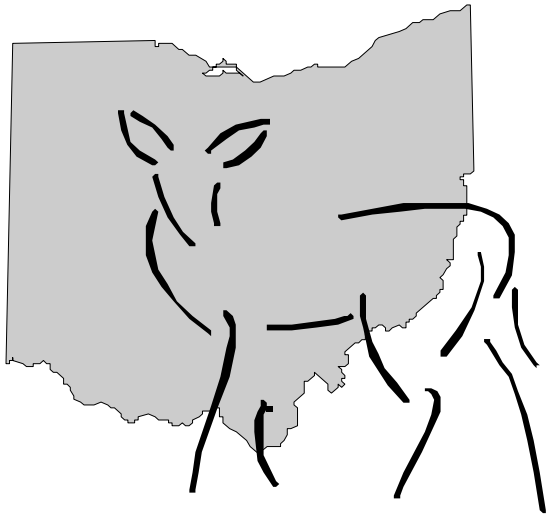
DEER MANAGEMENT IN CUYAHOGA VALLEY NATIONAL PARK: A STUDY OF LOCAL RESIDENTS' ATTITUDES

FINAL REPORT

Submitted to:
Cuyahoga Valley National Park
National Park Service, Midwest Region



by

Erin M. Dougherty

David C. Fulton, USGS-BRD

Department of Fisheries, Wildlife, and Conservation Biology
MINNESOTA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

David W. Lime

Department of Forest Resources
COOPERATIVE PARK STUDIES PROGRAM

University of Minnesota
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Erin M. Dougherty, Graduate Research Assistant

David C. Fulton, Assistant Unit Leader, USGS-BRD

University of Minnesota

MINNESOTA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT
Department of Fisheries, Wildlife, and Conservation Biology
1980 Folwell—220 Hodson Hall
St. Paul, MN 55108
Telephone: 612-625-5256
FAX: 612-625-5299

David W. Lime, Senior Research Associate

University of Minnesota
COOPERATIVE PARK STUDIES PROGRAM
Department of Forest Resources
Cooperative Park Studies Program
1530 Cleveland Ave. North—115 Green Hall
St. Paul, MN 55108

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EXECUTIVE SUMMARY

Deer Management in Cuyahoga Valley National Park: A Study of Local Residents' Attitudes

Overview

Cuyahoga Valley National Park (CVNP) stretches for 22 miles along the Cuyahoga River between Akron and Cleveland, OH. The National Park Service manages CVNP in cooperation with others who own property within its boundaries including Cleveland Metroparks and Summit County's Metro Parks. CVNP preserves 33,000 acres that provide recreation and natural resource education opportunities.

In recent years, the white-tailed deer population in CVNP has grown. Deer populations in some areas of the Park range between 30 and 100 deer per square mile, with the average being about 40 deer per square mile. Currently, the National Park Service is collecting background information to help assess the deer management situation and analyze potential deer management alternatives. This study was conducted as part of a larger effort to assess the deer populations, the natural and social effects of the increased number of deer, as well as the potential biological, social and psychological impacts of the management alternatives, lethal control and no action.

A mail-back survey was sent to 1800 residents living in the nine county area surrounding CVNP. Based on a previous study by Cuyahoga Valley Communities Council, two strata were defined in the study sample. Half of the surveys (900) were sent to people who lived within 5 miles of the CVNP; respondents from this area were placed in the "near strata." The second half of the surveys were sent to people living at least five miles away from the Park but within the nine county area, and these responses were placed in the "far strata." The survey questions were designed to accomplish several objectives:

- Determine the acceptability and perceived consequences of the deer management alternatives, lethal control and no action.
- Identify and determine the intensity of the psychological and emotional effects of the local public served by CVNP to the management alternatives
- Assess the potential effects of deer management activities on local public attitudes toward the Park, its services and staff, and visitation patterns to CVNP.

Of the 1800 surveys mailed, 681 were completed and returned. In the near strata, 369 (42.7%) individuals responded; 312 (38.3%) responded in the far strata. Because the response rates were relatively low for both strata, a non-response check was conducted to determine what, if any, differences existed between respondents and non-respondents. The check revealed minimal differences between these groups, except that respondents indicated they were more informed and concerned about the deer management issue in CVNP than non-respondents. Additionally, those who did complete and return the survey were disproportionately male. Because gender has been shown to be a strong predictor of wildlife attitudes and values, and to account for this bias in response, the research results were weighted for gender to more accurately represent the census data of the local population.

Attitudes toward Deer Management Options in CVNP

Individuals were asked in the survey to indicate the degree to which they feel deer management actions are acceptable or unacceptable to them personally. In both strata, responses illustrate that lethal control was more acceptable to most respondents than no action (see Table E). While 71.4% in the near strata and 61.9% in the far strata found lethal control "slightly," "moderately," or "very acceptable," only 14.8% in the near strata and 20.3% in the far strata found no action acceptable to these degrees. However, it is also important to note that one fifth to one quarter of respondents found lethal control unacceptable. This finding highlights the potential for differing opinions of the public concerning either management strategy. In addition, respondents in the near strata found lethal control significantly more acceptable than respondents in the far strata.

Lethal Control

Analyzing data on individuals' beliefs about and evaluations of potential outcomes of lethal control revealed information regarding the reasons why individuals found lethal control acceptable. The following beliefs about the outcomes of lethal control appear to be most influential on overall acceptability of this management alternative:

Lethal control would…

- lead to a decrease in the occurrence of deer-vehicle collisions.
- reduce the damage to crops and native plant species.
- help maintain a healthy deer herd.

No Action

The survey also inquired about attitudes toward the National Park Service taking no action concerning deer populations. Overall, respondents indicated that no action was generally unacceptable. Though the majority of respondents found no action very unacceptable, nearly one tenth in each strata indicated that this would be a "very acceptable" alternative. No significant differences existed between near and far strata with regards to the acceptability of no action.

Again, evaluations of and beliefs about the outcomes of taking no action show that the following reasons were highly influential in individuals attitude toward the "no action" alternative:

Taking no action would…

- lead to too many car collisions.
- lead to too much damage to crops.
- increase damage to native plant species.

Potential Psychological Consequences of Lethal Control

To assess the varying levels of impact the lethal control action might have on the public, questions were asked about personal psychological impacts. About one in ten respondents in both strata said they would not visit CVNP if a lethal control program were initiated, the most extreme response to the management action (near strata: 9.0%; far strata: 12.2%). Approximately one-fifth to one-quarter of respondents in both strata agreed that a lethal control program would:

- conflict with what the National Park Service is all about (near strata: 26.0%; far strata: 30.5%).
- cause them to be very emotionally upset (near strata: 20.6%; far strata: 23.0%).

- be an inappropriate action for the National Park Service to deal with animal populations when the animals are damaging Park resources (near strata: 17.7%; far strata: 20.6%).

Most respondents, however, indicated that a lethal control program would not have such a detrimental emotional or psychological effect on them. Nearly one half of all respondents (near strata: 54.0%; far strata: 41.8%) strongly disagreed that they would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNP.

Attitudes toward National Park Service Management of Resources

Respondents were asked questions about their confidence in the National Park Service and its management decisions. Results show that most respondents have a high level of confidence in the Park staff's abilities to appropriately manage natural resources in the Park and a high level of trust in the National Park Service to make management decisions that are good for CVNP. Both strata showed high levels of agreement with the following statements:
The National Park Service…

- will be open and honest in the things they do and say when deciding about deer issues in CVNP (near strata: 74.1%; far strata: 66.4%).
- can be trusted to make decisions about deer management that are good for CVNP (near strata: 77.2%; far strata: 68.0%).
- will make decisions about deer management in a way that is fair (near strata: 76.7%; far strata: 66.4%).
- should lethally control animal populations in national parks if the animals are damaging Park resources (near strata: 71.2%; far strata: 68.1%).
- makes decisions that are good for the natural resources in CVNP (near strata: 78.0%; far strata: 75.0%).

These findings indicate a strong likelihood that a large majority local residents will show support for National Park Service decisions regarding deer management and Park staff management actions.

Importance and Understanding of Deer Management Issue

While 79.8% of near strata respondents and 68.6% of far strata respondents indicated that they were "moderately" to "very informed" about deer management issues in CVNP, respondents in the near strata indicated that they were more informed than respondents in the far strata (see Tables D.1. and D.2.). Most respondents, 84.1% in the near strata and 72.1% in the far strata, felt that issues at CVNP were "moderately" to "very important" to them, however, respondents in the near strata indicated the deer management issue is significantly more important to them and that they care more about the issue than respondents in the far strata. Large majorities in both strata, 85.1% in the near strata and 83.1% in the far strata, responded that they care "moderately" to "very" much about the deer management issue in CVNP. These findings indicate that the study is largely representative of the service population of interest to CVNP.

Social Values and Deer Management Alternatives

The issue of deer population management is related to some people's underlying values regarding human use and treatment of animals. When asked about values and deer management alternatives in CVNP, the majority of respondents, indicated that lethal control is, to some

degree, related to their values (see Table I). Respondents in the near strata felt significantly stronger than respondents in the far strata that their opinions regarding lethal control of deer in CVNP are related to the values they care most about. A similar percentage of respondents in both strata indicated that the issue of lethal control is related to their personal values.

Comparison of Near and Far Strata Responses

Those living farther from CVNP would be less likely to support lethal control according to these research findings. However, these findings reveal no significant differences in attitudes of near and far strata respondents toward no action. Results indicate that a strong majority of both near and far residents would accept lethal deer control. In both strata, perceptions of personal impacts and acceptability of lethal deer control are strongly influenced by both people's values toward human use of wildlife and their specific beliefs about the outcomes of lethal deer control in CVNP.

Conclusions

Results indicate that, despite some notable differences between near and far strata respondents, several conclusions can be drawn from the study to help direct management of deer in CVNP:

- Most respondents in both strata support lethal deer control to some degree (near strata: 71.4%; far strata: 61.9%). A larger percentage of respondents in the near strata supported lethal control, but the difference, though statistically significant, is moderately small.

- In both strata, majorities of respondents reported lethal deer control would not have negative psychological or emotional impacts on them (near strata: 54.0%; far strata: 41.8% "strongly disagreed" that they would be very emotionally upset by a lethal control program). However, a notable portion of respondents in both strata did, in fact, feel that lethal control could have a serious negative psychological impact on them, causing them to be very emotionally upset (near strata 20.6%; far strata: 30.5%). This finding illustrates the potential for disagreement regarding deer management decisions at CVNP.

- At least three-quarters of respondents in both strata "agreed" or "strongly agreed" the National Park Service makes good decisions about the management of natural resources in CVNP (near strata: 78.0%; far strata 75.0%). When asked specifically about deer management in the Park, however fewer respondents in each strata "agreed" or "strongly agreed" that the National Park Service does a good job (near strata: 77.2%; far strata: 68.0%). This finding highlights the complex nature of decisions regarding the deer management issue in CVNP; while biological information is necessary to making appropriate decisions, managers must also address values and attitudes that affect people's opinions of deer management alternatives.

- Respondents in both strata feel the issue of deer management is important to them personally and that the issue of lethal deer control is related to their personal values. Near strata respondents felt significantly stronger than far strata respondents that deer management is an important issue to them personally.

INTRODUCTION

Cuyahoga Valley deer population

The white-tailed deer is a native species in Ohio and has inhabited the area since the last Ice Age. Around the turn of last century, unrestricted hunting and rapid land conversion from forest to farm apparently caused the extirpation of deer in Ohio. A successful restocking program was initiated in the 1920's and the deer population rebounded, and as of 1995, was over half a million.

As in other areas of the eastern United States, deer populations in Cuyahoga Valley have reached levels where they are perceived by at least some people to be problematic. The more recent growth in numbers that occurred in the 1980s and '90s was mostly due to habitat alteration from the development of suburban and rural areas, as well as the loss of natural predators (cougar, wolf) and the decline of and protection from human hunting (*Wildlife Society Bulletin*, 1997 v25; McAninch 1995). Additionally, deer are naturally adapted as a prey species, and thus can have high reproduction rates and they can feed on a wide variety of vegetation.

As these populations expand along with the human population, the large deer populations are socially perceived as problematic. The five primary human-deer conflicts that may potentially arise are: the spread of Lyme disease, increased deer-vehicle collisions, browse damage to crops, shrubs, and gardens, the loss of biodiversity, and introduction of exotics into areas of high deer density. The first three items being of direct concern to humans and the last two, more of a concern for the larger ecosystem.

Cuyahoga Valley deer management

The white-tailed deer is a component of the natural ecosystem protected and maintained by the National Park Service. Past studies indicate that deer may have a negative impact on other plant and animal species when their densities rise above 10 deer per square mile. Within the park, the impacts of extensive deer browsing on tree regeneration, herbaceous plant diversity and distribution, and songbird nesting success have been documented (USDI NPS 1996). The National Park Service has a duty to preserve national parks for the use and enjoyment of present and future generations. One aspect of managing park units for future generations involves determining "when it is necessary to destroy animals which, for any reason, may be detrimental to the use of the park" (16 USC section 3). Information about the social and psychological consequences of deer management options is needed in order to properly manage the area under the mission of the National Park Service (39 Stat. 535, 16 USC 1, et seq.) and the requirements of the National Environmental Policy Act (42 USC s 4321 et seq.). As one part of this broad-based assessment, quantitative social information was collected regarding these consequences as well as an evaluation of the aesthetic and recreational values of the park, emotional effects of management alternatives, and attitudes of the public toward the park and park staff.

To understanding the problem of deer overabundance in CVNP, the park service has been involved in several studies to monitor and assess the impact of the populations. In 1993, the Cuyahoga Valley Communities Council established the Deer Management Task Force (DMTF), composed of citizens and resource managers. This task force identified the problems caused by deer in CVNP and adjacent lands, and recommended potential solutions (DMTF 1996). The

Task Force ultimately concluded that the deer density exceeded desired and healthy levels. The DMTF recommended deer population control, set objectives for deer population densities between 20 to 40 deer per square mile. They also suggested that local park units may wish to pursue a lower population objective of 10 to 20 deer per square mile in order to meet their goal of preserving and protecting natural resources and processes. The DMTF recommended four methods of deer population control (DMTF 1996):

- Public sport hunting in areas where legal, practical, feasible, and safe.
- Specially controlled hunting on isolated land areas of greater than five acres.
- Sharpshooting in areas which are not suitable for public sport hunting or specially controlled hunting.
- Capture/ euthanasia in developed areas where the other methods are not practical or safe.

History of Deer Management

The rebound and rapid growth of North American white-tailed deer (*Odocoileus virginianus*) populations during the 20th Century has become one of the most significant successes of modern wildlife management. Due to the dramatically increased number of deer and people, however, white-tailed deer management in the Eastern half of the United States has presented an increasingly challenging task. This management challenge has been precipitated by two broad factors: (1) management approaches focused on the use of public hunting to control deer populations are not feasible or effective in many urban/suburban areas or rural/natural areas with special management concerns and restrictions such as National Parks, and (2) the various stakeholders interested in deer management have diverse values, attitudes and beliefs concerning deer and deer management that may conflict with management options preferred by professional wildlife managers (Decker and Richmond 1995).

The dilemma of effectively managing deer in an age of perceived "overabundance" has led most managers to conclude that human values and attitudes must be considered if deer management programs are to be successful (Decker et al. 1992, Minnis and Peyton 1995). For this reason a number of studies focused on the human dimensions of deer management were conducted over the past 20 years, and many focused on assessing public perceptions, values, and attitudes related to these issues.

