# Deer, People, and Parks:

## Perspectives of Residents in Communities Near the Great Falls Area of the Chesapeake and Ohio Canal National Historic Park

**December 2007**

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**Key Words:** attitudes, community concerns, credibility, deer, impacts, interactions, management, public involvement, trust, Chesapeake and Ohio Canal National Historic 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 Chesapeake and Ohio Canal National Historic Park (CHOH).

## 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 stakeholders with respect to deer issues and suggesting 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 CHOH 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 the Great Falls area of CHOH. The second stratum consisted of residents of owner-occupied homes who live slightly further away, in surrounding communities within a few miles of CHOH. 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 18, 2007.

## Key Findings and Study Conclusions

We received 429 completed questionnaires, for an adjusted response rate of 37.4% (response in the adjacent and surrounding communities strata was 42% and 33% respectively). We compared respondents and nonrespondents on 12 variables measured in a telephone follow-up study of nonrespondents. Respondents were slightly older and respondents from adjacent communities were more likely to be male. We found some differences between respondents and nonrespondents by strata. For example, respondents from adjacent communities were more likely than nonrespondents from adjacent communities to agree that park staff are trustworthy, believe park staff are concerned about their community. However, respondents and nonrespondents were no different with regard to attitudes toward deer, the rate at which they see deer in their community, or interest in attending any future public meetings offered the park. Moreover, overall patterns of response were similar for nonrespondents and respondents from the two study strata. Given those similarities, we decided not to weight the data based on nonrespondent information.

The following bullets summarize key findings and study conclusions.

- Local residents use and appreciate CHOH for its amenity values (e.g., as open space, as a leisure resource, as natural habitats). Many visit CHOH multiple times each year to view the scenery, get exercise, and spend time outside.

- Many local residents, especially those living in adjacent communities, interact with deer regularly. They believe deer use both park lands and local communities as their habitat—they recognize that the park and local communities share a common deer herd.

- Many residents are very concerned about negative impacts associated with deer-vehicle collisions, disease transmission from deer to humans, and deer browsing damage to landscape and natural plants. Future discussions of potential deer management activities should address how these concerns relate to park management objectives and the degree to which community concerns about those impacts may be affected, either directly or indirectly.

- A plurality of respondents in both strata believe that deer in the park are having a negative impact on park plants; however, lower proportions believe that deer presented a serious risk to public health or safety.

- More than half of local residents believe NPS should be managing deer-related impacts on CHOH. Fewer than half of residents believe NPS actions to manage deer-related impacts would affect local communities, but most of those who anticipated an effect thought actions by the park would have a positive effect on local communities. Future communication is needed to determine the reasons behind this positive evaluation.

- While not reflected in responses from all community residents, a base of general credibility and trust exists for CHOH decision makers. However, a substantial proportion of residents in neighboring communities are uncertain about the beliefs of NPS managers regarding deer and deer management in the park.

- A majority of local residents have heard or read news stories about the park, but few have participated in activities where they provided input to decisions about park management activities. Adjacent community residents were more likely to have talked with local staff or participated in a community group related to a park issue.

- Substantial numbers of residents are interested in providing input on managing deer-related impacts in CHOH, although many residents also indicated that they did not believe they had enough information to provide meaningful input. Interest in providing input was stronger in adjacent communities than in surrounding communities.

- A substantial proportion of residents in both community categories are skeptical about the degree to which NPS decision makers listen to community residents or consider their input in decisions.

- Experience with deer, 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 represent different publics. Communication intended to reach one or the other community type will have different fundamental objectives.

- 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.

Management decisions for park resources 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 (e.g., 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 Chesapeake and Ohio Canal National Historical Park.

## Context for Deer Management in Chesapeake and Ohio Canal National Historic Park

The Chesapeake and Ohio Canal National Historical Park (hereafter referred to as CHOH) follows 184.5 miles of the Potomac River, from the mouth of Rock Creek in Washington D.C. to Cumberland M.D. It encompasses 20,239 acres of the C & O Canal, its towpath and surrounding areas. The nucleus of the property was purchased by the federal government in 1938 from the receivers of the defunct C & O Canal Company and was originally administered by the National Capital Parks system and the Civilian Conservation Corps. In

1954, Supreme Court Justice William O. Douglas led a march to save the C&O Canal and its towpath from destruction and organized a committee to make recommendations for an expanded canal park. As a result, the park was designated in 1971 to preserve, restore and develop what has been called "…the finest relic of America's canal-building era" (Parsons 1976 p.3). Today, the park preserves hundreds of the canals' original structures, including locks, lockhouses, and aqueducts, as reminders of the canal's role as a transportation system. Its towpath provides a nearly level, continuous trail through the Potomac River Valley, which provides natural, cultural, and recreational opportunities for millions of visitors each year.

CHOH natural resource managers have observed impacts from deer browsing on rare plant communities and agricultural fields, and data currently is being collected to determine whether deer negatively impact management objectives. For the most part, CHOH is linear and narrow, and deer management would only be considered in the sections of the park that encompass larger areas. Great Falls, located approximately 5 miles northwest of Washington D.C., is one such area. In addition to the canal and towpath, the Great Falls, Maryland, area of the CHOH contains six locks, the Great Falls Tavern Visitor Center, the 340-acre Gold Mine tract, and 14.6 miles of hiking trails (Figure 1).

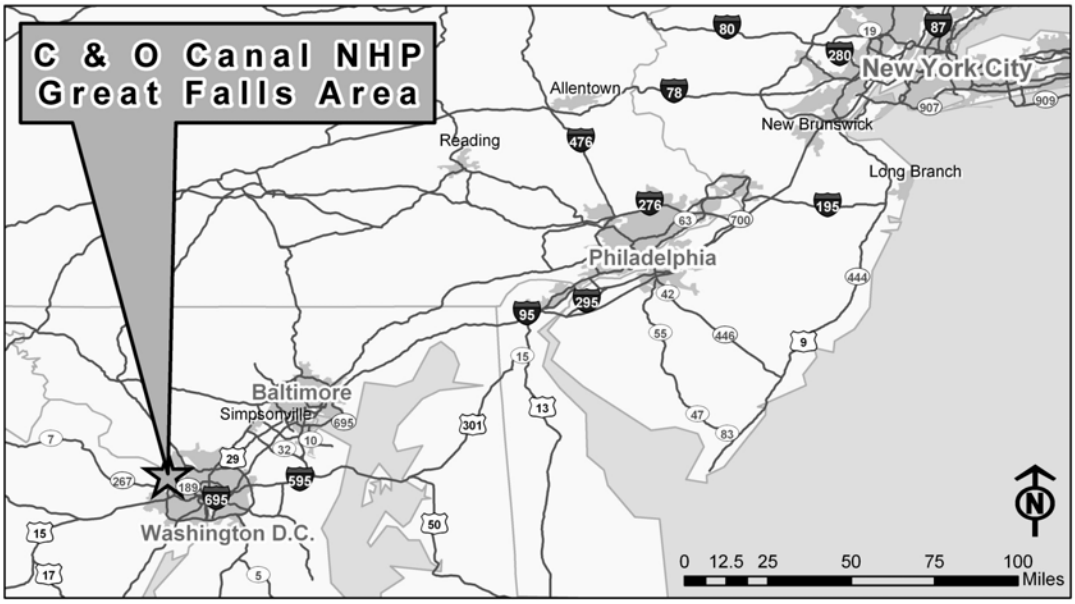


**Figure 1. Map showing location of the Chesapeake and Ohio Canal National Historic Park (CHOH), Great Falls area, Maryland.**

As part of an ongoing monitoring effort in the NPS National Capital Region (NCR), white-tailed deer have been surveyed in the CHOH Gold Mine tract since 2001 using distance sampling. In 2006, population densities of deer were recorded as 103.67 deer per square mile, much higher than the density at which negative effects have been reported for vegetation, especially rare plants (20 deer per square mile), as well as other wildlife species (40 deer per square mile, Bates 2007).

Unlike at many other parks throughout the northeastern U.S., CHOH managers have not observed 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 CHOH 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, CHOH managers believe that deer impacts will likely increase in the future, both within CHOH boundaries and in adjacent and nearby communities. This baseline study will assist in ongoing communication between park management and local community residents so that managers and stakeholders more accurately understand each other's perceptions of deer and deer impacts.

**The CHOH 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 Prince William Forest Park [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 the final phase of research (phase IIIB), conducted in CHOH. The goal of phase IIIB research was to gain an in-depth understanding of a variety of stakeholder beliefs and attitudes related to deer and deer-related impacts. This phase of research focused on comparisons of residents living in communities adjacent to a park 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 CHOH, the role of CHOH in deer and other wildlife management, and the influence of public input in wildlife management at CHOH.

## 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 Prince William Forest Park, 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 strata consisted of residents, aged 18 and older, of owner-occupied homes in communities adjacent to CHOH. The second strata consisted of residents of owner-occupied homes who live slightly further away, in surrounding communities within a few miles of CHOH (Figure 2).

Adjacent communities were defined as the residential neighborhoods that share a boundary with the park, bounded by major geographic features (rivers, highways, other major roads). Boundaries for the adjacent communities stratum included River Road, Falls Road, Oaklyn Road, the Tournament Players Club, and Rock Run Park on the north, and the Potomac River on the south. We defined surrounding communities as the area of Montgomery County (excluding adjacent communities) delimited by: the 20854 zip code boundary on the north; the Potomac River on the south; and I-495 and I-270 on the east.

We mailed questionnaires to 1,200 households (600 in each stratum). We used a four-wave mailing approach, similar to total design approach advocated by Dillman (2000). We mailed all members of the sample a cover letter and a questionnaire on April 19, 2007. We contacted nonrespondents up to three additional times, with the last reminder mailing taking place on May 18, 2007.

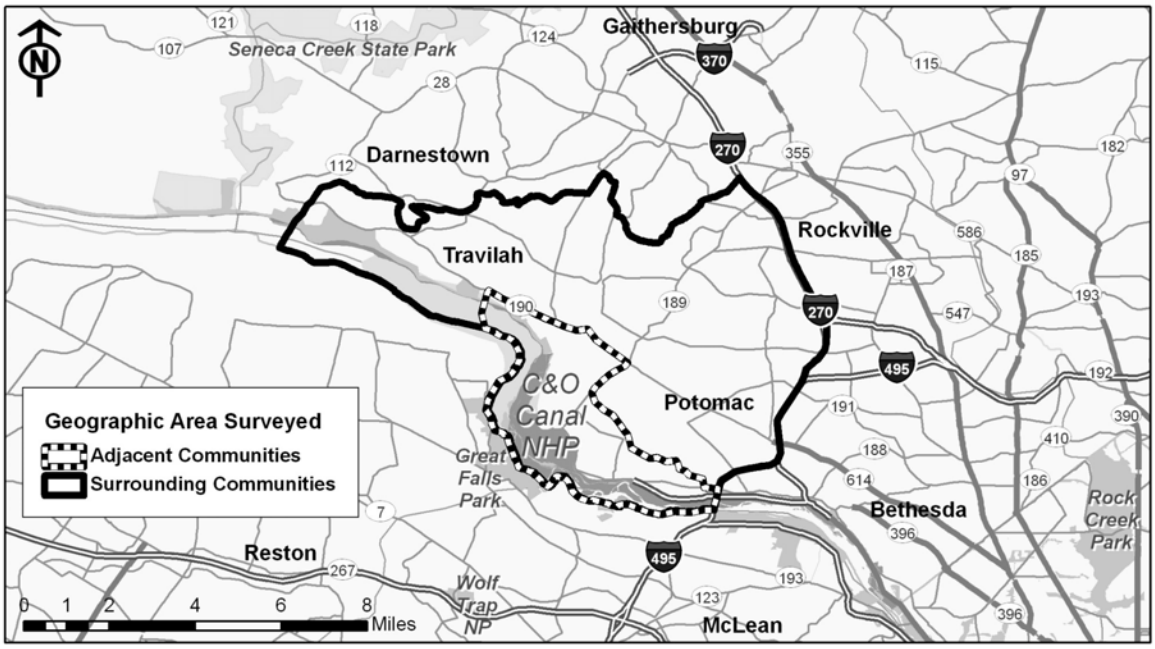


**Figure 2. Geographic boundaries used to assign households to a community.**

### 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 and achieved a target of completing 50 interviews in each stratum (Box 1). Data collection began on June 18, 2007 and was completed on July 8, 2007.

