

Rock Creek Park

Final White-Tailed Deer Management Plan /
Environmental Impact Statement

National Park Service
U.S. Department of the Interior



ROCK CREEK PARK

Final White-Tailed Deer Management Plan / EIS

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UNITED STATES DEPARTMENT OF THE INTERIOR – NATIONAL PARK SERVICE
FINAL WHITE-TAILED DEER MANAGEMENT PLAN ENVIRONMENTAL IMPACT STATEMENT
ROCK CREEK PARK, WASHINGTON, DC

Lead Agency: National Park Service (NPS), U.S. Department of the Interior

This *Final White-tailed Deer Management Plan/Environmental Impact Statement* (plan/EIS) describes four alternatives for the management of deer at Rock Creek Park, as well as the environment that would be affected by the alternatives and the environmental consequences of implementing these alternatives. The plan/EIS also responds to and incorporates the public and agency or other stakeholder comments received on the draft plan/EIS.

The purpose of this action is to develop a white-tailed deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park. Action is needed at this time to address the potential of deer becoming the dominant force in the park's ecosystem, and adversely impacting native vegetation and other wildlife; a decline in tree seedlings caused by excessive deer browsing and the ability of the forest to regenerate in Rock Creek Park; excessive deer browsing impacts on the existing shrubs and herbaceous species; and deer impacts on the character of the park's cultural landscapes. White-tailed deer herds have increased substantially within and around Rock Creek Park, and results of vegetation monitoring in recent years have documented the adverse effects of the large herd size on forest regeneration.

Under alternative A (no action), the existing deer management plan of monitoring, data management, research, and use of protective caging and repellents in landscaped areas would continue; no new deer management actions would be taken. Under alternative B, several non-lethal actions, such as large-scale exclosures (large fenced areas), and reproductive control of does via sterilization and an acceptable reproductive control agent when feasible would be taken to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. Under alternative C, direct reduction of the deer herd would be achieved by sharpshooting and by capture and euthanasia of individual deer in certain circumstances where sharpshooting would not be appropriate. Alternative D (preferred alternative) would combine elements from alternatives B and C: sharpshooting and capture/euthanasia would be used initially to quickly reduce the deer herd numbers, followed by population maintenance via reproductive control methods if these are available and feasible; if not, sharpshooting would be used as a default option for maintenance.

The potential environmental consequences of the alternatives are addressed for vegetation; soils and water quality; wetlands and floodplains; wildlife and wildlife habitat (including deer); rare, unique, threatened or endangered species; cultural landscapes; soundscapes; visitor use and experience; visitor and employee safety; socioeconomics; and park management and operations. Under alternative A, no action would be taken to reverse the expected long-term continued growth in the deer population, and damage to vegetation would likely continue. Impairment to vegetation, wildlife habitat, and certain rare plant species could result in the long term if alternative A was implemented. No impairment of any resources or values of Rock Creek Park would result from the implementation of the preferred alternative.

The draft plan/EIS was available for public and agency review and comment from July 13 to November 2, 2009. Copies of the document were distributed to individuals, agencies, organizations, and local businesses. This final plan/EIS provides responses to substantive stakeholder and public comments, incorporates those comments and suggested revisions where necessary, and provides copies of relevant comment letters. Once this document is released and a Notice of Availability (NOA) is published by the Environmental Protection Agency, a 30-day no-action period will follow. Following the 30-day period, the alternative or actions constituting the approved plan will be documented in a record of decision that will be signed by the Regional Director of the National Capital Region. For further information regarding this document, please contact:

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PURPOSE OF AND NEED FOR ACTION

The “Purpose of and Need for Action” chapter explains what this plan intends to accomplish and why the National Park Service (NPS) is taking action at this time. This final White-Tailed Deer Management Plan and Environmental Impact Statement (plan/EIS) presents three action alternatives for managing white-tailed deer (*Odocoileus virginianus*), and assesses the impacts that could result from continuation of the current management framework (alternative A) or implementation of any of the action alternatives. Upon conclusion of the plan and decision-making process, the alternative that is selected will become the white-tailed deer management plan for Rock Creek Park, which will guide future actions for a period of 15 years. Brief summaries of both purpose and need are presented here, but more information is available in the “Park Background” section of this chapter.

PURPOSE OF THE PLAN / ENVIRONMENTAL IMPACT STATEMENT

The purpose of this plan/EIS is to develop a white-tailed deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park.

NEED FOR ACTION

Although relatively rare at the turn of the twentieth century, white-tailed deer populations in the District of Columbia metropolitan area have rebounded during recent years. Deer thrive on food and shelter available in the “edge” habitat conditions created by suburban development. In addition, fragmentation of the landscape and the increase in developed areas have reduced suitable hunting opportunities. This is particularly true in Maryland’s growing suburban areas, some of which are adjacent to the District of Columbia (MD DNR 1998).

Although there are no historic records before 1960 of the deer population specific to Rock Creek Park, deer herds have increased substantially within and around Rock Creek Park since that time. Park observation records show four sightings of deer in Reservation 339 of Rock Creek Park in the 1960s. Deer sightings increased to 19 by the 1970s, and in 1984, the first recorded deer sighting in Glover-Archbold Park occurred. In the late 1980s (1987–1989) there were 39 deer sightings. By the early 1990s, deer sightings were so prevalent that observation cards were no longer completed. In 2007, sampling indicated 82 deer per square mile in the park, and deer densities continued at high levels in 2008 (66 deer per square mile) and 2009 (67 deer per square mile). Results of vegetation monitoring in recent years have documented the effects of the large herd size on forest regeneration.

The deer population in Rock Creek Park has grown and continues to exist at relatively high densities and to have adverse effects on the park’s vegetation; therefore, action is needed at this time to address:

- The potential of deer becoming the dominant force in the park’s ecosystem, and adversely impacting native vegetation and other wildlife.
- A decline in tree seedlings caused by excessive deer browsing and the ability of the forest to regenerate in Rock Creek Park.
- Excessive deer browsing impacts on the existing shrubs and herbaceous species.

The purpose of this plan/EIS is to develop a white-tailed deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park.

- Deer impacts on the character of the park's cultural landscapes.
- Opportunities to coordinate with other jurisdictional entities currently implementing deer management actions beneficial to the protection of park resource and values.

OBJECTIVES IN TAKING ACTION

Objectives define what must be achieved for an action to be considered a success. Alternatives selected for detailed analysis must meet all objectives to a large degree and must also resolve the purpose of and need for action. Using the park's enabling legislation, mandates, and direction in other planning documents, as well as service-wide objectives, management policies, and the Organic Act, park staff identified the following objectives relative to deer management at Rock Creek Park:

VEGETATION

- Develop and implement informed, scientifically-based vegetation impact levels and corresponding measures of deer population density that would serve as a threshold for taking prescribed management actions within the park.
- Protect the natural abundance, distribution, and diversity of native plant species within the applicable park units by reducing excessive deer browsing, trampling, and nonnative seed dispersal.
- Maintain, restore, and promote a mix of native plant species and reduce the spread of nonnative plant species through effective deer management.

WILDLIFE AND WILDLIFE HABITAT

- Allow for a white-tailed deer population within the park while protecting other park resources.
- Protect the natural abundance, distribution, and diversity of native animal species within the park by reducing excessive deer browsing, trampling, and nonnative seed dispersal.
- Protect lower canopy, shrub, and ground nesting bird habitat from adverse effects of deer browsing.

THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN

- Protect habitat of rare plant and animal species from adverse effects of deer, such as excessive deer browsing, trampling, and nonnative seed dispersal.

CULTURAL RESOURCES

- Protect the integrity, variety, and character of the cultural landscapes by reducing excessive deer browsing, trampling, and nonnative seed dispersal.

VISITOR USE AND EXPERIENCE

- Share information with the public regarding the deer population and the forest regeneration process and diversity, including the role of deer as part of a functioning park ecosystem, not the primary driving force within it.
- Initiate cooperative efforts to address deer effects on the park and surrounding communities.

PARK MANAGEMENT AND OPERATIONS

- Share information with park staff and other regional parks regarding the deer population and management strategies.

Purpose—The 1890 enabling legislation for Rock Creek Park states:

- The area is to be “perpetually dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States.”
- The park is to “provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible.”

Based on NPS’s interpretation of this legislation, as presented in the Rock Creek Park and the Rock Creek and Potomac Parkway General Management Plan, Rock Creek Park exists to:

- Preserve and perpetuate for this and future generations the ecological resources of the Rock Creek valley within the park in as natural a condition as possible, the archeological and historic resources in the park, and the scenic beauty of the park.
- Provide opportunities for the public to experience, understand, and appreciate the park in a manner appropriate to the preservation of its natural and cultural resources.
- Provide opportunities for recreation appropriate to the park’s natural and cultural resources. The purpose of the tributary parks adjacent to Rock Creek Park includes the preservation of forests and natural scenery in and around the District of Columbia (NPS 2005a).

Rock Creek and Potomac Parkway exists to connect Rock Creek Park and the National Zoological Park to Potomac Park with a scenic road; and prevent pollution and obstruction of Rock Creek.

Significance—Park significance statements capture the essence of the park’s importance to the nation’s natural and cultural heritage. Understanding park significance helps managers make decisions that preserve the resources and values necessary to the park’s purpose. The following significance statements, as detailed in the Rock Creek Park and the Rock Creek and Potomac Parkway General Management Plan (NPS 2005a), recognize the important features of the park.

- Rock Creek Park is one of the oldest and largest naturally managed urban parks in the United States. The park and parkway contains approximately 2,100 acres of valuable plant and wildlife habitat, providing protection for a variety of native species within a heavily urbanized area.
- Rock Creek Park encompasses a rugged stream valley of exceptional scenic beauty with forested, natural landscapes and intimate natural details, in contrast to the surrounding cityscape of Washington, D.C.
- Rock Creek Park’s forests and open spaces help define the character of the nation’s capital.
- Rock Creek valley was important in the early history of the region and in the development of the nation’s capital. The park’s cultural resources are among the few tangible remains of the area’s past.
- Rock Creek Park is an oasis for urban dwellers, offering respite from the bustle of the city.
- Rock Creek Park is a historic designed landscape incorporating early twentieth century picturesque and rustic features designed to enhance the visitors’ experience of the naturalistic park scenery.
- Located in the heart of a densely populated cosmopolitan area, Rock Creek Park serves as an ambassador for the national park idea, providing outstanding opportunities for education, interpretation, and recreation to foster stewardship of natural and cultural resources.

The following significance statement recognizes the important features of the parkway: The Rock Creek and Potomac Parkway provides a scenic gateway to the city’s downtown area, known as the monumental core.

Forward Looking Infrared Surveys (1997–1999)

In March 1997, the park used FLIR, a nighttime survey conducted from a helicopter to estimate the total number of deer in the park. In the first two years of the survey, the main reservation of Rock Creek Park (Reservation 339), Glover-Archbold Park, and Battery Kemble Park were surveyed. In 1999 (year 3 of the survey), only Rock Creek Park was surveyed, to allow a more intensive survey in one location to attempt to obtain more accurate results. In Rock Creek Park the survey results were as follows: 1997, 87 deer; 1998, 80 deer; and 1999, 90 deer in the park. The company conducting the survey stated the results were 75% accurate or better; however, due to unacceptable error rate, the park did not use FLIR after 1999.

Distance Sampling (2000–present)

In 2000, Dr. Brian Underwood of the U.S. Geological Survey taught Distance Sampling, which accurately estimates animal population density, to the National Capital Region natural resource personnel. Trained Rock Creek Park staff conducted the first Distance Sampling in November 2000, estimating 62 deer per square mile within the park. Since 2000, Distance Sampling is repeated annually over three to four consecutive nights (table 2). In 2004, 75 deer per square mile were surveyed, a decrease from 98 deer per square mile in 2003 (NPS 2005d). The densities surveyed in 2005 and 2006, respectively, were 52 and 58 deer per square mile (K. Ferebee, pers. comm. 2007b). The 2007 density was estimated at 82 deer per square mile (K. Ferebee, pers. comm. 2008a). Densities in 2008 and 2009 were estimated at 66 and 67 deer per square mile, respectively (K. Ferebee, pers. comm. 2010a).

TABLE 2. DISTANCE SAMPLING RESULTS IN ROCK CREEK PARK

Year	Deer per Square Mile (density)	Standard Error of the Mean (±)
2000	62	11.6
2001	63	6.9
2002	60	8.0
2003	98	17.3
2004	75	7.8
2005	52	6.9
2006	58	8.9
2007	82	10.21
2008	66	10.05
2009	67	8.91

Source: K. Ferebee pers comm. 2007b, 2008f, 2010a

Effects of White-tailed Deer on Vegetation Structure and Diversity at Rock Creek Park

In addition to determining abundance and distribution of deer at Rock Creek Park, the park is also conducting studies to determine the impacts of deer on other natural resources. Studies conducted to date include long-term monitoring of unfenced vegetation plots and studies of paired plots (fenced and unfenced) to assess the effects of deer browsing on forest vegetation.

