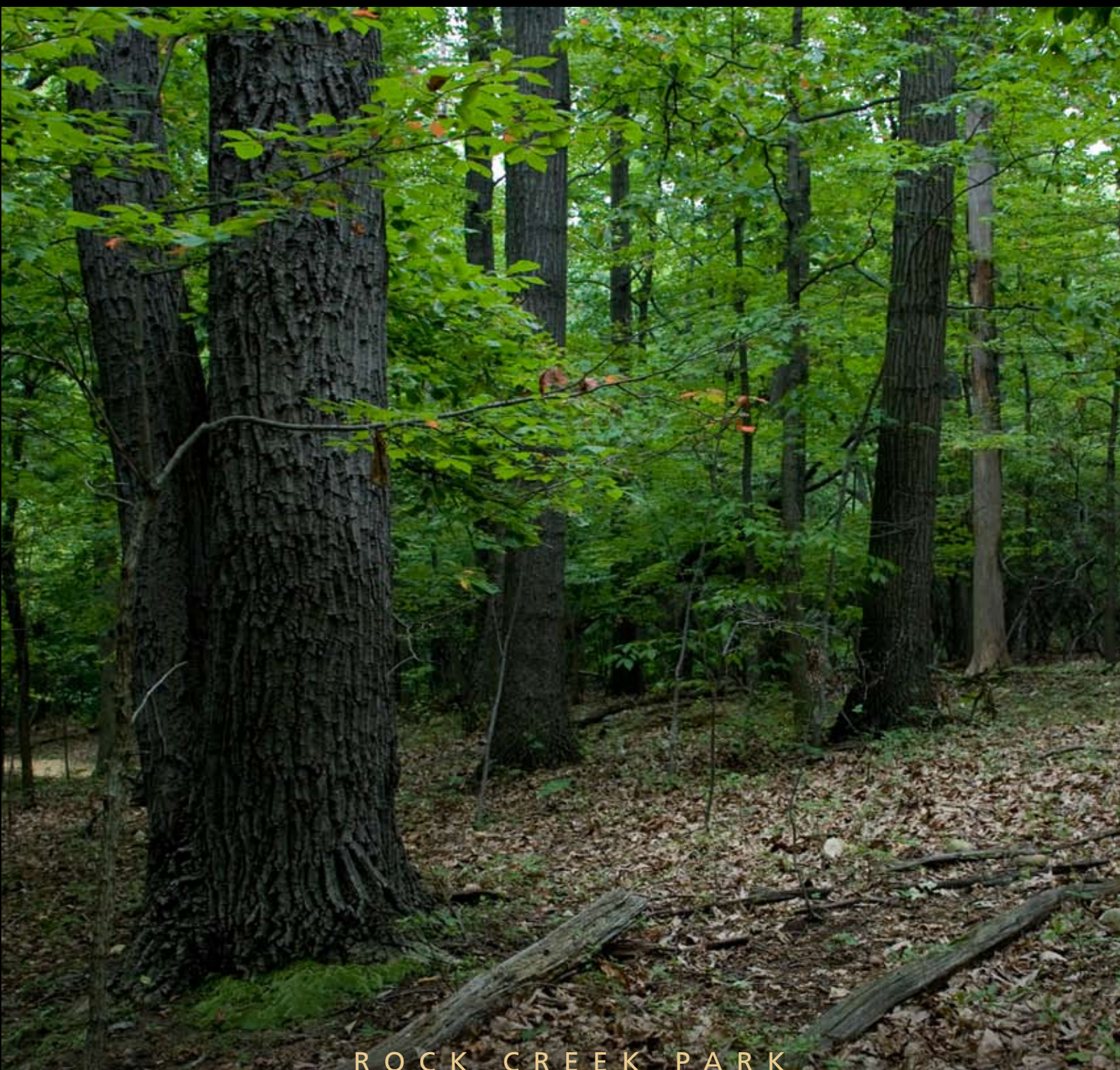
National Park Service
U.S. Department of the Interior



ROCK CREEK PARK

Final White-Tailed Deer Management Plan / EIS

DECEMBER 2011

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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National Park Service
U.S. Department of the Interior

Rock Creek Park
District of Columbia

ROCK CREEK PARK
FINAL DEER MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

December 2011

SUMMARY

PURPOSE OF AND NEED FOR ACTION

The purpose of this action is to develop a white-tailed deer (*Odocoileus virginianus*) management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park. White-tailed deer herds have increased substantially within and around Rock Creek Park. 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 adverse 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.
- 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. The following objectives relative to deer management at Rock Creek Park were developed for this plan, based on the park's enabling legislation, mandates, and direction in other planning documents, as well as service-wide objectives, management policies, and the Organic Act.

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.

WHITE-TAILED DEER AT ROCK CREEK PARK

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.

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.

The large numbers of white-tailed deer within the park are resulting in a substantial effect on the park ecosystem due to the deer's heavy browsing of vegetation. Studies being conducted by the park indicate that deer are having adverse effects on shrub cover, tree seedling regeneration, and herbaceous cover, which affect habitat quality for other wildlife within the park that are dependent on this vegetation for food, shelter, and cover.

ALTERNATIVES CONSIDERED

The alternatives under consideration include a required "no action" alternative and three action alternatives that were developed by an interdisciplinary planning team and through feedback from the public and scientific community during the planning process. The three action alternatives would meet, to

a large degree, the objectives for this plan and also the purpose of and need for action. The alternatives are described below.

- ***Alternative A: No Action*** — Current deer management actions and policies would continue under alternative A, including monitoring deer density and relative numbers, monitoring vegetation, data management, and opportunity for research. Protective caging and limited use of deer repellents may also be used to protect rare plants in natural areas and small areas in landscaped and cultural areas. Current educational and interpretive measures, as well as inter-jurisdictional communication, would continue. No new actions would occur to reduce the effects of deer overbrowsing.
- ***Alternative B: Combined Non-Lethal Actions*** — Alternative B would include all actions described under alternative A, but would also incorporate several non-lethal actions to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include the construction of large-scale deer exclosures (large fenced areas) and reproductive control of does via sterilization and an acceptable reproductive control agent when feasible. Reproductive control implementation may require construction of temporary holding areas to house captured deer prior to treatment.
- ***Alternative C: Combined Lethal Actions*** — Alternative C would include all actions described under alternative A, but would also incorporate two lethal deer management actions to reduce the herd size. The additional actions would include reduction of the deer herd by either sharpshooting or by implementing capture and euthanasia of individual deer, to be used in limited circumstances where sharpshooting may not be appropriate.
- ***Alternative D: Combined Lethal and Non-Lethal Actions (Preferred Alternative)*** — Alternative D would include all actions described under alternative A, but would also include 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 would be taken initially to quickly reduce the deer herd numbers. Population maintenance would be conducted via reproductive control methods if these are available and feasible; if not, sharpshooting would be used as a default option for maintenance.