| **Box 1. Outcome of follow-up telephone interviews after 2007 CHOH Deer, Parks, and People mail survey.** | **Adjacent communities** | **Surrounding communities** | **Overall** |
|---|---|---|---|
| | | (n) | |
| Completed telephone interview | 50 | 50 | 100 |
| Bad phone number | 13 | 16 | 29 |
| Too Ill; Deceased; Incapable of responding | 0 | 0 | 0 |
| Language problem | 0 | 0 | 0 |
| Did not call | 108 | 93 | 201 |
| Refused | 1 | 5 | 6 |
| Pending (number called; person not reached) | 166 | 213 | 379 |
| **Total** | **338** | **377** | **715** |

## Analysis

In this report we provide descriptive study highlights using a set of tables with frequencies of response from residents in two geographic strata: (1) adjacent communities and (2) surrounding communities. We used chi-square tests to identify statistically different results between the strata and between respondents and non-respondents. 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 CHOH; (2) perceptions of deer behavior; (3) concerns about deer; and (4) public image of CHOH management. All data analysis was conducted using SPSS version 15.0 (SPSS Inc., Chicago, IL).

### Community importance of CHOH:

We developed 12 items to assess community residents' held values for CHOH as a community asset. We used those 12 items to create a multi-item index of community importance placed on CHOH. Dropping 3 items yielded an 9-item scale with high reliability (alpha = 0.655). Principal axis factoring identified 2 factors with an eigen value above 1. These factors accounted for 48% of the variance between items. Factor loadings ranged from 0.506 to 0.867. 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 CHOH and in neighboring communities. Dropping 3 items yielded an 9-item scale with high reliability (alpha = 0.818 for perceptions of deer within CHOH; alpha = 0.842 for perceptions of deer in local communities). Principal axis factoring identified 2 factors with an eigen value above 1. Those factors accounted for 55% of the variance between items in the park scale (58% of variance on the community scale). Factor loadings ranged from 0.435 to 0.868 in the park scale and from 0.0.507 to 0.814 in the community scale. We labeled the factors "harmless" and "natural" behavior (Appendix B, Table B2).

### Concerns about deer:

We developed 12 items to assess community residents' concerns about deer within CHOH and in neighboring communities. Retaining all items yielded a 12-item scale with high reliability (alpha = 0.885 park, alpha = 0.867 communities). Principal axis factoring identified 2 factors with an eigen value above 1. Those factors accounted for 57% of the variance between items in the park scale and 56% of variance in the community scale. Factor loadings ranged from 0.479 to 0.894 in the park scale and 0.611 to 0.870 in the community scale. We labeled the factors "primary" and "other" concerns (Appendix B, Table B3).

### Public image of CHOH management:

We developed 8 items to assess community residents' image of CHOH management. Dropping one item yielded a 7-item scale with high reliability (alpha = 0.850). Principal axis

factoring identified 2 factors with an eigen value above 1. Those factors accounted for 69% of the variance between items. Factor loadings ranged from 0.720 to 0.869. We labeled the factors "professionalism" and "community affiliation" (Appendix B, Table B4).

## RESULTS

We received 429 completed questionnaires, for an adjusted response rate of 37.5% (Table 1). Response rate was higher for the adjacent communities stratum (response rates in the adjacent and surrounding communities strata were 42% and 33% respectively). We compared respondents and nonrespondents on 12 variables measured in our telephone follow-up study of nonrespondents (Appendix C). Respondents were slightly older and respondents from adjacent communities were more likely to be male. We found some differences between respondents and nonrespondents by strata. For example, respondents from adjacent communities were more likely than nonrespondents from adjacent communities to agree that park staff are trustworthy, believe park staff are concerned about their community. However, respondents did not differ from nonrespondents with regard to attitudes toward deer in the park or in their community, the rate at which they see deer in their community, or interest in attending any future public meetings offered the park (Appendix C). Moreover, overall patterns of response were similar for nonrespondents and respondents from the two study strata. Given those similarities, we decided not to weight the data based on nonrespondent information.

**Table 1. Response rates by stratum for the 2007 Chesapeake and Ohio Canal National Historic Park (CHOH) Deer, People, and Parks survey.**

| Community | n | Returns | Not deliverable | Not usable | Adjusted response rate (%) |
|---|---|---|---|---|---|
| Adjacent communities | 600 | 240 | 23 | 4 | 41.6 |
| Surrounding communities | 600 | 189 | 32 | 10 | 33.3 |
| **Total** | **1,200** | **429** | **55** | **14** | **37.47** |

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

### Respondent characteristics

The majority (50%) of respondents in the adjacent community were male (50.2%); the majority (54%) of respondents were female in the surrounding community strata. Mean age was

59 years old. On average, respondents had lived near CHOH 21 years. The majority of respondents in adjacent and surrounding communities participated in walking/hiking and viewing wildlife. Participation in traditional wildlife-related and outdoor activities (i.e., fishing, hunting, camping) was relatively low in both types of communities. Respondents from adjacent communities were more likely to participate in hiking/walking, wildlife viewing, biking, and boating (Table 2).

**Use of Chesapeake and Ohio Canal NHP**

Most local residents had visited CHOH at some time. Adjacent residents were more likely to have ever visited the park. (94% vs. 76%, respectively; $\chi^2 = 10.610$; df = 1; p = 0.001) or to have visited the park in the previous 12 months (96% vs. 80%, respectively; $\chi^2 = 45.393$; df = 5; $p < 0.001$). Over eighty percent of local residents who visited the park stayed for over four hours per visit. Among respondents who had visited CHOH in the previous 12 months, residents of adjacent communities were more likely than residents of surrounding communities to have visited the park more than 10 times (44% vs. 23%, respectively; $\chi^2 = 26.399$; df = 4; $p < 0.001$)

**Table 2. Rates of participation in outdoor activities reported by respondents to the 2007 Chesapeake and Ohio National Historic Park (CHOH) Deer, People, and Parks survey.**

| Activity | Strata | | Chi-square | P-value |
|---|---|---|---|---|
| | Adjacent communities (n=239) | Surrounding communities (n=186) | | |
| Hiked /Walked | 95.8 | 89.8 | 5.98 | 0.014 |
| Viewing wildlife | 61.9 | 50.5 | 5.53 | 0.019 |
| Picnicking | 44.4 | 50.0 | 1.34 | NS[1] |
| Biked | 51.5 | 35.5 | 10.81 | 0.001 |
| Photo/sketch | 26.8 | 24.7 | 0.22 | NS |
| Boating | 26.4 | 18.3 | 3.87 | 0.049 |
| Fishing | 14.6 | 9.7 | 2.36 | NS |
| Camping | 12.1 | 9.7 | 0.64 | NS |
| Horse riding | 7.9 | 3.8 | 3.19 | NS |
| Hunting | 2.5 | 1.6 | 0.40 | NS |

[1]Not significant

The most common reasons for visiting CHOH were to view the scenery, get exercise, and spend time outside. In addition to visiting CHOH more frequently, residents of adjacent communities were more likely than residents of surrounding communities to utilize the park as a place for exercise and viewing wildlife (Table 3).

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

Visitors to CHOH often saw deer. Over half of adjacent community respondents saw deer on half or more visits. Adjacent community residents encountered deer more often in the park (50% of adjacent community respondents saw deer on half or more visits compared to vs. 31% of surrounding community residents; $\chi^2 = 23.7896$, df = 3; $p < 0.001$). Adjacent community respondents also saw deer more often in their community (51% of adjacent community respondents saw deer daily compared to vs. 16% of surrounding community residents; $\chi^2 = 89.273$, df = 4; $p < 0.001$).

**Table 3. Reasons for visiting Chesapeake and Ohio Canal NHP (CHOH) lands offered by the 76% of residents who visited CHOH 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 CHOH | Strata | | Chi-square | P-value |
|---|---|---|---|---|
| | Adjacent communities (n=222) | Surrounding communities (n=166) | | |
| View the scenery | 92.3 | 89.8 | 0.73 | NS[1] |
| Exercise | 79.3 | 67.5 | 6.92 | 0.009 |
| Be outside | 78.4 | 75.9 | 0.33 | NS |
| Enjoy the sounds and smells of nature | 68.0 | 62.0 | 1.49 | NS |
| Spend time with family or friends | 64.4 | 67.5 | 0.39 | NS |
| View wildlife | 55.9 | 41.0 | 8.42 | 0.004 |
| Get away from demands | 47.7 | 42.8 | 0.94 | NS |
| Learn about history | 27.9 | 22.9 | 1.25 | NS |
| Other | 11.7 | 7.2 | 2.16 | NS |
| Volunteer in park | 4.5 | 3.6 | 0.19 | NS |

[1]Not significant

Half or more respondents in both strata reportedly enjoy deer, but worry about deer-related problems in CHOH (Table 4). Attitudes toward deer in neighboring communities were less positive. Respondents from adjacent communities were most likely to report that they worry about deer-related problems in the park and do not enjoy deer in their community (Table 4).

Residents of both community types held similar perceptions of deer behavior in the park and in neighboring communities (Table 5-6). Both groups of respondents generally regarded deer behavior as normal, natural, unthreatening, and harmless (Table 5). These perceptions are echoed in the high and uniform mean scores both strata received on the "harmless" and "natural" factors reported in Table 7.

We assessed resident's concerns about a range of deer-related impacts. Most respondents were very concerned about deer-car collisions and diseases and/or parasites carried by deer in the park. The majority of respondents were very concerned about, deer-car collisions, diseases and/or parasites carried by deer, and deer browsing on landscape plants and vegetable gardens (Table 8-9). Adjacent community residents reported relatively higher concern about presence of deer browsing on landscape plants, natural plants, and vegetable gardens in their communities (Table 9). Their higher concern about those "primary" impacts is reflected in a higher mean score on the primary concerns factor in Table 10.