Vegetation Impacts

Long-term Vegetation Plots

In 1990, 27 long-term vegetation monitoring plots (20 meters \times 20 meters [66 feet \times 66 feet], unfenced plots) were placed in three geographic regions in the park—north, central, and south—to ensure that all areas would be adequately sampled. Plots were placed randomly within each region to capture general changes in vegetation over time. There were not many deer documented in the park in 1990, providing a good baseline of vegetation characteristics. Data from these long-term unfenced plots, read every four years (1991, 1995, 1999, 2003, 2007), indicate that in 1991, $3.1 \pm 0.9\%$ of the stems were browsed compared to $31.1 \pm 2.9\%$ in 2003. During this time, the shrub cover decreased from $54.63 \pm 5.9\%$ in 1991 to $14.92 \pm 2.2\%$ in 2003. Tree seedlings decreased significantly from 1991 across all other years measured (Hatfield 2005). A cumulative data analysis of all years through 2007 (Hatfield 2008) shows that all tree seedling counts generally declined since 1991 and that counts for all height classes were near zero in 2007. The data collected from these monitoring plots indicate that the mean seedling stocking rates (or tree seedling weighted measure, see appendix A) declined significantly from 1991 to 2007, with a stocking rate of $2.26 \pm 0.32\%$ in 2007, significantly below the 67% stocking rate recommended for regeneration (Hatfield 2008; Stout 1998 appendix A). Additional information including the most recent results of long-term monitoring can be found in the “Vegetation” section of the “Affected Environment” chapter.



Understory growth in a fenced plot

Paired Plots

In 2000, 20 paired plots (one plot fenced, one plot unfenced, located next to each other in similar vegetation conditions) were established in Rock Creek Park proper and Glover-Archbold Park. From 2001 to 2004, the paired plots showed that plant cover outside the fenced plots was substantially less when compared to plant cover inside the fenced plots over the study period. Specifically, the mean percentages of plant cover for nonnative, native, herbaceous, and woody plants were 2 to 3 times less in the paired unfenced plots than in the paired fenced plots (Rossell et al. 2007). A report summarizing the results of the paired plot data from 2001 to 2009 (Krafft and Hatfield 2011) states that vegetation in plots protected from deer herbivory for 9 years showed significantly greater vegetative cover compared to plots not protected from deer herbivory. This effect was most pronounced for woody and shrub cover. Cover by the dominant species was not significantly greater in the exclosed plots compared to the paired unfenced control plots, indicating that the significant differences observed for groups were not driven by single species within those groups. With respect to vegetation thickness, the results indicate that protection from deer herbivory produced significantly higher levels of vegetation in the exclosed plots compared to the paired unfenced control plots for both the low (0 to 30 centimeters, or 0 to about 12 inches) and middle (30 to 110 centimeters, or about 12 to 43 inches) height classes. These impacts can be directly attributed to deer browsing and indicate deer are

affecting the integrity of the understory structure and species composition, diminishing the value of habitat for other wildlife. While there is some understory vegetation and the browse line is not prominent at Rock Creek Park, trends indicate that an unmanaged deer population could lead to these problems, which are currently being faced by similar eastern national parks such as Catoctin Mountain Park, Maryland.

CURRENT DEER MANAGEMENT AT ROCK CREEK PARK AND IN SURROUNDING JURISDICTIONS

Rock Creek Park currently has no formal deer management plan, but does undertake numerous deer management activities. In addition to the deer population and vegetation monitoring described in previous sections, other deer management activities currently undertaken by Rock Creek Park include assisting D.C. Animal Control with injured animals (e.g., darting animals, euthanizing injured animals), responding to neighbors' questions about the deer population (e.g., how to keep deer out of yards, preventing browsing of landscaping vegetation), and disseminating information about the deer population. These actions constitute this plan's "no action" alternative, and details about current management actions are described in this document in "Chapter 2: Alternatives" under alternative A.

District of Columbia – Fisheries and Wildlife

Although there is not a formal deer management plan in the District of Columbia, issues associated with an overabundance of deer still exist. As issues arise, they are addressed mainly by two District government agencies: the Department of Health and the Department of the Environment. The Department of Environment's Fisheries and Wildlife Division has four major components: the Aquatic and Wildlife Education Branch, the Fisheries Research and Management Branch, the Grant Coordination and Licensure Branch, and the Wildlife Management and Research Branch. Collectively these branches monitor the District's aquatic and wildlife resources. Although not currently engaged in deer management activities, the Fisheries and Wildlife Division has hired several wildlife biologists and established an inventory and monitoring program.

The majority of deer related actions in the city are undertaken by the District of Columbia Department of Health (DCDOH). The DCDOH, through a contract with the Washington Humane Society, provides animal control and animal disease prevention services and assists the public with animal-related problems. Services offered by this agency include, but are not limited to, animal disease control, rabies suspect control, stray animal control, dangerous dog control, licensing, enforcement, sterilization, and adoption. Specific activities that may relate to this deer management effort include conducting disease surveillance, enforcement of animal control laws, and disposal of animals by redemption to owner, release to the wild, humane intravenous euthanasia; providing education via pamphlets and classroom visits, and assisting District of Columbia agencies, such as the Metropolitan Police Department, as requested (DCDOH n.d.).



White-tailed deer near the road at Rock Creek Park

Maryland National Capital Park and Planning Commission – Montgomery County Division

In addition to the District of Columbia, Rock Creek Park shares a border with Montgomery County, Maryland. Along this border, the NPS Rock Creek Park transitions into the Maryland National Capital Park and Planning Commission (M-NCPPC)-managed Rock Creek Park, a portion of the 33,000-acre county park system. Montgomery County and the NPS have concurrent jurisdiction over Rock Creek

(the waterway). Montgomery County has been actively addressing deer overabundance since 1995.

Citizen complaints about the effects of deer, including deer/vehicle collisions and damage to landscape vegetation, began to increase in the county around 1992. At that time, the county established a task force to determine if deer overabundance was a problem and, if so, to discuss solutions for addressing it. The efforts of the task force focused on information relative to conflicts between deer and people in the county and resulted in the April 1994 *Report of the Task Force to Study White-Tailed Deer Management*. The report included a recommendation to the county council to establish a working group to prepare a comprehensive deer management plan. This working group is still active today.

As a result of the working group efforts, in 1995 the *Comprehensive Management Plan for White-tailed Deer in Montgomery County, Maryland* was published. This plan recognized that the type and extent of deer-human conflicts varies throughout the county and addresses deer from a variety of standpoints including public safety issues (collisions), economic issues (agricultural interests, agricultural preserves), and the maintenance and protection of natural areas. The goal of the deer management plan in Montgomery County is to address the effects of deer. The plan does not provide a density goal to be reached (Montgomery County 1995a).

To develop the plan, the county collected and centralized data on the deer and their impacts so that these data could be used as a foundation for management decisions. Data collected during the initial stages included information on deer/vehicle collisions that was later incorporated into a geographic information system to identify hot spots and target areas, effects on agricultural lands and residential properties, and effects on natural areas. Part of the data collection involved vegetation monitoring where a number of plots were established throughout the county in upland and stream valley parks. The study, concluded in 1999, indicated that county forests experienced degradation, but it did not show to what extent increasing deer densities were responsible.

In 1990, the county placed one set of paired unfenced and fenced plots (20 meters \times 20 meters [66 feet \times 66 feet]) in each of nine parks (Storm and Ross 1992). The plots were arbitrarily placed in the county parks and there was no replication. Data from the paired plots showed an average loss of 65% of species to deer browsing. A qualitative assessment of 1995–2001 paired plot data concluded that (1) deer impacts are reducing height, number, and species diversity of seedlings within county parks, (2) understory density has been dramatically reduced, and (3) the effects appear greatest in parks with higher densities of deer (Montgomery County 2002). In 1995, the *Inventory of Rare, Threatened, and Endangered Plant Populations and Significant Habitats on Selected Park Lands of M-NCPPC in Montgomery County, Maryland* stated:

Every park surveyed during this project had an overpopulation of deer. The severity of this problem varies from one park to another, but it represents a considerable threat to the native vegetation in every park (Montgomery County 1995b).

*Depredation means
damage or loss.*

The county studied a variety of deer management methods, and in 1996 in areas where immediate attention was required, managed deer hunts were implemented. The first managed hunt occurred in northern Montgomery County on a 400-acre agricultural history farm park.

The hunt was considered a success based on several factors: it was completed safely with no injuries or accidents; the deer population was reduced to the desired goal; and impacts to the surrounding communities (landscape and crop damages) were reduced. Managed hunts have continued throughout the county and the program has been expanded since its implementation (W. Hamilton, pers. comm. 2008).

The county also considered the use of repellents/scare devices, fencing/physical exclusion, habitat management, supplemental feeding, restoration of predators, modifying legal harvest, agricultural depredation permits, direct reduction through sharpshooting or special or managed hunts, contraception,

and trapping and removal/relocation. Although all were considered, not all of these methods have been or will be implemented.

One method implemented throughout the county is sharpshooting. When sharpshooting activities occur, a notification is posted at the entrance of the park stating that the park is closed to the public from sunset to sunrise. M-NCPPC Park Police officers perform the sharpshooting, removing deer for approximately five hours per night. Deer are processed and donated to the Capital Area Food Bank. The county notes that, while this method is effective, the administration and logistics are difficult. The county has estimated the cost of sharpshooting at \$150 per animal, which includes approximately \$50 for deer processing for donation and the rest for ammunition, staffing, and other needs. The other form of direct reduction, special or managed hunts, involves taking land previously closed to hunting and holding a managed hunt under strict guidelines for limited duration. To participate in the hunts, hunters must pass special training and marksmanship tests.

The county has considered contraception and has worked with the Humane Society of the United States and the National Institute of Standards and Technology (NIST) to implement a study in Wheaton Regional Park. However, the Wheaton Regional Park site was determined inappropriate for such an effort as policy in the State of Maryland prefers an enclosed population for research studies.

As part of the Comprehensive Management Plan (1995), the Montgomery County Deer Management Work Group annually reviews deer impact data and creates a list of recommendations for the upcoming year. In fiscal year 2003, this report stated that the management options implemented over the previous six years appeared to be having an effect. The report also stated that, in areas where managed hunts had been held (Little Bennett Regional Park, the Agricultural History Farm Park, and Seneca Creek State Park), the number of deer/vehicle collisions had been reduced and remained at lower levels. The fiscal year 2003 study also identified 19 “hot spots” for deer impacts and listed a combination of lethal and non-lethal methods at each site to manage the deer population (Montgomery County 2002).

Deer removals are not currently taking place in Maryland’s lower Rock Creek Park. The M-NCPPC has been addressing other areas within the county that have higher concentrations of deer. The park is currently on a list of areas to be managed for deer, but specific management actions have not yet been implemented. The M-NCPPC continues to express interest in working together with Rock Creek Park to coordinate management efforts (K. Ferebee, pers. comm. 2008h).

Comprehensive Management Plan for White-tailed Deer in Montgomery County (1995, updated 2004)

The M-NCPPC, which oversees the Montgomery County Department of Park and Planning, created a comprehensive management plan for white-tailed deer on the premise that deer are an important and valued part of the county’s natural heritage; however, deer are an opportunistic species that can, in the absence of checks and balances, become abundant enough to conflict with human interests. The plan, developed to be open-ended and adaptable, acknowledges that deer-human conflicts vary and one single management prescription may not be appropriate. The *Comprehensive Management Plan for White-tailed Deer in Montgomery County* establishes goals and objectives for managing deer in the county, develops a plan of action for each of the problem issues identified, and sets a timetable for implementation of these actions. The management plan is composed of four components:

Part I addresses the collection, centralization, and use of accurate data on white-tailed deer and their effects on Montgomery County, and forms the foundation on which sound management decisions must be based.

Part II outlines the implementation of a comprehensive public awareness and public education program to better inform citizens about deer-human conflicts and how to prevent them.

Part III describes the various management alternatives that are available to reduce the deer effects and outlines the implementation of population management alternatives to reduce deer populations in areas where this is deemed necessary.

Part IV outlines the current status of the plan's implementation and the work program for the current fiscal year—this component of the plan is updated annually.

Other Deer Management Efforts

Deer Management Efforts within the National Park Service

Other national park units have been involved in deer management planning efforts. Plans and associated EISs have been completed at Gettysburg National Military Park and Eisenhower National Historic Site in Pennsylvania, Catoctin Mountain Park in Maryland, and Valley Forge National Historical Park in Pennsylvania. Deer management planning and environmental review efforts are also being undertaken at Indiana Dunes National Lakeshore and Cuyahoga Valley National Park in Ohio and are in various stages of completion. The following provides short summaries for the three deer management plans that have been completed and implemented by the NPS to date.

Gettysburg National Military Park and Eisenhower National Historic Site (Pennsylvania)

The Gettysburg deer management plan was initiated in response to increasing concerns about conflicts involving white-tailed deer and other park resources, first noted in the 1970s. Data collected between 1987 and 1992 showed that deer were excessively abundant and were causing losses to crops and forest regeneration. Vegetation monitoring indicated that excessive browsing of deciduous forest vegetation was a serious threat to forest regeneration; in addition, winter wheat yields were reduced by an average of 30%, and corn was reduced by 20%. The preferred alternative was a combination of sharpshooting in the park and working with the Pennsylvania Game Commission and private landowners to increase public hunting outside the park. The initial density goal was set at 25 deer per square mile.

