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# Deer, People, and Parks:

## Perspectives of Residents in Communities Near Prince William Forest Park



**December 2007**

**HDRU Series No. 07-11**

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## HUMAN DIMENSIONS RESEARCH UNIT PUBLICATION SERIES

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**Deer, People, and Parks:  
Results from a Survey of Residents Living Near  
Prince William Forest Park**

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**Key Words:** attitudes, community concerns, credibility, deer, impacts, interactions, management, public involvement, trust, Prince William Forest Park

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## EXECUTIVE SUMMARY

### Study Background and Purpose

We established a research project to clarify human dimensions of white-tailed deer (*Odocoileus virginianus*) issues in National Park Service (NPS) units in the northeastern U.S. as part of a cooperative agreement between the NPS Biological Resource Management Division (BRMD) and Cornell University's Human Dimensions Research Unit (HDRU) in the Department of Natural Resources. The project was completed in three phases; this report details findings from research phase IIIB at Prince William Forest Park (PRWI).

### Methods

HDRU staff conducted a series of mail surveys specific to each of five NPS parks for the purpose of describing and understanding the views of local residents with respect to deer issues, and suggest how NPS staff might utilize this understanding to enhance management practices, including stakeholder engagement activities.

We developed a 16-page questionnaire with sections focused on perceptions about and use of PRWI lands, perceptions of and concerns about deer, opinions about NPS decision making and land management, and information about the backgrounds of respondents. Our sampling universe was divided into two strata. The first stratum consisted of residents, aged 18 and older, of owner-occupied homes living in communities adjacent to PRWI. The second stratum consisted of residents of owner-occupied homes who live slightly further away, in surrounding communities within a few miles of PRWI. We mailed questionnaires to 1,200 households (600 in each stratum). We mailed all members of the sample a cover letter and questionnaire on April 19, 2007. We contacted nonrespondents up to three additional times, with the last reminder mailing taking place on May 21, 2007.

### Key Findings and Recommendations

We received 369 completed questionnaires, for an adjusted response rate of 32.8% (response rates in the adjacent and surrounding communities strata were 35.2% and 30.5%, respectively). We compared respondents and nonrespondents on 12 variables measured in a telephone follow-up of nonrespondents. We found that respondents did not differ from nonrespondents with regard to: gender, age, years living near PRWI, visits to PRWI in the past 12 months, attitudes toward deer, or likelihood of talking with park staff. On average, nonrespondents were less likely than respondents to see deer once a week or more in the park or their community, they were less likely to believe they could influence park decisions, agree that park staff are trustworthy, or expect to attend public meetings or offer written comments if those input opportunities were offered in the future. These differences are described in Appendix C, but for the purposes of this report we decided not to adjust the data based nonrespondent information.

The following bullets summarize key findings and recommendations.

- Many local residents living near PRWI regard the park as a positive part of their local community. They use and appreciate the park for its amenity values (e.g., as open space, as a leisure resource, as natural habitats). A majority local residents visit the park a few times per year to be outdoors, enjoy the natural surroundings, exercise, or spend time with family or friends.
- Most local residents near PRWI interact with deer less than once a week (a lower level of interaction than reported by local residents in some of our other study areas). They believe deer use both park lands and communities as their habitat (i.e., they recognize that the park and communities share a common deer herd). Local residents near PRWI were most likely to express concern about deer-car collisions and disease transmission from deer to humans, but fewer than half of respondents were “very” concerned even about those potential impacts associated with the presence of deer. Few regarded deer as a serious health or safety risk to park visitors, and few would characterize deer-related plant damage in the park as a “serious” problem. In contrast to some of our other study areas, residents near PRWI were more likely to enjoy deer without worrying about deer-related problems.
- Only a minority of local residents believed NPS should be managing deer-related impacts in PRWI, but few believed action by NPS to manage deer-related impacts would affect their community negatively. Adjacent and surrounding community members were relatively similar with regard to the experiences and perceptions measured in this study (another finding that distinguished PRWI respondents from those in our other study areas). All of these findings are consistent with our expectations in a situation like one near PRWI, where deer management has not yet emerged as a public policy issue.
- While not reflected in responses from all community residents, a base of general trust and credibility exists for PRWI decision makers. A majority of respondents believe PRWI staff are dedicated to protecting the park and they trust PRWI staff to make good decisions about resource management. In contrast to respondents from other study areas, a majority of PRWI respondents believed that they could have at least “some” influence on management decisions in the park. It should be noted, however, that these positive impressions are based on limited awareness of PRWI management issues related to deer and little direct experience providing input to PRWI. Only about half of respondents had heard or read news stories about the park and very few have participated in public input processes at PRWI. Given those findings, it isn’t surprising that a majority of respondents said they do not have enough information to provide meaningful input to the park. It also is not surprising that a substantial proportion of local residents near PRWI are uncertain about the beliefs of NPS managers regarding deer and deer management in the park and the degree to which NPS decision makers listen to community residents or consider their input in decisions.
- Public issues education (PIE) is necessary to increase the capacity of publics to understand public issues and participate effectively in public decision-making processes (Dale and Hahn 1994, Leong et al. 2006). Different learning objectives are addressed at different stages of a public issue. In the earliest stages, the objective of issue education is to increase public understanding of the issue and the public input process. Raising awareness of deer management issues or opportunities for public input into other management issues would be

- Concern about deer damage to vegetation and interest in providing input is stronger in adjacent communities than in surrounding communities, indicating that these two strata are beginning to develop into different publics. At present, residents of adjacent and surrounding communities probably are not different enough to address as separate target audiences for information/education interventions near PRWI. However, that may change if deer-related impacts intensify over time.
- This study examined local community members' perceptions about and use of NPS lands, perceptions of and concerns about deer, and opinions about NPS decision making and land management. This study provides NPS decision makers with information about community interests related to deer impacts and management of NPS lands. Insights from this study can be used to guide ongoing communication about deer management between NPS personnel and residents of neighboring communities. Findings should be especially useful to park managers as they think about tailoring communication toward communities of place and communities of interest.



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## INTRODUCTION

White-tailed deer have been a major concern in park units of the northeastern U.S. for over two decades, and biological studies have been undertaken at a number of parks to determine deer population density, movement, and impact on park resources (for example: Frost et al. 1997, Lovallo and Tzilkowski 2003, Porter and Underwood 1999, Shafer-Nolan 1997, Underwood 2005, Underwood and Porter 1991, Warren 1991). To reduce adverse impacts of deer to park resources, the NPS may propose actions that are consistent with NPS policy and the park's enabling legislation. Deer can have profound impacts not only on a park's natural and cultural resources, but also on the residents of neighboring communities. In addition, any management actions considered by a park also may impact stakeholders (i.e., may cause collateral impacts, Decker et al. 2006), either tangibly or intangibly. Likewise, actions taken by park neighbors can exacerbate or diminish impacts experienced in the park that are associated with deer.

While park management decisions ultimately are made by NPS, such decisions are guided by the fundamental purpose of the NPS, which includes "...providing for the enjoyment of park resources and values by the people of the United States," with types of activities and use level that avoid impairment of the resource condition or value (National Park Service 2006:10). In addition, the NPS has adopted a civic engagement philosophy "... that will help ensure the relevance of NPS resources and programs to people, as well as ensure NPS responsiveness to diverse public viewpoints, values, and concerns" (National Park Service 2007:2). NPS policies also recognize that "...parks are integral parts of larger regional environments, the service will work cooperatively with others to anticipate, avoid and resolve potential conflicts...and address mutual interests in the quality of life of community residents" (National Park Service 2006:13). Local stakeholders often are crucial to the initial identification and articulation of wildlife issues at parks, such as those related to deer, although park management objectives and policy influence the degree to which NPS becomes involved in management of those issues (Leong and Decker 2005). After the NPS formally identifies, defines, publicizes and is in the process of planning actions, regional or national stakeholder groups may become involved in management planning. In addition, NPS policies place emphasis on public participation in wildlife management planning, especially local stakeholders (National Park Service 2006, 2007). Federal agencies also are required to engage stakeholders whenever any action is considered that may significantly impact the environment (National Environmental Policy Act, NEPA, 1969). In addition to these policy directives, a growing body of literature recognizes the role of deliberative stakeholder engagement in resolving conflicts, improving the quality of decisions, and building relationships (for example, Beierle and Cayford 2002, Halvorsen 2003, Wondolleck and Yaffee 2000). Yet few studies have addressed the ways in which human values and attitudes affect wildlife management planning in national parks and land units managed by NPS. The research we report here addressed those information needs in one NPS park.

### **Context for Deer Management in Prince William Forest Park**

Located approximately 35 miles south of Washington, D.C. (Figure 1), Prince William Forest Park (hereafter referred to as PRWI) contains about 6,000 hectares (15,000 acres) of mixed hardwood forest and is the largest example of a piedmont forest system preserved by the NPS). PRWI was originally established as the Chopawamsic Recreation Demonstration Area

(RDA) in 1933 under the Roosevelt administration's New Deal program. Civilian Conservation Corps (CCC) workers were used to develop recreational facilities and restore the area, which had been disturbed by intensive early settlement (National Park Service 1999). Administrative and operational responsibility was transferred to the National Park Service in 1936, and the name was changed to Prince William Forest Park in 1948.

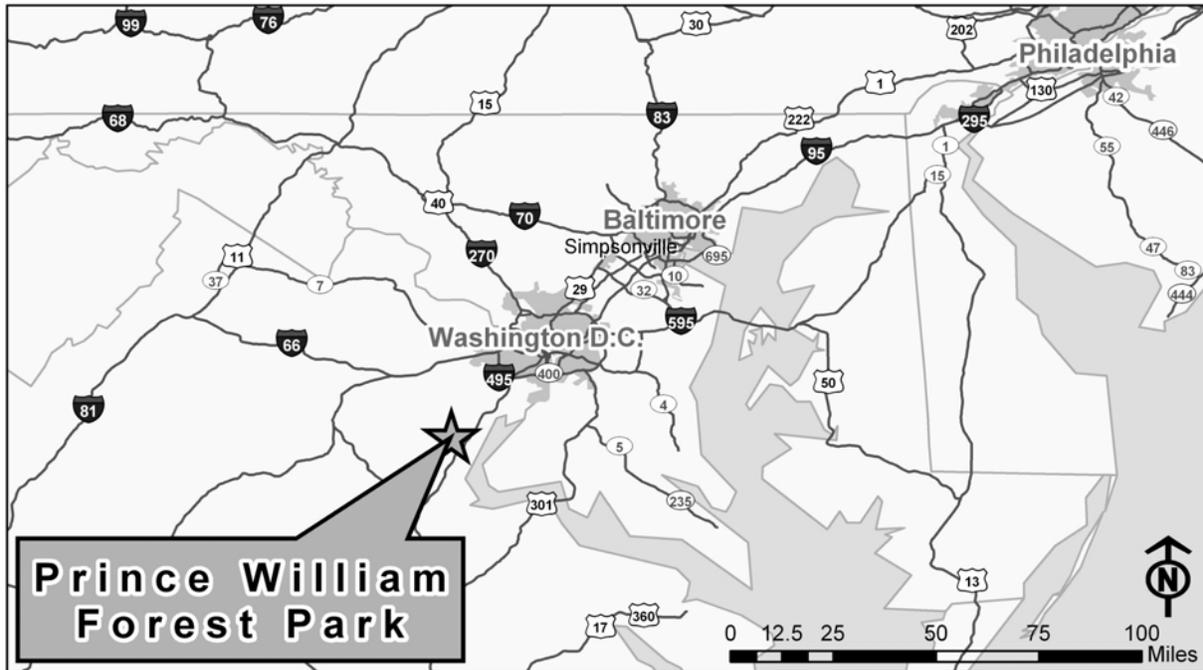


Figure 1. Map showing the location of Prince William Forest Park (PRWI), Virginia.

Today, PRWI “conserves and protects outstanding and significant natural, cultural, and historical resources and objects while providing for resource-based recreation that does not impair resource values” (PRWI Mission Statement, National Park Service 1999:41). These resources include: Piedmont and Coastal Plain forests; the Quantico Creek watershed; diverse flora and fauna, including rare and threatened species; historic structures constructed by the CCC; archeological sites dating from the pre-Colonial period; and diverse recreational opportunities in the midst of a rapidly growing urban area. Over the past 25 years, Prince William County has had one of the fastest rates of population growth in the nation (National Park Service 1999) and was one of the 100 fastest growing U.S. counties in 2006 (U.S. Census Bureau Population Division 2007).