ENVIRONMENTAL CONSEQUENCES

The summary of environmental consequences considers the actions being proposed and the cumulative impacts to resources from occurrences inside and outside the park. The potential environmental consequences of the actions 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.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Vegetation	*Direct/Indirect Impact*: 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.	*Direct/Indirect Impact*: 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.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts. Over time as natural forest regeneration occurred, adverse, long-term, major impacts that could be expected if the deer herd continued unchecked would be reduced to minor levels.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through the use of reproductive control (and direct reduction if needed) would result in beneficial, long-term impacts. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to minor levels.
	Cumulative Impact: Would result in adverse, long-term, major cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate to major adverse cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.
Soils and Water Quality	*Direct/Indirect Impact*: Soil erosion and sedimentation due to loss of vegetation from increased deer browsing could result in adverse long-term, negligible to minor impacts on soils and water quality.	*Direct/Indirect Impact*: If deer displaced by the fenced exclosures concentrated in other areas of the park, resulting in increased loss of vegetation in those areas and a potential increase in soil erosion, adverse, long-term, minor impacts to soils and water quality could occur. Impacts would gradually shift to beneficial in the long term.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on soils and water quality.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on soils and water quality.
	Cumulative Impact: Would result in adverse, long-term, minor cumulative impacts on soil and water quality.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Wetlands and Floodplains	*Direct/Indirect Impact*: Loss of vegetation from increased deer browsing, disturbance to small wetland areas and vernal pools and changes in species composition would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Direct/Indirect Impact*: Use of exclosures to protect many of the park's forested wetlands would gradually result in beneficial long-term impacts to wetlands, although continued long-term minor to moderate adverse impacts would be expected in areas that are not fenced and in smaller wetland areas and seeps. Beneficial long-term impacts would also result from decreased vegetation loss. Construction of exclosures within the 100-year floodplain could result in short-term, minor adverse impacts on the floodplain.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on wetlands and floodplains.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on wetlands and floodplains.
	Cumulative Impact: Would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Cumulative Impact*: Would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Cumulative Impact*: Would result in adverse, long term, minor to moderate cumulative impacts due mainly to past actions.	*Cumulative Impact*: Would result in adverse, long term, minor to moderate cumulative impacts due mainly to past actions.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
White-tailed Deer	*Direct/Indirect Impact*: Excessive deer browsing that would degrade habitat and limit food sources would result in long-term, moderate adverse impacts.	*Direct/Indirect Impact.* Because the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to deer habitat, and in turn deer, would be adverse, long term, and moderate as a result of habitat degradation and loss of food sources. There could also be long-term, major adverse impacts to individual deer from the physiological, biological, and behavioral effects associated with the use of reproductive control; however, long-term impacts to the population would be minor to moderate because the adverse effects would be offset over time by the benefits of population reduction.	*Direct/Indirect Impact*: The relatively rapid reduction of the deer herd and the resultant regeneration of forage would result in beneficial effects on the deer herd and would reduce adverse impacts to negligible or minor levels over the long term.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure would result in beneficial, long-term impacts to deer and deer habitat. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to negligible to minor levels. If reproductive controls are used, there could also be long-term, major adverse impacts to individual deer from the physiological, biological, and behavioral effects associated with the use of reproductive control; however, long-term impacts to the population would be minor to moderate because the adverse effects would be offset over time by the benefits of population reduction.
	Cumulative Impact: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate adverse cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts on deer herd health.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Other Wildlife and Wildlife Habitat	*Direct/Indirect Impact*: A continued large deer population and related browsing, resulting in decreased plant diversity, increased invasive exotic plants, and reduced forest regeneration would result in adverse effects on other wildlife. A few predator species would benefit from a large deer population and an open understory; however, the impacts of large numbers of deer browsing on vegetation would adversely affect a large percentage of habitats for other wildlife (e.g., ground-nesting birds, frogs, snakes, and turtles), resulting in adverse, long-term, and negligible to potentially major impacts, depending on the species.	*Direct/Indirect Impact*: Construction of large, fenced exclosures over the life of the plan would protect some habitat; however, the remaining habitat would continue to be subject to a high degree of deer browsing, adversely impacting both ground and shrub layer habitat for many other species of wildlife until reproductive controls took effect and reduced the deer population. A few species would tend to benefit from a large deer population and an open understory but overall, impacts to other wildlife would be adverse, long term, and negligible to potentially major, depending on the species.	*Direct/Indirect Impact*: Rapid reductions in deer numbers in the park, thereby reducing deer browsing pressure on woody and herbaceous vegetation and allowing increased abundance and diversity of other wildlife that depend on understory vegetation would result in beneficial long-term impacts. Adverse, long-term impacts would be reduced to negligible or minor levels over time.	*Direct/Indirect Impact*: Rapid reductions in deer numbers in the park, thereby reducing deer browsing pressure on woody and herbaceous vegetation and allowing increased abundance and diversity of other wildlife that depend on understory vegetation would result in beneficial long-term impacts. Adverse, long-term impacts would be reduced to negligible or minor levels over time.
	Cumulative Impact: Would result in both adverse and beneficial impacts, with adverse, long-term, major cumulative impacts.	*Cumulative Impact*: Would result in both adverse and beneficial impacts, with overall adverse, long term, moderate to major cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Rare, Unique, Threatened, or Endangered Species	*Direct/Indirect Impact*: Impacts to rare, unique, threatened, or endangered species under alternative A would be both beneficial and adverse. Adverse impacts to the federally listed Hay's Spring amphipod (*Stygobromus hayi*) could be long term and negligible to minor. Beneficial impacts to state-listed plants would result from establishing caging around known individual plants and around newly discovered plants in the park. Overall, there would be adverse, long-term, negligible to major impacts to rare, unique, threatened, or endangered species, from excessive deer browsing and the associated habitat degradation that could result in lack of food or cover for such species.	*Direct/Indirect Impact*: Adverse impacts to the federally listed Hay's Spring amphipod could be long term and negligible to minor. Impacts to species listed or considered special status species by Maryland and the District of Columbia would be adverse, long term, and moderate to major, until reproductive controls of the park deer herd were effective. The placement and maintenance of large exclosures would include many species listed or considered special status species by Maryland and the District of Columbia, resulting in beneficial, long-term impacts. However, adverse, long-term, negligible to moderate impacts due to deer browsing would continue outside the exclosures.	*Direct/Indirect Impact*: The reduced deer density would minimize potential impacts on the habitat for the Hay's Spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation. A few predators that use deer as a food source could be adversely affected by a lower deer density, as could scavengers that feed on deer carcasses, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time.	*Direct/Indirect Impact*: The reduced deer density would minimize potential impacts on the habitat for the Hay's Spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation. Adverse, long-term impacts would be reduced to negligible or minor levels over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time.
	Cumulative Impact: Would result in both adverse and beneficial impacts, with overall long-term, minor to major, adverse cumulative impacts.	*Cumulative Impact*: Would result in both beneficial and adverse impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Cultural Landscapes	*Direct/Indirect Impact*: The use of small cages and repellents to protect landscape plantings, new restoration plantings, or rare plant species at specified areas could result in beneficial, long-term, minor impacts to these parts of the park's vegetation. However, continued growth of the deer population and the associated ongoing decline in the abundance and diversity of the native plant communities and cultural plantings would result in an adverse, long-term, minor to moderate impact to the park's cultural landscapes.	*Direct/Indirect Impact*: Constructing exclosures over the life of this plan would preserve some vegetation that is part of the cultural landscapes of the park. However, presence of the exclosures would result in long-term minor to moderate adverse impacts to the cultural landscapes in which they are located, and remaining 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. Since the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to cultural landscapes would be adverse, long term, and minor to moderate.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts.
	Cumulative Impact: Would result in adverse, long-term, minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate adverse cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.
Soundscapes	*Direct/Indirect Impact*: Actions taken to protect plants and monitor the deer population and park vegetation would result in an adverse, short-term, negligible impact on soundscapes.	*Direct/Indirect Impact*: Intermittent construction of exclosures and reproductive control activities would result in short term, negligible to minor, adverse impacts. Individual construction and reproductive control activities would be short term, but would continue indefinitely into the future, resulting in both short- and long-term, negligible to minor, adverse impacts.	*Direct/Indirect Impact*: Sharpshooting would result in adverse impacts, primarily affecting nearby residents. Perception of the intensity of the impacts would vary depending on several factors, including timing, attenuation levels, and distance from the source, resulting in minor to moderate impacts to individuals experiencing the sound.	*Direct/Indirect Impact*: Sharpshooting would result in adverse impacts, primarily affecting nearby residents. Perception of the intensity of the impacts would vary depending on several factors, including timing, attenuation levels, and distance from the source, resulting in minor to moderate impacts to individuals experiencing the sound.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
	Cumulative Impact: Would result in cumulative impacts ranging from minor to moderate and adverse depending on the source, due to the variety and abundance of noise sources that already exist around and within the park.	*Cumulative Impact*: Would result in cumulative impacts ranging from minor to moderate and adverse depending on the source, due to the variety and abundance of noise sources that already exist around and within the park.	*Cumulative Impact*: Would result in adverse, short and long term, and minor to moderate cumulative impacts. However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.	*Cumulative Impact*: Would result in adverse, short and long term, and minor to moderate cumulative impacts. However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.
Visitor Use and Experience	*Direct/Indirect Impact*: Impacts to visitor use and experience would be both beneficial and adverse to those visitors who maybe primarily interested in viewing deer (beneficial in that there would be more deer to see, adverse in that the appearance of the herd could be poor). However, overall impacts related to a decreased ability to view scenery and other wildlife would be long term, minor to moderate and adverse.	*Direct/Indirect Impact*: Visitors would experience adverse, short-term impacts primarily due to aesthetics and closures of certain areas of the park, as well as a slight increase in occasional noise levels. These impacts would be offset by the educational and interpretive information, which would reduce adverse impacts to minor. Short-term impacts would eventually give way to beneficial, long-term impacts as the need for exclosures diminished and the deer population declined, resulting in a restored forest ecosystem throughout the park. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such an impact would be negligible to minor, as opportunities to view deer would still exist.	*Direct/Indirect Impact*: Adverse, short-term impacts that could occur if visitors were exposed to management actions would be offset by educational and interpretive information, resulting in negligible adverse impacts. Beneficial impacts would occur in the long term, as the forest regenerated and visitors could see increased plant and animal diversity, and enjoy enhanced scenery. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such impact would be negligible to minor, as opportunities to view deer would still exist.	*Direct/Indirect Impact*: Adverse, short-term impacts that could occur if visitors were exposed to management actions would be offset by educational and interpretive information, resulting in negligible adverse impacts. Beneficial impacts would occur in the long term, as the forest regenerated and visitors could see increased plant and animal diversity, and enjoy enhanced scenery. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such impact would be negligible to minor, as opportunities to view deer would still exist.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
	Cumulative Impact: Would result in both adverse and beneficial (depending on an individual visitor's goals) impacts. Overall cumulative impacts would be long term, minor to moderate and adverse.	*Cumulative Impact*: Would result in mostly beneficial and long-term cumulative impacts due to the effects of combined forest regeneration activities.	*Cumulative Impact*: Would result in cumulative impacts that would be primarily beneficial and long term.	*Cumulative Impact*. Would result in cumulative impacts that would be primarily beneficial and long term.
Visitor Safety	*Direct/Indirect Impact*: Because it is expected that no discernible effects to visitor safety would result from deer management actions, but vehicle collisions would continue, adverse, long-term, negligible to moderate adverse impacts could occur.	*Direct/Indirect Impact*: Adverse impacts to visitors would be short and long term and negligible from deer management, although the continued presence of a large number of deer over the life of the plan would continue to contribute to vehicle deer collisions on park roads and result in minor to moderate adverse impacts.	*Direct/Indirect Impact*: The extent of safety measures would result in adverse, short- and long-term, negligible to minor impacts, as it is expected that no discernible effects to visitor safety would occur from deer management actions and the possibility of deer-vehicle collisions would be diminished.	*Direct/Indirect Impact*: The extent of safety measures that would be used and locating activities away from park boundaries would result in adverse, short- and long-term, negligible impacts. The possibility of deer-vehicle collisions would be greatly diminished.
	Cumulative Impact: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.
Employee Safety	*Direct/Indirect Impact*: Because it is expected that no discernible effects to employee safety would occur as a result of deer management actions, impacts would be adverse, long term, and negligible.	*Direct/Indirect Impact*: Adverse impacts to government employees would be short and long term and negligible to minor.	*Direct/Indirect Impact*: Adverse, short- and long-term, negligible to minor impacts would occur.	*Direct/Indirect Impact*: Adverse, short- and long-term, negligible to minor impacts would occur.
	Cumulative Impact: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Socio-economic Resources	*Direct/Indirect Impact*: 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 and could result in varying impacts, ranging from minor to moderate and adverse.	*Direct/Indirect Impact*: Reproductive controls (if successful) would allow for only a gradual reduction in the number of deer, and there could be some displacement of deer from the park due to exclosures. The net effect on surrounding property could result in slightly greater damage to landscaping, the impacts of which would be long term and moderate.	*Direct/Indirect Impact*: The reduction of the existing deer populations in both the short and long term could result in fewer deer leaving the park and browsing landscaping on adjacent lands, with long-term beneficial effects that would reduce adverse impacts to negligible or minor levels.	*Direct/Indirect Impact*: The reduction of the existing deer populations in both the short and long term could result in fewer deer leaving the park and browsing landscaping on adjacent lands, with long-term beneficial effects that would reduce adverse impacts to negligible or minor levels.
	Cumulative Impact: Would result in adverse, long term, and minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in moderate adverse long-term cumulative impacts.	*Cumulative Impact*: Would result in long-term minor cumulative adverse impacts.	*Cumulative Impact*: Would result in long-term minor cumulative adverse impacts.
Park Management and Operations	*Direct/Indirect Impact*: Long-term demands on park staff and funding for managing the deer herd and protecting other park resources would result in adverse, long term, and minor to moderate impacts.	*Direct/Indirect Impact*: Installing and maintaining large exclosures and implementing and monitoring reproductive controls would result in long-term, moderate adverse impacts.	*Direct/Indirect Impact*: The need for additional staff time for monitoring and coordinating activities under alternative C would result in adverse, moderate impacts initially, reduced to minor over time.	*Direct/Indirect Impact*: The need for additional staff time for monitoring and coordinating activities under alternative C would result in adverse, moderate impacts initially, reduced to minor over time.
	Cumulative Impact: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, minor to moderate cumulative impacts.

