists visit this community		.81	2.25	1.01
I would like to see an increase in tourism development in this community		.74	2.54	1.16

Note. Survey items were measured using a five-point scale where 1 = Strongly Agree and 5 = Strongly Disagree. All positive measures were re-coded into negative measures.

Reliability analysis tests for the internal consistency of items and results in the creation of a scale. To be accurate, all individual items within each concept must be rated in the same direction. In order to make all impact concepts negative, positively worded impact items were re-coded into negative variables. In order to make the desired tourism concept positive, negatively worded desired tourism items were re-coded into positive variables. Reliability analyses were conducted on each of the variables being studied which were then converted into scales. Variables with an inter item correlation < .40 were removed from the scale. Scales with Cronbach's alpha scores < .65 were also removed.

Six separate regressions were conducted in order to obtain estimates of the path coefficients and the relative influence of the independent variables on the dependent variables. Place identity was regressed on place dependence and tourism dependence. Four impact variables, cultural impacts, social impacts, environmental impacts, and economic impacts, were regressed separately on place dependence, tourism dependence, and place identity. Finally, desired tourism growth was regressed on place identity, place dependence, and tourism dependence, as well as on each of the four impacts. The resulting standardized beta coefficients (β) represent the direct relationship between two concepts. The resulting coefficient of determination (R^2) represents the percent of variability in the dependent variable that is explained by the independent variable (Vaske, 2008).

Results

All of the measured variables were found to have reliable internal consistency after removing items with total correlations below .4 (α > .70, in all cases, Table 1.1). The statement, 'Tourism provides more recreational activities for locals' was removed from the social impacts scale due to low inter item correlation scores. Similarly, the statements 'Tourism has resulted in

more employment opportunities in this community' and 'Tourism has resulted in more business for local small businesses' were removed from the economic impacts scale. The statement, 'Tourism provides an incentive to conserve natural areas' was removed from the environmental impacts scale.

Place dependence had a substantial positive effect on place identity (β = .61, p < .001). Tourism dependence offered no additional explanatory power when included in the model. The total model explained 37% of the variability in place identity (R^2 = .37, p < .001, Figure 1.2).

Place identity had a minimal negative effect on cultural impacts (β = -.23, p = .001). Tourism dependence also had a minimal negative effect on cultural impacts (β = -.19, p < .001). Place dependence offered no additional explanatory power when included in the model. The total model explained 10% of the variability in cultural impacts (R^2 = .10, p < .001). Place identity had a minimal negative effect on social impacts (β = -.27, p < .001). Tourism dependence also had a minimal negative effect on social impacts (β = -.17, p = .002). Place dependence offered no additional explanatory power when included in the model. The total model explained 7% of the variability in social impacts (R^2 = .073, p < .001). The models for environmental impacts and economic impacts were both insignificant (R^2 = .012, p > .05, Figure 1.2).

Tourism dependence had a minimal positive effect on desired tourism (β = .26, p < .001). Cultural impacts, social impacts, and environmental impacts all had a minimal negative effect on desired tourism (β > -.19, $p \leq .001$). Economic impacts, place dependence, and place identity offered no additional explanatory power when included in the model. The total model explained 41% of the variance in desired tourism (R^2 = .414, p < .001, Figure 1.2).

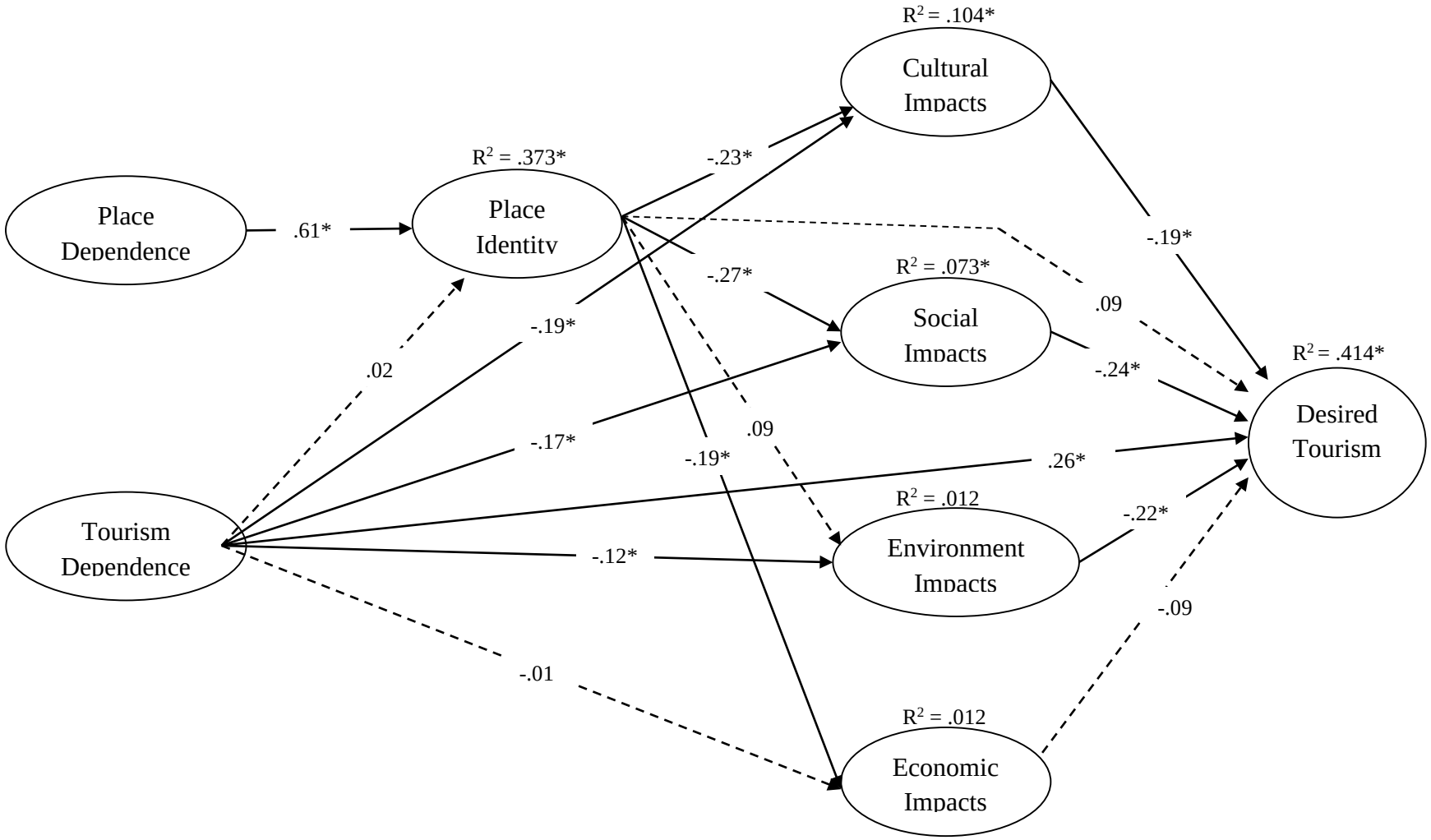

Figure 1.2. Regression model showing analysis results.
Note. Dotted lines are not significant, * refers to significant at $p < .05$, and insignificant pathways for place dependence not shown.

Conclusion and Implications

The results supported three of the four hypotheses. However, before discussing the hypotheses, results from the reliability tests merit attention. The statement that was removed from the social impacts scale ('Tourism provides more recreational opportunities for locals') may have been too specific for assessing social impacts across all communities. The term 'recreational opportunities' may be interpreted differently among residents. For example, one resident may consider shopping as a recreational activity while for another, the word 'recreational activity' may conjure ideas of skiing or hiking in the mountains.

The two statements removed from the economic impacts scale were both positively worded. However, when re-coded into negative statements, reliability analysis still revealed a negative correlation with the other two economic impact statements. Ancillary analyses indicated that residents were reporting both negative and positive economic impacts simultaneously. The ability of residents to report at both ends of the economic impacts spectrum has implications for further tourism impact studies. Future studies may need to consider measuring economic impacts as two separate concepts in the future: negative economic impacts and positive economic impacts.

Finally, the statement removed from the environmental impacts scale ('Tourism provides an incentive to conserve natural areas') may have been interpreted as an economic incentive and thus not fit appropriately into the environmental impacts scale.

Hypothesis 1 was supported. Place dependence was found to have a substantial influence on place identity and no significant influence on any other variable in the model. This contradicts study findings in the field of tourism that treat place dependence and place identity as similar level variables (Kyle, Graefe, Manning, & Bacon, 2004; White, Virden, & van Riper, 2008). The

results give support to the idea that place identity is a mediating variable for place dependence and its indirect effect on tourism impacts.

Hypothesis 2 was not supported. Tourism dependence had no additional influence on place identity. Results suggest that tourism dependence may operate separately from notions of place attachment and directly affect tourism impacts. For the model under investigation in this study, tourism dependence is seen as an exogenous variable similar to place dependence.

Hypothesis 3 was mostly supported. All impact concepts were significantly correlated in the hypothesized direction to place identity with the exception of environmental impacts. All of the direct relationships, however, had minimal practical significance. Tourism dependence also had a minimal negative effect on three of the four impact concepts. The explained variance in the impact concepts was also minimal or non-significant. The fact that tourism dependence had nearly as much direct effect on the impact variables as place identity further justifies its position outside the concept of place attachment.

Hypothesis 4 was mostly supported. Three of the four impact variables were significantly correlated in the hypothesized direction to desired tourism with the exception of economic impacts. However, all of the direct relationships had minimal practical significance. Tourism dependence also had an unanticipated minimal direct effect on desired tourism. The combined variables explained a substantial amount of the variance in desired tourism (41%). The direct relationship between tourism dependence and desired tourism was greater than any single impact variable. This, along with its influence on the impact variables directly, suggests that tourism dependence may play a substantial role in influencing desired tourism.

As social exchange theory would predict, this research reveals that residents may place different emphases on impacts related to tourism which therefore alter their desire for additional

tourism growth in their respective communities. In this instance, residents may place less importance on economic benefits and greater importance on social and environmental impacts when considering an exchange of community resources for additional tourism development. Also, as other studies have shown, the dependence on tourism can alter residents' perceptions of tourism impacts (Smith & Krannich, 1998). Furthermore, the results indirectly support the hypothesis proposed by community attachment theory. This study, along with others, shows that the greater attachment a person has to a community, the more they will report negative impacts (Kyle et al., 2004). However, contradictory findings have also been shown in the literature (McCool & Martin, 1994). Findings similar to previous research also suggest that the more negatively impacts are perceived; the less residents will desire additional tourism (Perdue et al, 1990; Gursoy et al, 2002; and Um & Crompton, 1987).

These results justify the use of more advanced analytical techniques such as covariance structure analysis through LISREL. Such analysis has been shown to be effective in other studies by allowing for the testing of multiple dependent variables at once as well as accounting for indirect effects of other variables (Kyle et al, 2004; Gursoy et al, 2002; and Gursoy & Rutherford, 2004).

This study has several limitations. By using a convenience sample instead of a random sample, results cannot be generalized to the general population. Also, due to a limited sample size for each community, differences in communities cannot be assessed. Using multivariate regression limits the ability to test for indirect effects of the variables and thus limits the strength of the results. Also, by operationalizing the impact variables as negative or positive impacts; answers on both ends of the impacts scale spectrum may have been missed.

This study has implications for management and tourism development. Tourism development at the community level must consider the residents. Concepts such as place attachment indicate that there is more to communities than merely bricks and mortar. Communities contain not only an economic fabric but also cultural, social, and environmental fabrics that are woven together into unique tapestries. It is with a delicate balance that tourism may enter such communities without disruption. With proper planning, tourism may not only avoid disruption but add another layer to the community that is in keeping with the residents' desired future and sense of place.

CHAPTER 2 - INNOVATIONS IN ON-SITE SURVEY ADMINISTRATION: USING AN IPAD INTERFACE AT NATIONAL WILDLIFE REFUGES AND NATIONAL PARKS[1]

Introduction

New technology for survey administration and analysis is emerging daily. Most prominent are the advances in online data collection. Online survey research in human dimensions scholarship has increased substantially over the past decade (Vaske, 2011). In this surge of research, we gain several opportunities, but we lose one important thing: place. Online surveys are typically completed off-site, in the comfort of the respondent's home. This is appropriate for several types of human dimensions research, and has been successful in gathering data about National Wildlife Refuge visitors (Sexton, Miller & Dietsch, 2011; Vaske, 2011). However, researchers have also found that responses to the same questions vary if the questionnaire is administered online or on-site (Sax, Gilmartin & Bryant, 2003). For the purposes of our work, we wanted to investigate visitors' immediate connection to a specific landscape, and better understand how those visitors' learn about and engage with the landscape of National Parks and National Wildlife Refuges. To capture that immediate connection, we opted for an onsite survey protocol, despite the advantages to online survey administration (Couper, 2000; Schmidt, 1997; Vaske, 2011; Wright, 2005).

The results presented here are part of a larger project to investigate National Wildlife Refuge and National Park visitors' understanding of climate change. Specifically, we developed and administered an on-site visitor survey assessing knowledge, concern, awareness and

[1] This is an Author's Original Manuscript of an article whose final and definitive form, the Version of Record, has been published in *Human Dimensions of Wildlife: An International Journal* (July 31, 2012, copyright Taylor & Francis), available online at: http://www.tandfonline.com/10.1080/10871209.2012.673242.

willingness to act in response to climate change impacts at different Refuges and Parks across the United States (see Figure 2.1 for survey locations).

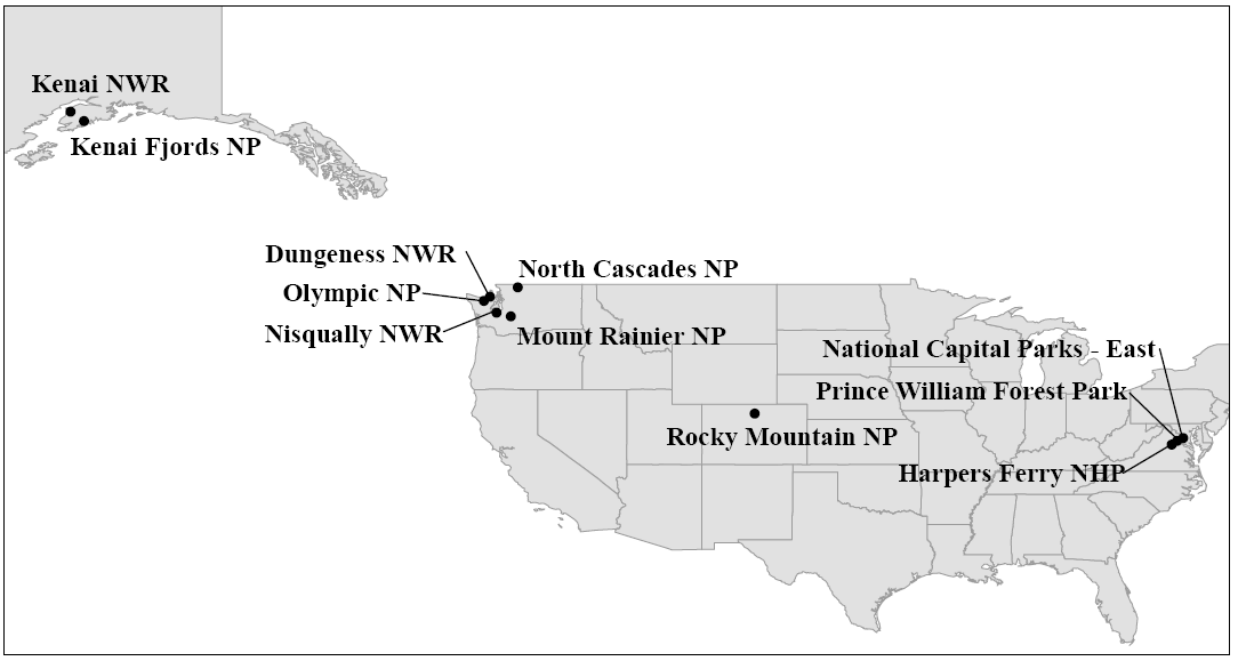

Figure 2.1. Eleven refuge and park survey sites.

On-site surveying typically has a greater response rate than other survey administration approaches (Vaske, 2008), specifically some researchers have found that online surveys have a much lower response rate than on-site surveys (Witmer, Colman & Katzman, 1999). When gathering thousands of on-site surveys at multiple locations, managing all of the paper and inputting data can become a cumbersome and costly endeavor. Rapid advances in tablet technology and the increasing availability of electronic survey applications provide opportunities to streamline on-site human dimensions data collection.

In this manuscript, we begin by briefly reviewing different types of advances and technology used in human dimensions survey administration. Then we highlight the benefits of on-site survey administration, and the use of tablet technology. While tablet technology has

several similarities to online survey administration, it is still a type of on-site surveying, allowing the respondents to reflect about their connection to the Refuge or Park, while at that place. After a review of recent, relevant literature, we introduce our survey methodology and detail the survey application we used, where we conducted our surveys and our dependent and independent variables for analyzing interface preferences. Finally, we present our results and conclude with several ideas for scholars and managers seeking to invest in tablet technology to conduct on-site visitor surveys.

Background

Several researchers have analyzed the quality and quantity of data that are collected through survey methods (de Leeuw, 1992; Dillman, Sangster, Tarnai & Rockwood, 1996) and the various transitions survey research has experienced (Chang & Krosnick, 2009). In addition, there has been substantial research on the different approaches to survey design, including how different mediums of administering the survey influence response rates (Babbie, 1990; Baruch, 1999; Dillman, 1978; Fowler, 1993; Lavrakas, 1993; Sudman & Bradburn, 1982; Witmer et al., 1999; Yu & Cooper, 1983).

Mail and telephone surveys have been a popular approach for human dimensions of wildlife research (e.g., assessing people's knowledge, attitudes, values and behaviors related to conservation and wildlife management) since the mid-1960s, with a surge of empirical studies in the early 1980s (Manfredo, 1989). However, research shows that mail and telephone survey response rates have declined over time (Atrostic et al., 2001; Connely, Brown, & Decker, 2003; Dillman, 2007; Tortora, 2004; Vaske, 2008). Similarly, research and federal land management budgets are also continuing to decline. At the same time, online surveys have grown in popularity as a way to overcome high costs associated with mail surveys (Dillman, Tortora, &

Bowker, 1998; Sheehan & Grubbs-Hoy, 1999). Criticisms of online surveys include lower response rates (Lozar Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2008; Shih & Fan, 2008) and unrepresentative samples including younger, better educated, and more affluent respondents due to knowledge or access of internet (Duda & Nobil, 2010; Graefe, Mowen, Covelli, & Trauntvein, 2011). Vaske and colleagues (2011) urge researchers to use caution when generalizing the results from online surveys. Recent studies, however, have shown that online surveys, when utilizing a mixed-mode design, can be a good option for obtaining balance between response rates and costs (Greenlaw & Brown-Welty, 2009) as well as a successful tool for human dimensions of wildlife research (i.e., Cornicelli & Grund, 2011; Graefe, Mowen, Covelli, & Trauntvein, 2011; Lesser, Yang, & Newton, 2011; Sexton, Miller, & Dietsch, 2011).

While online surveys provide an alternative to mail and telephone surveys, it does not support a place-based approach for federal land managers and researchers to survey visitors on-site. As Graefe and colleagues (2011) point out, there is no "master list" of names and e-mail addresses of refuge and park visitors for managers to access. Instead managers would need to acquire visitor's e-mail addresses at the site and follow up by providing a link to an online survey. For this reason, traditional on-site surveys with paper-and-pencil are often used in National Wildlife Refuges and National Parks in order to achieve exceptionally high response rates (Vaske, 2008).

On-site survey administration has several advantages in place-based research, perhaps the most important being the ability to find the target population and obtain higher response rates than online (~21-30% response rate; Sheehan, 2001; Kaplowitz, Hadlock & Levine, 2005), telephone (~48% response rate; Curtin, Presser & Singer, 2005), or mail surveys (~30-40% response rates; Dillman, 2007; Kaplowitz et al., 2005). Comparatively, on-site response rates

typically fall between 70-75% (Krosnick, 1999; Hox & de Leeuw, 1994). Unlike, online, telephone, and mail surveys, the presence of the researcher at a site has the opportunity to establish rapport with visitors and demonstrate the legitimacy of the study, ultimately reducing refusal rates (Bowling, 2005; Vaske, 2008). A researcher is also able to provide instructions and assist the visitor in answering the survey. If visitors find the survey to be confusing, the researcher can attempt to clarify the misunderstanding immediately.

Although paper-and-pencil on-site survey administration achieves the goal of data collection, we have found that it has several limitations. Perhaps the greatest weakness of this approach, especially in research conducted at recreation areas, is the limitation on survey length. On-site surveys cannot be too long as they require participants to stop their current activity in order to complete the survey (Vaske, 2008). In our experience, paper-and-pencil surveys require several hours to input data and greater chances of data entry errors, than online or electronic surveys. With the growing demand of timely and accurate data, we hypothesize that touch-screen tablets are an appropriate alternative.

Using tablet devices, researchers are able to customize research needs by downloading a variety of applications and survey software. The process of using a tablet device to conduct surveys has four easy steps: (1) create a survey on a survey website; (2) download the survey application from the App store on to your tablet; (3) administer the survey and collect data on the device; and (4) export results and analyze the data in an automatically-generated SPSS data file (or CSV, or other statistical program, if desired). Even someone who has little familiarity with tablet devices can create or complete surveys with little effort or instruction. Furthermore, researchers are able to capitalize on additional features such as camera and microphone to conduct interviews, GPS to record location, multimedia features, and the ability to collect, chart,

and evaluate data on the spot. Duke Global Health Institute was an early adopter of tablet technology. Duke was one of the first research institutes to adopt the use of iPads in the fall of 2010 as a teaching and field research tool in the graduate-level research method classes. Duke's Global Health Institute uses various iPad apps to help students make the most of their time in remote and low-resource settings.

Although tablets require an initial investment, we anticipate that these devices are efficient and cost-effective in the long run, and once purchased can be used for several years for a variety of data collection projects. Touch-screen tablet technology may provide endless innovative research opportunities for human dimensions of wildlife research.

Hypotheses

We hypothesize that there are many benefits to using tablets, such as higher response rates and increased efficiency and reduced cost of administration. We also assume that respondents will be enticed by such new technology, and may enjoy the survey experience because of the novelty of using electronic tablets. Thus, we tested the following hypotheses:

Hypothesis 1a: Using tablet devices for on-site surveying may result in higher response rates than the average response rates for online surveys (~25%). telephone surveys (~48%) and mail surveys (~35%).

Hypothesis 1b: Using tablet devices for on-site surveying may result in higher average response rates than traditional pencil-and-paper on-site surveys (~ 70%).

Hypothesis 2: Using tablet devices for on-site surveying allows for economical, efficient and immediate access to data.

Hypothesis 3: Refuge and Park visitors will prefer taking on-site surveys on iPads as opposed to pencil-and-paper on-site surveys.

Methods

Survey Development

The visitor survey used in this study was first created in paper form using basic word processing software. The survey was later converted into an electronic form using an online template purchased from iSURVEY, with an accompanying iSURVEY app for the iPad (http://www.isurveysoft.com/). The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices (such as mobile phones and wi-fi compatible iPods). The Apple iPad 1 ("first generation") was used in this study, currently it is the only tablet compatible with the iSURVEY application. The iPad, a touch-screen tablet device, designed for multiple multi-media uses, is also an efficient tool for survey research. The iPad is portable and lightweight weighing 1.33-1.35 lbs and measuring 241.2 x 185.7 x 8.8 mm with a viewing display of 9.7 inches. The device comes in 16GB, 32GB, or 64GB flash hard drive sizes providing for ample data storage. The researchers used the 16GB version for this study. It features wireless Internet through Wi-Fi and 3G capabilities, which is only necessary for uploading results into a master data file, and is not necessary to administer surveys. The iPad's 10-hour battery life and rechargeable batteries also allow for extended and remote fieldwork.

Facilitating the transition from the paper version of the survey into digital form essentially involved choosing a question template from the iSURVEY website and typing in the questions and accompanying answer choices. Our team found the iSURVEY interface and template to be very user friendly. Problems, however, arose during analysis of data from a pilot study in Florida. Earlier versions of iSURVEY, versions 2.3 and 2.4, created non-numeric data output in an Excel file format. The output these versions provided were difficult to use and took several hours to manually reformat into an SPSS data file. However, iSURVEY released an

SPSS integrated *Beta* version of their software in April 2011, which assigned numeric values to variables and created SPSS data files. The lead author worked directly with Steve Cohn, founder and president of iSURVEY, as one of the *Beta* testers to address issues that arose with missing data and free text entry questions.

The version of iSURVEY used for this study, was version 2.5, which links seamlessly with both the iPad 1 and SPSS. In addition, it includes other useful features such as grid questions, multilingual support, GPS coordinates of the device during a survey, automatic results upload, and real time charts. The most recent release, version 2.6, features the ability to access multiple surveys on one device, calculators for confidence intervals, and calculates average time participants take to complete a survey. The iSURVEY app costs $89 per month of use or $400.50 for six consecutive months. Prior to purchasing the app, researchers are able to demo the survey for an unlimited time, with as many devices and users as desired, however only 10 results are stored with the free demo version. Once the app is purchased, researchers can administer the survey on as many devices as desired and gather an unlimited number of responses within the month or six month license. All of the results are saved, synced and uploaded to an automatically-generated data file, accessed on the iSURVEY password protected website.

Prior to purchasing the iSURVEY app, our team investigated a similar product from Survey Analytics and their accompanying app SurveyPocket. This product allows for more flexibility in question and survey design, however, we found the user interface more complex. Also, this product was more cost prohibitive, we were quoted $8,000.00 for a year subscription.

Procedure

Nearly three thousand (2948) visitor surveys were administered in 11 Refuges and Parks from May 6, 2011 to July 24, 2011, using a non-random, intercept sampling method. Researchers

administered surveys at various stages of the visitor experience, from visitor centers near the entrance to popular viewpoints and trailheads, and in the evenings at on-site campgrounds. Although this was a non-probabilistic sample, efforts were made by the research team to ask every visitor encountered to take a survey. In approaching every visitor, we increased the chances of a more representative sample since every member of the population had an equal chance of being selected. We also attempted to reduce sampling error by increasing the overall sample size. Inevitably, a few visitors were able to stealthily avoid taking the survey, though these instances were rare, and when noticed were noted as a "non-response."

On-site survey administration locations were unique at each Refuge and Park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers for popular and diversified locations for surveying. Typically, researchers spent two weeks in each region and four days at each individual site collecting visitor data. The brevity of time spent at each site was necessary to reach a greater number of sites within each region. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site.

The survey was presented as a research project and not affiliated with the Refuge or Park in which the survey was being conducted. Researchers would offer an iPad to visitors who agreed to take the survey and give them a brief (five second) tutorial on how to choose answers and advance through the sequence of questions. When all of the iPads were in use and in order to collect as many responses as possible, the researchers would hand out paper versions of the same survey on clipboards to visitors who agreed to take the survey. Rarely, a participant would

choose to wait for an iPad instead of completing the paper survey or request a paper survey even if iPads were available. In both cases efforts were made to accommodate these requests.

Most of the 2948 visitors surveyed (90%) completed the electronic version of the survey on the iPad while the remaining 280 participants (10%) completed the survey on paper. The disparity in size of the two subsets occurs from the survey protocol of delivering iPads first. The total response rate for the sample was 68%, though this varied from site to site. Most visitors who declined the survey did so because of the time it would take to complete (10 – 15 minutes). The collective sample is large enough to generalize to the total population of visitors for the combined list of sites at a 95% confidence level with a ±2% margin of error using a 50/50 split (Salant & Dillman, 1994).

Dependent variable. Three distinct questions were asked to assess our dependent variable of visitor preference of survey interface. Participants were asked to agree or disagree with the following statements on the paper version of the survey: (a) I enjoyed taking this survey on paper, (b) I would rather take surveys on paper than on an iPad, (c) I would enjoy taking future surveys on paper. Similarly, visitors who completed the iPad version of the survey were asked to agree or disagree with the following statements: (a) I enjoyed taking this survey on an iPad, (b) I would rather take surveys on an iPad than on paper, (c) I would enjoy taking future surveys on an iPad. Each variable was coded on a five-point scale ranging from 1 “strongly agree” to 5 “strongly disagree”.

Independent variable. The independent variable was whether the survey interface was completed on an iPad or paper survey. This dichotomous variable was assigned by the researchers according to whether the survey data originated from the iPad or were entered manually from paper.

Analysis

Dependent variables on the paper versions of the survey were combined with those from the iPad version. A reliability analysis was conducted on the three dependent variables to determine if the variables formed a reliable scale. Measurements under consideration of the researchers included the overall Chrobach's alpha score, the individual item total correlation, and the alpha if item deleted score. Consideration was also given to the theoretical importance of each variable.

The researchers conducted independent samples *t*-tests on all dependent variables as well as the "user interface preference" concept which resulted from the reliability analysis. The independent variable in this analysis was the dichotomous survey interface variable. The effect size, *eta*, was calculated to estimate the strength of the relationship between the independent and dependent variables.

The reliability analysis revealed the dependent variables have reliable internal consistency ($\alpha = .80$, all item total correlations $\geq .54$, Table 4). In one instance the alpha if item deleted score was above the respective initial alpha score. This item was retained for theoretical completeness of the scale.

Results

Sample Demographics

Demographic characteristics reveal an even representation of male (51%) and female (49%) participants (Table 2.1). The average age of the participants who completed the survey was 45 years. Most participants had completed a four-year college degree or above (70%). The majority of participants identified their ethnicity as Caucasian (87%).

Table 2.1

*Demographic Characteristics of Participants (*n *= 2,948)*

Characteristic	*n*	%
Gender		
Male	1459	51
Female	1386	49
Highest education level completed		
Less than high school	72	3
Some high school	62	2
High school graduate	174	6
Some college	355	13
Two-year college degree	191	7
Four-year college degree	836	29
Graduate or professional degree	1157	41
Ethnicity		
American Indian or Alaska Native	31	1
Asian	122	5
Black or African American	60	2
Hawaiian or Pacific Islander	13	1
Hispanic or Latino/Latina	61	2
White or Caucasian	2377	87
Other	54	2

Hypothesis 1a: Supported

We hypothesized that using tablet devices for on-site surveying may result in higher response rates than the average response rates for online surveys (~25%). telephone surveys (~48%) and mail surveys (~35%). Despite using a non-probabilistic sampling technique, we approached every visitor encountered on a given day at each site, and had a total response rate of 68% for the entire sample.

Table 2.2

Response Rates Per Survey Site

Park/Refuge	Annual visitation 2010 (N)	*n*	%	Response rate (%)
Olympic NP	2,844,563[a]	413	14	70
Dungeness NWR	80,263[b]	155	5	58
Mount Rainier NP	1,191,754[a]	409	14	63
Nisqually NWR	200,000	291	10	75
North Cascades NP	24,659[a]	291	10	69
Kenai NWR	1,021,525[c]	144	5	75
Kenai Fjords NP	297,596[a]	493	17	68
National Capital Parks East	19,421,149[a]	162	6	76
Prince William Forest Park	386,521[a]	174	6	68
Harpers Ferry NHP	268,822[a]	203	7	68
Rocky Mountain NP	2,955,821[a]	213	7	54
Total	28,492,673	2948	100	68

Note. Response rate was calculated by dividing the number of visitors who agreed to take the survey by the total number of visitors who were asked to take the survey.
[a] Statistics obtained from http://www.nature.nps.gov/stats/ .
[b] Statistics obtained from Kevin Ryan, Dungeness National Wildlife Refuge (K. Ryan, personal communication, August 8, 2011).
[c] Statistics obtained from Candace Ward, Kenai National Wildlife Refuge (C. Ward, personal communication, August 8, 2011).

Hypothesis 1b: Not Supported

We also hypothesized that using tablet devices for on-site surveying may result in higher response rates than the average responses rates for traditional paper-and-pencil on-site surveys. Though response rates at some individual sites yielded response rates in excess of 70%, the overall response rate for the study (68%) did not meet this criterion.

Hypothesis 2: Supported

Second, we hypothesized that using tablet devices for on-site surveying would be more economical and efficient than paper-and-pencil protocols. For a sample of this size, the costs for paper-and-pencil on-site surveys is nearly double the cost for iPad survey data collection and entry. Table 2.3 illustrates the comparative break-down of costs for paper and tablet-based surveys, based on administering and inputting 3,000 10-page surveys. As the number of surveys increases, only the expenses for paper surveys increase; once invested there are not any additional expenses for printing or data entry for the tablet-based surveys.

Table 2.3

Cost Comparison for Paper versus iPad Survey Administration and Data Entry

Interface Type	Device/Printing Cost	Software Cost	Data Entry Cost	Total
iPad Survey	$1,958.94[a]	$400.50	$0	$2,359.44
Paper Survey	$3,600.00[b]	$0	$2,158.50[c]	$5,758.50

Note. The survey was administered for six consecutive months, which costs $400.50, if you'd like to purchase it by the month, the cost is $89 per month of active survey administration.

[a] The average cost for a used "first generation" iPad is $320.00, we purchased 6 for our team on Amazon.com, and paid $6.49 in shipping for each.

[b] The printing cost is for 3,000 10-page surveys, double sided, printed in color, at a discounted rate of .12/page

[c] Cost was calculated using GS-4 pay rate for a data entry technician. The average technician entered 20 surveys per hour, for a total of 150 hours paid at $14.39 per hour.

Hypothesis 3: Supported

Our final, and more complex hypothesis was about visitor preference for survey administration mode; we hypothesized that Refuge and Park visitors will prefer taking on-site surveys on iPads as opposed to pencil-and-paper on-site surveys.

Table 2.4

Reliability Analysis of User Interface Preference Variables

Variable	α	Item total correlation	α if item deleted
User Interface Preference	.80		
I enjoyed taking this survey on an iPad/paper		.65	.72
I would rather take surveys on iPad/paper		.54	.85
I would enjoy taking future surveys on an iPad/paper		.62	.60

Participants who completed a survey using the iPad had significantly more favorable responses on each variable tested when compared to those who completed a paper version of the same survey ($t > 14.21$, $p < .001$, in all cases, Table 2.5). Differences between participants using iPads and paper in the variables "I enjoyed taking this survey on an iPad/paper" and "I would rather take surveys on iPad/paper" were typical ($\eta > .28$) whereas the difference in the variable "I would enjoy taking future surveys on an iPad/paper" was substantial ($\eta > .43$). The created scale variable "user interface preference" showed a similar pattern of user preference for the iPad as a survey interface ($t = 21.64$, $p < .001$, $\eta = .39$).

Table 2.5

Difference in Interface Preference Between Groups Surveyed via Paper or via an iPad

Variable	iPad		Paper		*df*	*t*	*p*	*η*
	M	*SD*	*M*	*SD*				
I enjoyed taking this survey on an iPad/paper	1.17	0.85	0.34	0.90	2653	-14.80	<.001	0.28
I would rather take surveys on iPad/paper	1.18	1.06	0.08	1.19	296	-14.21	<.001	0.29
I would enjoy taking future surveys on an iPad/paper	1.27	0.86	-0.12	0.97	2590	-21.84	<.001	0.43
User interface preference	1.38	0.76	0.09	0.90	1657	-16.67	<.001	0.39

Note. Each variable was coded on a 5-point scale. 2 = strongly agree; 1 = agree; 0 = neutral; -1 = disagree; -2 = strongly disagree.

Conclusion

The results of this study are not surprising; on-site surveys typically have higher response rates than other modes. Although using tablet technology did not exceed the average response rates of traditional on-site surveys, there was not a sizable difference in the response rates observed. We were delighted to discover that survey respondents preferred, and many enjoyed taking the survey on an iPad, which provided all the benefits of an electronic survey with the advantages of face-to-face survey administration. Also, we did not anticipate that iPad survey administration would be an economical alternative to paper-and-pencil procedures. Nearly all of our hypotheses were supported, which indicates that combining traditional on-site survey administration with innovative, new tablet technology has the potential to improve efficiency of visitor research. Results from this analysis also illustrate that Refuge and Park visitors would prefer to take future surveys in this format. More importantly, in a time of limited budgets and

increased scrutiny, tablet technology provides a less expensive alternative for rapid evaluation and visitor research on America's public lands.

The applications of survey methods will continue to transition as communication networks become more advanced. We encourage reluctant researchers to consider adopting this new technology and to actively engage in the techniques and refinements that will improve the utility of tablet-based survey collection.

Limitations

This study has a number of limitations which merit discussion. First, the non-probabilistic sampling design as well as the non-random selection of study sites prevents us from statistically generalizing the findings presented here. We recognize that an ideal study would gather all the names of all the visitors to each of the Refuges and Parks included in this study, create a master population list, then through a precise process, generate a list of randomized names and addresses. Since Refuges and Parks rarely collect this information, and there is not a historical or master list of visitors, we devised an alternative, non-randomized procedure.

In addition, the time spent surveying at each site varied and was often less than 8 hours per day for 3-4 days. This narrow window of time only allows for a snapshot-sample of visitors to any of the 11 sites. If our goal was to characterize all of the visitors over the course of an entire year, we would need to devise an alternative strategy to be able to sample multiple times throughout the year in each location.

The iPad device itself was somewhat of a novelty at the time of this study. This may have a strong influence on visitors' preference. It is possible that the potential popularity of this method may wane as the technology becomes outdated or replaced, just as online surveying has faded (Curtain et al., 2005).

Finally, further research is needed to determine additional benefits and drawbacks of using tablet technology for on-site surveying. For example, while conducting time trials in the field, researchers found that visitors taking a survey on the iPad were able to complete the survey more quickly that those who completed a paper version of the survey. This may allow for longer surveys to be administered on-site than previously found desirable. A more rigorous experimental design is required to validate these initial observations. Furthermore, visitors occasionally encountered difficulties in using the iPads including difficulty seeing the screen due to glare, overheating while in direct sunlight, and difficulty using them in snowy and windy conditions -- presumably due to cold fingers. Again, additional research is required to determine the probability and extent to which these problems may occur in different environments.