As part of an ongoing monitoring effort in the NPS National Capital Region (NCR), white-tailed deer have been surveyed in PRWI since 2001 using distance sampling. In 2006, deer densities at PRWI were recorded as 28.56 per square mile, lower than at any other NCR park and below 40 deer per square mile, the density at which negative effects on other wildlife species have been reported (effects on vegetation and especially rare plants may be seen at

densities as low as 20 deer per square mile, see Bates 2007). Unlike at many other parks throughout the northeastern U.S., PRWI managers have not experienced high levels of negative impacts from deer, either to other park resources (e.g., effects on vegetation regeneration or biodiversity) or park visitors. Similarly, severe problems caused by deer have not been reported to the park by residents of local communities. Managers at PRWI believed that participation in this study offered a unique opportunity to learn more about neighboring community perceptions while impacts from deer are relatively low.

Based on experiences in similar NCR parks and current trends in development of surrounding communities, PRWI managers believe that deer impacts will likely increase in the future, both within PRWI boundaries and in adjacent and surrounding communities. Impacts have been generically defined as socially-determined important effects (e.g., ecological, economic, psychological, health, and safety, etc.) of events or interactions involving (a) wildlife and other natural resources, (b) humans and wildlife, and (c) wildlife management interventions (Riley et al. 2002). Because deer move through political jurisdictions and across property boundaries, local community members may experience a range of impacts from deer they associate with PRWI, just as PRWI experiences impacts from deer that use local communities.

The degree to which impacts from deer warrant management action depends on a park's mission and management policies. Deer-related impacts have the potential to affect achievement of PRWI's mission (PRWI Mission Statement, National Park Service 1999:41). Recent NPS Management Policies (2006) also recognize that natural resources in parks are inherently important, regardless of park designation.

### **The Prince William Forest Park Deer Management Study**

While biological studies can help assess physical impacts to the environment, sociological studies are necessary to determine impacts to stakeholders. We established a research project to clarify human dimensions of white-tailed deer issues in NPS units in the northeastern U.S. as part of a cooperative agreement between the NPS Biological Resource Management Division (BRMD) and Cornell University's Human Dimensions Research Unit (HDRU) in the Department of Natural Resources. Information from the overall research project is intended to help NPS decision makers better understand community interests related to deer impacts and management of NPS lands. Findings from each research area provide insights to guide ongoing communication between NPS personnel and residents of communities near parks. The data reported herein will be especially useful to park managers as they think about tailoring communication toward communities of place and communities of interest. This study also will help park managers better understand factors associated with intention to participate in deer management planning opportunities.

The project was completed in three phases.

In phase I of our research project, Leong and Decker (2005) used a web-based survey and semi-structured in-depth discussions with NPS natural resource managers and staff describe the deer situation in northeastern parks and develop an approach for inquiry to aid in management practice and policy interpretation, resulting in a study plan. Managers described a multi-tiered

complex of influences shaping a park's management environment and identified five key elements for the foundation of successful management plans: understanding the park's unique management environment, internal NPS coordination, coordination with external stakeholders, effective planning processes, and adequate resources. For each of these elements, local communities were seen as significantly affecting management activity and so became the focal point for additional inquiry.

In research phase II, Leong (2007) conducted in-depth semi-structured interviews with 20 public participation practitioners to determine how public participation and civic engagement methods fit within NPS wildlife management, including (but not limited to) NPS policies that fulfill the purposes of the National Environmental Policy Act (1969). Interviewees included: natural resource managers, superintendents, rangers, and scientists with the NPS, USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and US Geological Survey, and; specialists in community planning, dispute resolution, and public participation who regularly provide their services to federal land management agencies. Practitioners identified participatory strategies that integrate the substance of negotiations, relationships between stakeholders, and process design.

In research phase IIIA, HDRU staff conducted qualitative interviews with a total of 267 local community residents living near three suburban NPS units (i.e., Fire Island National Seashore [Leong and Decker 2007a], Valley Forge National Historical Park [Leong and Decker 2007b], and PRWI [Leong and Decker 2007c]). Interviews with residents of communities near parks were used as an orientation to community members' understanding of park wildlife management, expectations for public input in management planning, and experiences with the park related to wildlife management. Capacity needs were identified to improve future public participation efforts in wildlife management planning. Insights from study phase IIIA informed development of a mail-back survey to NPS managers and residents of communities near five parks (phase IIIB).

### **Purpose of this report:**

This report focuses on results of research phase IIIB, in PRWI. The goal of phase IIIB research was to gain an in-depth understanding of a variety of stakeholder beliefs and attitudes regarding deer-related impacts. This phase of research focused on comparisons of residents living in communities adjacent to parks with residents living in surrounding communities near parks (i.e. the study compared communities with a different potential to experience direct impacts from deer or deer management at parks, due to their relative distance from a park). The sociological research conducted during this phase of the project uncovers a range of local community members' opinions and experiences related to: deer issues and deer management at PRWI, the role of PRWI in deer and other wildlife management, and the influence of public input in wildlife management at PRWI.

## METHODS

### Study site

Potential study sites were identified based on discussions with BRMD staff, Regional Chief Scientists from the Northeast and National Capital Regions of NPS, and Natural Resource Managers at NPS units throughout the northeast. Seven NPS units volunteered to participate in the project; five sites ultimately were chosen to represent various stages of maturity of their deer issues and amount of outreach effort related to these issues. Fire Island National Seashore, on Long Island, New York, was the only park identified with a long history of deer issues and experience with outreach activities with communities and visitors about deer. Valley Forge National Historical Park, in southeastern Pennsylvania, and Morristown National Historical Park, in New Jersey, represent parks with a long history of deer issues and limited public outreach activities about deer. Chesapeake and Ohio Canal National Historical Park (Great Falls area), in Maryland, and PRWI, in Virginia, represent parks where deer issues are emerging only recently and relatively few outreach activities have occurred related to deer. No parks were identified that were experiencing recently emerging deer issues yet had engaged in many outreach activities about deer.

### Phase IIIB survey instrument

As described above, the phase IIIB survey instrument is the product of a multi-step process, including our previous research experience on community-based deer management and insights gained through study phases I and II. Many of the items used in our survey instrument were pilot tested in a community-based deer management survey instrument used in central New York in 2006 (Siemer et al. 2007).

The data collection instrument for study phase IIIB was a 16-page questionnaire with sections focused on perceptions about and use of NPS lands, perceptions of and concerns about deer, opinions about NPS decision making and land management, and information about the backgrounds of respondents (Appendix A). We designed the instrument to assess key beliefs held by residents of local communities with respect to issues related to deer and deer management. In addition, we designed the survey instrument to help determine whether the perspectives of interviewees in phase IIIA are representative of a random sample of local residents and whether responses differ for parks with longer histories of deer impacts.

### Survey implementation

Our sampling universe was divided into two strata. The first stratum consisted of residents, aged 18 and older, of owner-occupied homes in communities adjacent to PRWI. We defined residential neighborhoods within the park administrative boundary as adjacent communities. The second stratum consisted of residents of owner-occupied homes slightly further away, in surrounding communities within a few miles of PRWI (Figure 2). Adjacent communities were defined as the residential neighborhoods within the park administrative boundary. Surrounding communities included residents of southeastern Prince William County (excluding adjacent communities), bounded by major geographic features (rivers, highways,

other major roads). Boundaries for the surrounding community stratum included: Hoadly Road and Dale Road on the north; the Potomac River on the southeast; and Joplin Road and Aden Road on the southwest.

We mailed questionnaires to 1,200 households (600 in each stratum). We used a four-wave mailing approach, similar to the total design approach advocated by Dillman (2000). We mailed all members of the sample a cover letter and questionnaire on April 19, 2007. We contacted nonrespondents up to three additional times, with the last reminder mailing taking place on May 21, 2007.

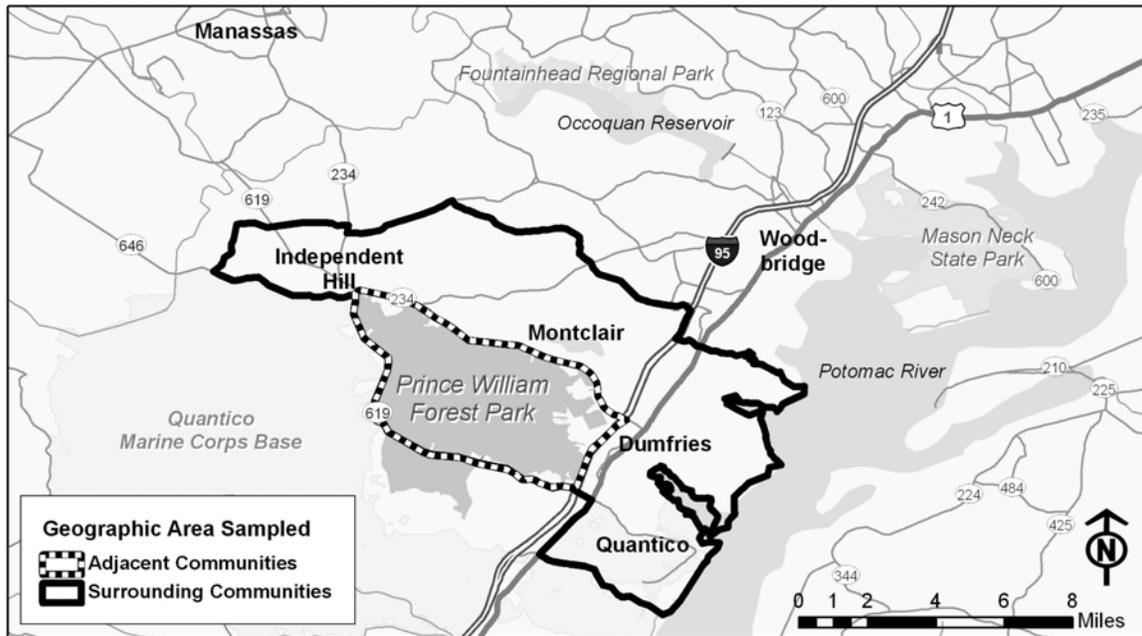


Figure 2. Geographic boundaries used to assign households to a community.

### Nonrespondent follow-up survey

To assess potential for nonresponse bias in the data, we conducted a follow-up study with nonrespondents. The purpose of the follow-up study was to determine if non-respondents differed significantly from respondents on key questions. We developed a 12-item telephone interview instrument and contracted with Cornell University's Survey Research Institute (SRI) to use the instrument in a telephone survey with a random sample of nonrespondents. SRI staff set a target of completing 50 interviews in each stratum. They completed 50 interviews in the near neighbor stratum and 50 interviews in the local communities stratum (Box 1). Data collection began on June 18, 2007 and was completed on July 8, 2007.

<b>Box 1. Outcome of follow-up telephone interviews after 2007 PRWI Deer, Parks, and People mail survey.</b>	<b>Adjacent communities</b>	<b>Surrounding communities</b>	<b>Overall</b>
		(n)	
Completed telephone interview	50	50	100
Bad phone number	6	19	25
Too Ill; Deceased; Incapable of responding	1	0	1
Language problem	0	0	0
Did not call	157	136	293
Refused	3	3	6
Pending (number called; person not reached)	141	189	330
<b>Total</b>	<b>358</b>	<b>397</b>	<b>755</b>

## Analysis

In this report we provide descriptive study highlights using a set of tables with frequencies of response in two strata: residents of (1) adjacent communities and (2) surrounding communities. We used chi-square tests to identify statistically different results between the strata. Differences are reported at the  $p < 0.05$  level of significance.

We used factor analysis as a technique to reduce data from individual items into scales. We were able to develop multi-item scales for: (1) community importance of PRWI; (2) perceptions of deer behavior; (3) concerns about deer; and (4) public image of PRWI management. All data analysis was conducted using SPSS version 15.0.0 (SPSS Inc., Chicago IL).

### Community importance of PRWI:

We developed 12 items to assess community residents' held values for PRWI as a community asset. We used those 12 items to create a multi-item index of community importance placed on PRWI. Dropping three items yielded a 9-item scale with high reliability ( $\alpha = 0.814$ ). Principal axis factoring identified two factors with an eigen value above 1. These factors accounted for 55.27% of the variance between items. Factor loadings ranged from 0.412 to 0.846. We labeled the factors "amenity values" and "economic values" (Appendix B, Table B1).