History and Concepts of Human Dimensions Research on Deer Management

Studies focused on human tolerance of deer and deer damage were conducted as early as 1957 (Craven, Decker, Siemer, and Hygnstrom 1992), but most early human dimensions of wildlife (HDW) studies of deer management focused on enhancing deer hunting opportunities and experiences (see for example Hendee and Potter 1971). By the late 1970's, there were apparent conflicts growing between hunters who were demanding increased numbers of deer and farmers who were experiencing increasing damage to crops caused by deer. Given this growing conflict, more studies on public perceptions of deer and deer damage were conducted and information about farmers' tolerance of deer and deer damage were incorporated in decisions concerning deer management in the state of New York (Brown, Dawson and Decker 1977, Brown and Decker 1979, Brown, Decker, and Dawson 1978).

During the early 1980's, as increasing deer and human populations led to increased concerns about deer-car collisions, the threat of Lyme disease, and deer damage to gardens and ornamental

plants, other states with white-tailed deer populations began to assess public perceptions of deer and deer damage (e.g., Stoll and Mountz 1983). These studies focused on general public and stakeholder groups' attitudes toward deer population densities and potential problems associated with deer as well as the human values leading to such attitudes.

Attitudes within these studies are generally defined as the positive or negative evaluations of deer, deer populations, potential problems caused by deer, or potential deer management actions. The social psychological values related to deer represent another important concept associated with many of the studies (Kellert 1980, Brown and Manfredo 1987, Purdy and Decker 1989). *Wildlife values* are conceptualized as broad, basic beliefs about appropriate relationships between humans and wildlife such as human use of wildlife, active management of wildlife populations, concerns about the rights or welfare of wildlife, and the value of wildlife in human experience (Fulton, Manfredo, and Lipscomb 1996). While attitudes provide a specific assessment of whether specific deer population, damage levels, or management actions are acceptable, values provide an understanding of why an individual or group of people holds a particular attitude toward deer or management actions. Studies seeking to understand human attitudes and values associated with deer and deer damage led to the development of the concept of Wildlife Acceptance Capacity (WAC).

Wildlife Acceptance Capacity

Wildlife acceptance capacity is defined as the "maximum wildlife population level in an area that is acceptable to people" (Decker and Purdy 1988: 53). The concept of WAC was derived from the concept of recreational carrying capacity developed by natural resource recreation researchers as a tool for understanding and managing the effects of user density on visitor satisfaction in recreation areas (Stankey 1973; Shelby and Heberlein 1984). Determining acceptance capacity involves measuring both perceptions of the deer population density or level of deer damage and evaluations of whether or not such levels are socially acceptable or appropriate.

Application of the WAC concept focuses on defining the maximum level of deer or various deer conflicts that are acceptable in an area among a particular segment of the public or within a stakeholder group. This means that different, and potentially conflicting, acceptance capacity levels may be defined for different stakeholder groups. During the 1990's, the WAC concept evolved in three significant ways. First, as described by Minnis and Peyton (1995), research increasingly focused on how to integrate diverse stakeholder acceptance capacities into a single, collective social, or cultural, carrying capacity. Second, there was growing recognition for the need to define both minimum population acceptance levels as well as maximum population acceptance levels in a geographic area. Third, there was a shift in research focus to identify not only the deer population size, or level of deer-associated damage, that is acceptable but also the acceptability of various management actions among the general public and interested stakeholders (Zinn, Manfredo, Vaske and Wittman 1998; Wittman, Vaske, Manfredo, and Zinn 1998; Loker, Decker, and Schwager 1999).

Guide for Human Dimensions Information Collection Addressing Deer Management

In their review of the human dimensions challenges facing deer managers, Decker and Richmond (1995), identify five key topics of HDW research that are particular beneficial for addressing the overabundant white-tailed deer management issue. These topics include (1995:9):

1. identifying the values that are involved in the specific issues and how they are affecting the context of management;

2. determining the relationship between attitudes/beliefs and experiences on people's WAC for white-tailed deer;

3. determining the acceptability of different management techniques changing deer populations;

4. evaluate alternative mechanisms for engaging the public in decision-making about deer management;

5. developing mechanisms to monitor human-deer interactions and conflicts to anticipate changes in management activities directed at deer populations.

Decker and Richmond's (1995) guide is used as a framework for reviewing and integrating the broad information from the HDW literature focused on white-tailed deer management.

Summary of Findings and Trends

Early Findings from Farmers and Rural Landowners

Initially, Human Dimensions of Wildlife studies of deer populations and deer damage focused on the attitudes and preferences of agriculturalists and other rural landowners (McDowell and Benson 1960; Flyger and Thoerig 1962; Queal 1968; Brown, Dawson, and Decker 1977; Brown, Decker, and Dawson 1978; Brown and Decker 1979; Brown, Decker and Huston 1979; Brown, Decker and Hutson 1980; Phillips 1980; Decker, O'Pezio, and Hutson 1981; Decker and Brown 1982; Stoll and Mountz 1983; Kube 1983; Decker, Mattfield, and Brown 1984; Decker, Sanyal, Brown, Smolka, and Connelly 1984; Porath, Sheriff, and Witter 1984; Tanner and Dimmick 1984; Scott and Townsend 1985; Pomerantz, Ng, and Decker 1986).

In summary, these studies indicate that farmers' acceptance, or tolerance, of deer is strongly influenced by concerns about actual or potential damage to crops. Also, rural landowners who receive a moderate or high proportion of their incomes from some form of agriculture that is susceptible to deer damage (i.e., row-cropping, orchards, ornamental horticulture, timber) tend to be less tolerant of deer and deer damage than landowners not primarily engaged in agriculture (Craven et al. 1992; Siemer and Decker 1991). Most rural landowners', including farmers, are willing to tolerate some amount of deer damage because they appreciate deer for aesthetic and recreational purposes (Craven et al. 1992). However, at least among rural landowners in Ohio, more non-farmers than farmers reported that deer are aesthetically pleasing (Stoll and Mountz 1983). Even among those farmers who hold aesthetic, appreciative, and educational values toward deer, the damage caused by deer to crops and the resulting economic costs may outweigh any non-economic benefits obtained from the presence of deer (Decker and Brown 1982; Purdy and Decker 1985).

At least two studies indicate that deer damage increased and tolerance of deer damage among rural landowners decreased from 1960 to the middle 1980's. Conover and Decker (1991) indicate that between 1957 and 1987 the perception among landowners and agencies responsible

for responding to wildlife damage was that damage from deer had greatly increased and there was generally less tolerance for deer damage. Decker, Mattfield, and Brown (1984) report that although the percentage of New York farmers reporting damage caused by deer remained stable between 1978 and 1982, the percentage of farmers who reported being "worried" about deer damage increased. These findings indicate a diminished tolerance for increasing deer and deer damage among New York farmers (Purdy 1987) and suggest that as awareness about the potential of deer damage increased among New York farmers, their tolerance for deer and deer damage decreased (Craven et al. 1992).

Studies of Diverse Stakeholders and the General Public

Throughout the 1980's, wildlife managers' concerns about overabundant white-tailed deer populations led to an increasing number of studies focused on public attitudes and acceptance of deer and deer damage (Siemer and Decker 1991). The growing interest in such HDW research is evidenced by professional conference sessions and journal issues devoted to the topic (McAninch 1995; Warren 1997). In contrast to the earlier work on farmers' and rural landowners' attitudes and values, much of the attitude and value research on deer overabundance and management conducted since the early 1980's has focused on general public and stakeholders' values related to deer and their tolerance of deer populations and damage.

As suggested by Decker and Richmond (1995), studies in the 1980's and 1990's (Decker and Gavin 1987; Decker and Purdy 1988; Purdy and Decker 1989; Siemer and Decker 1991; Stout, Stedman, Decker and Knuth 1993; Loker, Decker, and Schwager 1999), focused on 4 key aspects of the human dimensions of deer management: 1) level of public acceptance, or tolerance, for deer population densities and for damage and risks associated with deer, 2) understanding the relationship between level of experience with deer and deer damage and tolerance of deer and deer damage, 3) the level of acceptance of different management strategies for addressing deer-people conflicts, and 4) understanding the diverse values held by different segments of the public that frame how they view the deer management issue.

<u>Acceptance of Deer and Deer Damage and Experience with Deer</u>

Numerous studies have been conducted examining human acceptance or tolerance of deer populations and deer damage. Of course, public acceptance of deer and deer damage varies from location to location, however, some general trends are discernible from the numerous studies.

- **As negative experiences with deer increase, or concerns about negative experiences increase, tolerance for deer decreases.** Concerns about deer damage to gardens and ornamental plants and concerns about risks to human health and safety posed by Lyme disease and deer-vehicle collisions are related to a lower acceptance capacity for deer population densities (Decker and Gavin 1985; Kuser and Applegate 1985; Connelly et al. 1987; Decker and Gavin 1987; Stout et al. 1993) and to decreased enjoyment of deer (Green, Askins, and West 1997). Kuser, Applegate, and Wolgast (1993) report that tolerance for deer among Princeton, New Jersey residents decreased from 1984 to 1991 as levels of experience and awareness about deer damage increased. Also, concern about Lyme disease heightened concerns about deer (Kuser 1995). A series of studies conducted by Robert Stoll and colleagues (Stoll and Mountz 1983; Stoll and Mountz 1986; Stoll, Culbertson, and Miller 1991) in Ohio indicate that tolerance and appreciation of deer diminishes as level of experience with deer damage increases.

- **As the severity of deer damage increases, tolerance for deer decreases.** Decker (1991) contends that acceptance of deer populations is influenced by people's tolerance for different types of wildlife problems and the level of tolerance for a problem depends on the nature of the problem. In general, acceptance of deer damage and acceptance of potential risks associated with deer decrease as the severity of the consequences for human increases. Decker and colleagues (1991; Loker et al. 1999:153) proposed a simple hierarchy of problem acceptance where: "(1) tolerance of personal or community nuisance is greater than (2) tolerance of negative personal or community economic or aesthetic impacts, which is greater than (3) tolerance of threats to personal or community health or safety." Thus, people tend to be more tolerant of damage to shrubs and gardens and much less tolerant of risks to human health and safety posed by deer-vehicle collisions and Lyme disease (Siemer and Decker 1991; Stout et al. 1993; Kuser, Applegate, and Wolgast 1993; Kuser 1995). Although vehicle damage and injuries due to deer-vehicle collisions are more common, Lyme disease is increasingly the most significant concern about overabundant deer among many residents in the Eastern U.S. (Kuser 1995; Stout et al. 1993; Connelly et al. 1997; Kilpatrick, Eccleston and Ellingwood 1996; Kilpatrick and Walter 1997).

Acceptance of Deer Management Strategies

In different locations throughout the country a wide variety of management techniques have been attempted to address growing deer populations (McAninch 1995; Warren 1997).

- **Most studies have indicated that the public in urban and suburban areas are more likely to be supportive of nonlethal management actions as opposed to the lethal control of deer populations and other wildlife populations (Curtis et al. 1993; Stout, Knuth and Curtis 1997; Zinn et al. 1998; Wittman et al. 1999).** But it has been suggested that as the level of negative experience with deer or concerns about deer problems increases in number or severity, support for invasive or lethal control of deer may increase (Decker 1994; Loker 1996). Loker (1996) reported that public stakeholders may be willing to support lethal control methods for deer if they are confronted by deer-related problems and if wildlife management agencies have clearly demonstrated that lethal methods are the feasible option for controlling damage caused by deer. Further, Loker, Decker and Schwager (1999) found that support for more invasive management action (such as lethal control) increases as public concern about deer populations increases regardless of the severity of the concerns. That is, heightened concern about economic-nuisance and aesthetic issues leads to increased support for lethal control as well as heightened concerned about health and safety. It is important to note, however, that past surveys (Messmer, Cornicelli, Decker, and Hewitt 1997) and experience with citizen stakeholder forums indicate that some stakeholder groups (e.g., animal-rights organizations) are unlikely to support lethal control actions regardless of the severity of the deer-related problems (Decker and Richmond 1995; Baker and Fritsch 1997; Curtis and Hauber 1997).

Diverse Values Related to Deer Management

The role of values in influencing public perceptions of wildlife policy issues, including deer management, has been a focus of considerable research attention (Kellert 1978; Decker and Goff 1987; Shaw and Zube 1980). Values concerning appropriate human uses and actions toward

wildlife can play a key role in shaping attitudes toward wildlife and attitudes toward different wildlife management actions and activities (Kellert 1996; Purdy and Decker 1989; Fulton, Manfredo and Lipscomb 1996; Bright, Manfredo and Fulton 2000). Individuals with value orientations more directed at protecting wildlife tend to have lower acceptance of actions that involve lethal control of wildlife (Zinn et al. 1998; Wittman et al. 1998; Kellert 1996; Purdy and Decker 1989; Decker and Purdy 1988; Pomerantz, Stumvoll, and Decker 1987). This finding is important for two key reasons. First, values and more basic beliefs and attitudes tend to be enduring and resistant to change (Fulton et al. 1996; Rokeach 1973). So, attitudes toward wildlife and wildlife management activities that are influenced by values will be resistant to public communication campaigns and other attempts to change attitudes toward and acceptance of management actions. Second, although there is not definitive data, there appears to be a trend toward increasing protection-oriented wildlife values among the general public (Kellert 1996). This trend suggests activities such as the lethal control of deer will become increasingly controversial.

Incorporating Human Dimensions Information into Decision-Making

Vaske, Fulton, and Manfredo (In press; see also Fulton, Whittaker, and Manfredo, In press; Vaske, Decker and Manfredo 1995; Fulton 2000) outline a planning process that identifies key steps in integrating human dimensions information into wildlife decision-making and management. This planning process emphasizes traditional rational decision processes as outlined by Crowe (1983). However, it also recognizes the importance of involving stakeholders in a meaningful way in decision-making (Decker and Chase 1997, Decker, Krueger, Baer, Knuth, and Richmond 1996, Stout, Decker, Knuth, Proud, and Nelson 1996). In brief, the critical aspects of incorporating human dimensions information into decision-making involves bringing social science technical information such as public attitudes and WAC into the 5 key steps of planning:

1. defining goals
2. identifying objectives
3. identifying problems and opportunities
4. developing and selecting action alternatives; and
5. evaluating responses to management actions

In fact much of the more recent HDW research has focused not on public attitudes toward deer and deer management techniques, but on public acceptance and preferences for decision-processes addressing the issue of deer management (Chase, Siemer, and Decker 1999; Stout, Knuth, and Curtis 1997).

PURPOSE OF CURRENT STUDY

This study assesses the positive and negative attitudes toward and social consequences of various potential deer management alternatives in CVNP. This information will be used to help the staff at CVNP develop a deer management strategy that considers public desires and concerns relating to management of the CVNP. The specific study objectives include:

- Determine the acceptability and preferences among the local public for: deer management activities, and the perceived positive and negative consequences of deer management activities;

- Identify and determine the intensity of the psychological and emotional impacts among the local public served by CVNP due to various deer management options;

- Determine the effect of deer management activities on local public attitudes toward the Park, its services, and Park staff;

- Determine the degree to which deer management activities may affect Park visitation patterns among the local public;

The social information presented here will further contribute to the foundation of knowledge on the management of overabundant wildlife on public lands. Many other units within the National Park Service face management issues regarding the social and ecological impacts of overabundant wildlife species. This information clarifies the impacts that overabundant wildlife and management actions to resolve overabundant wildlife issues have on the public evaluation of resources and management within a National Park Service unit.