Practical Applications and Opportunities

There are numerous opportunities for managers and scholars to advance human dimensions of wildlife research through the use of tablet devices in on-site survey protocols. With recent innovations in survey apps and tablet technology, researchers can develop increasingly interactive tools to assess attitudes, values and behaviors in rich, place-based contexts. Newer devices include cameras, voice recorders, and other features that will enable researchers and managers to gather a variety of instantaneous social science data. Not only can the data be collected quickly, it is automatically inputted and uploaded to a master data sheet, reducing data entry errors entirely and time required to conduct such surveys. Such innovations in technology will bring innovations in human dimensions of wildlife research by empowering researchers and managers to more quickly gather more nuanced and dynamic data about visitor populations.

CHAPTER 3 – CHANGING THE CONVERSATION ABOUT CLIMATE CHANGE: A THEORETICAL FRAMEWORK FOR PLACE-BASED CLIMATE CHANGE ENGAGEMENT[2]

Introduction

America's national parks and wildlife refuges are changing. Climate change has been recognized as possibly the greatest challenge ever faced by the country's land management agencies (Delach & Matson, 2010). National parks and national wildlife refuges throughout the country are already beginning to see impacts to natural and cultural resources (Bentz et al. 2003; Millar et al. 2004, Moritz et al. 2008; Salazar-Halfmoon, 2010) and ongoing research continues to reveal how our changing climate is affecting public lands across the country. Specifically, we have spent the past year understanding the array of climate impacts at 16 different places, including sea level rise and ocean acidification in south Florida (e.g., Krauss et al. 2011, Ross et al. 1994, Wanless & Vlaswinkel 2005), changes to estuaries and species range shifts in the greater Washington DC area (e.g. Gonzalez, 2010; La Sorte & Thompson, 2007; McMahon et al., 2010; Scavia et al., 2002), glacial retreat, drought and species shifts on the Kenai Peninsula in Alaska (e.g., Adalgeirsdottier, 1997; Berg, 2006; Klein et al., 2005; Kyle et al., 2001; Magness, 2011, O'Brian, 2005), altered river and marine ecosystems in the Puget Sound region (e.g. Elsner et al., 2009; Huppert et al., 2009; Mote & Salathe, 2009) and snowmelt, stream flow and vegetation changes in northern Colorado (e.g., Allen & Breshears, 1998; Clow, 2010; Hicke et al., 2006; Mote, 2003; Mote et al., 2005; van Mantgem et al., 2009). With impacts all around us, citizens are exposed to many messages about climate change on a daily basis, yet studies

[2] This is an Author's Original Manuscript of an article whose final and definitive form, the Version of Record, has been published in *Environmental Communication: A Journal of Nature and Culture* (March 5, 2013, copyright Taylor & Francis), available online at: http://www.tandfonline.com/10.10.1080/17524032.2012.753634.

show a declining trend in public understanding of human caused climate change (Scruggs & Benegal, 2012; Stern, 2007; Vitousek et al, 1997).

In this manuscript we propose a framework for *place-based climate change engagement*, based on place attachment, place-based education, free choice learning and norm activation theories, we argue that place-based engagement is a framework for transforming public understanding about climate change. We present qualitative (349 interviews) and quantitative (4,181 surveys) evidence to validate the framework and ultimately propose that creating place-based climate change engagement activities, situated in a meaningful geophysical context, such as the treasured landscapes of America's national parks and wildlife refuges can inspire deeper public understanding of climate change and engage visitors in public discourse about its impacts.

Results from our interviews and surveys indicate that messages about climate change complexity and impacts resonate when they are nested in the cultural values and beliefs of the audience and are integrated with the experiential meaningfulness of place. Results also reveal that park and refuge visitors are seeking meaningful explanations and experiences to more deeply understand climate change impacts. The foundation of this paper is based on the premise that: *place-based engagement about landscape-scale climate change impacts, situated in the contexts of national parks and wildlife refuges has the potential to deepen public understanding of and engagement with the complex processes of climate change.* The goal of this investigation is to better understand diverse audiences' connection to place, desire for place-based and free choice learning as well as desire for empowerment when attempting to understand climate change science and impacts. The framework and results presented here are an attempt to enhance the potential for communicators, interpreters and managers of America's public lands to serve a more prominent and meaningful role in educating diverse members of the public about climate

change. Historically, federal land management agencies were known for their conservative conservation behaviors, often seen catering to the needs of middle class leisure activities and neglecting marginalized social groups. However, this has changed in the past 30 years, and today one can find tremendous evidence of federal agencies actively reaching out to diverse audiences, from urban youth to rural Latino populations. This shift in agency priority audiences combined with enthusiasm for alternative methods of audience engagement on climate change is a timely opportunity to transcend the political debate about climate change in the United States and engage citizens in meaningful civic dialogue about our changing planet.

The Challenge of Communicating and Engaging Citizens in Climate Change

Numerous writers have described climate change as one of humanity's greatest challenges (Silver, 1990; Speth, 2004). However, the public, to date, has paid relatively little attention to climate change and those trying to create a greater sense of urgency have used some unsuccessful strategies (i.e., overly "balanced" news reporting, jargon-laden and cautious science-speak, and alarmist fear appeals). Since the 1990s communication and social science scholars have worked to investigate, analyze, and determine what makes for effective communication about climate change. This thread of research began in the early 1990s with numerous studies of the public's understanding of climate change (i.e., Bell, 1994; Bord, O'Connor & Fisher, 1998; McComas & Shanahan, 1999; Shackley & Wynne, 1996; Stamm, Clark & Eblacas, 2000; Trumbo, 1995; Trumbo, 1996; Ungar, 1995; Ungar 2000; Williams, 2001; Wilson 1995; Wilson, 2000; Zehr, 2000). These studies primarily focused on news media and journalistic reporting traditions.

Many factors have explicitly challenged the effective communication of climate change science to the public. First, there is an enormous time lag in the change in climate and changes in

our social system coupled with the assumption that the impacts of climate change most directly affect the developing world (Moser & Dilling, 2004; Lorenzoni & Pidgeon, 2006). Second, there is a widening gap between the public's awareness of what action is needed and what actions are being taken. Without an understanding of what to do, individuals are left feeling overwhelmed and frightened, or blissfully ignore the magnitude of the issue through denial (Moser & Dilling, 2004).

Compacting an individual's feeling of being overwhelmed, blissfully ignorant or outright denying climate change is happening is a lack of understanding of the science of climate change. When it comes to climate change literacy in the United States, the average American would score 54% (i.e., they would fail) on an 81-question test about climate science, climate change impacts and earth systems (Leiserowitz, Smith & Marlon, 2010). One issue influencing the lack of climate literacy in the U.S. is that most people get their information about climate change from television news (Maibach, Wilson & Witte, 2010), and when climate change is reported in the news it is often accompanied by images of weather disasters. From earlier research (i.e., Bostrom, Morgan, Fischhoff & Read, 1994; Read, Bostrom, Morgan, Fischhoff & Smuts, 1994; Trumbo, 1995) we know that the public understands weather and natural disasters as *acts of god* and fails to see that human actions and lifestyle choices are capable of influencing the pace of climate change. Overcoming this challenge requires that climate change communicators connect human choices and behaviors to the cause of climate change events by educating their audience on the complexity of earth systems, specifically the dynamic relationships and interconnections within our social and ecological systems.

Theoretical Foundation for Place-based Engagement

Four theoretical threads: (1) place attachment, (2) place-based education, (3) free-choice learning, and (4) norm activation theory, create the foundation for developing a multi-faceted, holistic framework for place-based climate change engagement. In the next section we articulate the components of the framework and then introduce the key insights gained from the synthesis of these four theories.

Place Attachment Theory

Place attachment theory suggests that people have an emotional relationship with specific landscapes. The environmental psychology field has defined place attachment as the bonding of people to places (Altman & Low, 1992). Brown and Perkins (1992) discuss the complexity and dynamics of emotions in place attachment. In *Disruptions in Place Attachment,* they note: "Place attachments are not static either; they change in accordance with changes in the people, activities or processes, and places involved in the attachments. They are nurtured through continuing series of events that reaffirm humans' relations with their environment" (p. 282).

In creating our climate change engagement framework, we have focused on devising strategies to seek to understand the bonds and different forms of attachment that people have for places, particularly landscapes impacted by climate change. Extensive research has covered place attachment in public space, and nature and wilderness experiences (Low, 2000; Bricker & Kerstetter, 2000; Steel 2000; Vitterso, Vorkinn, & Vistad 2001) but place attachment alone cannot explain the meanings people assign to places and how those meanings are altered as environmental crises arise. Stedman (2003) indicates the opportunities for us to take advantage of peoples' bonds to specific places: "Place-protective behaviors are especially likely to result when attachment and satisfaction are based on preferred meanings that are threatened by

potential changes to the setting" (p. 567). Furthermore, O'Neill and Nicholson-Cole's (2009) study on visual and iconic representations of climate change reinforce the importance of a physical, place-based connection in the communication of climate change:

> All groups made it clear that local impact images are necessary to make people feel empowered to make a difference. They also insisted that a global context should be included, to make the seriousness of the issue resonant, though this should be done carefully so as to avoid making people feel afraid or overwhelmed and totally helpless (p. 374).

Hess and colleagues (2008) stress the benefits of localizing climate change messages:

> In particular, a focus on place emphasizes the local nature of both exposures and response, and it brings attention to environmental changes where the motivation to address them is strongest: Emphasizing place highlights climate change's effects where they are most acutely felt, where local strengths are best understood, where place attachment can be leveraged most effectively; where residents will reap the benefits of adaptive measures promoting sustainability and livable communities (p. 476).

Place-Based Education

The practice of learning outside has been called many names including bioregional education, environmental education, outdoor education, place-based education, and experiential learning. Despite different labels these concepts are often interconnected and have similar meanings. For the scope of this framework we focus on place-based education and experiential learning as communication and engagement opportunities to link climate change with places and individual or group-based experiences. Both of these paradigms are based on connecting people to the land through applied learning and experiences in the field. People will remember lessons and adopt behaviors when they feel a sense of responsibility and have knowledge of consequences. Thomashow (2002) states the most effective way to understand and learn about the changes in the environment is by developing an intimacy with the land around you. Much of the current place-based education research is focused on children's learning experiences but we believe that the underlying principles are applicable to educating *K-to-Gray* audiences. It is

essential that people are encouraged to understand and appreciate natural environmental processes before trying to digest the complexity of global climate change and make appropriate behavior changes. Sobel (2004) observed that:

> Authentic environmental commitment emerges out of firsthand experiences with real places on a small manageable scale (p. 34)… What's important is that [people] have an opportunity to bond with the natural world to learn to love it, before being asked to heal its wounds (p. 9).

Sobel's research also reinforces the importance to develop place-based climate change engagement activities.

Free-Choice Learning Theory

Free-choice learning is guided by the desires and motivations of each idiosyncratic learner and therefore exhibits different learning outcomes as varied as the learners themselves (Falk, 2005; Falk & Dierking, 2002). Free-choice learning typically occurs in areas such as national parks, national wildlife refuges, aquariums, zoos, and museums where a highly structured learning atmosphere is absent (Falk, 2005; Falk & Dierking, 2002; Heimlich & Falk, 2009). According to Falk and Dierking (2002), free-choice learning integrates three factors of place, person, and others; also known as the physical, personal, and social contexts. Learning of this nature occurs in particular places where the learner can discuss and form personally relevant knowledge with friends, family, and others. Free-choice learning has been suggested as a major means in which many individuals learn about the environment (Heimlich & Falk, 2009; Falk, 2005). Even though many learners may not receive the intended message from the venue, the experience is still enriching and continues to sculpt the identity of the individual learner (Heimlich & Falk, 2009; Falk, 2005).

Norm Activation Theory

Originally, Schwartz (1977) proposed the norm activation theory (NAT) to explain pro-social behaviors, or behaviors which benefit society or others at the giver's expense, such as donating to charity. This original theory held that personal norms, or self-expectations of performing pro-social behaviors, were activated by four situational variables: (1) problem awareness - an individual's knowledge of a person or subject in need; (2) ascription of responsibility - how responsible an individual feels for the need; (3) outcome efficacy – the usefulness of actions to alleviate the need; and (4) ability to help – an individual's perception of their ability to help alleviate the need (Schwartz, 1977). An activated personal norm thus led to pro-social behaviors. In more recent applications of NAT in the environmental field, personal norms were found to be a better predictor of pro-environmental behavior than the new environmental paradigm scale (Wildegren, 1998). Other studies which have successfully employed NAT involve participation in curbside recycling programs (Schultz 1998), home water conservation (Harland, Staats, & Wilke, 2007), littering (de Kort, McCalley, & Midden, 2008) and car use (Harland et. al., 2007; Klöckner & Matthies, 2009). Relatively few studies have been conducted on NAT and climate change and studies that have addressed climate change include the issue among other environmental variables (eg. Guagnano, Dietz, & Stern, 1994). Climate change is different from many environmental problems, in that the causes are globally diffuse and impacts are not uniformly spread or universally noticeable. Current confusion among much of the American public regarding the causes of and solutions to climate change (Leiserowitz, Smith & Marlon, 2010) also act to deactivate situational variables of problem awareness, ascription of responsibility, outcome efficacy, and ability to help.

The Place-Based Climate Change Engagement Framework

Based on the theoretical threads introduced, place-based climate change engagement should provide a meaningful dialogue in a specific place, where audiences interact with each other and the landscape to develop a deeper understanding about ecological and social interrelationships and impacts on the ecosystem. Through this framework, communicators have the opportunity to create a public engagement forum that is place-based and social with an emphasis on learning and personal responsibility. Such engagement has the potential to inspire the necessary behavior change to curb anthropogenic climate change impacts and ultimately change the public conversation through simplifying and connecting climate change impacts to people's values, personal experiences and daily lives. This framework allows us to integrate multiple dimensions of climate change communication and argue for the potential power of landscapes to assist in telling the story of climate change. Offering place-based illustrations will encourage and influence individuals perceived response efficacy and self-efficacy to combat climate change on a local, regional, national and global scale. Adhering to the framework, communicators, or stewards of any place, can: (1) illustrate the impacts of climate change by emphasizing impacts in the immediate local context, (2) connect climate impacts to human behavioral choices through systems-based explanations, and (3) provide concrete suggestions for specific actions; thus, overcoming the typical challenges of communicating about climate change. We tested the viability of our framework through extensive national surveys and interviews at 16 national parks and wildlife refuges across the United States.

Table 3.1
Response Rates from Visitor Surveys at National Parks and National Wildlife Refuges

Park/Refuge	Annual visitation (2010)	*n*	%	Response rate (%)	Confidence Interval
Olympic NP	2,844,563[a]	425	10	70	±5%
Dungeness NWR	80,263[b]	160	4	58	±8%
Mount Rainier NP	1,191,754[a]	414	10	63	±5%
Nisqually NWR	200,000	295	7	75	±6%
North Cascades NP	24,659[a]	294	7	69	±6%
Kenai NWR	1,021,525[c]	144	3	75	±8%
Kenai Fjords NP	297,596[a]	494	12	68	±4%
National Capital Parks East	1,167,393[a]	162	4	76	±8%
Prince William Forest Park	386,521[a]	174	4	68	±7%
Harpers Ferry NHP	268,822[a]	203	5	68	±7%
Rocky Mountain NP	2,955,821[a]	382	9	54	±5%
Rocky Mountain Arsenal NWR	30,100	58	1	76	±13%
Everglades NP	915,538	416	10	64	±5%
Biscayne NP	467,612	264	6	67	±6%
Ten Thousand Islands NWR	180,520	112	3	82	±9%
Key Deer NWR	95,000	179	4	88	±7%
Total	12,127,687	4,181	100	70	±2%

Note. Response rate was calculated by dividing the number of visitors who agreed to take the survey by the total number of visitors who were asked to take the survey.
[a] Statistics obtained from http://www.nature.nps.gov/stats/ .
[b] Statistics obtained from Kevin Ryan, Dungeness National Wildlife Refuge (K. Ryan, personal communication, August 8, 2011).
[c] Statistics obtained from Candace Ward, Kenai National Wildlife Refuge (C. Ward, personal communication, August 8, 2011).

Methodology

We surveyed and interviewed national park and refuge visitors to better understand if our framework matched audience desires and preferences for climate change engagement.

Specifically, we assessed (1) audience concern about and willingness to change their behavior in response to climate change (empowerment; connection to human behavior); (2) audience awareness and knowledge about climate change (local impacts and context); (3) how they want to learn about climate change (audience preferences; empowerment); and (4) how significant the place (park or refuge) is to them (connection to place).

From May 2011 through January 2012, the authors and a team of graduate researchers and undergraduate interns conducted 349 visitor interviews and administered 4,181 visitor surveys in 16 different national parks and wildlife refuges across the United States. Nearly half of the participating national parks and wildlife refuges were located in urban, metropolitan areas (Washington, DC, Miami, Denver and Tacoma). All of the urban parks and refuges are, easily accessible by public transportation and frequently used for field trips with local, urban youth. Within these urban contexts, there remains a vast potential for communication and engagement opportunities, especially as urban population centers continue to grow.

The research team used a non-random, intercept sampling method. Researchers administered interviews and surveys at various stages of the visitor experience, from visitor centers near the entrance to popular viewpoints and trailheads, and in the evenings at on-site campgrounds. The researchers conducted surveys and interviews separately, with an interview team conducting research at one park or refuge while a survey team conducted research at another park or refuge within the region. Respondents took an average of 15 minutes to complete the survey and an average of 5 minutes to complete the interview. Although this was a non-probabilistic sample, efforts were made by the research team to ask every visitor encountered to take a survey. At trailheads, this included asking every visitor who was exiting the trail, while in campgrounds protocol included visiting every inhabited campsite. In approaching every visitor,

we increased the chances of a more representative sample since every member of the population had an equal chance of being selected. We also attempted to reduce sampling error by increasing the overall sample size. Inevitably, a few visitors were able to stealthily avoid taking the survey, though these instances were rare, and when noticed were noted as a *non-response*.

The survey was first created in paper form and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. The survey team was able to administer the survey on 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website. The following script was used to recruit individuals to take the survey:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about 15 minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

A recruitment script similar to the one above was employed for the interviews. The interviews were recorded using handheld voice recorders which were later transcribed by the researchers. The interviews consisted of seven open-ended questions which included the following: (1) What does climate change mean to you; (2) How would you describe climate change to a friend; (3) Have you seen anything in the park/refuge today that makes you think, "that's happening because of climate change"; (4) Have you received any information about climate change at this park or refuge; (5) Would you like to learn about climate change in this place and if so, how would you like to learn; (6) Do you personally do anything to reduce your

impact on the Earth; and (7) What motivates you to take these actions. The ordering of these questions has most likely led to order effects and social desirability bias where respondents provide answers consistent with the perceived viewpoints of the interviewer (Vaske, 2008). Results should therefore be interpreted with caution.

Typically, researchers spent two weeks in each region and four days at each individual site collecting visitor data. The brevity of time spent at each site was necessary to reach a greater number of sites within each region. Most interviews and surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The interview and survey request was presented as a research project and not affiliated with the specific Refuge or Park at which the survey was being conducted.

Data Treatment and Analysis

Among the primary aims of the on-site qualitative and quantitative research was to assess the extent that visitors are concerned about climate change, willing to engage in mitigating actions, accept responsibility for personal contributions to climate change, aware of site-specific impacts, interested in learning about the subject, and attached to parks and refuges. These topics were addressed through 34 separate items on the survey. Most of the questions on the survey measured participants' level of agreement to a variety of statements regarding parks and refuges and climate change on a five-point scale which ranged from (1) strongly agree to (5) strongly disagree. Other questions on the survey consisted of partially close-ended response choices and close-ended with ordered response choices (Salant & Dillman, 1994). Data were downloaded from the iSURVEY website into an automatically generated SPSS file. The iSURVEY program assigns numeric values to question options based on their order with the first option being

assigned a value of 1, the second option being assigned a value of 2, etc. Missing values were omitted from analyses. All analyses were conducted using SPSS 19. Internal consistency scales measuring salience, ascription of responsibility, awareness of consequences, and place attachment were examined using Cronbach alpha reliability coefficients. The questions used in this study are described below.

Three variables were used to measure concern: (1) how worried are you about climate change, responses ranging from extremely worried to not worried; (2) how important is the issue of climate change to you personally, responses ranging from extremely important to not important; and (3) how often do you think about climate change, responses ranging from all the time to not at all were combined successfully into one concept of salience (α = .89, Table 3.2). Visitors' willingness to change behavior was measured with a single item indicator. Respondents were asked to respond to the question: how willing are you to change your behaviors in this park/refuge to help reduce the impacts of climate change. Responses options consisted of (1) extremely willing; (2) very willing; (3) somewhat willing; (4) slightly willing; and (5) not willing.

Visitors were also asked to respond to three questions regarding their responsibility for contributing to climate change. The questions specifically asked visitors to agree or disagree with the following statements (1) I feel somewhat responsible for the presently occurring environmental problems, (2) I feel responsible for contributing to the condition of the climate, and (3) because my contribution is very small, I do not feel responsible for climate change. Responses were measured on a five-point scale ranging from (1) strongly agree to (5) strongly disagree. These three questions were combined, after reverse coding the third question, to create an ascription of responsibility concept (α = .74, Table 3.2).

In addition to concern about climate change and willingness to take mitigating action, the visitor survey assessed visitors' awareness of climate change and its site-specific impacts as well as their self-reported knowledge about this issue. Visitors were asked: do you think climate change is happening. Response options were on a seven point scale ranging from extremely sure climate change is happening to extremely sure climate change is not happening. To further test visitor knowledge of causes, respondents were asked if they believed that climate change is mostly caused by humans, by both humans and natural causes, or by mostly natural causes. With regard to visitors' knowledge about the causes and consequences of climate change, the visitor survey included three items assessing how well informed respondents feel about the different causes of climate change, its consequences, and ways in which we can reduce global warming. Each of these items was measured on a 5 – point scale ranging from (1) extremely informed to (5) not informed.

Two questions on the survey measured visitors' ability to notice climate change impacts in parks and refuges. Visitors were asked to rate their level of agreement with the following statements: (1) I believe that some of the effects of climate change can already be seen at our parks/refuges; and (2) I believe that some of the effects of climate change can already be seen at this park/refuge. In order to measure current actions taken to mitigate climate change, visitors were also asked to select all mitigating actions they currently take from a list of ten possible actions ranging from planting trees to reducing airplane travel.

Table 3.2
Reliability analysis of variables used in the regression model

Scale Items	Cronbach's alpha	Item total correlation	*M*	SD
Place Attachment	.92			
This park/refuge is very special to me		.79	1.82	.78
I identify with this park/refuge		.83	2.10	.86
I am very attached to this park/refuge		.83	2.25	.89
This park/refuge means a lot to me		.85	2.07	.86
Ascription of Responsibility	.74			
I feel somewhat responsible for the presently occurring environmental problems		.66	2.60	1.01
I feel responsible for contributing to the condition of the climate		.70	2.64	1.05
Because my contribution is very small, I do not feel responsible for climate change		.37	2.55	1.06
Salience	.89			
How worried are you about climate change		.83	2.48	1.17
How important is the issue of climate change to you personally		.84	2.47	1.12
How often do you think about climate change		.71	2.67	.97
Awareness of Consequences	.87			
How much do you believe climate change will harm future generations		.78	1.66	.99
How much do you believe climate change will harm you personally		.73	2.47	.91
How much do you believe climate change will harm this park/refuge		.74	1.94	1.08
Knowledge of Causes	--			
Assuming climate change is happening, what do you think it is caused by		--	1.80	.69
Willingness to Change	--			
How willing are you to change your behaviors to help reduce the impacts of climate change		--	2.17	1.04

Note. Scaled survey items were measured using a five-point scale where 1 = 'Strongly Agree' and 5 = 'Strongly Disagree'. All positive measures were re-coded into negative measures. The concept 'Knowledge of Causes' was measured on a three point scale where 1 = 'mostly human activities', 2 = both human activities and natural changes in the environment, and 3 = mostly by natural changes in the environment. The concept 'Willingness to Change' was measured on a five point scale where 1 = Extremely Willing and 5 = Not Willing.

Two questions were used to measure visitors' desire to learn about climate change impacts. Visitors were asked to rate their level of agreement with the following statements: (1) I would like to learn more about climate change impacts in our national parks/refuges; and (2) I would like to learn more about climate change impacts in this park/refuge. Additionally, visitors were asked to select all of the ways they would like to learn about climate change from a list of 12 different options ranging from ranger guided walks/talks to trailside exhibits.

Connection to place serves as a powerful ally for galvanizing people to learn of, care about, and mitigate the impacts of climate change in National Parks and National Wildlife Refuges. In this study, place attachment was measured according to four self-reported variables measured on a 5-point agreement scale: (1) this park/refuge is very special to me; (2) I identify strongly with this park/refuge; (3) I am very attached to this park/refuge; and (4) this park/refuge means a lot to me. These variables were combined to form the concept of place attachment (α = .92, Table 3.2).

To compare park and refuge visitors' engagement with climate change to the average American, an audience segmentation analysis similar to the Yale Project on Climate Change Communication's (YPCC) Six Americas study was conducted using results from our visitor data. Unfortunately, at the time of implementation of the survey instrument, the Global Warming's Six America's screening tools were not available. However, efforts were made early in development to incorporate many of the questions from the original Six America's study into the survey. A K-means cluster analysis was used to segment respondents into homogeneous groups based on their responses to 11 questions regarding their awareness, knowledge, and concern about climate change (Table 3). The Global Warming's Six Americas 15-item screening tool (Maibach, Leiserowitz, Roswer-Renoug, Mertz, & Akerlof, 2011) is available in Appendix A for

comparison with the questions used in the cluster analysis (Appendix B). Survey respondents were grouped into six clusters similar to those included in the YPCC's Six Americas studies: *alarmed, concerned, cautious, disengaged, doubtful, and dismissive* (Maibach, Roser-Renouf, & Leiserowitz, 2009). We labeled our six, comparable clusters of this study *engaged, thoughtful, questioning, apathetic, sceptical, and disbelieving*. The resulting clusters are similar to the Six Americas segmentation, however, due to the discrepancy between the questions used in the Six Americas segmentation and the limited questions used in this study, comparison of the results should be interpreted with caution.

Many of the above mentioned concepts were used in a regression model to test the normative function of visitors' willingness to change behavior to mitigate the effects of climate change. Two separate regressions were conducted in order to obtain estimates of the path coefficients and the relative influence of the independent variables on the dependent variables. Variables were entered into the regression equation simultaneously using the *Enter* method in SPSS. Saliency was regressed on ascription of responsibility, place attachment, awareness of consequences, and knowledge of causes. Willingness to change behavior was regressed on all four variables, including saliency. The resulting standardized beta coefficients (β) represent the direct relationship between two concepts. The resulting coefficient of determination (R^2) represents the percent of variability in the dependent variable that is explained by the independent variable (Vaske, 2008).

Table 3.3
Means and Standard deviations for items used in K-means cluster analysis (n = 4,181)

Variables	*M*	*SD*
1. Do you think climate change is happening	2.49	1.59
2. Assuming climate change is happening, what do you think it is caused by	1.86	.77
3. How well informed do you feel about the different causes of climate change	2.34	.88
4. How well informed do you feel about the different consequences of climate change	2.34	.87
5. How well informed do you feel about the ways in which we can reduce climate change	2.45	.90
6. How worried are you about climate change	2.48	1.17
7. How important is the issue of climate change to you personally	2.47	1.12
8. How often do you think about climate change	2.67	.97
9. How much do you think climate change will harm you personally	2.41	.83
10. How much do you think climate change will harm future generations of people	1.57	.83
11. When do you think climate change will start to harm people in the United States	2.87	1.82

Note. Variable (1) was measured on a seven-point scale where 1 = 'extremely sure climate change is happening' and 7 = 'extremely sure climate change is not happening'. Variable (2) was measured on a four-point scale where 1 = 'mostly human activities', 2 = 'both human activities and natural causes', 3 = 'mostly natural causes' and 4 = 'none of the above because climate change is not happening'. Variables (3 – 5) were measured on a five-point scale where 1 = 'extremely informed' and 5 = 'not informed'. Variable (6) was measured on a five-point scale where 1 = 'extremely worried' and 5 = 'not worried'. Variable (7) was measured on a five-point scale where 1 = 'extremely important' and 5 = 'not important'. Variable (8) was measured on a five-point scale where 1 = 'all the time' and 5 = 'never'. Variables (9 – 10) were measured on a four-point scale where 1 = 'a great deal' and 4 = 'not at all'. Variable (11) was coded on a seven-point scale where 1 = 'now' and 7 = 'never'.

Results

Sample Demographics

Demographic characteristics reveal an even representation of male (51%) and female (49%) participants (Table 2). The average age of the participant was 45 years. Most participants

had completed a four-year college degree or above (70%). The majority of participants identified their ethnicity as Caucasian (87%). The sample demographics of this study represent visitors to national parks and wildlife refuges and do not reflect the U.S. population as a whole.

Table 3.4
Demographic Characteristics of Participants (n = 4,181)

Characteristic	*n*	%
Gender		
Male	2065	51
Female	1945	49
Highest education level completed		
Less than high school	109	3
Some high school	108	3
High school graduate	248	6
Some college	500	13
Two-year college degree	279	7
Four-year college degree	1133	28
Graduate or professional degree	1625	41
Ethnicity		
American Indian or Alaska Native	45	1
Asian	186	5
Black or African American	72	2
Hawaiian or Pacific Islander	14	0
Hispanic or Latino/Latina	141	4
White or Caucasian	3981	86
Other	80	2

Of the visitors surveyed, 56% stated that they are either extremely worried (22%) or very worried (34%) about climate change. When asked how important climate change is on a personal level, 55% of visitors responded that climate change is extremely (21%) or very (34%) important. The third survey item related to concern about climate change regarded how often visitors think about climate change. Survey results indicate that 45% of visitors were cognizant of this issue. Over one-third (36%) stated that they think about climate change frequently, and just under 10% responded that they think about climate change all the time.

Similar results were found in the interviews as well. The following quote from a 73 year-old, retired male reflects the typical level of visitor concern: "Well, I've read quite a bit about it and I'm very fearful of reaching the tipping point which can be devastating…There could also be an ice age in this area, I'm concerned about that." The potential for visiting a national park or refuge in vulnerable climate regions to influence the extent that visitors perceive climate change as an important issue is illustrated by a 69 year-old retiree: "…[climate change] didn't mean a whole lot until I'm seeing this stuff. It's happening. I guess I didn't think it was that important before. I see now that it is." This is one example where place-based engagement has an opportunity to ground climate change from a temporally and spatially problem to a tangible and visible issues that can translate to people's backyards and local communities.

Consistent with the above mentioned results regarding the degree of visitor concern about climate change, the vast majority of survey respondents (68%) stated that they are willing to change their behaviors in national parks and wildlife refuges to help reduce the impacts of climate change. Nearly 30% of visitors indicated they are extremely willing to change their behaviors, and 38% said they would be very willing to do so.

Most visitors either strongly agreed or agreed with the first question: I feel somewhat responsible for the present occurring environmental problems (50%) and the second question: I feel responsible for contributing to the condition of the climate (54%) and disagreed (55%) with the third question: because my contribution is very small, I do not feel responsible for climate change.

Results from the cluster analysis show that a substantially higher proportion of park/refuge visitors (29%) fall into the "engaged" category relative to the amount of the American public falling into the "alarmed" category (Leiserowitz, Maibach, Roser-Renouf, & Smith, 2011) (Figure 3.1). Furthermore, 21% of survey respondents were in the "thoughtful" category. According to the most recent YPCC Six Americas study, 39% of the American public is either alarmed or concerned about climate change population (Leiserowitz et al., 2011); therefore, the fact that 50% of park and refuge visitors were grouped in the engaged and thoughtful categories suggests that this audience may be more knowledgeable, concerned, and engaged with climate change than the average American.

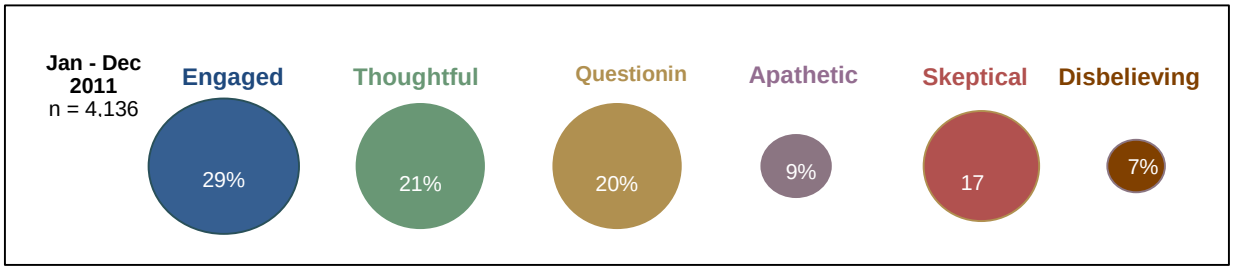

Figure 3.1. National Parks and National Wildlife Refuges Audience Segmentation

Audience Awareness and Knowledge of Climate Change and Impacts

The results from visitor interviews provide useful insight regarding the extent that visitors understand the meaning of the term climate change and recognize the relationship between site-specific ecological changes and increasing global temperatures. Of the 4,181 visitors surveyed, the majority (61%) is either very or extremely sure that climate change is happening. Most respondents stated that climate change is caused by both humans and natural causes (49%), whereas (36%) answered that climate change is caused mostly by humans.

Based on the survey results, most visitors feel either very or extremely informed about both the causes of climate change (59%) and its consequences (59%). Approximately one-third (33%) of respondents, however, stated that they feel only somewhat informed about each of these concepts. Transcriptions of visitor interviews corroborated these findings. When asked what climate change meant to them, a male and female, both in their mid-30s and responding jointly, stated that:

> …[The earth's] temperatures are warmer now than they used to be probably from the greenhouse gases society has been emitting and that leads to an overall warming, and different areas may experience that differently…[They] started calling it climate change because some areas may experience drought and others may experience more rain and more snow…

This quote demonstrates that visitors have a fairly clear understanding of the meaning of the term climate change as well as some of its general global consequences. Many other quotes from interviews indicate that there was a great deal of awareness among visitors that glaciers are melting because of climate change and that polar bears are being negatively affected by increasing global temperatures due to loss of habitat. Nevertheless, the following quote from a woman in her mid-40s regarding the meaning of climate change reflects the difficulty some

visitors experience comprehending an issue that is so large-scale and complex: “It doesn’t really mean anything to me because it’s too broad for me to really grasp.”

As far as the occurrence of place-specific impacts of climate change and ways that we can reduce it, the survey results indicate that park and refuge visitors are well informed. While over half of the visitors surveyed (57%) agreed or strongly agreed that the impacts of climate change are observable in the specific area they visited, survey results demonstrate that more visitors (67%) are aware that the effects of climate change can already be seen in national parks and wildlife refuges across the country. More than half of the visitors (53%) stated that they are either very or extremely informed about ways that climate change can be mitigated. Additionally, most visitors selected four to five actions (36%), when asked to select from a list of ten mitigating actions they were currently taking.

Audience Desire to Learn about Climate Change

Visitor survey and interview results demonstrate significant visitor interest in learning about climate change and its impacts on parks and refuges 68% of 4,181 visitors surveyed expressed a desire to learn more about climate at parks and refuges. For example, when asked if interested in learning about climate change at Nisqually National Wildlife Refuge one visitor replied, “Yeah… people that come here… are interested in taking care of our world, so I think it’s a proper place to teach.” Another visitor at Olympic National Park said, “I think that’s a very good idea, because [the NPS] is more like… an objective voice… They have a lot of credibility, [like] the whole idea of the rangers.”

When provided a list of 12 learning methods, surveyed visitors identified websites as the most preferred method (46%) followed by trailside exhibits (42%) and indoor exhibits (38%). Visitor interviews revealed more scattered interests, with trailside exhibits ranking highest (26%)

followed by ranger/interpretive programs (18%) and brochures (16%); a visitor at Kenai Fjords National Park suggested the use of trailside exhibits to "point out the different birds that used to be here or the mile posts where the glacier has been the past 100 years. I don't think you really need to preach at people but show them what's going on. I like subtle." In addition to identifying preferred methods of learning, 78% of surveyed visitors believe informing visitors of actions they can take is particularly salient and important to communicate in parks and refuges. Articulating interest in action-oriented outreach, a visitor at Biscayne National Park said, "I guess the whole thing about climate change is that it feels so overwhelming… what am I supposed to do about it? It's easier to do nothing. So saying things that you can do [into outreach] that people feel are do-able [is a good idea]." As recommended by this visitor, it is critical that place-based engagement activities focus on bioregional principles and practices, and identifies specific actions that visitors can do – today – to slow the impact of climate change.

Audience Connection to Place

Of the 4,181 visitors surveyed, over half (55%) were either strongly attached (21%) or attached (34%) to the park or refuge they were visiting. Surprisingly, these bonds formed rather quickly, and often times within the first visit to these sites; most likely due to the iconic, awe inspiring nature of national parks and wildlife refuges. Place attachment scores also positively and significantly ($p = <.001$) correlate with visitors' desire to learn more about the impacts of climate change ($r = .27$), their ability to see the impacts of climate change at the park/refuge they were visiting ($r = .23$), and their willingness to change behaviors to mitigate climate change ($r = .16$, table 3.5).

Table 3.5
Means, Standard Deviations, and Intercorrelations of Place Attachment with Place Dependent Climate Change variables. (n =4131)

Variables	*M*	SD	1	2	3
1. Place Attachment	2.30	.84	-		
2. I would like to learn more about climate change at this park	2.36	.92	.27	-	
3. I believe that some of the effects of climate change can already be seen at this park	2.37	.95	.23	.59	-
4. I am willing to change my behaviors to mitigate climate change in this park/refuge	2.17	1.04	.16	.49	.44

Note. All correlations are statistically significant at $p < .001$.

Audience Normative Function Pertaining to Climate Change

Place attachment had a minimal effect of saliency ($\beta = .12$, $p < .001$). Ascription of responsibility and knowledge of consequences had a typical positive effect on saliency ($\beta \geq .23$, $p < .001$, in both cases), whereas awareness of consequences had a substantial positive effect on saliency ($\beta = .42$, $p < .001$). The total model explained 58% of the variability in salience ($R^2 = .58$, $p < .001$, Figure 3.2).