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Purpose of and Need for Action

CHAPTER 1

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.

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.

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.

- 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.

PROJECT SITE LOCATION

Part of the national park system, Rock Creek Park is composed of 99 separate units, known as reservations, located in the District of Columbia and bordered by Montgomery County, Maryland (see figure 1). The focus of the analysis is to develop management strategies for the white-tailed deer population in and around the 99 units administered by Rock Creek Park. Although all units were considered, those units that have the available land to support a deer population, provide travel corridors between viable habitats, and/or where deer are currently known to occur, are emphasized in this plan. Table 1 lists all administered units of Rock Creek Park, including the main unit, Reservation 339 (which is also called "Rock Creek Park," but as a separate unit) and its tributary extension units and other reservations that are part of the overall NPS-administered park. Reservations that are not specifically addressed in the plan are highlighted in gray. Triangle parks, traffic circles, and most parks less than one acre in size were removed from site-specific evaluation. Park units less than one acre in size that are not highlighted in gray are included in the study area because of their proximity to Reservation 339 and their potential as a wildlife corridor to that reservation.

TABLE 1. ROCK CREEK PARK NAMED ADMINISTERED UNITS

Unit Name	Reservation Number	Approx. Acreage	Enabling Legislation
Rock Creek Park and tributary park extensions Pinehurst Parkway Klingle Valley Soapstone Valley Park Normanstone Parkway North Portal Parkway Beach Parkway	339 545 356, 635, 563 402 514 433 432	1,822	26 Stat 492 September 27, 1890 Purchased by National Capital Planning Commission April 30, 1926 and Capper-Cramton Act, transfer from District of Columbia
Rock Creek and Potomac Parkway	360	171	Public Buildings Act of March 4, 1913
Fort Circle Parks Fort Reno Fort Stevens Battery Kemble Fort Bayard Fort Slocum Fort Totten Fort Bunker Hill	 470, 515, 542 358, 494, 499 521, 530 359 435 497, 544, 451 443	 62 24 57 4 18 129 6	Capper-Cramton Act, May 29, 1930
Potomac Palisades Parkway – Key Bridge to Chain Bridge, NW	404 Section 3	232	Capper-Cramton Act, May 29, 1930 Transfer of jurisdiction from District of Columbia
Georgetown Waterfront Park	404	10	Acquired as a transfer of jurisdiction from the District of Columbia
Barnard Hill	520, 528	29	Capper-Cramton Act, May 29, 1930
Dumbarton Oaks Park	637	27	Deeded to government from private donors
Meridian Hill Park	327	12	36 Stat 1310 March 4, 1911
Montrose Park	324	16	1911 District appropriations act provision (36 Stat 1005), transfer of jurisdiction from District of Columbia or other
Glover-Archbold Park, Glover Parkway & Children's Playground	351 (A–K), 450 (A–B), 451, 641	287	Land donations, authorized June 6, 1924 (43 Stat 464) and February 25, 1925 (43 Stat 978)