STUDY METHODS

Data reported for this study were collected using mail back surveys (see Appendix A for the complete instrument). The design of the survey instruments and methods for conducting this research closely follow Dillman's Total Design Method (TDM) (Dillman 1978). This methodology involved designing a survey that is relatively easy to complete along with written contact information that encourages response by highlighting the importance of study participation and the social utility of the study. An initial questionnaire and cover letter were sent to all individuals in the study sample. After 1 week, a postcard reminder was mailed encouraging respondents to return a completed survey. Three weeks after the initial mailing, a replacement questionnaire and cover letter were sent to individuals who had not completed a questionnaire. After seven weeks, a final mailing consisting of a reminder letter and replacement questionnaire were sent to individuals who had not yet returned a questionnaire. This methodology has been shown to increase response rates, improve accuracy and reduce costs and burden hours. Distribution of the survey occurred from December 1999 through February 2000.

The population of interest in this study included all adults (18 years of age or older) living in a 9 county region in northeastern Ohio that is the primary service area of Cuyahoga Valley NP. These counties include: Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, Stark, Summit, and Wayne counties. For study purposes, this population was segmented into two strata: 1) those living near the CVNP, and 2) those living a greater distance from CVNP (see Table 1). This stratification was defined using zipcodes of the respondents' mailing addresses and was based on areas defined in a previous study by Cuyahoga Valley Community Council DMTF (see table for stratum and zipcodes). The DMTF (1996) defines a specific "area of concern," which corresponds to the "near strata" of this sample. The "far strata," though outside the area of concern, includes a large portion of the population served by CVNP within the greater 9 county area.

Table 1. Counties and zip codes of sample

Far Strata, Counties of NE Ohio (n = 900)	Near Strata, Zip codes (n = 900)
Cuyahoga	44056
Geauga	44067
Lake	44125
Lorain	44131
Medina	44137
Portage	44141
Stark	44146
Summit	44147
Wayne	44223
	44224
	44236
	44264
	44286
	44313
	44333

The sample was obtained through a commercial vendor, Survey Sampling, Inc., using listed telephone numbers in the areas of interest as a sampling frame. The initial study sample consisted of 1800 residents (near stratum n = 900; distal stratum n = 900). Residents in the near

strata can be described as non-urban; residents in the distal strata were largely from Cleveland (24.7%) and Akron (7.8%), and thus can be generally described as urban.

Respondents were disproportionately male, therefore the data are weighted to account for gender bias. Additionally, given the response rates of 42.7% for the near and 38.3% for the far strata, a non-response check was done. All the non-respondents were attempted to be reached by telephone, and a total of 203 non-respondents were contacted.

SELECTED STUDY RESULTS

A. Characteristics of Respondents and Non-respondents

The respondents in both strata were disproportionately male (Far strata 73.4%; Near strata, 72.1%, Table A.1.). This bias was primarily due to the fact that the sample was using listed telephone numbers. This information yielded a disproportionately male sample, and this bias was reflected in the respondent population. Because wildlife-oriented values have been shown to be correlated with gender, the responses were weighted according to gender to account for this difference. Scores for female respondents were weighted by 1.82; scores for male respondents were weighted by 0.69. The non-response check yielded a gender bias favoring females, and non-response scores were also weighted. Female non-respondent scores were weighted by 0.82; male non-respondent scores were weighted by 1.29. Using these weights, the results are more likely to accurately reflect the opinions of the study population by reflecting a 50/50 gender distribution. The results reported here focus on the weighted responses. Selected unweighted results are displayed in Appendix C, but managers should focus on the weighted results as a more appropriate reflection of population attitudes toward management alternatives.

The mean age of respondents in the near strata was approximately 55 years. Respondents in the far strata were, on average, slightly younger, with a mean age of 52 years (Table A.2.). The mean age for non-respondents was slightly younger than respondents, with a far strata average of 50.9 years and a near strata average of 49.1 years. The mean age of respondents versus non-respondents in the near strata was significant (F = 3.159, sig. at .05), but no significant difference existed between the mean ages of far strata respondents and non-respondents.

Over half of respondents in both strata indicated that they had lived in the area for more than 30 years (Table A.3.). No significant differences existed between near and far strata respondents with regards to how long they had lived in the CVNP area.

Table A.1. Gender of respondents and non-respondents

	Respondents				Non-respondents			
	Near Strata		Far Strata		Near Strata		Far Strata	
Gender	n	%	n	%	n	%	n	%
Female	98	27.9	82	26.6	60	59.4	64	62.7
Male	253	72.1	226	73.4	41	40.6	38	37.3
Total	351	100.0	308	100.0	101	100.0	102	100.0

Table A.2. Age of respondents and non-respondents, percentages

Years	Near strata		Far strata	
	Respondents	Non-respondents	Respondents	Non-respondents
21-30	2.6	11.3	6.0	14.4
31-40	14.6	12.4	16.5	23.7
41-50	25.0	26.8	24.5	18.6
51-60	26.2	23.7	20.9	15.5
61-70	13.5	9.3	17.9	11.3
71-80	13.5	11.3	11.2	11.3
Greater than 80	4.6	5.2	3.0	5.2
Total	100.0	100.0	100.0	100.0
F value*	6.191[a]		3.159	

*F values compare mean ages for respondents vs. non-respondents in each strata.
[a] F value significant at .05

Table A.3. Number of years living in CVNP area

Number of years	Percent respondents	
	Near strata, weighted	Far strata, weighted
0-10	15.5	18.1
11-20	14.8	6.8
21-30	17.8	14.2
31-40	19.3	18.9
41-50	16.0	20.1
50+	16.5	21.8
Total	99.9*	99.9*
F value**	3.707	

*Percentage totals do not equal 100.0% due to rounding error.
** F value compares mean number of years for near strata vs. far strata respondents.

B. Comparison of respondents and non-respondents: Non-response check

A total of 681 surveys, 369 for the near stratum and 312 for the distal stratum, were returned providing response rates of 42.7% for the near and 38.3% for the far strata. Due to the relatively low response rates, we attempted to contact all non-respondents over the phone to determine if there were any significant differences between study respondents and non-respondents on key variables (see Tables B.). A total of 203 non-respondents were contacted: 101 in the near strata and 102 in the far strata.

The near strata respondents indicated that they visited CVNP more frequently than those in the far strata (chi square = 27.199, sig. at .001), with over three-fourths of respondents in the near strata visiting at least 3 times per year (80.3%). While one-sixth (14.5%) of respondents in the far strata said that they had never visited CVNP, only three percent of those in the near strata had never visited the Park. Forty percent of the non-respondents in the far strata had never visited CVNP (Table B.). More respondents in the near strata than in the far strata had a college or professional degree; fewer non-respondents had college or professional degrees than respondents (chi square = 19.251, sig. at .001; Table B).

Difference in the mean acceptability scores of "no action" between respondents and non-respondents in the near strata was significant (chi square = 30.990, sig. at .001). However, the difference between respondents and non-respondents on acceptability of lethal control was not significant in either strata. Non-respondents in both strata were also significantly less informed about CVNP and the deer management issue (near strata: chi square =16.621, sig. at .01; far strata: chi square = 30.460, sig. at .001) and less aware that CVNP existed (near strata: chi square = 12.526, sig. at .01; far strata: chi square = 48.225, sig. at .001). Given the lack of a significant difference between respondents and non-respondents with regards to acceptability of lethal control, the information collected through the completed mail-back survey reflects the general population served by CVNP.

Table B. Respondents versus non-respondents

Questions and Responses	Near Strata, %		Far Strata, %	
	Respondents	Non-respondents	Respondents	Non-respondents
Were you aware that CVNP existed?				
Yes	97.3	92.2	92.3	66.7
No	0.9	6.9	5.2	31.4
Not sure	1.8	1.0	2.4	2.0
Chi square*	12.526[b]		48.225[c]	
How well informed are you about deer management issues at CVNP?				
Not at all	4.6	9.8	13.2	32.7
Slightly	16.0	26.5	18.1	27.7
Moderately	46.9	43.1	48.7	30.7
Very	32.6	19.6	20.1	8.9
Chi square*	16.621[b]		30.460[c]	
How much do you personally care about the deer management issue at CVNP?				
Not at all	2.0	2.9	2.3	7.9
Slightly	12.9	22.3	14.3	22.8
Moderately	29.3	34.0	41.5	40.6
Very	54.9	37.9	41.2	22.8
Chi square*	12.545[a]		27.277[c]	

Questions and Responses	Near Strata, %		Far Strata, %	
	Respondents	Non-respondents	Respondents	Non-respondents
How acceptable would you say it is for the National Park Service to take no action concerning the management of deer populations in CVNP?				
Very unacceptable	52.4	27.7	41.4	28.7
Moderately unacceptable	15.5	24.8	20.3	17.8
Slightly unacceptable	5.5	14.9	7.6	6.9
Not sure	9.6	16.8	8.4	16.8
Slightly acceptable	3.7	0.0	3.2	8.9
Moderately acceptable	2.6	5.9	6.4	10.9
Very acceptable	8.9	8.9	10.0	6.9
Chi square*	30.990[c]		15.670[a]	
How acceptable would you say it is for the National Park Service to take lethal control concerning the management of deer populations in CVNP?				
Very unacceptable	15.2	25.3	18.8	16.8
Moderately unacceptable	3.8	4.0	8.2	3.0
Slightly unacceptable	1.8	3.0	1.7	5.0
Not sure	7.9	9.1	8.6	16.8
Slightly acceptable	7.0	8.1	8.6	7.9
Moderately acceptable	18.1	23.2	18.8	20.8
Very acceptable	45.3	26.3	32.9	27.7
Chi square*	13.165		12.234	
What is the highest level of education you have completed?				
Elementary	1.1	4.9	3.3	5.9
High school	17.8	32.4	22.0	39.6
Technical school or some college	24.9	25.5	31.5	28.7
Completed college	33.8	20.6	23.9	18.8
Graduate or professional school	22.3	16.7	19.3	6.9
Chi square*	19.251[c]		18.578[c]	
Over the past 5 years, how frequently have you visited CVNP?				
Never	3.4	9.8	14.5	40.0
1-2 times in 5 years	6.9	4.9	13.9	31.0
1-2 times per year	9.2	17.6	15.8	8.0
3-6 times per year	16.0	19.6	22.4	9.0
7-15 times per year	40.4	17.6	19.8	8.0
Almost weekly	18.3	22.5	7.6	2.0
Almost daily	4.9	7.8	1.0	1.0
Chi square*	27.199[c]		58.996[c]	

*Chi square compares respondents and non-respondents in each strata.

[a] Chi square significant at .05

[b] Chi square significant at .01

[c] Chi square significant at .001

C. Awareness of CVNP

Results in the remainder of this report are from respondents who completed the mail-back survey. Statistics and information on results will now focus on the overall attitudes and beliefs of respondents as well as the differences between the near and far strata.

The great majority of respondents were aware, before receiving the questionnaire, that CVNP existed (Table C). Significantly more respondents in the near strata (97.2%) than in the far strata (92.2%) were aware of CVNP (chi square = 10.551, sig. at .01). A very small number of respondents in the near strata (1.0%) did not know about CVNP. This percentage was slightly higher in those respondents were lived in the far strata (5.3%). In both strata, a small portion of the respondents were not sure whether or not they knew about CVNP before the questionnaire arrived in the mail (near strata: 1.9%; far strata: 2.5%).

Table C. Percentage of respondents who were aware that CVNP existed.

Before you received this questionnaire, were you aware that CVNP existed?	Near Strata	Far Strata
Yes	97.2	92.2
No	1.0	5.3
Not sure	1.9	2.5
Total	100.1*	100.0
Chi square**	10.551[a]	

*Percentage totals do not equal 100.0% due to rounding.

**Chi square compares near and far strata.

[a] Chi square significant at .01

D. Importance and understanding of issues at CVNP

The quality of information collected concerning opinions about deer management in CVNP is influenced by the degree to which individuals are familiar with the Park. The following questions assessed respondents' familiarity with and use of the Park. The results (Tables D.1.-D.2.) indicate that respondents in the near strata were significantly more familiar with management issues at CVNP than respondents in the far strata (chi square = 25.234, sig. at .001). Nearly one-third (31.4%) of respondents in the far strata indicated that they were slightly or not at all informed about deer management issues at the CVNP, and over half (57.0%) replied that they were slightly or not at all informed on management issues in general at CVNP. In the near strata, these numbers were lower, with one-fifth (20.2%) of respondents indicating that they were slightly or not at all informed on deer management issues, and less than one-half (43.6%) replying that they were slightly or not at all informed about issues in general.

This same trend applied to the subsequent questions, indicating that respondents in the near strata may have a greater understanding and awareness of management issues at CVNP. It is interesting to note that majorities in both strata indicated they felt issues at CVNP were "moderately" or "very important" to them personally (near strata: 79.1%; far strata: 72.2%).

Table D.1. Importance and understanding of issues at CVNP: Near strata, weighted

Questions	n	Chi square*	Percent of Respondents by Response Category			
			Not at all	Slightly	Moder-ately	Very
How well informed are you about deer management issues at CVNP?	348	25.234[b]	4.2	16.0	47.2	32.6
How important is the deer management issue at CVNP to you personally?	345	20.572[b]	3.2	12.8	32.2	51.9
How much do you personally care about the deer management issue at CVNP?	343	14.461[a]	1.9	13.0	29.3	55.8
How well informed are you about management issues at CVNP in general?	347	21.338[b]	12.2	31.4	40.9	15.6
How much do you personally care about what goes on at CVNP?	349	12.019[a]	0.4	12.6	37.0	50.0
How important, in general, are management issues at CVNP to you?	339	16.464[b]	2.3	22.7	40.6	34.5
How important is the deer management issue compared to other issues at CVNP?	339	12.704[a]	2.5	10.0	34.9	52.6

*Chi square compares near and far strata
[a] Chi square significant at .01
[b] Chi square significant at .001

Table D.2. Importance and understanding of issues at CVNP: Far strata, weighted

Questions	n	Chi square*	Percent of Respondents by Response Category			
			Not at all	Slightly	Moder -ately	Very
How well informed are you about deer management issues at CVNP?	303	25.234[b]	13.2	18.2	48.4	20.2
How important is the deer management issue at CVNP to you personally?	294	20.572[b]	4.4	23.5	36.1	36.0
How much do you personally care about the deer management issue at CVNP?	298	14.461[a]	2.5	14.4	41.8	41.3
How well informed are you about management issues at CVNP in general?	296	21.338[b]	22.3	34.7	35.9	7.1
How much do you personally care about what goes on at CVNP?	295	12.019[a]	2.3	16.3	41.9	39.5
How important, in general, are management issues at CVNP to you?	294	16.464[b]	8.4	21.4	44.8	25.4
How important is the deer management issue compared to other issues at CVNP?	278	12.704[a]	3.0	16.5	41.4	39.1

*Chi square compares near and far strata

[a] Chi square significant at .01

[b] Chi square significant at .001

E. Acceptability of lethal control and no action as management alternatives

To adequately assess social and emotional impacts of potential deer management actions on local residents, it is useful to analyze the degree to which they feel management actions are acceptable or unacceptable to them personally. The following question provided that key piece of information. The acceptable/unacceptable measurement tapped an evaluative dimension toward the action. This evaluation or expression of favor/disfavor toward an action or object is agreed by most social psychological researchers to represent the latent construct technically known as an attitude (Eagly and Chaiken 1993).

In both strata, responses illustrate that lethal control was more acceptable than "no action." Although the majority of respondents in both strata indicated that they found "no action" generally unacceptable and lethal control acceptable, it is interesting to note that nearly one-third (29.4%) of far strata respondents and one-fifth (20.7%) of near strata respondents found lethal control "slightly," "moderately," or "very" unacceptable. Further, respondents in the near strata found lethal control significantly more acceptable than those in the far strata (chi square = 13.260, sig. at .05), however no significant difference existed between near and far strata respondents with regards to acceptability of "no action."