Place attachment had a minimal positive effect on willingness to change ($\beta = .04$, $p = .003$). Ascription of responsibility and awareness of consequences had a minimal positive effect on willingness to change ($\beta \leq .15$, $p < .001$, in both cases). Knowledge of causes had no direct effect on willingness to change. Saliency had a typical positive effect on willingness to change ($\beta = .34$, $p < .001$). The total model explained 33% of the variability in willingness to change behavior ($R^2 = .33$, $p < .001$, Figure 3.2).

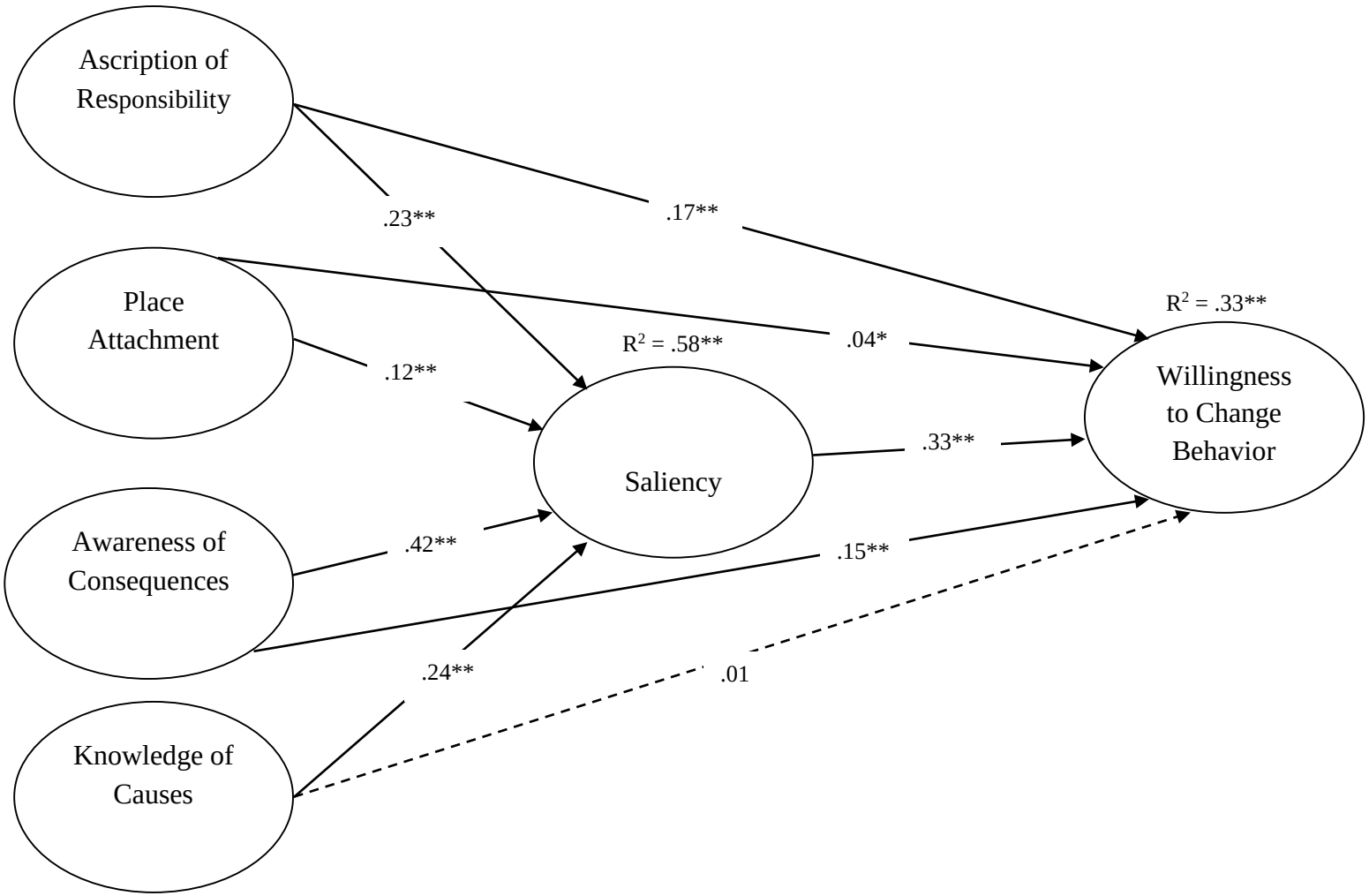

Figure 3.2. Regression model showing norm activation analysis results (dotted lines are not significant, * refers to significant at $p<.01$, ** refers to significant at $p<.001$).

Conclusion

In an effort to advance the application of the growing literature on climate change communication, the place-based climate change engagement framework is a potentially useful approach for academics and practitioners to rethink how they engage audiences in conversations about climate change. The results of this study validate the proposed framework for place-based climate change engagement at national parks and wildlife refuges. Communicators, interpreters and managers of America's public lands are encouraged to embrace the idea of changing the conversation about climate change by using the landscape as a story telling and engagement tool. The National Park Service and US Fish and Wildlife Service, as unpoliticized federal agencies have an opportunity to increase awareness of climate change related issues and promote political action to mitigate further impacts. National parks and wildlife refuges have the power to transcend the typical scientific and political debate to facilitating civic dialogue about the places people want to protect.

Specifically, lessons from this empirically validated framework, lead us to suggest: (1) use place as a medium and (2) connect that place to emotional and social meanings through (3) messages about localized impacts of climate change. Creating messages with a systems-based explanation will highlight the changes and impacts observed at a specific site and how those impacts are connected to individual decision-making and behavioral choices. This study demonstrates that many people need to see the effects of climate change before they can believe it is real and make sustainable decisions and behavioral changes. In addition, coupling meaningful social interaction with experiential learning opportunities is a way to build community and facilitate a deeper understanding of climate change impacts through the lens of place.

Climate change is a global issue that is already being felt locally. We recommend future education and outreach initiatives to develop integrated place-based activities such as climate camps, citizen science programs, and mobile and website tools that are locally relevant, empowering, and engaging for diverse audiences. These initiatives are appropriate for any scientist, communicator, or steward of public lands interested in transforming a global phenomenon into salient and tangible messages to community members and decision makers. In phase II of our project we plan to take the next step and assess the effectiveness such place-based engagement programs have on affecting visitors' understanding of climate change and their desire to adopt pro-environmental behaviors.

CHAPTER 4 – PLACE AND PROXIMITY: A SPATIAL ANALYSIS OF VISITORS' PLACE ATTACHMENT AT KENAI FJORDS NATIONAL PARK, ALASKA

Introduction

Climate change is important to every human being as it has the potential to drastically affect places that are important to us, including National Parks. In 2011 over 280 million people visited America's National parks (National Park Service, 2012). People visit these historic, pristine places to see some of the greatest swaths of preserved area in the world as well as places protecting historic or natural landscapes that can be found nowhere else on our planet (National Park Service, 2011). We continually observe changes in natural processes as the climate shifts and understanding how our beloved parks are changing can deliver a powerful message to National Park visitors everywhere. Through front-line interpreters or online webinars, avenues can be created through which visitors are engaged and empowered to help protect the places they love.

The data used in this study comes from the Place-Based Climate Change Education Partnership (CCEP); a National Science Foundation funded Phase I project. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among National Park and National Wildlife Refuge staff when discussing climate change impacts on America's public lands. The Place-Based CCEP conducted visitor and internal surveys and interviews in five pilot locations around the country: Northern Colorado, South Florida, the Washington, D.C.-metro area, the Kenai Peninsula, and the Puget Sound region. This study focuses on KEFJ because of its iconic landscapes and visible impacts of climate change.

Literature review

Climate change communication

Citizens are exposed to many messages about climate change on a daily basis, yet studies show a declining trend in public understanding of human caused climate change (Stern, 2007; Leiserowitz, Maibach & Roser-Renouf, 2010; Leiserowitz, Maibach, Roser-Renouf, &Smith, 2011; Leiserowitz, Smith & Marlon, 2010; Maibach, Roser-Renouf, Leiserowitz, 2009; Vitousek et al., 1997). Global climate change can be an intimidating topic for park visitors to think about, particularly for the majority of visitors who are on a vacation and simply want to enjoy the beauty of the place. When creating educational materials for this demographic, a fine line must be walked between pessimism and reality so the positive experience of being in the park is what is remembered.

People are more likely to accept information regarding climate change from messengers who they perceive to be trustworthy such as well-known scientists or friends and family (Lieserowitz et al. 2010). Environmental organizations and governmental operations such as the National Park Service are another source of trustworthy scientific information (Lieserowitz et al. 2010; Michaud, 2007). National Parks are a venue in which visitors can be engaged in a climate change discussion with rangers and others whom they perceive as trustworthy sources of information.

There are many barriers to effectively communicating about climate change, one of which is that the changes we will see are not easily predicted. Uncertainty leads to doubt and mistrust among people who do not fully understand the impacts or the mechanisms by which these changes are occurring (Budesco, Broomell & Por, 2009; Fischoff, 2011). It is difficult to attribute isolated events to climate change because of the interconnected nature of other changes

such as seasonal events and natural cycles in our larger global system. Due to its northern latitude and exaggerated warming effects, KEFJ gives a representation of landscape-based changes which are clearly visible in our lifetime.

Researchers have recently uncovered essential aspects of effective climate change communication on public lands such as National Parks. Schweizer, Thompson, Teel and Bruyere (2009) developed nine key messages and ten key principles for communicating about climate change, including themes of adaptation and human impact on the land, relevance to the audience's lives, and that each person can make a difference. Additionally, they advise messages to be tailored to the audience, delivered by a credible messenger, empowering and site specific, and connect to the audience's core values (Schweizer et al., 2009). Supporting these recommendations, National Parks can deliver messages from credible messengers such as experts in climate science or interpretive rangers using the surrounding landscape, which can make the messages more accessible and relevant to the audience.

Recent studies have examined peoples' perceptions of climate change based on their education, political affiliation, ethnicity, age, gender and where they live (Leiserowitz & Akerlof, 2010; Lieserowitz et al., 2011; McCright et al., 2010). Several studies have come from researchers at Yale and George Mason Universities using survey data to assess U.S. citizens' knowledge of climate change and classify them into the Six Americas, a segmentation model that is gaining popularity among those looking to communicate more effectively about climate change (Maibach et al., 2009).

Researchers have also investigated the level of concern regarding climate change around the globe and peoples' willingness to make personal changes to support sustainability (Bord et al., 1998; Botzen & van den Bergh, 2009). Among the regions studied, Canada, Europe and

South America were most concerned about climate change; however the research showed that most people, including US citizens, would only make small changes toward mitigating climate change. A change in lifestyle cannot be expected based on current perceptions of climate change causes and effects (Bord et al., 1998).

Studies on effective methods of communicating climate change have revealed unexpected responses to practices the media typically use. O'Neill and Nicholson-Cole (2009) explain how the media's use of sensational language may actually elicit ambivalent behavior toward climate change. In their study participants were asked to select photographs they perceived would be effective in communicating climate change first to others in a large-scale advertisement, followed by images that they themselves would respond to. The results showed that although people chose fearful images such as natural disasters to portray climate change in a media campaign, they personally stated those images would not be effective in convincing them to change their behavior to be more sustainable. Instead, pictures of riding a bike, gardening, composting and turning off the lights when not in use resonated with the majority of the individuals (O'Neill & Nicholson-Cole, 2009).

Place attachment

In Tuan's (1977) *Space and Place: the Perspective of Experience*, he differentiates between space and place; space is simply a location, devoid of personal meaning, whereas place has a special significance to an individual because that person has had a meaningful experience there. Place varies in its definition among different fields of study. In sociology, the symbolic meanings of place settings which influence the social context of human interaction are emphasized or provide a context for group or shared identity (Greider & Garkovich, 1994; Hummon, 1992). Anthropology studies the cultural influence of symbols, in both geographic

settings and the processes in day-to-day life (Geertz, 1973). It is defined elsewhere as a unique sense of place that involves unusually strong sentiments about places and heightened concerns about their management (Mitchell et al., 1993; Schroeder, 1996). Place attachment is defined in environmental psychology as an emotional or cognitive connection between a person and a particular place (Altman & Low, 1992).

Place attachment takes many forms in the tourism literature. When dealing with individual communities the concept usually takes the form of community attachment. McCool and Martin (1994) define community attachment as, "the extent and pattern of social participation and integration into the community, and sentiment or affect toward the community" (p. 30). Though a national park may not be considered a community in its own right, it shares many of the same concepts by being part of a community. Place attachment has been measured in a variety of ways. The concept has been operationalized as length of residency (Allen et al., 1988; Liu & Var, 1986; Mason & Cheyne, 2000; Schofield, 2011; Sheldon & Var, 1984; Williams & Lawson, 2001), combined with birthplace and heritage (Andereck et al., 2005; Haley et al., 2005; Um & Crompton, 1987), community sentiment (Gursoy & Rutherford, 2004; Jurowski et al., 1997; McCool & Martin, 1994; Davis et al., 2012a), number of relatives (Nepal, 2008) or as a combination of all of the above with reported number of friends and social connections (Harril & Potts, 2003). Other recent configurations include a model based off of research in Beijing. In the study, place attachment was found to include resident attitudes toward heritage, attractiveness of tourism as a source of employment, length of residency, and the percieved intrusiveness of tourism (Gu & Ryan, 2008). Place attachment and length of residency are also related (Cui & Ryan, 2011, McCool & Martin, 1994). Likewise, Williams, McDonald, Riden, and Uysal (1995) found that four place attachment measures: length of residency,

community setiment, community identity, and regional identity were all correlated to varying degrees.

Place attachment is an integral part of how people define themselves (Hess, Malilay, & Parkinson, 2008). Where a person lives, works, and recreates creates a foundation for who they perceive themselves to be and can have profound influence on behavior (Raymond & Brown, 2011). In previous research, Alaskans have identified their communities as "relatively distinct spatial areas that reflect local values, attitudes and lifestyles," (Brown, 1999). Place attachment plays a large role in defining who these people are and alarmingly, these places are changing within their lifetimes.

Place attachment & climate change

The environmental effects of global climate change can be observed in Polar Regions through changing snow and ice packs, altered seasonal changes, changing wildlife and vegetation patterns, and the depletion of permafrost (IPCC, 2007). These environmental changes are influencing people that inhabit these places, impacting the social and cultural identities of these groups (Kaltenborn, 1998). Research has shown that people in these areas feel that the place and the wilderness it can represent are important to who they are and should be protected for future generations (Kaltenborn, 1998).

This concept is not isolated to Alaska. For example, it is also witnessed in the people who were displaced after Hurricane Katrina made landfall in New Orleans, Louisiana. The heart of New Orleans was flooded and destroyed by this natural disaster. However, as soon as they could, residents moved back to their homes, despite knowing that another hurricane, as large as or larger than Katrina, is likely to strike at some point (Burby, 2006). These people knowingly returning to danger and destruction because it is their home, a part of who they are and where

they feel they belong. “People’s ties to a place are deep, as is their fealty to traditions that facilitate survival there. Historically, for many societies, this adherence to tradition has complicated adaptation to environmental change,” (Hess et al., 2008, p. 468).

The concept of vulnerability is an inherent part of planning for future climate changes. Vulnerability has been defined by the IPCC as “the extent to which climate change may damage or harm a system; it depends not only on a system’s sensitivity but also on its ability to adapt to new climatic conditions” (Watson et al., 1996). In a study by Hess, et al. (2008) health risks from potential climate change events were compared with their influence on social and mental consequences in affected communities. Place attachment is an integral aspect of creating a feeling of community which leads to good mental health:

> . . . the sense of belonging, which is necessary for psychological well-being, depends on strong, well-developed relationships with nurturing places. A major corollary of this proposition is that disturbance in these essential place relationships leads to psychological disorder, (Fullilove, 1996, p. 1518).

Stedman suggests that if a place particularly important to a person is threatened, they will participate in actions to protect that special place (2003). Regardless of perception of anthropogenic climate change, people are inextricably connected to the places they are familiar with, identify with and with which they have fond memories (Portier et al., 2010). As illustrated in Kaltenborn’s (1998) study, people who find the places they love affected by climate change want to help mitigate the impacts that are causing those changes (p. 180).

GIS modeling of place

The use of Geographic Information Systems (GIS) to display social science research is a relatively new field, thus little has been published relating place attachment and spatial representation. Maps are important tools that can help us understand large-scale social patterns and how they relate with the greater landscape (Longley et al., 2005). Several studies have

assessed the connection of place with climate change and spatial analyses (Brown, Reed & Harris, 2002; Raymond & Brown, 2011). Until now, most research has focused primarily on how to measure and include values and place attachment in landscape planning processes (Brown, 2007). More research is needed and encouraged to expand the body of literature pertaining to social values, natural resources, and geographic space.

Brown has produced several works on place and spatial analysis (Brown, 2002; Brown, 2006; Brown, 2007; Raymond & Brown, 2011). His 2002 study of the Chugach National Forest, Alaska, examines the connection between locals' perceived value of an ecosystem with their proximity to that location. Building upon Norton and Hannon's (1997) theory of geographic discounting, that the further a person lives from a place, the less likely they are to have a strong attachment to it, Brown et al. sought to determine whether places of importance to residents of the area were clustered or spatially dense (2002). Using a mail survey to residents of this area, Brown et al. (2002) found that place attachment varied by community and that different uses created different levels of acceptable proximity to specific locations.

In a study of communities on Kangaroo Island, Australia, values of natural areas were mapped spatially to create recommendations for future development of the area (Brown, 2006). Findings show that people tend to define particular locations for recreation and scenic purposes, and less specific locations for life-sustaining and spiritual values (Brown, 2006). Survey responses also indicate that life-sustaining values tended to be located within protected areas on the island (Brown, 2006, p. 105). This study shows that people tend to value natural areas not only for tangible activities, but also their existence for intrinsic reasons.

At the time of this writing there has been little previous research on spatial distribution of National Park visitors and their perceived connection to those places. This study further explores how emotional response to National Parks can be mapped across the United States.

Hypotheses

Black and Liljeblad (2006) state "…of social ecology, we need to understand the creation and dynamics of human relationships to physical space – place – at multiple spatial and temporal scales from the individual to greater society," (p.1). The purpose of this study is to test the relationship between proximity of visitors' homes to KEFJ and their level of place attachment to the Park. Based on previous research, we developed the following hypotheses:

- H1. As distance between KEFJ and visitors' homes increases, place attachment will decrease.
- H2. As visitor place attachment increases, propensity to notice changes in the landscape caused by climate change will also increase.
- H3. As visitor place attachment increases, desire to learn about changes in the landscape caused by climate change will also increase.
- H4. As visitor place attachment increases, belief that climate change will harm KEFJ will also increase.

Methods

Using survey data collected in the summer of 2011 by the Place-Based CCEP, the researchers identified by zip codes where Kenai Fjords National Park visitors live. Locations were paired with their responses to questions asking how attached to KEFJ they felt and if they had noticed any effects of climate change at the Park during their visits. By comparing visitor

responses to the survey with their spatial distribution across the United States, visitors' proximity to KEFJ and level of place attachment were mapped. Data were entered into the Statistical Package for Social Science 19 (SPSS) and ArcMap10 to visualize where visitors live in relation to the Park. Using a distance function, the researchers determined how far away from the Park visitors live then compared this information with their responses to questions about sense of place on the survey. From these results, we were able to show how proximity to the Park is related to visitors' attachment to it.

Surveys.

In June of 2011, the Place-Based CCEP research team administered a total of 493 on-sight surveys at Kenai Fjords National Park. Survey sites included the Exit Glacier trailheads and the Exit Glacier Nature Center. The surveys were administered via iPads using the iSURVEY app (for a complete description of this methodology see Davis, Thompson, & Schweizer, 2012). The survey contained questions regarding visitors' perceptions of climate change, specific climate change impacts, and attachment to the Park. The response rate for the sample was 68% and reflects the total population of visitors at a 95% confidence level with a $\pm$4% margin of error using a 50/50 split.

Three place-specific, visitor self-reported climate change variables were included in this study. These variables consisted of (1) I would like to learn more about climate change in this park; (2) I believe that some of the effects of climate change can be seen at this park; and (3) I believe that climate change will harm this park a great deal. Visitors were asked to indicate how much they agreed with each statement on a five-point scale where 1 = strongly agree and 5 = strongly disagree. A correlation analysis was conducted with these variables and the place attachment concept.

Place attachment.

The researchers created a place attachment concept by analyzing the reliability of four separate place attachment variables in SPSS 19. These variables include (1) This park is very special to me; (2) I identify strongly with this park; (3) I am very attached to this park; and (4) This park means a lot to me. Visitors were asked to identify how much they agreed with these statements using a five-point scale where 1 = strongly agree and 5 = strongly disagree. The resulting Chronbach's alpha (α) score was used to determine if the variables formed a reliable scale. The SPSS data table of visitor attributes was exported as a comma separated value (CSV) table and then imported into ArcMap10. Once the visitor attributes were given geographical reference points, (see Distance below) the place attachment variables could be spatially represented on a map of the United States. The place attachment scores were reclassified into five color coded values ranging from green =strong attachment to red = weak attachment.

Distance

Distance was calculated within ArcMap10. National zip code data were retrieved from the U.S. Census Bureau Tiger site and joined to a table of visitor attributes which also contained visitor zip codes. Cases with missing zip code data were removed from the analysis, greatly reducing the sample size (n = 242). The researchers followed a process similar to Brown's (2007) work in which respondent characteristics were combined with landscape values. By merging the two files the researchers gave the visitor zip codes a geographic reference point which could then be displayed on a map of the United States. Latitude and longitude for the Exit Glacier Visitor Center in KEFJ were extracted from Google Earth 6. These measures were converted into a table and imported into ArcMap10. After conversion into x and y coordinates, the data were placed on the United States map via a shape file. The researchers used the point

distance tool in ArcMap10 to calculate the distances between the visitor center and all zip code centroids (Theobald, 2007). The resulting distances were joined to the table of visitor attributes. The distance variables were reclassified into five outwardly radiating distance bands using natural breaks.

Place attachment and distance

Distance measures along with other visitor attributes in the table were exported in a CSV table and imported back into SPSS 19. Average place attachment scores were calculated for each distance band. Researchers used a one-way ANOVA to calculate mean differences for each distance band. Additionally, the researchers employed a spatial regression model in ArcMap10 to test the influence of distance on place attachment.

Results

The reliability analysis indicates that the four place attachment variables combine to create a single concept of place attachment (α = .88, Table 4.1). The overall average response to the place attachment concept for the entire dataset was one of moderate place attachment. (M = 2.09, SD = .69). The place attachment concept was measured on a five-point scale (1= strong attachment, 5= weak attachment).

Table 4.1
Reliability Analysis of Place Attachment Variables. (n = 493)

Variables	Cronbach's alpha	Item total correlation	*M*	SD
Place Attachment Concept	.88			
This park is very special to me		.72	1.76	.74
I identify strongly with this park		.76	2.16	.84
I am very attached to this park		.75	2.37	.80
This park means a lot to me		.76	2.12	.81

Note: Items were measured using a five-point scale where 1 = Strongly Agree and 5 = Strongly Disagree.

The visitor place attachment data were combined with spatial zip code data allowing for spatial representation of the place attachment variables. No pattern in the data emerged visually (Figure 4.1) or via spatial regression modeling.

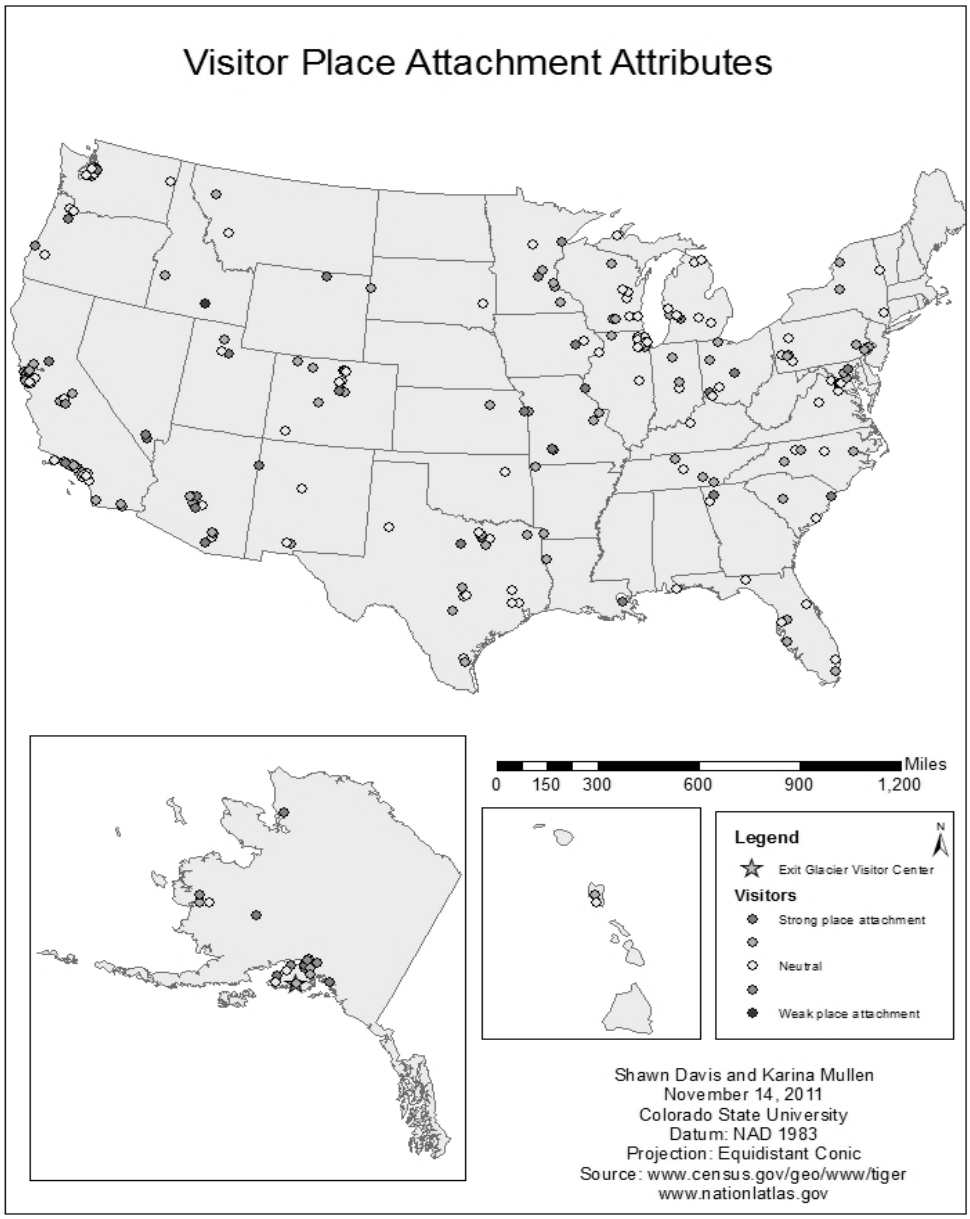

Figure 4.1. Visitor place attachment attributes

The researchers created five distance bands expanding out from the Exit Glacier Visitor Center in Kenai Fjords National Park using natural breaks in the visitor reported zip code data (Figure 4.2).

The place attachment data was segmented using the distance bands to detect patterns in the place attachment data related to distance from Exit Glacier Visitor Center within Kenai Fjords National Park. All distance bands indicate a moderate amount of place attachment (M < 2.3, SD < .84 in all cases, Table 4.2). A one-way ANOVA was conducted to test the mean differences in place attachment scores for each distance band, however, the results were not significant indicating that there was no difference in place attachment between any of the five bands.

Table 4.2
Mean place attachment scores as a function of distance. (n = 242)

Distance Band	Range from Kenai Fjords NP visitor center (mi)	n^a	Place Attachment Score (M)	SD
1	0 – 658	26	2.11	.73
2	1,423 – 2,109	38	2.29	.83
3	2,123 – 2,699	57	2.07	.80
4	2,707 – 3,239	72	2.09	.67
5	3,253 – 4066	49	2.01	.58

Note: The Place Attachment Concept was measured on a five-point scale where 1 = Strong Place Attachment and 5 = Weak Place Attachment.
[a] Refers to the subset of the sample for each distance band.

Three visitor self-reported climate change variables were correlated with the place attachment concept. The variable "I believe that climate change will harm this park" had a statistically significant though minimal correlation with the place attachment concept (r = .13, p < .01, Table 4.3). The variables "I believe that some of the effects of climate change can already be seen at this park" and "I would like to learn about climate change at this park" had a significant minimal correlation with the place attachment concept (r > .20, p < .001 in both

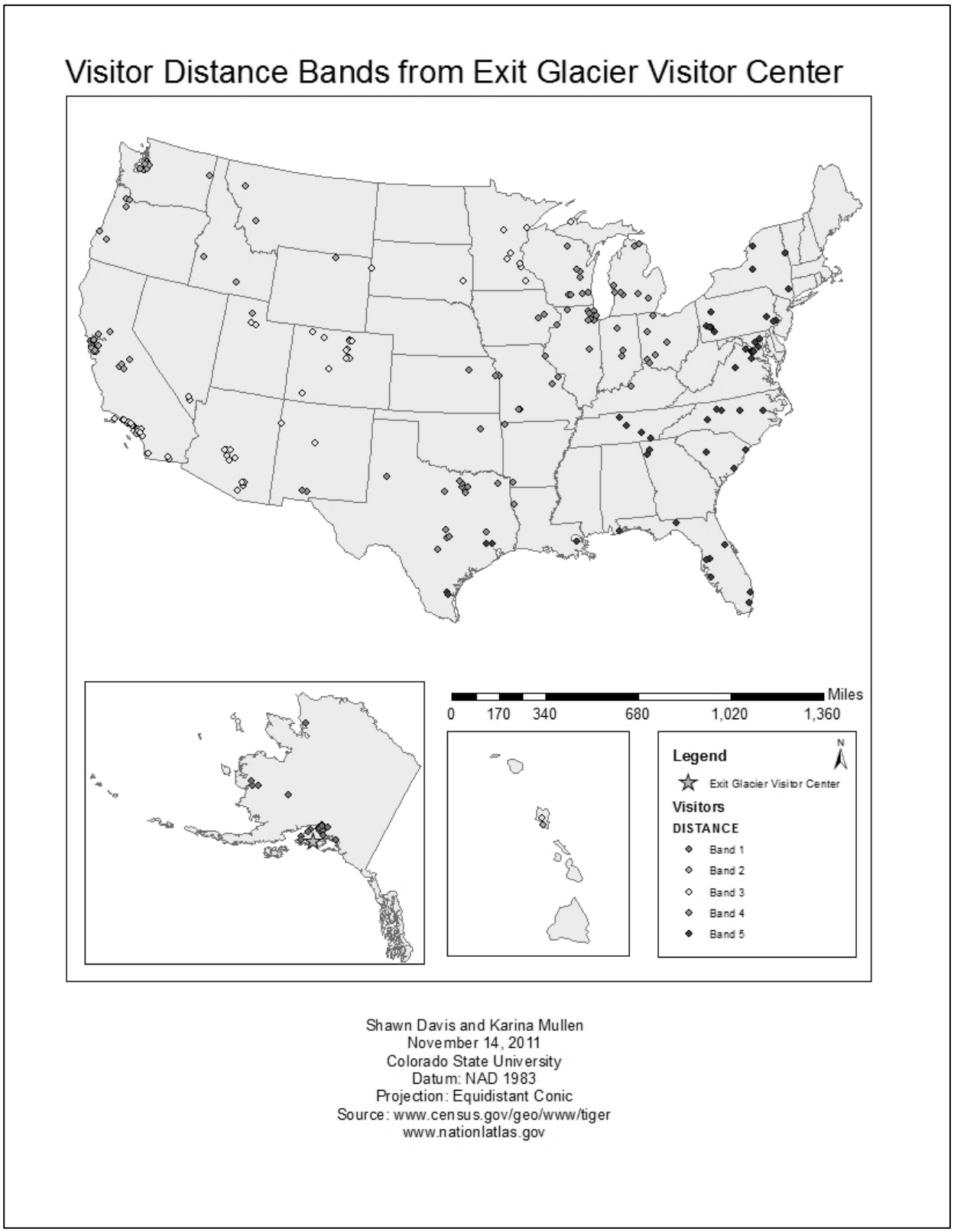

Figure 4.2. Visitor distance bands from Exit Glacier Visitor Center

cases). All three visitor self-reported climate change variables substantially correlated with each other ($r > .46$, $p < .001$ in all cases).

Table 4.3
Means, Standard Deviations, and Intercorrelations of Place Attachment with Place Dependent Climate Change variables. (n = 493)

Variables	*M*	SD	1	2	3	4
1. PA	2.09	.69	-			
2. LCCH	2.52	.89	.26**	-		
3. SCCH	1.94	.87	.20**	.50**	-	
4. CCHP	1.79	1.09	.13*	.46**	.50**	-

Note: PA = Place Attachment Concept; LCCH = I would like to learn about climate change at this park; SCCH = I believe that some of the effects of climate change can already be seen at this park; CCHP = I believe that climate change will harm this park or refuge a great deal.
* $p < .01$. ** $p < .001$.

Discussion

Although the place attachment variables formed a reliable scale for the place attachment concept there was no evidence to support our hypothesis that visitors who live closer to Kenai Fjords National Park would have a stronger place attachment value. This finding is also seen in Brown et al.'s (2002) study; people lived farthest away from "environmental values involving indirect or passive human use (intrinsic, future, and life-sustaining values)," (p. 62). Perhaps the type of place under study has a stronger influence to attachment than mere proximity. National Parks possess some of the most iconic and pristine landscapes in our country. Visitors find them unique and want them to be preserved for tangible or intrinsic reasons, regardless of their proximity to these places (Lockwood, 1999). For this reason, place of residence may not be a factor in visitor reported place attachment variables.

Additionally, the surveys were administered on-site which also has the potential to affect responses. Visitors completed the survey while in Kenai Fjords National Park and therefore were more likely to respond as feeling attached to the Park while surrounded by ancient snow-capped

peaks carved by the fingers of glaciers over millions of years. A social desirability bias could also have skewed results by visitors wanting to appear as if they care more deeply about KEFJ while the researchers were present. Our results may have been different if we had used a mail survey and included respondents who had never visited the Park before, the comparison of which may be an opportunity for future research.

Another consideration for the lack of continuity in geographic discounting is that it is a difficult concept to measure. “Complex cultural and physical variables” cloud a simple analysis of place attachment and geographic location (Brown et. al, 2002, p. 70). Indeed, Norton and Hannon (1997) also concede that this type of research establishes the point that place attachment and geographic discounting are place-based in theory. The researchers suggest more qualitative means of assessing place attachment be used in the future.

Hypotheses 2, 3, and 4 were supported by the data. Results from the correlation show that the stronger place attachment to Kenai Fjords National Park a visitor reports, the more likely they believe climate change will harm the Park. There were also correlations in visitors with a strong place attachment noticing more changes they see in the landscape, and thus they were more likely to want to learn about climate change at the Park. However, this correlation may be temporal in nature; quickly fading when visitors leave the Park, thus giving more support for education and communication regarding climate change to be implemented within the Park. Regardless, the data show that many visitors indicate a strong place attachment to KEFJ as well as a desire to learn about climate change within the Park giving a prime starting point to expand education and engagement programs for their visitors.

Though beyond the scope of this particular study, a strong correlation was discovered between visitors’ ability to see changes in the landscape and their desire to learn more about

climate change. Additionally, there was a strong correlation with their belief that climate change would harm the Park. This finding gives support to educating about climate change in places where the impacts are clearly visible. Exploring the connection between these variables should be the subject of further research.

These results show that the majority of Park visitors care about KEFJ and therefore want to learn about how climate change is affecting the land. Furthermore, this attachment is exhibited by visitors regardless of distance. One often overlooked facet of climate change is that impacts are globally diffuse; similarly, the mitigating solutions to this issue can be pursued worldwide. Due to the wide geographic range of visitors, education that shows how actions in New York, for example, can affect Exit Glacier in KEFJ may be particularly well-suited to encourage climate change-mitigating behaviors in visitors.

This study is one of the first in research for understanding visitors' attachment to U.S. National Parks. This is an analysis of only one park from the CCEP study; data has also been collected in nine other parks around the country. Future research is needed to determine whether this pattern of self-reported place attachment, regardless of proximity, can be observed around the nation, not simply with Kenai Fjords National Park. This research is valuable for National Park employees, including interpretive rangers and visitor program managers in providing support for the creation and implementation of educational materials on climate change for visitors who clearly desire the information.

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APPENDIX A – CLIMATE CHANGE EDUCATION PARTNERSHIP VISITOR SUMMARY REPORT[1]

Executive Summary

National parks and wildlife refuges offer a prime opportunity to improve citizen understanding of climate change science and the impacts on local landscapes through informal education. Through the lens of protected areas, visitors can witness and experience the impacts of climate change in a place they know and love, a place where they expect to have learning experiences. Despite the extensive climate change research being conducted, there are few successful examples of connecting the science to citizens. The goals of this Place-based Climate Change Education Partnership (CCEP) project were to assess visitor knowledge and opinions on climate change, willingness to take mitigating actions, perceptions of climate change impacts, and desire for climate change education. Through an improved understanding of the visitor audience, parks and refuges may be better equipped to communicate the science and impacts of climate change to their visitors.

From the months of May, 2011to January, 2012 the Place-based CCEP survey team from Colorado State University collected a total of 4,181 visitor surveys on climate change at 16 different National Parks and Wildlife Refuges across the nation. The on-site surveys were administered in an innovative fashion using iPads, rather than pencil and paper, with a response rate of 70%. The collective sample from all sites reflects the total population of visitors at a 99% confidence level with $\pm$2% margin of error. Survey results reveal a population of visitors who care deeply about these natural landscapes and differ significantly from the broader American public in regards to their knowledge and opinions on climate change, willingness to take mitigating actions, perceptions of climate change impacts, and desire for climate change education.