**Table 4. Attitude toward deer in Chesapeake and Ohio NHP (CHOH) and local communities expressed by respondents to the 2007 CHOH Deer, People, and Parks survey, by stratum.**

| | | (Percent) | | | | | |
|---|---|---|---|---|---|---|---|
| | **n** | **No particular feelings** | **Enjoy and do not worry** | **Enjoy BUT worry** | **Do not enjoy** | **Chi-square** | **P-value** |
| **Attitude toward Deer in CHOH** | | | | | | | |
| Adjacent | 225 | 6.2 | 20.4 | 63.1 | 10.2 | 21.855 | <0.001 |
| Surrounding | 165 | 21.2 | 22.4 | 50.3 | 6.1 | | |
| **Attitude toward Deer in your Community** | | | | | | | |
| Adjacent | 233 | 0.4 | 9.9 | 48.5 | 41.2 | 16.665 | 0.001 |
| Surrounding | 175 | 5.1 | 13.1 | 54.9 | 26.9 | | |

**Table 5. Perceptions of deer in Great Falls area of Chesapeake and Ohio NHP (CHOH) expressed by respondents to the 2007 CHOH Deer, People, and Parks survey, by stratum.**

| In C & O Canal NHP deer, in general are… | Strata | n | (Percent) Rarely | Some times | Almost Always | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| wild | Adjacent | 195 | 30.8 | 19.5 | 49.7 | 2.69 | NS[1] |
| | Surrounding | 125 | 26.4 | 27.2 | 46.4 | | |
| peaceful | Adjacent | 203 | 1.5 | 19.7 | 78.8 | 0.507 | NS |
| | Surrounding | 124 | 0.8 | 17.7 | 81.5 | | |
| behaving strangely | Adjacent | 197 | 83.8 | 14.2 | 2.0 | 0.219 | NS |
| | Surrounding | 119 | 82.4 | 16.0 | 1.7 | | |
| dangerous | Adjacent | 201 | 68.2 | 23.4 | 8.5 | 4.800 | NS |
| | Surrounding | 123 | 63.4 | 32.5 | 4.1 | | |
| tame | Adjacent | 201 | 35.8 | 39.3 | 24.9 | 4.596 | NS |
| | Surrounding | 117 | 46.2 | 28.2 | 25.6 | | |
| behaving normally | Adjacent | 196 | 4.1 | 15.3 | 80.6 | 3.800 | NS |
| | Surrounding | 123 | 1.6 | 9.8 | 88.6 | | |
| aggressive | Adjacent | 196 | 84.7 | 12.2 | 3.1 | 3.142 | NS |
| | Surrounding | 121 | 81.8 | 17.4 | 0.8 | | |
| timid | Adjacent | 197 | 16.2 | 38.1 | 45.7 | 2.003 | NS |
| | Surrounding | 121 | 16.5 | 30.6 | 52.9 | | |
| acting naturally | Adjacent | 199 | 3.5 | 18.6 | 77.9 | 2.517 | NS |
| | Surrounding | 123 | 4.9 | 12.2 | 82.9 | | |
| harmless | Adjacent | 196 | 19.9 | 28.1 | 52.0 | 3.189 | NS |
| | Surrounding | 123 | 12.2 | 30.9 | 56.9 | | |
| threatening | Adjacent | 199 | 77.9 | 16.1 | 6.0 | 2.641 | NS |
| | Surrounding | 120 | 77.5 | 20.0 | 2.5 | | |
| acting unnaturally | Adjacent | 197 | 82.2 | 12.2 | 5.6 | 4.641 | NS |
| | Surrounding | 119 | 87.4 | 11.8 | 0.8 | | |

[1]Not significant

**Table 6. Perceptions of deer in communities near Great Falls area of Chesapeake and Ohio NHP (CHOH) expressed by respondents to the 2007 CHOH Deer, People, and Parks survey, by stratum.**

| In communities near C & O Canal NHP deer, in general are… | Strata | n | (Percent) Rarely | Some times | Almost Always | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| wild | Adjacent | 213 | 32.9 | 20.7 | 46.5 | 2.776 | NS[1] |
| | Surrounding | 155 | 32.3 | 27.7 | 40.0 | | |
| peaceful | Adjacent | 227 | 1.3 | 22.0 | 76.7 | 1.564 | NS |
| | Surrounding | 160 | 3.1 | 20.6 | 76.3 | | |
| behaving strangely | Adjacent | 222 | 76.6 | 20.7 | 2.7 | 0.732 | NS |
| | Surrounding | 156 | 79.5 | 17.3 | 3.2 | | |
| dangerous | Adjacent | 226 | 53.5 | 31.0 | 15.5 | 6.006 | 0.050 |
| | Surrounding | 162 | 48.1 | 42.0 | 9.9 | | |
| tame | Adjacent | 225 | 32.0 | 39.6 | 28.4 | 3.355 | NS |
| | Surrounding | 148 | 39.9 | 31.1 | 29.1 | | |
| behaving normally | Adjacent | 223 | 4.9 | 22.0 | 73.1 | 2.237 | NS |
| | Surrounding | 158 | 3.8 | 16.5 | 79.7 | | |
| aggressive | Adjacent | 225 | 76.0 | 19.6 | 4.4 | 1.593 | NS |
| | Surrounding | 160 | 80.6 | 16.9 | 2.5 | | |
| timid | Adjacent | 220 | 20.0 | 40.9 | 39.1 | 2.821 | NS |
| | Surrounding | 157 | 17.2 | 35.0 | 47.8 | | |
| acting naturally | Adjacent | 224 | 6.3 | 23.2 | 70.5 | 1.807 | NS |
| | Surrounding | 158 | 3.8 | 20.3 | 75.9 | | |
| harmless | Adjacent | 220 | 25.0 | 34.5 | 40.5 | 1.862 | NS |
| | Surrounding | 157 | 19.1 | 38.2 | 42.7 | | |
| threatening | Adjacent | 224 | 69.2 | 22.8 | 8.0 | 2.864 | NS |
| | Surrounding | 158 | 71.5 | 24.7 | 3.8 | | |
| acting unnaturally | Adjacent | 222 | 73.4 | 20.3 | 6.3 | 2.286 | NS |
| | Surrounding | 154 | 79.9 | 16.2 | 3.9 | | |

[1]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 Chesapeake and Ohio NHP (CHOH) Deer, People, and Parks survey, by stratum.**

| Factor Label | Community Strata | "In Great Falls area of C & O Canal NHP" n | Mean[1] | t | P-value | "In your community" n | mean | t | P-value |
|---|---|---|---|---|---|---|---|---|---|
| **Harmless** | Adjacent | 205 | 2.63 | -0.651 | NS[2] | 230 | 2.51 | -0.655 | NS |
| | Surrounding | 128 | 2.66 | | | 166 | 2.55 | | |
| **Natural** | Adjacent | 203 | 2.77 | -1.347 | NS | 230 | 2.35 | -1.187 | NS |
| | Surrounding | 126 | 2.82 | | | 165 | 2.39 | | |

[1] 1=rarely, 2=sometimes, 3=almost always

[2] Not significant

**Table 8. Concerns about deer-related effects in Chesapeake and Ohio NHP (CHOH) expressed by respondents to the 2007 CHOH Deer, People, and Parks survey, by stratum.**

| Concern | Strata | n | Level of concern (percent) Not at all | Some what | Very | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| Car accidents involving deer | Adjacent | 201 | 12.9 | 16.4 | 70.6 | 1.52 | NS[1] |
| | Surrounding | 130 | 10.8 | 21.5 | 67.7 | | |
| Diseases/ parasites carried by deer | Adjacent | 201 | 13.4 | 24.9 | 61.7 | 2.01 | NS |
| | Surrounding | 131 | 14.5 | 31.3 | 54.2 | | |
| Deer browsing on land-scaped flowers, trees, shrubs | Adjacent | 201 | 35.3 | 21.4 | 43.3 | 5.81 | NS |
| | Surrounding | 129 | 34.1 | 32.6 | 33.3 | | |
| Deer browsing on vegetable gardens | Adjacent | 193 | 45.6 | 14.5 | 39.9 | 5.14 | NS |
| | Surrounding | 129 | 37.2 | 24.0 | 38.8 | | |
| Deer browsing on naturally growing plants | Adjacent | 200 | 41.5 | 24.0 | 34.5 | 3.38 | NS |
| | Surrounding | 132 | 47.0 | 28.0 | 25.0 | | |
| Deer accessing unsecured trash | Adjacent | 196 | 58.7 | 20.4 | 20.9 | 14.79 | 0.001 |
| | Surrounding | 130 | 36.9 | 31.5 | 31.5 | | |
| Deer interacting with pets | Adjacent | 198 | 58.6 | 20.7 | 20.7 | 1.58 | NS |
| | Surrounding | 130 | 51.5 | 24.6 | 23.8 | | |
| Presence of deer feces | Adjacent | 199 | 52.3 | 26.6 | 21.1 | 3.98 | NS |
| | Surrounding | 127 | 59.8 | 27.6 | 12.6 | | |
| Having seen unhealthy deer | Adjacent | 192 | 49.5 | 34.9 | 15.6 | 0.54 | NS |
| | Surrounding | 126 | 50.0 | 31.7 | 18.3 | | |
| People's behavior around deer | Adjacent | 195 | 49.7 | 36.9 | 13.3 | 5.01 | NS |
| | Surrounding | 127 | 37.8 | 42.5 | 19.7 | | |
| Deer behavior around people | Adjacent | 199 | 56.8 | 30.2 | 13.1 | 3.95 | NS |
| | Surrounding | 129 | 46.5 | 34.1 | 19.4 | | |
| Fawns born too late to survive winter | Adjacent | 191 | 58.1 | 28.3 | 13.6 | 1.26 | NS |
| | Surrounding | 122 | 53.3 | 28.7 | 18.0 | | |
| Other (most common other concern: | Adjacent | 16 | 12.5 | 0.0 | 87.5 | 4.03 | NS |
| | Surrounding | 10 | 20.0 | 20.0 | 60.0 | | |

[1]Not significant

**Table 9. Concerns about deer-related effects in "in your community, outside the park" expressed by respondents to the 2007 Chesapeake and Ohio NHP Deer, People, and Parks survey, by stratum.**

| Concern | Strata | n | Level of concern (percent) | | | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| | | | Not at all | Some what | Very | | |
| Car accidents involving deer | Adjacent | 231 | 0.9 | 8.2 | 90.9 | 4.41 | NS[1] |
| | Surrounding | 169 | 1.8 | 14.2 | 84.0 | | |
| Deer browsing on land-scaped flowers, trees, shrubs | Adjacent | 230 | 4.8 | 13.9 | 81.3 | 17.99 | <0.001 |
| | Surrounding | 171 | 7.6 | 29.8 | 62.6 | | |
| Deer browsing on vegetable gardens | Adjacent | 225 | 9.8 | 16.9 | 73.3 | 6.45 | 0.040 |
| | Surrounding | 165 | 13.9 | 24.8 | 61.2 | | |
| Deer browsing on naturally growing plants | Adjacent | 229 | 14.8 | 20.1 | 65.1 | 13.35 | 0.001 |
| | Surrounding | 169 | 23.1 | 30.2 | 46.7 | | |
| Diseases and/or parasites carried by deer | Adjacent | 231 | 6.5 | 22.9 | 70.6 | 3.90 | NS |
| | Surrounding | 173 | 9.2 | 29.5 | 61.3 | | |
| Deer accessing unsecured unsecured trash | Adjacent | 223 | 42.6 | 23.8 | 33.6 | 5.98 | 0.050 |
| | Surrounding | 164 | 30.5 | 29.9 | 39.6 | | |
| Presence of deer feces | Adjacent | 225 | 31.1 | 29.3 | 39.6 | 6.04 | 0.049 |
| | Surrounding | 162 | 39.5 | 32.7 | 27.8 | | |
| Deer interacting with pets | Adjacent | 224 | 44.6 | 22.3 | 33.0 | 0.43 | NS |
| | Surrounding | 163 | 43.6 | 25.2 | 31.3 | | |
| Having seen unhealthy deer | Adjacent | 216 | 42.6 | 34.3 | 23.1 | 1.03 | NS |
| | Surrounding | 158 | 43.7 | 29.7 | 26.6 | | |
| Deer behavior around people | Adjacent | 226 | 41.6 | 35.4 | 23.0 | 1.26 | NS |
| | Surrounding | 166 | 44.0 | 30.1 | 25.9 | | |
| People's behavior around deer | Adjacent | 220 | 39.1 | 42.7 | 18.2 | 2.08 | NS |
| | Surrounding | 163 | 34.4 | 41.7 | 23.9 | | |
| Fawns that are born too late to survive winter | Adjacent | 212 | 54.2 | 27.8 | 17.9 | 0.38 | NS |
| | Surrounding | 153 | 51.0 | 30.1 | 19.0 | | |
| Other (e.g., "too many deer") | Adjacent | 21 | 4.8 | 9.5 | 85.7 | 0.54 | NS |
| | Surrounding | 11 | 0.0 | 9.1 | 90.9 | | |

[1]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 Chesapeake and Ohio NHP Deer, People, and Parks survey.**

| Factor Label | Community Strata | "In Great Falls area of C & O Canal NHP" n | Mean[1] | t | P-value | "In your community" n | Mean | t | P-value |
|---|---|---|---|---|---|---|---|---|---|
| **Primary concerns** | Adjacent | 202 | 2.05 | 0.888 | NS[2] | 231 | 2.59 | 3.397 | 0.001 |
| | Surrounding | 134 | 1.98 | | | 173 | 2.42 | | |
| **Other concerns** | Adjacent | 202 | 1.75 | -1.707 | NS | 229 | 1.82 | -0.874 | NS |
| | Surrounding | 137 | 1.86 | | | 171 | 1.88 | | |

[1]1=not at all concerned, 2=somewhat concerned, 3=very concerned
[2]Not significant

**Perceptions of CHOH staff and land management**

Most community residents valued CHOH as a community asset. Nearly all respondents agreed that CHOH provides open space and wildlife habitat and having the park nearby 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.