Table E: Acceptability of lethal control and no action as management alternatives

Questions and respondent categories	Chi square**	Percent of Respondents by Response Category*						
		1	2	3	4	5	6	7
In your opinion, how acceptable would you say it is for the National Park Service to take no action concerning the management of deer populations in CVNP?								
Near strata, weighted	10.514	53.8	15.8	5.8	9.8	3.2	2.6	9.0
Far strata, weighted		42.8	20.7	7.6	8.7	3.5	6.5	10.3
In your opinion, how acceptable would you say it is for the National Park Service to take lethal control actions concerning the management of deer populations in CVNP?								
Near strata, weighted	13.260[a]	15.3	4.0	1.4	8.0	7.0	18.7	45.7
Far strata, weighted		19.4	8.4	1.6	8.7	8.9	19.1	33.9

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Not sure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

**Chi square compares near and far strata.

[a] Chi square significant at .05

F. Perceptions of potential outcomes of management alternatives

Measuring the perceived potential outcomes of management alternatives helps to explain why respondents support or oppose those alternatives. These measures of perceived outcomes do not necessarily reflect the biological or ecological likelihood of these outcomes, but rather, depict respondents' understanding of the potential outcomes of management strategies.

In both strata, large majorities (over 70%) agreed that "no action" would lead to too many car collisions, too much damage to crops, shrubs, and gardens, increased risk of disease, increased damage to native plant species, and decreased diversity of plants and animals in CVNP. More respondents in the near strata believed that "no action" would lead to increased damage to crops, shrubs, and gardens (chi square = 14.912, sig. at .05). The remaining items revealed a wider ranging perceptions of potential outcomes of "no action," with response distributions displaying no clearly defined modal response.

The beliefs about the potential outcomes of lethal control also displayed several wide-ranging response distributions. Beliefs about whether or not lethal control would cause unnecessary pain and suffering to deer, conflict with the purpose of a National Park, decrease opportunities to see deer in the Park, and upset local residents and visitors were distributed fairly evenly in both strata, from "strongly disagree" to "strongly agree." Nearly one-fifth of respondents in both strata were "unsure" whether or not lethal control would conflict with the purpose of a National Park (near strata: 19.1%; far strata: 17.7%) or upset local residents and visitors (near strata: 20.5%; far strata: 20.5%). Significantly more respondents in the near strata than the far strata believed that lethal control would reduce the risk of deer-vehicle collisions (chi square = 28.279, sig. at .001), damage to crops, shrubs, and gardens (chi square = 29.037, sig. at .001), the risk of diseases (chi square = 16.146, sig. at .05), and damage done by dear to native plant species in CVNP (chi square = 26.040, sig. at .001).

Table F.1. Perceptions of potential outcomes of management alternatives, Near strata weighted

	n	Chi square**	Percent of Respondents by Response Category*						
			1	2	3	4	5	6	7
In the long run, taking no action regarding the deer population of CVPA would…									
Lead to too many car collisions	341	8.846	3.4	4.2	5.9	3.4	11.0	19.7	52.5
Lead to too much damage from deer to shrubs, crops, and gardens	341	14.912[a]	4.6	4.2	4.1	3.9	9.1	18.7	55.4
Increase the risk of diseases associated with deer such as Lyme disease	338	7.677	4.5	2.6	4.7	9.8	11.2	25.9	41.5
Increase damage done by deer to native plant species in CVNP	339	11.659	3.2	1.9	4.0	7.2	12.1	22.0	49.7
Decrease the diversity of plants and animals in CVNP	331	8.448	5.1	4.6	4.3	10.4	11.1	23.7	40.7
Maintain a healthy deer population in CVNP	335	11.178	31.8	9.9	5.4	10.1	7.2	12.6	23.0
Cause unnecessary pain and suffering to deer in CVNP	334	11.116	15.4	4.7	6.9	10.1	8.6	17.7	36.7
Conflict with the purpose of a National Park	315	11.848	17.6	7.7	9.2	23.1	11.2	11.7	19.6
Maintain opportunities to see deer in CVNP	318	6.617	14.3	8.4	8.9	11.9	15.0	16.9	24.7
Upset local residents and visitors to CVNP	319	3.679	14.5	7.8	11.1	19.4	9.8	20.1	17.5
In the long run, a lethal control program to reduce deer populations in CVNP would…									
Reduce the risk of deer-vehicle collisions in CVNP	337	28.279[c]	4.9	1.7	2.3	2.3	14.0	16.0	58.7
Reduce damage by deer to shrubs, crops, and gardens	338	29.037[c]	4.9	1.3	2.1	4.7	9.8	19.2	58.0
Reduce the risk of diseases associated with deer such as Lyme disease	337	16.146[a]	4.2	2.2	2.9	9.6	12.1	18.9	50.1
Reduce damage done by deer to native plant species in CVNP	339	26.040[c]	4.9	1.6	2.7	6.7	10.0	20.7	53.4
Help maintain a diversity of plants and animals in CVNP	331	10.370	4.9	2.6	3.0	8.4	12.8	22.7	45.7
Maintain a healthy deer population in CVNP	334	10.521	5.6	2.7	3.1	7.0	8.0	23.5	50.1
Cause unnecessary pain and suffering to deer in CVNP	335	8.472	30.6	12.8	7.5	11.6	6.2	10.2	21.3
Conflict with the purpose of a National Park	318	5.488	31.0	12.8	8.6	19.1	9.2	6.8	12.6
Decrease opportunities of seeing deer in CVNP	318	10.011	20.7	13.3	11.8	11.4	17.5	10.4	14.8
Upset local residents and visitors to CVNP	319	3.477	19.4	10.6	10.1	20.5	13.3	12.0	14.1

* 1= Strongly disagree
2= Moderately disagree
3= Slightly disagree
4= Not sure
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

[a] Chi square significant at .05
[b] Chi square significant at .01
[c] Chi square significant at .001

** Chi square compares near and far strata.

Table F.2. Perceptions of potential outcomes of management alternatives, Far strata weighted

	n	Chi square**	Percent of Respondents by Response Category*						
			1	2	3	4	5	6	7
In the long run, taking no action regarding the deer population of CVNP would…									
Lead to too many car collisions	292	8.846	4.0	2.2	4.4	5.6	15.4	22.3	46.1
Lead to too much damage from deer to shrubs, crops, and gardens	292	14.912[a]	3.1	6.0	4.8	5.8	13.3	25.0	42.1
Increase the risk of diseases associated with deer such as Lyme disease	287	7.677	2.9	3.5	4.7	13.9	15.8	22.2	36.9
Increase damage done by deer to native plant species in CVNP	288	11.659	2.3	4.0	4.7	8.3	14.8	27.7	38.2
Decrease the diversity of plants and animals in CVNP	287	8.448	4.5	4.7	5.5	12.7	17.5	22.8	32.4
Maintain a healthy deer population in CVNP	289	11.178	29.6	17.2	7.2	11.9	5.2	11.0	17.8
Cause unnecessary pain and suffering to deer in CVNP	293	11.116	12.8	11.6	7.3	9.3	10.2	16.1	32.7
Conflict with the purpose of a National Park	281	11.848	17.2	10.3	8.4	20.4	6.1	19.4	18.1
Maintain opportunities to see deer in CVNP	276	6.617	10.2	10.1	9.7	13.7	20.3	15.4	20.6
Upset local residents and visitors to CVNP	277	3.679	12.5	9.9	7.6	19.2	12.1	19.5	19.2
In the long run, a lethal control program to reduce deer populations in CVNP would…									
Reduce the risk of deer-vehicle collisions in CVNP	290	28.279[c]	4.5	5.2	1.8	6.9	14.4	25.4	41.9
Reduce damage by deer to shrubs, crops, and gardens	286	29.037[c]	2.6	4.1	6.6	6.6	14.8	23.8	41.5
Reduce the risk of diseases associated with deer such as Lyme disease	282	16.146[a]	4.7	2.7	3.9	16.2	15.7	22.0	34.9
Reduce damage done by deer to native plant species in CVNP	283	26.040[c]	3.4	4.2	5.6	9.3	18.2	21.9	37.5
Help maintain a diversity of plants and animals in CVNP	285	10.370	4.7	3.9	5.1	14.2	13.6	23.2	35.3
Maintain a healthy deer population in CVNP	284	10.521	4.5	5.5	4.4	11.3	9.3	23.2	41.8
Cause unnecessary pain and suffering to deer in CVNP	280	8.472	22.7	18.0	7.1	9.6	8.4	10.5	23.7
Conflict with the purpose of a National Park	276	5.488	26.1	16.4	6.7	17.7	8.3	10.1	14.7
Decrease opportunities of seeing deer in CVNP	278	10.011	15.9	17.5	14.0	16.8	15.3	10.0	10.5
Upset local residents and visitors to CVNP	272	3.477	15.5	14.8	11.0	20.5	13.1	11.9	13.1

* 1= Strongly disagree
2= Moderately disagree
3= Slightly disagree
4= Not sure
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

[a] Chi square significant at .05
[b] Chi square significant at .01
[c] Chi square significant at .001

** Chi square compares near and far strata.

G. Perceptions of potential benefits of management alternatives

Measurements revealing perceptions of the potentially beneficial or harmful outcomes of management alternatives gives an evaluative component of attitudes toward the alternatives. The distribution of scores show that most respondents in both strata believe that reducing the risk of deer-vehicle collisions, reducing the damage done by deer to shrubs, crops, and gardens, reducing the risk of diseases, and maintaining a healthy deer population are "moderately" or "very beneficial" potential outcomes (Tables G.1.-G.2.). Majorities in both strata also found reducing damage done by deer to native plant and animal species and helping to maintain a diversity of plant and animal species were also beneficial potential outcomes.

The vast majority of respondents in both strata found reducing the risk of deer-vehicle collisions (near strata: 66.9%; far strata: 57.6%) and maintaining a healthy deer herd (near strata: 65.8%; far strata: 62.7%) to be "very beneficial." In both strata, responses indicate wide ranging evaluations of taking actions which may cause unnecessary pain and suffering to deer, conflict with the purpose of a National Park, decrease the opportunity to see deer in the CVNP, or upset local residents and visitors. Significantly more respondents in the near strata felt that reducing damage to crops, shrubs, and gardens (chi square = 14.396, sig. at .05), the risk of disease (chi square = 12.749, sig. at .05), and damage to native plants were beneficial outcomes of management (chi square = 15.119, sig. at .05).

Table G.1. Perceptions of potential benefits of management alternatives, Near strata weighted

To what extent do you personally think the following things would be generally "beneficial" or "harmful"?	n	Chi square**	Percent of Respondents by Response Category*						
			1	2	3	4	5	6	7
Reducing the risk of deer-vehicle collisions	330	11.926	0	0.6	1.5	3.9	10.2	16.8	66.9
Reducing damage done by deer to shrubs, crops, and gardens	325	14.396[a]	0	0.4	0.8	7.5	12.8	19.2	59.2
Reducing the risk of diseases associated with deer such as Lyme disease	324	12.749[a]	0	0.2	0.6	11.3	8.8	19.0	60.1
Reducing damage from deer to native plant and animal species in CVNP	322	14.666[a]	0	0.2	2.3	8.2	13.4	19.0	56.8
Helping maintain a diversity of plant and animal species in CVNP	322	8.844	0.2	0.4	1.9	9.0	12.2	21.8	54.4
Maintaining a healthy deer population in CVNP	327	1.303	0.6	0.2	1.0	4.5	9.0	19.0	65.8
Taking actions that cause unnecessary pain and suffering to deer in CVNP	317	15.119[a]	23.6	10.2	6.5	18.4	4.2	7.5	29.6
Taking actions in CVNP that conflict with the purpose of a National Park	295	9.104	23.6	14.2	8.6	30.3	8.1	4.2	11.1
Taking actions that decrease opportunities of seeing deer in CVNP	302	8.400	17.0	13.5	26.6	17.1	9.0	5.5	11.4
Taking actions that upset local residents and visitors to CVNP	291	8.873	17.9	10.9	26.4	25.4	7.8	3.6	8.0

* 1= Very harmful
2= Moderately harmful
3= Slightly harmful
4= Not sure
5= Slightly beneficial
6= Moderately beneficial
7= Very beneficial

** Chi square compares near and far strata.

[a] Chi square significant at .05

Table G.2. Perceptions of potential benefits of management alternatives, Far strata weighted

To what extent do you personally think the following things would be generally "beneficial" or "harmful"?	n	Chi square**	Percent of Respondents by Response Category*						
			1	2	3	4	5	6	7
Reducing the risk of deer-vehicle collisions	281	11.926	1.5	0	2.0	5.9	12.8	20.1	57.6
Reducing damage done by deer to shrubs, crops, and gardens	280	14.396[a]	0.3	0.3	2.5	6.4	19.3	24.8	46.6
Reducing the risk of diseases associated with deer such as Lyme disease	276	12.749[a]	0	0	2.7	9.6	13.5	23.9	50.3
Reducing damage from deer to native plant and animal species in CVNP	276	14.666[a]	0.5	0	2.8	11.8	17.3	25.1	42.4
Helping maintain a diversity of plant and animal species in CVNP	278	8.844	0	0.5	2.6	10.8	18.4	23.7	44.1
Maintaining a healthy deer population in CVNP	277	1.303	0.8	0.3	1.7	4.8	9.5	20.4	62.7
Taking actions that cause unnecessary pain and suffering to deer in CVNP	268	15.119[a]	30.8	9.0	11.8	12.2	4.9	9.6	21.9
Taking actions in CVNP that conflict with the purpose of a National Park	270	9.104	26.2	11.8	11.8	25.1	7.7	8.6	8.7
Taking actions that decrease opportunities of seeing deer in CVNP	265	8.400	12.1	10.0	26.9	24.2	11.8	5.5	9.6
Taking actions that upset local residents and visitors to CVNP	259	8.873	16.0	18.4	20.5	27.1	8.2	4.1	5.7

* 1= Very harmful
2= Moderately harmful
3= Slightly harmful
4= Not sure
5= Slightly beneficial
6= Moderately beneficial
7= Very beneficial

** Chi square compares near and far strata.

[a] Chi square significant at .05

H. Belief and evaluation measurements of management alternatives

One enduring and well-studied approach to assessing the determinants of an attitude is the Theory of Reasoned Action (Ajzen and Fishbein 1980). Two key determinants of an attitude are the personal beliefs about the outcome of action and the evaluation of those beliefs. Items in Q6-Q8 of the survey instrument provide measurement of beliefs about the outcome of taking various management actions. These beliefs were identified by examining public comments made on the Draft Environmental Assessment and Management Plan for White-tailed Deer produced by CVNP in May 1997 (NPS 1997). Responses to these beliefs can be used to suggest which have the greatest influence on people's support or opposition toward management alternatives.

Respondents were asked to react to the outcomes in two series of questions. The first series measured "belief strength," and asked respondents to rate how likely they thought that "no action" or "lethal control" would lead to each outcome in the long run on a seven point scale from "strongly disagree" (1) to "strongly agree" (7) that the stated management alternative would lead to each outcome (see Tables F1-F2). The second series measured "belief evaluations," and asked respondent to rate each outcome again on a seven point scale from "very harmful" (1) to "very beneficial" (7) (see Tables G1-G2). These scores were then translated into a –3 to +3 scale, with ratings of 1 becoming –3 and ratings of 7 becoming +3. A "belief-evaluation" score (b*e) was created by multiplying each belief strength score by its corresponding evaluation score, resulting in a single variable that ranged in value from –9 to +9 (Table H.). A positive value (representing a positive attitude) resulted when an individual expressed a belief that an outcome was positive and likely to occur (positive strength and positive evaluation), or negative but unlikely to occur (negative strength and negative evaluation). A negative value (representing a negative attitude) resulted when an individual expressed a belief that an outcome was either positive but unlikely to occur or negative and likely to occur.