Most respondents stated that the National Parks and National Wildlife Refuge system is extremely or very important to themselves and their family (95%) and were equally concerned about the future of the National Parks and National Wildlife Refuges (74%). Most visitors surveyed indicated that they think climate change will harm the National Park /Wildlife Refuge they visited a great deal (42%) and that it is being harmed now (32%).

When asked about their perceptions of climate change, many visitors surveyed were sure that climate change is happening (77%). Most visitors stated that the issue is important (84%), indicating the salience of the issue. In addition, many respondents asserted that they feel responsible for contributing to climate change (54%).

The majority of survey respondents believe they can already see the effects of climate change at National Parks and Wildlife Refuges (70%) and most visitors would like to learn more about climate change at these places (67%). Many visitors indicated that they have not received any information on the subject at the park or refuge they visited (66%) but would prefer to receive this information via trailside exhibits (42%) or online (46%). According to most respondents, actions visitors can take to reduce climate change is the most important topic for parks/refuges to address (78%). Additionally, most visitors are willing (91%) to change their behaviors in the park or refuge they visited to mitigate climate change.

Based on our research, it is apparent that the visitors to National Parks and Wildlife Refuges care deeply for this protected land, see how climate change is affecting it, and want to be engaged in protecting these parks and refuges themselves. This audience wants to learn more about climate

[1] All appendices originate from converted PDF documents which has permanently altered the formatting.

change and the actions they can take to mitigate its effects on these treasured landscapes. With proper education, visitors can become important advocates in the need to respond to climate change, both within the parks and refuges, and their communities.

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research.

We have five pilot site areas across the country (northern Colorado, Puget Sound in western Washington, southern Florida, Washington D.C. and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. These sites were selected because agency leadership at the Washington office highlighted these parks and refuges as important places to invest resources in building capacity or enhance ongoing efforts to communicate about climate change.

Because our goal is to engage staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visits, we conducted 4,181 surveys. This report provides a short description of our visitor survey and a summary of our results. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for this unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a one year period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table A.1
Participating parks and refuges in the 2011 – 2012 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over four thousand (4,181) surveys were administered in 16 different refuges and parks from May 6, 2011 to January 8, 2012, using a convenience sampling method. The total response rate for the sample was 70%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (93%) completed the electronic version of the survey on an iPad while the remaining 280 participants (7%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site.

Response Rates and Confidence Level. The survey team collected a total of 4,181 surveys. The average response rate for this sample was 70%. The sample reflects the total population of visitors at a 99% confidence level with $\pm$2% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 56-65 (20%). The highest percentage of visitors surveyed were male (51%). Many respondents had completed a graduate or professional degree (41%). Most visitors surveyed self-identified as white or Caucasian (86%) as well as Democratic (37%, Table A.2). On average, visitors surveyed have visited the parks or refuges 14 times. Many visitors indicated that this was their first visit (53%).

Table A.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N = 3,956)		
10 – 18	241	6
19 – 25	353	9
26 – 35	727	18
36 – 45	635	16
46 – 55	788	20
56 – 65	806	20
66 – 75	351	9
76 – 85	51	1
86 – 95	4	0
Gender (N = 4,011)		
Male	2,065	51
Female	1,945	49

Highest education level completed (N = 4,003)		
Less than high school	109	3
Some high school	108	3
High school graduate	248	6
Some college	500	13
Two-year college degree	279	7
Four-year college degree	1,133	28
Graduate or professional degree	1,625	41
Ethnicity (N = 3,830)		
American Indian or Alaska Native	45	1
Asian	186	5
Black or African American	72	2
Hawaiian or Pacific Islander	14	0
Hispanic or Latino/Latina	141	4
White or Caucasian	3,291	86
Other	80	2
Political Affiliation (N = 3,938)		
Republican	688	20
Democrat	1,296	37
Independent	653	19
No affiliation	737	21
Other	88	3

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table A.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the park/refuge they are respectively.

Table A.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* = 4139)	40	40	19	1	1
I identify strongly with this Park/Refuge (*n* = 4120)	28	37	31	3	1
I am very attached to this Park/Refuge (*n* = 4112)	24	32	39	5	1
This Park/Refuge means a lot to me (*n* = 4095)	29	38	30	3	1
This Park/Refuge is the best place for what I like to do (*n* = 4108)	16	34	41	8	1
No other place can compare to this Park/Refuge (*n* = 4103)	13	23	44	17	3
I get more satisfaction out of visiting this Park/Refuge than any other (*n* = 4103)	8	17	49	21	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n* = 3732)	8	18	49	21	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and the park/refuge they were visiting. Many respondents thought the National Park System was extremely important (70%) and that the National Wildlife Refuge System was extremely important (68%). Most respondents stated that the park/refuge they were visiting is extremely important to themselves and their family (53%, Table A.4).

Table A.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* = 4137)	70	25	4	0	0
Our National Wildlife Refuge System (*n* = 4094)	68	26	6	1	0
This Park/Refuge (*n* = 4073)	53	33	12	2	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to the park/refuge they were visiting. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (49%). Visitors perceived that the greatest threat to the park/refuge they were visiting was lack of funding (37%, Table A.5).

Table A.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* = 4130)	49	3	6	6	14	11	8	3
This Park or Refuge (*n* = 4038)	37	6	8	6	14	18	8	3

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and the park/refuge they were visiting. Many respondents were extremely concerned about the future of the National Park System (39%) and were also extremely concerned for the future of the National Wildlife Refuge System (38%). Most respondents were very concerned about the future of the park/refuge they were visiting (29%, Table A.6).

Table A.6
How concerned are you about the future of the following?

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n*= 4178)	39	39	18	4	1
Our National Wildlife Refuge System (*n*= 4170)	38	36	21	3	1
This Park/Refuge (*n*= 4170)	29	33	32	5	2

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (35%, Table A.7).

Table A.7
Do you think climate change is happening? (*n* = 4174)

Categories	Response Percentage (%)
Extremely sure it is happening	35
Very sure climate change is happening	26
Somewhat sure climate change is happening	16
Not sure	11
Somewhat sure climate change is not happening	5
Very sure climate change is not happening	3
Extremely sure it is not happening	3

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (43%) and very informed about the consequences of climate change (43%). Most visitors also felt very informed about ways in which we can mitigate climate change (39%, Table A.8).

Table A.8
Personally, how well informed do you feel about the following?

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change (*n* = 4165)	17	43	33	7	1
The different consequences of climate change (*n* = 4162)	16	43	33	7	1
Ways in which we can reduce climate change (*n* = 4162)	15	38	36	9	2

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (48%, Table A.9).

Table A.9
Assuming climate change is happening, do you think it is… (*n* = 4037)

Categories	Response Percentage (%)
Caused mostly by human activities	35
Caused mostly by natural changes in the environment	15
Caused by both human activities and natural changes in the environment	48
None of the above because climate change isn't happening	3
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (34%, Table A.10).

Table A.10

How worried are you about climate change? (*n* = 4170)

Categories	Response Percentage (%)
Extremely worried	22
Very worried	34
Somewhat worried	27
Slightly worried	9
Not worried	8

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (34%, Table A.11).

Table A.11

How important is the issue of climate change to you personally? (*n* = 4169)

Categories	Response Percentage (%)
Extremely important	21
Very important	34
Somewhat important	29
Slightly important	9
Not important	7

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (38%, Table A.12).

Table A.12

How often do you think about climate change? (*n* = 4170)

Categories	Response Percentage (%)
All the time	9
Frequently	36
Occasionally	38
Rarely	12
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table 1.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table A.13).

Table A.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 4000)	6	15	24	42	14
I feel somewhat responsible for the presently occurring environmental problems (*n*= 3965)	8	50	24	12	6
I feel responsible for contributing to the condition of the climate (*n*= 3845)	10	44	27	12	8

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and the park/refuge they were visiting. Of particular interest is how much visitors believe climate change is harming the Park/Refuge. Most visitors surveyed indicated that they think climate change will harm the park/refuge they were visiting a great deal (42%, Table A.14).

Table A.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 4108)	59	26	8	5	3
You personally (*n*= 4066)	11	47	29	11	3
This Park/Refuge (*n* = 4038)	42	37	11	5	5

Respondents were asked when they thought climate change would start to harm both people in the U.S. and the park/refuge they were visiting. Most visitors surveyed indicated that they think the park/refuge they were visiting is being harmed now (32%, Table A.15).

Table A.15

When do you think climate change will start to harm the following (*n* = 4165)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	34	16	13	21	7	5	6
This Park/Refuge	32	17	10	27	5	4	5

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n* = 4093). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table A.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 3774). Respondents gave an average of 10 days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (38%, Table A.17).

Table A.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 4093)

U.S. Dollars	Response Percentage (%)
0	5
1-5	73
6-10	8
11-15	2
16-20	2
> 21	10

Table A.17
How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 4174)

Categories	Response Percentage (%)
Extremely willing	29
Very willing	38
Somewhat willing	24
Slightly willing	4
Not willing	5

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (70%, Table A.18).

Table A.18
Which of the following actions have you taken? (*n* = 3805)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	16
Planting trees	53
Insulating your home	58
Switching from a gasoline to an electric or hybrid car	12
Driving less	54
Walking, riding a bike, or using public transportation instead of driving	56
Switching from regular (incandescent) to compact fluorescent bulbs	68
Reducing the amount of beef you eat	35
Reducing airplane travel	17
Reducing energy use at home	70

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at the park/refuge they were visiting (46%). Many of the visitors surveyed agreed that the effects of climate change can already be seen at the park/refuge they were visiting (39%, Table A.19).

Table A.19

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* = 4013)	16	51	25	5	3
I would like to learn more about climate change impacts in this Park/Refuge (*n* = 3987)	15	46	30	5	4
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* = 3997)	24	46	23	4	3
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* = 3964)	18	39	35	5	3

Respondents were asked what specific effects of climate change they have seen in the park/refuge they were visiting. Some options will not apply to certain study areas, as the list is comprehensive of all areas included in the study (Table A.20).

Table A.20

What specific effects of climate change have you seen at this Park/Refuge? (*n* = 3374)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	13
Increasing areas affected by drought	20
Increasing air temperature	25
Thawing of permanently frozen soil	16
Loss of snow and/or ice	33
Increasing number of flooding events	20
Rising sea level	12
Coral bleaching on reefs	9
Change in plant and animal populations	32
More intense storms	18
None of the above	23
Other	3

Note. Percentages do not sum to 100 as multiple selections were allowed

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by the park/refuge they were visiting. The effort most visitors surveyed recalled seeing was recycling (68%, Table A.21).

Table A.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge?

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles (*n* = 3590)	15
Energy efficient or LEED certified buildings (*n* = 3591)	18
Use of alternative renewable energy (ex: wind turbines, solar panels) (*n* = 3591)	19
Recycling (*n* = 3590)	68
None of the above (*n* = 3552)	24
Other (*n* = 3591)	3

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at the park/refuge they were visiting as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (66%). Many visitors indicated they would like to learn about climate change in the park/refuge they were visiting via the Park website (46% each, Table A.22).

Table A.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 3650)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 3815)
Have not received any information on climate change from this Park/Refuge.	66	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	13
Indoor exhibits	14	38
Roadside exhibits	7	26
Trailside exhibits	10	42
Films, movies, videos	9	31
Living history/costumed interpretive programs	3	14
Park website	9	46
Printed materials (brochures, books, maps, etc.)	12	32
Electronic media/devices available to visitors	3	23
As a volunteer in the park	2	11
Children's activities	2	15
Ranger guided walks/talks	6	26
Self-guided tours	6	21
Other	3	1

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in the park/refuge they were visiting. Most visitors surveyed indicated that the quality of climate change education in the park/refuge they were visiting was average (48%). Most visitors indicated that the quantity of climate change education was also average (48%, Table A.23).

Table A.23

Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* = 3503)	9	27	48	13	3
Quantity of education (*n* = 3403)	8	26	48	15	4

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (78% said it is either very or extremely important, Table A.24).

Table A.24

How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n* = 3177)	28	42	22	5	4
Ways parks/refuges are reducing emissions (*n* = 3129)	24	41	25	7	4
Sources of greenhouse gas emissions (*n* = 3113)	24	40	25	7	5
Relevance for surrounding communities (*n* = 3128)	30	41	21	5	3
Impact(s) on places managed by parks/refuges (*n* = 3098)	28	44	21	5	3
Ways parks/refuges are adapting to climate change (*n* = 3109)	27	45	20	5	3
Actions visitors can take (*n* = 3137)	40	38	15	4	3

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories reflect a greater visitor preference for using an iPad to take surveys rather than paper (Table A.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (40%) and most also strongly agreed they would rather take surveys on an iPad than on paper (49%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (47%).

Table A.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 3790)	40	38	18	3	1
I would rather take surveys on an iPad than paper (*n*= 3699)	49	28	13	6	4
I would enjoy taking future surveys on an iPad (*n*= 3693)	47	32	17	3	1

APPENDIX B – BISCAYNE BAY NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, District of Columbia, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of four protected areas in the South Florida area that was selected because agency leadership at the Washington office highlighted your Park as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 257 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table B.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over four thousand (4,163) surveys were administered in 16 different refuges and parks from May 6, 2011 to January, 2012, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site were inside and in the vicinity of the Dante Fascell Visitor Center.

Response Rates and Confidence Level. The survey team collected a total of 257 surveys at Biscayne National Park. The response rate for this sample was 67%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$6% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 36-45 (22%). The highest percentage of visitors surveyed were male (54%). Many respondents had completed a graduate or professional degree (35%). Most visitors surveyed self-identified as white or Cauasian (66%) as well as Democratic (33%, Table B.2). On average, visitors surveyed have visited the Park 12 times. Many visitors indicated that this was their first visit (52%).

Table B.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N = 251)		
10 – 18	22	9
19 – 25	25	10
26 – 35	34	13
36 – 45	57	22
46 – 55	49	19
56 – 65	41	16
66 – 75	21	8
76 – 85	1	0
86 – 95	1	0
Gender (N = 253)		
Male	137	54
Female	116	46
Highest education level completed (N = 252)		

Less than high school	8	3
Some high school	16	6
High school graduate	21	8
Some college	33	13
Two-year college degree	19	8
Four-year college degree	66	26
Graduate or professional degree	89	35
Ethnicity (N = 246)		
American Indian or Alaska Native	3	1
Asian	18	7
Black or African American	5	2
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	50	20
White or Caucasian	162	66
Other	8	3
Political Affiliation (N = 228)		
Republican	59	26
Democrat	76	33
Independent	37	16
No affiliation	52	23
Other	4	2

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table B.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table B.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* = 256)	30	39	30	1	0
I identify strongly with this Park/Refuge (*n* = 256)	25	34	38	3	0
I am very attached to this Park/Refuge (*n* = 255)	20	28	44	6	1
This Park/Refuge means a lot to me (*n* = 253)	24	33	37	4	2
This Park/Refuge is the best place for what I like to do (*n* = 255)	13	36	39	11	1
No other place can compare to this Park/Refuge (*n* = 255)	11	18	49	19	3
I get more satisfaction out of visiting this Park/Refuge than any other (*n* = 253)	8	18	49	21	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n* = 255)	9	15	50	21	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Biscayne National Park. Many respondents thought the National Park System was extremely important (69%) and that the National Wildlife Refuge System was extremely important (70%). Most respondents stated that Biscayne National Park is extremely important to themselves and their family (51%, Table B.4).

Table B.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* = 255)	69	26	4	1	0
Our National Wildlife Refuge System (*n* = 250)	70	24	6	1	0
This Park/Refuge (*n* = 247)	51	31	16	2	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Biscayne National Park. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (46%). Visitors perceived that the greatest threat to Biscayne National Park was lack of funding (30%, Table B.5).

Table B.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* = 256)	46	4	7	9	20	5	6	3
This Park or Refuge (*n* = 253)	30	15	6	10	27	5	3	4

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Biscayne National Park. Many respondents were extremely concerned about the future of the National Park System (41%) and were also extremely concerned for the future of the National Wildlife Refuge System (43%). Most respondents were very concerned about the future of Biscayne National Park (34%, Table B.6).

Table B.6
How concerned are you about the future of the following? (*n* = 257)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	41	39	18	2	0
Our National Wildlife Refuge System	43	38	17	2	1
This Park/Refuge	30	34	32	2	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (32%, Table B.7).

Table B.7
Do you think climate change is happening? (*n* = 257)

Categories	Response Percentage (%)
Extremely sure it is happening	32
Very sure climate change is happening	25
Somewhat sure climate change is happening	18
Not sure	12
Somewhat sure climate change is not happening	4
Very sure climate change is not happening	5
Extremely sure it is not happening	4

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (43%) and very informed about the consequences of climate change (43%). Most visitors also felt very informed about ways in which we can mitigate climate change (39%, Table B.8).

Table B.8
Personally, how well informed do you feel about the following? (*n* = 257)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	18	43	32	7	1
The different consequences of climate change	19	43	32	6	1
Ways in which we can reduce climate change	14	39	36	10	2

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (50%, Table B.9).

Table B.9
Assuming climate change is happening, do you think it is… (*n* = 256)

Categories	Response Percentage (%)
Caused mostly by human activities	34
Caused mostly by natural changes in the environment	14
Caused by both human activities and natural changes in the environment	50
None of the above because climate change isn't happening	2
Don't Know	2
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (32%, Table B.10).

Table B.10
How worried are you about climate change? (*n* = 257)

Categories	Response Percentage (%)
Extremely worried	23
Very worried	32
Somewhat worried	26
Slightly worried	10
Not worried	9

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (36%, Table B.11).

Table B.11
How important is the issue of climate change to you personally? (*n* = 257)

Categories	Response Percentage (%)
Extremely important	20
Very important	36
Somewhat important	29
Slightly important	7
Not important	8

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (38%, Table B.12).

Table B.12

How often do you think about climate change? (*n* = 257)

Categories	Response Percentage (%)
All the time	7
Frequently	34
Occasionally	38
Rarely	15
Never	7

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table B.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table B.13).

Table B.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 257)	6	18	24	40	12
I feel somewhat responsible for the presently occurring environmental problems (*n*= 257)	5	49	24	14	8
I feel responsible for contributing to the condition of the climate (*n*= 252)	8	46	24	13	8

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Biscayne National Park. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that they think climate change will harm this park a great deal (45%, Table B.14).

Table B.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 257)	57	27	10	5	2
You personally (*n*= 256)	7	51	29	11	2
This Park/Refuge (*n* = 255)	45	33	13	6	3

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Biscayne National Park. Most visitors surveyed indicated that they think Biscayne National Park is being harmed now (28%, Table B.15).

Table B.15

When do you think climate change will start to harm the following (*n* = 257)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	31	16	15	19	7	5	7
This Park/Refuge	28	20	10	27	4	6	5

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n* = 232). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table B.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 232). Respondents gave an average of 10 days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (37%, Table B.17).

Table B.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 232)

U.S. Dollars	Response Percentage (%)
0	12
1-5	47
6-10	28
11-15	1
16-20	3
> 21	8

Table B.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 257)

Categories	Response Percentage (%)
Extremely willing	25
Very willing	37
Somewhat willing	29
Slightly willing	3
Not willing	6

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (82%, Table B.18).

Table B.18

Which of the following actions have you taken? (*n* = 248)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	12
Planting trees	52
Insulating your home	59
Switching from a gasoline to an electric or hybrid car	11
Driving less	49
Walking, riding a bike, or using public transportation instead of driving	52
Switching from regular (incandescent) to compact fluorescent bulbs	68
Reducing the amount of beef you eat	39
Reducing airplane travel	21
Reducing energy use at home	82

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Biscayne National Park (48%). Many of the visitors surveyed agreed that the effects of climate change can already be seen at this Park (40%, Table B.19).

Table B.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* = 250)	18	53	21	3	6
I would like to learn more about climate change impacts in this Park/Refuge (*n* = 250)	18	48	25	3	6
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* = 251)	24	44	21	5	6
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* = 249)	14	40	35	5	6

Respondents were asked what specific effects of climate change they have seen in Biscayne National Park. Some options will not apply to Biscayne National Park, as the list is comprehensive of all areas included in the study. Most visitors reported seeing changes in plant and animal populations at this Park (37%, Table B.20).

Table B.20
What specific effects of climate change have you seen at this Park/Refuge? (*n* = 213)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	26
Increasing areas affected by drought	17
Increasing air temperature	22
Thawing of permanently frozen soil	3
Loss of snow and/or ice	7
Increasing number of flooding events	9
Rising sea level	17
Coral bleaching on reefs	35
Change in plant and animal populations	37
More intense storms	21
None of the above	29
Other	2

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Biscayne National Park. The effort most visitors surveyed recalled seeing was recycling (77%, Table B.21).

Table B.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 233)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	12
Energy efficient or LEED certified buildings	17
Use of alternative renewable energy (ex: wind turbines, solar panels)	15
Recycling	77
None of the above	16
Other	3

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Biscayne National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (63%). Many visitors indicated they would like to learn about climate change in Biscayne National Park via the Park website and indoor exhibits (43% each, Table B.22).

Table B.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 224)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 242)
Have not received any information on climate change from this Park/Refuge.	63	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	11
Indoor exhibits	17	43
Roadside exhibits	3	20
Trailside exhibits	5	33
Films, movies, videos	11	41
Living history/costumed interpretive programs	2	17
Park website	12	43
Printed materials (brochures, books, maps, etc.)	11	30
Electronic media/devices available to visitors	1	25
As a volunteer in the park	2	15
Children's activities	3	21
Ranger guided walks/talks	6	34
Self-guided tours	10	29
Other	1	1

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Biscayne National Park. Most visitors surveyed indicated that the quality of climate change education in Biscayne National Park was average (47%). Most visitors indicated that the quantity of climate change education was also average (46%, Table B.23).

Table B.23
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* = 232)	11	27	47	11	4
Quantity of education (*n* = 225)	12	25	46	12	5

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (81% said it is either very or extremely important, Table B.24).

Table B.24
How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n* = 239)	29	46	18	4	3
Ways parks/refuges are reducing emissions (*n* = 235)	24	41	24	6	5
Sources of greenhouse gas emissions (*n* = 235)	25	41	23	7	4
Relevance for surrounding communities (*n* = 238)	33	40	20	4	3
Impact(s) on places managed by parks/refuges (*n* = 234)	28	45	21	3	3
Ways parks/refuges are adapting to climate change (*n* = 232)	28	46	18	4	3
Actions visitors can take (*n* = 236)	42	39	12	3	4

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories reflect a greater visitor preference for using an iPad to take surveys rather than paper (Table B.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (49%) and most also strongly agreed they would rather take surveys on an iPad than on paper (57%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (56%).

Table B.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 250)	49	36	14	1	0
I would rather take surveys on an iPad than paper (*n*= 247)	57	26	9	3	5
I would enjoy taking future surveys on an iPad (*n*= 244)	56	28	15	1	0

APPENDIX C – EVERGLADES NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of four protected areas in the South Florida area that was selected because agency leadership at the Washington office highlighted your park as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 412 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table C.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (4,163) surveys were administered in 16 different refuges and parks from May 6, 2011 to January 8, 2012, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: Flamingo Bay visitor center and Anhinga trail.

Response Rates and Confidence Level. The survey team collected a total of 412 surveys at Everglades National Park. The response rate for this sample was 64%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$5% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 26-35 (21%). The highest percentage of visitors surveyed were male (51%). Many respondents had completed a graduate or professional degree (47%). Most visitors surveyed self-identified as white or Caucasian (85%) as well as Democratic (42%, Table C.2). On average, visitors surveyed have visited the park nine times. Many visitors indicated that this was their first visit (53%).

Table C.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N = 399)		
10 – 18	25	6
19 – 25	60	15
26 – 35	87	21
36 – 45	59	15
46 – 55	64	16
56 – 65	64	16
66 – 75	36	9
76 – 85	4	1
86 – 95	0	0
Gender (N = 402)		
Male	205	51
Female	197	49

Highest education level completed (N = 403)		
Less than high school	12	3
Some high school	15	4
High school graduate	22	6
Some college	39	10
Two-year college degree	26	7
Four-year college degree	98	24
Graduate or professional degree	191	47
Ethnicity (N = 390)		
American Indian or Alaska Native	4	1
Asian	26	7
Black or African American	6	2
Hawaiian or Pacific Islander	1	0
Hispanic or Latino/Latina	17	4
White or Caucasian	330	85
Other	6	2
Political Affiliation (N = 346)		
Republican	52	15
Democrat	144	42
Independent	58	17
No affiliation	82	24
Other	10	3

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table C.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table C.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* = 409)	47	39	13	1	0
I identify strongly with this Park/Refuge (*n* = 409)	31	36	29	4	o
I am very attached to this Park/Refuge (*n* = 407)	28	33	32	6	1
This Park/Refuge means a lot to me (*n* = 406)	32	39	26	3	0
This Park/Refuge is the best place for what I like to do (*n*=408)	17	32	41	9	2
No other place can compare to this Park/Refuge (*n* = 406)	24	24	36	13	2
I get more satisfaction out of visiting this Park/Refuge than any other (*n* = 407)	9	18	46	23	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n* = 403)	8	21	48	18	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Everglades National Park. Many respondents thought the National Park System was extremely important (73%) and that the National Wildlife Refuge System was extremely important (71%). Most respondents stated that Everglades National Park is extremely important to themselves and their family (65%, Table C.4).

Table C.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* = 411)	73	22	3	1	0
Our National Wildlife Refuge System (*n* = 407)	71	22	5	2	0
This Park/Refuge (*n* = 404)	65	26	8	1	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Everglades National Park. Most respondents thought lack of funding was the greatest threat to national parks and refuges (41%). Visitors perceived that the greatest threat to Everglades National Park was pollution from nearby sources (24%, Table C.5).

Table C.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* = 412)	41	2	6	6	22	14	5	4
This Park or Refuge (*n* = 406)	21	6	16	6	24	14	4	8

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Everglades National Park. Many respondents were extremely concerned about the future of the National Park System (43%) and were also extremely concerned for the future of the National Wildlife Refuge System (44%). Most respondents were extremely concerned about the future of Everglades National Park (42%, Table C.6).

Table C.6

How concerned are you about the future of the following? (*n* = 412)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	43	36	15	5	1
Our National Wildlife Refuge System	44	35	17	4	1
This Park/Refuge	42	31	21	4	2

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change is or is not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (45%, Table C.7).

Table C.7

Do you think climate change is happening? (*n* = 412)

Categories	Response Percentage (%)
Extremely sure it is happening	45
Very sure climate change is happening	25
Somewhat sure climate change is happening	14
Not sure	7
Somewhat sure climate change is not happening	6
Very sure climate change is not happening	2
Extremely sure it is not happening	3

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (44%) and very informed about the consequences of climate change (43%). Most visitors also felt very informed about ways in which we can mitigate climate change (37%, Table C.8).

Table C.8
Personally, how well informed do you feel about the following? (*n* = 412)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	22	44	28	5	1
The different consequences of climate change	22	43	31	5	1 (.2)
Ways in which we can reduce climate change	20	37	35	8	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. The highest number of visitors surveyed indicated that climate change was caused mostly by human activities (45%, Table C.9).

Table C.9
Assuming climate change is happening, do you think it is… (*n* = 412)

Categories	Response Percentage (%)
Caused mostly by human activities	45
Caused mostly by natural changes in the environment	8
Caused by both human activities and natural changes in the environment	44
None of the above because climate change isn't happening	1
Don't know	1
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (36%, Table C.10).

Table C.10

How worried are you about climate change? (*n* = 412)

Categories	Response Percentage (%)
Extremely worried	28
Very worried	36
Somewhat worried	23
Slightly worried	7
Not worried	6

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (39%, Table C.11).

Table C.11

How important is the issue of climate change to you personally? (*n* = 412)

Categories	Response Percentage (%)
Extremely important	26
Very important	39
Somewhat important	24
Slightly important	7
Not important	5

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they think about climate change frequently (43%, Table C.12).

Table C.12
How often do you think about climate change? (*n* = 412)

Categories	Response Percentage (%)
All the time	8
Frequently	43
Occasionally	35
Rarely	10
Never	4

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table 3.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table C.13).

Table C.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n* = 404)	4	15	21	45	15
I feel somewhat responsible for the presently occurring environmental problems (*n* = 403)	8	54	24	9	5
I feel responsible for contributing to the condition of the climate (*n* = 403)	12	50	23	8	7

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Everglades National Park. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that they think climate change will harm this Park a great deal (57%, Table C.14).

Table C.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n* = 410)	70	20	5	3	2
You personally (*n* = 408)	12	49	29	8	2
This Park/Refuge (*n* = 408)	57	28	9	3	4

Respondents were asked when they thought climate change would start to harm both people in the U. S. and Everglades National Park. Most visitors surveyed indicated that Everglades National Park is being harmed now (37%, Table C.15).

Table C.15

When do you think climate change will start to harm the following (*n* = 412)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	36	20	14	14	7	5	4
This Park/Refuge	37	21	10	19	6	4	4

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n* = 381). The average amount of additional fees respondents were willing to pay was $10.00 per visit (see Table C.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n* = 383). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they are to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (37%, Table C.17).

Table C.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 381)

U.S. Dollars	Response Percentage (%)
0	9
1-5	27
6-10	30
11-15	5
16-20	14
> 21	15

Table C.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 412)

Categories	Response Percentage (%)
Extremely willing	33
Very willing	37
Somewhat willing	24
Slightly willing	5
Not willing	2

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they have reduced energy use at home (78%, Table C.18).

Table C.18

Which of the following actions have you taken? (*n* = 412)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	23
Planting trees	51
Insulating your home	59
Switching from a gasoline to an electric or hybrid car	16
Driving less	54
Walking, riding a bike, or using public transportation instead of driving	63
Switching from regular (incandescent) to compact fluorescent bulbs	70
Reducing the amount of beef you eat	43
Reducing airplane travel	18
Reducing energy use at home	78

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Everglades National Park (49%). Many of the visitors surveyed agreed that the effects of climate change can already be seen at this Park (43%, Table C.19).

Table C.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* = 404)	22	53	22	2	2
I would like to learn more about climate change impacts in this Park/Refuge (*n* = 400)	21	49	26	3	2
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* = 402)	27	48	22	2	2
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* = 397)	20	43	33	3	2

Respondents were asked what specific effects of climate change they have seen in Everglades National Park. Some options will not apply to Everglades National Park, as the list is comprehensive of all areas included in the study. Most visitors reported seeing changes in plant and animal populations at this Park (42%, Table C.20).

Table C.20
What specific effects of climate change have you seen at this Park/Refuge? (*n* = 412)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	27
Increasing areas affected by drought	41
Increasing air temperature	25
Thawing of permanently frozen soil	4
Loss of snow and/or ice	8
Increasing number of flooding events	13
Rising sea level	20
Coral bleaching on reefs	24
Change in plant and animal populations	42
More intense storms	27
None of the above	21
Other	2

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Everglades National Park. The effort most visitors surveyed recalled seeing was recycling (73%, Table C.21).

Table C.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 412)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	17
Energy efficient or LEED certified buildings	22
Use of alternative renewable energy (ex: wind turbines, solar panels)	28
Recycling	73
None of the above	21
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Everglades National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (63%). Many visitors indicated they would like to learn about climate change in Everglades National Park via the Park website (50%, Table C.22).

Table C.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 412)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 412)
Have not received any information on climate change from this Park/Refuge.	63	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	7
Indoor exhibits	19	45
Roadside exhibits	8	31
Trailside exhibits	10	47
Films, movies, videos	11	42
Living history/costumed interpretive programs	2	17
Park website	10	50
Printed materials (brochures, books, maps, etc.)	12	38
Electronic media/devices available to visitors	4	28
As a volunteer in the park	2	16
Children's activities	1	18
Ranger guided walks/talks	11	38
Self-guided tours	6	26
Other	2	0

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Everglades National Park. Most visitors surveyed indicated that they thought the quality of climate change education in Everglades National Park is average (42%). Most visitors indicated that the quantity of climate change education was also average (46%, Table C.23).

Table C.23

Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* = 364)	10	31	42	16	2
Quantity of education (*n* = 349)	8	28	46	17	2

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (84% said it is either very or extremely important, Table C.24).

Table C.24

How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n* = 380)	35	37	22	4	2
Ways parks/refuges are reducing emissions (*n* = 370)	28	41	24	5	2
Sources of greenhouse gas emissions (*n* = 375)	30	38	24	5	3
Relevance for surrounding communities (*n* = 371)	33	40	21	4	1
Impact(s) on places managed by parks/refuges (*n* = 362)	35	40	20	4	1
Ways parks/refuges are adapting to climate change (*n* = 367)	34	42	19	4	1
Actions visitors can take (*n* = 367)	47	37	11	3	2

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table C.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (42%) and that they strongly agreed they would rather take surveys on an iPad than on paper (55%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (52%).

Table C.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 396)	42	39	16	2	1
I would rather take surveys on an iPad than paper (*n*= 385)	55	27	8	6	4
I would enjoy taking future surveys on an iPad (*n*= 382)	52	31	15	2	0

APPENDIX D – KEY DEER NATIONAL WILDLIFE REFUGE VISITOR SURVEY

SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, District of Columbia, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 4 protected areas in the southern Florida area that was selected because agency leadership at the Washington office highlighted your refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 176 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table D.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (4,163) surveys were administered in 16 different refuges and parks from May 6, 2011 to January 8, 2012, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: the Blue Hole visitor area

Response Rates and Confidence Level. The survey team collected a total of 176 surveys at Key Deer National Wildlife Refuge. The response rate for this sample was 88%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$7% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age brackets of 26-35 (19%), 46-55 (19%), and 56-65 (19%). The highest percentage of visitors surveyed were female (52%). Many respondents had completed a graduate or professional degree (35%). Most visitors surveyed self-identified as white or Caucasain (86%) as well as Democratic (39%, Table 4.2). On average, visitors surveyed have visited the park eleven times. Many visitors indicated that this was their first visit (57%).

Table D.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N =162)		
10 – 18	13	8
19 – 25	14	9
26 – 35	30	19
36 – 45	27	17
46 – 55	30	19
56 – 65	30	19
66 – 75	15	9
76 – 85	2	1
86 – 95	1	1
Gender (N =165)		
Male	80	49

Female	85	52
Highest education level completed (N =164)		
Less than high school	7	4
Some high school	6	4
High school graduate	7	4
Some college	25	15
Two-year college degree	11	7
Four-year college degree	51	31
Graduate or professional degree	57	35
Ethnicity (N =154)		
American Indian or Alaska Native	2	1
Asian	8	5
Black or African American	0	0
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	6	4
White or Caucasian	132	86
Other	6	4
Political Affiliation (N =143)		
Republican	19	13
Democrat	56	39
Independent	29	20
No affiliation	33	23
Other	6	4

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table D.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the refuge they are respectively.

Table D.3
How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* =173)	30	36	31	3	1
I identify strongly with this Park/Refuge (*n*=172)	20	35	38	5	1
I am very attached to this Park/Refuge (*n*=172)	16	34	44	5	1
This Park/Refuge means a lot to me (*n*=172)	23	38	34	5	1
This Park/Refuge is the best place for what I like to do (*n*=170	10	26	49	13	2
No other place can compare to this Park/Refuge (*n*=173)	9	23	45	19	5
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=172)	5	16	48	23	8
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=171)	5	15	46	26	8

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Key Deer National Wildlife Refuge. Many respondents thought the National Park System was extremely important (69%) and the National Wildlife Refuge System was extremely important (67%). Most respondents stated that Key Deer National Wildlife Refuge is extremely important to themselves and their family (47%, Table D.4).

Table D.4

Please rate the importance of the following to you and your family. (*n* = 173)

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System	69	26	5	0	0
Our National Wildlife Refuge System	67	29	5	0	0
This Park/Refuge	47	35	13	5	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Key Deer National Wildlife Refuge. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (53%). Visitors perceived that the greatest threat to Key Deer National Wildlife Refuge was also lack of funding (35%, Table D.5).

Table D.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=173)	53	4	9	8	12	7	6	2
This Park or Refuge (*n*=170)	35	9	14	10	14	9	4	5

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Key Deer National Wildlife Refuge. Many respondents were extremely concerned about the future of the National Park System (44%) and were also extremely concerned for the future of the National Wildlife Refuge System (48%). Most respondents were extremely concerned about the future of Key Deer National Wildlife Refuge (35%, Table D.6).

Table D.6

How concerned are you about the future of the following? (*n* = 176)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	44	39	15	2	1
Our National Wildlife Refuge System	48	32	17	2	1
This Park/Refuge	35	31	30	3	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were very sure that climate change is happening (38%, Table D.7).

Table D.7

Do you think climate change is happening? (*n* = 176)

Categories	Response Percentage (%)
Extremely sure it is happening	38
Very sure climate change is happening	25
Somewhat sure climate change is happening	14
Not Sure	13
Somewhat sure climate change is not happening	3
Very sure climate change is not happening	2
Extremely sure it is not happening	5

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (46%) and very informed about the consequences of climate change (47%). Most visitors also felt somewhat informed about ways in which we can mitigate climate change (44%, Table D.8).

Table D.8
Personally, how well informed do you feel about the following? (n = 176)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	17	46	35	2	1
The different consequences of climate change	14	47	35	3	1
Ways in which we can reduce climate change	13	35	44	6	2

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (52%, Table D.9).

Table D.9
Assuming climate change is happening, do you think it is… (*n* = 171)

Categories	Response Percentage (%)
Caused mostly by human activities	35
Caused mostly by natural changes in the environment	11
Caused by both human activities and natural changes in the environment	52
None of the above because climate change isn't happening	2
Don't Know	0
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (41%, Table D.10).

Table D.10
How worried are you about climate change? (*n* = 176)

Categories	Response Percentage (%)
Extremely worried	20
Very worried	41
Somewhat worried	22
Slightly worried	8
Not worried	9

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (37%, Table D.11).

Table D.11
How important is the issue of climate change to you personally? (*n* = 176)

Categories	Response Percentage (%)
Extremely important	24
Very important	37
Somewhat important	26
Slightly important	7
Not important	6

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (42%, Table D.12).

Table D.12

How often do you think about climate change? (*n* = 176)

Categories	Response Percentage (%)
All the time	7
Frequently	35
Occasionally	42
Rarely	10
Never	6

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table 4.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table D.13).