Unit Name	Reservation Number	Approx. Acreage	Enabling Legislation
Triangle Parks (irregular parcels) [note: Triangle Parks, located throughout the city, are not shown on figures 1 or 2]	302-303, 303B, 309 (A–B, G), 312 (A, I), 313B, 330 (B–C), 345–346, 397, 436, 438, 447–448, 468, 565, 573, 587, 614, 643, 667, 686	5.07	Transfer of jurisdiction from District of Columbia or other
Traffic Circles Grant Circle Chevy Chase Circle Sherman Circle Tenley Circle Westmoreland Circle Ward Circle	303A 312 335A 369 398, 399 559 572	0.16 1.84 0.71 2.32 0.16 0.76 0.69	Transfer of jurisdiction from District of Columbia or other
Curb Parking – Ashmeade Pl between Connecticut Ave & Kalorama Rd NW, Jenifer & 41st Sts at Belt Rd NW, Western Ave & Patterson St NW	303D, 326C, 335, 361	0.44	Transfer of jurisdiction from District of Columbia or other
Center Parking – Tilden St & Linnean Ave NW, Rock Creek Dr between Edgevale Terr & Normanstone Dr NW	308A, 338	1.20	Transfer of jurisdiction from District of Columbia or other
Rabaut Park	309C	0.57	Transfer of jurisdiction from District of Columbia or other
Whitehaven Parkway	357	51.25	--
National Zoological Park Entrance – Harvard St NW	516	1.0	Capper-Cramton Act, May 29, 1930
Park – Garfield St, between Fulton St & Foxhall Rd NW	529	14.0	Capper-Cramton Act, May 29, 1930
Piney Branch Portal	531	0.77	Transfer of jurisdiction from District of Columbia or other
Park – north side of National Zoological Park & Adams Mill Rd NW	563	1.77	Transfer of jurisdiction from District of Columbia or other U.S. agency
Battleground National Cemetery	568	1	Transfer from U.S. agencies
Melvin C. Hazen Park	630	43	Capper-Cramton Act, May 29, 1930
Woodley Park	635	3	Capper-Cramton Act, May 29, 1930 and transfer from District of Columbia or other
Francis G. Newlands Park (Little Forest)	668	9	Dedication/donation from private party
Park – Pennsylvania Ave btw 28th & M Sts NW	691	0.07	Transfer of jurisdiction from District of Columbia or other
Old Stone House	693	0.42	Purchased by USDI, NPS, or NCR, legislation approved September 25, 1950
Bryce Park	700	0.58	Capper-Cramton Act, May 29, 1930

Rock Creek Park Units
District of Columbia

Figure 1. Park Location Map

- Park Boundary
- District Boundary
- Interstate
- Major Road

Map	Name	Reservation #
1	Glover Archbold Park	351, 450
2	Barnard Hill	520, 528
3	Battery Kemble Park	521, 530
4	Battleground National Cemetery	568
5	Brentwood Maintenance	
6	Bryce Park	700
7	Chevy Chase Circle	335A
8	Dalecarlia Parkway	478
9	Dumbarton Oaks Park	637
10	East Beach Drive	432
11	Fort Bayard Park	359
12	Fort Bunker Hill	443
13	Fort Reno Park	470, 515, 542
14	Fort Slocum Park	435
15	Fort Stevens Park	358, 494, 499
16	Fort Trotten Park	497, 544, 451
17	Francis G. Newlands Park (Little Forest)	668
18	Georgetown Waterfront Park	
19	Glover Archbold Park & Playground	451, 641
20	Grant Circle	312
21	Klingle Valley Park	356, 635, 563
22	Melvin C. Hazen Park	630
23	Meridian Hill Park	327
24	Montrose Park	324
25	National Zoo Entrance	516
26	Normanstone Parkway	514
27	North Portal Drive	433
28	Old Stone House	693
29	Pinehurst Parkway	545
30	Piney Branch Portal	531
31	Potomac Palisades Parkway	404
32	Rabaut Park	309C
33	Rock Creek & Potomac Parkway	360
34	Rock Creek Park	339
35	Rock Creek Park & Piney Branch Parkway	339, 531
36	Sherman Circle	369
37	Soapstone Valley	402
38	Tenley Circle	398, 399
39	Ward Circle	572
40	Westmoreland Circle	559
41	Whitehaven Park	357
42	Woodley Park	635

PARK BACKGROUND

HISTORY OF ROCK CREEK PARK

The 1890 legislation establishing Rock Creek Park reserved land in the District of Columbia for the purpose of creating a "public park and pleasure ground for the benefit and enjoyment of the people of the United States." These urban allocations of land provided to the local residents and visitors fresh air, waterways, meadows, and serenity that were considered the antidote to the stress of daily work and the congestion of the city. However, Rock Creek Park was also linked to the burgeoning conservation movement within the United States. Congress emphasized the preservation of the park's natural resources and landscape scenery in the enabling legislation, stating "regulations shall 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" (Bushong 1990).

The 1890 legislation establishing Rock Creek Park reserved land in the District of Columbia for the purpose of creating a "public park and pleasure ground for the benefit and enjoyment of the people of the United States."

As previously noted, Rock Creek Park is an administrative unit of the national park system consisting of 99 separate units, known as reservations, located entirely within the northwest and northeast quadrants of the District of Columbia. Residential and commercial areas of Washington, D.C. and Maryland surround all of the park units. Over 1,100 homes and apartments abut the park units along 72 miles of the park boundary (NPS 2005a). The largest of the 99 reservations, Rock Creek Park (Reservation 339), was established by Congress on September 27, 1890, and consists of 1,754 acres of Rock Creek and the surrounding valley from the Maryland state line south to the National Zoological Park (see figure 2). Beyond Reservation 339, Rock Creek administers areas such as the Rock Creek and Potomac Parkway (Reservation 360), Glover-Archbold Park (Reservations 351 and 450), and the Fort Circle Parks to name a few. These units have different purposes, ranging from highly designed cultural landscapes to natural forested areas. Throughout this document, references to Rock Creek Park or the park include all administered units; descriptions of specific units are referenced as such.

OVERVIEW OF THE PARK'S ECOSYSTEM

Deciduous woods cover most of the park's total acreage. While there are six forest communities in the park, over half of the park is an American beech (*Fagus grandifolia*)/white oak (*Quercus alba*) forest (Nature Conservancy 1998). Several species of oak (*Quercus* spp.), hickory (*Carya* spp.), tulip poplar (*Liriodendron tulipifera*), and American beech predominate the slopes and ridges. Elm (*Ulmus* spp.), sycamore (*Platanus occidentalis*), ash (*Fraxinus* spp.), box elder (*Acer negundo*) and tulip poplar are common in the occasional floodplain areas along stream channels. Remnant coniferous trees are spread throughout the park as single trees or small groves. An inventory of the park's vegetation has documented approximately 700 species of vascular plants. Thirty-one rare or uncommon plants listed by Maryland and Virginia are found in the park. Approximately 15 meadow areas, measuring from 0.3 to 4 acres in size, are scattered among the park units (NPS 2005a).

Wildlife studies throughout the park have identified 36 species of mammals, 181 species of birds, and 19 species of reptiles and amphibians that are present or probably present in the park (NPS unpublished data-NPSpecies 2008b). Species in the park include white-tailed deer, red (*Vulpes vulpes*) and gray (*Urocyon cinereoargenteus*) fox, raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), beaver (*Castor canadensis*), chipmunk (*Tamias striatus*), southern flying squirrel (*Glaucomys volans*), coyote (*Canis latrans*), great horned owl (*Bubo virginianus*), barred owl (*Strix varia*), red shouldered hawk (*Buteo lineatus*), eastern box turtle (*Terrepene carolina*), spotted salamander (*Ambystoma maculatum*), and black rat snake (*Elaphe obsoleta*) (NPS 2005a). One endangered species is found in freshwater springs within the park, the Hay's Spring amphipod (*Stygobromus hayi*).