Sharpshooting began at Gettysburg in 1995 with 503 deer taken. More than 28,000 pounds of deer meat was donated to local food banks. In 1996, 355 deer were taken and more than 20,000 pounds of meat were donated. A lawsuit was filed in 1997 by six Gettysburg residents and three animal rights groups that alleged that the NPS failed to comply with National Environmental Policy Act (NEPA) and with the National Historic Preservation Act (NHPA). Removals were suspended until the court found in favor of the NPS in January 2000. By 2002, there were more tree seedlings in the unfenced plots when compared to fenced plots, and there was an increase in the species diversity of seedling, sapling, and overstory tree species in the long-term monitoring plots. The deer density goal of 25 deer per square mile was achieved in 2009 after 11 culling events during a 13-year period (Bates, pers. comm. 2011b).

Valley Forge National Historical Park (Pennsylvania)

At Valley Forge, white-tailed deer monitoring between 1983 and 2009 indicated an increase in deer density from 31-35 deer per square mile to 241 deer per square mile within the park. Browsing of tree seedlings and shrubs by deer in the park prevented forest regeneration, and thus, degraded habitat for many of the park's wildlife species. The park was directed by Congress to develop a White-tailed Deer Management Plan and Environmental Impact Statement in 2001. The preferred alternative continued current deer management actions including monitoring vegetation and deer population size, monitoring for chronic wasting disease, maintaining small fenced areas, removing roadkill, educating the public, and coordinating with the Pennsylvania Game Commission. It also incorporated lethal sharpshooting and nonlethal actions to quickly reduce and then maintain the deer population at a level that protects native plant communities and promotes forest regeneration and habitat. Target deer density was identified as

31-35 deer per square mile, but the success of the plan is being measured by the level of successful forest regeneration.

The Record of Decision was signed on October 1, 2009. A lawsuit was filed by several animal welfare groups in November 2009, asserting that the NPS had failed to comply with various federal statutes and regulations. This lawsuit was dismissed in October 2010, and the park began implementation of the plan late in 2010. The park worked with professional biologists from the USDA-Wildlife Services (USDA-WS) to conduct safe, effective, and humane actions to reduce deer populations. The park adopted additional safety measures that included conducting population reduction actions when the park is closed, establishing safety zones, using bait to attract deer to safe removal locations, conducting shooting actions from elevated positions, and using non-lead ammunition in accordance with NPS policy. All activities were coordinated with local law enforcement authorities and the Pennsylvania Game Commission. As of March 2011, the park removed 550 deer from the park. Over 14,000 pounds of the meat were donated to local food banks, following guidance provided by the NPS Office of Public Health (Bates, pers. comm. 2011c).

Catoctin Mountain Park (Maryland)

Problems related to an overabundance of deer were suspected in Catoctin Mountain Park (Maryland) in the 1970s. In the 1980s, park staff believed that the overabundant deer could cause a long-term decline in the abundance and diversity of native plants, and data collected in the 1990s indicated that forest regeneration was nearly absent within the majority of the park. Deer exclosures were established in the 1990s and 2004 to show the forest regeneration potential in the absence of deer. Catoctin has been monitoring deer density since 1983. A 1989 pellet-group survey indicated 145 deer per square mile. Initial Distance Surveys (2000-2001) found densities at 185 deer per square mile. The 2009 Distance Survey reported a density of 125 deer per square mile. In response to the problem, the park completed a Deer Management Plan/ Final Environmental Impact Statement that supports forest regeneration and provides for long-term protection, conservation, and restoration of native species and cultural landscapes. A deer density goal of 15- 20 deer per square mile was selected based on the recommended density for a healthy forest, although the deer population will be maintained at the density that allows the forest to regenerate. The preferred alternative includes the use of lethal actions (sharpshooting, capture and euthanasia) to manage deer impacts.

The Record of Decision for the EIS was signed in April 2009 and the park entered into an Interagency Acquisition Agreement with the USDA-WS on September 15, 2009, to conduct deer removal operations. A new biologist position was created to manage the deer project, and a seasonal interpretive ranger was hired to develop and conduct public programs about deer management at the park. Deer reduction was completed for the first time in February – March, 2010. Park staff worked with trained federal employees from the USDA-WS over 18 working days and, using firearms, removed 233 white-tailed deer, which was within the original estimated reduction of 200-300 animals in the EIS. Approximately 4,400 pounds of meat were donated to the Maryland and Thurmont Food Banks. Brain stems and lymph nodes were extracted from all deer and screened for chronic wasting disease (CWD). All samples returned negative results. During the second season of deer management (December 13, 2010 – March 23, 2011), 192 white-tailed deer were removed over 19 working days by USDA-WS, again within the original estimated range of the 200 animals in the EIS. The local Maryland Food Bank (including pantries in Frederick County, MD) and the Thurmont Food Bank received approximately 4,743 pounds of meat during the winter of 2011.

All removal actions included extensive measures to ensure a safe, humane, and successful operation. This included using highly qualified and experienced personnel familiar with the park's geography, conducting population reduction actions in closed areas of the park, establishing safety zones, shooting from elevated positions with a safe backdrop, and using non-lead ammunition. Catoctin closely coordinated communication with local law enforcement officials and the Maryland Department of Natural Resources.

Deer management will continue at Catoctin annually during the fall and winter. Before culling begins each year, deer density will be estimated each fall and vegetation plots will be monitored each summer to help park resource managers set population and removal goals (Donaldson, pers. comm. 2011).

Deer Management and Research by State and Other Federal Agencies

The Wildlife Services program of the Animal and Plant Health Inspection Service (APHIS), within the USDA, has been involved in the evaluation and/or implementation of a number of deer management plans on federal properties in the eastern United States. USDA-ARS Beltsville Agricultural Research Center has been conducting managed deer hunts since 1995. Average annual removal of deer is 200 to 400 (Mike Dudley, USDA-ARS biological science technician, pers. comm. June 10, 2008, reported in S. Bates, pers. comm. 2008c). Studies conducted for the states of New Jersey and Virginia concluded that direct reduction of the deer population was the preferred alternative (USDA 2000a, 2000b). In Pennsylvania the resulting management plan included a wide range of management options to assist landowners with damage control (USDA 2003).

*Direct Reduction —
Lethal removal of
deer; includes both
sharpshooting and
capture/euthanasia.*

The Mason Neck National Wildlife Refuge (NWR), located in northeastern Virginia, has been conducting managed deer hunts since 1989. The refuge is managed as part of the Potomac River NWR Complex, which includes Mason Neck, Occoquan Bay, and Featherstone NWRs. The Occoquan Bay NWR also initiated its first managed deer hunt in 2002. The managed hunts at both NWRs are in response to overabundance of white-tailed deer. The purpose of these hunting programs is to improve the quality of the habitat and protect the nesting habitat for bald eagles (*Haliaeetus leucocephalus*) at Mason Neck and migratory bird species at Occoquan Bay. The Refuge hunting program facilitates this goal by reducing the local deer herd through removal of a higher percentage of females and young deer (USFWS et al. 2005a, 2005b, 2005c).

The Maryland Department of Natural Resources has issued two permits to conduct reproductive control studies, one to the USDA-WS for research on the effectiveness of GonaCon® immunocontraceptive vaccine (GCIV) on female white-tailed deer in the White Oaks Federal Research Center in White Oak, Maryland, and the second to the Humane Society of the United States to test the effectiveness of different forms of porcine zona pellucida (PZP) on female white-tailed deer in the National Institute of Standards and Technologies (NIST) site in Gaithersburg, Maryland. APHIS conducted the research at the White Oak site, which is about 1 square mile in size and has a fenced perimeter that is relatively impermeable to deer. In 2004, female deer were individually darted with an immobilization drug and then treated with a Gonadotropin Releasing Hormone (GnRH) vaccine, GonaCon®. GnRH needs to be injected 8 to 10 weeks prior to rutting. This product has shown 0 to 4 years of effectiveness without boosters in some studies. Twenty-five does were treated and 15 does were marked as a control group. Each doe received a radio collar and ear tags to mark the animals. During the spring following initial treatment, 11 out of 15 control animals had fawns, where only 3 out of the 25 treated does gave birth. In the second year at White Oak, more than half (54%) of the treated does gave birth (K. Sullivan, Maryland State Director, USDA-WS, Wildlife Society Meeting presentation, 9/20/2007, as reported by S. Bates, pers. comm. 2008b). These numbers give some sense of the current effectiveness of this product, which is discussed in more detail in “Chapter 2: Alternatives.”

The NIST site and the NPS Fire Island National Seashore used PZP in contraceptive control research studies. SpayVac®, a vaccine containing PZP, does not need a booster, but is no longer available on the market. PZP is not currently registered with the Food and Drug Administration (FDA), and the FDA is

in designated areas, generally using firearms. However, the use of archery may be considered on a case-by-case basis in certain areas where use of firearms is not appropriate, such as near residences. Methods, removal numbers, and gender preferences are described in more detail below.

This action would continue for a minimum of three years, at which time it is estimated that the population would be reduced to the initial density goal of 15 to 20 deer per square mile.

Methods

Qualified federal employees or contractors would be used to implement this alternative. All employees or contractors used would be experienced with sharpshooting methods and would have the necessary sharpshooting qualifications. They typically would be expected to coordinate all details related to sharpshooting actions, such as setting up bait stations, locating deer, sharpshooting, and disposition of the deer (donation of meat and/or disposal of waste or carcasses).

In most locations, high-power, small caliber rifles would be used from close range. Non-lead ammunition will be used for any lethal removal of deer, whether for culling or the dispatching of sick or wounded wildlife. The use of non-lead ammunition for these activities, whether by contract or NPS staff, will be carried out in order to preserve the opportunity to donate the meat or to be left in the field for scavenging wildlife. Every effort would be made to make the shootings as humane as possible. Deer injured during the operation would be put down as quickly as possible to minimize suffering. Noise suppression devices and night vision equipment would be used to reduce disturbance to the public. Activities would be in compliance with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, and Firearms (ATF).

In certain locations, sharpshooting may be done using archery (bow and arrow). Possible locations would include areas of the park that are too narrow or close to occupied buildings or residences. Shooting with bow and arrow would be done from close range by federal employees or contractors specifically experienced with this type of deer removal.

Sharpshooting with firearms would primarily occur at night (between dusk and dawn), during late fall and winter months when deer are more visible and fewer visitors are in the park. In some restricted areas, sharpshooting may be done during the day if needed, which could maximize effectiveness and minimize the overall time of restrictions. If this is done, the areas would be closed to park visitors. The public would be notified of any park closures in advance, exhibits regarding deer management would be displayed at visitor centers, and information would be posted on the park's website to inform the public of deer management actions. Visitor access could be limited as necessary while reductions were taking place, and NPS personnel and U.S. Park Police (USPP) would patrol public areas to ensure compliance with park closures and public safety measures.

Qualified federal employees or contractors trained in all aspects of sharpshooting actions would perform all sharpshooting activities. Training would include safety measures to protect both visitors and NPS employees. If more than one shooting location was used, areas would be adequately separated to ensure safety.

Bait stations could be used to attract deer to safe removal locations, concentrate deer, improve removal success, and allow the maximum use of ground as a backstop (i.e., shooting would be directed downward toward the ground). Bait stations would consist of small grains, apples, hay, or other food placed on the ground. The stations would be placed in park-approved locations away from public use areas to maximize

Qualified, trained federal employees or contractors would be used to implement this alternative. Every effort would be made to make the shootings as humane as possible.

the efficiency and safety of the reduction program. The amount of bait placed in any one location would vary depending on the bait used and the number of deer in the immediate area.

The park intends to donate all deer meat to local charitable organizations to the maximum extent possible.

CAPTURE AND EUTHANASIA

Capture and euthanasia would be used in limited circumstances where sharpshooting may not be appropriate. The preferred technique for this method would be for NPS employees or their authorized agents to trap deer, immobilize them using chemical injection, and euthanize them. Activities would occur at dawn or dusk and in the fall or winter months when fewer visitors are in the park, but may occur at any time of day depending on deer activities.

Deer would be captured with nets, traps, or chemical immobilization by dart gun and euthanized as humanely as possible. If trapped or netted; deer would be immobilized prior to any type of euthanasia being administered. Euthanasia methods could include use of a penetrating captive bolt gun or exsanguination. Several methods of wildlife trapping could be used, including but not limited to drop nets and box traps. Most trapping methods involve using bait to attract deer to a specific area or trap. Box traps involve a confined space that would safely hold deer, while net traps are triggered to drop over deer and restrain them for staff to approach (Lopez et al. 1998). The method of capture would be selected based on the specific circumstances (location, number of deer, accessibility).

Several actions would be taken to ensure safety of the operation. NPS employees or their authorized agents trained in the use of penetrating captive bolt guns or tranquilizer guns would perform these actions. Training would include safety measures to protect both visitors and NPS employees. NPS employees or authorized agents would also be qualified to handle live deer in order to prevent disease transmission and prevent any harm to an animal or an employee/agent. Appropriate safety measures would be followed when setting drop nets or box traps. Visitor access could be limited as necessary while capture and euthanasia activities were taking place, and USPP officers, supplemented by NPS park rangers, would patrol public areas to ensure compliance with park closures and public safety measures.