### Perceptions of deer behavior:

We developed 12 items to assess community residents' perceptions of deer within PRWI and in neighboring communities. Dropping three items yielded a 9-item scale with high reliability ( $\alpha = 0.780$  for perceptions of deer within PRWI;  $\alpha = 0.788$  for perceptions of deer in local communities). Principal axis factoring identified two factors with eigen values

above 1. These factors accounted for 53.66% of the variance between items in the park scale (54.48% of variance on the community scale). Factor loadings ranged from 0.408 to 0.804 within the park, 0.552 to 0.807 outside the park. We labeled the factors “natural” and “not unnatural” perceptions of deer behavior (Appendix B, Table B2).

### **Concerns about deer:**

We developed 12 items to assess community residents’ concerns about deer within PRWI and in neighboring communities. These items yielded a 12-item scale with high reliability (alpha = 0.903 for concerns in PRWI, alpha = .896 for concerns in communities). Principal axis factoring identified two factors with an eigen value above 1. These factors accounted for 61.26% of the variance between items on the park scale, 60.07% for the community scale. Factor loadings ranged from 0.473 to 0.870 for the park scale, .421-.901 for the community scale. We labeled the factors “damage concerns” and “other concerns” (Appendix B, Table B3). Concerns about car accidents involving deer were included in the “other concerns” category for the park scale, but in the “damage concerns” for the community scale.

### **Public image of PRWI management:**

We developed 8 items to assess community residents’ image of PRWI management. These items yielded an 8-item scale with high reliability (alpha = 0.837). Principal axis factoring identified three factors with eigen values above 1. These factors accounted for 76.36% of the variance between items. Factor loadings ranged from 0.573 to 0.890. We labeled the factors “professionalism,” “community affiliation,” and “openness” (Appendix B, Table B4).

## **RESULTS**

We received 369 completed questionnaires, for an adjusted response rate of 32.8% (Table 1). Response rate was higher for the adjacent communities stratum (adjacent community response: 35.2%; surrounding communities response: 30.5%). We compared respondents and nonrespondents on 12 variables measured in our telephone follow-up study of nonrespondents (Appendix C). We found that respondents did not differ from nonrespondents with regard to: gender, age, years living near PRWI, visits to PRWI in the past 12 months, attitudes toward deer, or likelihood of talking with park staff. On average, nonrespondents were less likely than respondents to see deer once a week or more in the park or their community, they were less likely to believe they could influence park decisions, agree that park staff are trustworthy, or expect to attend public meetings or offer written comments if those input opportunities were offered in the future. These differences are described in Appendix C, but for the purposes of this report we decided not to adjust the data based nonrespondent information.

The following sections summarize study results within all the major categories of questions in the mail survey instrument. We note differences between neighborhoods that have practical implications for gathering input from or communicating with communities near PRWI.

## Respondent characteristics

The majority of respondents in both strata were male (54% of adjacent community respondents; 51% of surrounding community respondents). Mean age was 52 years old. On average, respondents had lived near PRWI 15 years. The majority of respondents in adjacent and surrounding communities participated in walking/hiking. Nearly half also participated in wildlife viewing and picnicking. There were no significant differences between strata with respect to outdoor activity involvement (Table 2).

**Table 1. Response rates by stratum for the 2007 Prince William Forest Park (PRWI) Deer, People and Parks survey.**

<b>Community</b>	<b>Sample</b>	<b>Returns</b>	<b>Not deliverable</b>	<b>Not usable</b>	<b>Adjusted response rate (%)</b>
Adjacent communities	600	194	49	7	35.2
Surrounding communities	600	175	26	6	30.5
<b>Total</b>	<b>1,200</b>	<b>369</b>	<b>75</b>	<b>13</b>	<b>32.80</b>

**Table 2. Rates of participation in outdoor activities by respondents to 2007 Prince William Forest Park (PRWI) Deer, People and Parks survey.**

Activity	Strata		Chi-square	P-value
	Adjacent communities (n=191)	Surrounding communities (n=171)		
Hiked /Walked	80.6	78.4	0.28	NS <sup>1</sup>
Viewing wildlife	49.2	52.0	0.29	NS
Picnicking	46.1	46.8	0.01	NS
Biked	35.6	29.8	1.36	NS
Fishing	23.0	26.3	0.52	NS
Boating	20.9	24.6	0.67	NS
Photo/sketch	18.3	17.5	0.03	NS
Camping	17.3	17.5	<0.01	NS
Hunting	9.9	5.3	2.77	NS
Horse riding	3.7	5.3	0.54	NS

<sup>1</sup>Not significant

### Use of Prince William Forest Park

A majority of the study sample (over 70% of respondents and nonrespondents in both community strata) had visited PRWI at some time. Seventy-five percent of respondents had visited PRWI in the past 12 months. Five percent of those were only passing through the park on their way to another destination. The majority (over 70%) of those who visited PRWI as their primary destination stayed less than 4 hours per visit. Residents of adjacent and surrounding communities visited the park at similar rates; a majority of local residents had visited PRWI fewer than five times in the past 12 months (Appendix C, Table C2).

The most common reasons for visiting PRWI were to view the scenery, get exercise, get outdoors, and spend time with family and friends. There were no significant differences between strata with respect to reasons for visiting PRWI (Table 3).

**Table 3. Reasons for visiting Prince William Forest Park (PRWI) lands offered by the 75% of residents who visited PRWI for a purpose other than passing through on the way to another destination. Numbers represent percent of respondents who indicated each reason.**

Reason for visiting CONHP	Strata		Chi-square	P-value
	Adjacent communities (n=135)	Surrounding communities (n=120)		
View the scenery	71.9	71.7	<0.01	NS <sup>1</sup>
Be outside	71.1	70.8	<0.01	NS
Exercise	60.0	48.3	3.48	NS
Enjoy the sounds and smells of nature	59.3	58.3	0.02	NS
Spend time with family or friends	56.3	60.0	0.35	NS
View wildlife	50.4	48.3	0.10	NS
Get away from demands	38.5	45.0	1.09	NS
Learn about history	17.8	21.7	0.61	NS
Other	16.3	15.0	0.08	NS
Volunteer in park	3.7	1.7	0.98	NS

<sup>1</sup>Not significant

### **Deer-related experiences, attitudes, perceptions, and concerns**

About 10% of visitors reportedly saw deer every visit and another 25% said they saw deer on half or more of their visits. Visitors from adjacent communities were more likely to report seeing deer on at least half their park visits ( $\chi^2 = 7.925$ ;  $df = 4$ ;  $p < 0.048$ ). Adjacent residents also were more likely to report frequent encounters with deer in their community ( $\chi^2 = 43.800$ ;  $df = 4$ ;  $p < 0.001$ ).

The majority of respondents in both strata reportedly enjoyed deer without worry or had no particular feelings about deer (Table 4). A higher proportion of adjacent residents enjoyed deer, but worried about deer-related problems in PRWI (Table 4). Respondents from adjacent communities also were more likely to report that they do not enjoy deer in their community (Table 4).

**Table 4. Attitude toward deer in Prince William Forest Park (PRWI) and local communities expressed by respondents to the 2007 PRWI Deer, People and Parks survey, by stratum.**

	n	No particular feelings	Enjoy and do not worry	Enjoy BUT worry	Do not enjoy	Chi-square	P-value
<b>Attitude toward Deer in PRWI</b>							
Adjacent	178	14.0	48.9	36.0	1.1	13.330	0.004
Surrounding	158	27.2	49.4	23.4	0.0		
<b>Attitude toward Deer in your community</b>							
Adjacent	182	8.8	35.7	44.5	11.0	4.108	NS <sup>1</sup>
Surrounding	162	13.6	40.7	37.7	8.0		

<sup>1</sup>Not significant

Residents of the two community types held relatively similar perceptions of deer behavior in the park and in local communities. Respondents from both strata generally regarded deer behavior as peaceful, normal, not aggressive, and not behaving strangely (Tables 5-6). These observations are reflected in aggregate by the high factor means for perceptions of deer as natural and not unnatural in both the park and in communities (Table 7). Residents of adjacent communities were less likely to perceive deer behavior as timid in the park or in their community (Table 5).

We assessed resident's concerns about a range of deer-related impacts. We found that a majority of local residents were not at all concerned about browsing damage caused by deer in the park or deer behavior around people or pets in the park. Concern about deer-car collisions and diseases and/or parasites carried by deer was higher both in the park and in local communities (Table 8-9). Levels of concern were similar across strata for most types of concern. However, adjacent community residents reported relatively higher concern about deer browsing on naturally growing or landscaped plants in their community (Table 9). In PRWI, residents of both community types placed higher importance on concerns other than browsing damage, while in communities outside the park, both community types placed higher importance on damage concerns (i.e., disease transmission, browsing damage, and presence of feces, Table 10). All mean factor scores were low, although adjacent community residents had higher scores for damage concerns in their community than did surrounding community residents (Table 10).

**Table 5. Perceptions of deer in Prince William Forest Park expressed by respondents to the 2007 PRWI Deer, People and Parks survey, by stratum.**

In Prince William Forest Park deer, in general are...	Strata	n	(Percent)			Chi-square	P-value
			Rarely	Some times	Almost Always		
wild	Adjacent	158	24.7	22.2	53.2	2.681	NS <sup>1</sup>
	Surrounding	126	32.5	16.7	50.8		
peaceful	Adjacent	163	3.1	12.3	84.7	2.111	NS
	Surrounding	130	6.2	14.6	79.2		
behaving strangely	Adjacent	158	91.1	7.0	1.9	0.084	NS
	Surrounding	126	90.5	7.1	2.4		
dangerous	Adjacent	161	86.3	11.2	2.5	0.952	NS
	Surrounding	129	82.2	14.7	3.1		
tame	Adjacent	157	52.9	24.2	22.9	3.768	NS
	Surrounding	127	46.5	34.6	18.9		
behaving normally	Adjacent	163	3.1	7.4	89.6	4.737	NS
	Surrounding	128	1.6	14.8	83.6		
aggressive	Adjacent	158	93.7	5.1	1.3	1.556	NS
	Surrounding	128	90.6	8.6	0.8		
timid	Adjacent	156	12.8	35.9	51.3	6.833	0.033
	Surrounding	127	11.0	22.8	66.1		
acting naturally	Adjacent	163	1.8	8.6	89.6	0.151	NS
	Surrounding	128	2.3	9.4	88.3		
harmless	Adjacent	159	7.5	22.0	70.4	1.689	NS
	Surrounding	126	4.0	21.4	74.6		
threatening	Adjacent	160	87.5	10.0	2.5	3.600	NS
	Surrounding	128	87.5	12.5	0.0		
acting unnaturally	Adjacent	160	90.0	7.5	2.5	1.890	NS
	Surrounding	129	90.7	4.7	4.7		

<sup>1</sup>Not significant

**Table 6. Perceptions of deer in communities near Prince William Forest Park, expressed by respondents to the 2007 PRWI Deer, People and Parks survey, by stratum.**

In communities near PRWI deer, in general are...	Strata	n	(Percent)			Chi-square	P-value
			Rarely	Sometimes	Almost Always		
wild	Adjacent	169	32.5	24.3	43.2	1.083	NS <sup>1</sup>
	Surrounding	154	37.0	20.1	42.9		
peaceful	Adjacent	174	3.4	17.8	78.7	3.657	NS
	Surrounding	155	7.7	20.6	71.6		
behaving Strangely	Adjacent	166	88.0	9.6	2.4	3.843	NS
	Surrounding	151	88.7	11.3	0.0		
dangerous	Adjacent	169	79.9	15.4	4.7	1.652	NS
	Surrounding	154	75.3	20.8	3.9		
Tame	Adjacent	167	52.1	26.3	21.6	1.173	NS
	Surrounding	152	51.3	30.9	17.8		
behaving Normally	Adjacent	171	3.5	10.5	86.0	1.192	NS
	Surrounding	155	2.6	14.2	83.2		
aggressive	Adjacent	169	89.3	8.9	1.8	0.846	NS
	Surrounding	153	90.8	8.5	0.7		
Timid	Adjacent	167	15.0	35.3	49.7	5.563	NS
	Surrounding	153	11.8	25.5	62.7		
acting Naturally	Adjacent	173	3.5	13.9	82.7	1.469	NS
	Surrounding	156	3.2	9.6	87.2		
Harmless	Adjacent	170	7.6	27.6	64.7	0.748	NS
	Surrounding	152	5.3	28.3	66.4		
threatening	Adjacent	170	82.9	12.4	4.7	1.901	NS
	Surrounding	152	84.2	13.8	2.0		
acting unnaturally	Adjacent	171	87.1	9.9	2.9	3.455	NS
	Surrounding	154	92.2	4.5	3.2		