Table D.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 168)	4	13	26	42	16
I feel somewhat responsible for the presently occurring environmental problems (*n*= 170)	9	55	21	11	3
I feel responsible for contributing to the condition of the climate (*n*= 169)	11	47	26	11	5

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Key Deer National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the refuge. Most visitors surveyed indicated that they think climate change will harm this park a great deal (42%, Table D.14).

Table D.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 170)	62	25	8	4	2
You personally (*n*= 171)	14	49	26	11	1
This Park/Refuge (*n*= 169)	42	35	14	4	5

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Key Deer National Wildlife Refuge. Most visitors surveyed indicated that they thought Key Deer National Wildlife Refuge was being harmed now (25%, Table D.15).

Table D.15

When do you think climate change will start to harm the following (*n* = 176)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	36	16	13	17	8	5	7
This Park/Refuge	25	22	12	24	5	5	7

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?"* (*n* = 157). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table D.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 154). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (34%, Table D.17).

Table D.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 157)

U.S. Dollars	Response Percentage (%)
0	13
1-5	53
6-10	16
11-15	3
16-20	3
> 21	11

Table D.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 176)

Categories	Response Percentage (%)
Extremely willing	27
Very willing	34
Somewhat willing	28
Slightly willing	6
Not willing	6

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (73%, Table D.18).

Table D.18

Which of the following actions have you taken? (*n* = 168)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	16
Planting trees	59
Insulating your home	61
Switching from a gasoline to an electric or hybrid car	11
Driving less	54
Walking, riding a bike, or using public transportation instead of driving	59
Switching from regular (incandescent) to compact fluorescent bulbs	70
Reducing the amount of beef you eat	39
Reducing airplane travel	20
Reducing energy use at home	73

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Key Deer National Wildlife Refuge (44%). Many of the visitors surveyed were neutral that the effects of climate change can already be seen at this Refuge (38%, Table D.19).

Table D.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*= 167)	22	47	20	6	5
I would like to learn more about climate change impacts in this Park/Refuge (*n*= 167)	19	44	26	7	5
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*= 166)	24	44	21	8	4
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 167)	13	34	38	11	5

Respondents were asked what specific effects of climate change they have seen in Key Deer National Wildlife Refuge. Some options will not apply to Key Deer National Wildlife Refuge, as the list is comprehensive of all areas included in the study. Most visitors reported seeing a change in plant and animal populations at this Refuge (38%, Table D.20).

Table D.20
What specific effects of climate change have you seen at this Park/Refuge? (*n* = 139)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	19
Increasing areas affected by drought	23
Increasing air temperature	20
Thawing of permanently frozen soil	7
Loss of snow and/or ice	11
Increasing number of flooding events	13
Rising sea level	25
Coral bleaching on reefs	22
Change in plant and animal populations	38
More intense storms	20
None of the above	29
Other	7

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Key Deer National Wildlife Refuge. Most visitors surveyed recalled seeing none of the options given (49%, Table D.21).

Table D.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 154)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	10
Energy efficient or LEED certified buildings	9
Use of alternative renewable energy (ex: wind turbines, solar panels)	13
Recycling	45
None of the above	49
Other	4

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Key Deer National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (73%). Many visitors indicated they would like to learn about climate change in Key Deer National Wildlife Refuge via trailside exhibits (52%, Table D.22).

Table D.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 154)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 161)
Have not received any information on climate change from this Park/Refuge.	73	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	13
Indoor exhibits	7	23
Roadside exhibits	7	26
Trailside exhibits	14	52
Films, movies, videos	6	22
Living history/costumed interpretive programs	3	13
Park website	5	44
Printed materials (brochures, books, maps, etc.)	10	35
Electronic media/devices available to visitors	5	25
As a volunteer in the park	1	12
Children's activities	2	11
Ranger guided walks/talks	7	29
Self-guided tours	9	34
Other	3	2

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Key Deer National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education in Key Deer National Wildlife Refuge was average (47%). Most visitors indicated that the quantity of climate change education was also average (46%, Table D.23).

Table D.23

Please rate your satisfaction with the current climate change education at this Park/Refuge. (*n* = 152)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	13	20	47	11	9
Quantity of education	12	17	46	15	10

Respondents were asked to specify how important they believe each of several climate change-related topics are for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (44% said it is either very or extremely important, Table D.24).

Table D.24

How important are the following topics for our parks/refuges to address? (*n* = 151)

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes	24	50	18	5	4
Ways parks/refuges are reducing emissions	26	45	21	5	3
Sources of greenhouse gas emissions	24	48	21	4	3
Relevance for surrounding communities	32	47	17	3	1
Impact(s) on places managed by parks/refuges	32	47	16	3	1
Ways parks/refuges are adapting to climate change	30	49	15	3	2
Actions visitors can take	44	40	11	3	2

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table D.25). Most visitors surveyed agreed that they enjoyed taking the survey on an iPad (45%) and that they strongly agreed they would rather take surveys on an iPad than on paper (55%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (53%).

Table D.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 161)	44	45	9	1	1
I would rather take surveys on an iPad than paper (*n*= 159)	55	28	9	4	4
I would enjoy taking future surveys on an iPad (*n*= 157)	53	36	10	0	2

APPENDIX E – TEN THOUSAND ISLANDS VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, District of Columbia, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 4 protected areas in the southern Florida area that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 111 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations. Each of these national parks and refuges are listed in the table below.

Table E.1
Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (4,163) surveys were administered in 11 different refuges and parks from May 6, 2011 to January 8, 2012, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific area where we administered surveys in your site was: the March Trail observation tower.

Response Rates and Confidence Interval. The survey team collected a total of 111 surveys at 10,000 Islands National Wildlife Refuge. The response rate for this sample was 82%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$9% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 56-65 (23%). The highest percentage of visitors surveyed were male (56%). Many respondents had completed a graduate or professional degree (48%). Most visitors surveyed self-identified as white or caucasain (98%) as well as democratic (36%, Table E.2). On average, visitors surveyed have visited the park four times. Many visitors indicated that this was their first visit (47%).

Table E.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N =107)		
10 – 18	2	2
19 – 25	11	10
26 – 35	11	10
36 – 45	8	8
46 – 55	22	21
56 – 65	25	23
66 – 75	22	21
76 – 85	6	6
86 – 95	0	0
Gender (N =109)		
Male	61	56
Female	48	44

Highest education level completed (N =106)		
Less than high school	2	2
Some high school	0	0
High school graduate	8	8
Some college	11	10
Two-year college degree	5	5
Four-year college degree	29	27
Graduate or professional degree	51	48
Ethnicity (N =107)		
American Indian or Alaska Native	0	0
Asian	1	1
Black or African American	0	0
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	0	0
White or Caucasian	105	98
Other	1	1
Political Affiliation (N =95)		
Republican	28	30
Democrat	34	36
Independent	15	16
No affiliation	17	18
Other	1	1

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table E.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the refuge they are respectively.

Table E.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* =111)	34	49	17	0	0
I identify strongly with this Park/Refuge (*n*=111)	26	41	31	2	0
I am very attached to this Park/Refuge (*n*=110)	22	37	36	5	0
This Park/Refuge means a lot to me (*n*=110)	25	41	34	1	0
This Park/Refuge is the best place for what I like to do (*n*=108)	11	41	37	10	1
No other place can compare to this Park/Refuge (*n*=109)	6	16	56	17	5
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=109)	1	12	63	20	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=109)	2	17	60	17	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and 10,000 Islands National Wildlife Refuge. Many respondents thought the National Park System was extremely important (76%) and the National Wildlife Refuge System was extremely important (73%). Most respondents stated that 10,000 Islands National Wildlife Refuge is extremely important to themselves and their family (59%, Table E.4).

Table E.4

Please rate the importance of the following to you and your family. (*n* = 111)

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System	76	21	3	0	0
Our National Wildlife Refuge System	73	25	3	0	0
This Park/Refuge	59	27	13	1	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to 10,000 Islands National Wildlife Refuge. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (39%). Visitors perceived that the greatest threat to 10,000 Islands National Wildlife Refuge was also lack of funding (25%, Table E.5).

Table E.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=110)	39	3	13	5	17	6	8	9
This Park or Refuge (*n*=105)	25	5	19	5	22	11	5	10

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and 10,000 Islands National Wildlife Refuge. Many respondents were extremely concerned about the future of the National Park Service (44%) and were also extremely concerned for the future of the National Wildlife Refuge Service (48%). Most respondents were very concerned about the future of 10,000 Islands National Wildlife Refuge (34%, Table E.6).

Table E.6

How concerned are you about the future of the following? (n = 111)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	44	35	16	4	1
Our National Wildlife Refuge System	48	31	18	3	1
This Park/Refuge	33	34	26	4	3

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors

Table E.7

Do you think climate change is happening? (n = 111)

Categories	Response Percentage (%)
Extremely sure it is happening	37
Very sure climate change is happening	22
Somewhat sure climate change is happening	14
Not Sure	15
Somewhat sure climate change is not happening	5
Very sure climate change is not happening	4
Extremely sure it is not happening	5

surveyed were extremely sure that climate change is happening (37%, Table E.7).

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (46%) and very informed about the consequences of climate change (49%). Most visitors also felt very informed about ways in which we can mitigate climate change (43%, Table E.8).

Table E.8
Personally, how well informed do you feel about the following? (n = 111)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	18	46	31	15	1
The different consequences of climate change	14	49	31	6	0
Ways in which we can reduce climate change	15	43	35	5	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (49%, Table E.9).

Table E.9
Assuming climate change is happening, do you think it is… (n = 111)

Categories	Response Percentage (%)
Caused mostly by human activities	29
Caused mostly by natural changes in the environment	20
Caused by both human activities and natural changes in the environment	49
None of the above because climate change isn't happening	2
Don't Know	1
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (28%, Table E.10).

Table E.10

How worried are you about climate change? (n = 111)

Categories	Response Percentage (%)
Extremely worried	24
Very worried	28
Somewhat worried	24
Slightly worried	14
Not worried	10

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was extremely important to them (30%, Table E.11).

Table E.11

How important is the issue of climate change to you personally? (n = 111)

Categories	Response Percentage (%)
Extremely important	30
Very important	26
Somewhat important	24
Slightly important	12
Not important	8

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (40%, Table E.12).

Table E.12

How often do you think about climate change? (n = 111)

Categories	Response Percentage (%)
All the time	8
Frequently	40
Occasionally	26
Rarely	20
Never	7

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table E.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table E.13).

Table E.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 111)	9	9	21	41	21
I feel somewhat responsible for the presently occurring environmental problems (*n*= 107)	12	45	21	13	9
I feel responsible for contributing to the condition of the climate (*n*= 107)	17	41	17	16	9

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and 10,000 Islands National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the refuge. Most visitors surveyed indicated that climate change would harm this park a great deal (39%, Table E.14).

Table E.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 109)	56	23	10	7	4
You personally (*n*= 108)	8	46	24	19	2
This Park/Refuge (*n*=109)	39	35	12	7	6

Respondents were asked when they thought climate change would start to harm both people in the U.S. and 10,000 Islands National Wildlife Refuge. Most visitors surveyed indicated that 10,000 Islands National Wildlife Refuge is being harmed now (32%, Table E.15).

Table E.15

When do you think climate change will start to harm the following

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States *(n = 111)*	34	11	11	24	9	4	7
This Park/Refuge*(n = 111)*	32	16	10	27	5	5	6

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?"* (*n* = 90). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table E.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 95). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (35%, Table E.17).

Table E.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n = 90)

U.S. Dollars	Response Percentage (%)
0	16
1-5	46
6-10	29
11-15	1
16-20	3
> 21	6

Table E.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (n = 111)

Categories	Response Percentage (%)
Extremely willing	26
Very willing	35
Somewhat willing	27
Slightly willing	3
Not willing	9

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (71%, Table E.18).

Table E.18

Which of the following actions have you taken? (n = 106)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	12
Planting trees	58
Insulating your home	63
Switching from a gasoline to an electric or hybrid car	10
Driving less	46
Walking, riding a bike, or using public transportation instead of driving	61
Switching from regular (incandescent) to compact fluorescent bulbs	67
Reducing the amount of beef you eat	43
Reducing airplane travel	18
Reducing energy use at home	71

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at 10,000 Islands National Wildlife Refuge (44%). Many of the visitors surveys were neutral that the effects of climate change can already be seen at this park (42%, Table E.19).

Table E.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*= 104)	23	46	24	1	6
I would like to learn more about climate change impacts in this Park/Refuge (*n*= 104)	18	44	31	0	7
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*= 104)	28	40	23	3	6
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 101)	16	29	42	7	7

Respondents were asked what specific effects of climate change they have seen at 10,000 Islands National Wildlife Refuge. Some of options will not apply to 10,000 Islands National Wildlife Refuge, as the list is comprehensive of all areas included in the study. Most visitors reported seeing changes in plant and animal populations at this Refuge (38%, Table E.20).

Table E.20
What specific effects of climate change have you seen at this Park/Refuge? (n = 111)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	15
Increasing areas affected by drought	26
Increasing air temperature	17
Thawing of permanently frozen soil	5
Loss of snow and/or ice	5
Increasing number of flooding events	12
Rising sea level	10
Coral bleaching on reefs	15
Change in plant and animal populations	38
More intense storms	11
None of the above	35
Other	5

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by 10,000 Islands National Wildlife Refuge. The effort most visitors surveyed recalled seeing was recycling (45%, Table E.21).

Table E.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n = 83)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	6
Energy efficient or LEED certified buildings	11
Use of alternative renewable energy (ex: wind turbines, solar panels)	13
Recycling	45
None of the above	49
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Table E.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 95)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 100)
Have not received any information on climate change from this Park/Refuge.	72	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	19
Indoor exhibits	8	16
Roadside exhibits	11	29
Trailside exhibits	8	51
Films, movies, videos	3	21
Living history/costumed interpretive programs	0	12
Park website	6	35
Printed materials (brochures, books, maps, etc.)	5	32
Electronic media/devices available to visitors	2	14
As a volunteer in the park	2	12
Children's activities	0	11
Ranger guided walks/talks	5	26
Self-guided tours	5	27
Other	3	0

Respondents were asked to indicate how they have received information on climate change at 10,000 Islands National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (72%). Many visitors indicated they would like to learn about climate change in 10,000 Islands National Wildlife Refuge via trailside exhibits (51%, Table E.22).

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in 10,000 Islands National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education in 10,000 Islands National Wildlife Refuge was average (51%). Most visitors indicated the quantity of climate change education to also be average (56%, Table E.23).

Table E.23

Please rate your satisfaction with the current climate change education at this Park/Refuge. (n = 83)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	10	18	51	16	6
Quantity of education	9	16	56	14	5

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitor surveys indicated that actions visitors could take were the most important topic for parks/refuges to address (45% said it is extremely important, Table E.24).

Table E.24

How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes *(n = 90)*	34	36	19	7	4
Ways parks/refuges are reducing emissions *(n = 87)*	31	40	16	9	3
Sources of greenhouse gas emissions *(n = 87)*	33	30	20	12	6
Relevance for surrounding communities *(n = 91)*	36	36	17	7	4
Impact(s) on places managed by parks/refuges *(n = 90)*	33	41	12	8	6
Ways parks/refuges are adapting to climate change *(n = 88)*	33	38	15	9	6
Actions visitors can take *(n = 89)*	45	33	11	5	7

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table E.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (46%), as well as strongly agreed that they would rather take surveys on an iPad than on paper (52%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (50%).

Table E.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 102)	46	39	10	4	1
I would rather take surveys on iPad than paper (*n*= 93)	52	33	9	3	3
I would enjoy taking future surveys on an iPad (*n*= 97)	50	35	12	3	0

APPENDIX F – ROCKY MOUNTAIN NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (District of Columbia, southern Florida, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of two protected areas in northern Colorado area that was selected because agency leadership at the Washington office highlighted your Park as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 376 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Figure F.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: the Beaver Meadows Visitor Center, Sprague Lake trailhead, and Bear Lake trailhead.

Response Rates and Confidence Level. The survey team collected a total of 376 surveys at Rocky Mountain National Park. The response rate for this sample was 54%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$5% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 46-55 (21%). The highest percentage of visitors surveyed were male (52%). Many respondents had completed a graduate or professional degree (38%). Most visitors surveyed self-identified as white or Caucasain (93%) as well as Democratic (37%, Table F.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (32%).

Table F.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=354)		
10 – 17	15	4
18 – 25	55	16
26 – 35	68	19
36 – 45	46	13
46 – 55	73	21
56 – 65	71	20
66 – 75	24	7
76 – 85	2	1
86 – 95	0	0
Gender (N=357)		
Male	187	52
Female	170	48

Highest education level completed (N=352)		
Less than high school	6	2
Some high school	11	3
High school graduate	25	7
Some college	48	14
Two-year college degree	19	5
Four-year college degree	109	31
Graduate or professional degree	134	38
Ethnicity (N=338)		
American Indian or Alaska Native	5	2
Asian	11	3
Black or African American	2	1
Hawaiian or Pacific Islander	1	0
Hispanic or Latino/Latina	3	1
White or Caucasian	314	93
Other	2	1
Political Affiliation (N=309)		
Republican	66	21
Democrat	114	37
Independent	52	17
No affiliation	69	22
Other	8	3

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table F.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table F.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*=376)	56	32	10	1	0
I identify strongly with this Park/Refuge (*n*=376)	45	33	20	1	1
I am very attached to this Park/Refuge (*n*=376)	41	29	28	2	1
This Park/Refuge means a lot to me (*n*=375)	46	33	20	1	1
This Park/Refuge is the best place for what I like to do (*n*=376)	30	35	31	4	1
No other place can compare to this Park/Refuge (*n*=375)	18	29	41	9	2
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=372)	15	29	41	13	1
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=373)	13	27	43	15	2

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Rocky Mountain National Park. Many respondents thought that the National Park System and the National Wildlife Refuge System were extremely important (72% and 69% respectively). Most respondents stated that Rocky Mountain National Park is extremely important to themselves and their family (66%, Table F.4).

Table F.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n*=376)	72	22	6	0	1
Our National Wildlife Refuge System (*n*=373)	69	22	7	1	0
This Park/Refuge (*n*=375)	66	23	10	1	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Rocky Mountain National Park. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (39%). Visitors perceived that the greatest threat to Rocky Mountain National Park was also lack of funding (31%, Table F.5).

Table F.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=371)	39	5	12	5	10	13	13	1
This Park or Refuge (*n*=369)	31	3	18	6	7	15	20	1

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Rocky Mountain National Park. Many respondents were very concerned about the future of the National Park System (45%) as well as the National Wildlife Refuge System (42%). Most respondents were also very concerned about the future of Rocky Mountain National Park (39%, Table F.6).

Table F.6

How concerned are you about the future of the following?

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n*=376)	39	45	13	3	1
Our National Wildlife Refuge System (*n*=374)	41	42	14	2	1
This Park/Refuge (*n*=376)	33	39	21	4	2

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (30%, Table F.7).

Table F.7

Do you think climate change is happening? (*n*=372)

Categories	Response Percentage (%)
Extremely sure it is happening	30
Very sure climate change is happening	22
Somewhat sure climate change is happening	20
Not Sure	10
Somewhat sure climate change is not happening	9
Very sure climate change is not happening	3
Extremely sure it is not happening	6

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (46%) and very informed about the consequences of climate change (50%). Most visitors also felt very informed about ways in which we can mitigate climate change (45%, Table F.8).

Table F.8
Personally, how well informed do you feel about the following?

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change (*n* = 375)	17	46	30	6	1
The different consequences of climate change (*n* = 374)	16	50	29	5	1
Ways in which we can reduce climate change (*n* = 374)	15	45	32	7	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was mostly caused by human activities (43%, Table F.9).

Table F.9
Assuming climate change is happening, do you think it is… (*n*=372)

Categories	Response Percentage (%)
Caused mostly by human activities	43
Caused mostly by natural changes in the environment	23
Caused by both human activities and natural changes in the environment	23
None of the above because climate change isn't happening	7
Don't Know	4
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (34%, Table F.10).

Table F.10

How worried are you about climate change? (*n*=375)

Categories	Response Percentage (%)
Extremely worried	22
Very worried	34
Somewhat worried	28
Slightly worried	8
Not worried	8

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was somewhat important to them (37%, Table F.11).

Table F.11

How important is the issue of climate change to you personally? (*n*=375)

Categories	Response Percentage (%)
Extremely important	20
Very important	28
Somewhat important	37
Slightly important	8
Not important	8

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (34%, Table F.12).

Table F.12

How often do you think about climate change? (*n*=375)

Categories	Response Percentage (%)
All the time	20
Frequently	34
Occasionally	32
Rarely	10
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table F.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table F.13).

Table F.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 367)	7	14	28	39	13
I feel somewhat responsible for the presently occurring environmental problems (*n*= 366)	9	51	28	7	6
I feel responsible for contributing to the condition of the climate (*n*= 365)	9	36	35	12	8

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Rocky Mountain National Park. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that they think climate change will harm this Park a great deal (41%, Table F.14).

Table F.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*=372)	57	26	8	6	3
You personally (*n*=370)	10	50	27	11	3
This Park/Refuge (*n*=369)	41	40	11	5	3

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Rocky Mountain National Park. Most visitors surveyed indicated that Rocky Mountain National Park is currently being impacted by climate change (37%, Table F.15).

Table F.15

When do you think climate change will start to harm the following

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States (*n*=373)	34	16	12	21	6	3	7
This Park/Refuge (*n*=374)	37	13	12	24	4	3	7

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n*=344). The average amount of additional fees respondents were willing to pay was $10.00 per visit (see Table F.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*=351). Respondents gave an average of seven days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (42%, Table F.17).

Table F.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n*=344)

U.S. Dollars	Response Percentage (%)
0	20
1-5	15
6-10	21
11-15	1
16-20	17
> 21	26

Table F.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n*=375)

Categories	Response Percentage (%)
Extremely willing	30
Very willing	42
Somewhat willing	21
Slightly willing	3
Not willing	4

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (74%, Table F.18).

Table F.18

Which of the following actions have you taken? (*n*=358)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	13
Planting trees	53
Insulating your home	60
Switching from a gasoline to an electric or hybrid car	10
Driving less	52
Walking, riding a bike, or using public transportation instead of driving	51
Switching from regular (incandescent) to compact fluorescent bulbs	65
Reducing the amount of beef you eat	33
Reducing airplane travel	17
Reducing energy use at home	74

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Rocky Mountain National Park (49%). Many of the visitors surveyed agree that the effects of climate change can already be seen at this Park (43%), Table F.19).

Table F.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*= 365)	18	48	27	3	3
I would like to learn more about climate change impacts in this Park/Refuge (*n*=364)	17	49	28	3	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=365)	23	46	26	2	3
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*=363)	20	43	32	3	3

Respondents were asked what specific effects of climate change they have seen in Rocky Mountain National Park. Some options will not apply to Rocky Mountain National Park, as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow and ice at this Park (45%, Table F.20).

Table F.20
What specific effects of climate change have you seen at this Park/Refuge? (*n*=346)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	7
Increasing areas affected by drought	29
Increasing air temperature	30
Thawing of permanently frozen soil	20
Loss of snow and/or ice	45
Increasing number of flooding events	18
Rising sea level	7
Coral bleaching on reefs	4
Change in plant and animal populations	38
More intense storms	19
None of the above	20
Other	5

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Rocky Mountain National Park. The effort most visitors surveyed recalled seeing was recycling (72%, Table F.21).

Table F.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n*=340)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	19
Energy efficient or LEED certified buildings	16
Use of alternative renewable energy (ex: wind turbines, solar panels)	26
Recycling	72
None of the above	19
Other	3

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Rocky Mountain National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (61%). Many visitors indicated they would like to learn about climate change in Rocky Mountain National Park via the park website (45%, Table F.22).

Table F.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n*=344)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n*=347)
Have not received any information on climate change from this Park/Refuge.	61	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	11
Indoor exhibits	15	35
Roadside exhibits	7	29
Trailside exhibits	10	39
Films, movies, videos	8	28
Living history/costumed interpretive programs	1	13
Park website	13	45
Printed materials (brochures, books, maps, etc.)	18	30
Electronic media/devices available to visitors	5	24
As a volunteer in the park	1	11
Children's activities	2	14
Ranger guided walks/talks	4	23
Self-guided tours	6	14
Other	2	1

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Rocky Mountain National Park. Most visitors surveyed indicated that the quality of climate change education in Rocky Mountain National Park was average (50%). Most visitors indicated that the quantity of climate change education was also average (47%, Table F.23).

Table F.23
Please rate your satisfaction with the current climate change education at this Park/Refuge. (*n*=339)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	7	27	50	13	4
Quantity of education	7	27	47	16	3

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (37% said it is extremely important, Table F.24).

Table F.24
How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n*=138)	25	44	20	5	7
Ways parks/refuges are reducing emissions (*n*=137)	25	45	19	7	4
Sources of greenhouse gas emissions (*n*=141)	23	45	18	8	6
Relevance for surrounding communities (*n*=139)	26	40	21	8	5
Impact(s) on places managed by parks/refuges (*n*=136)	26	45	19	6	4
Ways parks/refuges are adapting to climate change (*n*=138)	26	47	16	4	7
Actions visitors can take (*n*=139)	37	37	18	2	7

Respondents were asked to agree or disagree with statements regarding how the survey was administered. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table F.25). Most visitors surveyed agreed that they enjoyed taking the survey on an iPad (42%), and they strongly agreed that they would rather take surveys on an iPad than on paper (46%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (42%).

Table F.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*=347)	34	42	20	3	1
I would rather take surveys on an iPad than paper (*n*=341)	46	29	14	9	3
I would enjoy taking future surveys on an iPad (*n*=343)	42	30	20	5	3

APPENDIX G – ROCKY MOUNTAIN ARSENAL WILDLIFE REFUGE VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (District of Columbia, southern Florida, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2 protected areas in the northern Colorado area that was selected because agency leadership at the Washington office highlighted your refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 60 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table G.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include the visitor center.

Response Rates and Confidence Level. The survey team collected a total of 60 surveys at Rocky Mountain Arsenal National Wildlife Refuge. The response rate for this sample was 76%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$13% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 26-35 (29%). The highest percentage of visitors surveyed were male (51%). Many respondents had completed a graduate or professional degree (31%). Most visitors surveyed self-identified as white or Caucasain (76%) as well as Democratic (33%, Table G.2). On average, visitors surveyed have visited the park three times. Many visitors indicated that this was their first visit (40%).

Table G.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N =60)		
10 – 17	2	4
18 – 25	7	13
26 – 35	16	29
36 – 45	7	13
46 – 55	8	14
56 – 65	10	18
66 – 75	6	11
76 – 85	0	0
86 – 95	0	0
Gender (N =57)		
Male	29	51
Female	28	49

Highest education level completed (N =55)		
Less than high school	2	4
Some high school	1	2
High school graduate	1	2
Some college	12	22
Two-year college degree	6	11
Four-year college degree	16	29
Graduate or professional degree	17	31
Ethnicity (N =50)		
American Indian or Alaska Native	0	0
Asian	3	6
Black or African American	0	0
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	4	8
White or Caucasian	42	84
Other	1	2
Political Affiliation (N =48)		
Republican	3	6
Democrat	18	38
Independent	15	25
No affiliation	12	25
Other	0	0

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table G.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the refuge they are respectively.

Table G.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* =60)	20	62	18	0	0
I identify strongly with this Park/Refuge (*n*=59)	24	36	39	2	0
I am very attached to this Park/Refuge (*n*=59)	19	29	49	3	0
This Park/Refuge means a lot to me (*n*=59)	20	44	32	3	0
This Park/Refuge is the best place for what I like to do (*n*=59)	10	36	39	12	3
No other place can compare to this Park/Refuge (*n*=59)	10	17	48	19	7
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=58)	7	14	53	17	9
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=58)	5	16	50	21	9

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Rocky Mountain Arsenal National Wildlife Refuge. Many respondents thought the National Park System was extremely important (65%) and the National Wildlife Refuge System was extremely important (62%). Most respondents stated that Rocky Mountain Arsenal National Wildlife Refuge is extremely important to themselves and their family (52%, Table G.4).

Table G.4

Please rate the importance of the following to you and your family. (*n* = 60)

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System	65	30	5	0	0
Our National Wildlife Refuge System	62	28	10	0	0
This Park/Refuge	52	37	10	2	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Rocky Mountain Arsenal National Wildlife Refuge. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (52%). Visitors perceived that the greatest threat to Rocky Mountain Arsenal National Wildlife Refuge was also lack of funding (54%, Table G.5).

Table G.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=60)	52	3	7	3	12	15	2	7
This Park or Refuge (*n*=57)	54	0	2	0	32	5	2	5

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Rocky Mountain Arsenal. Many respondents were extremely concerned about the future of the National Park System (38%) and were also extremely concerned for the future of the National Wildlife Refuge System (38%). Most respondents were very concerned about the future of Rocky Mountain Arsenal National Wildlife Refuge (38%, Table G.6).

Table G.6
How concerned are you about the future of the following? (*n* = 60)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	38	37	25	0	0
Our National Wildlife Refuge System	38	35	25	2	0
This Park/Refuge	27	37	30	7	0

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (40%, Table G.7).

Table G.7
Do you think climate change is happening? (*n* = 60)

Categories	Response Percentage (%)
Extremely sure it is happening	40
Very sure climate change is happening	27
Somewhat sure climate change is happening	15
Not Sure	8
Somewhat sure climate change is not happening	7
Very sure climate change is not happening	2
Extremely sure it is not happening	2

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (47%) and very informed about the consequences of climate change (50%). Most visitors also felt very informed about ways in which we can mitigate climate change (42%, Table G.8).

Table G.8
Personally, how well informed do you feel about the following? (n = 60)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	12	47	38	2	2
The different consequences of climate change	15	50	33	2	0
Ways in which we can reduce climate change	10	42	38	7	3

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (48%, Table G.9).

Table G.9
Assuming climate change is happening, do you think it is… (*n* = 58)

Categories	Response Percentage (%)
Caused mostly by human activities	35
Caused mostly by natural changes in the environment	15
Caused by both human activities and natural changes in the environment	48
None of the above because climate change isn't happening	2
Don't Know	0
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (38%, Table G.10).

Table G.10
How worried are you about climate change? (*n* = 60)

Categories	Response Percentage (%)
Extremely worried	20
Very worried	38
Somewhat worried	27
Slightly worried	5
Not worried	10

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (32%, Table G.11).

Table G.11
How important is the issue of climate change to you personally? (*n* = 60)

Categories	Response Percentage (%)
Extremely important	23
Very important	32
Somewhat important	28
Slightly important	8
Not important	8

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (43%, Table G.12).

Table G.12
How often do you think about climate change? (*n* = 60)

Categories	Response Percentage (%)
All the time	8
Frequently	35
Occasionally	43
Rarely	10
Never	3

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table G.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table G.13).

Table G.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 59)	9	9	25	46	12
I feel somewhat responsible for the presently occurring environmental problems (*n*= 59)	9	49	27	7	9
I feel responsible for contributing to the condition of the climate (*n*= 59)	10	42	32	9	7

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Rocky Mountain Arsenal National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the refuge. Most visitors surveyed indicated that they think climate change will harm this park a moderate amount (52%, Table G.14).

Table G.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 58)	62	22	7	2	7
You personally (*n*= 58)	12	47	29	7	5
This Park/Refuge (*n*=58)	26	52	12	5	5

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Rocky Mountain Arsenal National Wildlife Refuge. Most visitors surveyed indicated that Rocky Mountain Arsenal was being harmed now (30%, Table G.15).

Table G.15

When do you think climate change will start to harm the following (*n* = 60)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	42	13	5	17	8	10	5
This Park/Refuge	30	22	10	22	5	5	7

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?"* (*n* = 55). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table G.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 54). Respondents gave an average of eight days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (38%, Table G.17).

Table G.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 55)

U.S. Dollars	Response Percentage (%)
0	13
1-5	53
6-10	26
11-15	4
16-20	0
> 21	5

Table G.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 60)

Categories	Response Percentage (%)
Extremely willing	25
Very willing	38
Somewhat willing	25
Slightly willing	7
Not willing	5

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (81%, Table G.18).

Table G.18

Which of the following actions have you taken? (*n* = 57)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	16
Planting trees	53
Insulating your home	51
Switching from a gasoline to an electric or hybrid car	4
Driving less	72
Walking, riding a bike, or using public transportation instead of driving	54
Switching from regular (incandescent) to compact fluorescent bulbs	70
Reducing the amount of beef you eat	37
Reducing airplane travel	23
Reducing energy use at home	81

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Rocky Mountain Arsenal National Wildlife Refuge (46%). Many of the visitors surveyed were neutral that the effects of climate change can already be seen at this Refuge (42%), Table G.19).

Table G.19

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*= 57)	18	49	26	4	4
I would like to learn more about climate change impacts in this Park/Refuge (*n*= 57)	19	46	26	5	4
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*= 57)	23	54	16	4	4
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 57)	12	37	42	4	5

Respondents were asked what specific effects of climate change they have seen in Rocky Mountain Arsenal National Wildlife Refuge. Some options will not apply to Rocky Mountain Arsenal, as the list is comprehensive of all areas included in the study. Most visitors reported seeing a change in plant and animal populations at this Refuge (36%, Table G.20).

Table G.20
What specific effects of climate change have you seen at this Park/Refuge? (*n* = 47)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	2
Increasing areas affected by drought	26
Increasing air temperature	28
Thawing of permanently frozen soil	13
Loss of snow and/or ice	30
Increasing number of flooding events	2
Rising sea level	2
Coral bleaching on reefs	2
Change in plant and animal populations	36
More intense storms	11
None of the above	38
Other	2

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Rocky Mountain Arsenal National Wildlife Refuge. The effort most visitors surveyed recalled seeing was recycling (75%, Table G.21).

Table G.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 52)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	15
Energy efficient or LEED certified buildings	58
Use of alternative renewable energy (ex: wind turbines, solar panels)	50
Recycling	75
None of the above	6
Other	0

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Rocky Mountain Arsenal National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (50%). Many visitors indicated they would like to learn about climate change via indoor exhibits (62%, Table G.22).

Table G.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 51)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 53)
Have not received any information on climate change from this Park/Refuge.	50	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	17
Indoor exhibits	29	62
Roadside exhibits	8	30
Trailside exhibits	8	53
Films, movies, videos	14	43
Living history/costumed interpretive programs	2	17
Park website	15	45
Printed materials (brochures, books, maps, etc.)	15	43
Electronic media/devices available to visitors	10	25
As a volunteer in the park	2	15
Children's activities	10	30
Ranger guided walks/talks	17	43
Self-guided tours	6	26
Other	2	2

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education at Rocky Mountain Arsenal National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education at Rocky Mountain Arsenal was average (40%). Most visitors indicated that the quantity of climate change education was also average (38%, Table G.23).

Table G.23

Please rate your satisfaction with the current climate change education at this Park/Refuge. (*n* = 50)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	12	32	40	12	4
Quantity of education	12	34	38	12	4

Respondents were asked to specify how important they believe each of several climate change-related topics are for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (38% said it is extremely important, Table G.24).

Table G.24

How important are the following topics for our parks/refuges to address? (*n* = 49)

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes	27	41	31	2	0
Ways parks/refuges are reducing emissions	23	46	25	6	0
Sources of greenhouse gas emissions	21	50	23	6	0
Relevance for surrounding communities	35	46	15	4	0
Impact(s) on places managed by parks/refuges	29	48	19	4	0
Ways parks/refuges are adapting to climate change	28	47	19	4	2
Actions visitors can take	38	47	11	4	0

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table G.25). Most visitors surveyed agreed that they enjoyed taking the survey on an iPad (47%) and that they strongly agreed they would rather take surveys on an iPad than on paper (43%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (47%).

Table G.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 55)	38	47	11	2	2
I would rather take surveys on an iPad than paper (*n*= 53)	43	36	15	2	4
I would enjoy taking future surveys on an iPad (*n*= 53)	47	36	15	2	0

APPENDIX H – PRINCE WILLIAM FOREST VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in the District of Columbia area that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 174 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations, and each of these national parks and refuges are listed in the table below.

Table H.1
Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: the visitor center and various trails throughout the park.

Response Rates and Confidence Interval. The survey team collected a total of 174 surveys at Prince William Forest Park. The response rate for this sample was 68%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$7% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 26-35 (32%). The highest percentage of visitors surveyed were male (56%). Many respondents had completed a graduate or professional degree (40%). Most visitors surveyed self-identified as white or caucasain (86%) as well as democratic (28%, Table H.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (33%).

Table H.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N =173)		
10 – 17	1	1
18 – 25	13	8
26 – 35	54	32
36 – 45	45	29
46 – 55	37	23
56 – 65	12	7
66 – 75	4	4
76 – 85	1	1
86 – 95	2	1
Gender (N =174)		
Male	97	56
Female	77	44

Highest education level completed (N =174)		
Less than high school	2	1
Some high school	2	1
High school graduate	7	4
Some college	16	9
Two-year college degree	9	5
Four-year college degree	68	39
Graduate or professional degree	70	40
Ethnicity (N =174)		
American Indian or Alaska Native	3	2
Asian	1	1
Black or African American	6	3
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	5	3
White or Caucasian	149	86
Other	10	6
Political Affiliation (N =173)		
Republican	45	26
Democrat	48	28
Independent	32	19
No affiliation	29	17
Other	19	11

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table H.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the park they are respectively.

Table H.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* =173)	27	41	31	1	0
I identify strongly with this Park/Refuge (*n*=174)	19	39	40	2	0
I am very attached to this Park/Refuge (*n*=174)	13	33	49	5	0
This Park/Refuge means a lot to me (*n*=174)	20	42	36	2	0
This Park/Refuge is the best place for what I like to do (*n*=174)	12	43	37	8	1
No other place can compare to this Park/Refuge (*n*=173)	2	18	51	24	5
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=174)	4	14	56	21	5
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=168)	4	20	48	26	3

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Prince William Forest Park. Many respondents thought the National Park System was extremely important (64%) and the National Wildlife Refuge System was extremely important (60%). Most respondents stated that Prince William Forest Park is extremely important to themselves and their family (37%, Table H.4).