The large numbers of white-tailed deer within the park are resulting in a substantial effect on the park ecosystem due to the deer's heavy browsing of vegetation. Studies being conducted by the park indicate that deer are having adverse effects on shrub cover, tree seedling regeneration, and herbaceous cover, which affect habitat quality for other wildlife within the park that are dependent on this vegetation for food, shelter, and cover (see "Vegetation Impacts section, below).

Herbaceous plants are non-woody plants, including grasses, wildflowers, and sedges and rushes (grass-like plants).

PURPOSE AND SIGNIFICANCE OF ROCK CREEK PARK UNITS

All units of the national park system are formed for a specific purpose and to preserve significant resources or values for the enjoyment of future generations. The purpose and significance identify uses and values that individual NPS plans should support.

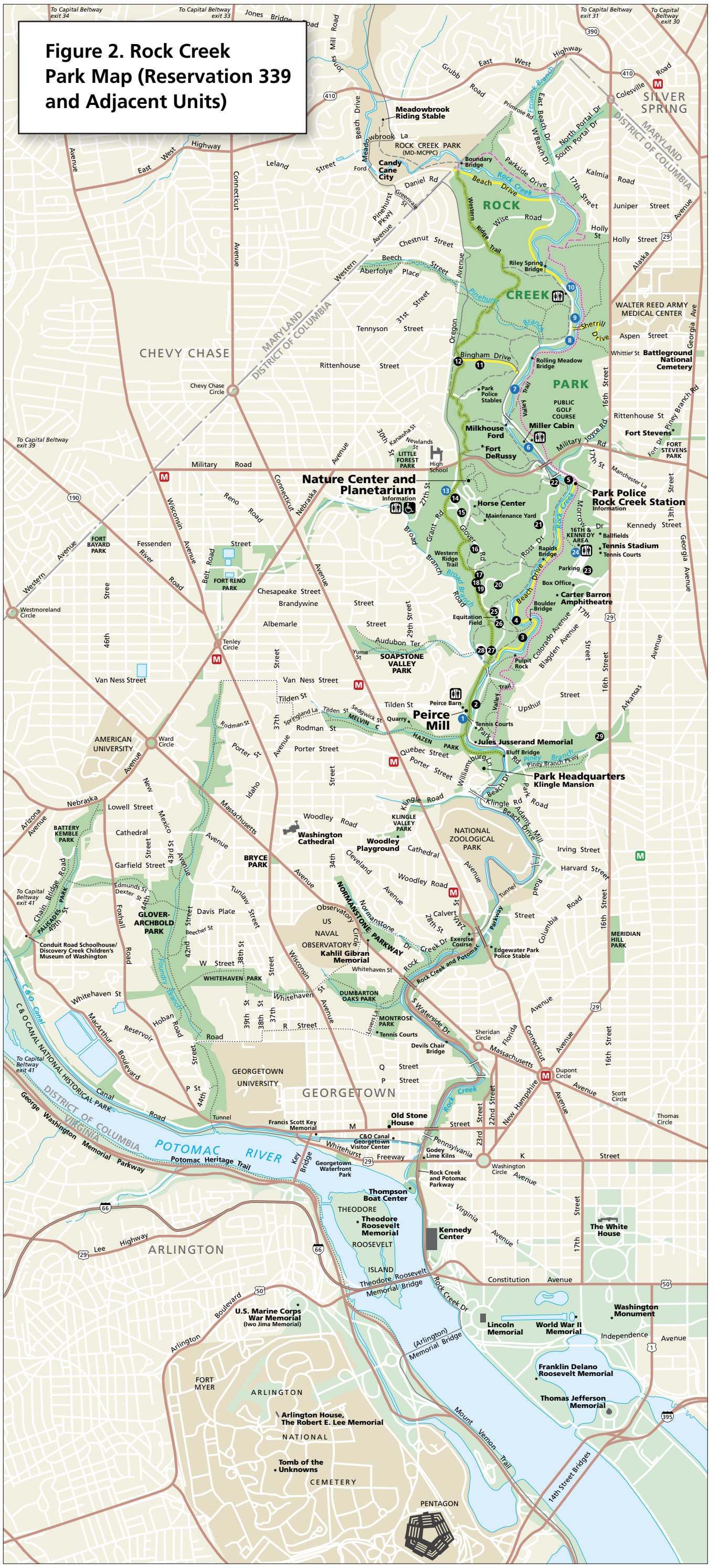
The following provides background on the purpose and significance of three large units managed by Rock Creek Park: Rock Creek Park (Reservation 339), Rock Creek and Potomac Parkway, and the Fort Circle Parks. Information on purpose and significance were taken from the enabling legislation and general management plan (GMP) language.

Rock Creek Park and Associated Tributary Parks (Reservation 339) and the Rock Creek and Potomac Parkway (Reservation 360)

Establishment—Congress established Rock Creek Park, one of the first national park areas, on September 27, 1890 as a unique natural park containing significant historic and archeological resources, and providing a variety of recreational opportunities for visitors and residents of the District of Columbia metropolitan area (Pub. L. 51-297, 26 Stat. 482).

Rock Creek Park is linked to the Potomac River and the monuments in downtown Washington, D.C. by the Rock Creek and Potomac Parkway. Congress established the parkway through the Public Buildings Act of March 4, 1913. The parkway corridor is managed contiguously with Rock Creek Park.

Figure 2. Rock Creek Park Map (Reservation 339 and Adjacent Units)



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.

Fort Circle Parks (Battery Kemble, Fort Bayard, Fort Reno, Fort DeRussy, Fort Stevens, Fort Slocum, Fort Totten, and Fort Bunker Hill)

Establishment—The monies used by the NPS to acquire the Fort Circle Parks were appropriated by the Capper-Cramton Act of 1930. This act appropriated funds for the further acquisition of "…such lands in the District of Columbia as are necessary and desirable for the suitable development of the National Capital Park, parkway, and playground system…"

Purpose—The Fort Circle Park Final Management Plan / Environmental Assessment (NPS 2004b) states that the purpose of the Fort Circle Parks is to:

- Preserve and interpret historical resources related to the Civil War defenses of Washington.
- Conserve this linkage or urban green space that contributes to the natural character and scenic values of the nation's capital.
- Provide recreational opportunities compatible with historic and natural resource values.
- Protect the forests and natural scenery and prevent the pollution of park waterways.

Significance—The *Fort Circle Parks Final Management Plan/Environmental Assessment* (NPS 2004b) states that the significance of the Fort Circle Parks is as follows:

- The park sites contain remains of the defense sites (e.g., forts, batteries, rifle trenches) that effectively deterred the invasion of the nation's capital during the Civil War.
- The Fort Circle Parks include the remains of forts that were engaged in the Battle of Fort Stevens in July 1864 – the only Civil War battle in the District of Columbia and the only time a sitting U.S. president has come under enemy fire in warfare.
- The pattern (greenbelt) of public space of Fort Circle Parks represents an element of one of the earliest urban planning efforts for public recreation in the United States. Today it enhances the aesthetics of the capital city and the quality of life for its citizens.
- The Fort Circle Parks preserve significant natural features, including substantial acreage of mature native hardwood forests, geologic and aquatic resources, and a diversity of important habitat for indigenous flora and fauna that are unusual in an urban setting and that contribute to the uniqueness of the nation's capital.

AUTHORITY TO MANAGE DEER

The NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. See, generally, 16 USC 1 (NPS "shall promote and regulate the use of Federal areas known as national parks…by such mean and measures as conform with the fundamental purpose of the parks…to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations") and 16 USC 3 [The Secretary of the Interior] may… provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any of [the parks, monuments, and reservations under the jurisdiction of the National Park Service]. In defining this discretion, the 10th Circuit Court of Appeals overturned a district court decision, holding in part that the NPS "need not wait until the damage through overbrowsing has taken its toll on park plant life … before taking preventative action" New Mexico State Game Commission v. Udall, 410 F.2d 1197, 1201 (10th Cir. 1969). This discretion has been reinforced over time. In United States v. Moore, 640 F.Supp. 164, 166 (S.D. W.VA. 1986) the court found that Congress had given the Secretary great discretion in regulating and controlling wildlife within the national park system. This discretion is further defined by NPS management policy.