All actions would be conducted in accordance with AVMA recommendations for the humane treatment of animals to the greatest extent possible (AVMA 2001).

The number of deer removed by capture and euthanasia would be recorded, including the age and sex, location of removal, circumstance requiring removal and capture, and lethal method used.

Numbers of Deer Removed (combination of sharpshooting and capture and euthanasia)

Based on the 2009 survey, Rock Creek's deer population is estimated at about 315, or 67 deer per square mile for the 4.69 square miles of the entire park management unit. Park staff would determine the number of deer to be removed from the park based on the most recent survey and a population goal of 15 to 20 deer per square mile. About three years would be required to reach this goal, given the limited accessibility to some areas of the park and changes in population movements as the population decreased. Based on 2009 data, the following assumptions were used for analysis:

- *Year 1* — With concentrated efforts, about one-half of the deer could be removed the first year (157 deer: 147 from sharpshooting and 10 from capture and euthanasia), assuming periodic removal efforts over a five-month period (November to March). This would reduce the population to 158 deer or about 34 deer per square mile.
- *Year 2* — Assuming a 20% growth rate in the deer herd (a general rate commonly used by deer managers considering reproduction, mortality, and recruitment), the deer population would be an estimated 190 deer by the second year. If half of this population was removed (95 deer: 85 from

sharpshooting and 10 from capture and euthanasia), 95 deer would remain in the park, or about 20 deer per square mile.

- *Year 3* — Again assuming a 20% growth rate in the deer herd, the deer population would be an estimated 114 deer by the third year. If 44 deer are removed (34 from sharpshooting and 10 from capture and euthanasia), 70 deer would remain in the park, or about 15 deer per square mile.
- *Subsequent Years* — Assuming the same 20% growth rate in the deer herd, about 14 deer would need to be removed annually in subsequent years to maintain the population at about 70 deer or 15 deer per square mile. This number may vary annually depending on success of previous removal efforts, deer adaptations to removal efforts, regeneration response, and other factors.

Several factors could influence the number of years to reach the initial deer density goal. A key factor would be the response of vegetation to reduced deer browsing pressure. Additionally, as the deer population decreased through successful reduction efforts, deer might become adapted to the capture operations and become more evasive, increasing the effort necessary to reach the removal numbers in any year. Existing reproduction and mortality rates might differ from the estimate used in this projection. If reproduction rates were higher and mortality lower than estimated, the population growth would be greater than 20%, and more deer would need to be removed, potentially increasing the time to reach the initial density goal. The converse would be true if reproduction rates were lower and mortality rates higher than estimated, resulting in fewer deer having to be removed, and efforts could take less time. Immigration of deer into the park could also have a substantial effect on the number of deer to be removed, especially if the goal was toward a low population density (Porter et al. 2004).

The number of females in the population would also influence reproduction rates. Does would be preferentially removed during the first few years (see following discussion), which would shift the herd composition to a 50:50 or less sex ratio. Reproduction should decrease as the number of females in the population decreases.

Gender Preference

During the first two to three years of removal, both does and antlered deer (bucks) would be removed based on opportunity, although there would be a preference for removing does because this would reduce the population level more efficiently over the long term. Buck-only removal would not control population growth, as deer populations are largely dependent on the number of does with potential for reproduction. Harvest of does is necessary to stabilize or reduce populations, and for a rapid decrease in deer population, at least 15 does should be taken for every 10 bucks during the first three years of treatment (West Virginia University 1985).

Records would be kept on the age and gender of all deer removed from the park to aid in defining the local population composition. This information would be compared with composition data collected during park population surveys.

Disposal

The park intends to donate as much deer meat to local charitable organizations as possible. If this is done, field dressing would occur in the park, and the entrails would be placed in barrels for disposal at a facility that accepts such waste from deer removal operations, or possibly buried if there is an appropriate location. The meat processor would work with charitable organizations to distribute the meat.

In cases where a few deer have been euthanized (without chemical use) at a given site, the waste or carcasses may be moved away from roads and trails and left on the surface to be naturally scavenged and/or decompose. Carcasses may also be taken to a location where they would be left in an isolated area away from the public to decompose and/or be scavenged. The selected disposal option would be

dependent on whether chemicals were used, suitability of meat for donation, amount of waste or carcasses, and distance from trails, roads, and nearby facilities and residences.

In cases where the meat from deer is unsuitable for donation to charity or surface disposal, the carcasses and waste would be buried on site or collected for disposal in an approved landfill. There are no landfills in the District, and the District's transfer station (garbage collection / sorting facility) does not accept dead animals; however, nearby Maryland landfills may accept dead animals as long as they are not diseased. The park would investigate the cost of sending carcasses to landfills in both Maryland and Virginia as the need arises.

If on-site burial is selected, any burial locations would be in previously disturbed sites in or near developed areas of the park. These sites would be generally devoid of vegetation except for weeds and outside any floodplain boundaries or wetlands. In addition, these sites would not be located within an area identified as an archeological site or as having archeological resources. Disposal pits would be approximately 8 feet wide by 8 feet long by 5 feet deep. They would be dug prior to removal activities and covered and surrounded with fencing to prevent entry. Soil removed from the pits would remain on site and be covered to prevent erosion. Carcasses and waste would be transported to the pit(s) within 12 hours, and a layer of carcasses and waste would be put into the pit. That layer would be covered by hand with approximately 1 foot of the soil that was removed from the pit. The second and final layer of carcasses and waste would be covered with approximately 3 feet of soil. The soil covering the filled pit would be covered with straw or wood chips to prevent erosion. The fence would be secured between uses to prevent entry.

If a pit is not completely filled between removal activities or if the soil is frozen, the pit would be covered with tarps or plywood, and fencing would be installed to prevent entry and reduce visibility. When conditions permit, the carcasses and waste would be covered with soil or the pit filled. When the weather and season are appropriate, the soil covering the pits would be seeded with an NPS approved seed mix and mulched. Any soil not used to refill the pits would be used in other locations within the park.

Should CWD be found in the deer herd, the park would follow current NPS Public Health Service guidelines or NPS Standard Operating Procedures for storage and disposal of deer infected with the disease. A standard operating procedure is now under development for the NPS National Capital Region.

MONITORING

SHARPSHOOTING AND CAPTURE AND EUTHANASIA

Throughout the removal efforts, vegetation monitoring would be conducted, as described under alternative A and in appendix A, to document changes in deer browsing and forest regeneration that might result from reduced deer numbers. Vegetation monitoring would be conducted annually to document vegetation recovery. If the objectives were being met and changes in regeneration were observed as anticipated at the target deer density goal, removal efforts would be maintained at the level necessary to keep the deer population at the target density. Adjustment of the removal goal in either direction from the initial deer density goal could be made based on how close the conditions indicated by the vegetation monitoring were to the park's forest regeneration objectives (see "Adaptive Management" section).

CHRONIC WASTING DISEASE

CWD opportunistic and targeted surveillance would occur as described under alternative A. Sharpshooting and the use of captive bolt gun may result in animals being unable to be tested (due to location of impact); however, CWD testing would be performed whenever possible. All animals sampled would be stored per approved standard operating procedures until test results are obtained. All deer testing negative for CWD would be donated in accordance with NPS Public Health guidelines.

IMPLEMENTATION COSTS

Costs of implementing alternative C would include the same costs described under alternative A (continued monitoring programs, limited small area protective caging), plus the cost of sharpshooting and capture/euthanasia. Costs to cover additional staffing using USPP that would likely be necessary for closing off all or portions of the park during sharpshooting have also been included. Estimated costs for alternative C are discussed below and summarized in table 8.

TABLE 8. COST ESTIMATE — ALTERNATIVE C: COMBINED LETHAL ACTIONS*

Action	Assumptions	Annual Cost	Cost for the 15-year Planning Period
Same actions as described for alternative A (common to all alternatives)	See alternative A		\$308,880
Sharpshooting ^a	Years 1–3 at \$200 per deer (147 deer in year 1, 85 in year 2, and 34 in year 3)	Year 1 — \$29,400 Year 2 — \$17,000 Year 3 — \$6,800	\$393,400 ^a
	Years 4–15 at \$400 per deer (14 deer annually)	Years 4–15 — 14 deer × \$400/deer = \$5,600/year × 12 = \$67,200	
	USPP staffing for park closure and safety	Year 1 — \$78,000 Year 2 — \$39,000 Year 3 — \$23,400 Years 4–15 — 12 × \$7,800 = \$93,600 Subtotal - \$234,000	
	Park staff support for park closures	Years 1–15 — 15 × \$2,600/year = \$39,000	
Capture and Euthanasia ^b	For estimate, assume up to 10 deer removed per year in years 1–3 and assume a maximum of five deer in years 4–15 at \$500 per deer ^b	Year 1 — \$5,000 Year 2 — \$5,000 Year 3 — \$5,000 Years 4–15 — \$2,500/year = (12 × \$30,000) + 15,000	\$45,000
Total			\$747,280

a. This cost could increase if deer density goal is not reached by the third year.

b. Costs for this method would vary from \$100 to \$1,000 per deer, but is expected to be in the middle (\$500) of this range.

* Costs have been adjusted for 4% estimated inflation over two years between the draft plan/EIS and final plan/EIS; assume per deer estimates for deer sharpshooting and euthanasia are still valid.

SHARPSHOOTING

Factors affecting the final cost of implementing this alternative include deer density, number of deer to be removed, ease of access to deer, number and location of bait stations, equipment availability, amount of data to be collected from deer, and processing requirements. The greatest costs would generally be incurred when the deer and bait stations were difficult to access, when deer were wary of humans, the removal area was large, and when deer densities were lower (requiring more time to find each deer). Conversely, lower costs could be expected when the removal area was smaller, deer density was high (less time to find each deer), and deer were accustomed to human activities.

Costs and efficiencies of sharpshooting programs have been assessed in the literature. One study documented that costs ranged from \$72 to \$260 per deer harvested (Warren 1997). A study in Minnesota compared methods to reduce deer abundance, and sharpshooting averaged \$121 per deer harvested (Doerr et al. 2001). Gettysburg National Military Park reported that costs averaged \$128 per deer, with 355 deer

removed (Frost et al. 1997). Costs of up to \$354 per deer were recently reported (DeNicola and Williamson 2008).

It is estimated that the sharpshooting part of this alternative would initially cost \$200 per deer for the first 3 years, increasing to \$400 per deer as the population decreased, and that these estimates are still valid for 2009.

Costs for USPP staffing to close off the park during sharpshooting were estimated assuming that there would be 20 staff needed during a 6-hour night shift to close off all or parts of the park. Also, it was assumed that deer removal would require 10 nights in year 1, 5 nights in year 2, 3 nights in year 3, and 1 night in subsequent years, and that overtime pay would be required.

CAPTURE AND EUTHANASIA

The costs for capturing deer would likely vary. Factors would include the location of the removal, accessibility, type of trap or immobilization drug used, the means of deer disposal, and the type of euthanasia used. Based on the experience of park personnel, and the range of costs identified for capturing deer under the reproductive control action, costs could range from \$100 to \$1,000 per deer. An experienced contractor estimates that the minimum cost for capture and euthanasia would be \$400 per animal (White Buffalo, Inc. 2005); therefore, actual costs for this method would likely be closer to the middle of the range (\$500), and this estimate is assumed to be valid for 2009. It was assumed that 10 deer would be removed by this technique in the first three years, and a maximum of five deer per year in subsequent years.

ALTERNATIVE D: COMBINED LETHAL AND NON-LETHAL ACTIONS (PREFERRED ALTERNATIVE)

Alternative D would include all actions described under alternative A, plus a combination of certain additional lethal and non-lethal actions from alternatives B and C to reduce deer herd numbers. The lethal actions would include both sharpshooting and capture/euthanasia, and these actions would be taken initially to quickly reduce the deer herd numbers. Reproductive control of does would be implemented to maintain the reduced herd numbers through sterilization or acceptable reproductive control agents, if feasible. If reproductive controls meeting required criteria become available sooner than expected, the park could select to use these first (before the initial sharpshooting), so that deer are not as hard to capture and more can be treated. However, for this analysis, it is assumed that sharpshooting would be conducted first and that population maintenance would be conducted via the most practicable method and could include a combination of lethal and non-lethal methods (i.e., sharpshooting could be used for maintaining the deer herd if necessary).

ADDITIONAL PROPOSED ACTIONS UNDER ALTERNATIVE D (PREFERRED ALTERNATIVE)

SHARPSHOOTING

Sharpshooting would be used to initially reduce the deer population in areas of the park and as a maintenance treatment if needed. Generally, the methods described in alternative C, using sharpshooting instead of capture and euthanasia as the primary removal method, would be implemented. Sharpshooting would involve using trained sharpshooters to shoot deer in designated areas using small caliber rifles from close range. Removal numbers and gender preferences would also be similar to alternative C. This action would continue for a minimum of three years, at which time it is estimated that the population would be reduced to the initial density goal of 15 to 20 deer per square mile. The disposal methods described in alternative C would apply to alternative D as well.