<sup>1</sup>Not significant

**Table 7. A comparison of mean scores on factors within a perception of deer scale (in the park and in communities) obtained by community stratum, for respondents to the 2007 PRWI Deer, People and Parks survey.**

Factor Label	Community Strata	n	“In Prince William Forest Park”			“In your community”			
			Mean <sup>1</sup>	t	P-value	n	mean	t	P-value
<b>Natural</b>	Adjacent	166	2.80	0.425	NS	176	2.73	0.266	NS <sup>2</sup>
	Surrounding	131	2.78			157	2.72		
<b>Not Unnatural</b>	Adjacent	162	2.87	0.240	NS	172	2.47	-0.347	NS
	Surrounding	130	2.86			155	2.48		

<sup>1</sup>1=rarely, 2=sometimes, 3=almost always

<sup>2</sup>Not significant

**Table 8. Concerns about deer-related impacts in Prince William Forest Park (PRWI) expressed by respondents to the 2007 PRWI Deer, People and Parks survey, by stratum.**

Concern	Strata	n	Level of concern (%)			Chi-square	P-value
			Not at all	Some what	Very		
Car accidents involving deer	Adjacent	164	26.2	31.1	42.7	2.04	NS <sup>1</sup>
	Surrounding	126	19.8	37.3	42.9		
Diseases, parasites carried by deer	Adjacent	164	31.1	34.8	34.1	0.28	NS
	Surrounding	127	28.3	37.0	34.6		
People's behavior around deer	Adjacent	162	45.7	30.2	24.1	6.05	0.048
	Surrounding	127	31.5	39.4	29.1		
Deer accessing unsecured trash	Adjacent	162	51.2	22.8	25.9	2.31	NS
	Surrounding	126	43.7	30.2	26.2		
Deer browsing on vegetable gardens	Adjacent	161	58.4	18.0	23.6	3.10	NS
	Surrounding	126	57.1	25.4	17.5		
Deer browsing on landscaped flowers, trees, shrubs	Adjacent	162	56.2	21.6	22.2	5.97	0.050
	Surrounding	127	56.7	30.7	12.6		
Fawns born too late to survive winter	Adjacent	160	56.9	28.8	14.4	3.00	NS
	Surrounding	126	48.4	30.2	21.4		
Deer interacting with pets	Adjacent	157	63.7	15.3	21.0	1.80	NS
	Surrounding	127	60.6	21.3	18.1		
Having seen unhealthy deer	Adjacent	158	62.0	21.5	16.5	<0.01	NS
	Surrounding	125	61.6	21.6	16.8		
Deer behavior around people	Adjacent	160	66.3	17.5	16.3	5.58	NS
	Surrounding	126	60.3	28.6	11.1		
Deer browsing on naturally growing plants	Adjacent	164	67.1	18.9	14.0	2.90	NS
	Surrounding	127	75.6	15.7	8.7		
Presence of deer feces	Adjacent	163	70.6	20.9	8.6	0.30	NS
	Surrounding	126	73.0	18.3	8.7		
Other	Adjacent	6	16.7	16.7	66.7	0.91	NS
	Surrounding	5	.0	20.0	80.0		

<sup>1</sup>Not significant

**Table 9. Concerns about deer-related impacts “in your community, outside the park,” expressed by respondents to the 2007 Prince William Forest Park (PRWI) Deer, People and Parks survey, by stratum.**

Concern	Strata	n	Level of concern (%)			Chi-square	P-value
			Not at all	Some what	Very		
Car accidents involving deer	Adjacent	176	7.4	33.0	59.7	0.94	NS <sup>1</sup>
	Surrounding	153	5.2	36.6	58.2		
Diseases, parasites carried by deer	Adjacent	176	19.3	33.0	47.7	1.55	NS
	Surrounding	153	24.2	34.0	41.8		
Deer browsing on landscaped flowers, trees, shrubs	Adjacent	177	23.2	33.9	42.9	13.05	0.001
	Surrounding	153	38.6	35.3	26.1		
Deer browsing on vegetable gardens	Adjacent	176	26.7	32.4	40.9	0.001	NS
	Surrounding	153	35.9	32.7	31.4		
People’s behavior around deer	Adjacent	175	34.9	35.4	29.7	4.29	NS
	Surrounding	153	28.1	39.2	32.7		
Deer accessing unsecured trash	Adjacent	174	39.7	23.6	36.8	1.72	NS
	Surrounding	152	37.5	26.3	36.2		
Deer browsing on naturally growing plants	Adjacent	176	45.5	25.0	29.5	12.11	0.002
	Surrounding	152	64.5	17.8	17.8		
Deer interacting with pets	Adjacent	172	50.6	21.5	27.9	0.59	NS
	Surrounding	152	52.0	23.7	24.3		
Fawns born too late to survive winter	Adjacent	168	53.6	31.0	15.5	2.84	NS
	Surrounding	149	47.7	29.5	22.8		
Deer behavior Around people	Adjacent	173	55.5	22.5	22.0	5.748	NS
	Surrounding	152	52.6	32.9	14.5		
Having seen unhealthy deer	Adjacent	166	54.8	22.9	22.3	1.04	NS
	Surrounding	149	60.4	20.8	18.8		
Presence of deer feces	Adjacent	172	57.6	25.0	17.4	1.43	NS
	Surrounding	152	63.2	23.7	13.2		
Other	Adjacent	8	0.0	0.0	100	1.73	NS
	Surrounding	5	0.0	20.0	80.0		

<sup>1</sup>Not significant

**Table 10. A comparison of mean scores on factors within a deer-related impacts scale obtained by community stratum, for respondents to the 2007 Prince William Forest Park (PRWI) Deer, People and Parks survey.**

Factor Label	Community Strata	“In Prince William Forest Park”				“In your community”			
		n	Mean <sup>1</sup>	t	P-value	n	Mean	t	P-value
<b>Damage concerns</b>	Adjacent	166	1.54	1.037	NS	178	2.07	2.871	0.004
	Surrounding	127	1.46			153	1.88		
<b>Other concerns</b>	Adjacent	167	1.75	-0.950	NS	177	1.86	0.240	NS <sup>2</sup>
	Surrounding	129	1.82			154	1.84		

<sup>1</sup>1=not at all concerned, 2=somewhat concerned, 3=very concerned

<sup>2</sup>Not significant

### **Perceptions of PRWI staff and land management**

Local residents valued PRWI as a community asset. Most respondents agreed that the park provides open space, wildlife habitat, and makes their community a special place to live (Table 11). Residents were more likely to agree that the park provided amenity values than they were to agree it provided positive economic impact to their communities (Table 12). Few differences between strata emerged, suggesting that the park is valued at much the same level in both types of communities.

**Table 11. Attitudes about benefits that Prince William Forest Park (PRWI) provides to people living near the park (“adjacent communities”) and in surrounding communities, reported in the 2007 PRWI Deer, People and Parks survey.**

Prince William FP...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
makes my community a special place to live.	Adjacent	361	1.6	6.3	91.6	0.5	10.629	0.014
	Surrounding		1.8	12.9	81.2	4.1		
is not an important place for recreation for my community.	Adjacent	359	74.3	8.9	14.7	2.1	4.613	NS <sup>1</sup>
	Surrounding		73.8	11.9	9.5	4.8		
provides habitat for plants and animals.	Adjacent	360	1.6	2.1	94.2	2.1	0.843	NS
	Surrounding		2.9	2.4	92.9	1.8		
does not help the local economy.	Adjacent	353	59.1	19.9	9.1	11.8	2.250	NS
	Surrounding		53.3	20.4	13.8	12.6		
does not protect the landscape from development.	Adjacent	357	75.1	5.3	15.3	4.2	1.749	NS
	Surrounding		73.2	7.1	13.1	6.5		
provides open space for my community.	Adjacent	355	3.7	4.8	89.3	2.1	0.396	NS
	Surrounding		3.0	6.0	88.7	2.4		
plays a significant role in my community.	Adjacent	356	2.1	21.8	68.6	7.4	4.791	NS
	Surrounding		4.8	16.1	67.9	11.3		
Attracts tourism dollars to my community.	Adjacent	357	4.8	23.3	55.0	16.9	2.387	NS
	Surrounding		7.7	25.6	48.2	18.5		

<sup>1</sup>Not significant

**Table 11. continued.**

Prince William FP...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
is not a good neighbor.	Adjacent Surrounding	357	87.3 85.7	2.6 5.4	8.5 4.8	1.6 4.2	5.621	NS <sup>1</sup>
increases the job opportunities in my community.	Adjacent Surrounding	358	9.5 13.6	34.4 33.1	31.7 34.3	24.3 18.9	2.717	NS
preserves natural resources.	Adjacent Surrounding	359	2.1 1.2	5.3 1.8	90.5 93.5	2.1 3.6	4.216	NS
is a place where people in my community spend leisure time.	Adjacent Surrounding	359	1.6 3.0	14.2 11.8	72.1 78.7	12.1 6.5	4.625	NS

<sup>1</sup>Not significant

**Table 12. A comparison of mean scores on factors within a Prince William Forest Park (PRWI) community importance scale, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

<b>Factor label</b>	<b>Community Strata</b>	<b>n</b>	<b>Mean<sup>1</sup></b>	<b>t</b>	<b>P-value</b>
<b>Amenity values</b>	Adjacent	190	4.43	1.686	NS <sup>2</sup>
	Surrounding	170	4.33		
<b>Economic values</b>	Adjacent	178	3.71	1.199	NS
	Surrounding	158	3.61		

<sup>1</sup>1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

<sup>2</sup>Not significant

Although most respondents in both strata believe the habitat inside the park is better than outside, the majority of respondents also believe that local deer use habitat inside and outside the park (adjacent residents were more likely to agree that deer use habitat inside and outside the park) (Table 13). Few respondents believed that deer in the park are having a negative impact on park plants and/or threatening public health or safety (Table 13). About one third of respondents agreed with the statement, “The park should start now to address deer-related impacts.” Approximately half of respondents anticipated that actions by the park to manage deer-related impacts would have a positive effect on local communities; few expected park actions would affect communities negatively. Adjacent community respondents were more likely to expect park actions to positively affect their community (Table 13).

We repeated the questions asked in Table 13 and asked residents how they thought PRWI staff would respond. Depending on the item and stratum, 24-46% of residents responded “not sure” (Table 14). In aggregate, this pattern suggests unfamiliarity with park staff and their views on deer and deer management.

Findings suggest that PRWI and park staff have a positive public image in local communities. Most respondents believed NPS employees were dedicated to preserving and protecting the park and the majority reported having trust in PRWI staff to make good decisions about natural resource management (Table 15). However, a plurality also were unsure whether park staff listen to public opinion or work with local communities for shared purposes (Table 15). The plurality of respondents in both strata agreed with almost all items used to create the park image scale (Table 16). Fewer respondents agreed that the park is unbiased and tells the whole story (Table 16). On average, the park was rated positively on all three public image factors, with the highest scores for professionalism and the lowest for openness (Table 17).