The majority of residents recognized that deer and deer-related impacts cross jurisdictional boundaries. Although most (about 80% in both strata) believe the habitat inside the park is better than outside, they also believe that local deer use habitat inside and outside the park (Table 11). A plurality of respondents in both strata believed that deer in the park are having a negative impact on park plants, but lower proportions believed that deer presented a serious risk to public health or safety (Table 13).

More than half of four respondents agreed with the statement, "The park should start now to address deer-related impacts". Most of those respondents anticipated that actions by the park to manage deer-related impacts would have a positive effect on local communities (Table 13).

We repeated the questions asked in Table 13 and asked residents how they thought CHOH staff would respond. Depending on the item and stratum, 31-52% of residents responded "not sure" (Table 14). In aggregate, this pattern suggests unfamiliarity with park staff and their views on deer and deer management.

**Table 11. Attitudes about benefits that Chesapeake and Ohio NHP provides to people living near the park ("adjacent communities") and in surrounding communities, expressed in the 2007 CHOH Deer, People, and Parks survey.**

| Chesapeake and Ohio NHP… | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| provides open space for my community. | Adjacent | 236 | 2.5 | 2.1 | 95.3 | 0.0 | 1.340 | NS[1] |
| | Surrounding | 185 | 2.2 | 2.2 | 95.1 | 0.5 | | |
| provides habitat for plants and animals. | Adjacent | 235 | 1.7 | 2.6 | 95.3 | 0.4 | 5.062 | NS |
| | Surrounding | 185 | 1.6 | 2.2 | 93.0 | 3.2 | | |
| makes my community a special place to live. | Adjacent | 237 | 1.3 | 2.5 | 94.9 | 1.3 | 9.377 | 0.025 |
| | Surrounding | 182 | 1.6 | 9.3 | 87.9 | 1.1 | | |
| preserves natural resources. | Adjacent | 234 | 1.7 | 4.3 | 92.3 | 1.7 | 0.490 | NS |
| | Surrounding | 185 | 2.7 | 4.3 | 91.4 | 1.6 | | |
| is a place where people in my community spend leisure time. | Adjacent | 236 | 0.4 | 4.2 | 91.9 | 3.4 | 4.593 | NS |
| | Surrounding | 185 | 2.2 | 2.7 | 93.5 | 1.6 | | |
| plays a significant role in my community. | Adjacent | 235 | 2.1 | 12.8 | 82.6 | 2.6 | 6.876 | NS |
| | Surrounding | 185 | 3.8 | 20.5 | 71.9 | 3.8 | | |
| attracts tourism dollars to my community. | Adjacent | 236 | 12.7 | 25.8 | 48.3 | 13.1 | 1.799 | NS |
| | Surrounding | 185 | 10.8 | 30.3 | 43.8 | 15.1 | | |
| increases the job opportunities in my community. | Adjacent | 233 | 24.5 | 39.5 | 20.2 | 15.9 | 4.089 | NS |
| | Surrounding | 183 | 16.9 | 39.9 | 24.6 | 18.6 | | |

[1]Not significant

**Table 11. continued.**

| Chesapeake and Ohio NHP… | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| does not help the local economy. | Adjacent | 235 | 57.0 | 21.7 | 11.5 | 9.8 | 2.819 | NS[1] |
| | Surrounding | 183 | 54.6 | 26.2 | 7.7 | 11.5 | | |
| does not protect the landscape from development. | Adjacent | 234 | 77.8 | 5.1 | 10.3 | 6.8 | 3.125 | NS |
| | Surrounding | 184 | 74.5 | 3.8 | 15.8 | 6.0 | | |
| is not an important place for recreation for my community. | Adjacent | 237 | 86.1 | 3.4 | 9.3 | 1.3 | 8.576 | NS |
| | Surrounding | 183 | 75.4 | 8.2 | 14.8 | 1.6 | | |
| is not a good neighbor. | Adjacent | 235 | 88.5 | 4.7 | 5.5 | 1.3 | 0.535 | NS |
| | Surrounding | 183 | 90.7 | 3.8 | 4.4 | 1.1 | | |

[1]Not significant

**Table 12. A comparison of mean scores on factors within a C & O Canal NHP community importance scale, expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| Factor label | Community Strata | n | Mean[1] | t | P-value |
|---|---|---|---|---|---|
| **Amenity values** | Adjacent | 237 | 4.57 | 2.308 | 0.021 |
| | Surrounding | 185 | 4.45 | | |
| **Economic values** | Adjacent | 226 | 3.42 | -0.603 | NS[2] |
| | Surrounding | 173 | 3.47 | | |

[1]1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree
[2]Not significant

**Table 13. Beliefs about deer-related impacts and impacts management in C & O Canal NHP (CHOH) expressed by respondents to the 2007 CHOH 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** |
| The local deer herd uses habitat both in the park and in communities outside the park | Adjacent | 237 | 2.1 | 1.3 | 95.8 | 0.8 | 9.681 | 0.021 |
| | Surrounding | 182 | 2.7 | 1.6 | 89.6 | 6.0 | | |
| It is reasonable to have deer in the park | Adjacent | 235 | 3.8 | 7.7 | 88.1 | 0.4 | 1.697 | NS[1] |
| | Surrounding | 178 | 3.9 | 7.9 | 86.5 | 1.7 | | |
| The habitat for deer is better in the park than in communities outside the park | Adjacent | 236 | 5.9 | 9.7 | 81.4 | 3.0 | 4.703 | NS |
| | Surrounding | 182 | 2.7 | 6.0 | 87.4 | 3.8 | | |
| Deer seriously damage plants and other resources in the park | Adjacent | 234 | 18.4 | 22.2 | 41.9 | 17.5 | 5.584 | NS |
| | Surrounding | 182 | 15.4 | 30.2 | 33.5 | 20.9 | | |
| Deer present a serious safety risk in the park | Adjacent | 235 | 53.2 | 19.1 | 20.0 | 7.7 | 3.783 | NS |
| | Surrounding | 182 | 51.6 | 24.7 | 14.3 | 9.3 | | |
| Deer create a serious health risk in the park | Adjacent | 236 | 39.4 | 22.0 | 28.4 | 10.2 | 3.255 | NS |
| | Surrounding | 183 | 40.4 | 23.5 | 21.9 | 14.2 | | |

[1]Not significant

**Table 13. continued.**

| | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not Sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| Deer create a serious nuisance for people visiting the park | Adjacent | 235 | 59.6 | 24.7 | 8.1 | 7.7 | 1.924 | NS[1] |
| | Surrounding | 183 | 56.8 | 22.4 | 9.8 | 10.9 | | |
| The park is part of the local community | Adjacent | 237 | 1.7 | 3.0 | 94.5 | 0.8 | 1.540 | NS |
| | Surrounding | 182 | 3.3 | 3.8 | 92.3 | 0.5 | | |
| It is important to understand other people's views about deer-related impacts | Adjacent | 234 | 8.1 | 17.9 | 70.1 | 3.8 | 0.070 | NS |
| | Surrounding | 180 | 7.8 | 18.9 | 69.4 | 3.9 | | |
| The park should start now to address deer-related impacts in the park | Adjacent | 236 | 16.5 | 18.2 | 56.8 | 8.5 | 1.917 | NS |
| | Surrounding | 180 | 12.8 | 22.2 | 55.6 | 9.4 | | |
| Addressing deer-related impacts in the park would affect communities outside the park | Adjacent | 237 | 5.1 | 6.3 | 77.2 | 11.4 | 10.877 | 0.012 |
| | Surrounding | 182 | 3.8 | 15.4 | 66.5 | 14.3 | | |
| Addressing deer-related impacts in the park would affect me positively | Adjacent | 235 | 17.0 | 16.2 | 57.0 | 9.8 | 20.732 | <0.001 |
| | Surrounding | 183 | 17.5 | 29.0 | 36.6 | 16.9 | | |
| Addressing deer-related impacts in the park would affect me negatively | Adjacent | 234 | 60.7 | 16.7 | 10.3 | 12.4 | 18.866 | <0.001 |
| | Surrounding | 181 | 43.1 | 30.9 | 7.2 | 18.8 | | |

[1]Not significant

**Table 14. Beliefs about C & O Canal NHP (CHOH) staff perceptions of deer-related impacts and impacts management in CHOH, expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| | | | (Percent) | | | | | |
|---|---|---|---|---|---|---|---|---|
| **"NPS managers think…"** | **Strata** | **n** | **Disagree, Strongly Disagree** | **Neutral** | **Agree, Strongly Agree** | **Not Sure** | **Chi-square** | **P-value** |
| the local deer herd uses habitat both in the park and in communities outside the park | Adjacent | 232 | 1.3 | 3.4 | 64.7 | 30.6 | 4.131 | NS[1] |
| | Surrounding | 176 | 1.7 | 6.3 | 55.7 | 36.4 | | |
| it is reasonable to have deer in the park | Adjacent | 231 | 0.9 | 6.5 | 58.9 | 33.8 | 3.111 | NS |
| | Surrounding | 174 | 1.7 | 8.0 | 50.6 | 39.7 | | |
| the park is part of the local community | Adjacent | 231 | 2.2 | 4.3 | 56.3 | 37.2 | 2.216 | NS |
| | Surrounding | 174 | 2.9 | 7.5 | 52.3 | 37.4 | | |
| the habitat for deer is better in the park than in communities outside the park | Adjacent | 232 | 3.4 | 8.6 | 51.3 | 36.6 | 6.681 | NS |
| | Surrounding | 176 | 0.0 | 10.8 | 50.6 | 38.6 | | |
| deer seriously damage plants and other resources in the park | Adjacent | 233 | 11.6 | 11.6 | 29.2 | 47.6 | 11.873 | 0.008 |
| | Surrounding | 176 | 14.2 | 21.6 | 18.2 | 46.0 | | |
| deer present a serious safety risk in the park | Adjacent | 232 | 28.0 | 13.8 | 12.5 | 45.7 | 0.358 | NS |
| | Surrounding | 175 | 29.1 | 14.9 | 10.9 | 45.1 | | |