CAPTURE AND EUTHANASIA

Capture and euthanasia would be implemented in areas where sharpshooting may be inappropriate (e.g., near residences where there could be a concern about safety or noise). This procedure would include trapping or immobilizing deer using the technique that would create the least amount of stress as described in alternative C. The disposal methods described under alternative C would apply to alternative D as well.

REPRODUCTIVE CONTROL

Reproductive control could be implemented, as described under alternative B, to maintain the deer population level. Assuming lethal actions reduced the deer population to the initial deer density goal after year 3, for this analysis it was assumed that an acceptable reproductive control agent (if available and feasible) would be used to maintain the desired population number starting in year 4. The success of using a reproductive control agent on a population that has undergone sharpshooting efforts for several years would depend on advances in reproductive control technology, sensitivity of the deer herd to humans, methods used by the sharpshooters, changes in immigration with reduced deer density, and general deer movement behavior (Porter et al. 2004; Naugle et al. 2002). It should be expected that getting close enough to administer remote injections would become increasingly difficult after sharpshooting efforts due to deer behavior changes in response to previous human interaction. Sterilization would also be considered as a reproductive control maintenance option. This would reduce the number of does requiring treatment over the long term, although the initial cost per doe is about the same as reproductive control.

Assuming a park deer population of 70 deer (density of about 15 per square mile) following sharpshooting, with 65% (45) of the deer being does (K. Ferebee, pers. comm. 2008g), 41 does (45 × 90%) would need to be treated annually, assuming that leuprolide or a similar agent were used. If an agent like Gonacon® is available and meets the criteria established for use of reproductive control agents, the frequency of treatment and costs would be reduced (current formulations of Gonacon® last up to four years). However, until a reproductive control agent meets the use criteria described under alternative B, sharpshooting would be used for long-term maintenance of the reduced deer population size as needed (i.e., approximately 14 deer would be removed annually as described under alternative B).

MONITORING

Monitoring under this alternative would include the same opportunistic and targeted surveillance for CWD described under alternative A, as well as the same techniques described for capture and euthanasia (alternative C), and reproductive controls (alternative B). This would include spotlight surveys to assess the effectiveness of reproductive controls and vegetation monitoring to document changes in forest regeneration that would result from reduced deer numbers. The numbers of deer to be removed or treated in subsequent years would be adjusted based on the success of previous removal or reproductive control efforts, projected growth in the population, and vegetation and deer monitoring results.

IMPLEMENTATION COSTS

Costs of implementing alternative D would include the same costs described under alternative A, plus additional costs for sharpshooting, capture and euthanasia, and reproductive control. Estimated costs for alternative D based on assumptions provided are discussed below and summarized in table 9.

**TABLE 9. COST ESTIMATE — ALTERNATIVE D: COMBINED LETHAL AND NON-LETHAL ACTIONS
(PREFERRED ALTERNATIVE)***

Action	Assumptions	Annual Cost	Cost for the 15-year Planning Period
Same actions as described for alternative A	See alternative A		\$308,880
Sharpshooting ^a	Years 1–3 at \$200 per deer (147 deer in year 1, 85 in year 2, and 34 in year 3)	Year 1 — \$29,400 Year 2 — \$17,000 Year 3 — \$6,800 Subtotal - \$53,200	\$232,600
	USPP staffing for park closure and safety (years 1–3 only)	Year 1 — \$78,000 Year 2 — \$39,000 Year 3 — \$23,400 Subtotal - \$140,400	
	Park staff support for park closures	Years 1–15 — 15 × \$2,600/year = \$39,000	
Capture and Euthanasia ^b	For estimate, assume up to 10 deer removed per year in years 1–3 at \$500 per deer	Year 1 — \$5,000 Year 2 — \$5,000 Year 3 — \$5,000	\$15,000
Reproductive Control ^c	For estimate, assume treatment of 41 does annually starting in year 4 (for 12 years)	\$1,000 per deer or \$41,000 per year	\$492,000
Deer Population Monitoring	Three days of survey plus data Analysis each summer (same as alternative B)	\$5,200	\$78,000
Total			\$1,126,480

a. This cost could increase if the deer density goal was not reached by the third year.

b. Costs for this method would vary but assumed mid-range cost of \$500.

c. Reproductive control costs could be reduced considerably with improved technology. For example, if Gonacon® or a similar agent were used, with treatments needed only once every four years, costs after the first year of reproductive control could fall to about \$20,000 per year. Reproductive control costs could similarly be reduced over the long term if sterilization is used.

* Costs have been adjusted for 4% estimated inflation over two years between the draft plan/EIS and final plan/EIS; assume per deer estimates for deer sharpshooting and euthanasia are still valid.

SHARPSHOOTING

Factors affecting the final cost of implementing this alternative include deer density, number of deer to be removed, ease of access to deer, number and location of bait stations, equipment availability, amount of data to be collected from deer, and processing requirements. The greatest costs would generally be incurred when the deer and bait stations were difficult to access, when deer were wary of humans, the removal area was large, and when deer densities were lower (requiring more time to find each deer). Conversely, lower costs could be expected when the removal area was smaller, deer density was high (less time to find each deer), and deer were accustomed to human activities.

Costs and efficiencies of sharpshooting programs have been assessed in the literature. One study documented that costs ranged from \$72 to \$260 per deer harvested (Warren 1997). A study in Minnesota compared methods to reduce deer abundance and sharpshooting averaged \$121 per deer harvested (Doerr et al. 2001). Gettysburg National Military Park reported that costs averaged \$128 per deer, with 355 deer removed (Frost et al. 1997). Sharpshooting costs of up to \$354 per deer were reported by DeNicola and Williamson (2008), and costs of \$91 to \$300 per deer were reported by McDonald and McKinley in 2009.

It is estimated that this alternative would cost \$200 per deer. However, if sharpshooting were needed in the future years (e.g., if reproductive control or capture and euthanasia were not used for maintenance), costs could increase up to \$400 per deer as the population decreased. It is assumed these estimates are still valid for 2009.

Costs for USPP staffing to close off all or portions of the park during sharpshooting were estimated assuming that there would be 20 staff needed during a 6-hour night shift, and that deer removal would require 10 nights in year 1, 5 nights in year 2, and 3 nights in year 3, and that overtime pay would be required.

CAPTURE AND EUTHANASIA

The cost for using capture and euthanasia to supplement the sharpshooting effort would be the same as described for alternative C. For the purposes of analysis for this plan, it is assumed that up to 10 deer would be removed per year in years 1–3 at \$500 per deer.

REPRODUCTIVE CONTROL

For purposes of analysis for this plan, it is assumed that reproductive control would begin in year 4. Costs could be reduced considerably depending on the results of the lethal efforts, the cost per deer based on current technology, and the year treatment begins. To minimize costs (to reduce the number of deer to be treated), sharpshooting would occur before reproductive control is implemented. Sharpshooting would also focus on removing does to minimize reproduction. If reproductive control criteria are met, an acceptable reproductive control agent would be used to maintain the reduced population size. Until the criteria are met, reduction through sharpshooting would continue for population size maintenance.

ADAPTIVE MANAGEMENT

The U.S. Department of the Interior (USDI) requires that its agencies “. . . use adaptive management to fully comply” with the Council on Environmental Quality’s (CEQ) guidance that requires “a monitoring and enforcement program to be adopted . . . where applicable, for any mitigation” required in a NEPA planning process (516 Departmental Manual [DM] 1.3 D[7]; 40 CFR 1505.2). In addition, the Department has recently outlined the adaptive management approach in a technical guide developed to provide guidance to all USDI bureaus and agencies (Williams et al. 2007).

According to the USDI Technical Guide (Williams et al. 2007), “Adaptive management is a systematic approach for improving resource management by learning from management outcomes (Sexton et al. 1999). An adaptive approach involves exploring ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions (Murray and Marmorek 2004). Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stakeholders who learn together how to create and maintain sustainable resource systems (Bormann et al. 2006).”

Adaptive management should be used when decisions must be made despite uncertainty and there is a commitment to using this approach. In addition to these two primary conditions, adaptive management should be used when (1) there is a real management choice to be made; (2) there is an opportunity to apply learning; (3) clear and understandable objectives can be identified; (4) the value of information gained is high; (5) uncertainty can be expressed as models that can be tested; and (6) monitoring is in place or can be put in place to reduce uncertainty (Williams et al. 2007). The deer management situation at Rock Creek Park meets all of these conditions.

Appendix E provides more details about the phases of adaptive management as it would be applied to this deer management plan.

The **sycamore-green ash association** is a floodplain forest, found along stream banks, low terraces, and other areas subject to temporary or irregular flooding. It occurs mostly on Codorus silt loam, with smaller deposits of sand and gravel intermixed on small tracts of 30 to 40 acres. The canopy is characterized by sycamore and box elder, with red maple and tulip poplar often co-dominant with the sycamore. Green ash, white ash (*F. americana*), and hickory species are frequent associates. The shrub layer may be dominated by spicebush, with black haw (*Viburnum prunifolium*) occurring less frequently. Characteristic herbaceous species include jewelweed (*Impatiens capensis*), mild water-pepper (*Polygonum hydropiperoides*), jack-in-the-pulpit, enchanter's nightshade (*Circea quadrisulcata*), skunk cabbage (*Symplocarpus foetidus*), and others.

The **loblolly pine-mixed oak association** is found exclusively on Joppa soils in the park, which are well-drained to excessively well-drained sandy loams of the coastal plain, on mid- to lower slopes or in sheltered ravines. This association is distinguished by the relatively high diversity of tree species, including a number of species that are not common at other locations in the park. No single species is dominant in the canopy. The community is characterized by the presence of black cherry (*Prunus serotina*), sweet gum (*Liquidambar styraciflua*), loblolly pine, blackjack oak (*Q. marilandica*), chestnut oak, post oak, and southern red oak. Willow oak is typical in the subcanopy and shrub layer. Beech tends to be absent or sparse. Typical shrubs and vines include Pennsylvania blackberry (*Rubus pennsylvanicus*), greenbrier, Virginia creeper (*Parthenocissus quinquefolia*), arrow-wood (*Viburnum dentatum*), poison ivy, and grape. The herbaceous layer tends to be patchy, with seedlings of canopy tree species.

The **Virginia pine-oak association** occurs on well-drained soils of hilltops in the park. It is an early to mid-successional forest characterized by the presence of Virginia pine in the canopy. Associates include white oak, southern red oak, post oak, black oak, tulip poplar, and beech. Mapleleaf viburnum is typical in the shrub layer and herbs tend to be sparse.

Shrub areas in the park are found in forest openings, either along ecotones or in small gaps within the forest matrix. These occur on many different soil types and are an early successional stage, often with many exotic species. Typically seen are vines growing over blackberry, spicebush, and/or tree seedlings of tulip poplar, cherry, or slippery elm (*Ulmus rubra*).

Meadow habitats are also present in the park, with a total of 15 small meadow areas ranging in size from 0.3 to 4 acres. The meadow areas are composed mostly of deep grass and other herbs that grow when frequent mowing of lawn areas is stopped.

Some wetland vegetation is found in small areas of the sycamore-green ash association adjacent to Rock Creek (see the "Wetlands and Floodplains" section). Most wetland vegetation that naturally occurred along Rock Creek has been eliminated and replaced with seeded and transplanted species as the land was developed. The selection of species used for landscaping was based primarily on aesthetics and growth characteristics in the past, but now only native species are used unless a specific species is needed as part of a cultural site.

EXOTIC INVASIVE SPECIES

BACKGROUND

Invasive nonnative plants (exotic species) seriously threaten the integrity of native habitats, including eastern deciduous forests, by aggressively displacing and killing native plants, altering native habitats, and stifling forest regeneration. Exotic species populations have been slowly increasing over the past century or more and seem to have exploded within the last 30 years. The exotic species problem is particularly acute in urban parklands where extensive edges and frequent human disturbances enhance opportunities for aggressive exotic plants to become established, such as at Rock Creek Park (NPS 2004a).

Ornamental vines like Asiatic bittersweet (*Celastrus orbiculatus*), porcelain berry (*Ampelopsis brevipedunculata*), and English ivy kill trees along the edges of forest openings. Multiflora rose (*Rosa multiflora*) forms occasional dense thickets that out-compete native shrubs and ground covers. Herbaceous invaders like lesser celandine (*Ranunculus ficaria*) and Japanese stiltgrass (*Microstegium vimineum*) blanket the floodplain, crowding out native herbaceous species and, in some cases, changing soil chemistry to make it harder for native plants to recover. Most invasive plants get started in open, disturbed areas where there is ample space and light. However, several of the most aggressive invaders Asiatic bittersweet, English ivy, burning bush (*Euonymus alatus*), privet (*Ligustrum* spp.), nonnative viburnums (*Viburnum plicatum*, *V. dilatatum*, and *V. sieboldii*), Japanese barberry (*Berberis thunbergii*), garlic mustard (*Alliaria petiolata*), lesser celandine, and Japanese stiltgrass also penetrate undisturbed forest interiors, reducing light levels to the forest floor, limiting regeneration, and displacing native shrubs and saplings (NPS 2004a). Deer can promote nonnative species through habitat alteration (disturbance to vegetation and soils from trampling) and through seed dispersal from seeds carried on their coats or found in fecal matter (Vellend 2002; Vellend et al. 2004; Williams and Ward 2006).