**Table 13. Beliefs about deer-related impacts and impacts management in Prince William Forest Park (PRWI) expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

		(Percent)						
	Strata	n	Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure	Chi- square	P- value
It is reasonable to have deer in the park	Adjacent	189	2.1	1.6	94.7	1.6	2.333	NS <sup>1</sup>
	Surrounding	167	0.6	3.0	95.2	1.2		
The habitat for deer is better in the park than in communities outside the park	Adjacent	189	1.6	7.4	88.4	2.6	3.585	NS
	Surrounding	166	1.2	3.6	94.0	1.2		
The local deer herd uses habitat both in the park and in communities outside the park	Adjacent	189	4.8	7.4	77.8	10.1	10.165	0.017
	Surrounding	166	3.6	12.7	64.5	19.3		
Deer seriously damage plants and other resources in the park	Adjacent	189	39.2	30.2	11.6	19.0	0.371	NS
	Surrounding	167	41.9	29.3	10.2	18.6		
Deer create a serious nuisance for people visiting the park	Adjacent	189	69.8	15.9	3.2	11.1	1.583	NS
	Surrounding	166	72.9	12.7	1.8	12.7		
Deer create a serious health risk in the park	Adjacent	189	64.6	15.9	4.2	15.3	0.395	NS
	Surrounding	167	65.3	14.4	5.4	15.0		
Deer present a serious safety risk in the park	Adjacent	189	67.2	13.2	5.3	14.3	0.021	NS
	Surrounding	167	67.7	13.2	5.4	13.8		

<sup>1</sup>Not significant

**Table 13. Continued.**

			(Percent)				Chi-square	P-value
	Strata	n	Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
The park should start now to address deer-related impacts in the park	Adjacent	189	26.5	24.3	36.0	13.2	1.522	NS <sup>1</sup>
	Surrounding	167	23.4	29.9	34.7	12.0		
Addressing deer-related impacts in the park would affect communities outside the park	Adjacent	189	9.0	20.6	52.4	18.0	3.078	NS
	Surrounding	166	13.3	24.7	47.0	15.1		
Addressing deer-related impacts in the park would affect me positively	Adjacent	187	22.5	30.5	28.3	18.7	9.171	0.027
	Surrounding	166	28.3	34.3	15.1	22.3		
Addressing deer-related impacts in the park would affect me negatively	Adjacent	186	34.4	36.0	9.7	19.9	0.426	NS
	Surrounding	165	33.9	35.2	8.5	22.4		
It is important to understand other people's views about deer-related impacts	Adjacent	188	5.3	21.3	67.0	6.4	0.202	NS
	Surrounding	166	4.8	21.7	68.1	5.4		
The park is part of the local community	Adjacent	188	3.2	4.8	88.3	3.7	4.165	NS
	Surrounding	166	2.4	5.4	91.6	0.6		

<sup>1</sup>Not significant

**Table 14. Beliefs about Prince William Forest Park (PRWI) staff perceptions of deer-related impacts and impacts management in PRWI, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

NPS managers think ...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
it is reasonable to have deer in the park	Adjacent	187	1.6	7.5	66.8	24.1	1.281	NS <sup>1</sup>
	Surrounding	163	2.5	8.6	61.3	27.6		
the habitat for deer is better in the park than in communities outside the park	Adjacent	187	2.1	9.1	64.7	24.1	0.940	NS
	Surrounding	163	2.5	6.7	63.8	27.0		
the local deer herd uses habitat both in the park and in communities outside the park	Adjacent	187	3.7	9.1	60.4	26.7	3.144	NS
	Surrounding	163	6.7	12.3	53.4	27.6		
deer seriously damage plants and other resources in the park	Adjacent	184	21.2	20.7	16.8	41.3	8.920	0.030
	Surrounding	162	27.2	24.1	6.8	42.0		
deer create a serious nuisance for people visiting the park	Adjacent	184	44.6	15.2	3.8	36.4	3.978	NS
	Surrounding	163	44.8	16.6	.6	38.0		
deer create a serious health risk in the park	Adjacent	184	41.8	17.4	4.9	35.9	0.438	NS
	Surrounding	163	40.5	18.4	3.7	37.4		
deer present a serious safety risk in the park	Adjacent	184	43.5	13.6	6.5	36.4	6.138	NS
	Surrounding	163	41.1	19.0	1.8	38.0		

<sup>1</sup>Not significant

**Table 14. Continued.**

NPS managers think ...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
the park should start now to address deer-related impacts in the park	Adjacent	184	12.0	22.8	29.9	35.3	1.422	NS <sup>1</sup>
	Surrounding	163	14.1	19.0	27.6	39.3		
addressing deer-related impacts would affect communities outside the park	Adjacent	183	5.5	18.0	42.1	34.4	4.134	NS
	Surrounding	163	8.6	15.3	34.4	41.7		
addressing deer-related impacts in the park would affect me positively	Adjacent	182	8.2	28.6	23.1	40.1	2.483	NS
	Surrounding	163	10.4	22.7	20.9	46.0		
addressing deer-related impacts in the park would affect me negatively	Adjacent	180	23.3	29.4	5.0	42.2	0.591	NS
	Surrounding	162	21.6	27.2	4.9	46.3		
it is important to understand other people's views about deer-related impacts	Adjacent	184	4.9	12.0	58.7	24.5	5.830	NS
	Surrounding	163	2.5	16.0	49.1	32.5		
the park is part of the local community	Adjacent	184	2.7	8.7	66.8	21.7	2.060	NS
	Surrounding	163	3.1	8.0	60.7	28.2		

<sup>1</sup>Not significant

**Table 15. Perceptions of Prince William Forest Park (PRWI) as a land manager and community partner, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

Prince William FP...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
NPS employees are dedicated to preserving, protecting park.	Adjacent	181	1.1	6.1	84.5	8.3	3.905	NS
	Surrounding	153	2.6	7.8	76.5	13.1		
PRWI is an educational resource for my community.	Adjacent	183	0.0	2.7	94.0	3.3	8.201	0.042
	Surrounding	153	2.0	6.5	85.6	5.9		
I do not feel welcome at PRWI.	Adjacent	183	90.7	3.8	1.1	4.4	10.098	0.018
	Surrounding	153	79.1	11.8	1.3	7.8		
PRWI works with local communities for shared purposes.	Adjacent	182	2.2	21.4	48.9	27.5	4.854	NS
	Surrounding	153	1.3	19.0	41.2	38.6		
The rules and regs at PRWI do not help preserve/protect it for the future.	Adjacent	183	56.8	11.5	7.1	24.6	7.739	0.052
	Surrounding	153	51.0	16.3	2.0	30.7		
My community typically does not help care for PRWI.	Adjacent	183	39.9	16.4	16.9	26.8	3.366	NS
	Surrounding	153	30.7	18.3	17.6	33.3		
Managers at PRWI listen to opinions from people like me.	Adjacent	183	4.9	23.5	32.2	39.3	4.430	NS
	Surrounding	153	2.6	26.1	24.2	47.1		
I usually do not support the resource management decisions made at PRWI.	Adjacent	181	45.3	30.4	2.2	22.1	3.111	NS
	Surrounding	152	38.2	35.5	4.6	21.7		
I usually trust management at PRWI to make good decisions about resource management.	Adjacent	183	7.7	13.1	67.8	11.5	2.876	NS
	Surrounding	153	3.9	17.0	68.6	10.5		

**Table 16. Perceptions of Prince William Forest Park management public image, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in three community strata.**

Management at Prince William Forest Park typically is...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
trustworthy	Adjacent	182	0.5	11.0	64.8	23.6	8.348	0.039
	Surrounding	152	1.3	15.1	49.3	34.2		
not knowledgeable	Adjacent	182	65.4	8.2	3.3	23.1	6.368	NS <sup>1</sup>
	Surrounding	152	52.6	11.8	2.6	32.9		
not fair	Adjacent	181	55.8	12.7	5.0	26.5	3.922	NS
	Surrounding	152	50.7	13.8	2.0	33.6		
telling the whole story	Adjacent	182	8.2	20.3	36.3	35.2	3.931	NS
	Surrounding	152	9.9	25.0	26.3	38.8		
unbiased	Adjacent	181	11.0	21.5	32.6	34.8	4.144	NS
	Surrounding	151	6.6	23.2	27.2	43.0		
concerned about my community's well-being	Adjacent	182	4.9	17.6	54.4	23.1	3.190	NS
	Surrounding	152	5.3	13.2	50.7	30.9		
unconcerned about the public interest	Adjacent	181	51.4	13.8	11.0	23.8	6.136	NS
	Surrounding	152	49.3	9.9	6.6	34.2		
watching out for my community's interests	Adjacent	182	7.1	18.7	48.9	25.3	5.017	NS
	Surrounding	152	7.2	11.2	48.0	33.6		

<sup>1</sup>Not significant

**Table 17. A comparison of mean scores on factors within a Prince William Forest Park PRWI) public image scale, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

Factor label	Community Strata	n	Mean <sup>1</sup>	t	P-value
<b>Professionalism</b>	Adjacent	145	4.01	1.534	NS <sup>2</sup>
	Surrounding	107	3.89		
<b>Community Affiliation</b>	Adjacent	145	3.69	-0.937	NS
	Surrounding	109	3.77		
<b>Openness</b>	Adjacent	127	3.50	1.308	NS
	Surrounding	98	3.34		

<sup>1</sup>1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

<sup>2</sup>Not significant

### **Interest in opportunities to provide input to PRWI on deer management**

The majority of residents agreed that public input usually leads to better management decisions, and interactions between park managers and residents with different ideas helps build future relationships (Table 18). However, fewer than 25% of respondents agreed with the statement “I usually have enough opportunities to provide input on park management decisions” (Table 18). A majority of respondents also believed they did not have enough information to provide meaningful input on deer management in the park. Adjacent community respondents and surrounding community respondents held similar beliefs on PRWI’s use of public input (Table 18).

About half of respondents had learned about park news from mass media sources during the previous 12 months. Very few had had taken personal actions to learn about park activities. However, adjacent community residents were more likely to have talked with local park staff or other public officials about the (Table 19).

Though few had provided input previously, substantial numbers of residents expressed an interest in providing input if NPS addresses deer-related impacts in the future. Interest in providing input was stronger in adjacent communities than in surrounding communities (Table 20). A majority of respondents believed that they could have at least “some” influence on management decisions in the park (Table 21).

**Table 18. Perceptions about Prince William Forest Park (PRWI) use of public input for land management decisions, expressed by respondents to the 2007 Valley Forge NHP Deer, People and Parks survey in two community strata.**

Prince William FP...	Strata	n	(Percent)				Chi-square	P-value
			Disagree, Strongly Disagree	Neutral	Agree, Strongly Agree	Not Sure		
I usually have enough opportunities to provide input on park management decisions.	Adjacent	185	23.8	28.6	23.8	23.8	2.843	NS
	Surrounding	164	26.8	25.6	18.3	29.3		
I do not believe my input typically (or would be) taken seriously by park management.	Adjacent	183	32.2	26.2	20.8	20.8	2.699	NS
	Surrounding	163	25.2	27.0	21.5	26.4		
I do not have enough information to provide meaningful input on deer management.	Adjacent	186	12.4	17.7	59.1	10.8	6.231	NS
	Surrounding	164	5.5	14.6	68.3	11.6		
The different ways the park asks for my opinion encourages me to provide input.	Adjacent	185	14.6	29.7	37.8	17.8	7.164	NS
	Surrounding	164	15.2	32.9	25.6	26.2		
I am not comfortable voicing my opinion about park mgt. decisions.	Adjacent	183	51.9	21.3	15.3	11.5	2.069	NS
	Surrounding	163	49.7	27.6	12.9	9.8		
Public input usually leads to better management decisions.	Adjacent	184	6.0	14.7	66.8	12.5	.913	NS
	Surrounding	164	7.9	15.9	65.9	10.4		
For the most part, interactions between myself, park managers, and people with different ideas helps build future relationships.	Adjacent	185	.5	23.5	60.5	15.7	5.593	NS
	Surrounding	164	3.7	18.3	59.8	18.3		

**Table 19. Actions taken in the previous 12 months to obtain information about Prince William Forest Park (PRWI), reported by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

Actions in past 12 months	Strata	n	(Percent)			Chi-square	P-value
			No	Yes	Not Sure		
Read or listened to news about park.	Adjacent	184	40.2	56.0	3.8	2.369	NS <sup>1</sup>
	Surrounding	167	45.5	48.5	6.0		
Talked with local park staff.	Adjacent	185	65.9	31.9	2.2	13.433	0.001
	Surrounding	167	82.0	18.0	0.0		
Talked with other public officials about the park.	Adjacent	184	85.9	12.5	1.6	8.224	0.016
	Surrounding	166	94.6	5.4	0.0		
Provided written comments to a park plan, impact statement, survey.	Adjacent	185	96.2	2.7	1.1	.325	NS
	Surrounding	166	97.0	1.8	1.2		
Written a letter to a newspaper about the park.	Adjacent	185	99.5	0.0	0.5	2.235	NS
	Surrounding	167	98.2	1.2	0.6		
Attended a public meeting about the park.	Adjacent	185	93.5	5.9	0.5	3.653	NS
	Surrounding	167	97.6	2.4	0.0		
Participated in a community group or activity related to a park issue.	Adjacent	185	89.7	9.2	1.1	1.078	NS
	Surrounding	167	92.8	6.6	0.6		

<sup>1</sup>Not significant

**Table 20. Likelihood of participating in involvement opportunities if those opportunities were provided by Prince William Forest Park (PRWI), reported by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