[1]Not significant

**Table 14. continued.**

| "NPS managers think…" | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not Sure | Chi - square | P-value |
|---|---|---|---|---|---|---|---|---|
| deer create a serious health risk in the park | Adjacent | 232 | 19.4 | 16.8 | 16.4 | 47.4 | 2.897 | NS[1] |
| | Surrounding | 176 | 25.6 | 14.2 | 13.1 | 47.2 | | |
| deer create a serious nuisance for people visiting the park | Adjacent | 233 | 27.9 | 16.7 | 9.4 | 45.9 | .515 | NS |
| | Surrounding | 175 | 26.3 | 16.0 | 11.4 | 46.3 | | |
| the park should start now to address deer-related impacts in the park | Adjacent | 231 | 10.4 | 13.0 | 30.3 | 46.3 | 2.167 | NS |
| | Surrounding | 175 | 8.0 | 17.7 | 29.7 | 44.6 | | |
| addressing deer-related impacts in the park would affect communities outside the park | Adjacent | 231 | 6.9 | 6.5 | 43.3 | 43.3 | 11.062 | 0.011 |
| | Surrounding | 174 | 3.4 | 15.5 | 36.8 | 44.3 | | |
| addressing deer-related impacts in the park would affect me positively | Adjacent | 230 | 11.3 | 9.1 | 29.6 | 50.0 | 11.831 | 0.008 |
| | Surrounding | 173 | 6.4 | 19.1 | 22.5 | 52.0 | | |
| addressing deer-related impacts in the park would affect me negatively | Adjacent | 231 | 31.6 | 10.8 | 6.1 | 51.5 | 7.958 | 0.047 |
| | Surrounding | 173 | 23.1 | 19.7 | 5.2 | 52.0 | | |

[1]Not significant

Findings suggest that CHOH and park staff have a positive public image among residents of local communities. Most residents believed NPS employees were dedicated to preserving and protecting the park and the majority reported having trust in CHOH staff to make good decisions about natural resource management (Table 15). However, many also were unsure whether park staff listen to public opinion or work with local communities for shared purposes (Table 15). The majority of respondents in both strata believed that the park is trustworthy, knowledgeable and fair. The majority of respondents disagreed that management at CHOH is unconcerned about the public interest (Table 16). Fewer respondents agreed that the management at CHOH is typically unbiased and "tells the whole story" (Table 16). In aggregate, respondents in both strata regarded CHOH staff higher with regard to professionalism than with regard for community affiliation (Table 17).

**Interest in opportunities to provide input to CHOH on deer management**

The majority of residents agreed that public input usually leads to better management decisions (Table 18). Less than one in four respondents agreed with the statement "I usually have enough opportunities to provide input on park management decisions" (Table 18). Surrounding community respondents were comparatively more skeptical about whether their input would be taken seriously (Table 18).

The majority of residents had learned about park news from mass media sources during the previous 12 months. Few had had taken personal actions to learn about park activities. However, adjacent community residents were more likely to have talked with local staff or participated in a community group related to a park issue (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). Residents of adjacent communities were more likely than residents of surrounding communities to believe they could have "a lot" of influence on management decisions in the park or in their communities (Table 21).

**Table 15. Perceptions of Chesapeake and Ohio NHP (CHOH) as a land manager and community partner, expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| Chesapeake and Ohio NHP… | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not Sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| is an educational resource for my community. | Adjacent | 213 | 0.5 | 3.8 | 93.4 | 2.3 | 3.486 | NS |
| | Surrounding | 171 | 0.0 | 7.6 | 90.1 | 2.3 | | |
| employees are dedicated to preserving, protecting park. | Adjacent | 213 | 0.5 | 1.9 | 93.0 | 4.7 | 6.588 | NS |
| | Surrounding | 170 | 0.0 | 2.4 | 86.5 | 11.2 | | |
| I usually trust management at CHOH to make good decisions about resource management. | Adjacent | 212 | 6.1 | 17.0 | 65.6 | 11.3 | 2.968 | NS |
| | Surrounding | 169 | 3.0 | 14.2 | 71.6 | 11.2 | | |
| works with local communities for shared purposes. | Adjacent | 210 | 4.8 | 21.4 | 40.0 | 33.8 | 1.706 | NS |
| | Surrounding | 169 | 2.4 | 21.9 | 39.1 | 36.7 | | |
| managers listen to opinions from people like me. | Adjacent | 213 | 9.4 | 23.9 | 26.8 | 39.9 | 8.040 | 0.045 |
| | Surrounding | 170 | 2.9 | 28.2 | 22.9 | 45.9 | | |
| my community typically does not help care for CHOH. | Adjacent | 212 | 53.3 | 13.2 | 9.9 | 23.6 | 5.430 | NS |
| | Surrounding | 169 | 41.4 | 17.8 | 12.4 | 28.4 | | |
| rules and regulations do not help preserve and protect it for the future | Adjacent | 213 | 68.1 | 9.4 | 5.2 | 17.4 | 5.363 | NS |
| | Surrounding | 169 | 61.5 | 11.2 | 2.4 | 24.9 | | |
| I usually do not support the resource management decisions made there | Adjacent | 210 | 40.5 | 27.6 | 4.8 | 27.1 | 0.303 | NS |
| | Surrounding | 166 | 41.0 | 29.5 | 4.2 | 25.3 | | |
| I do not feel welcome at CHOH | Adjacent | 214 | 93.9 | 2.3 | 2.3 | 1.4 | 4.329 | NS |
| | Surrounding | 171 | 91.8 | 2.3 | 1.2 | 4.7 | | |

**Table 16. Perceptions of C & O Canal NHP (CHOH) management public image, expressed by respondents to the 2007 CHOH Deer, People and Parks survey in three community strata.**

| Management at C & O Canal NHP typically is… | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not Sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| trustworthy | Adjacent | 207 | 1.4 | 15.9 | 58.5 | 24.2 | 1.936 | NS[1] |
| | Surrounding | 167 | 3.0 | 12.6 | 58.1 | 26.3 | | |
| not knowledgeable | Adjacent | 209 | 62.7 | 12.0 | 2.9 | 22.5 | 0.183 | NS |
| | Surrounding | 166 | 62.7 | 11.4 | 3.6 | 22.3 | | |
| not fair | Adjacent | 207 | 56.5 | 15.9 | 2.9 | 24.6 | 1.884 | NS |
| | Surrounding | 165 | 53.9 | 13.9 | 1.8 | 30.3 | | |
| telling the whole story | Adjacent | 208 | 13.0 | 25.5 | 28.4 | 33.2 | 0.805 | NS |
| | Surrounding | 167 | 13.2 | 24.6 | 25.1 | 37.1 | | |
| unbiased | Adjacent | 205 | 11.2 | 28.3 | 26.8 | 33.7 | 0.718 | NS |
| | Surrounding | 163 | 9.8 | 28.2 | 24.5 | 37.4 | | |
| concerned about my community's well-being | Adjacent | 209 | 9.1 | 16.7 | 46.9 | 27.3 | 0.370 | NS |
| | Surrounding | 168 | 9.5 | 15.5 | 45.2 | 29.8 | | |
| unconcerned about the public interest | Adjacent | 208 | 58.2 | 13.0 | 5.8 | 23.1 | 0.623 | NS |
| | Surrounding | 167 | 55.1 | 12.6 | 7.2 | 25.1 | | |
| watching out for my community's interests | Adjacent | 206 | 9.2 | 24.8 | 38.8 | 27.2 | 1.960 | NS |
| | Surrounding | 168 | 8.3 | 19.6 | 39.9 | 32.1 | | |

[1]Not significant

**Table 17. A comparison of mean scores on factors within a C & O Canal NHP (CHOH) public image scale, expressed by respondents to the 2007 CHOH Deer, People and Parks survey in two community strata.**

| Factor label | Community Strata | n | Mean[1] | t | P-value |
|---|---|---|---|---|---|
| **Professionalism** | Adjacent | 170 | 3.92 | 0.569 | NS[1] |
| | Surrounding | 138 | 3.87 | | |
| **Community Affiliation** | Adjacent | 164 | 3.47 | -0.045 | NS |
| | Surrounding | 129 | 3.48 | | |

[1]1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree
[2]Not significant

**Table 18. Perceptions of Chesapeake and Ohio NHP (CHOH) use of public input for land management decisions, expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| Chesapeake and Ohio NHP… | Strata | n | (Percent) Disagree, Strongly Disagree | Neutral | Agree, Strongly Agree | Not Sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|---|
| Public input usually leads to better management decisions. | Adjacent<br>Surrounding | 226<br>172 | 2.2<br>2.3 | 14.6<br>23.8 | 65.9<br>60.5 | 17.3<br>13.4 | 5.891 | NS |
| I am not comfortable voicing my opinion about park mgt. decisions. | Adjacent<br>Surrounding | 227<br>173 | 5.7<br>9.2 | 15.4<br>15.0 | 64.8<br>68.2 | 14.1<br>7.5 | 5.647 | NS |
| I do not believe my input typically (or would be) taken seriously by park management. | Adjacent<br>Surrounding | 227<br>171 | 26.9<br>13.5 | 12.3<br>16.4 | 52.9<br>63.7 | 7.9<br>6.4 | 11.762 | 0.008 |
| I do not have enough information to provide meaningful input on deer management. | Adjacent<br>Surrounding | 225<br>171 | 25.3<br>13.5 | 29.3<br>45.0 | 25.8<br>20.5 | 19.6<br>21.1 | 14.694 | 0.002 |
| I usually have enough opportunities to provide input on park management decisions. | Adjacent<br>Surrounding | 222<br>169 | 28.8<br>24.9 | 26.1<br>27.8 | 21.6<br>20.1 | 23.4<br>27.2 | 1.316 | NS |
| The different ways the park asks for my opinion encourages me to provide input. | Adjacent<br>Surrounding | 227<br>171 | 57.7<br>36.3 | 17.2<br>28.1 | 17.2<br>24.6 | 7.9<br>11.1 | 18.219 | <0.001 |
| For the most part, interactions between myself, park managers, and people with different ideas helps build future relationships. | Adjacent<br>Surrounding | 220<br>168 | 30.0<br>28.0 | 29.1<br>31.5 | 11.8<br>8.9 | 29.1<br>31.5 | 1.268 | NS |

**Table 19. Actions taken in the previous 12 months to obtain information about Chesapeake and Ohio NHP (CHOH) , reported by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| Actions in past 12 months | Strata | n | (Percent) No | Yes | Not sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| Read or listened to news about park. | Adjacent | 228 | 22.4 | 74.1 | 3.5 | 21.731 | <0.001 |
| | Surrounding | 178 | 36.5 | 52.8 | 10.7 | | |
| Talked with local park staff. | Adjacent | 230 | 63.5 | 35.7 | 0.9 | 10.176 | 0.006 |
| | Surrounding | 178 | 78.1 | 21.3 | 0.6 | | |
| Participated in a community group or activity related to a park issue. | Adjacent | 230 | 87.0 | 12.2 | 0.9 | 5.366 | NS[1] |
| | Surrounding | 179 | 93.9 | 5.6 | 0.6 | | |
| Talked with other public officials about the park. | Adjacent | 230 | 91.7 | 5.7 | 2.6 | 1.242 | NS |
| | Surrounding | 178 | 93.8 | 5.1 | 1.1 | | |
| Attended a public meeting about the park. | Adjacent | 229 | 96.1 | 3.9 | 0.0 | 2.199 | NS |
| | Surrounding | 179 | 97.2 | 2.2 | 0.6 | | |
| Provided written comments to a park plan, impact statement, survey. | Adjacent | 229 | 97.4 | 2.2 | 0.4 | 0.640 | NS |
| | Surrounding | 179 | 96.6 | 2.2 | 1.1 | | |
| Written a letter to a newspaper about the park. | Adjacent | 230 | 98.3 | 1.3 | 0.4 | 3.126 | NS |
| | Surrounding | 178 | 100 | 0.0 | 0.0 | | |