The b*e scores for respondents suggest which outcomes contributed most strongly to their attitude toward lethal control. A large b*e score, either positive or negative, indicates that the potential for that outcome had a large effect on the overall attitude toward lethal control. Smaller b*e scores suggest smaller contributions toward their attitude. The larger gap between mean scores for groups, the greater disagreement over beliefs about that outcome.

The assessment of beliefs is not intended to be an assessment of the actual biological and social effects of deer management actions, rather they will be used to help understand why certain segments of the public hold certain attitudes toward these potential management actions. This point will be made clear in any other subsequent publications. Additionally, if beliefs held by the public are in contradiction with factual information this information will be invaluable in designing information/education programs designed to improve public understanding of the biological consequences of these potential management actions.

The results from items Q6-Q8 in the survey instrument, presented in Tables F.1., F.2., G.1., and G.2., were used to construct the following measurements of attitude strength based on beliefs about outcomes and the evaluations of those outcomes (Table H). The respondents were categorized according to the response to Q5 in the survey instrument regarding the overall acceptability of lethal control (Table E) as well as according to strata. Those who responded with a 1-3 for acceptability of lethal control were placed into the "Lethal Control Unacceptable" category, while those who responded with a 5-7 acceptability measurement were placed in the

"Lethal Control Acceptable" category. Those who responded with a 4, or "unsure," were treated as missing values. The respondents were split according to overall acceptability of lethal control because the beliefs and evaluations of potential outcomes are different for those two groups. Differentiating between the groups according to acceptability allows for analysis of the reasons that influence attitudes toward lethal control.

The b*e scores show that the strongest attitudes regarding management alternatives were held by those respondents in the near strata who found lethal control generally acceptable. In both strata, those who accepted lethal control were likely to believe that "no action" would lead to too many car collisions and lethal control would reduce the risk of collisions. Respondents in the near strata also who found lethal control "acceptable" also held strong attitudes that "no action" would lead to too much damage to crops and increase damage to native plant species while lethal control would reduce the occurrence of these potential outcomes. The beliefs that appear to be most influential on overall acceptability of lethal control are those pertaining to the occurrence of deer-vehicle collisions, damage to crops and native species, and the maintenance of a healthy deer population.

The most common difference between mean b*e scores existed between respondents who found lethal control acceptable and those who found it unacceptable. Fewer differences existed between respondents of different strata who had similar attitudes toward acceptability of lethal control. Only two items ("Taking no action would cause unnecessary pain and suffering to deer" and "Taking no action would conflict with the purpose of a National Park") revealed no significant differences among the four categories of respondents.

Table H. Belief*evaluation scores for no action and lethal control management alternatives*

Outcome Item	Near Strata, weighted				Far Strata, weighted			
	Lethal Control Unacceptable		Lethal Control Acceptable		Lethal Control Unacceptable		Lethal Control Acceptable	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Taking no action would…								
Lead to too many car collisions	2.00[a]	4.17	6.77[b]	3.34	2.46[a]	4.22	6.40[b]	3.41
Lead to too much damage to crops	2.57[a]	3.87	6.82[b]	3.18	1.94[a]	3.89	5.87[b]	3.44
Increase risk of disease	2.22[a]	3.85	5.99[b]	3.48	1.76[a]	3.86	5.31[b]	3.70
Increase damage to native plant species	2.45[a]	3.80	6.35[b]	3.41	1.79[a]	3.51	5.78[b]	3.26
Decrease diversity of plants and animals	1.94[a]	3.96	5.37[b]	4.12	1.23[a]	3.65	4.92[b]	4.04
Maintain a healthy deer herd	1.02[a]	4.89	-1.51[a]	7.11	0.03[a,b]	5.04	-2.06[b]	6.86
Cause unnecessary pain and suffering	1.01	5.25	0.09	5.91	1.69	4.94	-0.04	5.60
Conflict with the purpose of a National Park	0.75	4.35	-0.15	4.39	1.05	4.25	0.25	4.65
Maintain opportunities to see deer in the Park	-2.03[a]	5.02	-0.12[b]	3.94	-0.89[a,b]	4.03	0.91[b]	3.38
Upset local residents and visitors	1.50[a]	4.18	-0.06[b]	3.55	0.63[a,b]	4.07	-0.06[b]	3.67
A lethal control program would…								
Reduce the risk of deer vehicle collisions	2.58[a]	4.11	7.03[b]	3.11	2.47[a]	3.62	6.23[b]	3.61
Reduce damage done to crops	2.45[a]	3.73	6.92[b]	2.93	1.91[a]	3.40	5.80[c]	3.61
Reduce risk of disease	2.49[a]	3.80	6.20[b]	3.53	1.51[a]	3.79	5.18[c]	3.91
Reduce damage to native plant species	2.33[a]	3.86	6.58[b]	3.23	1.55[a]	3.25	5.42[c]	3.80
Help maintain diversity of plants and animals	2.14[a]	3.61	6.01[b]	3.55	1.33[a]	3.42	5.26[b]	3.91
Maintain a healthy deer population	1.10[a]	4.44	6.73[b]	3.38	1.86[a]	4.50	5.96[b]	3.85
Cause unnecessary pain and suffering	-0.10[a,b]	5.90	1.73[a]	5.72	-0.84[b]	5.58	1.21[a]	5.56
Conflict with the purpose of a National Park	-0.96[a]	4.85	1.05[b,c]	4.46	-0.35[c]	4.86	1.47[b]	4.40
Decrease opportunities to see deer in the Park	-2.22[a]	4.82	0.22[b]	4.01	-0.48[b]	3.80	0.24[b]	3.36
Upset local residents and visitors	-1.74[a]	4.81	0.71[b]	3.46	-0.77[a]	4.26	0.82[b]	3.48

*Tests for differences between means were conducted using one-way analysis of variance. Means with different superscripts ([a, b, c]) were found to be significantly different using the Scheffe post hoc test for differences between means.

I. Values and management alternatives

The issue of wildlife population management is related to some people's underlying values regarding human use and treatment of animals. Items in these questions assessed the degree to which respondents are concerned with animal welfare/rights issues and the degree to which they favor protecting natural areas and the diverse plants and animals in such areas. This information allows for identification of segments of the public whose attitudes toward potential deer management options are strongly related to their values. Such information is important in designing information/education programs that explain management actions because value-based attitudes are very difficult to change. Messages targeted at segments of the population with value-based attitudes are unlikely to be successful and a poor investment of public funds. Also, knowing the overall percentage of the local population for which deer management issues are related to personal values helps provide an indication of the tractability of the issue for Park managers.

In both strata, the majority of respondents indicated that lethal control of deer is, to some degree, related to their values (Table I.). Many respondents in both strata indicated their opinions about lethal control (near strata: 43.2%; far strata: 39.0%) and the issues of lethal control (near strata: 38.5%; far strata: 38.4%) are related to personal values "to a great extent." The first question, which inquires how much one's opinions about lethal control are related to values, revealed a significant difference between opinions of those living near CVNP and those living farther from the Park. Respondents in the near strata felt that their opinions were related to their values to a greater extent than respondents in the far strata (chi square = 12.58, sig. at .05). The difference between the strata on responses to the second question was not significant. In the near and far strata, 60% or more of respondents reported a 6 or 7 for both questions, indicating that, for most people, the issue of lethal deer control is related to values they care about.

Table I. Values and management alternatives

	Near strata, %	Far strata, %
To what extent do you think your opinions about lethal control of deer in CVNP are related to values you care most about? Chi square** = 12.580[a]		
1, Not at all	3.5	3.4
2	1.0	2.6
3	6.0	2.2
4	8.6	12.4
5	14.6	19.9
6	23.2	20.6
7, To a great extent	43.2	39.0
Total	100.1*	100.1*
To what extent do you think the issue concerning lethal control of deer is related to your personal values? Chi square** = 6.652		
1, Not at all	6.2	4.6
2	3.4	3.2
3	4.7	1.8
4	10.2	9.3
5	12.7	17.1
6	24.2	25.6
7, To a great extent	38.5	38.4
Total	99.9*	100.0

*Percentage totals do not equal 100.0 due to rounding.

**Chi square compares near and far strata.

[a] Chi square significant at .05

J. Attitudes toward CVNP and National Park Service staff

The items in the following questions examine the impact of potential management actions on the local public. These questions were not designed to identify appropriate policy for CVNP, rather they were designed to assess the varying levels of impact a management action will have on the public based on the rationale that the NPS provides for a potential management action. Public acceptance of various management actions varies due to the reasons management actions are taken. High acceptability of a management action indicates a lower potential for negative impacts on the public.

Scores for both strata showed agreement with the following statements: the National Park Service will be open and honest in the things they do and say; the National Park Service can be trusted to make decisions about deer management that are good for CVNP; the National Park Service will make decisions about deer management in a way that is fair; the National Park Service should lethally control animal populations in national parks if the animals are damaging Park resources, and the National Park Service makes decisions that are good for the natural resource (Tables J.1. and J.2.). When asked if they thought NSP does a good job managing deer in CVNP, nearly one-third of respondents in each strata were "unsure." Conversely, when asked if the NPS does a good job managing resources in general in CVNP, large majorities indicated that they "agreed" or "strongly agreed" with this statement. These results highlight the controversial nature of deer management issues in the Park. Although general confidence in the NPS is high, confidence in decisions specifically regarding deer management is moderate.

Although majorities do not report potential negative impacts of a lethal control program, some respondents in both strata feel strongly that lethal control would affect them in a negative way. About one in ten respondents in both strata responded that they would not visit CVNP is there were a lethal control program (near strata: 9.0%; far strata: 12.2%). Nearly one-third of far strata respondents (30.5%) and one-fourth of near strata respondents (26.0%) agreed with the statement that the lethal control of wildlife conflicts with what the National Park Service is supposed to be about. At least one-fifth of respondents in both strata indicated that they would be very emotionally upset if the National Park Service were to implement a lethal control program for deer in CVNRA (near strata: 20.6%; far strata: 23.0%) and disagreed that the National Park Service should lethally control animal populations in national parks if the animals are damaging Park resources (near strata: 17.7%; far strata: 20.6%).

On several items, respondents in the near and far strata felt significantly different about the potential impact of lethal control and the role of the NPS. More respondents in the near strata felt that the NPS does a good job of managing deer and other resources in CVNP (chi square = 10.234, sig. at .05); when deciding about deer issues, the NPS will be open and honest (chi square = 19.736. sig. at .001); the NPS will make decisions in a way that is fair (chi square = 10.353, sig. at .05), and the NPS should lethally control animal populations in national parks if the animals are damaging Park resources (chi square = 10.186, sig. at .05). Significantly more respondents in the far strata felt that lethal control of wildlife conflicts with the purpose of a national park (chi square = 10.071, sig. at .05), they would be very emotionally upset if the NPS implemented a lethal control program (chi square = 10.754, sig. at .05), and that such a program would make them have a negative opinion of Park staff (chi square = 12.238, sig. at .05).

Table J.1. Attitudes toward CVNP and National Park Service staff, Near strata weighted

Statements	n	Chi square**	Percent of Respondents by Response Category*				
			1	2	3	4	5
I would not visit CVNP if there were a lethal deer control program.	329	3.897	62.0	18.3	10.8	2.5	6.5
I think the lethal control of wildlife conflicts with what the National Park Service is supposed to be about.	329	10.071[a]	41.5	21.5	11.0	10.3	15.7
The National Park Service does a good job of managing deer and other resources in CVNP.	324	10.234[a]	7.9	8.9	30.8	34.4	18.0
I would not participate in activities at CVNP led by National Park Service staff because of a lethal control program.	332	6.943	60.8	17.9	9.0	4.5	7.9
When deciding about deer issues at CVNP, the National Park Service will be open and honest in the things they do and say.	319	19.736[b]	3.6	4.2	18.1	35.1	39.0
I would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNP.	339	10.754[a]	54.0	19.5	5.9	10.2	10.4
A lethal deer control program would make me have a negative opinion of Park staff.	341	12.238[a]	56.3	21.0	7.0	7.6	8.2
The National Park Service can be trusted to make decisions about deer management that are good for CVNP.	332	8.360	3.7	3.7	15.6	41.4	35.8
The National Park Service will make decisions about deer management in a way that is fair	335	10.353[a]	3.0	3.8	16.5	43.3	33.4
The National Park Service should lethally control animal populations in national parks if the animals are damaging Park resources.	333	10.186[a]	8.7	9.0	11.1	29.1	42.1
The National Park Service makes decisions that are good for the natural resources of CVNP.	337	8.373	1.7	4.0	16.3	41.8	36.2

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree

**Chi square compares near and far strata.

[a] Chi square significant at .05

[b] Chi square significant at .001

Table J.2. Attitudes toward CVNP and National Park Service staff, Far strata weighted

Statements	n	Chi square**	Percent of Respondents by Response Category*				
			1	2	3	4	5
I would not visit CVNP if there were a lethal deer control program.	290	3.897	55.9	21.7	10.2	4.3	8.0
I think the lethal control of wildlife conflicts with what the National Park Service is supposed to be about.	294	10.071[a]	29.6	27.8	12.1	11.3	19.2
The National Park Service does a good job of managing deer and other resources in CVNP.	268	10.234[a]	2.7	7.9	34.2	39.8	15.4
I would not participate in activities at CVNP led by National Park Service staff because of a lethal control program.	290	6.943	51.2	25.3	10.0	4.8	8.7
When deciding about deer issues at CVNP, the National Park Service will be open and honest in the things they do and say.	280	19.736[b]	1.5	6.4	25.7	42.1	24.3
I would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNP.	293	10.754[a]	41.8	27.8	7.5	10.1	12.9
A lethal deer control program would make me have a negative opinion of Park staff.	292	12.238[a]	46.4	30.3	3.9	9.1	10.4
The National Park Service can be trusted to make decisions about deer management that are good for CVNP.	285	8.360	3.5	4.3	24.1	39.2	28.8
The National Park Service will make decisions about deer management in a way that is fair	286	10.353[a]	3.0	4.2	26.4	40.4	26.0
The National Park Service should lethally control animal populations in national parks if the animals are damaging Park resources.	291	10.186[a]	8.6	12.0	11.5	37.6	30.5
The National Park Service makes decisions that are good for the natural resources of CVNP.	286	8.373	2.2	3.3	19.5	49.2	25.8

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree

**Chi square compares near and far strata.

[a] Chi square significant at .05

[b] Chi square significant at .001

K. Reasons for accepting a lethal deer control program

Individuals were asked to respond to questions regarding the reasons for which they would consider a lethal deer control program acceptable. Responses in both strata show that all the reasons listed were, to some degree, acceptable justification for a lethal control program (Tables K.1. and K.2.). In both strata, the most acceptable reason was to maintain a healthy deer herd, and the least acceptable was to maintain the natural beauty of CVNP by reducing browse damage.