Table H.4

Please rate the importance of the following to you and your family. (*n* = 174)

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System	64	29	6	1	1
Our National Wildlife Refuge System	60	31	8	1	1
This Park/Refuge	37	33	24	5	2

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Prince William Forest Park. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (60%). Visitors perceived that the greatest threat to Prince William Forest Park was also lack of funding (52%, Table H.5).

Table H.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=172)	60	2	4	10	12	2	8	2
This Park or Refuge (*n*=168)	52	2	4	8	19	2	8	4

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and Prince William Forest Park. Many respondents were very concerned about the future of the National Park Service (44%) and were also very concerned for the future of the National Wildlife Refuge Service (40%). Most respondents were somewhat concerned about the future of Prince William Forest Park (46%, Table H.6).

Table H.6

How concerned are you about the future of the following? (n = 174)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	28	44	21	4	3
Our National Wildlife Refuge System	26	40	27	4	3
This Park/Refuge	13	27	46	8	6

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were very sure that climate change is happening (27%, Table H.7).

Table H.7

Do you think climate change is happening? (n = 174)

Categories	Response Percentage (%)
Extremely sure it is happening	21
Very sure climate change is happening	27
Somewhat sure climate change is happening	25
Not Sure	17
Somewhat sure climate change is not happening	6
Very sure climate change is not happening	2
Extremely sure it is not happening	2

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt somewhat informed about the causes of climate change (43%) and somewhat informed about the consequences of climate change (46%). Most visitors also felt somewhat informed about ways in which we can mitigate climate change (44%, Table H.8).

Table H.8
Personally, how well informed do you feel about the following? (n = 174)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	10	33	43	13	1
The different consequences of climate change	11	32	46	9	1
Ways in which we can reduce climate change	9	32	44	14	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (47%, Table H.9).

Table H.9
Assuming climate change is happening, do you think it is… (n = 174)

Categories	Response Percentage (%)
Caused mostly by human activities	33
Caused mostly by natural changes in the environment	13
Caused by both human activities and natural changes in the environment	47
None of the above because climate change isn't happening	3
Don't Know	4
Other	1

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were somewhat worried about climate change (36%, Table H.10).

Table H.10
How worried are you about climate change? (n = 174)

Categories	Response Percentage (%)
Extremely worried	16
Very worried	25
Somewhat worried	36
Slightly worried	10
Not worried	13

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was somewhat important to them (36%, Table H.11).

Table H.11
How important is the issue of climate change to you personally? (n = 174)

Categories	Response Percentage (%)
Extremely important	12
Very important	32
Somewhat important	36
Slightly important	9
Not important	12

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (51%, Table H.12).

Table H.12

How often do you think about climate change? (n = 174)

Categories	Response Percentage (%)
All the time	2
Frequently	26
Occasionally	51
Rarely	13
Never	7

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table H.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table H.13).

Table H.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 170)	5	12	28	46	8
I feel somewhat responsible for the presently occurring environmental problems (*n*= 173)	5	51	22	17	5
I feel responsible for contributing to the condition of the climate (*n*= 164)	8	46	26	13	7

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Prince William Forest Park. Of particular interest is how much visitors believe climate change is harming the park. Most visitors surveyed indicated that climate change would harm this park a moderate amount (49%, Table H.14).

Table H.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 172)	47	38	6	7	2
You personally (*n*= 169)	10	50	28	10	2
This Park/Refuge (*n*=168)	27	49	14	7	3

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Prince William Forest Park. Most visitors surveyed indicated that they did not know when Prince William Forest Park would be harmed (30%, Table H.15).

Table H.15

When do you think climate change will start to harm the following (n = 173)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	29	16	16	21	6	4	8
This Park/Refuge	23	17	14	30	6	2	8

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?"* (*n* = 169). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table H.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n*= 166). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (44%, Table H.17).

Table H.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n = 169)

U.S. Dollars	Response Percentage (%)
0	12
1-5	47
6-10	24
11-15	3
16-20	8
> 21	12

Table H.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (n = 173)

Categories	Response Percentage (%)
Extremely willing	25
Very willing	44
Somewhat willing	20
Slightly willing	6
Not willing	5

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (71%, Table H.18).

Table H.18

Which of the following actions have you taken? (n = 169)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	7
Planting trees	50
Insulating your home	44
Switching from a gasoline to an electric or hybrid car	8
Driving less	54
Walking, riding a bike, or using public transportation instead of driving	54
Switching from regular (incandescent) to compact fluorescent bulbs	65
Reducing the amount of beef you eat	28
Reducing airplane travel	11
Reducing energy use at home	71

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Prince William Forest Park (46%). Many of the visitor surveys were neutral that the effects of climate change can already be seen at this park (41%), Table H.19).

Table H.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*= 172)	11	52	26	8	4
I would like to learn more about climate change impacts in this Park/Refuge (*n*= 169)	9	46	33	8	4
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*= 172)	15	45	27	9	4
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 172)	8	37	41	11	4

Respondents were asked what specific effects of climate change they have seen at Prince William Park Forest. Some of options will not apply to Prince William Park Forest, as the list is comprehensive of all areas included in the study. Most visitors reported seeing more intense storms at this Park (41%, Table H.20).

Table H.20

What specific effects of climate change have you seen at this Park/Refuge? (n = 151)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	7
Increasing areas affected by drought	23
Increasing air temperature	33
Thawing of permanently frozen soil	6
Loss of snow and/or ice	15
Increasing number of flooding events	25
Rising sea level	7
Coral bleaching on reefs	2
Change in plant and animal populations	23
More intense storms	41
None of the above	33
Other	2

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Prince William Forest Park. The effort most visitors surveyed recalled seeing was recycling (56%, Table H.21).

Table H.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n = 160)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	14
Energy efficient or LEED certified buildings	9
Use of alternative renewable energy (ex: wind turbines, solar panels)	10
Recycling	56
None of the above	35
Other	4

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Prince William Forest Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (75%). Many visitors indicated they would like to learn about climate change in Prince William Forest Park via park website (58%, Table H.22).

Table H.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 161)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 167)
Have not received any information on climate change from this Park/Refuge.	75	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	17
Indoor exhibits	3	29
Roadside exhibits	1	26
Trailside exhibits	4	37
Films, movies, videos	6	18
Living history/costumed interpretive programs	1	10
Park website	11	58
Printed materials (brochures, books, maps, etc.)	9	26
Electronic media/devices available to visitors	1	26
As a volunteer in the park	1	10
Children's activities	1	14
Ranger guided walks/talks	1	20
Self-guided tours	4	20
Other	5	1

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Prince William Forest Park. Most visitors surveyed indicated that the quality of climate change education in Prince William Forest Park was average (52%). Most visitors indicated the quantity of climate change education to also be average (53%, Table H.23).

Table H.23
Please rate your satisfaction with the current climate change education at this Park/Refuge. (n = 154)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	8	19	52	16	6
Quantity of education	6	20	53	12	7

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitor surveys indicated that actions visitors could take were the most important topic for parks/refuges to address (39% said it is either very or extremely important, Table H.24).

Table H.24
How important are the following topics for our parks/refuges to address? (n = 161)

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes	24	38	26	7	6
Ways parks/refuges are reducing emissions	22	44	21	8	6
Sources of greenhouse gas emissions	20	39	29	6	6
Relevance for surrounding communities	29	41	20	5	5
Impact(s) on places managed by parks/refuges	24	50	15	7	4
Ways parks/refuges are adapting to climate change	23	47	18	7	6
Actions visitors can take	39	37	14	6	6

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table H.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (54%), as well as strongly agreed that they would rather take surveys on an iPad than on paper (58%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (60%).

Table H.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 173)	54	27	17	2	1
I would rather take surveys on iPad than paper (*n*= 173)	58	21	10	5	6
I would enjoy taking future surveys on an iPad (*n*= 172)	60	26	12	1	1

APPENDIX I – NATIONAL CAPITAL PARKS EAST VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of three protected areas in the District of Columbia that was selected because agency leadership at the Washington office highlighted your park as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 162 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table I.1

Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response

rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: Frederick Douglass National Historic Site, Kenilworth Park and Aquatic Gardens, and Anacostia Park.

Response Rates and Confidence Level. The survey team collected a total of 162 surveys at National Capital Parks-East. The response rate for this sample was 76%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$8% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 26-35 (24%). The highest percentage of visitors surveyed were male (54%). Many respondents had completed a graduate or professional degree (51%). Most visitors surveyed self-identified as white or Caucasian (86%) as well as Democratic (60%, Table I.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (41%).

Table I.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=157)		
10 – 17	4	2
18 – 25	11	7
26 – 35	37	24
36 – 45	36	23
46 – 55	30	19
56 – 65	25	16
66 – 75	11	7
76 – 85	1	.6
86 – 95	0	0
Gender (N=159)		
Male	86	54
Female	73	46

Highest education level completed (N=160)		
Less than high school	5	3
Some high school	4	3
High school graduate	13	8
Some college	15	9
Two-year college degree	4	3
Four-year college degree	38	24
Graduate or professional degree	81	51
Ethnicity (N=156)		
American Indian or Alaska Native	1	1
Asian	6	4
Black or African American	34	22
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	1	1
White or Caucasian	102	86
Other	12	8
Political Affiliation (N=157)		
Republican	7	5
Democrat	94	60
Independent	20	13
No affiliation	19	12
Other	17	11

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table I.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the park they are respectively.

Table I.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*=160)	38	32	28	2	1
I identify strongly with this Park/Refuge (*n*=159)	27	27	39	6	1
I am very attached to this Park/Refuge (*n*=160)	26	23	44	8	1
This Park/Refuge means a lot to me (*n*=159)	30	29	35	6	1
This Park/Refuge is the best place for what I like to do (*n*=159)	18	28	43	9	3
No other place can compare to this Park/Refuge (*n*=157)	11	26	41	19	5
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=160)	9	18	41	25	8
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=158)	8	22	42	18	10

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and National Capital Parks-East. Many respondents thought the National Park System was extremely important (77%) and the National Wildlife Refuge System was extremely important (71%). Most respondents stated that National Capital Parks-East is extremely important to themselves and their family (38%, Table I.4).

Table I.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n*=161)	77	20	3	0	0
Our National Wildlife Refuge System (*n*=161)	71	24	5	0	0
This Park/Refuge (*n*=159)	38	32	22	8	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to National Capital Parks-East. Most respondents thought lack of funding was the greatest threat to national parks and refuges (60%). Visitors perceived that the greatest threat to National Capital Parks-East was also lack of funding (46%, Table I.5).

Table I.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=172)	60	1	3	0	19	1	3	13
This Park or Refuge (*n*=168)	46	1	4	0	37	1	0	

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and National Capital Parks-East. Many respondents were very concerned about the future of the National Park System (43%) and were also very concerned for the future of the National Wildlife Refuge System (41%). Most respondents were somewhat concerned about the future of National Capital Parks-East (41%, Table I.6).

Table I.6
How concerned are you about the future of the following? (*n*=162)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	38	43	17	3	0
Our National Wildlife Refuge System	36	41	20	3	0
This Park/Refuge	20	31	41	7	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (51%, Table I.7).

Table I.7
Do you think climate change is happening? (*n*=162)

Categories	Response Percentage (%)
Extremely sure it is happening	51
Very sure climate change is happening	25
Somewhat sure climate change is happening	12
Not sure	9
Somewhat sure climate change is not happening	1
Very sure climate change is not happening	1
Extremely sure it is not happening	1

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt somewhat informed about the causes of climate change (40%) and somewhat informed about the consequences of climate change (36%). Most visitors also felt somewhat informed about ways in which we can mitigate climate change (39%, Table I.8).

Table I.8
Personally, how well informed do you feel about the following? (*n*=174)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	18	35	40	4	3
The different consequences of climate change	17	34	36	9	3
Ways in which we can reduce climate change	18	32	39	7	4

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. The highest percentage of visitors surveyed (44%) indicated that climate change is either caused mostly by human activities or that it is caused by both human activities and natural changes in the environment (44%, Table I.9).

Table I.9
Assuming climate change is happening, do you think it is… (*n*=162)

Categories	Response Percentage (%)
Caused mostly by human activities	44
Caused mostly by natural changes in the environment	7
Caused by both human activities and natural changes in the environment	44
None of the above because climate change isn't happening	1
Don't Know	3
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (35%, Table I.10).

Table I.10
How worried are you about climate change? (*n*=162)

Categories	Response Percentage (%)
Extremely worried	32
Very worried	35
Somewhat worried	27
Slightly worried	4
Not worried	3

Respondents were asked to rate how important the issue of climate change is to them personally. Most visitors surveyed indicated that climate change was very important to them (41%, Table I.11).

Table I.11
How important is the issue of climate change to you personally? (*n*=162)

Categories	Response Percentage (%)
Extremely important	26
Very important	41
Somewhat important	25
Slightly important	6
Not important	2

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they think about climate change frequently (46%, Table I.12).

Table I.12
How often do you think about climate change? (*n*=162)

Categories	Response Percentage (%)
All the time	6
Frequently	46
Occasionally	36
Rarely	7
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table I.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table I.13).

Table I.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*=151)	4	10	18	48	21
I feel somewhat responsible for the presently occurring environmental problems (*n*= 152)	16	52	19	17	6
I feel responsible for contributing to the condition of the climate (*n*= 152)	20	49	20	7	4

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and National Capital Parks-East. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that they think climate change will harm this Park a moderate amount (49%, Table I.14).

Table I.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 160)	74	17	4	1	4
You personally (*n*= 158)	18	44	29	6	4
This Park/Refuge (*n*=158)	36	46	10	1	6

Respondents were asked to indicate when they thought climate change would start to harm people in the U.S. and National Capital Parks-East. Most visitors surveyed indicated that National Capital Parks-East is being harmed by climate change now (34%, Table I.15).

Table I.15

When do you think climate change will start to harm the following (*n*=162)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	42	20	7	19	6	3	3
This Park/Refuge	34	21	6	32	3	1	1

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n*=151). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table I.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?*" (*n*=154). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered extremely willing (44%, Table I.17).

Table I.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n*=151)

U.S. Dollars	Response Percentage (%)
0	10
1-5	54
6-10	23
11-15	3
16-20	5
> 21	5

Table I.17
How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n*=162)

Categories	Response Percentage (%)
Extremely willing	44
Very willing	33
Somewhat willing	19
Slightly willing	3
Not willing	2

Respondents were asked to state what they have done out of a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they have walked, ridden a bike, or used public transportation instead of driving (72%, Table I.18).

Table I.18
Which of the following actions have you taken? (*n*=155)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	18
Planting trees	41
Insulating your home	48
Switching from a gasoline to an electric or hybrid car	12
Driving less	61
Walking, riding a bike, or using public transportation instead of driving	72
Switching from regular (incandescent) to compact fluorescent bulbs	65
Reducing the amount of beef you eat	34
Reducing airplane travel	15
Reducing energy use at home	62

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at National Capital Parks-East (51%). Many of the visitors surveyed were neutral that the effects of climate change can already be seen at this Park (41%), Table I.19).

Table I.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*=158)	20	51	22	4	2
I would like to learn more about climate change impacts in this Park/Refuge (*n*=158)	18	49	27	4	2
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=156)	26	49	21	2	3
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*=157)	17	33	41	4	3

Respondents were asked what specific effects of climate change they have seen in National Capital Parks-East. Some options will not apply to National Capital Parks-East, as the list is comprehensive of all areas included in the study. Most visitors reported observing increased air temperature at this Park (39%, Table I.20).

Table I.20
What specific effects of climate change have you seen at this Park/Refuge? (*n*=151)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	4
Increasing areas affected by drought	21
Increasing air temperature	39
Thawing of permanently frozen soil	4
Loss of snow and/or ice	11
Increasing number of flooding events	22
Rising sea level	8
Coral bleaching on reefs	3
Change in plant and animal populations	37
More intense storms	21
None of the above	28
Other	3

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by National Capital Parks-East. The effort most visitors surveyed recalled seeing was recycling (52%, Table I.21).

Table I.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n*=138)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	10
Energy efficient or LEED certified buildings	12
Use of alternative renewable energy (ex: wind turbines, solar panels)	7
Recycling	52
None of the above	36
Other	5

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at National Capital Parks-East as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (75%). Many visitors indicated they would like to learn about climate change in National Capital Parks-East via the Park website (47%, Table I.22).

Table I.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n*=143)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n*=152)
Have not received any information on climate change from this Park/Refuge.	78	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	13
Indoor exhibits	4	42
Roadside exhibits	4	20
Trailside exhibits	6	45
Films, movies, videos	7	32
Living history/costumed interpretive programs	4	13
Park website	6	47
Printed materials (brochures, books, maps, etc.)	11	28
Electronic media/devices available to visitors	5	19
As a volunteer in the park	4	12
Children's activities	4	23
Ranger guided walks/talks	3	28
Self-guided tours	4	24
Other	4	1

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in National Capital Parks-East. Most visitors surveyed indicated that the quality of climate change education in National Capital Parks-East was average (51%). Most visitors indicated that the quantity of climate change education was also average (54%, Table I.23).

Table I.23

Please rate your satisfaction with the current climate change education at this Park/Refuge. (*n*=154)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	9	14	51	24	3
Quantity of education	10	11	54	22	3

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (45% said it is extremely important, Table I.24).

Table I.24

How important are the following topics for our parks/refuges to address?

Topics	Response Percentages (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n*=150)	29	41	25	2	3
Ways parks/refuges are reducing emissions (*n*=148)	25	45	24	3	3
Sources of greenhouse gas emissions (*n*=144)	26	38	32	2	3
Relevance for surrounding communities (*n*=148)	40	42	16	1	2
Impact(s) on places managed by parks/refuges (*n*=148)	32	48	18	0	2
Ways parks/refuges are adapting to climate change (*n*=147)	31	49	17	1	2
Actions visitors can take (*n*=146)	45	36	15	2	2

Respondents were asked to agree or disagree with statements regarding how the survey was administered. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table I.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (49%) and that they strongly agreed they would rather take surveys on an iPad than on paper (52%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (55%).

Table I.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 157)	49	29	18	3	1
I would rather take surveys on an iPad than paper (*n*= 154)	52	24	13	5	6
I would enjoy taking future surveys on an iPad (*n*= 154)	55	27	14	3	1

APPENDIX J – HARPERS FERRY NATIONAL HISTORIC PARK VISITOR SURVEY

SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in the District of Columbia area that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhancing ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 203 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations, and each of these national parks and refuges are listed in the table below.

Table J.1. *Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey*

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The survey team for recruiting participants used the following script:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the surveys were in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (71%) completed the electronic version of the survey on the iPad while the remaining 203 participants (29%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: The Harper's ferry river lookout area.

Response Rates and Confidence Interval. The survey team collected a total of 203 surveys at Harper's Ferry National Historical Park. The response rate for this sample was 68%. The sample from your site reflects the total population of visitors at a 95% confidence level with ± 7% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 46-55 (31%). The highest percentage of visitors surveyed were male (58%). Most respondents had completed a 4 year college degree (35%). Most visitors surveyed self-identified as white or caucasain (88%) as well as independent political affiliation (27%, Table 10.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (27%).

Table J.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N =191)		
10 – 17	2	1
18 – 25	17	9
26 – 35	24	11
36 – 45	33	17
46 – 55	59	31
56 – 65	41	21
66 – 75	12	6
76 – 85	3	2
86 – 95	0	0
Gender (N =199)		
Male	116	58
Female	83	42

Demographic Characteristics of Participants

Characteristic	*n*	%
Highest education level completed (N =200)		
Less than high school	2	1
Some high school	3	2
High school graduate	11	6
Some college	29	15
Two-year college degree	17	9
Four-year college degree	70	35
Graduate or professional degree	68	34
Ethnicity (N =199)		
American Indian or Alaska Native	3	2
Asian	2	1
Black or African American	5	3
Hawaiian or Pacific Islander	1	1
Hispanic or Latino/Latina	2	1
White or Caucasian	176	88
Other	10	5
Political Affiliation (N =200)		
Republican	38	19
Democrat	45	23
Independent	53	27
No affiliation	23	12
Other	41	21

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table J.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the park they are respectively.

Table J.3

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* =198)	34	38	27	1	0
I identify strongly with this Park/Refuge (*n* =198)	22	38	36	4	0
I am very attached to this Park/Refuge (*n* =197)	21	27	43	7	1
This Park/Refuge means a lot to me (*n* =196)	25	34	38	3	0
This Park/Refuge is the best place for what I like to do (*n* =196)	14	36	43	5	2
No other place can compare to this Park/Refuge (*n* =195)	8	26	42	21	4
I get more satisfaction out of visiting this Park/Refuge than any other (*n* =197)	4	16	52	23	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Harper's Ferry National Historical Park. Many respondents thought the National Park System was extremely important (82%) and the National Wildlife Refuge System was extremely important (72%). Most respondents stated that Harper's Ferry NHP is extremely important to themselves and their family (53%, Table J.4).

Table J.4
Please rate the importance of the following to you and your family.

	Response Percentage (%)				
Categories	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* =201)	82	17	1	0	0
Our National Wildlife Refuge System (*n* =199)	72	23	5	0	0
This Park/Refuge (*n* =198)	53	40	6	1	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as Harper's Ferry NHP. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (59%). Visitors perceived that the greatest threat to Harper's Ferry NHP was also lack of funding (52%, Table J.5).

Table J.5
What do you think is the greatest threat to the following?

	Response Percentage (%)							
Categories	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* =199)	59	5	4	5	13	6	7	3
This Park or Refuge (*n* =191)	52	10	3	8	15	3	7	2

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and Harper's Ferry National Historic Park. Many respondents were very concerned about the future of the National Park Service (44%) and were also very concerned for the future of the National Wildlife Refuge Service (40%). Most respondents were somewhat concerned about the future of Harper's Ferry NHP (46%, Table J.6).

Table J.6
How concerned are you about the future of the following?

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n* =202)	47	41	10	3	0
Our National Wildlife Refuge System (*n* =200)	46	40	12	3	0
This Park/Refuge (*n* =200)	28	41	27	5	0

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were very sure that climate change is happening (26%, Table J.7).

Table J.7
Do you think climate change is happening? (n = 202*)*

Categories	Response Percentage (%)
Extremely sure it is happening	25
Very sure climate change is happening	26
Somewhat sure climate change is happening	18
Not Sure	14
Somewhat sure climate change is not happening	8
Very sure climate change is not happening	3
Extremely sure it is not happening	6

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (48%) and very informed about the consequences of climate change (50%). Most visitors also felt very informed about ways in which we can mitigate climate change (46%, Table J.8).

Table J.8
Personally, how well informed do you feel about the following?

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change (*n* =199)	20	48	0	28	5
The different consequences of climate change (*n* =198)	20	50	0	26	4
Ways in which we can reduce climate change (*n* =197)	18	46	0	34	3

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (38%, Table J.9).

Table J.9
Assuming climate change is happening, do you think it is… (n =200*)*

Categories	Response Percentage (%)
Caused mostly by human activities	33
Caused mostly by natural changes in the environment	17
Caused by both human activities and natural changes in the environment	38
None of the above because climate change isn't happening	5
Don't Know	5
Other	3

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (40%, Table J.10).

Table J.10
*How worried are you about climate change? (n =*200*)*

Categories	Response Percentage (%)
Extremely worried	30
Very worried	40
Somewhat worried	30
Slightly worried	2
Not worried	0

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was somewhat important to them (38%, Table J.11).

Table J.11
*How important is the issue of climate change to you personally? (n =*200*)*

Categories	Response Percentage (%)
Extremely important	21
Very important	26
Somewhat important	38
Slightly important	10
Not important	6

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (37%, Table J.12).

Table J.12
*How often do you think about climate change? (n =*200*)*

Categories	Response Percentage (%)
All the time	27
Frequently	37
Occasionally	30
Rarely	7
Never	1

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table J.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table J.13).

Table J.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n* =188)	4	15	31	35	14
I feel somewhat responsible for the presently occurring environmental problems (*n* =190)	7	38	30	16	8
I feel responsible for contributing to the condition of the climate (*n* =134)	6	25	36	25	8

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Harper's Ferry National Historical Park. Of particular interest is how much

visitors believe climate change is harming the park. Most visitors surveyed indicated that climate change would harm this park a moderate amount (39%, Table J.14).

Table J.14
How much do you think climate change will harm the following?

	Response Percentage (%)				
Categories	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n* =197)	53	28	11	5	3
You personally (*n* =192)	13	43	29	12	3
This Park/Refuge (*n* =192)	31	39	17	7	6

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?"* (*n* =184). The average amount of additional fees respondents were willing to pay was up to $5.00 per visit (see Table J.15 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?"* (*n* =184). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (45%, Table J.16).

Table J.15
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n =184*)*

U.S. Dollars	Response Percentage (%)
0	17
1-5	33
6-10	27
11-15	5
16-20	6
> 21	15

Table J.16

*How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (n =*201*)*

Categories	Response Percentage (%)
Extremely willing	33
Very willing	45
Somewhat willing	18
Slightly willing	3
Not willing	1

Table J.17

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* =192)	15	51	24	7	3
I would like to learn more about climate change impacts in this Park/Refuge (*n* =188)	13	44	30	9	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* =190)	23	45	23	6	4
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* =188)	13	37	39	7	4

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Harper's Ferry NHP (44%). Many of the visitors surveys were neutral that the effects of climate change can already be seen at this park (39%), Table J.17).

Respondents were asked what specific effects of climate change they have seen at Harper's Ferry National Historical Park. Some of options will not apply to Harper's Ferry NHP, as the list is comprehensive of all areas included in the study. Most visitors reported seeing increased number of flood events at this Park (45%, Table J.18).

Table J.18

*What specific effects of climate change have you seen at this Park/Refuge? (n =*149*)*

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	7
Increasing areas affected by drought	15
Increasing air temperature	28
Thawing of permanently frozen soil	5
Loss of snow and/or ice	13
Increasing number of flooding events	45
Rising sea level	11
Coral bleaching on reefs	4
Change in plant and animal populations	26
More intense storms	14
None of the above	20
Other	4

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Harper's Ferry NHP. The effort most visitors surveyed recalled seeing was recycling (66%, Table J.19).

Table J.19

*What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n =*184*)*

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	15
Energy efficient or LEED certified buildings	10
Use of alternative renewable energy (ex: wind turbines, solar panels)	11
Recycling	66
None of the above	22
Other	7

Note. Percentages do not sum to 100 as multiple selections were allowed.

Table J.20

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

Ways of receiving information	Response Percentages (%)	
	How have you received information about climate change at this Park/Refuge? (*n* =197)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* =191)
Have not received any information on climate change from this Park/Refuge.	73	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	20
Indoor exhibits	1	8
Roadside exhibits	3	16
Trailside exhibits	3	33
Films, movies, videos	4	20
Living history/costumed interpretive programs	2	13
Park website	7	50
Printed materials (brochures, books, maps, etc.)	8	27
Electronic media/devices available to visitors	5	23
As a volunteer in the park	5	5
Children's activities	0	8
Ranger guided walks/talks	2	10
Self-guided tours	3	8
Other	3	3

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Harper's Ferry National Historical Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on

climate change (73%). Many visitors indicated they would like to learn about climate change in Harper's Ferry NHP via park website (50%, Table J.20).

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Harper's Ferry NHP. Most visitors surveyed indicated that the quality of climate change education in Harper's Ferry NHP was average (49%). Most visitors indicated the quantity of climate change education to also be average (50%, Table J.21).

Table J.21
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* =186)	7	19	49	20	6
Quantity of education (*n* =184)	7	19	50	19	6

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table J.22). Most visitors surveyed were neutral when asked if they enjoyed taking the survey on an iPad (50%), as well as neutral that they would rather take surveys on an iPad than on paper (30%). Visitors also indicated neutral when asked if they would enjoy taking future surveys on an iPad (43%).

Table J.22
How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n* =56)	5	30	50	11	4
I would rather take surveys on iPad than paper (*n* =53)	19	23	30	21	8
I would enjoy taking future surveys on an iPad (*n* =53)	4	21	43	25	8

APPENDIX K - KENAI FJORDS NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, and Puget Sound in western Washington). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of two protected areas in the Kenai Fjords area that was selected because agency leadership at the Washington office highlighted your park as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 493 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges are listed in the table below.

Table K.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response

rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site were the Exit Glacier trailheads and visitor center.

Response Rates and Confidence Level. The survey team collected a total of 493 surveys at Kenai Fjords National Park. The response rate for this sample was 68%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$4% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age brackets of 26-35 (20%) and 46-55 (20%). Of the visitors surveyed, there was a nearly equal number of males and females (approximately 50% each). Many respondents had completed a graduate or professional degree (40%). Most visitors surveyed self-identified as white or Caucasian (82%) as well as Republican (24%, Table K.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (70%).

Table K.2

Demographic Characteristics of Participants

Characteristic	*N*	%
Age at time of survey (years) (N=466)		
10 – 17	35	8
18 – 25	43	9
26 – 35	94	20
36 – 45	71	15
46 – 55	94	20
56 – 65	86	19
66 – 75	37	8
76 – 85	5	1
86 – 95	1	1
Gender (N=493)		
Male	231	50

Female	236	51
Highest education level completed (N=471)		
Less than high school	16	3
Some high school	17	4
High school graduate	30	6
Some college	58	12
Two-year college degree	27	6
Four-year college degree	134	29
Graduate or professional degree	189	40
Ethnicity (N=469)		
American Indian or Alaska Native	7	2
Asian	25	5
Black or African American	4	1
Hawaiian or Pacific Islander	-	-
Hispanic or Latino/Latina	21	5
White or Caucasian	384	82
Other	28	6
Political Affiliation (N=458)		
Republican	108	24
Democrat	104	23
Independent	77	17
No affiliation	97	21
Other	72	16

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table K.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table K.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*=490)	41	43	15	1	1
I identify strongly with this Park/Refuge (*n*=488)	25	38	33	3	1
I am very attached to this Park/Refuge (*n*=486)	17	34	46	4	1
This Park/Refuge means a lot to me (*n*=484)	25	42	31	2	1
This Park/Refuge is the best place for what I like to do (*n*=487)	10	39	41	9	1
No other place can compare to this Park/Refuge (*n*=485)	9	25	45	25	5
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=485)	5	17	49	25	5
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=481)	4	17	50	23	6

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Kenai Fjords National Park. Many respondents thought the National Park System was extremely important (69%) and the National Wildlife Refuge System was extremely important (66%). Most respondents stated that Kenai Fjords National Park is either very or extremely important to themselves and their family (40% for each response option, Table K.4).

Table K.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Park System (*n*=486)	69	27	4	1	0
Our National Wildlife Refuge System (*n*=487)	66	27	6	1	0
This Park/Refuge (*n*=485)	40	40	17	3	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Kenai Fjords National Park. Most respondents thought lack of funding was the greatest threat to national parks and refuges (39%). Visitors perceived that the greatest threat to Kenai Fjords National Park was climate change (58%, Table K.5).

Table K.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=486)	39	3	6	6	13	19	11	2
This Park or Refuge (*n*=476)	20	5	2	4	4	58	5	2

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Kenai Fjords National Park. Many respondents were very concerned about the future of the National Park System (37%) and were also very concerned for the future of the National Wildlife Refuge System (37%). Most respondents were somewhat concerned about the future of Kenai Fjords National Park (42%, Table K.6).

Table K.6
How concerned are you about the future of the following? (*n*=493)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	31	37	27	3	1
Our National Wildlife Refuge System	29	37	30	4	1
This Park/Refuge	21	31	42	5	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (32%, Table K.7).

Table K.7
Do you think climate change is happening? (*n*=493)

Categories	Response Percentage (%)
Extremely sure it is happening	32
Very sure climate change is happening	28
Somewhat sure climate change is happening	19
Not sure	9
Somewhat sure climate change is not happening	5
Very sure climate change is not happening	4
Extremely sure it is not happening	3

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt somewhat informed about the causes of climate change (42%) and very informed about the consequences of climate change (41%). Most visitors also felt somewhat informed about ways in which we can mitigate climate change (43%, Table K.8).

Table K.8
Personally, how well informed do you feel about the following? (*n*=493)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	12	39	42	6	1
The different consequences of climate change	11	41	40	7	1
Ways in which we can reduce climate change	12	34	43	10	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change is caused by both human activities and natural changes in the environment (59%, Table K.9).

Table K.9
Assuming climate change is happening, do you think it is… (*n*=490)

Categories	Response Percentage (%)
Caused mostly by human activities	18
Caused mostly by natural changes in the environment	19
Caused by both human activities and natural changes in the environment	59
None of the above because climate change isn't happening	2
Don't know	1
Other	1

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (33%, Table K.10).

Table K.10
How worried are you about climate change? (*n*=493)

Categories	Response Percentage (%)
Extremely worried	17
Very worried	33
Somewhat worried	27
Slightly worried	12
Not worried	12

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (34%, Table K.11).

Table K.11
How important is the issue of climate change to you personally?

Categories	Response Percentage (%)
Extremely important	16
Very important	34
Somewhat important	29
Slightly important	12
Not important	9

Respondents were asked how often they think about climate change. Most visitors surveyed indicated that they thought about climate change occasionally (44%, Table K.12).

Table K.12

How often do you think about climate change? (*n*=493)

Categories	Response Percentage (%)
All the time	5
Frequently	31
Occasionally	44
Rarely	13
Never	7

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table K.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table K.13).

Table K.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*=457)	7	16	25	40	12
I feel somewhat responsible for the presently occurring environmental problems (*n*=461)	7	48	24	13	9
I feel responsible for contributing to the condition of the climate (*n*=458)	8	43	27	13	9

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Kenai Fjords National Park. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that they think climate change will harm this Park a great deal (53%, Table K.14).

Table K.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*=485)	53	29	11	5	3
You personally (*n*= 486)	10	42	33	13	3
This Park/Refuge (*n*=477)	53	28	11	3	5

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Kenai Fjords National Park. Most visitors surveyed indicated that they believe Kenai Fjords National Park is being harmed by climate change now (40%, Table K.15).

Table K.15

When do you think climate change will start to harm the following (*n*=493)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	28	14	14	27	7	4	6
This Park/Refuge	40	12	8	30	4	2	4

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n*=236). The average amount of additional fees respondents were willing to pay was $0.00 per visit (see Table K.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?*" (*n*=440). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (40%, Table K.17).

Table K.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 236)

U.S. Dollars	Response Percentage (%)
0	70
1-5	24
6-10	2
11-15	1
16-20	3
> 21	1

Table K.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n*=493)

Categories	Response Percentage (%)
Extremely willing	29
Very willing	40
Somewhat willing	20
Slightly willing	5
Not willing	6

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (66%, Table K.18).

Table K.18

Which of the following actions have you taken? (*n*=471)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	16
Planting trees	53
Insulating your home	59
Switching from a gasoline to an electric or hybrid car	9
Driving less	47
Walking, riding a bike, or using public transportation instead of driving	54
Switching from regular (incandescent) to compact fluorescent bulbs	64
Reducing the amount of beef you eat	25
Reducing airplane travel	9
Reducing energy use at home	66

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Kenai Fjords National Park (46%). Many of the visitors surveyed agree that the effects of climate change can already be seen at this Park as well (45%, Table K.19).

Table K.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*=474)	12	49	29	7	4
I would like to learn more about climate change impacts in this Park/Refuge (*n*=471)	8	46	36	6	4
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=475)	28	48	19	3	2
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*=469)	33	45	18	3	2

Respondents were asked what specific effects of climate change they have seen in Kenai Fjords National Park. Some options will not apply to this Park, as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow and/or ice at this Park (81%, Table K.20).

Table K.20
What specific effects of climate change have you seen at this Park/Refuge? (*n*=443)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	14
Increasing areas affected by drought	12
Increasing air temperature	29
Thawing of permanently frozen soil	43
Loss of snow and/or ice	81
Increasing number of flooding events	17
Rising sea level	11
Coral bleaching on reefs	6
Change in plant and animal populations	26
More intense storms	11
None of the above	8
Other	1

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Kenai Fjords National Park. The effort most visitors surveyed recalled seeing was recycling (71%, Table K.21).

Table K.21
What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n*=423)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	12
Energy efficient or LEED certified buildings	20
Use of alternative renewable energy (ex: wind turbines, solar panels)	24
Recycling	71
None of the above	25
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Kenai Fjords National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (52%). Many visitors indicated they would like to learn about climate change in Kenai Fjords National Park via indoor and trailside exhibits (44% for each response option, Table K.22).

Table K.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n*=429)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n*=167)
Have not received any information on climate change from this Park/Refuge.	52	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	13
Indoor exhibits	25	44
Roadside exhibits	12	22
Trailside exhibits	25	44
Films, movies, videos	11	31
Living history/costumed interpretive programs	4	14
Park website	9	41
Printed materials (brochures, books, maps, etc.)	16	30
Electronic media/devices available to visitors	4	21
As a volunteer in the park	2	11
Children's activities	2	11
Ranger guided walks/talks	10	26
Self-guided tours	8	21
Other	2	1

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Kenai Fjords National Park. Most visitors surveyed indicated that the quality of climate change education in Kenai Fjords National Park was average (40%). Most visitors indicated that the quantity of climate change education was also average (42%, Table K.23).

Table K.23
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n*=421)	11	39	40	9	1
Quantity of education(*n*=406)	10	38	42	9	2

Respondents were asked to specify how important they believe each of several climate change-related topics is for parks and refuges to address. Most visitors surveyed indicated that actions visitors can take is the most important topic for parks/refuges to address (75% said it is either very or extremely important, Table K.24).

Table K.24
How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n*=441)	27	41	25	4	3
Ways parks/refuges are reducing emissions (*n*=427)	24	36	27	8	5
Sources of greenhouse gas emissions (*n*=427)	23	36	27	9	5
Relevance for surrounding communities (*n*=425)	26	40	26	6	2
Impact(s) on places managed by parks/refuges (*n*=424)	26	43	23	6	2
Ways parks/refuges are adapting to climate change (*n*=432)	25	46	21	5	3
Actions visitors can take (*n*=426)	36	39	16	5	3

Respondents were asked to agree or disagree with statements regarding how the survey was administered. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories reflect greater visitor preference for using an iPad to take surveys rather than paper (Table K.25). Most visitors surveyed strongly agreed that they enjoyed taking the survey on an iPad (38%) and that they strongly agreed they would rather take surveys on an iPad than on paper (54%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (48%).