Actions	Strata	n	(Percent)			Chi-square	P-value
			Very unlikely, Unlikely	Very likely, Likely	Not Sure		
Read or listen to news about park actions to address deer impacts.	Adjacent	186	8.6	87.1	4.3	9.207	0.010
	Surrounding	167	19.8	76.0	4.2		
Talk with local park staff about deer-related impacts	Adjacent	185	44.9	45.9	9.2	11.887	0.003
	Surrounding	167	62.3	28.7	9.0		
Talk with other public officials about deer-related impacts.	Adjacent	184	51.1	36.4	12.5	6.616	0.037
	Surrounding	165	63.6	24.2	12.1		
Provide written comments to a park plan, impact statement, survey related to deer impacts.	Adjacent	185	43.8	40.5	15.7	9.560	0.008
	Surrounding	167	59.9	26.9	13.2		
Write a letter to a newspaper about deer impacts.	Adjacent	185	74.1	13.0	13.0	1.617	NS <sup>1</sup>
	Surrounding	167	79.0	9.0	12.0		
Attend a public meeting about deer impacts.	Adjacent	186	43.0	43.0	14.0	6.124	0.047
	Surrounding	166	56.0	31.9	12.0		
Participate in a community group or activity related to deer impacts.	Adjacent	186	45.7	35.5	18.8	12.794	0.002
	Surrounding	167	64.7	22.8	12.6		

<sup>1</sup>Not significant

**Table 21. Level of influence respondents perceive they have to influence management of Prince William Forest Park (PRWI) or communities surrounding the park, expressed by respondents to the 2007 PRWI Deer, People and Parks survey in two community strata.**

<b>How much influence do you think people like yourself can have ...</b>	<b>n</b>	<b>A lot</b>	<b>Some</b>	<b>Very little</b>	<b>None at all</b>	<b>Chi-square</b>	<b>P-value</b>
on the management of Prince William FP?							
Adjacent	188	13.3	53.7	25.0	8.0	3.393	NS <sup>1</sup>
Surrounding	168	8.3	61.9	23.2	6.5		
In making communities surrounding the park a better place to live?							
Adjacent	187	28.9	51.3	17.6	2.1	5.858	NS
Surrounding	168	19.6	58.9	16.7	4.8		

<sup>1</sup>Not significant

## SUMMARY AND CONCLUSIONS

Like their counterparts in the other areas we studied (i.e., Valley Forge NHP, Fire Island National Seashore, Morristown NHP, Great Falls area near the Chesapeake and Ohio Canal NHP), many local residents living near Prince William Park Forest regard PRWI as a positive part of their local community. They use and appreciate the park for its amenity values (e.g., as open space, as a leisure resource, as natural habitats). A majority local residents visit the park a few times per year to be outdoors, enjoy the natural surroundings, exercise, or spend time with family or friends.

Most local residents near PRWI interact with deer less than once a week (a lower level of interaction than reported by local residents in some of our other study areas). They believe deer use both park lands and communities as their habitat (i.e., they recognize that the park and communities share a common deer herd). Local residents near PRWI were most likely to express concern about deer-car collisions and disease transmission from deer to humans, but fewer than half of respondents were “very” concerned even about those potential impacts associated with the presence of deer. Few regarded deer as a serious health or safety risk to park visitors, and few would characterize deer-related plant damage in the park as a “serious” problem. In contrast to some other study areas, residents near PRWI were more likely to enjoy deer without worrying about deer-related problems. Recent deer monitoring efforts indicate that unlike most parks in the region, deer densities within PRWI may be decreasing (Bates 2007). If deer densities continue to decline over coming years, it would be useful to re-survey local

residents to assess whether lower deer densities are associated with more positive attitudes toward the presence of deer.

Only a minority of local residents believed NPS should be managing deer-related impacts in PRWI, but few believed action by NPS to manage deer-related impacts would affect their community negatively. Adjacent and surrounding community members were relatively similar with regard to the experiences and perceptions measured in this study (another finding that distinguished PRWI respondents from those in our other study areas). All of these findings are consistent with our expectations in a situation like one near PRWI, where deer management has not yet emerged as a public policy issue.

While not reflected in responses from all community residents, a base of general trust and credibility exists for PRWI decision makers. A majority of respondents believe PRWI staff are dedicated to protecting the park and they trust PRWI staff to make good decisions about resource management. In contrast to respondents from other study areas, a majority of PRWI respondents believed that they could have at least “some” influence on management decisions in the park. It should be noted, however, that these positive impressions are based on limited awareness of PRWI management issues related to deer and little direct experience providing input to PRWI. Only about half of respondents had heard or read news stories about the park over the preceding year and very few had participated in public input processes at PRWI. Given those findings, it isn’t surprising that a majority of respondents said they do not have enough information to provide meaningful input to the park. It also is not surprising that a substantial proportion of local residents near PRWI are uncertain about the beliefs of NPS managers regarding deer and deer management in the park and the degree to which NPS decision makers listen to community residents or consider their input in decisions.

Public issues education (PIE) is necessary to increase the capacity of publics to understand public issues and participate effectively in public decision-making processes (Dale and Hahn 1994, Leong et al. 2006). Different learning objectives are addressed at different stages of a public issue. In the earliest stages, the objective of issue education is to increase public understanding of the issue and the public input process. Raising awareness of deer management issues or opportunities for public input into other management issues would be more appropriate than any other PIE objectives for PRWI at this time. Any efforts to raise public knowledge about deer management issues or public participation in park management planning in general should help build community capacity to respond later, if deer management issues become more pronounced at PRWI in the future.

Though few had provided input previously, substantial numbers of respondents from adjacent communities indicated an interest in providing input if NPS addresses deer-related impacts in the future. Adjacent community residents indicated less interest in providing input on deer management issues. These findings are consistent with the situational theory of publics (Grünig 1977), which posits that individuals are more likely to actively seek information and take action if they believe a situation involves them. This theory also suggests that to encourage involvement from a public, the type of information to be provided should focus on: understanding the problem itself (to encourage the public to think about the problem and possibly to become involved), the solutions to the problem (to provide referent criteria for the

specific problem), and information to eliminate constraints to action (in this case, increased awareness of opportunities to provide input). These suggestions assume that the park (as communicator) has adequately framed the problem and potential solutions. More recent communications research emphasizes the importance of two-way communication that incorporates dialogue with the public to improve mutual learning about the variety of ways the problem and potential solutions are understood (Pearce and Littlejohn 1997). This dialogic approach will be most important for topics where PRWI and public perspectives diverge.

Because of their proximity to PRWI, residents of adjacent communities have greater potential to experience direct impacts from deer associated with the park or deer management initiated by PRWI than do visitors from surrounding communities. We expected deer management to be a more salient issue in adjacent communities and some of the data from this study were consistent with that expectation. A few concerns about deer-related impacts and interest in providing input to PRWI about managing deer-related impacts are stronger among adjacent community residents than among surrounding community residents. At present, residents of adjacent and surrounding communities probably are not different enough to address as separate target audiences for information/education interventions near PRWI. However, that may change if deer-related impacts intensify over time.

Over the past century, the types of units administered by the NPS have broadened from parks created to preserve America's scenic treasures to include parks that are embedded in human-dominated landscapes (Runte 1997), such as PRWI. NPS public participation policies likewise have evolved to acknowledge communities of place (related to the physical context of resource management issues) in addition to communities of interest (e.g., regional or national publics with different sets of concerns, Patterson, et al., 2003). The NPS Director's Order 12 Handbook for Conservation Planning, Environmental Impact Analysis, and Decision Making (National Park Service 2001) requires NPS to seek input on management decisions from all interested parties during development of an EIS. This requirement assures that input is received from communities of interest during specific planning episodes. NPS Director's Order #75A: Civic Engagement and Public Involvement (National Park Service 2007a), on the other hand, views civic engagement as "...a continuous, dynamic conversation with the public..." (p. 2). This perspective better reflects the process for engaging communities of place (e.g., adjacent community residents). Recent NPS policies recognize the importance of this type of dialogue and encourage ongoing two-way communication with communities of place as a way of doing business.

This study examined local community members' perceptions about and use of NPS lands, perceptions of and concerns about deer, and opinions about NPS decision making and land management. Overall, this study provides NPS decision makers with information that will help them better understand community interests related to deer impacts and management of NPS lands. Insights from this study can be used to guide ongoing communication about deer management between NPS personnel and residents of local communities. Findings should be especially useful to park managers as they think about tailoring communication toward communities of place and communities of interest.

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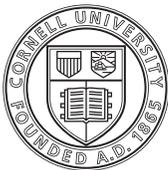
APPENDIX A: Survey instrument

# Deer, People and Parks

*A Survey of Residents Living Near  
Prince William Forest Park*



Research conducted by



Cornell University  
Department of Natural Resources  
Human Dimensions Research Unit



National Park Service  
Biological Resource Management Division

## About this Questionnaire

The National Park Service seeks your help to improve public involvement in management decisions. The purpose of this survey is to learn about your experiences, opinions and suggestions related to natural resource management in Prince William Forest Park, particularly with respect to deer and related issues in the park and surrounding community. This survey is part of a large study about deer and the National Park System and does not imply that Prince William Forest Park is currently planning to manage deer.

Even if you have not visited Prince William Forest Park, your feedback will assist the National Park Service when considering community involvement there and at other parks in the future.

Please complete this questionnaire at your earliest convenience, seal it, and drop it in any mailbox (no envelope is needed); return postage has been provided. The questionnaire has an identification number so you can be removed from our mailing list when you return it; your name and address will not be saved with your responses. We appreciate your prompt response.

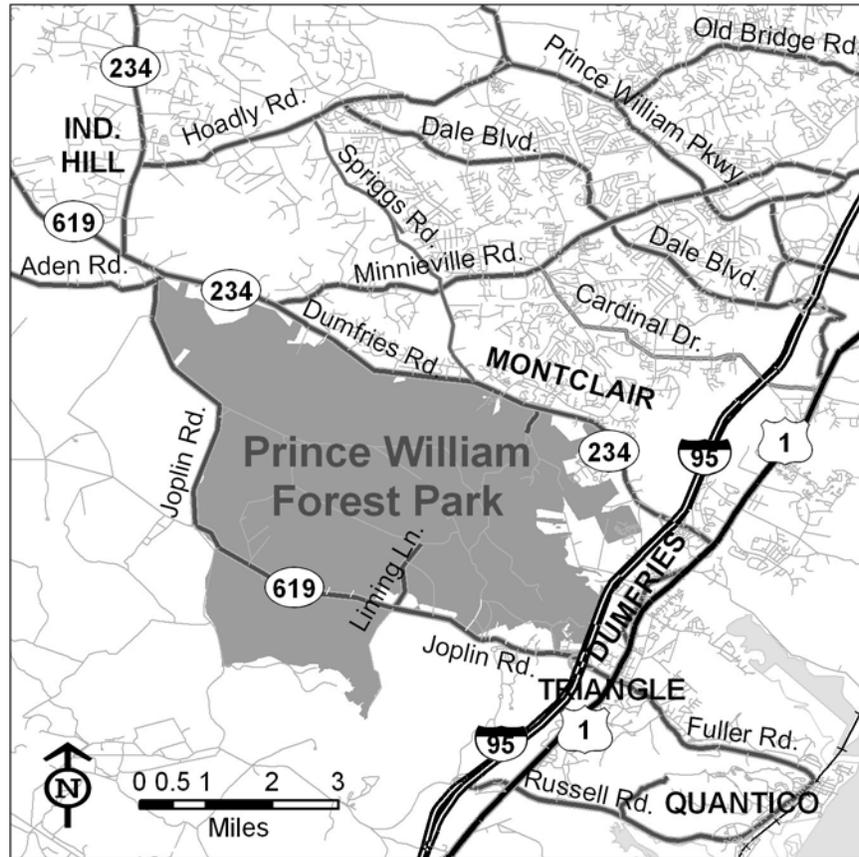
***Thank you for your help with this important study!***



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Throughout this survey, we may refer to the National Park Service as “NPS” and Prince William Forest Park as “Prince William FP,” or “the Park.”

By Prince William Forest Park, we mean the area shaded in gray on the map, bounded by I-95 on the east, Route 234 (Dumfries Rd.) to the north, and Route 619 (Joplin Rd.) to the south, with a portion that is surrounded by Quantico Marine Corps Base to the south of Joplin Rd.