Acceptance of lethal control in order to decrease damage by deer to shrubs, crops, and gardens had a bimodal distribution, with one-fourth (25.5%) of far strata respondents and one-fifth (19.6%) of near strata respondents finding this an "unacceptable" reason, and over one-third (near strata: 42.1%; far strata: 35.4%) in both strata finding this "very acceptable." Although about one-half (near strata: 55.8%; far strata: 48.6%) of respondents in both strata found lethal control "very acceptable" in order to reduce the risk of deer-vehicle collisions, approximately one-sixth (near strata: 15.6%; far strata: 17.3%) of respondents found this "unacceptable" justification for lethal control. Respondents in the near strata felt significantly stronger that lethal control was acceptable in order to help maintain a balanced ecosystem (chi square = 21.437, sig. at .01), decrease damage to shrubs, crops, and gardens (chi square = 19.719, sig. at .01), maintain a diversity of plants and animals in CVNP (chi square = 14.975, sig. at .01), and reduce the risk of disease (chi square = 13.675, sig. at .05).

Table K.1. Reasons for accepting a lethal deer control program, Near strata, weighted

It is acceptable or unacceptable for the National Park Service to use lethal control on deer in CVNP in order to…	n	Chi square**	Percent respondents for each category*						
			1	2	3	4	5	6	7
Maintain the natural beauty of CVNP by reducing browse damage.	331	6.626	11.0	4.8	6.7	4.8	12.3	23.4	37.0
Maintain a healthy deer herd.	336	9.761	7.1	3.9	2.6	1.5	11.2	17.2	56.6
Help maintain a balanced ecosystem in CVNP.	335	21.473[b]	8.3	2.7	2.8	1.9	11.7	17.2	55.6
Decrease damage by deer to shrubs, crops, and gardens on private property near CVNP.	335	19.719[b]	12.6	3.7	3.3	4.8	10.6	22.9	42.1
Maintain a diversity of other plant and animal species in CVNP.	336	14.975[b]	7.8	3.1	3.2	5.6	14.5	21.4	44.4
Reduce the risk of deer-vehicle collisions in and around CVNP.	343	6.135	8.9	4.1	2.6	3.8	9.5	15.3	55.8
Reduce the risk of diseases associated with deer such as Lyme disease.	342	13.675[a]	7.5	4.5	1.7	5.2	9.9	19.5	51.8

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Unsure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

**Chi square compares near and far strata.

[a] Chi square significant at .05

[b] Chi square significant at .01

Table K.2. Reasons for accepting a lethal deer control program, Far strata, weighted

It is acceptable or unacceptable for the National Park Service to use lethal control on deer in CVNP in order to…	n	Chi square**	Percent respondents for each category*						
			1	2	3	4	5	6	7
Maintain the natural beauty of CVNP by reducing browse damage.	290	6.626	11.8	8.4	6.5	6.6	15.1	20.7	30.9
Maintain a healthy deer herd.	296	9.761	5.9	5.9	4.0	4.3	9.4	20.7	49.9
Help maintain a balanced ecosystem in CVNP.	295	21.473[b]	5.8	6.5	3.8	5.1	12.3	24.2	42.4
Decrease damage by deer to shrubs, crops, and gardens on private property near CVNP.	294	19.719[b]	12.0	6.2	7.3	5.1	18.5	15.4	35.4
Maintain a diversity of other plant and animal species in CVNP.	292	14.975[b]	5.8	7.8	6.4	4.6	17.8	20.7	37.0
Reduce the risk of deer-vehicle collisions in and around CVNP.	293	6.135	7.5	5.1	4.7	5.2	11.6	17.5	48.6
Reduce the risk of diseases associated with deer such as Lyme disease.	289	13.675[a]	5.6	3.6	5.8	7.6	13.9	17.3	46.1

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Unsure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

**Chi square compares near and far strata.

[a] Chi square significant at .05

[b] Chi square significant at .01

L. Attitudes toward wildlife and natural resources

Questions about individuals' attitudes toward wildlife, natural resources, and the human use of these resources illustrate the paradigm held by respondents that influences attitudes toward management alternatives. Wildlife value orientations may be the consequence of fundamental values held by individuals. These orientations result from the application of fundamental values as evaluative standards to issues relating to human use of wildlife. An individual's basic beliefs regarding appropriate human use of wildlife provides an indication of that individual's wildlife value orientation (Fulton, Pate, Manfredo 1995).

The distributions of responses on most of the following questions indicate a wide range in wildlife value orientations (Tables L.1. and L.2.). Interestingly, over ninety percent of respondents in both strata indicated that healthy natural environments (near strata: 94.9%; far strata: 95.5%) and diverse plant and wildlife populations are important to them (near strata: 90.3%; far strata: 93.9%). About one-third of respondents in both strata disagreed that causing pain and suffering to wildlife is undesirable but unavoidable (near strata: 30.0%; far strata: 31.7%). Nearly two-thirds of respondents in both strata agreed that wildlife have a right to live a life free from any pain caused by people (near strata: 63.4%; far strata: 57.2%), and over three-fourths in both strata disagreed that it is acceptable for people to use wildlife for whatever reasons they wish (near strata: 85.4%; far strata: 86.5%). Interestingly, responses revealed no significant differences between near and far strata respondents toward wildlife and natural resources.

Table L.1. Attitudes toward wildlife and natural resources, Near strata, weighted

Statements	n	Chi square**	Percent of Respondents by Response Category*				
			1	2	3	4	5
People should be allowed to hunt and trap but only if it is done in the most humane way possible.	333	9.082	16.8	11.1	8.8	32.5	30.8
Causing pain and suffering to wildlife is undesirable, but it is an unavoidable part of life.	325	2.359	12.7	19.0	8.3	40.4	19.6
It is acceptable for people to harm or kill wildlife only to protect their own life.	338	7.765	15.5	38.4	9.1	23.6	13.5
People should not be allowed to use wildlife in any way that may cause harm to wildlife.	319	4.940	11.4	21.4	14.0	29.2	24.0
It's important to know that there are healthy natural ecosystems in the area I live.	337	1.852	0.2	0.7	3.5	44.2	51.3
Wildlife have a right to live a life free from any pain caused by people.	325	3.304	10.7	22.0	10.2	33.2	24.0
Protecting local natural areas is very important to me.	341	3.003	0.7	0.9	0.8	38.9	58.6
It is acceptable for people to use wildlife for whatever reasons they wish.	336	3.391	54.9	31.6	6.4	3.6	3.5
Protecting diverse plant and wildlife populations where I live is very important to me.	331	7.531	0.8	1.4	4.0	47.1	46.8
Killing wildlife is acceptable but only when the wildlife are causing an economic loss.	334	4.669	20.4	36.4	11.9	19.3	12.1
We should not limit human activities, even if some pain and suffering caused to wildlife could be avoided.	311	4.508	24.8	36.5	22.1	10.8	5.8
Ensuring a healthy natural environment is very important to me.	339	6.329	0.5	0.0	2.1	37.2	60.2
Wildlife exist primarily for people to use.	330	6.848	45.8	35.5	8.8	7.0	2.9

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree

**Chi square compares near and far strata.

Table L.2. Attitudes toward wildlife and natural resources, Far strata, weighted

Statements	n	Chi square**	Percent of Respondents by Response Category*				
			1	2	3	4	5
People should be allowed to hunt and trap but only if it is done in the most humane way possible.	296	9.082	10.0	11.2	7.0	40.5	31.5
Causing pain and suffering to wildlife is undesirable, but it is an unavoidable part of life.	294	2.359	10.8	19.2	8.9	36.8	24.3
It is acceptable for people to harm or kill wildlife only to protect their own life.	284	7.765	20.4	37.0	6.7	17.9	18.1
People should not be allowed to use wildlife in any way that may cause harm to wildlife.	275	4.940	9.2	16.1	18.3	32.2	24.3
It's important to know that there are healthy natural ecosystems in the area I live.	294	1.852	0.5	1.7	2.9	47.1	47.8
Wildlife have a right to live a life free from any pain caused by people.	282	3.304	8.2	18.2	10.1	35.4	28.0
Protecting local natural areas is very important to me.	297	3.003	0.5	1.1	2.0	41.9	54.5
It is acceptable for people to use wildlife for whatever reasons they wish.	299	3.391	51.0	34.4	4.5	5.1	5.0
Protecting diverse plant and wildlife populations where I live is very important to me.	295	7.531	0.7	4.6	4.4	50.3	40.0
Killing wildlife is acceptable but only when the wildlife are causing an economic loss.	296	4.669	17.7	36.1	16.7	20.8	8.7
We should not limit human activities, even if some pain and suffering caused to wildlife could be avoided.	286	4.508	25.6	35.3	17.2	14.4	7.5
Ensuring a healthy natural environment is very important to me.	301	6.329	1.3	1.1	2.1	41.7	53.9
Wildlife exist primarily for people to use.	296	6.848	38.5	37.7	8.2	10.3	5.4

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree

**Chi square compares near and far strata.

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APPENDIX A: SURVEY INSTRUMENT

Deer Management in Cuyahoga Valley National Recreation Area

OMB# 1024-0229
Expires: October 2000

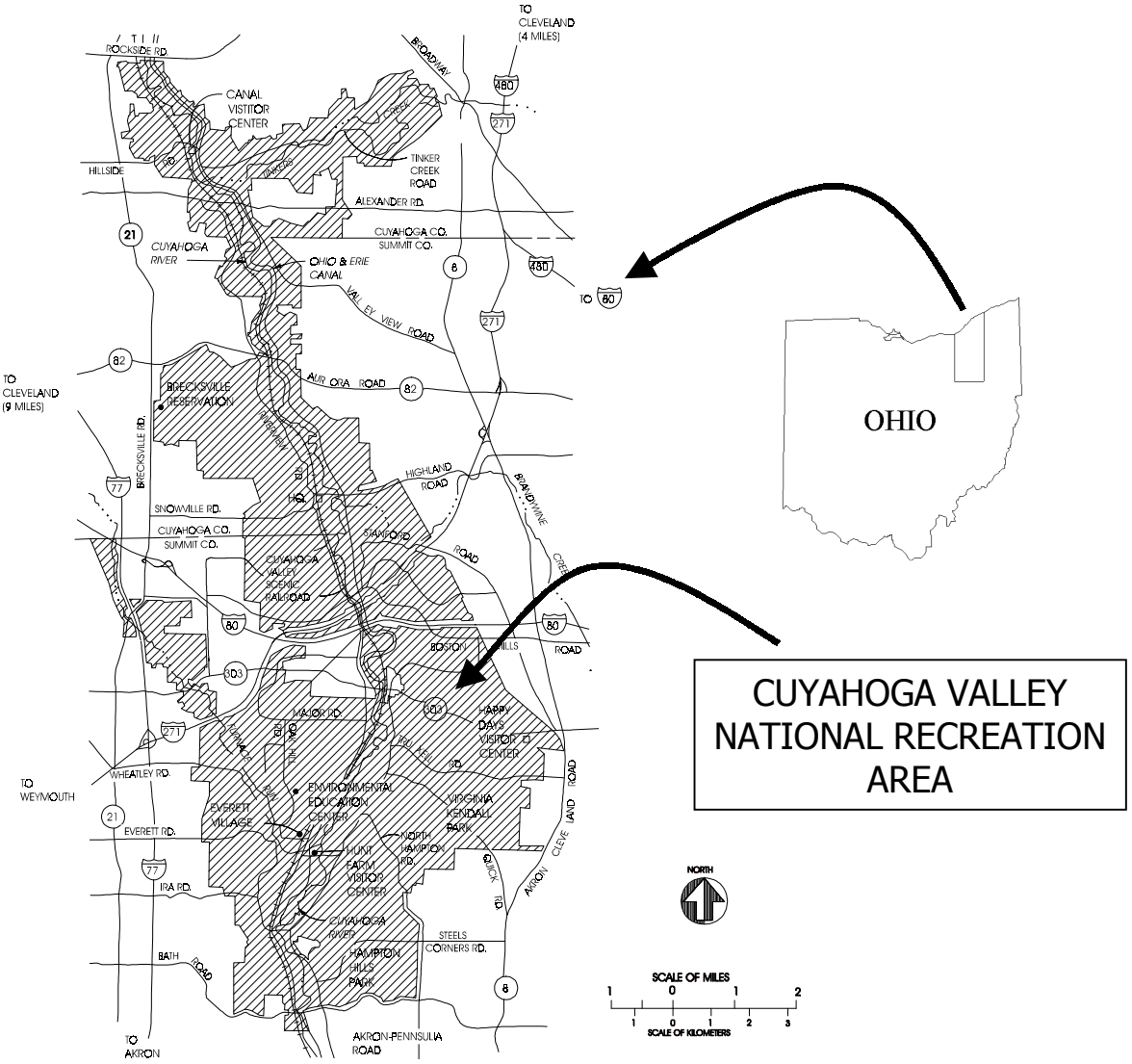
A cooperative study conducted by the National Park Service and the University of Minnesota

Your help is greatly appreciated!

Please place your completed questionnaire in the enclosed envelope and return it by mail.

CUYAHOGA VALLEY NATIONAL RECREATION AREA

* CLEVELAND



* AKRON

About the National Park Service's
Cuyahoga Valley National Recreation Area

Cuyahoga Valley National Recreation Area (CVNRA) stretches for 22 miles along the Cuyahoga River between Akron and Cleveland, Ohio. The National Park Service manages CVNRA in cooperation with others who own property within its boundaries including Cleveland Metroparks and Summit County's Metro Parks. The park preserves 33,000 acres that provide a place where you can relax, play, and learn about nature. There are a wide variety of recreation opportunities available at CVNRA, and you may have visited the park without realizing it. Some of the more popular attractions in CVNRA include:

- **Hiking or biking on the Ohio & Erie Canal Towpath Trail**
- **Riding along the Cuyahoga Valley Scenic Railroad**
- **Skiing at Boston Mills or Brandywine ski areas**
- **Sledding at Virginia Kendall**
- **Golfing at Shawnee Hills, Sleepy Hollow, Brandywine, or Astorhurst**
- **Concerts at the Blossom Music Center and plays at the Porthouse Theater**

The map on the facing page illustrates where the park is located and may help you determine if you have ever visited the park.

Q-1. Before you received this questionnaire, were you aware that Cuyahoga Valley National Recreation Area (CVNRA) existed? *(Circle one).*

1. YES
2. NO
3. NOT SURE

Section I. Deer in Cuyahoga Valley NRA

In recent years, the white-tailed deer population in Cuyahoga Valley National Recreation Area (CVNRA) has grown. Deer populations in some areas of CVNRA range between 30 and over 100 deer per square mile, with an average of about 40 deer per square mile. Previous studies suggest that deer affect other wildlife and plant species when their population increases beyond 10 deer per square mile. Currently, the National Park Service is trying to decide what it should do, if anything, about the increasing number of deer in national parks. We are interested in knowing how you feel about the issue at CVNRA.

Q-2. For each of the statements below, please respond on a scale from 1 to 4, where 1 = Not At All and 4 = Very. *(Please circle one number indicating your response)*.

	Not at all	Slightly	Moderately	Very	No Opinion
A. How well informed are you about the deer management issue at CVNRA?	1	2	3	4	9
B. How important is the deer management issue at CVNRA to you personally?	1	2	3	4	9
C. How much do you personally care about the deer management issue at CVNRA?	1	2	3	4	9
D. How well informed are you about management issues at CVNRA in general?	1	2	3	4	9
E. How much do you personally care about what goes on in CVNRA?	1	2	3	4	9
F. How important, in general, are management issues at CVNRA to you personally?	1	2	3	4	9
G. How important is the deer management issue compared to other issues at CVNRA?	1	2	3	4	9

Q-3. If you feel you are informed about the deer management issue at CVNRA, from what sources (newspaper, TV, radio, friends/family etc.) did you receive most of your information about the deer management issue at CVNRA? (*Write your response in the space below or ✔ the ❒ to indicate that you do not feel informed).*

_____

❒ I am not informed about the deer management issue at CVNRA

PLEASE READ BEFORE CONTINUING!