Table K.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n* =466)	38	36	23	2	1
I would rather take surveys on iPad than paper (*n* =449)	54	29	13	4	4
I would enjoy taking future surveys on an iPad (*n* =449)	48	35	15	2	1

APPENDIX L - KENAI NATIONAL WILDLIFE REFUGE VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, and Puget Sound in western Washington.) We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of two protected areas in the Kenai Fjords area that was selected because agency leadership at the Washington office highlighted your refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 144 surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our five pilot site locations. Each of these national parks and refuges is listed in the table below.

Table L.1
Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capital Parks-East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response

rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this Park/Refuge]. Would you like to take our survey about landscape changes at this [Park/Refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on an iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. On-site survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. Recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: Upper Skilak, Lower Skilak and Hidden Lake campgrounds, Jim's Landing boat ramp, and two visitor centers.

Response Rates and Confidence Level. The survey team collected a total of 144 surveys at Kenai National Wildlife Refuge. The response rate for this sample was 75%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$8% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, and frequency of visits. Most visitors surveyed were in the age bracket of 26-35 (28%). The highest percentage of visitors surveyed were male (60%). Many respondents had completed a graduate or professional degree (36%). Most visitors surveyed self-identified as white or Caucasain (86%) as well as Republican (30%, Table L.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (25%).

Table L.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=125)		
10 – 17	6	6
18 – 25	17	14
26 – 35	34	28
36 – 45	20	18
46 – 55	24	19
56 – 65	20	16
66 – 75	4	4
76 – 85	0	0
86 – 95	0	0
Gender (N=129)		
Male	79	60
Female	51	40

Highest education level completed (N=127)		
Less than high school	3	2
Some high school	3	2
High school graduate	10	8
Some college	17	13
Two-year college degree	15	12
Four-year college degree	33	26
Graduate or professional degree	46	36
Ethnicity (N=125)		
American Indian or Alaska Native	3	2
Asian	6	5
Black or African American	0	0
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	3	2
White or Caucasian	107	86
Other	6	5
Political Affiliation (N=125)		
Republican	38	30
Democrat	19	15
Independent	21	17
No affiliation	36	29
Other	11	9

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table L.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the refuge they are respectively.

Table L.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*=141)	49	37	14	1	0
I identify strongly with this Park/Refuge (*n*=141)	37	36	25	3	0
I am very attached to this Park/Refuge (*n*=140)	32	30	33	5	0
This Park/Refuge means a lot to me (*n*=138)	36	37	24	3	1
This Park/Refuge is the best place for what I like to do (*n*=140)	30	34	31	6	0
No other place can compare to this Park/Refuge (*n*=140)	16	26	41	14	3
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=139)	18	24	42	12	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=141)	16	21	44	14	6

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Kenai National Wildlife Refuge. Many respondents thought the National Park System was extremely important (65%) and the National Wildlife Refuge System was extremely important (62%). Most respondents stated that Kenai National Wildlife Refuge was extremely important to themselves and their family (44%, Table L.4).

Table L.4

Please rate the importance of the following to you and your family. (*n*=139)

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System	65	32	3	1	0
Our National Wildlife Refuge System	62	32	6	1	0
This Park/Refuge	44	37	19	1	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Kenai National Wildlife Refuge. Most respondents thought lack of funding was the greatest threat to national parks and refuges (39%). Visitors perceived that the greatest threat to Kenai National Wildlife Refuge was overuse (33%, Table L.5).

Table L.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=141)	39	1	9	16	10	4	18	4
This Park or Refuge (*n*=138)	25	4	5	14	4	12	33	3

Respondents were asked to rate their level of concern for the future of the National Park System, the National Wildlife Refuge System, and Kenai National Wildlife Refuge. Many respondents were somewhat concerned about the future of the National Park System (32%) and were also somewhat concerned for the future of the National Wildlife Refuge System (34%). Additionally, most respondents were somewhat concerned about the future of Kenai National Wildlife Refuge (48%, Table L.6).

Table L.6

How concerned are you about the future of the following? (*n*=144)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	26	31	32	9	1
Our National Wildlife Refuge System	27	30	34	8	1
This Park/Refuge	19	22	48	10	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were very sure that climate change is happening (27%, Table L.7).

Table L.7

Do you think climate change is happening? (*n*=144)

Categories	Response Percentage (%)
Extremely sure it is happening	19
Very sure climate change is happening	27
Somewhat sure climate change is happening	17
Not sure	15
Somewhat sure climate change is not happening	8
Very sure climate change is not happening	8
Extremely sure it is not happening	6

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt somewhat informed about the causes of climate change (40%) and somewhat informed about the consequences of climate change (40%). Most visitors also felt somewhat informed about ways in which we can mitigate climate change (42%, Table L.8).

Table L.8
Personally, how well informed do you feel about the following? (*n*=144)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	20	28	40	10	2
The different consequences of climate change	15	33	40	10	2
Ways in which we can reduce climate change	14	33	42	9	3

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (50%, Table L.9).

Table L.9
Assuming climate change is happening, do you think it is… (*n*=143)

Categories	Response Percentage (%)
Caused mostly by human activities	18
Caused mostly by natural changes in the environment	24
Caused by both human activities and natural changes in the environment	50
None of the above because climate change isn't happening	5
Don't know	3
Other	1

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were somewhat worried about climate change (29%, Table L.10).

Table L.10
How worried are you about climate change? (*n*=144)

Categories	Response Percentage (%)
Extremely worried	13
Very worried	24
Somewhat worried	29
Slightly worried	12
Not worried	21

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was somewhat important to them (33%, Table L.11).

Table L.11
How important is the issue of climate change to you personally? (*n*=144)

Categories	Response Percentage (%)
Extremely important	15
Very important	28
Somewhat important	33
Slightly important	10
Not important	13

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (41%, Table L.12).

Table L.12
How often do you think about climate change? (*n*=144)

Categories	Response Percentage (%)
All the time	7
Frequently	24
Occasionally	41
Rarely	19
Never	9

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table L.13 are scalable items for the concept of responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table L.13).

Table L.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*=136)	9	15	29	32	14
I feel somewhat responsible for the presently occurring environmental problems (*n*=135)	6	36	21	22	15
I feel responsible for contributing to the condition of the climate (*n*=135)	6	30	27	21	17

Respondents were asked to indicate the extent to which they believe climate change will harm future generations, themselves, and Kenai National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the Refuge. Most visitors surveyed indicated that they think climate change will harm this Refuge a great deal (33%, Table L.14).

Table L.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*=140)	48	25	12	11	4
You personally (*n*=138)	12	33	31	20	5
This Park/Refuge (*n*=134)	33	30	16	13	8

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Kenai National Wildlife Refuge. Most visitors surveyed indicated that they did not know when Kenai National Wildlife Refuge would be harmed (39%, Table L.15).

Table L.15

When do you think climate change will start to harm the following (*n*=144)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	21	16	12	31	4	5	13
This Park/Refuge	18	16	9	39	3	4	12

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked, "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?*" (*n*=126). The average amount of additional fees respondents were willing to pay was $5.00 per visit (see Table L.16 for an alternative data representation). Similarly, visitors were asked, "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?*" (*n*=124). Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing or somewhat willing (29%, Table L.17).

Table L.16
How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n*=126)

U.S. Dollars	Response Percentage (%)
0	20
1-5	32
6-10	21
11-15	2
16-20	18
> 21	8

Table L.17
How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n*=144)

Categories	Response Percentage (%)
Extremely willing	26
Very willing	29
Somewhat willing	29
Slightly willing	6
Not willing	11

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (62%, Table L.18).

Table L.18
Which of the following actions have you taken? (*n*=134)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	11
Planting trees	52
Insulating your home	60
Switching from a gasoline to an electric or hybrid car	6
Driving less	45
Walking, riding a bike, or using public transportation instead of driving	47
Switching from regular (incandescent) to compact fluorescent bulbs	60
Reducing the amount of beef you eat	25
Reducing airplane travel	11
Reducing energy use at home	62

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Kenai National Wildlife Refuge (41%). Many of the visitors surveyed were neutral that the effects of climate change can already be seen at this Refuge (33%, Table L.19).

Table L.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*=131)	15	42	24	7	12
I would like to learn more about climate change impacts in this Park/Refuge (*n*=131)	15	41	28	5	12
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=131)	20	30	28	10	13
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 130)	14	29	33	11	14

Respondents were asked what specific effects of climate change they have seen in Kenai National Wildlife Refuge. Some options will not apply to Kenai National Wildlife Refuge, as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow and/or ice at this Refuge (50%, Table L.20).

Table L.20

What specific effects of climate change have you seen at this Park/Refuge? (*n*=107)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	12
Increasing areas affected by drought	13
Increasing air temperature	20
Thawing of permanently frozen soil	20
Loss of snow and/or ice	50
Increasing number of flooding events	7
Rising sea level	10
Coral bleaching on reefs	2
Change in plant and animal populations	28
More intense storms	8
None of the above	33
Other	1

Respondents were asked to indicate any efforts to reduce impacts of climate change they have seen employed by Kenai National Wildlife Refuge. The effort most visitors surveyed recalled seeing was none of the above (49%, Table L.21).

Table L.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n*=118)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	12
Energy efficient or LEED certified buildings	13
Use of alternative renewable energy (ex: wind turbines, solar panels)	16
Recycling	44
None of the above	49
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Kenai National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change (74%).

Table L.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n*=115)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge
Have not received any information on climate change from this Park/Refuge.	74	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	21
Indoor exhibits	9	19
Roadside exhibits	7	7
Trailside exhibits	10	23
Films, movies, videos	8	24
Living history/costumed interpretive programs	4	31
Park website	7	11
Printed materials (brochures, books, maps, etc.)	9	38
Electronic media/devices available to visitors	1	20
As a volunteer in the park	2	17
Children's activities	4	14
Ranger guided walks/talks	7	11
Self-guided tours	4	13
Other	1	2

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Kenai National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education in Kenai National Wildlife Refuge was average (44%). Most visitors indicated that the quantity of climate change education was also average (46%, Table L.23).

Table L.23
Please rate your satisfaction with the current climate change education at this Park/Refuge. (*n*=118)

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education	8	24	44	16	9
Quantity of education	7	19	46	19	9

Respondents were asked to specify how important they believe each of several climate change- related topics is for parks and refuges to address. A large percentage of visitors surveyed (65%) indicated that actions visitors can take as well as impact(s) on places managed by parks/refuges are the most important topics for parks/refuges to address (65% said each of these topics is either very or extremely important, Table L.24).

Table L.24
How important are the following topics for our parks/refuges to address? (*n*=116)

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes	28	35	19	9	9
Ways parks/refuges are reducing emissions	25	30	24	10	10
Sources of greenhouse gas emissions	24	36	19	6	15
Relevance for surrounding communities	28	35	20	9	8
Impact(s) on places managed by parks/refuges	28	37	19	8	9
Ways parks/refuges are adapting to climate change	23	35	26	5	11
Actions visitors can take	31	34	17	9	9

Respondents were asked to agree or disagree with statements regarding how the survey was administered. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using an iPad to take surveys rather than paper (Table L.25). Most visitors surveyed agreed that they enjoyed taking the survey on an iPad (46%), and they strongly agreed that they would rather take surveys on an iPad than on paper (54%). Visitors also strongly agreed that they would enjoy taking future surveys on an iPad (50%).

Table L.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n* =121)	43	46	18	1	1
I would rather take surveys on iPad than paper (*n* =122)	54	30	9	4	3
I would enjoy taking future surveys on an iPad (*n* =122)	50	36	11	2	2

APPENDIX M – DUNGENESS NATIONAL WILDLIFE REFUGE VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in Western Washington that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhancing ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 155 visitor surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six-month period our survey team administered this visitor survey at each park and refuge within our six pilot site locations (Figure M.1).

Table M.1

Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Northern Colorado
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
District of Columbia
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forrest Park (VA)
Kenai Peninsula Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. Survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: the overlook on the bluff above Dungeness Spit and along the bluffs trail to the West.

Response Rates and Confidence Interval. The survey team collected a total of 155 surveys at Dungeness Wildlife Refuge. The response rate for this sample was 58%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$8% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of 56-65 years old (29%). The highest percentage of visitors surveyed were male (51%). Many respondents have completed a graduate or professional degree (38%). Most visitors surveyed self-identified as White or Caucasian (91%) as well as Democratic (39%, Table M.2). On average, visitors surveyed have visited the refuge one time (51%).

Table M.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=150)		
10 – 17	7	5
18 – 25	8	6
26 – 35	18	12
36 – 45	27	18
46 – 55	30	20
56 – 65	44	29
66 – 75	14	9
76 – 85	1	1
86 – 95	1	1
Gender (N=151)		
Male	77	51
Female	74	49

Demographic Characteristics of Participants

Characteristic	*n*	%
Highest education level completed (N = 152)		
Less than high school	7	5
Some high school	0	0
High school graduate	14	9
Some college	15	10
Two-year college degree	16	10
Four-year college degree	41	27
Graduate or professional degree	59	39
Ethnicity (N = 149)		
American Indian or Alaska Native	2	1
Asian	4	3
Black or African American	0	0
Hawaiian or Pacific Islander	3	2
Hispanic or Latino/Latina	0	0
White or Caucasian	135	90
Other	2	1
Political Affiliation (N = 149)		
Republican	19	13
Democrat	58	39
Independent	28	19
No affiliation	24	16
Other	1	1

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table M.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon Dungeness National Wildlife Refuge they are respectively.

Table M.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*= 155)	36	40	22	2	0
I identify strongly with this Park/Refuge (*n*=153)	27	33	35	5	1
I am very attached to this Park/Refuge (*n*=153)	20	37	38	5	1
This Park/Refuge means a lot to me (*n*=152)	22	37	37	3	1
This Park/Refuge is the best place for what I like to do (*n*= 153)	12	34	44	9	1
No other place can compare to this Park/Refuge (*n*=152)	9	26	44	18	3
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=153)	5	15	51	26	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=145)	4	13	55	26	2

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Dungeness National Wildlife Refuge. Many respondents thought the National Park System was extremely important (68%) and the National Wildlife Refuge System was also extremely important (64%). Most respondents stated that Dungeness National Wildlife Refuge is extremely important to themselves and their family (52% Table M.4).

Table M.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n*=151)	68	25	7	1	0
Our National Wildlife Refuge System (*n*=150)	64	28	7	1	0
This Park/Refuge (*n*=147)	52	34	12	1	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Dungeness National Wildlife Refuge. Most respondents thought lack of funding was the greatest threat to national parks and refuges (56%). Visitors perceived that the greatest threat to Dungeness National Wildlife Refuge was also lack of funding (42%, Table M.5).

Table M.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=153)	56	1	2	10	15	6	7	4
This Park or Refuge (*n*=150)	42	8	3	10	15	15	3	3

Respondents were asked to rate their level of concern for the future of the National Park System, The National Wildlife Refuge System, and Dungeness National Wildlife Refuge. Many respondents were extremely concerned about the future of the National Park System (45%) and were extremely concerned for the future of the National Wildlife Refuge System (44%). Most respondents were somewhat concerned about the future of Dungeness National Wildlife Refuge (32%, Table M.6).

Table M.6

How concerned are you about the future of the following?

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n*= 155)	45	34	16	3	2
Our National Wildlife Refuge System (*n*=154)	44	36	16	3	2
This Park/Refuge (*n*=154)	29	30	32	7	3

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (40%, Table M.7).

Table M.7

Do you think climate change is happening? (*n* =155)

Categories	Response Percentage (%)
Extremely sure it is happening	40
Very sure climate change is happening	25
Somewhat sure climate change is happening	15
Not Sure	14
Somewhat sure climate change is not happening	3
Very sure climate change is not happening	3
Extremely sure it is not happening	1

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (41%) and felt very informed about the consequences of climate change (44%). Most visitors felt somewhat informed about ways in which we can mitigate climate change (43%, Table M.8).

Table M.8
Personally, how well informed do you feel about the following? (*n* = 155)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	16	41	39	5	0
The different consequences of climate change	16	44	34	7	0
Ways in which we can reduce climate change	12	36	43	7	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (47%, Table M.9).

Table M.9
Assuming climate change is happening, do you think it is… (*n* = 154)

Categories	Response Percentage (%)
Caused mostly by human activities	38
Caused mostly by natural changes in the environment	11
Caused by both human activities and natural changes in the environment	47
None of the above because climate change isn't happening	3
Don't Know	1
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (34%, Table M.10).

Table M.10
How worried are you about climate change? (*n* = 154)

Categories	Response Percentage (%)
Extremely worried	26
Very worried	34
Somewhat worried	25
Slightly worried	7
Not worried	8

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (34%, Table M.11).

Table M.11
How important is the issue of climate change to you personally? (*n* = 154)

Categories	Response Percentage (%)
Extremely important	27
Very important	34
Somewhat important	27
Slightly important	6
Not important	7

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (41%, Table M.12).

Table M.12

How often do you think about climate change? (*n* = 154)

Categories	Response Percentage (%)
All the time	7
Frequently	37
Occasionally	41
Rarely	10
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table M.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table M.13).

Table M.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*=150)	5	19	20	41	15
I feel somewhat responsible for the presently occurring environmental problems (*n*=152)	9	51	25	11	5
I feel responsible for contributing to the condition of the climate (*n*=144)	9	47	26	13	5

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Dungeness National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the Dungeness Wildlife Refuge. Most visitors surveyed indicated that they thought climate change would harm Dungeness National Wildlife Refuge a moderate amount (41%, Table M.14).

Table M.14
How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*=153)	63	24	7	4	2
You personally (*n*=153)	11	44	35	9	1
This Park/Refuge (*n*=152)	38	41	11	6	5

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Dungeness National Wildlife Refuge. Most visitors surveyed indicated that they did not know when Dungeness National Wildlife Refuge would be harmed (32%, Table M.15).

Table M.15
When do you think climate change will start to harm the following?

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States (*n*=154)	44	15	7	25	3	1	5
This Park/Refuge (*n*=155)	31	22	7	32	5	0	4

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?" (n = 146).* The average amount of additional fees respondents were willing to pay was $10.00 per visit (see Table M.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?" (n=146)*. Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered that they are very willing (38%, Table M.17).

Table M.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n* = 146)

U.S. Dollars	Response Percentage (%)
0	14
1-5	38
6-10	35
11-15	4
16-20	5
> 21	5

Table M.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 155)

Categories	Response Percentage (%)
Extremely willing	26
Very willing	38
Somewhat willing	30
Slightly willing	3
Not willing	3

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (69%, Table M.18).

Table M.18
Which of the following actions have you taken? (*n* = 151)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	15
Planting trees	60
Insulating your home	62
Switching from a gasoline to an electric or hybrid car	15
Driving less	67
Walking, riding a bike, or using public transportation instead of driving	60
Switching from regular (incandescent) to compact fluorescent bulbs	67
Reducing the amount of beef you eat	36
Reducing airplane travel	21
Reducing energy use at home	69

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Dungeness National Wildlife Refuge (57%). Many of the visitors surveyed were neutral that the effects of climate change can already be seen at Dungeness National Wildlife Refuge (47%, Table M.19).

Table M.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*=152)	15	57	20	6	1
I would like to learn more about climate change impacts in this Park/Refuge (*n*=152)	14	48	31	6	1
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=150)	24	46	25	4	1
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*=151)	13	33	47	5	2

Respondents were asked what specific effects of climate change they have seen at Dungeness National Wildlife Refuge. Some of options will not apply to Dungeness National Wildlife Refuge as the list is comprehensive of all areas included in the study. Most visitors reported seeing no effects (none of the above) of climate change at this Refuge (38%, Table M.20).

Table M.20

What specific effects of climate change have you seen at this Park/Refuge? (*n* = 111)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	15
Increasing areas affected by drought	9
Increasing air temperature	17
Thawing of permanently frozen soil	6
Loss of snow and/or ice	12
Increasing number of flooding events	17
Rising sea level	17
Coral bleaching on reefs	17
Change in plant and animal populations	32
More intense storms	22
None of the above	38
Other	3

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Dungeness National Wildlife Refuge. The effort most visitors surveyed recalled seeing was recycling (71%, Table M.21).

Table M.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 132)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	13
Energy efficient or LEED certified buildings	17
Use of alternative renewable energy (ex: wind turbines, solar panels)	9
Recycling	71
None of the above	24
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Dungeness National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received information on climate change (79%). The highest number of visitors indicated they would like to learn about climate change in Dungeness National Wildlife Refuge via the Refuge website (56%, Table M.22).

Table M.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

Ways of receiving information	Response Percentages (%)	
	How have you received information about climate change at this Park/Refuge? (*n* = 135)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 142)
Have not received any information on climate change from this Park/Refuge.	79	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	15
Indoor exhibits	2	24
Roadside exhibits	4	17
Trailside exhibits	10	54
Films, movies, videos	3	22
Living history/costumed interpretive programs	1	13
Park website	5	56
Printed materials (brochures, books, maps, etc.)	13	32
Electronic media/devices available to visitors	2	20
As a volunteer in the park	6	9
Children's activities	1	16
Ranger guided walks/talks	1	21
Self-guided tours	7	28
Other	2	0

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Dungeness National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education in Dungeness National Wildlife Refuge was average (56%) and most visitors indicated the quantity of climate change education was also average (53%, Table M.23).

Table M.23
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n*=128)	4	20	56	18	2
Quantity of education (*n*=120)	3	23	53	20	3

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitors surveys indicated that actions visitors can take is the most important topic for parks/refuges to address (75% said it is either very or extremely important, Table M.24).

Table M.24
How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely Important	Very Important	Somewhat Important	Slightly Important	Not Important
Climate science and atmospheric processes (*n*=134)	24	38	30	6	2
Ways parks/refuges are reducing emissions (*n*=132)	19	38	32	8	3
Sources of greenhouse gas emissions (*n*=133)	20	40	28	9	4
Relevance for surrounding communities (*n*=135)	25	45	23	5	2
Impact(s) on places managed by parks/refuges (*n*=133)	26	44	24	5	2
Ways parks/refuges are adapting to climate change (*n*=134)	19	52	22	5	2
Actions visitors can take (*n*=136)	37	38	19	4	2

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table M.25). Most visitors surveyed indicated that they strongly agreed with enjoying taking this survey on an iPad (40%). Visitors also indicated that they strongly agreed with taking surveys on an iPad rather than paper (56%), as well as they would enjoy taking future surveys on an iPad (46%).

Table M.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*=150)	40	39	19	1	2
I would rather take surveys on iPad than paper (*n*=144)	56	26	10	4	3
I would enjoy taking future surveys on an iPad (*n*=149)	46	32	19	2	2

APPENDIX N - MOUNT RAINIER NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in the Puget Sound area that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 409 visitor surveys, and this report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations, and each of these national parks and refuges are listed in the table below.

Table N.1
Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. Survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: inside and outside of the Henry M. Jackson Memorial Visitor Center at Paradise.

Response Rates and Confidence Interval. The survey team collected a total of 409 surveys at Mt. Rainier National Park. The response rate for this sample was 63%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$5% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 56-65 (23%). The highest percentage of visitors surveyed were female (52%). Many respondents had completed a graduate or professional degree (37%). Most visitors surveyed self-identified as caucasion (80%) as well as democratic (33%, Table N.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (52%).

Table N.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=383)		
10 – 17	27	9
18 – 25	40	12
26 – 35	54	15
36 – 45	57	17
46 – 55	78	20
56 – 65	82	23
66 – 75	38	10
76 – 85	5	1
86 – 95	0	0
Gender (N=391)		
Male	189	48
Female	202	52

Demographic Characteristics of Participants

Characteristic	*n*	%
Highest education level completed (N=391)		
Less than high school	19	5
Some high school	10	3
High school graduate	27	7
Some college	47	12
Two-year college degree	24	6
Four-year college degree	121	31
Graduate or professional degree	143	37
Ethnicity (N=387)		
American Indian or Alaska Native	1	0
Asian	24	6
Black or African American	7	2
Hawaiian or Pacific Islander	4	1
Hispanic or Latino/Latina	15	4
White or Caucasian	309	80
Other	7	2
Political Affiliation (N=380)		
Republican	70	18
Democrat	124	33
Independent	63	17
No affiliation	52	14
Other	17	5

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table N.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the park they are respectively.

Table N.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*=404)	36	46	17	1	0
I identify strongly with this Park/Refuge (*n*=400)	25	41	31	3	0
I am very attached to this Park/Refuge (*n*=401)	25	31	39	4	1
This Park/Refuge means a lot to me (*n*=399)	30	38	29	3	0
This Park/Refuge is the best place for what I like to do (*n*=401)	12	30	49	8	1
No other place can compare to this Park/Refuge (*n*=402)	15	21	45	17	2
I get more satisfaction out of visiting this Park/Refuge than any other (*n*=401)	7	14	55	22	2
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*=307)	7	11	55	23	4

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Mt Rainier National Park. Many respondents thought the National Park System was extremely important (63%) and the National Wildlife Refuge System was also extremely important (61%). Most respondents stated that Mt. Rainier National Park is extremely important to themselves and their family (54%, Table N.4).

Table N.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n*=406)	63	32	5	0	0
Our National Wildlife Refuge System (*n*=402)	61	30	9	0	0
This Park/Refuge (*n*=403)	54	36	9	1	0

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to Mt. Rainier National Park. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (51%). Visitors perceived that the greatest threat to Mt. Rainier National Park was also lack of funding (39%, Table N.5).

Table N.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*=405)	51	5	2	6	11	14	8	3
This Park or Refuge (*n*=393)	39	11	2	5	8	24	8	3

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and Mt. Rainier National Park. Many respondents were extremely concerned about the future of the National Park Service (37%) and were also extremely concerned for the future of the National Wildlife Refuge Service (37%). Most respondents were very

concerned about the future of Mt. Rainier National Park (33%, Table N.6).

Table N.6
How concerned are you about the future of the following?

Categories	Response Percentage (%)				
	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n*=407)	37	36	21	5	1
Our National Wildlife Refuge System (*n*=406)	37	34	24	5	0
This Park/Refuge (*n*=405)	31	33	29	6	1

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (33%, Table N.7).

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (44%) and very informed about the consequences of climate change (42%). Most visitors also felt very informed about

Table N.7
Do you think climate change is happening? (n= 407)

Categories	Response Percentage (%)
Extremely sure it is happening	33
Very sure climate change is happening	28
Somewhat sure climate change is happening	17
Not Sure	11
Somewhat sure climate change is not happening	4
Very sure climate change is not happening	4
Extremely sure it is not happening	3

ways in which we can mitigate climate change (39%, Table N.8).

Table N.8

Personally, how well informed do you feel about the following? (n= 402)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	16	44	33	7	0
The different consequences of climate change	16	42	35	6	1
Ways in which we can reduce climate change	15	39	37	7	2

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (39%, Table N.9).

Table N.9

Assuming climate change is happening, do you think it is… (n= 398)

Categories	Response Percentage (%)
Caused mostly by human activities	35
Caused mostly by natural changes in the environment	20
Caused by both human activities and natural changes in the environment	39
None of the above because climate change isn't happening	2
Don't Know	2
Other	2

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (33%, Table N.10).

Table N.10

How worried are you about climate change? (n= 404)

Categories	Response Percentage (%)
Extremely worried	20
Very worried	33
Somewhat worried	24
Slightly worried	14
Not worried	9

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (%, Table N.11).

Table N.11

How important is the issue of climate change to you personally? (n= 403)

Categories	Response Percentage (%)
Extremely important	19
Very important	31
Somewhat important	30
Slightly important	13
Not important	7

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (36%, Table N.12).

Table N.12

How often do you think about climate change? (n= 404)

Categories	Response Percentage (%)
All the time	10
Frequently	36
Occasionally	34
Rarely	15
Never	4

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table N.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table N.13).

Table N.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*=385)	5	18	26	39	12
I feel somewhat responsible for the presently occurring environmental problems (*n*=388)	7	47	27	12	7
I feel responsible for contributing to the condition of the climate (*n*=295)	8	42	30	12	8

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Mt. Rainier National Park. Of particular interest is how much visitors believe climate change is harming the park. Most visitors surveyed indicated that climate change would harm this park a great deal (44%, Table N.14).

Table N.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*=400)	55	28	8	6	3
You personally (*n*=392)	9	43	33	12	3
This Park/Refuge (*n*=391)	44	36	10	6	4

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Mt. Rainier National Park. Most visitors surveyed indicated that Mt Rainier National Park is being harmed now (38%, Table N.15).

Table N.15

When do you think climate change will start to harm the following

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States (*n*=404)	40	12	11	21	4	5	7
This Park/Refuge (*n*=403)	38	15	8	25	4	4	6

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?" (n = 352).* The average amount of additional fees respondents were willing to pay was $10.00 per visit (see Table N.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?" (n= 360).* Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (34%), Table N.17).

Table N.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n = 352)

U.S. Dollars	Response Percentage (%)
0	19
1-5	21
6-10	28
11-15	6
16-20	9
> 21	17

Table N.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (n = 407)

Categories	Response Percentage (%)
Extremely willing	30
Very willing	34
Somewhat willing	27
Slightly willing	4
Not willing	5

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they reduced energy use at home (70%, Table N.18).

Table N.18

Which of the following actions have you taken? (n = 388)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	12
Planting trees	50
Insulating you home	60
Switching from a gasoline to an electric or hybrid car	14
Driving less	50
Walking, riding a bike, or using public transportation instead of driving	51
Switching from regular (incandescent) to compact fluorescent bulbs	67
Reducing the amount of beef you eat	32
Reducing airplane travel	19
Reducing energy use at home	70

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Mt. Rainier National Park (44%). Many of the visitors surveys agree that the effects of climate change can already be seen at this park (42%), Table 14.19).

Table N.19

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n*=386)	15	47	29	5	3
I would like to learn more about climate change impacts in this Park/Refuge (*n*= 383)	14	44	33	6	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*=383)	24	49	20	4	3
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*=378)	20	42	31	4	3

Respondents were asked what specific effects of climate change they have seen at Mt. Rainier National Park. Some of options will not apply to Mt. Rainier National Park, as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow and/or ice at this Park (50%, Table N.20).

Table N.20

What specific effects of climate change have you seen at this Park/Refuge? (n = 321)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	8
Increasing areas affected by drought	13
Increasing air temperature	23
Thawing of permanently frozen soil	26
Loss of snow and/or ice	50
Increasing number of flooding events	31
Rising sea level	12
Coral bleaching on reefs	4
Change in plant and animal populations	25
More intense storms	19
None of the above	20
Other	4

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Mt. Rainier National Park. The effort most visitors surveyed recalled seeing was recycling (79%, Table N.21).

Table N.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n = 353)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	17
Energy efficient or LEED certified buildings	21
Use of alternative renewable energy (ex: wind turbines, solar panels)	16
Recycling	79
None of the above	13
Other	4

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Mt. Rainier National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they had not received any information on climate change from this Park (61 %). Many visitors indicated they would like to learn about climate change in Mt. rainier National Park via a Park website (48%, Table N.22).

Table N.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 349)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 360)
Have not received any information on climate change from this Park/Refuge.	61	0
I do not want to learn about climate change impacts and solutions at this Park/Refuge	0	13
Indoor exhibits	17	44
Roadside exhibits	9	30
Trailside exhibits	8	35
Films, movies, videos	11	33
Living history/costumed interpretive programs	3	13
Park website	9	48
Printed materials (brochures, books, maps, etc.)	14	35
Electronic media/devices available to visitors	2	20
As a volunteer in the park	1	8
Children's activities	3	19
Ranger guided walks/talks	6	22
Self-guided tours	5	19
Other	4	2

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Mt. Rainier National Park. Most visitors surveyed indicated that the quality of climate change education in Mt. Rainier National Park was average (51%) whereas most visitors indicated the quantity of climate change education to also be average (51%, Table N.23).

Table N.23

Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n*=320)	8	31	51	8	2
Quantity of education (*n*=316)	6	30	51	11	2

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitors surveys indicated that actions visitors can take was the most important topic for parks/refuges to address (36%, Table N.24).

Table N.24

How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n*=260)	24	42	23	6	5
Ways parks/refuges are reducing emissions (*n*=260)	20	42	27	7	5
Sources of greenhouse gas emissions (*n*=254)	23	40	26	5	6
Relevance for surrounding communities (*n*=255)	24	41	24	6	5
Impact(s) on places managed by parks/refuges (*n*=254)	24	43	25	4	4
Ways parks/refuges are adapting to climate change (*n*=257)	21	47	23	9	4
Actions visitors can take (*n*=259)	36	38	17	5	4

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper. Most visitors said they agreed that they enjoyed taking this survey on an iPad (37%), while visitors said they strongly agreed that they would rather take future surveys on an iPad than paper (42%). Visitors also said they would strongly agree that they would enjoy taking future surveys on an iPad (36%, Table N.25).

Table N.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*=375)	32	37	25	5	1
I would rather take surveys on iPad than paper (*n*=376)	42	26	19	8	5
I would enjoy taking future surveys on an iPad (*n*=372)	36	29	26	7	3

APPENDIX O – NISQUALLY NATIONAL WILDLIFE REFUGE VISITOR SURVEY

SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in the Puget Sound in western Washington that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhancing ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 291 visitor surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations, and each of these national parks and refuges are listed in the table below.

Figure O.1
Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. Survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: Picnic area and surrounding trailheads.

Response Rates and Confidence Interval. The survey team collected a total of 291 surveys at Nisqually National Wildlife Refuge. The response rate for this sample was 75%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$6% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 56 – 65 (34%). The highest percentage of visitors surveyed were female (57%). Many respondents had completed graduate or professional degree (41%). Most visitors surveyed self-identified as white or caucasian (85%) as well as democrate (47%, Table O.2). On average, most visitors indicated that this was their first visit to the refuge (35%).

Table O.2

Demographic Characteristics of Participants (N = 276)

Characteristic	*n*	%
Age at time of survey (years)		
10 – 17	6	2
18 – 25	17	6
26 – 35	27	10
36 – 45	33	12
46 – 55	44	16
56 – 65	93	34
66 – 75	56	16
76 – 85	13	5
86 – 95	0	0
Gender (*n* =280)		
Male	121	43
Female	159	57

Highest education level completed		
Less than high school	5	2
Some high school	3	1
High school graduate	16	6
Some college	48	17
Two-year college degree	24	9
Four-year college degree	70	25
Graduate or professional degree	115	41
Ethnicity (*n* = 276)		
American Indian or Alaska Native	6	2
Asian	11	4
Black or African American	1	1
Hawaiian or Pacific Islander	3	1
Hispanic or Latino/Latina	5	2
White or Caucasian	235	85
Other/ Do not wish to answer	15	2
Political Affiliation (*n* = 274)		
Republican	33	12
Democrat	129	47
Independent	35	13
No affiliation	51	19
Other/ Do not wish to answer	26	10

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table O.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the refuge they are respectively.

Table O.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* = 287)	44	38	17	1	0
I identify strongly with this Park/Refuge (*n* = 286)	32	40	26	2	0
I am very attached to this Park/Refuge (*n* = 284)	31	32	33	4	0
This Park/Refuge means a lot to me (*n* = 284)	34	39	25	2	0
This Park/Refuge is the best place for what I like to do (*n* = 285)	19	31	41	7	1
No other place can compare to this Park/Refuge (*n* = 282)	13	21	48	16	2
I get more satisfaction out of visiting this Park/Refuge than any other (*n* = 284)	12	14	50	20	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n* = 249)	10	17	48	20	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Nisqually National Wildlife Refuge. Many respondents thought the National Park System was extremely important (76%) and the National Wildlife Refuge System was extremely important (74%). Most respondents stated that Nisqually National Wildlife Refuge is extremely important to themselves and their family (63%, Table O.4).

Table O.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* = 289)	76	20	4	0	0
Our National Wildlife Refuge System (*n* = 284)	74	22	4	1	0
This Park/Refuge (*n* = 285)	63	29	7	1	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to the refuge they were visiting. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (64%). Visitors perceived that the greatest threat to Nisqually National Wildlife Refuge was lack of funding (54%, Table O.5).

Table O.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* = 289)	64	1	5	2	11	8	6	4
This Park or Refuge (*n* = 279)	54	3	10	1	18	6	4	4

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and Nisqually National Wildlife Refuge. Many respondents were extremely concerned about the future of the National Park Service (51%) and were extremely concerned for the future of the National Wildlife Refuge Service (45%). Most respondents were extremely concerned about the future of Nisqually National Wildlife Refuge (38%, Table O.6).

Table O.6

How concerned are you about the future of the following?

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System (*n* = 291)	51	33	15	0	1
Our National Wildlife Refuge System (*n* = 289)	45	34	19	1	1
This Park/Refuge (*n* = 289)	38	28	29	1	0

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (42%, Table O.7).

Table O.7

Do you think climate change is happening? (n = 291)

Categories	Response Percentage (%)
Extremely sure it is happening	42
Very sure climate change is happening	25
Somewhat sure climate change is happening	14
Not Sure	9
Somewhat sure climate change is not happening	5
Very sure climate change is not happening	3
Extremely sure it is not happening	2

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (50%) and very informed about the consequences of climate change (48%). Most visitors also felt very informed about ways in which we can mitigate climate change (41%, Table O.8).

Table O.8
Personally, how well informed do you feel about the following?

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change (*n* = 289)	13	50	30	5	2
The different consequences of climate change (*n* = 287)	13	48	32	6	1
Ways in which we can reduce climate change (*n* = 289)	10	41	40	8	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (47%, Table O.9).

Table O.9
Assuming climate change is happening, do you think it is… (n = 290*)*

Categories	Response Percentage (%)
Caused mostly by human activities	36
Caused mostly by natural changes in the environment	12
Caused by both human activities and natural changes in the environment	47
None of the above because climate change isn't happening	3
Don't Know	1
Other	1

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be

interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (40%, Table O.10).

Table O.10

How worried are you about climate change? (*n* = 291)

Categories	Response Percentage (%)
Extremely worried	25
Very worried	40
Somewhat worried	21
Slightly worried	7
Not worried	8

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (40%, Table O.11).

Table O.11

How important is the issue of climate change to you personally? (*n* = 291)

Categories	Response Percentage (%)
Extremely important	23
Very important	40
Somewhat important	23
Slightly important	8
Not important	6

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (42%, Table O.12).