## YOUR EXPERIENCES WITH PRINCE WILLIAM FOREST PARK, DEER, AND YOUR COMMUNITY

**1. Have you ever visited Prince William Forest Park?**

- Yes  
 No *(If no, please skip to Question 6)*

**2. When you visit Prince William Forest Park, how much time do you usually spend there?**

*Please check one.*

- Passing through on my way to somewhere else  
 Less than 4 hours  
 Four hours or more, but less than one day  
 One day or more

**3. Why do you visit Prince William Forest Park?**

*Please check all that apply.*

- To view the scenery  
 To enjoy the smells and sounds of nature  
 To view wildlife  
 To learn about history  
 To spend time with family and friends  
 To exercise  
 To be outside  
 To get away from the usual demands of life  
 To volunteer in park activities  
 Other, please specify: \_\_\_\_\_

**4. How many visits have you made to Prince William Forest Park in the past 12 months?**

- None *(If none, please skip to Question 6)*  
 1  
 2-4  
 5-10  
 More than 10  
 Don't know/Can't remember

**5. In the past 12 months, how often have you seen deer in Prince William Forest Park?**

*Please check one.*

<input type="checkbox"/> Every visit	<input type="checkbox"/> Half or more but not all visits	<input type="checkbox"/> Less than half of visits	<input type="checkbox"/> Never
--------------------------------------	----------------------------------------------------------	---------------------------------------------------	--------------------------------

**6. In the past 12 months, how often have you seen deer in your community near Prince William Forest Park? Please check one.**

<input type="checkbox"/> Daily	<input type="checkbox"/> A few times a week	<input type="checkbox"/> Weekly	<input type="checkbox"/> Less often than once a week	<input type="checkbox"/> Never
--------------------------------	---------------------------------------------	---------------------------------	------------------------------------------------------	--------------------------------

**7. Please indicate to what extent you agree or disagree with the following statements about Prince William Forest Park and your community.**

**Prince William Forest Park ...**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
makes my community a special place to live	1	2	3	4	5	9
is not an important place for recreation for my community	1	2	3	4	5	9
provides habitat for plants and animals	1	2	3	4	5	9
does not help the local economy	1	2	3	4	5	9
does not protect the landscape from development	1	2	3	4	5	9
provides open space for my community	1	2	3	4	5	9
plays a significant role in my community	1	2	3	4	5	9
attracts tourism dollars to my community	1	2	3	4	5	9
is not a good neighbor	1	2	3	4	5	9
increases the job opportunities in my community	1	2	3	4	5	9
preserves natural resources	1	2	3	4	5	9
is a place where people in my community spend leisure time	1	2	3	4	5	9

## YOUR OPINIONS ABOUT DEER IN THE PARK & COMMUNITY

8. In Prince William Forest Park or in your community (outside the park), to what extent do you think that deer, in general, are:

*Please circle one number for each item.*

	IN PRINCE WILLIAM FOREST PARK			IN YOUR COMMUNITY (OUTSIDE THE PARK)		
	Rarely	Sometimes	Almost always	Rarely	Sometimes	Almost always
wild	1	2	3	1	2	3
peaceful	1	2	3	1	2	3
behaving strangely	1	2	3	1	2	3
dangerous	1	2	3	1	2	3
tame	1	2	3	1	2	3
behaving normally	1	2	3	1	2	3
aggressive	1	2	3	1	2	3
timid	1	2	3	1	2	3
acting naturally	1	2	3	1	2	3
harmless	1	2	3	1	2	3
threatening	1	2	3	1	2	3
acting unnaturally	1	2	3	1	2	3

9. Generally, how do you feel about deer IN PRINCE WILLIAM FOREST PARK? *Please check one.*

- I have no particular feelings about deer in Prince William FP
- I enjoy deer AND I do not worry about deer-related impacts
- I enjoy deer BUT I worry about deer-related impacts
- I do not enjoy deer in Prince William Forest Park

**10. Generally, how do you feel about deer IN YOUR COMMUNITY (outside Prince William Forest Park)?** *Please check one.*

- I have no particular feelings about deer in my community
- I enjoy deer AND I do not worry about deer-related impacts
- I enjoy deer BUT I worry about deer-related impacts
- I do not enjoy deer in my community

**11. Please indicate whether you are concerned about any of these deer-related impacts, either within Prince William Forest Park or in your community (outside the park):**

*Please circle one number for each item.*

	IN PRINCE WILLIAM FOREST PARK			IN YOUR COMMUNITY (OUTSIDE THE PARK)		
	Not at all concerned	Somewhat concerned	Very concerned	Not at all concerned	Somewhat concerned	Very concerned
Having seen unhealthy deer	1	2	3	1	2	3
Fawns that are born too late to survive winter	1	2	3	1	2	3
Presence of deer feces	1	2	3	1	2	3
Deer browsing on naturally growing flowers, trees and shrubs	1	2	3	1	2	3
Deer browsing on landscaped flowers, trees and shrubs	1	2	3	1	2	3
Deer browsing on vegetable gardens	1	2	3	1	2	3
Deer accessing unsecured trash	1	2	3	1	2	3
Deer interacting with pets	1	2	3	1	2	3
Deer behavior around people	1	2	3	1	2	3
People's behavior around deer	1	2	3	1	2	3
Diseases and/or parasites carried by deer	1	2	3	1	2	3
Car accidents involving deer	1	2	3	1	2	3
Other (Please specify): _____	1	2	3	1	2	3

**12. Please indicate to what extent you agree or disagree with the following statements.**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
It is reasonable to have deer in the park	1	2	3	4	5	9
The habitat for deer is better in the park than in communities outside the park	1	2	3	4	5	9
The local deer herd uses habitat both in the park and in communities outside the park	1	2	3	4	5	9
Deer seriously damage plants and other resources in the park	1	2	3	4	5	9
Deer create a serious nuisance for people visiting the park	1	2	3	4	5	9
Deer present a serious health risk in the park	1	2	3	4	5	9
Deer present a serious safety risk in the park	1	2	3	4	5	9
The park should start now to address deer-related impacts in the park	1	2	3	4	5	9
Addressing deer-related impacts in the park would affect communities outside the park	1	2	3	4	5	9
Addressing deer-related impacts in the park would affect me positively	1	2	3	4	5	9
Addressing deer-related impacts in the park would affect me negatively	1	2	3	4	5	9
It is important to understand other people's views about deer-related impacts	1	2	3	4	5	9
The park is part of the local community	1	2	3	4	5	9

**13. Please indicate to what extent you agree or disagree with the following statements about NPS managers in general.**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
NPS managers think it is reasonable to have deer in the park	1	2	3	4	5	9
NPS managers think the habitat for deer is better in the park than in communities outside the park	1	2	3	4	5	9
NPS managers think the local deer herd uses habitat both in the park and in communities outside the park	1	2	3	4	5	9
NPS managers think deer seriously damage plants and other resources in the park	1	2	3	4	5	9
NPS managers think deer create a serious nuisance for people visiting the park	1	2	3	4	5	9
NPS managers think deer present a serious health risk in the park	1	2	3	4	5	9
NPS managers think deer present a serious safety risk in the park	1	2	3	4	5	9
NPS managers think they should start now to address deer-related impacts in the park	1	2	3	4	5	9
NPS managers think that addressing deer-related impacts in the park would affect communities outside the park	1	2	3	4	5	9
NPS managers think that addressing deer-related impacts in the park would affect me positively	1	2	3	4	5	9
NPS managers think that addressing deer-related impacts in the park would affect me negatively	1	2	3	4	5	9
NPS managers think it is important to understand other people's views about deer-related impacts	1	2	3	4	5	9
NPS managers think the park is part of the local community	1	2	3	4	5	9

## YOUR EXPERIENCES WITH PARK MANAGEMENT

### 14. Have you done any of the following IN THE PAST 12 MONTHS?

*Please circle one category for each item.*

Read or listened to news about the park	Yes	No	Not Sure
Talked with local park staff	Yes	No	Not Sure
Talked with other public officials about the park	Yes	No	Not Sure
Provided written comments to a park management plan, impact statement, or survey (excluding this survey)	Yes	No	Not Sure
Written a letter to a newspaper about the park	Yes	No	Not Sure
Attended a public meeting about the park	Yes	No	Not Sure
Participated in a community group or community activity related to a park issue	Yes	No	Not Sure

### 15. If the park were to consider addressing deer-related impacts in the future, how likely is it that you would do any of the following ?

*Please circle one number for each item.*

	Very Unlikely	Unlikely	Likely	Very Likely	Not Sure
Read or listen to news about park actions to address deer-related impacts	1	2	3	4	9
Talk with local park staff about deer impacts	1	2	3	4	9
Talk with other public officials about deer impacts	1	2	3	4	9
Provide written comments to a park management plan, impact statement, or survey related to deer impacts (in addition to this survey)	1	2	3	4	9
Write a letter to a newspaper about deer impacts	1	2	3	4	9
Attend a public meeting about deer impacts	1	2	3	4	9
Participate in a community group or community activity related to deer impacts	1	2	3	4	9

**16. Please indicate to what extent you agree or disagree with the following statements about management and planning at Prince William Forest Park.**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
I usually have enough opportunities to provide input on park management decisions	1	2	3	4	5	9
I do not believe my input typically is (or would be) taken seriously by park management	1	2	3	4	5	9
I do not have enough information to give meaningful input on deer management	1	2	3	4	5	9
The different ways the park asks for my opinion (e.g., via written comments, conversations with park staff, public meetings, etc.) encourage me to provide input	1	2	3	4	5	9
I am not comfortable voicing my opinion about park management decisions	1	2	3	4	5	9
Public input usually leads to better management decisions	1	2	3	4	5	9
For the most part, interactions between myself, park managers, experts, and people with ideas different from my own help build future relationships	1	2	3	4	5	9

**17. How much influence do you think people like yourself can have on the management of Prince William Forest Park?**

*Please check one.*

- A lot     
  Some     
  Very little     
  None at all

**18. How much influence do you think people like yourself can have in making the communities surrounding Prince William Forest Park a better place to live? Please check one.**

- A lot     
  Some     
  Very little     
  None at all

**19. Please indicate to what extent you agree or disagree with the following statements about management at Prince William Forest Park.**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
On the whole, National Park Service employees are dedicated to preserving and protecting Prince William Forest Park	1	2	3	4	5	9
Prince William Forest Park is an educational resource for my community	1	2	3	4	5	9
I do not feel welcome at Prince William Forest Park	1	2	3	4	5	9
Prince William Forest Park typically works with local communities for shared purposes	1	2	3	4	5	9
On the whole, the rules and regulations at Prince William Forest Park do not help preserve and protect it for the future.	1	2	3	4	5	9
My community typically does not help care for Prince William Forest Park	1	2	3	4	5	9
Managers at Prince William Forest Park typically listen to opinions from people like me	1	2	3	4	5	9
I usually do not support the resource management decisions made at Prince William Forest Park	1	2	3	4	5	9
I usually trust management at Prince William Forest Park to make good decisions about resource management	1	2	3	4	5	9

**20. Please indicate to what extent you agree or disagree that management at Prince William Forest Park typically is...**

*Please circle one number for each item.*

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Sure
trustworthy	1	2	3	4	5	9
not knowledgeable	1	2	3	4	5	9
not fair	1	2	3	4	5	9
telling the whole story	1	2	3	4	5	9
unbiased	1	2	3	4	5	9
concerned about my community's well-being	1	2	3	4	5	9
unconcerned about the public interest	1	2	3	4	5	9
watching out for my community's interests	1	2	3	4	5	9

## BACKGROUND INFORMATION

*All information you provide is never associated with your name.*

21. In what year were you born? 19\_\_\_\_\_

22. Are you male or female?  Male  Female

23. How long have you lived in a community near Prince William Forest Park?  
\_\_\_\_\_ years

24. Please tell us which activities you have participated in, at any location (not just in the park or your community), in the last 12 months: *Please check all that apply.*

- Hiking/Walking outdoors
- Biking
- Picnicking
- Camping
- Boating/Canoeing/Kayaking
- Wildlife viewing
- Nature photography/Painting/Sketching
- Horseback riding
- Hunting
- Fishing

25. What is the highest level of formal education you have completed? *Please check one.*

- Some high school
- High school diploma/G.E.D.
- Some college or technical school
- Associate's Degree (e.g., A.A.)
- College undergraduate degree (e.g., B.A., B.S.)
- Graduate degree (e.g., M.S., Ph.D., M.D.)

26. Please use the space below for any additional comments:

***THANK YOU FOR YOUR PARTICIPATION!***

**To return this questionnaire, simply seal it and drop it into the nearest mailbox.  
Postage has already been provided.**

For more information about this project, please visit:  
**<http://www.dnr.cornell.edu/deerpeopleparks>**  
or call: 607-255-4136.