[1]Not significant

**Table 20. Likelihood of participating in involvement opportunities if those opportunities were provided at Chesapeake and Ohio NHP (CHOH), expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| Actions | Strata | n | (Percent) Very unlikely, Unlikely | Very likely, Likely | Not Sure | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| Read or listen to news about park actions to address deer impacts. | Adjacent | 230 | 3.9 | 96.1 | 0.0 | 19.320 | <0.001 |
| | Surrounding | 178 | 9.6 | 84.8 | 5.6 | | |
| Attend a public meeting about deer impacts. | Adjacent | 228 | 41.7 | 52.6 | 5.7 | 19.253 | <0.001 |
| | Surrounding | 178 | 60.7 | 30.9 | 8.4 | | |
| Participate in a community group or activity related to deer impacts. | Adjacent | 229 | 44.5 | 46.3 | 9.2 | 15.305 | <0.001 |
| | Surrounding | 176 | 59.7 | 27.3 | 13.1 | | |
| Talk with local park staff about deer-related impacts | Adjacent | 228 | 44.7 | 46.1 | 9.2 | 21.777 | <0.001 |
| | Surrounding | 178 | 59.0 | 24.2 | 16.9 | | |
| Provide written comments to a park plan, impact statement, survey related to deer impacts. | Adjacent | 229 | 48.5 | 42.8 | 8.7 | 14.068 | 0.001 |
| | Surrounding | 176 | 61.9 | 25.0 | 13.1 | | |
| Talk with other public officials about deer-related impacts. | Adjacent | 227 | 53.3 | 36.1 | 10.6 | 8.956 | 0.011 |
| | Surrounding | 178 | 63.5 | 22.5 | 14.0 | | |
| Write a letter to a newspaper about deer impacts. | Adjacent | 229 | 75.1 | 13.5 | 11.4 | 4.133 | NS[1] |
| | Surrounding | 177 | 79.1 | 7.3 | 13.6 | | |

[1]Not significant

**Table 21. Level of influence respondents perceive they have to influence management of Chesapeake and Ohio NHP (CHOH) or communities surrounding the park, expressed by respondents to the 2007 CHOH Deer, People, and Parks survey in two community strata.**

| How much influence do you think people like yourself can have … | n | (Percent) a lot | Some | Very little | None at all | Chi-square | P-value |
|---|---|---|---|---|---|---|---|
| on the management of Chesapeake and Ohio NHP? | | | | | | | |
| Adjacent | 229 | 13.1 | 49.3 | 32.3 | 5.2 | 11.177 | 0.011 |
| Surrounding | 178 | 3.9 | 57.3 | 31.5 | 7.3 | | |
| in making communities surrounding the park a better place to live? | | | | | | | |
| Adjacent | 229 | 27.5 | 56.3 | 13.5 | 2.6 | 8.663 | 0.034 |
| Surrounding | 178 | 18.0 | 56.2 | 20.8 | 5.1 | | |

## SUMMARY AND CONCLUSIONS

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. Almost all respondents regarded CHOH as part of the local community. Local residents appreciate the park for its amenity values (e.g., as open space, as a leisure resource, as natural habitats) and visit CHOH frequently to spend time outdoors, enjoy nature, or spend time with family, friends, or pets. Respondents indicated these quality-of-life factors to be as important, if not more so, than the historical and cultural aspects that led to the park's creation, a phenomenon typical in many gateway communities (Howe et al. 1997).

Many local residents (especially those living in adjacent communities) interact with deer regularly. 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). Many local residents are very concerned about three categories of negative impacts associated with the presence of deer on park lands and in their communities: impacts associated with deer-vehicle collisions, disease transmission from deer to humans, and deer browsing damage to landscape and natural plants.

Relatively few local residents believed that deer presented a serious risk to public health or safety in the CHOH. However, a plurality of respondents in both strata believed that deer in the park are having a negative impact on park plants, and more than half of respondents believed the park should start now to address deer-related impacts. Most of those who thought the park should act anticipated that actions by the park to manage deer-related impacts would have a positive effect on local communities.

We did not ask respondents how they believed action by NPS would benefit their community. However, we recommend that future communication with communities address expectations for subsequent effects of deer management on public health and safety in communities near CHOH. Previous research revealed that different problem frames exist for deer issues in NPS units. That is, the topics that individuals perceive as salient affect the way they think about the dimensions of the problem and the appropriate means, time frame and geographic scope of potential solutions (Leong and Decker 2007b). Concerns about deer-vehicle collisions were as salient for respondents as damage to vegetation in their community. Without specific communication from NPS that explicitly states expectations for those concerns, community members may assume different metrics of success for deer management interventions than those chosen by NPS managers. Given the narrow, linear nature of the park, NPS managers recognize that success of any program to manage deer impacts would necessitate working closely with local governments, state agencies, neighbors, and other Federal agencies (P. S. Bell, personal communication, CHOH, NPS). Under these geographic and jurisdictional constraints, NPS managers may choose to emphasize management actions directed at human behavior or habitat conditions (e.g. vehicle speed reduction measures, alternative landscaping practices) rather than control of deer populations. Future communication with local residents also could include discussion of complementary actions which local communities could take to manage deer-related impacts that transcend park boundaries and may be outside the scope of work addressed within CHOH.

While not reflected in responses from all community residents, a base of general credibility and trust exists for CHOH decision makers. However, a substantial proportion of residents in local communities are uncertain about the beliefs of NPS managers regarding deer and deer management in the park. Most residents of local communities have heard or read news stories about the park, but few have participated in activities where they provided input to decisions about park management activities. Substantial numbers of residents are interested in providing input on managing deer-related impacts in CHOH, although many residents also indicated that they did not believe they had enough information to provide meaningful input. A substantial proportion of residents in both community types are skeptical about the degree to which NPS decision makers listen to community residents or consider their input in decisions. These results indicate the need for public issues education; that is, an effort to build the capacity of the public to provide informed input on decisions (Dale and Hahn 1994, Leong et al. 2006). Community members also may be offered training in community-based planning, as outlined in the Department of the Interior Environmental Statement Memorandum that discusses public participation and community-based training (Department of the Interior 2003).

Because of their proximity to CHOH, adjacent communities have greater potential to experience direct impacts from deer associated with the park or deer management initiated by CHOH than do surrounding communities. As expected, experience with deer and concern about deer damage to vegetation is stronger in adjacent communities than surrounding communities, indicating that deer-related impacts typically of concern to NPS natural resource managers are more salient to adjacent communities. Interest in providing input to managing deer-related impacts also is stronger in adjacent communities than in surrounding communities. These findings indicate that adjacent and surrounding communities represent two different publics, with

the adjacent community more likely to be actively seeking information about the situation of concern to CHOH managers. Thus, adjacent communities may be more prepared to discuss the problem as perceived by CHOH, while communication targeting surrounding communities would need more emphasis on problem definition and supporting logic.

These results also corroborate the situational theory of publics (Grunig 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 CHOH and public perspectives diverge.

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 CHOH. 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.

Overall, 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.

## LITERATURE CITED


Bates, S. 2007. National Capital Region Network 2006 Deer Monitoring Report. Natural Resource Report NPS/NCRN/NRTR—2007/033. National Park Service, Washington, D.C.

Beierle, T. C., and J. Cayford. 2002. Democracy in practice: Public participation in environmental decisions. Resources for the Future, Washington, D. C.

Dale, D. D., and A. J. Hahn. 1994. Public Issues Education: Increasing Competence in Resolving Public Issues. University of Wisconsin—Extension, Madison, W. I.

Decker, D. J., M. A. Wild, S. J. Riley, W. F. Siemer, M. M. Miller, K. M. Leong, J. G. Powers, and J. C. Rhyan. 2006. Wildlife Disease Management: A manager's model. Human Dimensions of Wildlife 11(3): 151-158.

Department of the Interior. 2003. Environmental Statement Memorandum no. ESM03-4, Procedures for Implementing Public Participation and Community-based Training. Department of the Interior, Washington, D. C.

Dillman, D. A. 2000. Mail and Internet Surveys: The Tailored Design Method. 2nd edition. John Wiley & Sons, Inc., New York.

Frost, H. C., G. L. Storm, M. J. Batcheller, and M. J. Lovallo. 1997. White-tailed deer management at Gettysburg National Military Park and Eisenhower National Historic site. Wildlife Society Bulletin 25: 462-469.

Grunig, J. E. 1977. Review of Research on Environmental Public Relations. Public Relations Review 3(3): 36-58.

Halvorsen, K. E. 2003. Assessing the effects of public participation. Public Administration Review 63: 535-543.

Howe, J., E. McMahon, and L. Propst. 1997. Balancing Nature and Commerce in Gateway Communities. Island Press, Washington, D.C.

Leong, K. M. 2007. Negotiating between resource conservation and the public trust on federal reserve lands. In: K. M. Leong. Biological Resource Management in a Changing World: Capacity for Local Community Participation in Wildlife Management Planning for National Parks, p.103-136. Doctoral dissertation, Cornell University, New York.

Leong, K. M. and D.J. Decker. 2005. White-tailed deer issues in NPS Units: Insights from natural resource managers in the Northeastern U.S. Human Dimensions Research Unit (HDRU) Series Publication 05-5. Department of Natural Resources, Cornell University, Ithaca, NY.

Leong, K. M. and D.J. Decker. 2007a. Identifying capacity for local community participation in wildlife management planning, Case 1: White-tailed deer issues at Fire Island National Seashore. Human Dimensions Research Unit (HDRU) Series Publication 07-1. Department of Natural Resources, Cornell University, Ithaca, NY.

Leong, K. M. and D.J. Decker. 2007b. Identifying capacity for local community participation in wildlife management planning, Case 2: White-tailed Deer Issues at Valley Forge National Historical Park.. Human Dimensions Research Unit (HDRU) Series Publication 07-3. Department of Natural Resources, Cornell University, Ithaca, NY.

Leong, K. M. and D.J. Decker. 2007c. Identifying capacity for local community participation in wildlife management planning, Case 3: White-tailed Deer Issues at Prince William Forest Park. Human Dimensions Research Unit (HDRU) Series Publication 07-4. Department of Natural Resources, Cornell University, Ithaca, NY.

Leong, K. M., D. J. Decker, M. A. Wild, J. Karish. 2006. Application of an Issue Evolution Model to Wildlife Issues in National Parks. George Wright Forum 23(1):62-71.

Lovallo, M. J., and W. M. Tzilkowski. 2003. Abundance of white-tailed deer (*Odocoileus virginianus*) within Valley Forge National Historic Park and movements related to surrounding private lands. Technical report NPS/NERCHAL/NRTR-03/091. National Park Service, Philadelphia, P.A.

National Environmental Policy Act. 1969. 42 U.S.C. § 4321 *et seq.*

National Park Service. 2001. Director's Order #12 handbook for Conservation Planning, Environmental Impact Analysis, and Decision Making. National Park Service, Washington, D. C.

National Park Service. 2006. Management policies 2006. National Park Service, Washington, D.C.

National Park Service. 2007. Director's Order #75 A: Civic engagement and publc involvement. National Park Service, Washington, D.C.