The threat of exotic species in Rock Creek Park was recognized as early as the 1970s, when control efforts were undertaken against kudzu (*Pueraria lobata*) in the park. During the late 1970s, research specialists began studying the effects of several of the most aggressive vines including English ivy, wisteria (*Wisteria sinensis*), and kudzu. Park staff implemented various pilot projects to document the spread of exotic species and find treatments for the most obvious threats. A research project was initiated in 1996 to determine the environmentally safest and most effective means of controlling woody vines, especially Asiatic bittersweet and porcelain berry, which were identified as the most ecologically damaging exotic species in the park. All other woody exotic species identified were also treated to avoid having one exotic plant replace another. During this research, staff treated not only the test plots, but also began to treat woody exotic species in large areas within the northern floodplains of the park. Another three-year research project (2000–2002) determined effective control methods for the invasive spring ephemeral lesser celandine. These studies have provided valuable information about how to control these most serious exotic plants. Through this research, park staff learned a great deal about the biology of the various species invading parklands and control methods for those that have been identified in the past (NPS 2004a).

The park began an invasive exotic plant management program in 1996 and efforts have thus far been directed at extending the areas treated during the research. Research plots were positioned in the densest areas of Asiatic bittersweet and porcelain berry and at the upstream end of Rock Creek in the park. Starting at these heavily infested areas allowed staff to remove the seed source for many woody vines in the Rock Creek floodplains. These floodplains also contain ephemeral ponds, an important wildlife habitat. In 2004, the park completed a draft of the “Invasive Exotic Plant Management Plan” (NPS 2004a). The purpose of this plan is to describe the principles under which exotic plant management will be prioritized and undertaken for all the natural areas within the park. The plan details methods to be used, with the understanding that methods will be adapted as more effective and efficient methods are developed and/or monitoring indicates that current methods are ineffective.

EXOTIC INVASIVE SPECIES IN ROCK CREEK PARK

There are currently 286 nonnative vascular plant species known to exist in the park, which vary widely in terms of their current and potential ecological effects. Some nonnative species have naturalized, but are not expected to cause damage to the ecosystem by displacing native species or changing the critical characteristics of the system, while a few species are ecologically destructive when allowed to spread. Several factors influence the relative adverse effects of a given exotic plant species:

- invasiveness, based on its life history
- potential ecological harm

- treatment potential
- discreteness of population

Based on literature searches and direct observation, the park's natural resource management staff identified 56 of the 286 species that seem to be negatively impacting the park's natural resources or have the potential to do so. Based on FY 2007 and 2008 expenditures, the park is spending about \$100,000 annually on invasive plant species control, including staff and volunteer time and contracted work (K. Ferebee, pers. comm. 2008e).

VEGETATION AND ROLE OF CLIMATE CHANGE

Some parks are already seeing changes to vegetation and wildlife habitat and water resources as a result of climate change, and research predicts that many parks will see changes to these resources in upcoming decades (NPS 2009). The NPS has mapped vegetation in Rock Creek Park and is including the park in the National Capital Region Network for inventory and monitoring. There is no documented change in vegetation as a result of climate change in Rock Creek, but funds are currently being sought to examine potential changes in vegetation community composition in response to climate change in the park. Data suggest that the climate in the National Capital Region Network is changing with less precipitation in summer and more in fall, and average temperatures may be on the rise (NPS 2010a). The proposed monitoring will be a primary gauge of how the forest is being affected by this. Potential impacts of climate change could include change in plant community makeup and range changes, more and/or persistent pests, and spread of exotics (NPS 2010a). The current state of highly browsed ground and shrub layer vegetation in the park affects the ability of these plants to survive other stressors such as climate change.

cars for more direct contact with the outdoors. Based on a traffic study conducted in 2004, approximately 2.5 to 3 million visitors per year drive on the Beach Drive segments north of Broad Branch Road and Joyce Road. South of Blagden Avenue, more than 7.5 million drivers travel on Beach Drive annually (Parsons 2004). More than 9 million drivers per year take Beach Drive south of Klinge Road (District of Columbia 2001a, b). Travel time analyses in the 2004 traffic study showed that some of the automobile travel through the park on Beach Drive on weekdays is not time effective, which suggests that some drivers use Beach Drive for the aesthetic quality of the experience.

Other park roads are less heavily traveled. Based on average daily traffic volumes from the District of Columbia and the 2004 traffic study, use includes the following:

- Wise Road – 1.3 million vehicles per year
- Bingham Drive – 285,000 vehicles per year
- Ross Drive – 125,000 vehicles per year north of the Glover Road intersection and 290,000 vehicles per year south of this intersection on Glover Road

Wise Road and Bingham Drive can provide cross-park connections, but use of these routes may also be based on the quality of the experience traveling through the park. Many routes are more efficient than the north/south trending Glover Road and Ross Drive, indicating that motorized use of these roads is related to enjoyment of the drive (NPS 2005a).

VISITOR AND EMPLOYEE HEALTH AND SAFETY

Deer management actions all have safety implications for employees and visitors, especially if firearm use is considered. Deer–vehicle collisions are of particular concern to residents and commuters. The NPS is committed to providing appropriate, high-quality opportunities for visitors and employees to enjoy parks in a safe and healthy environment. Further, the NPS will strive to protect human life and provide for injury-free visits.

The general management planning process identified the following optimum conditions related to visitor use and experience that influence health and safety:

- a safe healthful environment is provided for visitors and employees; management actions strive to protect human life and provide for injury-free visits
- park visitors assume a substantial degree of risk and responsibility for their own safety when visiting areas that are managed and maintained as natural, cultural, or recreational environments
- effective law enforcement occurs as part of a cooperative community effort; the park encourages and assists park neighbors in the development of cooperative crime prevention and detection programs

Health and safety applies to Rock Creek Park visitors, local residents, and Rock Creek Park employees.

VISITOR HEALTH AND SAFETY

A visitor accident or incident is defined as an accidental event affecting any non-NPS employee that results in serious injury or illness requiring medical treatment, or in death. Park rangers and employees post public notices on bulletin boards around the park and on the park website in order to ensure that visitors to Rock Creek Park are properly informed regarding safety concerns. The park will produce press releases if a situation requires public notification. Visitors can also gain information about safety measures and protocols by speaking to park rangers (K. Ferebee, pers. comm. 2007e).

Rock Creek Park visitor safety incidents are based on U.S. Park Police data because Rock Creek Park does not have its own emergency management system or law enforcement staff. In 2005, there were 85

visitor incidents within the park. In 2006, the reporting system was changed to reflect how many incidents occurred with visitor injuries. In 2006, there were 100 injured visitors; in 2007, 71 visitors were injured (Gunther, pers. comm. 2007, 2008).

The majority of incidents within Rock Creek Park are a result of vehicle accidents. A primary safety issue for visitors and local residents related to this plan involves injuries from deer/vehicle collisions.

DEER/VEHICLE COLLISIONS

Deer/vehicle collisions are a threat to human safety and are one of the predominant sources of deer mortality. In past studies, the number of deer/vehicle collisions has been correlated to both traffic volume and greater deer abundance. However, a working group within the Metropolitan Washington Council of Governments found that although deer/vehicle collisions have increased in the park, traffic volumes have not increased. Traffic data from 1995 and 2003 were compared with the correlating deer/vehicle collision numbers. Traffic volumes remained basically the same or decreased, while deer/vehicle collisions increased, indicating that the number of deer may be an important factor in the increased number of accidents occurring (Metropolitan Washington Council of Governments 2006).

Deer ranges are largest in winter and early spring, and there is a greater chance of a collision during these periods. The greatest number of reported animal crashes occur in November, and the second highest in October, which is deer mating season. In addition, deer often travel in family groups, causing more concern for motorists.

Rock Creek Park has surveyed dead deer since the early 1980s, and in 1989 the park recorded the first deer struck and killed by a vehicle. Data collected indicate an upward trend in deer/vehicle collisions from 1989 to 2007. Data collected included sex, age, and the presence or absence of parasites. Park staff continue to gather these data on park roads and roads adjacent to the park. The park now records the location of road-killed deer in a Geographic Information System (GIS) layer. Road-killed deer are typically found by park staff, and are not usually reported by people outside of the NPS. An average of 42 deer/vehicle collisions resulting in the death of the deer were recorded since 2003, with a high of 52 reported in 2006 (K. Ferebee, pers. comm. 2007a). Deer/vehicle collisions within the park are most common along Military Road, Oregon Avenue, Beach Drive, and Rock Creek and Potomac Parkway. Deer crossing warning signs have been installed in most areas of higher occurrences of deer vehicle collisions. The park also participated in the Metropolitan Washington Council of Governments working group, which was tasked with exploring the issue of deer-vehicle collisions in the area and developing a white paper as well as an educational DVD about the subject.

EMPLOYEE HEALTH AND SAFETY

Park staff are proactive about protecting the safety of employees. The park has implemented a tailgate meeting every Monday morning to review safety issues with maintenance employees. Because maintenance is the department that experiences the most injuries, daily emails are sent to all employees regarding safety issues and reminders. Table 21 shows recent years' injury rates.

TABLE 21. EMPLOYEE INJURY RATES FOR RECENT YEARS

Fiscal Year	Number of Injuries	Continuation-of-pay Hours (paid during sick leave)
2009	8	691
2008	2	119
2007	6	440

Most injuries or accidents are usually sustained by maintenance staff and park rangers, who often perform manual work outdoors. The most widespread injuries were maintenance activity-related, such as back and knee injuries. No injuries have occurred related to deer management activities performed to date (Ferebee, pers. comm. 2011e); however, NPS staff would be exposed to additional potential safety risks if deer management activities were added to their work routine.

SOCIOECONOMIC RESOURCES

The main socioeconomic issue addressed by this plan is the potential for an overabundance of deer to browse landscape vegetation on neighboring properties and cause economic damage. Rock Creek Park runs through the center of the District of Columbia, which has a population of 572,059 and an average population density of 9,471 people per square mile (NeighborhoodInfoDC, 2007a). The park contributes to the varied landscape of Washington, D.C., providing access to natural areas and many associated recreational opportunities, such as horseback riding, hiking, cycling, and picnicking.

The District of Columbia is the area within which the effects of any of the alternatives are most likely to be felt. The implementation of various deer management techniques in Rock Creek Park would most directly affect losses to landscaping by neighboring properties as the result of deer browsing and deer traffic. The majority of the park is surrounded by residential development (see figure 10). Therefore, damages to landscaping as the result of deer browse and trampling, and the subsequent effect on property values, are of importance in this plan/EIS.

There are 21 census tracts that border or are contained within Rock Creek Park as described in table 22. Although there is substantial variation in household income and home values, the majority of these selected census tracts show household income and home values above the average for the District of Columbia. The average median value of owner-occupied units in the census tracts adjacent to Rock Creek Park was approximately \$331,000 in 2000, more than double the average for the District as a whole. Average median household income was approximately \$66,000 in 2000, more than 60% higher than that of the rest of the district. Furthermore, most tracts also show increased rates of homeownership, whether for single-family homes, row houses, condominiums, or co-ops. These tracts vary in character, from primarily residential areas, to those that incorporate commercial development.

The damages that deer may inflict upon landscaping and its subsequent relationship to property values and cost to property owners are discussed below.

the adverse effects of pests and would continue to benefit forest resources and their ability to naturally regenerate in the future. The park's exotic plant management efforts would also benefit park vegetation in the long term. The future reconstruction of Rock Creek Parkway and Beach Drive and continued park maintenance operations would have long-term minor adverse impacts on vegetation, limited to the areas affected. Nearly all off-trail visitor uses affect vegetation to some extent, but some activities like horseback riding, dog walking, and hiking can lead to more social trails and spread of exotic plants. Scientific research such as vegetation monitoring benefits park vegetation by supplying information needed for management decisions, but even the use of area for monitoring plots limits natural growth in those areas. All of these activities, when combined with the major impacts of continued pressure on forest vegetation (woody and herbaceous) and the limited natural regeneration expected under alternative A because of continued deer browsing, would result in cumulative impacts that would be adverse, long term, and major, since deer would continue to restrict forest regeneration.

Conclusion

Under alternative A, the deer population would remain in excess of the recommended density for forest regeneration and would likely continue to gradually increase with annual fluctuations over the life of the plan, adversely impacting both woody and herbaceous vegetation. As long as the deer population remained in excess of recommended densities for forest regeneration, overall impacts would include decreased plant cover, increased exotic plants, and greatly reduced forest regeneration. Some benefits would be gained from management actions, such as maintaining small caged areas and applying repellents in selected areas; however, the benefits gained would not protect or affect the majority of the park. Although periodic declines in deer population would likely occur due to disease or lack of available food, population records indicate that past population declines have not dropped low enough or lasted long enough for forest regeneration to occur or vegetation to fully recover. The impacts of large numbers of deer browsing on a very large percentage of the park's woody and herbaceous vegetation and consequently limiting natural regeneration would be adverse, long term, and major. Past, present, and future actions, when combined with the continued pressure on forest regeneration expected under this alternative, would result in adverse, long-term, major cumulative impacts.