To learn more about the National Park System, please visit:  
**<http://www.nps.gov>**

To learn more about Prince William Forest Park, please visit:  
**<http://www.nps.gov/prwi/>**

**APPENDIX B: Factor loadings for data reduction scales**

**Table B1. Factor loadings for 9-item values of Prince William Forest Park to communities scale.**

“Prince William Forest Park ...”	Factor 1 (Amenity values)	Factor 2 (Economic values)
provides habitat for plants and animals	<b>0.778</b>	-0.102
makes my community a special place to live	<b>0.771</b>	0.193
provides open space for my community	<b>0.687</b>	0.249
plays a significant role in my community	<b>0.565</b>	0.516
preserves natural resources	<b>0.560</b>	0.244
is a place where people in my community spend leisure time	<b>0.496</b>	0.494
helps the local economy	0.367	<b>0.412</b>
attracts tourism dollars to my community	0.125	<b>0.840</b>
increases the job opportunities in my community	0.052	<b>0.846</b>
% variance explained by factor	41.34	13.93
factor alpha	0.799	0.659

**Table B2. Factor loadings for 9-item scale on perceptions of deer in Prince William Forest Park.**

“...deer in general are...”	Park scale		Community scale	
	Factor 1 (Natural)	Factor 2 (Not Unnatural)	Factor 1 (Not Unnatural)	Factor 2 (Natural)
peaceful	<b>0.804</b>	0.009	0.013	<b>0.721</b>
behaving normally	<b>0.787</b>	0.301	0.325	<b>0.771</b>
acting naturally	<b>0.743</b>	0.220	0.114	<b>0.807</b>
harmless	<b>0.700</b>	0.141	0.276	<b>0.552</b>
not aggressive	0.141	<b>0.774</b>	<b>0.775</b>	0.175
not behaving strangely	0.185	<b>0.720</b>	<b>0.592</b>	0.326
not acting unnaturally	-0.027	<b>0.680</b>	<b>0.754</b>	0.010
not threatening	0.261	<b>0.641</b>	<b>0.736</b>	0.171
not dangerous	0.286	<b>0.408</b>	<b>0.619</b>	0.173
% variance explained	38.15	15.51	39.33	15.16
factor alpha	0.764	0.680	0.754	0.690

**Table B3. Factor loadings for 12-item scale on concerns about deer in Prince William Forest Park.**

Potential concerns:	Park scale		Community scale	
	Factor 1 (Other)	Factor 2 (Damage)	Factor 1 (Damage)	Factor 2 (Other)
Deer interacting with pets	<b>0.763</b>	0.280	<b>0.745</b>	0.294
People's behavior around deer	<b>0.758</b>	-0.040	<b>0.693</b>	0.028
Deer behavior around people	<b>0.742</b>	0.384	<b>0.728</b>	0.402
Deer accessing unsecured trash	<b>0.742</b>	0.238	<b>0.715</b>	0.317
Fawns born too late to survive winter	<b>0.687</b>	0.208	<b>0.706</b>	0.058
Having seen unhealthy deer	<b>0.668</b>	0.365	<b>0.711</b>	0.253
Diseases and/or parasites carried by deer	<b>0.570</b>	0.447	<b>0.565</b>	0.531
Car accidents involving deer	<b>0.473</b>	0.441	0.408	<b>0.421</b>
Deer browsing on landscaped flowers, trees and shrubs	0.214	<b>0.870</b>	0.161	<b>0.901</b>
Deer browsing on naturally growing flowers, trees and shrubs	0.096	<b>0.860</b>	0.035	<b>0.886</b>
Deer browsing on vegetable gardens	0.264	<b>0.839</b>	0.286	<b>0.801</b>
Presence of deer feces	0.362	<b>0.562</b>	0.372	<b>0.531</b>
% variance explained by factor	49.04	12.21	47.22	12.85
factor alpha	0.879	0.749	0.869	0.831

**Table B4. Factor loadings for 8-item scale on image of Prince William Forest Park management.**

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“Management at Prince William Forest Park typically is...”	Factor 1 (Professionalism)	Factor 2 (Community affiliation)	Factor 3 (Openness)
Trustworthy	<b>0.786</b>	0.200	0.267
Knowledgeable	<b>0.890</b>	0.170	0.114
Fair	<b>0.825</b>	0.190	0.170
Watching out for my community’s interests	0.171	<b>0.850</b>	0.210
Concerned about my community’s well being	0.167	<b>0.821</b>	0.355
Concerned about the public interest	0.454	<b>0.573</b>	-0.132
Telling the whole story	0.207	0.061	<b>0.876</b>
Unbiased	0.144	0.316	<b>0.831</b>
% variance explained by factor	48.36	15.68	12.31
factor alpha	0.829	0.629	0.784

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**APPENDIX C: Nonrespondent-respondent comparison tables**

**Table C1. Percent of respondents and nonrespondents who have visited Prince William FP by stratum.**

Ever visited PRWI?	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
No	Respondents	36	19.1	47	27.5
	Nonrespondents	14	28.0	14	28.0
Yes	Respondents	152	80.9	124	72.5
	Nonrespondents	36	72.0	36	72.0
Total	Respondents	188	100.0	171	100.0
	Nonrespondents	50	100.0	50	100.0

**Table C2. Percent of respondents and nonrespondents who visited Prince William FP, by stratum and number of visits in past 12 months.**

Visits in past 12 months	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
0, 1, don't know	Respondents	60	39.5	58	47.2
	Nonrespondents	20	55.6	19	52.8
2-4 times	Respondents	41	27.0	48	39.0
	Nonrespondents	4	11.1	11	30.6
5 or more visits	Respondents	51	33.6	17	13.8
	Nonrespondents	12	33.3	6	16.7
Total	Respondents	152	100.0	123	100.0
	Nonrespondents	36	100.0	36	100.0
Chi-square			4.829		0.876
P-value			NS <sup>1</sup>		NS

<sup>1</sup>Not significant

**Table C3. Percent of Prince William FP respondents and nonrespondents by stratum and by frequency with which they see deer in their community.**

See deer in Community	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Daily	Respondents	15	8.0	2	1.2
	Nonrespondents	10	20.0	0	0.0
A few times a week	Respondents	37	19.8	14	8.3
	Nonrespondents	3	6.0	9	18.0
Weekly	Respondents	18	9.6	7	4.2
	Nonrespondents	2	4.0	2	4.0
Less than once a week	Respondents	98	52.4	88	52.4
	Nonrespondents	23	46.0	30	60.0
Never	Respondents	19	10.2	57	33.9
	Nonrespondents	12	24.0	9	18.0
Total	Respondents	187	100.0	168	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			17.383		7.653
P-value			0.002		NS <sup>1</sup>

<sup>1</sup>Not significant

**Table C4. Percent of respondents and nonrespondents with particular attitudes toward deer in Prince William FP, by stratum.**

Collapsed response categories	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
No particular feelings/ Enjoy deer without Worry	Respondents	112	62.9	121	76.6
	Nonrespondents	27	54.0	31	63.3
Enjoy deer but worry/ Do not enjoy deer	Respondents	66	37.1	37	23.4
	Nonrespondents	23	46.0	18	36.7
Total	Respondents	178	100.0	158	100.0
	Nonrespondents	50	100.0	49	100.0
Chi-square			1.306		3.400
P-value			NS <sup>1</sup>		NS

<sup>1</sup>Not significant

**Table C5. Percent of Prince William FP respondents and nonrespondents with particular attitudes toward deer in their community, by stratum.**

Collapsed response categories	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
No particular feelings/ Enjoy deer without Worry	Respondents	81	44.5	88	54.3
	Nonrespondents	24	48.0	27	54.0
Enjoy deer but worry/ Do not enjoy deer	Respondents	101	55.5	74	45.7
	Nonrespondents	26	52.0	23	46.0
Total	Respondents	182	100.0	162	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			0.193		0.002
P-value			NS <sup>1</sup>		NS

<sup>1</sup>Not significant

**Table C6. Percent of Prince William FP respondents and nonrespondents by stratum and beliefs about level of influence they can have on management of the park.**

Level of influence you expect to have on park decisions	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
A lot	Respondents	25	13.3	14	8.3
	Nonrespondents	7	14.9	7	14.3
Some	Respondents	101	53.7	104	61.9
	Nonrespondents	12	25.5	19	38.8
Very little	Respondents	47	25.0	39	23.2
	Nonrespondents	21	44.7	18	36.7
None at all	Respondents	15	8.0	11	6.5
	Nonrespondents	7	14.9	5	10.2
Total	Respondents	188	100.0	168	100.0
Total	Nonrespondents	47	100.0	49	100.0
Chi-square			13.238		8.297
P-value			0.004		0.040

**Table C7. Percent of Prince William FP respondents and nonrespondents by stratum and response to trustworthiness of PRWI staff.**

Management at PRWI is typically trustworthy	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Strongly disagree, Disagree	Respondents	1	0.5	2	1.3
	Nonrespondents	5	10.0	4	8.0
Neutral	Respondents	20	11.0	23	15.1
	Nonrespondents	21	42.0	28	56.0
Strongly agree, Agree	Respondents	118	64.8	75	49.3
	Nonrespondents	21	42.0	18	36.0
Not sure	Respondents	43	23.6	52	34.2
	Nonrespondents	3	6.0	0	0.0
Total	Respondents	182	100.0	152	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			44.450		49.109
P-value			<.001		<.001

**Table C8. Percent of Prince William FP respondents and nonrespondents by stratum and response to concern about local communities among PRWI staff.**

Management at PRWI is concerned about my community	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Strongly disagree, Disagree	Respondents	9	4.9	8	5.3
	Nonrespondents	5	10.0	4	8.0
Neutral	Respondents	32	17.6	20	13.2
	Nonrespondents	18	36.0	20	40.0
Strongly agree, Agree	Respondents	99	54.4	77	50.7
	Nonrespondents	25	50.0	25	50.0
Not sure	Respondents	42	23.1	47	30.9
	Nonrespondents	2	4.0	1	2.0
Total	Respondents	182	100.0	152	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			15.503		27.411
P-value			0.001		<0.001

**Table C9. Percent of Prince William FP respondents and nonrespondents by stratum and likelihood of talking to park staff about deer impacts if park offers such opportunities.**

Likelihood of talking with park staff about deer impacts	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Very unlikely, unlikely	Respondents	83	44.9	104	62.3
	Nonrespondents	21	42.0	37	74.0
Very likely, likely	Respondents	85	45.9	48	28.7
	Nonrespondents	27	54.0	13	26.0
Not sure	Respondents	17	9.2	15	9.0
	Nonrespondents	2	4.0	0	0.0
Total	Respondents	185	100.0	167	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			1.920		5.408
P-value			NS <sup>1</sup>		NS

<sup>1</sup>Not significant

**Table C10. Percent of Prince William FP respondents and nonrespondents by stratum and likelihood of writing comments regarding an issue with deer in the park.**

Likelihood of provide some form of written comments (to a park plan, impact statement, survey) related to deer impacts	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Very unlikely, unlikely	Respondents	81	43.8	100	59.9
	Nonrespondents	22	44.0	26	52.0
Very likely, likely	Respondents	75	40.5	45	26.9
	Nonrespondents	27	54.0	23	46.0
Not sure	Respondents	29	15.7	22	13.2
	Nonrespondents	1	2.0	1	2.0
Total	Respondents	185	100.0	167	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			7.410		9.402
P-value			0.025		0.009

**Table C11. Percent of Prince William FP respondents and nonrespondents by stratum and likelihood of attending a public meeting on the topic of deer-related impacts in the park.**

Likelihood of attending a public meeting related to deer impacts	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Very unlikely, unlikely	Respondents	80	43.0	93	56.0
	Nonrespondents	25	50.0	35	70.0
Very likely, likely	Respondents	80	43.0	53	31.9
	Nonrespondents	25	50.0	15	30.0
Not sure	Respondents	26	14.0	20	12.0
	Nonrespondents	0	0.0	0	0.0
Total	Respondents	186	100.0	166	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			7.855		7.336
P-value			0.020		0.026

**Table C12. Gender of Prince William FP respondents and nonrespondents by stratum.**

Gender	Respondent classification	Adjacent Communities		Surrounding Communities	
		n	(%)	n	(%)
Male	Respondents	103	54.2	86	50.6
	Nonrespondents	29	58.0	23	46.0
Female	Respondents	87	45.8	84	49.4
	Nonrespondents	21	42.0	27	54.0
Total	Respondents	190	100.0	170	100.0
	Nonrespondents	50	100.0	50	100.0
Chi-square			0.230		0.325
P-value			NS <sup>1</sup>		NS

<sup>1</sup>Not significant

**Table C13. Year born and years lived in a community near Prince William FP for Prince William FP survey respondents and nonrespondents.**

		n	Mean	Median
Year born	Respondents	349	1955	1956
	Nonrespondents	97	1956	1955
Years lived in community near park	Respondents	359	15	10
	Nonrespondents	100	17.17	12.50