Different ways in which the National Park Service could manage deer at CVNRA include:

NO ACTION:

- Taking no action in regards to the current deer population at CVNRA.

LETHAL CONTROL:

- Reducing the deer population through lethal population control.
- Deer would be killed by capturing them and killing them

OR BY

- using well-trained marksmen to shoot deer within CVNRA.

No decisions have been made about what actions are best to take. The National Park Service is very interested in knowing how you feel about the issue.

Q-4. In your opinion, how acceptable would you say it is for the National Park Service to take each of the following actions concerning the management of the deer population in Cuyahoga Valley National Recreation Area? *(Please circle the number that best represents your response. 1 = Very Unacceptable, 2= Moderately Unacceptable, 3 = Slightly Unacceptable, 4 = Not Sure, 5 = Slightly Acceptable, 6 = Moderately Acceptable, 7 = Very Acceptable, 9 = No Opinion).*

	Very Unacceptable	Moderately Unacceptable	Slightly Unacceptable	Not Sure	Slightly Acceptable	Moderately Acceptable	Very Acceptable	No Opinion
NO ACTION	1	2	3	4	5	6	7	9
LETHAL CONTROL	1	2	3	4	5	6	7	9

Q-5. To what extent, do you personally believe that if NO ACTION is taken regarding the deer population in CVNRA the following things will happen IN THE LONG-RUN? *(Please circle your response).*

In the long run, taking no action regarding the deer population at CVNRA would...	Strongly Disagree	Moderately Disagree	Slightly Disagree	Not Sure	Slightly Agree	Moderately Agree	Strongly Agree	No Opinion
A. Lead to too many car collisions with deer in CVNRA	1	2	3	4	5	6	7	9
B. Lead to too much damage from deer to shrubs, crops, and gardens	1	2	3	4	5	6	7	9
C. Increase the risk of diseases associated with deer such as Lyme disease	1	2	3	4	5	6	7	9
D. Increase the damage done by deer to native plant species in CVNRA	1	2	3	4	5	6	7	9
E. Decrease the diversity of plants and animals in CVNRA	1	2	3	4	5	6	7	9
F. Maintain a healthy deer population in CVNRA	1	2	3	4	5	6	7	9
G. Cause unnecessary pain and suffering to deer in CVNRA	1	2	3	4	5	6	7	9
H. Conflict with the purpose of a National Park	1	2	3	4	5	6	7	9
I. Maintain opportunities to see deer in CVNRA	1	2	3	4	5	6	7	9
J. Upset local residents and visitors to CVNRA	1	2	3	4	5	6	7	9

Q-6. To what extent, do you personally believe that if A LETHAL CONTROL PROGRAM FOR DEER in CVNRA is implemented the following things will happen IN THE LONG-RUN. *(Please circle your response).*

In the long run, a lethal control program to reduce the deer population in CVNRA would…	Strongly Disagree	Moderately Disagree	Slightly Disagree	Not Sure	Slightly Agree	Moderately Agree	Strongly Agree	No Opinion
A. Reduce the risk of deer-vehicle collisions in CVNRA	1	2	3	4	5	6	7	9
B. Reduce damage by deer to shrubs, crops, and gardens	1	2	3	4	5	6	7	9
C. Reduce the risk of diseases associated with deer such as Lyme disease	1	2	3	4	5	6	7	9
D. Reduce damage done by deer to native plant species in CVNRA	1	2	3	4	5	6	7	9
E. Help maintain a diversity of plants and animals in CVNRA	1	2	3	4	5	6	7	9
F. Maintain a healthy deer population in CVNRA	1	2	3	4	5	6	7	9
G. Cause unnecessary pain and suffering to deer in CVNRA	1	2	3	4	5	6	7	9
H. Conflict with the purpose of a National Park	1	2	3	4	5	6	7	9
I. Decrease opportunities of seeing deer in CVNRA	1	2	3	4	5	6	7	9
J. Upset local residents and visitors to CVNRA	1	2	3	4	5	6	7	9

Q-7. To what extent do you personally think the following things would be generally "beneficial" or "harmful." Please respond on a scale where 1 = Very Harmful, 2 = Moderately Harmful, 3 = Slightly Harmful, 4 = Not Sure, 5 = Slightly Beneficial, 6 = Moderately Beneficial, 7 = Very Beneficial, or 9 = Don't Know. *(Please circle your response*).

	Very Harmful	Moderately Harmful	Slightly Harmful	Not Sure	Slightly Beneficial	Moderately Beneficial	Very Beneficial	No Opinion
A. Reducing the risk of deer-vehicle collisions in CVNRA	1	2	3	4	5	6	7	9
B. Reducing damage by deer to shrubs, crops, and gardens	1	2	3	4	5	6	7	9
C. Reducing the risk of diseases associated with deer such as Lyme disease	1	2	3	4	5	6	7	9
D. Reducing damage from deer to native plant species in CVNRA	1	2	3	4	5	6	7	9
E. Helping maintain a diversity of other plant and animal species in CVNRA	1	2	3	4	5	6	7	9
F. Maintaining a healthy deer population in CVNRA	1	2	3	4	5	6	7	9
G. Taking actions that cause unnecessary pain and suffering to deer in CVNRA	1	2	3	4	5	6	7	9
H. Taking actions in CVNRA that conflict with the purpose of a National Park	1	2	3	4	5	6	7	9
I. Taking actions that decrease opportunities of seeing deer in CVNRA	1	2	3	4	5	6	7	9
J. Taking actions that upset local residents and visitors to CVNRA	1	2	3	4	5	6	7	9

Q-8. Please answer the next few questions on a scale where 1 = Not at All and 7 = To a Great Extent. *(Please circle your response).*

	Not at all						To a Great Extent	No Opinion
A. To what extent does the decision about deer management in CVNRA affect the values you care most about?	1	2	3	4	5	6	7	9
B. To what extent do you think your reaction to the deer management issue at CVNRA reflects your personal values?	1	2	3	4	5	6	7	9

Q-9. Next we have a few statements about deer management and your attitudes toward the CVNRA and the National Park Service employees who manage it. Please indicate your level of agreement with each statement on a scale where 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Unsure (U), 4 = Agree (A), 5 = Strongly Agree (SA), and 9 = No Opinion. *(Please circle your response*).

	SD	D	U	A	SA	No Opinion
A. I would not visit CVNRA if there were a lethal deer control program.	1	2	3	4	5	9
B. I think the lethal control of wildlife conflicts with what the National Park Service is supposed to be about.	1	2	3	4	5	9
C. The National Park Service does a good job of managing deer and other resources in CVNRA.	1	2	3	4	5	9
D. I would not participate in activities at CVNRA led by National Park Service staff because of a lethal control program.	1	2	3	4	5	9
E. When deciding about deer issues at CVNRA, the National Park Service will be open and honest in the things they do and say.	1	2	3	4	5	9
F. I would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNRA.	1	2	3	4	5	9
G. A lethal deer control program would make me have a negative opinion of park staff.	1	2	3	4	5	9
H. The National Park Service can be trusted to make decisions about deer management that are good for CVNRA.	1	2	3	4	5	9
I. The National Park Service will make decisions about deer management in a way that is fair.	1	2	3	4	5	9
J. The National Park Service should lethally control animal populations in national parks if the animals are damaging park resources.	1	2	3	4	5	9
K. The National Park Service makes decisions that are good for the natural resources (wildlife, forests, plants, water, etc.) of CVNRA.	1	2	3	4	5	9

Q-10. In your personal opinion, is it **ACCEPTABLE OR UNACCEPTABLE** for the National Park Service to reduce the number of deer in CVNRA by using a LETHAL CONTROL PROGRAM in order to…(*Please respond on a scale where 1 = (VU--Very Unacceptable) 2 =(MU--Moderately Unacceptable), 3 = (SU--Slightly Unacceptable), 4 = (U--Undecided), 5= (SA--Slightly Acceptable), 6 = (MA--Moderately Acceptable), 7 = (VA--Very Acceptable), and 9 = No Opinion Please circle the number of your response)*.

Is it acceptable or unacceptable for the National Park Service to use lethal control on deer in CVNRA in order to…	VU	MU	SU	U	SA	MA	VA	No Opinion
A. Maintain the natural beauty of CVNRA by reducing browse damage	1	2	3	4	5	6	7	9
B. Maintain a healthy deer herd	1	2	3	4	5	6	7	9
C. Help maintain a balanced ecosystem in CVNRA	1	2	3	4	5	6	7	9
D. Decrease damage by deer to shrubs, crops, and gardens on private property near CVNRA	1	2	3	4	5	6	7	9
E. Maintain a diversity of other plant and animal species in CVNRA	1	2	3	4	5	6	7	9
F. Reduce the risk of deer-vehicle collisions in and around CVNRA	1	2	3	4	5	6	7	9
G. Reduce the risk of diseases associated with deer such as Lyme disease	1	2	3	4	5	6	7	9

Section II. Questions about You

Q-11. Please indicate the extent to which you agree or disagree with each of the following statements on a scale where 1 = Strongly Disagree, 2 = Disagree, 3= Unsure, 4 = Agree, 5 = Strongly Agree, and 9 = No Opinion *(Circle one response)*.

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree	No Opinion
A. People should be allowed to hunt or trap but ONLY in the most humane way possible.	1	2	3	4	5	9
B. Causing pain and suffering to wildlife is undesirable, but it is an unavoidable part of life.	1	2	3	4	5	9
C. It is acceptable for people to harm or kill wildlife ONLY to protect their own life.	1	2	3	4	5	9
D. People should not be allowed to use wildlife in any way that may cause harm to wildlife.	1	2	3	4	5	9
E. It's important to know that there are healthy natural ecosystems in the area I live.	1	2	3	4	5	9
F. Wildlife have a right to live a life free from any pain caused by people.	1	2	3	4	5	9
G. Protecting local natural areas is very important to me.	1	2	3	4	5	9
H. It is acceptable for people to use wildlife for whatever reasons they wish.	1	2	3	4	5	9
I. Protecting diverse plant and wildlife populations where I live is very important to me.	1	2	3	4	5	9
J. Killing wildlife is acceptable but ONLY when the wildlife are causing an economic loss.	1	2	3	4	5	9
K. We SHOULD NOT limit human activities, even if some pain and suffering caused to wildlife could be avoided.	1	2	3	4	5	9
L. Ensuring a healthy natural environment is a very important issue.	1	2	3	4	5	9
M. Wildlife exist primarily for people to use.	1	2	3	4	5	9

Q-12. What was the year you were born ? 19 _____

Q-13. What is your gender? (*Check one*) ____Female ____ Male

Q-14. How many years have you lived in the Cuyahoga Valley area?_____

Q-15. What is the highest level of education you have completed? (*Circle one*).

1. Elementary School (1-8)
2. High School
3. Technical School or Some College
4. Completed College Degree
5. Graduate or Professional School

Q-16.Which of the following activities did you do during any of your past visits to CVNRA? (*Please check <u>all</u> that apply).*

___WALKED FOR PLEASURE
___ATTENDED RANGER GUIDED WALK
___BICYCLING
___RUNNING, OR JOGGING
___FISHING

___PICNICKED
___BIRDWATCHING/WILDLIFE VIEWING
___ PHOTOGRAPHY
___WENT HORSEBACK RIDING
___CANOED OR KAYAKED ON THE CUYAHOGA RIVER

___ STOPPED AT A VISITOR CENTER
___ATTENDED INDOOR PROGRAM AT A VISITOR CENTER
___ ENVIRONMENTAL EDUCATION CENTER PROGRAMS
___VISITED HALE FARM
___VISITED A BOY SCOUT OR GIRL SCOUT CAMP

___WENT SIGHTSEEING OR DRIVING FOR PLEASURE
___RODE THE TRAIN (CUYAHOGA VALLEY SCENIC RAILROAD)
___SKIING (BOSTON MILLS, BRANDYWINE)
___SLEDDING AT VIRGINIA KENDALL PARK
___PLAYED GOLF AT SHAWNEE HILLS, SLEEPY HOLLOW, BRANDYWINE, OR ASTORHURST

___VISITED DOVER LAKE WATERPARK
___CONCERTS AT BLOSSOM MUSIC CENTER
___MUSICALS/PLAYS AT PORTHOUSE THEATER
___ATTENDED SPECIAL EVENTS (PLAYS, RIVER DAY, WALKS, RUNS)
___ STAYED AT THE STANDFORD HOSTEL OR INN AT BRANDYWINE FALLS

___JUST PASSED THROUGH

___OTHER (PLEASE EXPLAIN)_____
___NEVER VISITED

Q-17. Over the past 5 years how frequently have you visited CVNRA for different recreation activities such as hiking or biking on trails, fishing, skiing, or attending music concerts? *(Circle one).*

1. NEVER
2. ONCE OR TWICE DURING THE PAST 5 YEARS
3. ONCE OR TWICE EACH YEAR
4. A FEW TIMES (3-6) EACH YEAR
5. SEVERAL TIMES (7-15) EACH YEAR
6. ALMOST WEEKLY
7. ALMOST DAILY
8. DON'T KNOW

Please make any additional comments in the space below:

THANK YOU FOR YOUR HELP!

Please RETURN THE COMPLETED QUESTIONNAIRE by mailing it in the prepaid, self-addressed envelope provided.

If you have any questions, please contact Dr. David Fulton, Department of Fisheries and Wildlife, 1980 Folwell, 200 Hodson Hall, University of Minnesota, St. Paul, MN 55108 (612) 625-5256

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by the National Park Service to measure and describe public use of this area. Response to this request is voluntary. No action will be taken against you for refusing to supply the information requested. Your name will not be asked so the information you give is anonymous. Public reporting burden for this form is estimated to average 20 minutes per respondent. Direct comments regarding the burden estimate or any other aspect of this form to the Office of Information and Regulatory Affairs of OMB, Attention Desk Officer for the Interior Department, (OMB# 1024-0229), Office of Management and Budget, Washington, DC 20503; to the Information Collection Clearance Officer, WASO Administrative Program Center, National Park Service, 1849 C Street, N.W., Washington, DC 20240. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

APPENDIX B: NON-RESPONSE TELEPHONE SURVEY INSTRUMENT

Interviewer Name:_____

Hello, my name is _____ and I'm calling from the Cooperative Fish and Wildlife Research Studies Unit at the University of Minnesota. May I speak to the member of the household who has had the most recent birthday and is 18 years of age or older?

(IF NOT AVAILABLE, TAKE PERSON WITH NEXT MOST RECENT BIRTHDAY)
(WHEN QUALIFIED RESPONDANT IS ON THE LINE, SAY:)

The National Park Service is interested in your opinions about deer management in Cuyahoga Valley National Recreation Area. Your opinions are valuable to the Park Service and will help them in their decision making. Even if you do not feel that deer management is important to you, we are very interested in what you have to say. The survey takes less than 5 minutes to complete, and your opinion does count. Let me assure you that all your answers will be kept confidential. May I ask you some questions, please?

(IF YES, THEN PROCEED TO FILL OUT THE FOLLOWING:)
ID #:

Cuyahoga Valley National Recreation Area stretches for 22 miles along the Cuyahoga River between Akron and Cleveland, Ohio. The National Park Service manages the Recreation Area in cooperation with others who own property within its boundaries. The park preserves 33,000 acres that provide a place for recreational activities including hiking, biking, skiing, sledding, golf, concerts, and plays.