Current conditions in the park indicate severe adverse impacts on vegetation resources, based on the lack of regeneration found through monitoring. The park's enabling legislation states that the park is to provide for the "preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as possible." The importance of vegetation is also recognized in the GMP goals for the park, including to "preserve and perpetuate for this and future generations the ecological resources of the Rock Creek valley within the park in as natural condition as possible..." Since alternative A would not reverse the expected long-term continued growth in the deer population, and damage to vegetation would likely continue, it is expected that impairment of vegetation resources would occur over the long term under the no action alternative.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Under this alternative, a combination of several non-lethal actions would be implemented to protect forest resources and reduce deer numbers in the park. Actions include the use of large-scale exclosures and reproductive control of does, including both sterilization and reproductive control (assuming it is feasible).

WOODY VEGETATION. The repellents and small caged areas described under alternative A would continue to be used under alternative B. Large fenced exclosures would be constructed under alternative B to allow forest regeneration to occur within enclosed areas of the park that would not be accessible to deer. Approximately 14 exclosures of various configurations to fit the landscape, each encompassing from 7 to

25 acres, would be used throughout the park. The exclosures would eliminate deer presence within a total of 167 acres or about 5% of the park. Protecting these areas from deer browsing would allow native woody species to grow higher than heights reached by deer (60 inches or 150 centimeters) after about 10 years, at which time the exclosures would be moved, and another 5% of the park's vegetation would be enclosed. Although much of the most recent new growth (including seedlings) would be browsed once the surrounding exclosures are moved, many seedlings would be above the height reached by deer and would not succumb to browsing. Therefore, this action would have a beneficial, long-term impact on up to about 10% of the woody vegetation in the park after 15 years (the life of the plan): 5% inside the existing exclosures at 15 years, and 5% in the original exclosures, which has grown above deer reach. Since 5% to 10% of the forested area would need to be fenced at any one time (T. Bowersox, pers. comm. 2005) to meet the park's regeneration goals, the actions under alternative B would meet this minimum by protecting 5% at any one time. However, the effect of no browsing protection on woody species in the remaining undeveloped areas of the park would be similar to alternative A. It is expected that monitoring over the life of the plan would continue to show that 67% or more of the long-term unfenced plots would have less than 51 seedlings per plot, resulting in an adverse, long-term, major impact.

Constructing, maintaining, and monitoring the 14 large exclosures would have some impact to the woody vegetation within the park due to the trampling of small tree seedlings and the incidental removal of existing woody vegetation. Even though fences would be located to avoid most trees, some trees would likely need to be removed during construction. Additionally, tree branches within 5 feet of either side of the fence would be removed to avoid branches hitting the fence in high winds or existing dead branches falling on the fence, thus minimizing future maintenance requirements. The area affected during construction would be about 10 acres (0.003%) of the park (45,540 total linear feet for all perimeters \times 10-foot-wide cleared area = 455,400 square feet or 10.45 acres). Given the small size of the affected area in relation to the size of the park (about 3,000 acres), and the limited nature of the action, the impact of exclosure construction and maintenance would be adverse, long term, and negligible. Trampling during fence construction and removal of deer from within fenced areas, as well as during monitoring, would have adverse, short-term, negligible impacts, because construction and monitoring would average only a few days per year and affect only a few areas, resulting in very small changes to the herbaceous vegetation that would be very small.

Implementing reproductive control, as described in chapter 2, would have several impacts on vegetation. Sterilization would involve capturing does and taking them to a mobile field station set up to perform the surgical procedure. This would involve setting up a bait station where the deer would congregate to allow for easier trapping or darting, and carrying deer to the field station for the operation. Baited areas would be small, the bait would not remain long, and any uneaten bait would be removed after does had been collected. Construction of bait stations and transporting deer carcasses to the field station could temporarily disturb or trample some vegetation; however, the area of impact would be small, and the baiting and capture procedure would last approximately 45 days. Temporary holding pens may need to be constructed if more does are captured than can be treated in one day, and these would involve minor fence construction and trampling of any vegetation within the pen areas. Assuming reproductive control was used after year 5, impacts to vegetation would be similar, since this would also require setting up bait stations and trapping or darting deer. Impacts to vegetation in the areas around the bait piles and reproductive control operations would be adverse, short term (a few hours to a few days in any location), localized, and negligible.

The effect of reproductive control on the deer population and thus deer browsing could be beneficial. However, the time required for the population to be reduced to the extent needed to allow for forest regeneration could be many years; researchers disagree on the amount of time needed to reduce a population size using reproductive controls (Hobbs et al. 2000; Nielsen et al. 1997; Rudolph et al. 2000). The actual amount of time needed to observe a decrease would depend on a number of factors, such as the type of treatment, its effectiveness in stopping reproduction, the size of the population at the time of

initial treatment, the actual mortality rate, and the percentage of the population that was treated. Other factors, such as untreated deer moving into the park and treated deer leaving the park, would also influence the time required to achieve reduced numbers.

Numerical reductions of white-tailed deer populations have been achieved with fertility control in at least two instances (Rutberg and Naugle 2008). However, these studies cannot be taken as evidence that fertility control can be used in Rock Creek Park to reduce the deer population to the density that will allow the forest to regenerate. These studies focused on a fenced population and a relatively small segment of an intensively managed island population, and both study areas occupied less than 1 square mile. Also, the reductions achieved in these studies (27% over 5 years and 58% over 10 years) indicate that the amount of reduction in deer density needed to achieve the desired forest regeneration would take a long time to occur, and forest regeneration would not be successful within the life of this plan. Thus, there is no empirical research that supports the conclusion that existing fertility control technology in a free-ranging population contiguous with other deer herds (such as what occurs in Rock Creek Park) would have the desired outcome and meet plan objectives in support of forest regeneration.

Modeling efforts (Hobbs et al. 2000; Rudolph et al. 2000; Merrill et al. 2006) and a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008) have also shown that fertility control and sterilization are not as effective or efficient as culling when the goal is to reduce white-tailed deer populations. Hobbs et al. described a model where if 90% of the breeding does in the park were effectively treated annually, mortality would need to exceed the number of surviving offspring from the 10% of untreated does to achieve a population reduction. An average mortality rate in urban/suburban deer populations is 10% (Hobbs et al. 2000). Based on these factors, it is expected that reproductive control could stop population growth, but the park would not be able to reach its initial deer density goal within the life of this management plan using current technology.

The benefit of this alternative would be proportional to the population reduction, with the greatest benefit achieved when the population was lowered to the point where successful forest regeneration could occur. Forest regeneration would not be expected outside the large exclosures during the life of this plan.

HERBACEOUS VEGETATION. Under alternative B, the impacts to herbaceous vegetation would be similar to those described for woody vegetation. The primary impact would result from not taking immediate action to control deer numbers. As described for alternative A, deer browsing has already caused noticeable changes to the herbaceous vegetation, based on observations and research conducted within the park. Providing no immediate reduction or control on the deer population would result in adverse, long-term, major impacts, because deer browsing would continue to cause noticeable changes to the abundance and diversity of herbaceous vegetation throughout the park. Exclosures would provide a beneficial, long-term impact on herbaceous vegetation in about 5% of the park at any one time; however, these benefits would be limited to the park areas that were treated. Reproductive controls would cause the deer population to decline slowly; however the regeneration of herbaceous vegetation outside exclosures is not expected to occur within the life of this plan under alternative B. Therefore, the impact of this action would remain adverse, long term, and major.

Activities such as monitoring, fence construction and maintenance, and administering reproductive control agents would not result in any measurable or perceptible change in the herbaceous vegetation, resulting in adverse, short-term, negligible impacts.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative B. Management actions identified in alternative B, where approximately 5% to 10% of the park's vegetation would be protected from browsing, combined with reproductive control, could reduce the deer density after more than 15 years of implementation and would provide some beneficial impacts over the long term, but not immediately. Large exclosures would give small patches of forest the

opportunity to regenerate and reproductive control would eventually help reduce the size of the deer herd, resulting in beneficial impacts that would combine with the beneficial effects of research, exotic plant control, and disease and pest control. However, adverse effects from increased development and other cumulative adverse actions, in conjunction with continued deer browsing pressure on the majority of the woody and herbaceous vegetation and delayed reduction in the deer population, would not be offset by the beneficial effects of proposed actions. Therefore, cumulative impacts to vegetation under this alternative would be adverse, long term, and moderate to major.

Conclusion

Under alternative B, approximately 5% of the herbaceous vegetation and up to 10% of the woody vegetation in the park would benefit from constructing exclosures over the life of this plan. Remaining woody and herbaceous vegetation within the park would continue to be adversely affected by deer browsing over the long term until reproductive controls became effective and the population decreased. Alternative B would provide continued protection of certain areas of the park over the long term, would meet the minimum of protecting 5% to 10% of the park at any one time (T. Bowersox, pers. comm. 2005), and would introduce reproductive controls that could reduce deer numbers gradually over an extended period of time. Since the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to woody and herbaceous vegetation would be adverse, long term, and major as the young woody vegetation and herbaceous ground cover decreased in quantity and diversity in the majority of the park. Past, present, and future activities, when combined with the continued pressure on woody and herbaceous vegetation expected under this alternative, would result in long-term, moderate to major adverse cumulative impacts.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Under alternative C, the deer herd would be reduced through sharpshooting and capture and euthanasia, when appropriate.

WOODY VEGETATION. The repellents and small caged areas described under alternative A would continue to be used under alternative C. No additional caging or repellent use would occur under this alternative. Immediately reducing the deer population would allow natural forest regeneration to occur.

Under this alternative, it is estimated that up to 147 deer (approximately 50% of the herd) would be removed during the first year of sharpshooting in the park. Roughly 50% of the population would be removed in subsequent years until the initial density goal (15 deer per square mile) was achieved, which would occur at the end of year 3 if the beginning deer population was at 2009 levels. It is expected rapidly reduced deer browsing pressure (dropping from 67 deer per square mile to about 15 deer per square mile) would allow the number of tree and shrub seedlings to increase and survive to maturity, providing the necessary growth for natural forest regeneration. The closer the deer density got to 15 deer per square mile, the higher the chance of achieving successful forest regeneration (Bowersox et al. 2002; Horsley et al. 2003; Stout 1998; Marquis et al. 1992).

The conclusion is supported by the long-term unfenced vegetation plot data from the park. As described under alternative A, mean tree seedling stocking rates declined substantially from 1991 through 2007, and none of the plots that were measured in 2007 had at least 153 seedlings per plot at high deer densities. The most recent data from the 26 plots (2007) show that 0 plots had more than 153 seedlings (high deer densities) present, 3 plots had no seedlings present, and 21 plots had less than 10 seedlings each. Providing rapid deer herd reduction and control would result in beneficial long-term impacts on woody vegetation, because deer browsing would be substantially reduced, allowing the abundance and diversity of woody vegetation throughout the park to recover. The vegetation would also be more resilient in the face of any climate change. It is expected that after approximately 10 years, monitoring would show that

IMPACTS OF THE ALTERNATIVES

ALTERNATIVE A: NO-ACTION ALTERNATIVE (EXISTING MANAGEMENT CONTINUED)

Analysis

Under this alternative, park staff would continue to implement current management actions and policies related to deer and their effects. This would include deer population monitoring, as well as caging of small areas and using small amounts of repellents to protect native plants and ornamental landscaping. Current monitoring efforts would continue to record deer browsing impacts and deer population numbers within the park, although specific monitoring actions may be modified or discontinued over time, depending on the results and need for monitoring. Educational and interpretive activities would continue to be used to inform the public about deer ecology and park resource issues, and cooperation with regional entities and inter-jurisdictional agencies would continue. No additional deer management actions to reduce the deer population would occur under this alternative.

These controls would serve to protect important resources, but they would not affect the size of deer populations in the park. Deer populations would continue to remain at high levels and likely grow over time, although numbers would fluctuate annually due to winter temperatures, snow depths and duration of snow cover, food availability, reproduction and mortality rates due to herd health, and other factors.

Landscaping Damage. Private landowners adjacent to the park could experience increased deer browsing on plants in landscaped areas over the short and long term as food sources decreased within the park due to population pressures. Damage to landscaping may result in a decline in property values for affected landowners unless they undertake measures to replace damaged landscaping or pursue the protection mechanisms discussed below. These increases in the deer population could result in adverse, short- and long-term, moderate impacts.

Protection Mechanisms and Costs. Landowners would most likely incur additional costs for caging, repellents, and other forms of deer control to protect their landscaping as the deer population grows under this alternative. The time and monetary costs associated with acquiring additional protection measures would result in adverse, long-term, minor impacts to private landowners, depending on the number of landowners that used such measures.