NPS *Management Policies 2006*, section 4.4.2, states that "[w]henever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species. The Service may intervene to manage populations or individuals of native species only when such intervention will not cause unacceptable impacts to the populations of the species or to other components and processes of the ecosystems that support them." In addition, the policy restricts management to times when certain conditions exist. One such condition is when "a population occurs in an unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes), and it is not possible to mitigate the effects of the human influences."

NPS policies also require that parks "assess the results of managing plant and animal populations by conducting follow-up monitoring or other studies to determine the impacts of the management methods on nontargeted and targeted components of the ecosystem" section 4.4.2. This strategy is described in this plan including specific thresholds for taking action and end points on management actions.

SCIENTIFIC BACKGROUND: DEER AND VEGETATION MANAGEMENT

DEER MANAGEMENT ISSUES AND RESEARCH OVERVIEW

The focus of the analysis is to develop deer management methods and strategies for Rock Creek Park in cooperation with local, state, and regional entities, as well as other federal agencies. A science team consisting of scientists and other specialists from a variety of state and federal government organizations has helped define components of the planning process. The team evaluated scientific literature and research on the topic of deer management; established a monitoring protocol for park deer populations and other park resources; and recommended resource thresholds at which deer management strategies would be implemented. Monitoring protocols and impact thresholds are a component of all action alternatives evaluated in analysis, helping to ensure that the deer population at the park does not jeopardize the ecological integrity of the park.

Regional Landscape-level Changes

Before European settlement of North America, white-tailed deer populations are estimated to have been between 23 and 34 million (McCabe and McCabe 1984). Deer herds throughout the eastern United States were heavily exploited after the arrival of Europeans around 1600. By 1790, deer populations were low wherever Europeans had settled. However, since the early 1900s, as a result of low mortality rates due to a lack of predators and increased availability of food and habitat, the deer population has increased. Today the deer density in many areas of the eastern United States exceeds 100 deer per square mile (Porter 1991), and researchers have established that such high deer densities have negative impacts on plant and animal species (Alverson 1988; Anderson 1994; Augustine and Frelich 1998; deCalesta 1994; McShea 2000; McShea and Rappole 2000).

White-tailed deer in Rock Creek Park

Improved habitat conditions resulting in increased reproduction, coupled with low mortality rates, have resulted in deer numbers that have grown to an estimated current population in excess of 234,000 animals in Maryland (MD DNR 2006–2007). Deer thrive on habitat conditions created by suburban development. New roads, housing, and related enterprises fragment forests and farms, and

create “edge” habitats that provide plenty of food and ample shelter for deer. Fragmentation of the landscape and the increase in residential development have also reduced suitable hunting opportunities, particularly in Maryland’s growing suburban areas, some of which are adjacent to the District of Columbia and Rock Creek Park (MD DNR 1998). Although data exist for the District of Columbia near Rock Creek Park, the observations are too general and inconclusive (S. Bates, pers. comm. 2008d). However, because deer populations can and do cross these political boundaries, and because there are many similarities in regional landscape level changes and conditions, it is reasonable to assume that the District of Columbia and Rock Creek Park face the same issues as the neighboring Maryland suburbs.

Documentation of Deer Damage at Rock Creek Park

As in other eastern national parks, today the white-tailed deer at Rock Creek Park have no significant natural predators and virtually no hunting. The park provides an island of habitat in an urban environment, where there is no hunting per 36 Code of Federal Regulations (CFR) 2.2. Coupled with the lack of natural predation within the park, the combination of these factors has facilitated the growth of the deer population at Rock Creek Park.

Occasional sightings of deer in Rock Creek Park emerged in the 1960s, and continued sporadically throughout the 1970s. The deer population continued to increase, and in 1984, the first deer sighting in Glover-Archbold Park was recorded. By 1990, deer sightings were common throughout Rock Creek Park (K. Ferebee, pers. comm. 2005).

Deer have browsed a considerable amount of the understory at Rock Creek Park.

In an effort to determine the extent of deer-related impacts at Rock Creek Park, park staff have conducted a number of monitoring studies to document the size of the park’s deer population, as well as plant growth in the understory of the forest. Generally, the data collected indicate that deer are having adverse effects on shrub cover, tree seedling regeneration, and understory plant densities. The following summarizes the surveys performed at the park to date and their results.

Population and Ecological Characteristics of White-tailed Deer at Rock Creek Park

Observed deer trends and density at Rock Creek Park have been estimated through roadside spotlight surveys, Distance Sampling, limited Forward Looking Infrared Surveys (FLIR), and roadkill reports. Deer monitoring and research started in Rock Creek Park when deer were first spotted in the 1960s. From the 1960s to the early 1990s, deer observation cards were collected to document sightings. By the early 1990s, deer sightings were so prevalent that observation cards were no longer completed. Until the early 1990s, observation cards served as the only method for tracking deer in Rock Creek Park.

Roadkill Reports (1989–present)

Rock Creek Park staff have been recording dead animals found in the park since the early 1980s. In 1989, the first deer struck and killed by a vehicle in the park was recorded. 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. Areas of high numbers of road-killed deer include Military Road, Oregon Avenue, Beach Drive and Rock Creek and Potomac Parkway. Road-killed deer are typically found by park staff, and are not usually reported by people outside of the NPS.

Radio Telemetry Surveys (2001–2008)

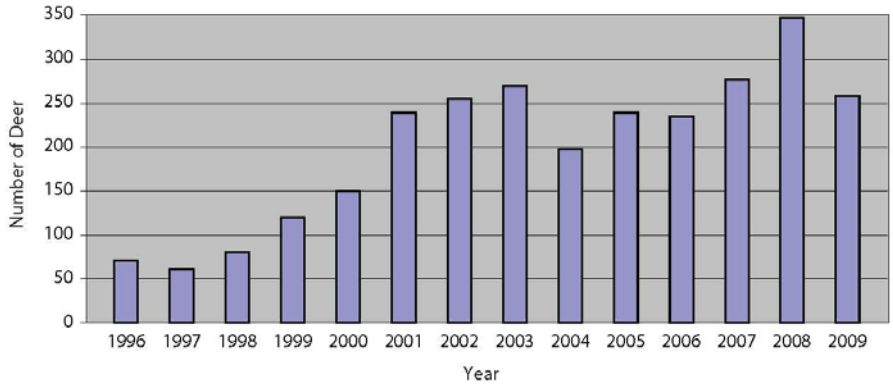
The park performed limited radio telemetry studies, which involved collaring five deer (does) with a radio transmitter and recording their movements. Data collected from the telemetry surveys were used to estimate the area used by each deer and the percentage of time that each deer is inside or outside of the park. The survey data show that the area used by each deer ranges from about 31 to 260 acres, and that the percentage of time spent outside the park is quite variable, ranging from about 5 to 42% (K. Ferebee, pers. comm. 2008d). Results of this limited research indicate that deer typically move about 0.25 miles outside the park boundary (K. Ferebee, pers. comm. 2008i).

Spotlight Surveys (1996–present)

Since 1996, park staff have conducted annual spotlight surveys to monitor trends in the deer population at Rock Creek Park. The surveys are conducted the same time each year over a four-night period, following the same 22-mile route covering the majority of Rock Creek Park (Reservation 339). The deer counts are based on visual sightings and eye shine from a spotlight. Where possible, sex and age determinations are recorded. The spotlight surveys are not based on any specific scientific protocols and provide population trends only, suggesting abundance levels in the area immediately adjacent to the vehicle route. Their usefulness is limited, since population densities cannot be calculated using this method (K. Ferebee, pers. comm. 2008c). As shown in figure 3, spotlight surveys indicate that the number of deer observed cumulatively over all four nights along the route increased steadily from 1997 to 2003, with a decrease in 2004, followed by some rebound in 2005–2008, and a drop in 2009 (NPS 2005c; K. Ferebee, pers. comm. 2006, 2007a, 2007b, 2010a).

Conducting spotlight surveys at Rock Creek Park

FIGURE 3. SPOTLIGHT COUNTS, 1996–2009



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 × 20 meters [66 feet × 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 × 20 meters [66 feet × 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 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

trying to transfer registration responsibility to the Environmental Protection Agency. Registration for non-research use may be available in five or more years.