Parsons, J. G. 1976. Chesapeake & Ohio Canal National Historical Park District of Columbia/Maryland General Plan. National Park Service, Washington, D. C.

Patterson, M. E., J. M. Montag, and D. R. Williams. 2003. The urbanization of wildlife management: Social science, conflict, and decision making. Urban Forestry & Urban Greening 1:171-183.

Pearce, W. B., and S. W. Littlejohn. 1997. Moral Conflict: When Social Worlds Collide. Sage Publications, Thousand Oaks, C. A.

Porter, W. F., and H. B. Underwood. 1999. Of elephants and blind men: Deer management in the U. S. National Parks. Ecological Applications 9:3-9.

Riley, S. J., D. J. Decker, L. H. Carpenter, J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. Wildlife Society Bulletin 30(2):585-593.

Runte, A. 1997. National Parks: The American Experience. 3rd Edition. University of Nebraska Press, Lincoln, N.E.

Shafer-Nolan, A. L. 1997. The science and politics of deer overabundance at Cuyahoga Valley National Recreation Area. Wildlife Society Bulletin 25: 457-461.

Siemer, W. F., K. Leong, and D. J. Decker. 2007. Cornell lands, deer, and East Hill communities: Results from a 2006 survey of community residents. Human Dimensions Research Unit (HDRU) Series Publication 07-5. Department of Natural Resources, Cornell University, Ithaca, N.Y.

Underwood, H. B. 2005. White-tailed deer ecology and management on Fire Island National Seashore (Fire Island National Seashore Science Synthesis paper). Technical Report NPS/NER/NRTR—2005/022.National Park Service, Boston, M.A.

Underwood, H. B., and W. F. Porter. 1991. Values and science: White-tailed deer management in eastern National Parks. Transactions of the 56th North American Wildlife and Natural Resources Conference: 67-73.

Warren, R. J. 1991. Ecological justification for controlling deer populations in eastern National Parks. Transactions of the 56th North American Wildlife and Natural Resources Conference: 55-66.

Wondolleck, J. M., and S. L. Yaffee. 2000. Making collaboration work: Lessons from innovation in natural resources management. Island Press, Washington, D. C.

**APPENDIX A: Survey instrument**

# Deer, People and Parks

*A Survey of Residents Living Near*
*The Great Falls Area of the*
*Chesapeake and Ohio Canal*
*National Historical 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 the Great Falls area of the Chesapeake and Ohio Canal National Historical 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 Chesapeake and Ohio Canal National Historical Park is currently planning to manage deer.

Even if you have not visited Chesapeake and Ohio Canal National Historical 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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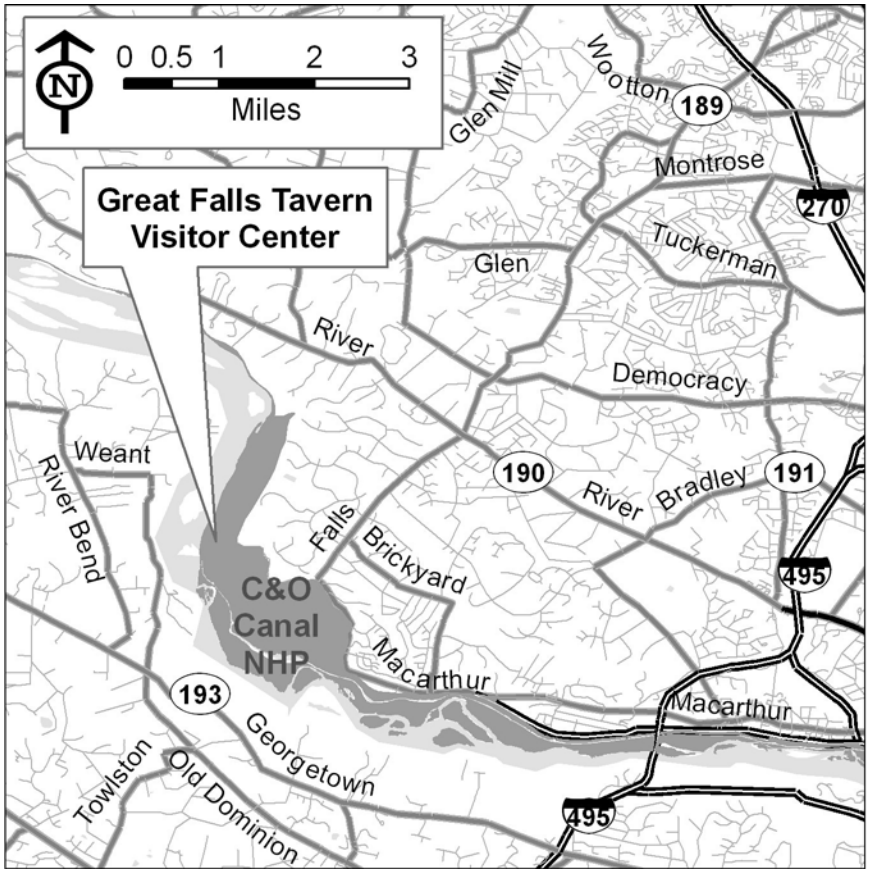
Throughout this survey, we may refer to the National Park Service as “NPS” and Chesapeake and Ohio Canal National Historical Park as “C&O Canal NHP,” or “the Park.”

When responding to answers about the park, please refer to your experiences in or near the Great Falls area (see shaded area on map).



## YOUR EXPERIENCES WITH C&O CANAL NHP, DEER, AND YOUR COMMUNITY

**1. Have you ever visited the Great Falls area of Chesapeake and Ohio Canal National Historical Park?**

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

**2. When you visit the Great Falls area of C&O Canal NHP, 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 the Great Falls area of C&O Canal NHP?**

*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 the Great Falls area of C&O Canal NHP 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 the Great Falls area of C&O Canal NHP?** *Please check one.*

| | | | |
|---|---|---|---|
| ☐ Every visit | ☐ Half or more but not all visits | ☐ Less than half of visits | ☐ Never |

**6. In the past 12 months, how often have you seen deer in your community near C&O Canal NHP?** *Please check one.*

| | | | | |
|---|---|---|---|---|
| ☐ Daily | ☐ A few times a week | ☐ Weekly | ☐ Less often than once a week | ☐ Never |

**7. Please indicate to what extent you agree or disagree with the following statements about C&O Canal NHP and your community.**

| **C&O Canal NHP ...**<br>*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 the Great Falls area of C&O Canal NHP 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 GREAT FALLS AREA OF C&O CANAL NHP | | | 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 THE GREAT FALLS AREA OF C&O CANAL NHP?**
*Please check one.*

- ☐ I have no particular feelings about deer in C&O Canal NHP
- ☐ 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 C&O Canal NHP

**10. Generally, how do you feel about deer IN YOUR COMMUNITY (outside C&O Canal NHP)?**
*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 the Great Falls area of C&O Canal NHP or in your community (outside the park):**

*Please circle one number for each item.*

| | IN GREAT FALLS AREA OF C&O CANAL NHP | | | 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 <u>IN THE PAST 12 MONTHS?</u>**

*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 C&O Canal NHP.**

| *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 C&O Canal NHP?** *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 C&O Canal NHP 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 C&O Canal NHP.**

| *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 C&O Canal NHP | 1 | 2 | 3 | 4 | 5 | 9 |
| C&O Canal NHP is an educational resource for my community | 1 | 2 | 3 | 4 | 5 | 9 |
| I do not feel welcome at C&O Canal NHP | 1 | 2 | 3 | 4 | 5 | 9 |
| C&O Canal NHP typically works with local communities for shared purposes | 1 | 2 | 3 | 4 | 5 | 9 |
| On the whole, the rules and regulations at C&O Canal NHP do not help preserve and protect it for the future. | 1 | 2 | 3 | 4 | 5 | 9 |
| My community typically does not help care for C&O Canal NHP | 1 | 2 | 3 | 4 | 5 | 9 |
| Managers at C&O Canal NHP 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 C&O Canal NHP | 1 | 2 | 3 | 4 | 5 | 9 |
| I usually trust management at C&O Canal NHP 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 C&O Canal NHP 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 C&O Canal NHP?**
_____ 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 C&O Canal NHP, please visit:
**http://www.nps.gov/choh/**

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Expiration Date: 3/31/2010

## APPENDIX B: Factor loadings for data reduction scales

**Table B1. Factor loadings for 9-item values of C & O Canal NHP to communities scale.**

| "C& O Canal NHP…" | Factor 1 (Amenity values) | Factor 2 (Economic values) |
|---|---|---|
| provides open space for my community | **0.762** | -0.033 |
| preserves natural resources | **0.652** | -0.011 |
| provides habitat for plants and animals | **0.612** | 0.052 |
| makes my community a special place to live | **0.563** | 0.038 |
| is a good neighbor | **0.558** | 0.152 |
| plays a significant role in my community | **0.506** | 0.344 |
| attracts tourism dollars to my community | -0.011 | **0.867** |
| helps the local economy | 0.177 | **0.763** |
| increases the job opportunities in my community | 0.020 | **0.738** |
| % variance explained by factor | 28.92 | 19.09 |
| factor alpha | 0.661 | 0.705 |

**Table B2. Factor loadings for 9-item scale on perceptions of deer in Great Falls area of C & O Canal NHP.**

| | Park scale | | Community scale | |
|---|---|---|---|---|
| "…deer in general are…" | Factor 1 (Harmless) | Factor 2 (Natural) | Factor 1 (Natural) | Factor 2 (Harmless) |
| not threatening | **0.764** | 0.215 | 0.259 | **0.709** |
| not aggressive | **0.732** | 0.097 | 0.456 | **0.500** |
| not dangerous | **0.711** | 0.257 | 0.155 | **0.780** |
| harmless | **0.710** | 0.170 | 0.123 | **0.796** |
| peaceful | **0.494** | 0.263 | 0.336 | **0.507** |
| acting naturally | 0.163 | **0.868** | **0.814** | 0.208 |
| not acting unnaturally | 0.203 | **0.648** | **0.790** | 0.130 |
| behaving normally | 0.202 | **0.841** | **0.756** | 0.302 |
| not behaving strangely | 0.383 | **0.435** | **0.694** | 0.240 |
| % variance explained | 41.66 | 13.00 | 45.45 | 12.67 |
| factor alpha | 0.765 | 0.755 | 0.819 | 0.767 |

**Table B3. Factor loadings for 12-item scale on concerns about deer in Great Falls area of C & O Canal NHP.**

| | Park scale | | Community scale | |
|---|---|---|---|---|
| Potential concerns: | Factor 1 (Primary) | Factor 2 (Other) | Factor 1 (Primary) | Factor 2 (Other) |
| Deer browsing on landscaped flowers, trees and shrubs | **0.894** | 0.202 | **0.870** | 0.138 |
| Deer browsing on vegetable gardens | **0.863** | 0.237 | **0.823** | 0.187 |
| Deer browsing on naturally growing flowers, trees and shrubs | **0.831** | 0.026 | **0.745** | 0.098 |
| Presence of deer feces | **0.586** | 0.357 | **0.578** | 0.406 |
| Car accidents involving deer | **0.557** | 0.359 | **0.643** | 0.094 |
| Diseases and/or parasites carried by deer | 0.394 | **0.479** | **0.629** | 0.361 |
| Deer behavior around people | 0.334 | **0.748** | 0.304 | **0.756** |
| People's behavior around deer | 0.116 | **0.744** | 0.051 | **0.729** |
| Having seen unhealthy deer | 0.181 | **0.731** | 0.245 | **0.710** |
| Deer interacting with pets | 0.312 | **0.692** | 0.263 | **0.722** |
| Fawns that are born too late to survive winter | 0.027 | **0.627** | 0.022 | **0.611** |
| Deer accessing unsecured trash | 0.383 | **0.573** | 0.229 | **0.669** |
| % variance explained by factor | 44.69 | 12.62 | 41.90 | 14.13 |
| factor alpha | 0.858 | 0.831 | 0.831 | 0.822 |