Cumulative Impacts

Several factors have affected and may affect the landscaping in properties surrounding the park. The area around Rock Creek Park is densely developed, with very little open space. Development and activities within the park may cause increased habitat disruption, and as a result, more deer may forage outside the park during construction or times of disruption. This would result in short- and long-term minor impacts to adjacent landowners. Exotic plants both inside and outside the park have reduced deer forage, and other animals or pests may also damage landscaping. The socioeconomic impacts of all these activities would be both short and long term, adverse, and minor. Combined with the impacts of a continued high number of deer under alternative A, cumulative impacts would be long term, adverse, minor to moderate, and mostly localized to those properties along the park boundary.

Conclusion

Under alternative A, the continued high numbers of deer and likely long-term increase in the deer population in Rock Creek Park would result in additional damage to landscaping in the surrounding areas. Large fluctuations in annual deer populations could result in varying impacts, ranging from minor to moderate and adverse. Landowners would also incur additional costs for caging, repellents, and other

Maryland, 171 (13.23%) came from within the District, and 562 (43.46%) came from the Commonwealth of Virginia. The remaining pieces of correspondence came from eight other states, except for commenters who stated they resided in “UN.” The majority of comments (97.76%) came from unaffiliated individuals, with 0.31% of the comments coming from conservation/preservation organizations.

GUIDE TO THIS DOCUMENT

This report is organized as follows:

Content Analysis Report: This is the basic report produced from PEPC, which provides information on the numbers and types of comments received, organized by code and by various demographics. The first section is a summary of the number of comments that fall under each code or topic, and what percentage of comments falls under each code. Note that those coded *XX1000 – Duplicate Comment* represent comments that were entered into the system twice; these are not additional comments.

Data are then presented on the amount of correspondence by type (numbers of faxes, emails, letters, etc.); and amount received by organization type (conservation organizations, city governments, individuals, etc.), and amount received by state and country.

Concern Response Report: This report summarizes the substantive comments received during the DEIS public review comment process. These comments are organized by codes and further organized into concern statements. Representative quotes are then provided for each concern statement. The NPS provides a response for each concern statement.

Correspondence Received: Copies of correspondence received follow the concern response report. The correspondence includes emails, letters, and transcripts of comments provided at the public meeting from a wide range of stakeholders, including businesses, organizations, individuals, and agencies.

Correspondence was received from neighborhood advisory groups and citizens’ organizations, local wildlife and environmental groups, non-governmental wildlife and animal welfare organizations, organizations that promote hunting, and local and federal agencies, including the Environmental Protection Agency, District of Columbia Historic Preservation Office, and National Capital Parks and Planning.

CONTENT ANALYSIS REPORT

Comment Distribution by Code			
Code	Description	# of Comments	% of Comments Received
AE1000	Affected Environment: Non Substantive	11	0.43%
AE12000	Affected Environment: Wildlife And Wildlife Habitat	1	0.04%
AE20500	Affected Environment: Surrounding Land Use	57	2.23%
AE9000	Affected Environment: Vegetation	19	0.74%
AL2000	Alternatives: Alternatives Eliminated	1	0.04%
AL2010	Alternative A: No Action Alternative (Non-substantive)	5	0.20%
AL2020	Alternative B: Combined Non-Lethal Actions	32	1.25%
AL2021	Alternative B: Combined Non-Lethal Actions (Non-substantive)	8	0.31%

Comment Distribution by Code			
Code	Description	# of Comments	% of Comments Received
AL2025	Support Alternative B: Non-Lethal Actions	428	16.73%
AL2030	Oppose Alternative B: Non-Lethal Actions	8	0.31%
AL2035	Alternative C: Combined Lethal Actions	5	0.20%
AL2036	Alternative C: Combined Lethal Actions (Non-Substantive)	5	0.20%
AL2040	Support Alternative C: Combined Lethal Actions	30	1.17%
AL2045	Oppose Alternative C: Combined Lethal Actions	354	13.83%
AL2055	Support No Action Alternative	14	0.55%
AL2060	Oppose No Action Alternative	6	0.23%
AL2063	Alternatives: Humaneness of Lethal Control Options	9	0.35%
AL3055	Support Public/Managed Hunt	21	0.82%
AL3060	Oppose Public/Managed Hunt	5	0.20%
AL3065	Support Bow Hunting	13	0.51%
AL3070	Oppose the Use of Permitted Bow Hunters	11	0.43%
AL3075	Oppose Lethal Reduction	480	18.76%
AL3080	Support Lethal Reduction	33	1.29%
AL3085	Support Use of Volunteers	8	0.31%
AL3700	Alternatives: Support General Management of Rock Creek Park Deer Population	42	1.64%
AL4000	Alternatives: New Alternatives Or Elements	25	0.94%
AL4040	Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred)	15	0.59%
AL4041	Alternative D: Combined Lethal and Non-Lethal Actions (Non-Substantive)	8	0.31%
AL4045	Support Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred)	122	4.77%
AL4050	Oppose Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred)	359	14.03%
AL4055	Alternatives Dismissed: Substantive	8	0.31%
AL4056	Alternatives Dismissed: Non-Substantive	2	0.08%
AL4060	Alternatives Dismissed: Speed Limit Reduction	1	0.04%
AL4065	Alternatives Dismissed: Reproductive Control/Contragestives	26	1.02%

Comment Distribution by Code			
Code	Description	# of Comments	% of Comments Received
AL4070	Alternatives Dismissed: Fencing	12	0.47%
AL4075	Alternatives Dismissed: Wolf Reintroduction	4	0.16%
AL4080	Alternatives Dismissed: Capture and Relocation	4	0.16%
AL4090	Alternatives Dismissed: Repellents	4	0.16%
AL4095	Alternatives Dismissed: Landscape Modification	1	0.04%
CC1000	Consultation and Coordination: General Comments	13	0.51%
CR1000	Cultural Resources: Guiding Policies, Regs And Laws	2	0.08%
CR2000	Cultural Resources: Methodology And Assumptions	1	0.04%
CR4000	Cultural Resources: Impact Of Proposal And Alternatives	2	0.08%
ED1000	Editorial	5	0.20%
GA1000	Impact Analysis: Impact Analyses	11	0.43%
GA3000	Impact Analysis: General Methodology For Establishing Impacts/Effects	21	0.82%
GA4000	Impact Analysis: Impairment Analysis-General Methodology	11	0.43%
GR2000	Geologic Resources: Methodology And Assumptions	1	0.04%
LU3000	Land Use: Impact of Proposal and Alternatives on Surrounding Properties/Neighbors	1	0.04%
MT1000	Miscellaneous Topics: General Comments	11	0.43%
ON1000	Other NEPA Issues: General Comments	10	0.39%
ON1010	Other NEPA Issues: General Comments (Non-Substantive)	6	0.23%
PN1000	Purpose And Need: Planning Process And Policy	4	0.16%
PN3000	Purpose And Need: Scope Of The Analysis	4	0.16%
PN4000	Purpose And Need: Park Legislation/Authority	21	0.82%
PN4050	Purpose and Need: Park Legislations/Authority (Non-Substantive)	2	0.08%
PN5000	Purpose And Need: Regulatory Framework	8	0.31%
PN5050	Purpose and Need: Regulatory Framework (Non-Substantive)	3	0.12%
PN8000	Purpose And Need: Objectives In Taking Action	6	0.23%

Comment Distribution by Code			
Code	Description	# of Comments	% of Comments Received
PO1000	Park Operations: Guiding Policies, Regs And Laws	1	0.04%
RF1000	References: General Comments	4	0.16%
SE4000	Socioeconomics: Impact Of Proposal And Alternatives	5	0.20%
SE4050	Socioeconomics: Impact of Proposal and Alternative (Non-Substantive)	1	0.04%
SO4000	Soundscapes: Impact of Proposal and Alternatives	3	0.12%
TE2000	Threatened And Endangered Species: Methodology And Assumptions	1	0.04%
TE3000	Threatened And Endangered Species: Study Area	1	0.04%
UI1000	Unavoidable Impacts: General Comments	1	0.04%
VE1000	Visitor Experience: Guiding Policies, Regs And Laws	1	0.04%
VE2000	Visitor Experience: Methodology And Assumptions	8	0.31%
VE4000	Visitor Experience: Impact Of Proposal And Alternatives	10	0.39%
VE5000	Visitor Experience: Cumulative Impacts	1	0.04%
VR2000	Vegetation And Riparian Areas: Methodology And Assumptions	12	0.47%
VR4000	Vegetation And Riparian Areas: Impact Of Proposal And Alternatives	7	0.27%
VR5000	Vegetation And Riparian Areas: Cumulative Impacts	3	0.12%
VR6000	Vegetation And Riparian Areas: Impairment Analyses	1	0.04%
VS2000	Visitor Conflicts And Safety: Methodology And Assumptions	1	0.04%
VS4000	Visitor Conflicts And Safety: Impact Of Proposal And Alternatives	24	0.94%
VS7000	Visitor Conflict and Safety: Deer Diseases (Lyme, CWD, etc.)	37	1.45%
VS7500	Visitor Conflict and Safety: Deer Diseases (Lyme, CWD, etc.) - Cumulative Impacts	1	0.04%
VS8000	Visitor Conflict and Safety: Deer/Vehicle Collisions	8	0.31%
VS8050	Visitor Conflict and Safety: Deer/Vehicle Collisions (Non-substantive)	29	1.13%
VU3050	Visitor Use: Study Area (Non-Substantive)	2	0.08%

Comment Distribution by Code			
Code	Description	# of Comments	% of Comments Received
WH2000	Wildlife And Wildlife Habitat: Methodology And Assumptions	13	0.51%
WH4000	Wildlife And Wildlife Habitat: Impact Of Proposal And Alternatives	5	0.20%
WH4050	Wildlife and Wildlife Habitat: Impact of Proposal and Alternative (Non-Substantive)	2	0.08%
WH7000	Wildlife and Wildlife Habitat: Rock Creek Park Deer Herd	9	0.35%
WH7500	Wildlife and Wildlife Habitat: Rock Creek Park Deer Herd (Non-substantive)	11	0.43%
WQ4000	Water Resources: Impact Of Proposal And Alternatives	3	0.12%
XX1000	Duplicate Correspondence	8	0.31%
XX2000	Duplicate Comment	7	0.27%
Total		2560	100%

Corr. ID: 391**Organization:** The Humane Society of the United States**Comment ID:** 114975**Organization Type:** Non-Governmental

Representative Quote: With respect to visitor use and experience, the DEIS asserts that the effect of combined lethal actions would, for visitors who enjoy seeing deer, be "negligible to minor," a highly questionable assumption given that no poll or survey of public attitude regarding this was taken. Given the controversial nature of the preferred alternative, and the aforementioned growth in demand for non-lethal wildlife damage management methods, it is clear the NEPA planning process suffers from the lack of better information on attitudes and interests of visitors and the general public in important ways. Why would the visitors be more positive about seeing a regenerating forest with a dense understory than an open forest floor with extended sight lines where they might see and enjoy deer as well? There is an ample literature on how people value visual experiences with nature, much of which seems to support the idea of a native preference for openness. This should be noted.

Response:

The visitor use survey that was conducted at the park (Littlejohn 1999) did not specifically poll the public as to attitudes regarding seeing deer, and this is acknowledged in the analysis (FEIS, page 241). Based on the most common reasons for visiting the park (exercise, escaping the city, spending time with family and friends), there may be little impact from large numbers of deer to these visitors. The analysis has been modified to include this assessment in alternative A. However, it is not unreasonable to assume that those coming to the park for natural history purposes or who place high importance on native plants and wildlife (ranked by 67% as very or extremely important) would be adversely impacted by the lack of natural or historical vegetation; impacts were estimated in a range from minor to moderate adverse under alternative A, and alternative C analysis predicted long-term beneficial impacts based on forest regeneration, with no specific level of impact. The NPS believes these assessments are reasonable. As for impacts of seeing deer, the DEIS recognizes that visitors will have quite different opinions about removal of deer (FEIS, page 245). However, the herd size would not be reduced to the extent that deer would be rare in the park. Adverse impacts to those preferring to see deer were therefore acknowledged, but at negligible to minor levels.

Additional clarification has been added within the FEIS (page 241).

Concern ID: 22639**CONCERN STATEMENT:**

One commenter stated that if educational programs could be used to inform park visitors about the lethal methods, then, similarly, educational programs and signs could be used to educate park visitors about the natural processes of an ecosystem, including why some deer may appear emaciated.

Representative Quote(s):**Corr. ID:** 396**Organization:** Animal Welfare Institute**Comment ID:** 114784**Organization Type:** Non-Governmental

Representative Quote: Indeed, while the NPS is quick to point out that it could employ educational efforts to, for example, explain to its visitors why lethal deer control is necessary, it apparently is unwilling or unable to make such an effort to explain why, if the deer are left alone, some deer may, at times, appear ill or emaciated, why that is to be expected, and how that is an indication of a natural regulatory mechanism that acts to control deer and other wildlife populations in RCP and elsewhere. If the NPS is going to claim that it can inform and educate people to accept a wide-scale, multi-year program to slaughter protected deer in a national park then it must also concede that it can educate park visitors as to the concept of natural regulation, how density influences wildlife populations, and why this process, which is entirely natural, is important within the park ecosystem.

Corr. ID: 396**Organization:** Animal Welfare Institute