Other local governments or local institutions have also completed studies to develop deer management plans, including Fairfax County, Virginia, and Montgomery County, Maryland. The Fairfax County plan incorporates a combination of hunting and sharpshooting to manage the deer population (Fairfax County 2003). The Montgomery County plan includes a comprehensive management approach incorporating education, lethal means (sharpshooting, hunting), and non-lethal means (fencing, repellents) (Montgomery County 2004). The National Conservation Training Center in Shepherdstown, West Virginia, has a deer management plan that relies on managed hunts for deer management.

Other Vegetation Management Issues

Role of Invasive Exotic Plant Species

Invasive nonnative plants (exotics) seriously threaten the integrity of native habitats, including eastern deciduous forests, by aggressively displacing and killing native plants, reducing native habitats, and reducing forest regeneration (Bratton 1982). The exotics problem is particularly acute in urban parklands where the extensive edges and frequent human disturbances enhance opportunities for aggressive exotic plants to become established (NPS 2004a).

Rock Creek Park, within the city of Washington, D.C., is one of the largest natural, urban forests within the United States. The park is comprised of 2,980 acres of mostly natural forest with 72 miles of boundary and more than 1,000 adjacent neighbors. This boundary (edge) interfaces the forest with streets and other urban landscape components, especially numerous landscaped private properties. Of the 41 most aggressive exotics, 40 are horticultural plants (NPS 2004a).

Deer exclosure/fenced plot at edge of forest overrun by invasive plants. The plot was discarded because the number of nonnative plants biased the data.

Ornamental vines like Asiatic bittersweet (*Celastrus orbiculatus*), porcelain berry (*Ampelopsis brevipedunculata*), and English ivy (*Hedera helix*) 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 and thrive 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.), viburnums (*Viburnum* spp.), 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).

Between the late 1970s and 1995, park staff implemented various pilot programs to document the spread of exotics and find treatments for the most obvious threats (Fleming, 1978-1995, unpublished data). Under the direction of Richard Hammerschlag, research scientist at USGS-Biological Resources Division, a research project was initiated in 1996 to determine the environmentally safest and most effective

chemical means of controlling Asiatic bittersweet and porcelain berry, as well as other woody exotics (Salmons 2000). At the same time, park staff have implemented an exotics management program using this information. 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. 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. The park has started to prioritize work and identify what criteria will be used to assist park managers in implementation. In addition, some parts of the park have not been as thoroughly surveyed as the Rock Creek watershed, where the research has been conducted. The invasive exotic management plan will be updated as the park learns more about exotics and the resources they threaten within the park (NPS 2004a).

Anthracnose — Any of several plant diseases caused by certain fungi and characterized by dead spots on the leaves, twigs, or fruits.

Role of Pests and Disease

In addition to exotic plants, Rock Creek's forests are susceptible to pests, such as insects and disease, as described below.

- Chestnut Blight—A fungus (*Cryphonectria* [*Endothia*] *parasitica*) was accidentally introduced into New York City in the early 1900s from trees imported from Asia, destroying its new host, the American chestnut (*Castanea dentata*), throughout its range from Maine to Alabama.
- Dogwood Anthracnose—Native dogwood trees (*Cornus florida*) have succumbed to the dogwood anthracnose, a disease caused by the fungus (*Discula destructive*), which attacks flowering dogwood trees.
- Gypsy Moth—Gypsy moths (*Lymantria dispar*), target a number of tree species found in the park including chestnut oak (*Quercus prinus*), white oak, red oak (*Q. rubra*), black oak (*Q. velutina*), scarlet oak (*Q. coccinea*), American beech, and various hickories. Gypsy moth caterpillars feed on the leaves of these hardwood trees and can cause complete defoliation of a tree. This affects the vigor and general health of forests and shade trees, leading to tree death, and subsequently altering wildlife habitat and affecting water quality and quantity. Gypsy moths first appeared in Rock Creek Park in the late 1970s. An integrated pest management plan for the park was developed by the NPS Center for Urban Ecology and the USDA Forest Service in 1983. Direct suppression through aerial application of the biological insecticides *Bacillus thuringiensis* (B.t.) and the gypsy moth specific nucleopolyhedrosis virus (Gypchek®) occurred from 1987 through 1989 (Favre et al. 1993).

Female gypsy moth

- Hemlock Woolly Adelgid—The hemlock woolly adelgid (*Adelges tsugae*) feeds by sucking sap from young needles of eastern hemlock (*Tsuga canadensis*), which causes them to drop prematurely. Extensive tree death is accompanied by detrimental environmental effects, such as the loss of ecological function, the loss of wildlife habitat (in the northeast United States, 96 bird and 47 mammal species are associated with hemlock forests for some critical component of their life cycle), soil erosion, changes in water quality, loss of aesthetics, and diminished recreational opportunities.

Role of Fire

Fire is an active and powerful natural force, which has the potential to affect all areas of the park and all facets of park management at various times and to varying degrees. Rock Creek Park's Fire Management Plan (FMP; NPS 2004c) is essentially a fire suppression plan (no prescribed burns are allowed) due to the urban nature of the park. Therefore, vegetation has not been affected or controlled by the use of prescribed fires, and any unplanned fires in the park are immediately suppressed.

DESIRED CONDITIONS

This plan/EIS addresses desired conditions for Rock Creek Park, the desired condition of the deer population, and the desired condition of the forest.

This section defines the desired conditions for Rock Creek Park, which are connected to this plan's purpose, need, and objectives. Several objectives were factored into the definition of desired conditions: allowing for a deer population within the park while protecting other park resources; protecting the natural abundance, distribution, and diversity of native plant species by reducing excessive deer browsing, trampling, and nonnative seed dispersal; and developing and implementing 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.

DESIRED DEER POPULATION CONDITION

Deer are a natural part of the ecosystem and play an important role in it. One of the objectives of this plan is to allow for a deer population within the park while protecting other park resources. Therefore, the team needed to consider what a desired deer population condition for Rock Creek Park was to ensure that actions taken under this plan would meet objectives. For this plan, a desired deer population is one that allows the forest to naturally regenerate, while maintaining a deer population within the park. The measure of deer density that would meet this condition is described more in chapter 2.

DESIRED FOREST CONDITIONS

One of the objectives of this plan is to reduce adverse effects of deer browsing pressure on native plant species, which include the seedlings of forest species. A desired forest condition would be a forest community that has the ability to maintain forest structure (i.e., tree density, size, and age classes), function, species diversity, and natural processes by natural tree replacement. The scientifically based vegetation impact levels that would serve as a threshold for taking prescribed management actions to meet this desired condition are described more in chapter 2.

SCOPING PROCESS AND PUBLIC PARTICIPATION

The NEPA regulations require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." To determine the scope and identify significant issues to be analyzed in depth in this plan, internal scoping was conducted with park staff and other parties associated with preparing this document. As a result of this scoping effort (see "Chapter 5: Consultation and Coordination," for additional information), several issues were identified as requiring further analysis in this plan. These issues represent existing conditions, as well as concerns that might arise during implementation of alternatives.

ISSUES AND IMPACT TOPICS

The issue statements developed by the interdisciplinary team are presented below. These issues formed the basis for the impact topics discussed in chapters 3 and 4 of this environmental impact statement.

Vegetation

An overabundance of deer could possibly alter and affect forest regeneration patterns in the park, as well as the diversity of species within the park, by reducing the understory and affecting the natural diversity of dominant tree species. Vegetation monitoring in Rock Creek Park has demonstrated a decline in shrubs and seedlings since 1991. As previously described, data collected over nine years from the park's paired plots (Krafft and Hatfield 2011) indicate that vegetation in plots protected from deer herbivory showed significantly greater vegetative cover compared to plots not protected from deer herbivory, and protection from deer herbivory produced significantly higher levels of vegetation thickness in the exclosed plots compared to the paired unfenced control plots for both the low and middle 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 widespread at Rock Creek Park, trends indicate that an unmanaged deer population could lead to these problems, as are currently being faced by similar eastern national parks such as Catoctin Mountain Park in Maryland.