Before we contacted you, were you aware that Cuyahoga Valley National Recreation Area existed?

1. Yes
2. No
3. Not Sure

In recent years, the white-tailed deer population in Cuyahoga Valley has grown. Deer populations in some areas of the Recreation Area range between 30 to 100 deer per square mile, with an average of 40 deer per square mile. Previous studies suggest that deer affect other wildlife and plant species with their population increases beyond 10 deer per square mile. Currently, the National Park Service is trying to decide what it should do, if anything, about the increasing number of deer in the national parks.

How well informed are you about the deer management issue in Cuyahoga Valley? Would you say…

1. Not at all
2. Slightly
3. Moderately
4. Very
9. No opinion

How much do you personally care about the deer management issue in the Recreation Area? Would you say…

1. Not at all
2. Slightly
3. Moderately
4. Very
9. No opinion

Two of the different ways in which the National Park Service could manage deer in the Recreation Area include: 1.) taking no action in regard to the current deer population, and 2.) lethal control to reduce the number of deer. If lethal control were taken, deer would be killed by capturing them and killing them or by using well-trained marksmen to shoot deer within the Recreation Area.

In your opinion, how acceptable would you say it is for the National Park Service to take no action concerning the management of the deer population in Cuyahoga Valley National Recreation Area?

1. Very Unacceptable
2. Moderately Unacceptable
3. Slightly Unacceptable
4. Not Sure
5. Slightly Acceptable
6. Moderately Acceptable
7. Very Acceptable
9. No Opinion

In your opinion, how acceptable would you say it is for the National Park Service to take lethal control concerning the management of the deer population in Cuyahoga Valley National Recreation Area?

1. Very Unacceptable
2. Moderately Unacceptable
3. Slightly Unacceptable
4. Not Sure
5. Slightly Acceptable
6. Moderately Acceptable
7. Very Acceptable
9. No Opinion

What year were you born? 19_____

(What is your gender? ____ Female _____ Male) (you can probably tell without asking)

What is the highest level of education you have completed?

1. Elementary School (1-8)
2. High School
3. Technical School or Some College
4. Completed College Degree
5. Graduate or Professional School

Over the past 5 years, how frequently have you visited Cuyahoga Valley National Recreation Area?

1. Never
2. Once or Twice during the past 5 years
3. Once or Twice each year
4. A few times (3-6) each year
5. Several times (7-15) each year
6. Almost weekly
7. Almost daily
8. Don't know

That is the end of our questionnaire this evening. Are there any additional comments you would like to make?

Thank you very much for your time, we really appreciate your help.

APPENDIX C: SELECTED UNWEIGHTED RESULTS

Number of respondents who were aware that CVNP existed.

Before you received this questionnaire, were you aware that CVNRA existed?	Near Strata			Far Strata		
	weighted	unweighted		weighted	unweighted	
	%	n	%	%	n	%
Yes	97.2	333	97.7	92.2	262	91.6
No	1.0	3	0.9	5.3	17	5.9
Not Sure	1.9	5	1.5	2.5	7	2.4
Total	100.1*	341	100.1*	100.0	286	99.9*

*Percentage totals do not equal 100.0% due to rounding.

Importance and understanding of issues at CVNRA: Far strata, unweighted

Questions	n	Mean	Percent of Respondents by Response Category			
			Not at all	Slightly	Moder-ately	Very
How well informed are you about deer management issues at CVNRA?	308	2.80	12.0	18.5	46.8	22.7
How important is the deer management issue at CVNRA to you personally?	299	3.06	5.0	21.7	35.1	38.1
How much do you personally care about the deer management issue at CVNRA?	301	3.23	3.3	13.6	40.2	42.9
How well informed are you about management issues at CVNRA in general?	300	2.33	20.0	35.0	36.7	8.3
How much do you personally care about what goes on at CVNRA?	299	3.22	2.7	14.1	41.8	41.5
How important, in general, are management issues at CVNRA to you?	295	2.93	7.1	21.0	44.1	27.8
How important is the deer management issue compared to other issues at CVNRA?	288	3.21	3.1	14.6	40.6	41.7

Importance and understanding of issues at CVNRA: Near strata, unweighted

Questions	n	Mean	Percent of Respondents by Response Category			
			Not at all	Slightly	Moder-ately	Very
How well informed are you about deer management issues at CVNRA?	357	3.13	3.6	14.3	47.3	34.7
How important is the deer management issue at CVNRA to you personally?	356	3.33	3.4	12.1	32.3	52.3
How much do you personally care about the deer management issue at CVNRA?	354	3.40	2.3	11.9	29.7	56.2
How well informed are you about management issues at CVNRA in general?	357	2.62	10.4	32.2	42.3	15.1
How much do you personally care about what goes on at CVNRA?	357	3.41	0.6	10.1	37.0	52.4
How important, in general, are management issues at CVNRA to you?	351	3.11	2.6	19.4	42.7	35.3
How important is the deer management issue compared to other issues at CVNRA?	346	3.38	2.9	9.3	35.0	52.9

Acceptability of lethal control and no action as management alternatives

Questions and respondent categories	n	Mean	Percent of Respondents by Response Category*						
			1	2	3	4	5	6	7
In your opinion, how acceptable would you say it is for the National Park Service to take no action concerning the management of deer populations in CVNRA?									
Far strata, unweighted	242	2.51	48.8	19.4	7.0	6.6	3.7	4.1	10.3
Near strata, unweighted	277	2.13	58.5	16.6	5.1	8.3	3.3	1.8	6.5
In your opinion, how acceptable would you say it is for the National Park Service to take lethal control actions concerning the management of deer populations in CVNRA?									
Far strata, unweighted	288	4.98	17.0	6.9	1.7	8.0	7.6	19.4	39.2
Near strata, unweighted	350	5.52	11.4	3.7	1.4	7.4	6.6	19.4	50.0

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Not sure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

Attitudes toward CVNRA and National Park Service staff, Far strata unweighted

Statements	n	Mean	Percent of Respondents by Response Category*				
			1	2	3	4	5
I would not visit CVNRA if there were a lethal deer control program.	293	1.78	59.7	20.5	9.6	2.7	7.5
I think the lethal control of wildlife conflicts with what the National Park Service is supposed to be about.	296	2.45	35.8	26.7	10.8	10.1	16.6
The National Park Service does a good job of managing deer and other resources in CVNRA.	276	3.57	3.3	8.7	32.6	39.1	16.3
I would not participate in activities at CVNRA led by National Park Service staff because of a lethal control program.	293	1.87	56.1	22.9	8.2	4.1	8.9
When deciding about deer issues at CVNRA, the National Park Service will be open and honest in the things they do and say.	286	3.83	2.1	5.6	24.5	42.7	25.2
I would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNRA.	295	2.11	47.8	26.1	5.8	8.5	11.9
A lethal deer control program would make me have a negative opinion of Park staff.	296	1.99	50.0	28.4	4.4	7.4	9.8
The National Park Service can be trusted to make decisions about deer management that are good for CVNRA.	288	3.86	4.5	4.5	22.6	35.5	30.9
The National Park Service will make decisions about deer management in a way that is fair.	290	3.83	3.8	3.8	25.9	38.6	27.9
The National Park Service should lethally control animal populations in national parks if the animals are damaging Park resources.	295	3.77	7.8	11.5	10.9	35.9	33.9
The National Park Service makes decisions that are good for the natural resources of CVNRA.	293	3.98	2.1	2.4	19.8	46.8	29.0

*1= Strongly disagree 3= Unsure 5= Strongly agree
2= Disagree 4= Agree

Attitudes toward CVNRA and National Park Service staff, Near strata unweighted

Statements	n	Mean	Percent of Respondents by Response Category*				
			1	2	3	4	5
I would not visit CVNRA if there were a lethal deer control program.	340	1.60	65.9	20.0	7.4	2.1	4.7
I think the lethal control of wildlife conflicts with what the National Park Service is supposed to be about.	340	2.19	45.3	24.1	9.1	9.7	11.8
The National Park Service does a good job of managing deer and other resources in CVNRA.	333	3.45	7.2	9.9	30.0	36.3	16.5
I would not participate in activities at CVNRA led by National Park Service staff because of a lethal control program.	343	1.65	65.0	19.8	6.4	2.9	5.8
When deciding about deer issues at CVNRA, the National Park Service will be open and honest in the things they do and say.	330	4.04	3.0	4.2	17.3	36.7	38.8
I would be very emotionally upset if the National Park Service were to implement a lethal control program for deer at CVNRA.	350	1.87	57.7	22.0	4.6	7.1	8.6
A lethal deer control program would make me have a negative opinion of park staff.	351	1.75	59.8	23.1	5.1	6.0	6.0
The National Park Service can be trusted to make decisions about deer management that are good for CVNRA.	342	4.06	3.5	3.2	14.6	41.2	37.4
The National Park Service will make decisions about deer management in a way that is fair	345	4.06	2.3	3.2	16.2	43.2	35.1
The National Park Service should lethally control animal populations in national parks if the animals are damaging park resources.	343	3.99	7.3	6.4	10.5	32.1	43.7
The National Park Service makes decisions that are good for the natural resources of CVNRA.	347	4.09	1.7	4.0	13.8	44.1	36.3

*1= Strongly disagree 3= Unsure 5= Strongly agree
2= Disagree 4= Agree

Reasons for accepting a lethal deer control program, Far strata, unweighted

It is acceptable or unacceptable for the National Park Service to use lethal control on deer in CVNRA in order to…			Percent respondents for each category*						
	n	Mean	1	2	3	4	5	6	7
Maintain the natural beauty of CVNRA by reducing browse damage.	293	5.12	10.2	7.5	4.8	7.2	13.3	21.8	35.2
Maintain a healthy deer herd.	299	5.83	5.7	4.0	3.0	4.0	9.0	20.4	53.9
Help maintain a balanced ecosystem in CVNRA.	297	5.68	6.1	4.4	2.7	5.1	12.1	23.2	46.5
Decrease damage by deer to shrubs, crops, and gardens on private property near CVNRA.	298	5.23	10.1	5.0	6.0	5.7	15.4	18.8	38.9
Maintain a diversity of other plant and animal species in CVNRA.	296	5.48	6.1	5.1	4.7	5.4	16.6	22.3	39.9
Reduce the risk of deer-vehicle collisions in and around CVNRA.	296	5.67	7.4	3.4	3.4	5.7	12.2	16.2	51.7
Reduce the risk of diseases associated with deer such as Lyme disease.	294	5.67	5.8	2.4	4.4	7.5	14.3	18.0	47.6

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Unsure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

Reasons for accepting a lethal deer control program, Near strata, unweighted

It is acceptable or unacceptable for the National Park Service to use lethal control on deer in CVNRA in order to…			Percent respondents for each category*						
	n	Mean	1	2	3	4	5	6	7
Maintain the natural beauty of CVNRA by reducing browse damage.	339	5.40	8.6	4.7	5.6	4.4	12.7	23.9	40.1
Maintain a healthy deer herd.	345	6.03	5.2	3.2	1.7	1.2	10.1	18.8	59.7
Help maintain a balanced ecosystem in CVNRA.	343	5.98	6.4	2.3	2.0	1.8	9.9	18.4	59.2
Decrease damage by deer to shrubs, crops, and gardens on private property near CVNRA.	342	5.57	8.8	3.8	3.2	3.5	12.6	22.5	45.6
Maintain a diversity of other plant and animal species in CVNRA.	343	5.75	5.8	2.9	2.6	4.7	14.0	23.0	46.9
Reduce the risk of deer-vehicle collisions in and around CVNRA.	348	5.90	6.6	3.5	2.3	2.9	9.2	17.0	58.6
Reduce the risk of diseases associated with deer such as Lyme disease.	348	5.89	5.5	3.2	1.4	5.5	9.2	22.1	53.2

*1= Very unacceptable
2= Moderately unacceptable
3= Slightly unacceptable
4= Unsure
5= Slightly acceptable
6= Moderately acceptable
7= Very acceptable

Attitudes toward wildlife and natural resources, Far strata, unweighted

Statements	n	Mean	Percent of Respondents by Response Category*				
			1	2	3	4	5
People should be allowed to hunt and trap but only if it is done in the most humane way possible.	298	3.80	9.4	10.1	6.7	38.6	35.2
Causing pain and suffering to wildlife is undesirable, but it is an unavoidable part of life.	297	3.53	9.8	18.2	7.7	38.4	25.9
It is acceptable for people to harm or kill wildlife only to protect their own life.	290	2.68	23.1	37.2	5.5	16.9	17.2
People should not be allowed to use wildlife in any way that may cause harm to wildlife.	282	3.38	11.0	17.0	17.7	31.6	22.7
It's important to know that there are healthy natural ecosystems in the area I live.	297	4.43	0.7	1.4	3.0	43.8	51.2
Wildlife have a right to live a life free from any pain caused by people.	287	3.45	9.8	20.2	10.5	34.5	25.1
Protecting local natural areas is very important to me.	300	4.50	0.7	1.0	2.3	39.3	56.7
It is acceptable for people to use wildlife for whatever reasons they wish.	303	1.84	47.9	35.6	5.9	5.6	5.0
Protecting diverse plant and wildlife populations where I live is very important to me.	299	4.27	1.0	3.3	4.7	49.2	41.8
Killing wildlife is acceptable but only when the wildlife are causing an economic loss.	297	2.69	17.9	36.7	14.1	21.6	9.8
We should not limit human activities, even if some pain and suffering caused to wildlife could be avoided.	292	2.50	24.0	34.3	17.1	16.8	7.9
Ensuring a healthy natural environment is very important to me.	305	4.48	1.3	1.0	2.0	40.3	55.4
Wildlife exist primarily for people to use.	300	2.14	37.3	36.3	7.3	13.0	6.0

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree

Attitudes toward wildlife and natural resources, Near strata, unweighted

Statements	n	Mean	Percent of Respondents by Response Category*				
			1	2	3	4	5
People should be allowed to hunt and trap but only if it is done in the most humane way possible.	332	3.63	14.2	10.2	7.8	33.7	34.0
Causing pain and suffering to wildlife is undesirable, but it is an unavoidable part of life.	329	3.48	10.6	16.7	7.9	43.2	21.6
It is acceptable for people to harm or kill wildlife only to protect their own life.	337	2.71	18.7	38.6	8.3	21.7	12.8
People should not be allowed to use wildlife in any way that may cause harm to wildlife.	321	3.26	13.4	22.1	13.1	28.0	23.4
It's important to know that there are healthy natural ecosystems in the area I live.	339	4.49	0.3	0.6	2.7	42.8	53.7
Wildlife have a right to live a life free from any pain caused by people.	325	3.27	12.0	24.3	10.8	30.8	22.2
Protecting local natural areas is very important to me.	341	4.56	0.6	0.9	1.2	36.7	60.7
It is acceptable for people to use wildlife for whatever reasons they wish.	338	1.74	51.5	34.0	6.8	4.1	3.6
Protecting diverse plant and wildlife populations where I live is very important to me.	334	4.37	0.6	1.5	4.8	46.1	47.0
Killing wildlife is acceptable but only when the wildlife are causing an economic loss.	333	2.73	18.3	36.6	11.7	20.7	12.6
We should not limit human activities, even if some pain and suffering caused to wildlife could be avoided.	314	2.44	21.0	38.9	21.7	11.8	6.7
Ensuring a healthy natural environment is very important to me.	341	4.57	0.3	0.0	2.1	38.1	59.5
Wildlife exist primarily for people to use.	332	1.94	41.9	37.7	8.7	8.1	3.6

*1= Strongly disagree
2= Disagree
3= Unsure
4= Agree
5= Strongly agree