Table O.12
How often do you think about climate change? (*n* = 291)

Categories	Response Percentage (%)
All the time	11
Frequently	42
Occasionally	34
Rarely	9
Never	4

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table O.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table O.13).

Table O.13
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n* = 278)	7	9	26	44	14
I feel somewhat responsible for the presently occurring environmental problems (*n* = 280)	11	54	19	10	6
I feel responsible for contributing to the condition of the climate (*n* = 249)	15	47	21	9	9

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Nisqually National Wildlife Refuge. Of particular interest is how much visitors believe climate change is harming the refuge. Most visitors surveyed indicated that climate change would harm this refuge a moderate amount (42%, Table O.14).

Table O.14
How much do you think climate change will harm the following?

	Response Percentage (%)				
Categories	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n* = 286)	63	23	6	4	4
You personally (*n* = 279)	12	50	27	9	3
This Park/Refuge (*n* = 277)	33	42	12	5	8

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Nisqually National Wildlife Refuge. Most visitors surveyed indicated that they did not know when climate change would start to harm Nisqually (34%, Table O.15).

Table O.15
When do you think climate change will start to harm the following

	Response Percentage (%)						
Categories	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States (*n* = 289)	39	17	11	23	1	4	6
This Park/Refuge (*n* = 290)	27	23	8	34	2	1	6

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?" (n =* 271*).* The average amount of additional fees respondents were willing to pay was $1.00 to $5.00 per visit (see Table O.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?" (n =* 262*).* Respondents gave an average of 0 days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (38%, Table O.17).

Table O.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (*n =* 271)

U.S. Dollars	Response Percentage (%)
0	15
1-5	53
6-10	21
11-15	4
16-20	3
> 21	5

Table O.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n* = 290)

Categories	Response Percentage (%)
Extremely willing	29
Very willing	38
Somewhat willing	23
Slightly willing	3
Not willing	6

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they switched from regular (incandescent) to compact fluorescent bulbs (72%, Table O.18).

Table O.18

Which of the following actions have you taken? (*n* = 282)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	16
Planting trees	59
Insulating you home	57
Switching from a gasoline to an electric or hybrid car	16
Driving less	62
Walking, riding a bike, or using public transportation instead of driving	55
Switching from regular (incandescent) to compact fluorescent bulbs	72
Reducing the amount of beef you eat	43
Reducing airplane travel	26
Reducing energy use at home	60

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Nisqually National Wildlife Refuge (44%). Many of the visitor surveys indicate neutral that the effects of climate change can already be seen at this refuge (46%, Table O.19).

Table O.19
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* = 280)	17	50	25	5	3
I would like to learn more about climate change impacts in this Park/Refuge (n = 279)	17	44	31	5	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* = 277)	23	44	26	3	4
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* = 277)	12	32	46	6	4

Respondents were asked what specific effects of climate change they have seen at Nisqually National Wildlife Refuge. Some of options will not apply to Nisqually, as the list is comprehensive of all areas included in the study. Most visitors reported seeing a change in animal and plant populations at this Refuge (41%, Table O.20).

Table O.20

What specific effects of climate change have you seen at this Park/Refuge? (*n* = 222)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	11
Increasing areas affected by drought	17
Increasing air temperature	19
Thawing of permanently frozen soil	4
Loss of snow and/or ice	10
Increasing number of flooding events	24
Rising sea level	12
Coral bleaching on reefs	4
Change in plant and animal populations	41
More intense storms	16
None of the above	27
Other	5

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Nisqually National Wildlife Refuge. The effort most visitors surveyed recalled seeing was recycling (67%, Table O.21).

Table O.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (*n* = 226)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	15
Energy efficient or LEED certified buildings	24
Use of alternative renewable energy (ex: wind turbines, solar panels)	17
Recycling	67
None of the above	23
Other	4

Note. Percentages do not sum to 100 as multiple selections were allowed.

Table O.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? (*n* = 261)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 268)
Have not received any information on climate change from this Park/Refuge.	72	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	14
Indoor exhibits	11	45
Roadside exhibits	1	19
Trailside exhibits	5	54
Films, movies, videos	3	27
Living history/costumed interpretive programs	2	13
Park website	4	40
Printed materials (brochures, books, maps, etc.)	10	38
Electronic media/devices available to visitors	2	19
As a volunteer in the park	0	10
Children's activities	0	11
Ranger guided walks/talks	1	25
Self-guided tours	7	21
Other	2	2

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Nisqually National Wildlife Refuge as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received information on

climate change (72%). Many visitors indicated they would like to learn about climate change in Nisqually National Wildlife Refuge via trailside exhibits (54%, Table O.22).

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Nisqually National Wildlife Refuge. Most visitors surveyed indicated that the quality of climate change education in Nisqually was average (49%) whereas most visitors indicated the quantity of climate change education to be average (51%, Table O.23).

Table O.23
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* = 222)	8	29	49	12	2
Quantity of education (*n* = 214)	9	24	51	14	1

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitors' surveys indicated that actions visitors can take was the most important topic for parks/refuges to address (83% said it is either very or extremely important, Table O.24).

Table O.24

How important are the following topics for our parks/refuges to address?

Topics	Response Percentages (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n* = 228)	30	40	21	5	4
Ways parks/refuges are reducing emissions (*n* = 227)	23	40	27	6	4
Sources of greenhouse gas emissions (*n* = 221)	25	39	28	2	6
Relevance for surrounding communities (*n* = 227)	33	42	19	1	4
Impact(s) on places managed by parks/refuges (*n* = 216)	30	42	24	2	2
Ways parks/refuges are adapting to climate change (*n* = 216)	27	49	19	2	3
Actions visitors can take (*n* = 228)	44	39	14	1	3

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table O.25).

Table O.25

How much do you agree or disagree with the following statements?

Statements	Response Percentages (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n* = 273)	36	41	20	3	2
I would rather take surveys on iPad than paper (*n* = 260)	41	30	17	7	5
I would enjoy taking future surveys on an iPad (*n* = 261)	41	35	18	5	2

APPENDIX P – NORTH CASCADES NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of 2-5 protected areas in Puget Sound in western Washington that was selected because agency leadership at the Washington office highlighted your park or refuge as an important place to invest resources in building capacity or enhance ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 291 visitor surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations. Each of these national parks and refuges are listed in the figure below.

Table P.1
Participating parks and refuges in the 2011 Visitors' Concerns about Climate Change Survey

Rocky Mountain Region
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida and the Keys
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
Washington D.C. Area
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forest Park (VA)
Southern Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. Survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: the North Cascades National Park Visitor Center adjacent to the Newhalem Creek Campground and the Diablo Lake Overlook area.

Response Rates and Confidence Interval. The survey team collected a total of 291 surveys in the North Cascades National Park. The response rate for this sample was 69%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$6 % margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 46-55 (25%). The highest percentage of visitors surveyed were male (54%). Many respondents had completed a graduate or professional degree (44%). Most visitors surveyed self-identified as white or caucasian (88%) as well as Democratic (29%, Table P.2). On average, visitors surveyed have visited the park one time. Many visitors indicated that this was their first visit (53%).

Table P.2

Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of survey (years) (N=280)		
10 – 17	11	3
18 – 25	23	8
26 – 35	52	20
36 – 45	37	13
46 – 55	68	25
56 – 65	61	22
66 – 75	26	9
76 – 85	2	0
86 – 95	0	0
Gender (N = 281)		
Male	151	54
Female	130	46

Highest education level completed (N = 283)		
Less than high school	6	2
Some high school	7	3
High school graduate	12	4
Some college	33	12
Two-year college degree	24	9
Four-year college degree	79	28
Graduate or professional degree	122	43
Ethnicity (N = 282)		
American Indian or Alaska Native	1	0
Asian	10	4
Black or African American	1	0
Hawaiian or Pacific Islander	0	0
Hispanic or Latino/Latina	1	0
White or Caucasian	249	88
Other	20	8
Political Affiliation (N = 281)		
Republican	34	12
Democrat	81	29
Independent	52	19
No affiliation	63	22
Other	51	18

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table P.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table P.3
How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n*= 290)	27	47	25	1	0
I identify strongly with this Park/Refuge (*n*= 289)	19	39	38	4	1
I am very attached to this Park/Refuge (*n*= 289)	16	27	52	4	0
This Park/Refuge means a lot to me (*n*= 287)	21	39	38	2	1
This Park/Refuge is the best place for what I like to do (*n*= 288)	11	30	51	8	1
No other place can compare to this Park/Refuge (*n*= 288)	9	17	51	19	4
I get more satisfaction out of visiting this Park/Refuge than any other (*n*= 288)	5	12	51	29	4
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n*= 287)	5	11	51	28	5

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and North Cascades National Park. Many respondents thought the National Park System was extremely important (73%) and the National Wildlife Refuge System was also extremely important (62%). Most respondents stated that North Cascades National Park is extremely important to themselves and their family (51%, Table P.4).

Table P.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n*= 286)	73	22	4	1	0
Our National Wildlife Refuge System (*n*= 280)	62	29	8	1	0
This Park/Refuge (*n*= 280)	51	35	14	0	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to North Cascades National Park. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (56 %). Visitors perceived that the greatest threat to North Cascades National Park was lack of funding (54%, Table P.5).

Table P.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n*= 290)	56	2	4	3	10	13	9	3
This Park or Refuge (*n*= 279)	54	3	3	3	10	17	7	3

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and North Cascades National Park. Many respondents were very concerned about the future of the National Park Service (43%) and were extremely/very concerned for the future of the National Wildlife Refuge Service (36%). Most respondents were very concerned for the future of North Cascades National Park (35%, Table P.6).

Table P.6

How concerned are you about the future of the following? (*n= 291*)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	35	43	17	4	1
Our National Wildlife Refuge System	36	36	23	4	1
This Park/Refuge	26	35	32	5	3

Visitor Knowledge and Opinions on Climate Change

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (33%, Table P.7).

Table P.7

Do you think climate change is happening? (*n=* 291)

Categories	Response Percentage (%)
Extremely sure it is happening	33
Very sure climate change is happening	29
Somewhat sure climate change is happening	17
Not Sure	10
Somewhat sure climate change is not happening	5
Very sure climate change is not happening	1
Extremely sure it is not happening	3

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (46%) and very informed about the consequences of climate change (43%). Most visitors also felt very informed about ways in which we can mitigate climate change (42%, Table P.8).

Table P.8
Personally, how well informed do you feel about the following? (n= 291)

	Response Percentage (%)				
Categories	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	16	46	33	6	0
The different consequences of climate change	18	43	33	6	0
Ways in which we can reduce climate change	12	42	38	8	0

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (55%, Table P.9).

Table P.9
Assuming climate change is happening, do you think it is… (*n*= 289)

Categories	Response Percentage (%)
Caused mostly by human activities	31
Caused mostly by natural changes in the environment	12
Caused by both human activities and natural changes in the environment	55
None of the above because climate change isn't happening	0
Don't Know	1
Other	1

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (32%, Table P.10).

Table P.10

How worried are you about climate change? (*n*= 291)

Categories	Response Percentage (%)
Extremely worried	20
Very worried	32
Somewhat worried	30
Slightly worried	12
Not worried	6

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (37%, Table P.11).

Table P.11

How important is the issue of climate change to you personally? (*n*= 291)

Categories	Response Percentage (%)
Extremely important	21
Very important	37
Somewhat important	25
Slightly important	12
Not important	5

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change occasionally (40%, Table P.12).

Table P.12

How often do you think about climate change? (*n*= 291)

Categories	Response Percentage (%)
All the time	6
Frequently	39
Occasionally	40
Rarely	11
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table P.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table P.13).

Table P.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n*= 283)	3	16	22	45	15
I feel somewhat responsible for the presently occurring environmental problems (*n*= 288)	7	55	23	10	5
I feel responsible for contributing to the condition of the climate (*n*= 282)	9	49	26	10	6

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and North Cascades National Park. Of particular interest is how much visitors believe climate change is harming the park. Most visitors surveyed indicated that climate change would harm this park a moderate amount (43%, Table P.14).

Table P.14

How much do you think climate change will harm the following?

Categories	Response Percentage (%)				
	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n*= 290)	60	23	11	3	2
You personally (*n*= 289)	11	52	25	11	2
This Park/Refuge (*n*= 286)	35	43	9	5	8

Respondents were asked when they thought climate change would start to harm both people in the U.S. and North Cascades National Park. Most visitors surveyed indicated that North Cascades National Park was being harmed right now (30%, Table P.15).

Table P.15

When do you think climate change will start to harm the following (n= 291)

Categories	Response Percentage (%)						
	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	35	16	11	23	4	6	5
This Park/Refuge	30	17	9	31	6	3	5

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?" (n = 251).* The average amount of additional fees respondents were willing to pay was $10.00 per visit (see Table P.16 for an alternative data representation). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?" (n= 255).* Respondents gave an average of zero days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (37%, Table P.17).

Table P.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n= 251)

U.S. Dollars	Response Percentage (%)
0	16
1-5	25
6-10	32
11-15	6
16-20	6
> 21	14

Table P.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (*n*= 291)

Categories	Response Percentage (%)
Extremely willing	26
Very willing	37
Somewhat willing	31
Slightly willing	3
Not willing	3

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they switched from regular (incandescent) to compact fluorescent bulbs (70%, Table P.18).

Table P.18

Which of the following actions have you taken? (n= 277)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	21
Planting trees	53
Insulating your home	60
Switching from a gasoline to an electric or hybrid car	12
Driving less	59
Walking, riding a bike, or using public transportation instead of driving	56
Switching from regular (incandescent) to compact fluorescent bulbs	70
Reducing the amount of beef you eat	34
Reducing airplane travel	17
Reducing energy use at home	68

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at North Cascades National Park (43%). Many of the visitors surveyed indicated neutral that the effects of climate change can already be seen at this park (41%), Table P.19).

Table P.19

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* =281)	14	52	28	4	3
I would like to learn more about climate change impacts in this Park/Refuge (n=281)	12	43	38	4	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n*= 280)	27	43	23	4	3
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n*= 280)	18	33	41	5	3

Respondents were asked what specific effects of climate change they have seen at North Cascades National Park. Some of options will not apply to North Cascades, as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow and/or ice at this Park (45%, Table P.20).

Table P.20

What specific effects of climate change have you seen at this Park/Refuge? (n= 212)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	7
Increasing areas affected by drought	12
Increasing air temperature	21
Thawing of permanently frozen soil	16
Loss of snow and/or ice	45
Increasing number of flooding events	31
Rising sea level	9
Coral bleaching on reefs	4
Change in plant and animal populations	23
More intense storms	17
None of the above	28
Other	3

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by North Cascades National Park. The effort most visitors surveyed recalled seeing was recycling (72%, Table P.21).

Table P.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n= 234)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	13
Energy efficient or LEED certified buildings	19
Use of alternative renewable energy (ex: wind turbines, solar panels)	20
Recycling	72
None of the above	23
Other	3

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at North Cascades National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received information on climate change (70%). Many visitors indicated they would like to learn about climate change in North Cascades National Park via park website (50%, Table P.22).

Table P.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

	Response Percentages (%)	
Ways of receiving information	How have you received information about climate change at this Park/Refuge? *(n= 231)*	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? *(n= 264)*
Have not received any information on climate change from this Park/Refuge.	70	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	11
Indoor exhibits	14	45
Roadside exhibits	7	35
Trailside exhibits	5	42
Films, movies, videos	10	31
Living history/costumed interpretive programs	4	14
Park website	8	50
Printed materials (brochures, books, maps, etc.)	10	29
Electronic media/devices available to visitors	4	23
As a volunteer in the park	1	6
Children's activities	2	14
Ranger guided walks/talks	4	24
Self-guided tours	3	20
Other	4	1

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in North Cascades National Park. Most visitors surveyed indicated that the quality of climate change education in North Cascades National Park was average (48%) whereas most visitors indicated the quantity of climate change education to be average (49%, Table P.23).

Table P.23
Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n*= 211)	10	32	48	9	1
Quantity of education (*n*= 202)	8	31	49	10	2

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitors' surveys indicated that actions visitors can take is the most important topic for parks/refuges to address (78% said it is either very or extremely important, Table P.24).

Table P.24
How important are the following topics for our parks/refuges to address?

	Response Percentages (%)				
Topics	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n*= 259)	27	43	20	7	4
Ways parks/refuges are reducing emissions (*n*= 255)	20	44	25	7	4
Sources of greenhouse gas emissions (*n*= 256)	22	41	23	9	5
Relevance for surrounding communities (*n*= 251)	26	40	23	8	4
Impact(s) on places managed by parks/refuges (*n*= 255)	26	44	21	6	3
Ways parks/refuges are adapting to climate change (*n*= 253)	27	45	20	5	4
Actions visitors can take (*n*= 256)	42	36	16	4	3

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table P.25).

Table P.25

How much do you agree or disagree with the following statements?

	Response Percentages (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n*= 278)	39	43	16	2	1
I would rather take surveys on iPad than paper (*n*= 272)	48	32	11	5	4
I would enjoy taking future surveys on an iPad (*n*= 271)	45	35	17	1	2

APPENDIX Q – OLYMPIC NATIONAL PARK VISITOR SURVEY SUMMARY REPORT

Project Introduction

The Climate Change Education Partnership (CCEP) is a National Science Foundation funded research project involving Colorado State University, the National Park Service, the U.S. Fish and Wildlife Service, and the National Parks Conservation Association. The purpose of this nationwide, collaborative effort is to scope the communication challenges, opportunities, and needs among park and refuge staff when discussing climate change impacts on America's public lands. This effort is funded as a "Phase 1 Project", and the data we have gathered regarding our regional site partners and site-specific information will inform a "Phase 2 Proposal" to be submitted in March 2012. If funded, Phase 2 of the CCEP would provide the resources to implement ideas generated through our Phase 1 research at your site.

Including your region, we have five pilot site areas across the country (northern Colorado, southern Florida, District of Columbia, Puget Sound in western Washington, and Kenai Fjords in Alaska). We have engaged each region in a similar process, beginning in late March 2011 and continuing through January of 2012. Your site is one of five protected areas in western Washington that was selected because agency leadership at the Washington D.C. office highlighted your park or refuge as an important place to invest resources in building capacity or enhancing ongoing efforts to communicate about climate change in your region.

Because our goal is to engage you, your staff, managers, volunteers, and partners at adjacent public lands in a "landscape-scale" approach to climate change education, a significant part of our effort to achieve this goal has been to collect quantitative and qualitative data regarding national park and wildlife refuge visitor perceptions of specific effects of climate change on America's public lands. During our visit to your site, we conducted 413 visitor surveys. This report provides a short description of our visitor survey and a summary of our results from your site. The survey data we have collected at each park or refuge within our pilot site locations is very important as we begin to brainstorm and collaboratively develop education tools for your unique visitor population.

Methods

The CCEP core team developed an on-site visitor survey to assess national park and wildlife refuge visitors' awareness and knowledge of place-specific climate change impacts, as well as their level of concern and willingness to act in response to these impacts. Over a six month period, our survey team administered this visitor survey at each park and refuge within our six pilot site locations (Table Q.1).

Table Q.1

Participating parks and refuges in the 2011 Visitor Concerns about Climate Change Survey

Northern Colorado
Rocky Mountain Arsenal National Wildlife Refuge (CO)
Rocky Mountain National Park (CO)
Southern Florida
Biscayne National Park (FL)
Everglades National Park (FL)
National Key Deer Refuge (FL)
Ten Thousand Islands National Wildlife Refuge (FL)
District of Columbia
Harpers Ferry National Historic Park (WV)
National Capitol Parks East (DC)
Prince William Forrest Park (VA)
Kenai Peninsula Alaska
Kenai Fjords National Park (AK)
Kenai National Wildlife Refuge (AK)
Puget Sound Area
Dungeness National Wildlife Refuge (WA)
Mount Rainier National Park (WA)
Nisqually National Wildlife Refuge (WA)
North Cascades National Park (WA)
Olympic National Park (WA)

Survey Development. The survey used in this study was first created in paper form using basic word processing software, and was later converted into an electronic form using an online template from iSURVEY and an accompanying app for Apple iPads. The iSURVEY app allows for the electronic survey to be presented on iPads as well as other handheld electronic devices. Following the purchase of this app, the survey team was able to administer the survey on each of 10 iPads and gather an unlimited number of responses within the allowable one-month license period, which we renewed as necessary. All of the results are saved, synced and uploaded to an automatically generated data file, accessed on the iSURVEY password protected website.

Procedure. Over three thousand (3118) surveys were administered in 11 different refuges and parks from May 6, 2011 to September 11, 2011, using a convenience sampling method. The total response

rate for the sample was 68%. The following script was used by the survey team for recruiting participants:

> Hello, we are students from Colorado State University conducting visitor surveys at [this park/refuge]. Would you like to take our survey about landscape changes at this [park/refuge]? The survey takes about five to ten minutes to complete. Your participation is completely voluntary and you can stop taking the survey at any time.

The survey team protocol for answering participants' questions during the course of the survey was to answer any question that pertained to technical operation of the iPads and to supply any needed clarification regarding questions and response options. The survey team was not to offer any opinions or facts pertaining to specific questions while the survey was in progress. When all of the iPads were in use, the survey team protocol was to administer paper versions of the same survey. Most visitors surveyed (91%) completed the electronic version of the survey on the iPad while the remaining 280 participants (9%) completed the survey on paper.

Survey Sites. Survey administration locations were unique at each refuge and park, though the team targeted popular trailheads, visitor centers, campsites, and viewpoints. In each case, recommendations were sought and followed from managers at each site for popular and diversified locations for surveying. Most surveys were collected during the weekends for greater visitor numbers and convenience; however, efforts were made to have both weekends and weekdays represented at each site. The specific areas where we administered surveys in your site include: Hurricane Ridge, the Hoh Rainforest, and the Kalaloch Campgrounds.

Response Rates and Confidence Interval. The survey team collected a total of 413 surveys at Olympic National Park. The response rate for this sample was 70%. The sample from your site reflects the total population of visitors at a 95% confidence level with $\pm$5% margin of error using a 50/50 split.

Visitor Demographics

The following demographic characteristics were gathered from respondents: age, gender, education, ethnicity, political affiliation, frequency of visits, and zip codes. Most visitors surveyed were in the age bracket of age 26 – 35 (22%). The highest percentage of visitors surveyed was female (50%). Many respondents had completed a Graduate or Professional degree (45%). Most visitors surveyed self-identified as White or Caucasian (84%) as well as Democratic (37%, Table Q.2). Many visitors indicated that this was their first visit (53%).

Table Q.2

Demographic Characteristics of Participants (N =391)

Characteristic	*n*	%
Age at time of survey (years)		
10 – 17	16	4
18 – 25	40	10
26 – 35	84	22
36 – 45	65	17
46 – 55	70	18
56 – 65	83	21
66 – 75	31	8
76 – 85	2	1
86 – 95	0	0
Gender		
Male	196	50
Female	198	50

Highest education level completed		
Less than high school	7	2
Some high school	9	2
High school graduate	18	5
Some college	46	12
Two-year college degree	27	7
Four-year college degree	106	27
Graduate or professional degree	175	45
Ethnicity		
American Indian or Alaska Native	2	1
Asian	26	7
Black or African American	1	0
Hawaiian or Pacific Islander	1	0
Hispanic or Latino/Latina	7	2
White or Caucasian	329	84
Do Not Wish to Answer	16	4
Other	9	2
Political Affiliation		
Republican	56	15
Democrat	142	37
Independent	64	17
No affiliation	68	18
Do Not Wish to Answer	43	11
Other	7	2

Visitor Opinions on Parks/Refuges

The following eight statements are 'sense of place' variables employed to assess visitor levels of place attachment and place dependence (Table Q.3). The first four statements listed are scalable items for the concept of place attachment while the last four statements are for the concept of place dependence. The more visitors agree with these statements, the more attached to and dependent upon the Park they are respectively.

Table Q.3

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
This Park/Refuge is very special to me (*n* = 409)	44	37	19	0	0
I identify strongly with this Park/Refuge (*n* = 405)	31	40	27	2	0
I am very attached to this Park/Refuge (*n* = 403)	26	36	34	5	0
This Park/Refuge means a lot to me (*n* = 402)	30	39	28	3	0
This Park/Refuge is the best place for what I like to do (*n* = 404)	15	37	41	6	1
No other place can compare to this Park/Refuge (*n* = 405)	18	24	42	15	2
I get more satisfaction out of visiting this Park/Refuge than any other (*n* = 406)	7	18	53	19	3
Doing what I do in this Park/Refuge is more important to me than doing it in any other place (*n* = 383)	7	15	53	21	4

Respondents were asked to rate the importance of the National Park System, the National Wildlife Refuge System, and Olympic National Park. Many respondents thought the National Park System was extremely important (69%) and the National Wildlife Refuge System was extremely important (66%). Most respondents stated that Olympic National Park is extremely important to themselves and their family (55%, Table Q.4).

Table Q.4

Please rate the importance of the following to you and your family.

Categories	Response Percentage (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Our National Parks System (*n* = 410)	69	26	5	0	0
Our National Wildlife Refuge System (*n* = 401)	66	27	6	1	0
This Park/Refuge (*n* = 399)	55	34	9	1	1

Respondents were asked to rate a number of different threats to parks and refuges as a whole as well as to the park they were visiting. Most respondents thought lack of funding was the greatest threat to National Parks and Refuges (52%). Visitors perceived that the greatest threat to Olympic National Park was lack of funding (46%, Table Q.5).

Table Q.5

What do you think is the greatest threat to the following?

Categories	Response Percentage (%)							
	Lack of funding	Natural disasters	Invasive species	Pollution within the area	Pollution from nearby sources	Climate change	Overuse	Other
Our National Parks and Refuges (*n* = 407)	52	3	4	5	13	12	8	3
This Park or Refuge (*n* = 404)	46	5	6	4	10	19	9	2

Respondents were asked to rate their level of concern for the future of the National Park Service, The National Wildlife Refuge Service, and the park they were visiting. Many respondents were extremely concerned about the future of the National Park System (39%) and were extremely concerned for the future of the National Wildlife Refuge System (37%). Most respondents were extremely concerned about the future of Olympic National Park (32%, Table Q.6).

Table Q.6

How concerned are you about the future of the following? (n = 413)

	Response Percentage (%)				
Categories	Extremely concerned	Very concerned	Somewhat concerned	Slightly concerned	Not concerned
Our National Park System	39	38	17	5	1
Our National Wildlife Refuge System	37	35	23	3	2
This Park/Refuge	32	32	30	4	2

Respondents were asked to select a degree to which they thought climate change was or was not happening. Current scientific consensus indicates that climate change is occurring. Most visitors surveyed were extremely sure that climate change is happening (39%, Table Q.7).

Table Q.7

Do you think climate change is happening? (n = 413)

Categories	Response Percentage (%)
Extremely sure it is happening	39
Very sure climate change is happening	26
Somewhat sure climate change is happening	13
Not Sure	13
Somewhat sure climate change is not happening	4
Very sure climate change is not happening	2
Extremely sure it is not happening	3

Visitor Knowledge and Opinions on Climate Change

Respondents were asked how well informed they felt about the causes, consequences, and mitigation of climate change. Many visitors felt very informed about the causes of climate change (43%) as well as the consequences of climate change (43%). Additionally, most visitors felt very informed about ways in which we can mitigate climate change (39%, Table Q.8).

Table Q.8

Personally, how well informed do you feel about the following? (n = 412)

Categories	Response Percentage (%)				
	Extremely informed	Very informed	Somewhat informed	Slightly informed	Not informed
The different causes of climate change	21	43	31	4	2
The different consequences of climate change	21	43	30	5	1
Ways in which we can reduce climate change	20	39	32	9	1

Respondents were asked to indicate the causes of climate change. Current scientific consensus is that climate change is mostly caused by human activities. Most visitors surveyed indicated that climate change was caused by both human activities and natural changes in the environment (52%, Table Q.9).

Table Q.9

Assuming climate change is happening, do you think it is… (n = 410)

Categories	Response Percentage (%)
Caused mostly by human activities	34
Caused mostly by natural changes in the environment	10
Caused by both human activities and natural changes in the environment	52
None of the above because climate change isn't happening	3
Don't Know	1
Other	0

Respondents were asked to indicate how worried they are about climate change. This item, when combined with the following two items regarding importance and prevalence of thought, may be interpreted as visitor level of concern about climate change. Most visitors surveyed indicated they were very worried about climate change (37%, Table Q.10).

Table Q.10

How worried are you about climate change? (n = 412)

Categories	Response Percentage (%)
Extremely worried	19
Very worried	37
Somewhat worried	28
Slightly worried	9
Not worried	7

Respondents were asked to rate how important the issue of climate change is to them. Most visitors surveyed indicated that climate change was very important to them (39%, Table Q.11).

Table Q.11

How important is the issue of climate change to you personally? (n = 412)

Categories	Response Percentage (%)
Extremely important	19
Very important	39
Somewhat important	29
Slightly important	9
Not important	4

Respondents were asked how often they think about climate change. Most visitors surveyed indicated they thought about climate change frequently (41%, Table Q.12).

Table Q.12

How often do you think about climate change? (n = 412)

Categories	Response Percentage (%)
All the time	7
Frequently	41
Occasionally	37
Rarely	10
Never	5

Respondents were asked to indicate how responsible they felt for climate change. The three statements in Table Q.13 are scalable items for the concept on responsibility for climate change. The first statement, 'Because my contribution is very small I do not feel responsible for climate change' should be reverse coded when creating a scale as it is negatively worded comparative to the other two items. Therefore, visitors who feel responsible for climate change would generally disagree with the first statement and agree with the last two statements (Table Q.13).

Table Q.13

How much do you agree or disagree with the following statements?

	Response Percentage (%)				
Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Because my contribution is very small I do not feel responsible for climate change (*n* = 403)	5	15	23	46	12
I feel somewhat responsible for the presently occurring environmental problems (*n* = 401)	6	57	23	11	4
I feel responsible for contributing to the condition of the climate (*n* = 381)	10	49	26	10	5

Respondents were asked to indicate the extent to which climate change would harm future generations, themselves, and Olympic National Park. Of particular interest is how much visitors believe climate change is harming the Park. Most visitors surveyed indicated that climate change would harm this Park a moderate amount (43%, Table Q.14).

Table Q.14

How much do you think climate change will harm the following?

	Response Percentage (%)				
Categories	A great deal	A moderate amount	Only a little	Not at all	Don't know
Future generations of people (*n* = 399)	62	28	5	3	3
You personally (*n* = 396)	9	52	29	8	2
This Park/Refuge (*n* = 404)	39	43	10	4	4

Respondents were asked when they thought climate change would start to harm both people in the U.S. and Olympic National Park. Most visitors surveyed indicated that Olympic is being harmed now (33%, Table Q.15).

Table Q.15

When do you think climate change will start to harm the following (n = 413)

	Response Percentage (%)						
Categories	They are being harmed now	In 10 years	In 25 years	Don't know	In 50 years	In 100 years	Never
People in the United States	36	19	16	17	6	3	4
This Park/Refuge	33	17	12	26	4	4	3

Visitor Willingness to Help Mitigate Climate Change

Visitors were asked "*How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge?" (n = 374).* The average amount of additional fees respondents were willing to pay was $1.00 – 10.00 per visit (see Table Q.16). Similarly, visitors were asked "*How much time, in days per year, would you be willing to volunteer at this Park/Refuge to support additional conservation efforts related to climate change?" (n =* 377*).* Respondents gave an average of 0 days they would be willing to volunteer. Finally, visitors were asked how willing they were to change their behaviors to help reduce the impacts of climate change. Most respondents answered very willing (39%, Table Q.17).

Table Q.16

How much money, in addition to the entrance fees you currently pay, would you be willing to pay per visit to support additional conservation efforts related to climate change at this Park/Refuge? (n =374)

U.S. Dollars	Response Percentage (%)
0	14
1-5	26
6-10	26
11-15	7
16-20	9
> 21	19

Table Q.17

How willing are you to change your behaviors in this Park/Refuge to help reduce the impacts of climate change? (n = 413)

Categories	Response Percentage (%)
Extremely willing	29
Very willing	39
Somewhat willing	23
Slightly willing	5
Not willing	3

Respondents were asked to indicate what they have done from a list of individual actions known to mitigate climate change. Visitors were allowed to select as many actions that applied to them specifically. Most visitors indicated that they switch from regular (incandescent) to compact fluorescent bulbs (73%, Table Q.18).

Table Q.18

Which of the following actions have you taken? (n = 391)

Actions	Response Percentage (%)
Switching from fossil fuels to renewable energy at home	19
Planting trees	56
Insulating you home	60
Switching from a gasoline to an electric or hybrid car	15
Driving less	55
Walking, riding a bike, or using public transportation instead of driving	58
Switching from regular (incandescent) to compact fluorescent bulbs	73
Reducing the amount of beef you eat	36
Reducing airplane travel	18
Reducing energy use at home	70

Note. Percentages do not sum to 100 as multiple selections were allowed.

Visitor Perception of Climate Change Impacts and Education

Respondents were asked to agree or disagree with four statements involving their desire to learn about climate change impacts and visible effects of climate change. Most respondents agree that they would like to learn more about climate change at Olympic National Park (49%). Many of the visitors surveyed agree that the effects of climate change can already be seen at this park (40%), Table Q.19).

Table Q.19

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I would like to learn more about climate change impacts in our national parks/refuges (*n* = 394)	15	55	23	5	3
I would like to learn more about climate change impacts in this Park/Refuge (*n* = 392)	15	49	28	5	3
I believe that some of the effects of climate change can already be seen at our national parks/refuges (*n* = 392)	24	47	22	5	2
I believe that some of the effects of climate change can already be seen at this Park/Refuge (*n* = 388)	18	40	34	6	2

Respondents were asked what specific effects of climate change they have seen at Olympic National Park. Some of options will not apply to Olympic as the list is comprehensive of all areas included in the study. Most visitors reported seeing loss of snow or ice at this Park (40%, Table Q.20).

Table Q.20

What specific effects of climate change have you seen at this Park/Refuge? (n = 327)

Effects of climate change	Response Percentages (%)
Increasing ocean temperature	14
Increasing areas affected by drought	20
Increasing air temperature	21
Thawing of permanently frozen soil	19
Loss of snow and/or ice	40
Increasing number of flooding events	17
Rising sea level	10
Coral bleaching on reefs	5
Change in plant and animal populations	28
More intense storms	16
None of the above	26
Other	3

Respondents were asked to indicate any efforts to reduce impacts of climate change employed by Olympic National Park. The effort most visitors surveyed recalled seeing was recycling (73%, Table Q.21).

Table Q.21

What specific efforts to reduce impacts of climate change have you seen employed at this Park/Refuge? (n = 354)

Efforts to reduce impacts	Response Percentage (%)
Use of hybrid or electric vehicles	17
Energy efficient or LEED certified buildings	19
Use of alternative renewable energy (ex: wind turbines, solar panels)	16
Recycling	73
None of the above	21
Other	2

Note. Percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to indicate how they have received information on climate change at Olympic National Park as well as how they would like to receive information on climate change in the future. Most visitors surveyed indicated that they have not received any information on climate change at the Park (63%). Many visitors indicated they would like to learn about climate change in Olympic National Park via the Park website (53%, Table Q.22).

Table Q.22

How have you received information on climate change at this Park/Refuge and how would you like to receive information on climate change in the future?

Ways of receiving information	Response Percentages (%)	
	How have you received information about climate change at this Park/Refuge? (*n* = 351)	In the future, how would you like to learn about climate change impacts and solutions at this Park/Refuge? (*n* = 376)
Have not received any information on climate change from this Park/Refuge.	63	-
I do not want to learn about climate change impacts and solutions at this Park/Refuge	-	9
Indoor exhibits	20	47
Roadside exhibits	7	32
Trailside exhibits	9	44
Films, movies, videos	12	33
Living history/costumed interpretive programs	2	16
Park website	9	53
Printed materials (brochures, books, maps, etc.)	14	34
Electronic media/devices available to visitors	2	26
As a volunteer in the park	1	10
Children's activities	2	15
Ranger guided walks/talks	7	29
Self-guided tours	7	22
Other	2	0

Note. Response percentages do not sum to 100 as multiple selections were allowed.

Respondents were asked to comment on their satisfaction with the quality and quantity of climate change education in Olympic National Park. Most visitors surveyed indicated that the quality of climate change education in Olympic was average (50%) whereas most visitors indicated the quantity of climate change education to be average (48%, Table Q.23).

Table Q.23

Please rate your satisfaction with the current climate change education at this Park/Refuge.

	Response Percentages (%)				
Categories	Very good	Good	Average	Poor	Very poor
Quality of education (*n* = 347)	9	24	50	13	4
Quantity of education (*n* = 342)	9	22	48	17	5

Respondents were asked to specify how important they believe each of several climate change related topics are for parks and refuges to address. Most visitors surveys indicated that actions visitors can take was the most important topic for parks/refuges to address (43%, Table Q.24).

Table Q.24

How important are the following topics for our parks/refuges to address?

Topics	Response Percentages (%)				
	Extremely important	Very important	Somewhat important	Slightly important	Not important
Climate science and atmospheric processes (*n* = 343)	26	45	21	6	2
Ways parks/refuges are reducing emissions (*n* = 344)	22	41	25	8	3
Sources of greenhouse gas emissions (*n* = 333)	25	38	24	9	4
Relevance for surrounding communities (*n* = 340)	28	40	24	5	2
Impact(s) on places managed by parks/refuges (*n* = 339)	29	43	21	6	1
Ways parks/refuges are adapting to climate change (*n* = 343)	29	41	22	6	2
Actions visitors can take (*n* = 345)	43	39	13	4	1

Respondents were asked to agree or disagree with statements regarding how the survey was employed. The three statements listed scale into the concept of survey preference. Higher percentages in agree categories refer to a greater visitor preference for using the iPad in taking surveys rather than paper (Table Q.25).

Table Q.25

How much do you agree or disagree with the following statements?

Statements	Response Percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I enjoyed taking this survey on an iPad (*n* = 386)	44	36	16	4	1
I would rather take surveys on iPad than paper (*n* = 377)	50	29	12	6	3
I would enjoy taking future surveys on an iPad (*n* = 377)	48	35	12	4	2