**Table B4. Factor loadings for 7-item scale on image of C & O Canal NHP management.**

| "Management at C & O Canal NHP typically is…" | Factor 1 (Professionalism) | Factor 2 (Community affiliation) |
|---|---|---|
| Fair | **0.828** | 0.188 |
| Knowledgeable | **0.798** | 0.248 |
| Trustworthy | **0.763** | 0.293 |
| Concerned about the public interest | **0.720** | 0.197 |
| Watching out for my community's interests | 0.187 | **0.869** |
| Concerned about my community's well being | 0.310 | **0.836** |
| Unbiased | 0.228 | **0.731** |
| % variance explained by factor | 53.32 | 15.51 |
| factor alpha | 0.792 | 0.808 |

## APPENDIX C: Nonrespondent-respondent comparison tables

**Table C1. Percent of respondents and nonrespondents who have visited Chesapeake and Ohio Canal NHP by stratum.**

| Ever visited CHOH? | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| No | Respondents | 3 | 1.3 | 14 | 7.6 |
| | Nonrespondents | 5 | 10.0 | 19 | 38.0 |
| Yes | Respondents | 233 | 98.7 | 171 | 92.4 |
| | Nonrespondents | 45 | 90.0 | 31 | 62.0 |
| Total | Respondents | 236 | 100.0 | 185 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |

**Table C2. Percent of respondents and nonrespondents who visited Chesapeake and Ohio NHP, 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 | 32 | 13.7 | 59 | 34.7 |
| | Nonrespondents | 9 | 20.0 | 8 | 25.8 |
| 2-4 times | Respondents | 48 | 20.6 | 49 | 28.8 |
| | Nonrespondents | 12 | 26.7 | 9 | 29.0 |
| 5 or more visits | Respondents | 153 | 65.7 | 62 | 36.5 |
| | Nonrespondents | 24 | 53.3 | 14 | 45.2 |
| Total | Respondents | 233 | 100.0 | 170 | 100.0 |
| | Nonrespondents | 45 | 100.0 | 31 | 100.0 |
| Chi-square | | | 2.548 | | 1.147 |
| P-value | | | NS[1] | | NS |

[1]Not significant

**Table C3. Percent of CHOH respondents and nonrespondents by strata and by frequency with which they see deer near park in their community.**

| See deer in Community | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| Daily | Respondents | 121 | 51.1 | 29 | 15.9 |
| | Nonrespondents | 28 | 56.0 | 12 | 24.5 |
| A few times a week | Respondents | 73 | 30.8 | 48 | 26.4 |
| | Nonrespondents | 13 | 26.0 | 8 | 16.3 |
| Weekly | Respondents | 20 | 8.4 | 23 | 12.6 |
| | Nonrespondents | 7 | 14.0 | 10 | 20.4 |
| Less than once a week | Respondents | 21 | 8.9 | 75 | 41.2 |
| | Nonrespondents | 2 | 4.0 | 17 | 34.7 |
| Never | Respondents | 2 | 0.8 | 7 | 3.8 |
| | Nonrespondents | 0 | 0.0 | 2 | 4.1 |
| Total | Respondents | 237 | 100.0 | 182 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 49 | 100.0 |
| Chi-square | | | 3.509 | | 5.249 |
| P-value | | | NS[1] | | NS |

[1]Not significant

**Table C4. Percent of respondents and nonrespondents with particular attitudes toward deer in CHOH, by strata.**

| Collapsed response categories | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| No particular feelings/ Enjoy deer without worry | Respondents | 60 | 26.7 | 72 | 43.6 |
| | Nonrespondents | 14 | 28.6 | 22 | 44.9 |
| Enjoy deer but worry/ Do not enjoy deer | Respondents | 165 | 73.3 | 93 | 56.4 |
| | Nonrespondents | 35 | 71.4 | 27 | 55.1 |
| Total | Respondents | 225 | 100.0 | 165 | 100.0 |
| | Nonrespondents | 49 | 100.0 | 49 | 100.0 |
| Chi-square | | | 0.074 | | 0.024 |
| P-value | | | NS[1] | | NS |

[1]Not significant

**Table C5. Percent of CHOH respondents and nonrespondents with particular attitudes toward deer in their community, by strata.**

| Collapsed response categories | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| No particular feelings/ Enjoy deer without worry | Respondents | 24 | 10.3 | 32 | 18.3 |
| | Nonrespondents | 5 | 10.0 | 12 | 24.0 |
| Enjoy deer but worry/ Do not enjoy deer | Respondents | 209 | 89.7 | 143 | 81.7 |
| | Nonrespondents | 45 | 90.0 | 38 | 76.0 |
| Total | Respondents | 233 | 100.0 | 175 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi-square | | | 0.004 | | 0.807 |
| P-value | | | NS[1] | | NS |

[1]Not significant

**Table C6. Percent of Chesapeake and Ohio NHP 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 | 30 | 13.1 | 7 | 3.9 |
| | Nonrespondents | 2 | 4.2 | 4 | 8.5 |
| Some | Respondents | 113 | 49.3 | 102 | 57.3 |
| | Nonrespondents | 18 | 37.5 | 18 | 38.3 |
| Very little | Respondents | 74 | 32.3 | 56 | 31.5 |
| | Nonrespondents | 18 | 37.5 | 17 | 36.2 |
| None at all | Respondents | 12 | 5.2 | 13 | 7.3 |
| | Nonrespondents | 10 | 20.8 | 8 | 17.0 |
| Total resp. | | 229 | 100.0 | 178 | 100.0 |
| Total nonresp. | | 48 | 100.0 | 47 | 100.0 |
| Chi-square | | | 16.389 | | 8.129 |
| P-value | | | 0.001 | | 0.043 |

**Table C7. Percent of CHOH respondents and nonrespondents by strata and response to trustworthyness of CHOH staff.**

| Management at CHOH is typically trustworthy | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| Strongly disagree, Disagree | Respondents | 3 | 1.4 | 5 | 3.0 |
| | Nonrespondents | 3 | 6.0 | 5 | 10.0 |
| Neutral | Respondents | 33 | 15.9 | 21 | 12.6 |
| | Nonrespondents | 22 | 44.0 | 24 | 48.0 |
| Strongly agree, Agree | Respondents | 121 | 58.5 | 97 | 58.1 |
| | Nonrespondents | 24 | 48.0 | 13 | 26.0 |
| Not sure | Respondents | 50 | 24.2 | 44 | 26.3 |
| | Nonrespondents | 1 | 2.0 | 8 | 16.0 |
| Total | Respondents | 207 | 100.0 | 167 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi-square | | | 29.128 | | 36.918 |
| P-value | | | <0.001 | | <0.001 |

**Table C8. Percent of CHOH respondents and nonrespondents by strata and response to concern about local communities well-being among CHOH staff.**

| Management at CHOH is concerned about my community | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| Strongly disagree, Disagree | Respondents | 19 | 9.1 | 16 | 9.5 |
| | Nonrespondents | 10 | 20.0 | 5 | 10.0 |
| Neutral | Respondents | 35 | 16.7 | 26 | 15.5 |
| | Nonrespondents | 23 | 46.0 | 23 | 46.0 |
| Strongly agree, Agree | Respondents | 98 | 46.9 | 76 | 45.2 |
| | Nonrespondents | 16 | 32.0 | 12 | 24.0 |
| Not sure | Respondents | 57 | 27.3 | 50 | 29.8 |
| | Nonrespondents | 1 | 2.0 | 10 | 20.0 |
| Total | Respondents | 209 | 100.0 | 168 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi-square | | | 33.247 | | 6.169 |
| P-value | | | <0.001 | | NS[1] |

[1]Not significant

**Table C9. Percent of CHOH respondents and nonrespondents by strata and likelihood of talking with park management 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 | 102 | 44.7 | 105 | 59.0 |
| | Nonrespondents | 22 | 44.0 | 27 | 54.0 |
| Very likely, likely | Respondents | 105 | 46.1 | 43 | 24.2 |
| | Nonrespondents | 28 | 56.0 | 22 | 44.0 |
| Not sure | Respondents | 21 | 9.2 | 30 | 16.9 |
| | Nonrespondents | 0 | 0.0 | 1 | 2.0 |
| Total | Respondents | 228 | 100.0 | 178 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi-square | | | 5.458 | | 11.893 |
| P-value | | | NS[1] | | 0.003 |

[1]Not significant

**Table C10. Percent of CHOH respondents and nonrespondents by strata and likelihood of writing comments to park management about deer impacts if park offers such opportunities.**

| 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 | 111 | 48.5 | 109 | 61.9 |
| | Nonrespondents | 19 | 38.0 | 20 | 40.0 |
| Very likely, likely | Respondents | 98 | 42.8 | 44 | 25.0 |
| | Nonrespondents | 30 | 60.0 | 26 | 52.0 |
| Not sure | Respondents | 20 | 8.7 | 23 | 13.1 |
| | Nonrespondents | 1 | 2.0 | 4 | 8.0 |
| Total | Respondents | 229 | 100.0 | 176 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi-square | | | 6.086 | | 13.283 |
| P-value | | | 0.048 | | 0.001 |

**Table C11. Percent of CHOH respondents and nonrespondents by strata and likelihood of attending public meetings to talk with park staff about deer impacts if park offers such opportunities.**

| Likelihood of attending a public meeting related to deer impacts | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| Very unlikely, unlikely | Respondents | 95 | 41.7 | 108 | 60.7 |
| | Nonrespondents | 23 | 46.0 | 30 | 60.0 |
| Very likely, likely | Respondents | 120 | 52.6 | 55 | 30.9 |
| | Nonrespondents | 27 | 54.0 | 20 | 40.0 |
| Not sure | Respondents | 13 | 5.7 | 15 | 8.4 |
| | Nonrespondents | 0 | 0.0 | 0 | 0.0 |
| Total | Respondents | 228 | 100.0 | 178 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi square | | | 3.047 | | 5.199 |
| P-value | | | NS | | NS |

[1]Not significant

**Table C12. Gender of CHOH respondents and nonrespondents, by strata.**

| Gender | Respondent classification | Adjacent Communities | | Surrounding Communities | |
|---|---|---|---|---|---|
| | | n | (%) | n | (%) |
| Male | Respondents | 120 | 50.2 | 84 | 45.9 |
| | Nonrespondents | 14 | 28.0 | 27 | 54.0 |
| Female | Respondents | 119 | 49.8 | 99 | 54.1 |
| | Nonrespondents | 36 | 72.0 | 23 | 46.0 |
| Total | Respondents | 239 | 100.0 | 183 | 100.0 |
| | Nonrespondents | 50 | 100.0 | 50 | 100.0 |
| Chi square | | | 8.202 | | 1.032 |
| P-value | | | 0.004 | | NS[1] |

[1]Not significant

**Table C13. Year born and years lived in a community near CHOH by strata for CHOH survey respondents and nonrespondents.**

| | | n | Mean | Median |
|---|---|---|---|---|
| Year born | Respondents | 408 | 1948 | 1949 |
| | Nonrespondents | 95 | 1955 | 1957 |
| Years lived in community near park | Respondents | 422 | 20.73 | 20 |
| | Nonrespondents | 100 | 18.6 | 13 |