The excessive browsing associated with an overabundance of deer in Rock Creek Park could adversely affect regeneration of vegetation in riparian areas. Riparian areas are important because of their relatively high biological diversity. The level of deer browsing in these areas that would be associated with an overabundance of deer in Rock Creek Park could prevent regeneration in these areas and negatively affect the riparian areas. Currently, no data exist on deer impacts to riparian areas within the park.

Increased deer activity can promote nonnative species through habitat alteration and seed dispersal. An increase in nonnative species could have a negative impact on the park's native plant communities. Deer activity, such as browsing, trampling, and seed dispersal through waste or attachment to hair, has the potential to increase the number and type of nonnative species within the park (Myers et al. 2004; Vellend 2002; Williams and Ward 2006; Willson 1993). As the number of nonnative species increases, the native species within the park encounter increased competition and are adversely affected.

Deer management activities could result in areas of increased deer use, if bait is used to attract deer to a particular area. This could have a disproportionate impact to vegetation in areas near established bait piles. In addition, fencing that keeps deer away from vegetation results in increased browsing pressure outside of the fenced area, as well as decreased browsing pressure inside the fenced area.

Soils and Water Quality

Deer overabundance has led to increased deer browsing and a reduction in the understory vegetation in Rock Creek Park, as shown in the data from the long-term and paired vegetation plots. As the understory cover decreases, soils become more susceptible to erosion, which can lead to sedimentation and degradation of the park's water resources. Certain deer management actions can also disturb soils and affect water quality, including construction of fencing, especially in riparian areas that are already impacted by erosion.

Peirce Mill Dam and fish ladder

Floodplains and Wetlands

The removal of ground vegetation as a result of overabundance of deer and their activities (i.e., browsing, trampling, creating trails) may increase erosion and stormwater runoff and affect floodplains and wetland habitats. As the deer population increases, the amount of deer browsing and trampling of vegetation increases, thus reducing the amount of ground cover within the forest. As ground cover decreases, stormwater runoff and erosion increase. Water retention in the forest is related to the amount of ground cover. Some of the vegetation in floodplains could be affected, and there could be degradation of wetland habitat from the increased erosion and sedimentation. Although some impacts to floodplains and wetlands may be attributed to deer activity, there are other factors from both inside and outside the park that also influence floodplains and wetlands, and contribute to the majority of impacts to these resources. Among these factors are land use changes, the large amount of impervious surfaces in Washington, DC, and the loss of ground cover and trampling of vegetation by park users and their off-leash pets. Also, several of the large exclosures proposed as part of one management alternative would be located within the 100-year floodplain and possibly within wetlands.

Wildlife and Wildlife Habitat

White-tailed Deer—Maintaining a viable deer population while protecting other park resources within Rock Creek Park, is imperative to this plan. Rock Creek Park has monitored the number and density of the deer population through spotlight counts, FLIR, and Distance Sampling. Survey results indicate an overabundance of deer. Although high deer densities may adversely affect plants and other wildlife species, deer themselves are an important park resource. It is important that this plan maintain a deer population in the park while taking action to reduce adverse effects to the deer population itself.

Other Wildlife—At certain levels, deer overabundance adversely affects other wildlife and/or habitat by reducing habitat diversity through activities such as browsing, trampling, and seed dispersal. Studies have linked high deer densities to undesirable effects on other wildlife species, such as migratory birds (deCalesta 1994; McShea 2000; McShea and Rappole 2000). Park staff are concerned that deer may be affecting other species, including breeding birds; however, there are no park-specific data to show that impacts to ground-nesting species have occurred from deer browsing (S. Bates, pers. comm. 2008d).

Changes in water quality from the removal of ground vegetation as a result of overabundance of deer and their activities (i.e., browsing, trampling, creating paths) have the potential to adversely affect unique and important fish habitats located within Rock Creek Park. Issues related to unique or essential fish habitat are similar to those for surface water. As the deer population increases, so does the amount of deer browsing and trampling of vegetation, reducing the amount of ground cover within the forest. As the ground cover decreases, the amount of stormwater runoff and erosion also increases and could degrade water quality, including unique and essential fish habitat. Efforts are currently underway in the park to improve fish habitat. As a part of the Woodrow Wilson Bridge project mitigation, man-made barriers to fish movement in Rock Creek Park have been removed. This project, which began in December 2003, removed or bypassed several man-made barriers that for generations had prevented herring and other migratory fish from returning to primordial spawning areas located upriver. A total of 23 fish barriers were removed or modified in several streams that empty into the Potomac River. In Rock Creek Park, six fish barriers were removed or modified, while two more were removed from the adjacent National Zoological Park. Furthermore, a fish ladder was constructed at the Peirce Mill dam to provide access to the habitat above the dam for migrating fish.

Deer management activities could also impact other wildlife and wildlife habitat. The use of bait piles could provide an additional food source for some species, while fencing could restrict access to certain wildlife habitat. In addition, the presence of increased human activities during specific time periods and associated noise could result in temporary behavior changes and avoidance of management areas.

Rare, Unique, Threatened, or Endangered Species

The NPS is required under the Endangered Species Act (ESA) to ensure that federally listed species and their designated critical habitats are protected on lands within the agency's jurisdiction. Only one federally listed species, the endangered Hay's Spring amphipod, is known to inhabit the park. The Hay's Spring amphipod was discovered in five groundwater springs in Rock Creek Park in 1998. Another rare species, Kenk's amphipod (*Stygobromus kenki*), also known as the Rock Creek groundwater amphipod, was identified in park springs (NPS 1997a). Kenk's amphipod is not listed under the ESA, and recently the U.S. Fish and Wildlife Service (USFWS) found that the petition for listing did not contain sufficient scientific or commercial information indicating that listing of this species was warranted (USFWS 2007b). In addition, three other *Stygobromus* species of amphipods that are listed by the state of Maryland as rare or uncommon have been located in or near the park (Maryland Department of Natural Resources, Heritage and Biodiversity Conservation Program 2003). Habitat for these species may be vulnerable to impacts from deer overabundance and their related activities (i.e., trampling, browsing, seed dispersal, etc.). Surface erosion may vary in extent due the nature of a disturbance as well as the local topography, soils, and vegetation. Such erosion can lead to impacts on the quality of underground water resources. Any erosion caused by overabundant deer could, in turn, affect the amphipod species, and other subterranean fauna. Protection of the amphipods will be considered in this deer management plan.

Rare species are also identified by the District of Columbia, Maryland, and Virginia. The Virginia species are not known in the park and it is not likely that they will occur because of the separation from Virginia by the Potomac River, as well as the presence of different habitats. However, there are several plant species that have been or are currently listed as rare by Maryland Department of Natural Resources that, although rare, have been documented in Rock Creek Park. Several animal species with known occurrences in Rock Creek Park are listed as rare or uncommon by Maryland. While the District of Columbia does not provide special protection for listed species, it has identified species of concern, called species of greatest conservation need, within the area in its Wildlife Action Plan (District of Columbia 2006). Because of the habitat value provided by Rock Creek Park, many of these species are found in the park. Habitats preferred by these species generally include springs, seeps, wetlands, and waterways and/or associated moist forested areas. While the NPS is not under any legal obligation to protect state- or locally-listed species, the park enabling legislation supports maintaining these as part of the park's natural heritage, and NPS management policies state that these should be addressed in environmental assessments of proposed actions (NPS 2006). These species have the potential to be impacted by an overabundance of deer as a result of habitat alteration as discussed under soils, water resources, and vegetation.

Cultural/Historic Resources – Cultural Landscapes

An overabundance of deer and the resulting deer browsing could impact the cultural landscapes within Rock Creek Park. Rock Creek Park consists of many diverse units varying from carefully designed landscapes to natural forested areas. The cultural landscapes at Rock Creek Park reflect the relationship between what is natural and what is man-made. Dumbarton Oaks Park is an example of a designed landscape within the park. Whether natural or designed, an overabundance of deer and the resulting deer browsing can impact the cultural landscape of an area and affect the historic integrity of a given site. Certain deer management activities that result in the construction of fences or the alteration of the landscape could impact designated cultural landscapes.

Peirce Barn

Soundscapes

Certain deer management activities may cause disturbance to park soundscapes. The deer management strategies discussed included the use of sharpshooting and/or contraceptives by dart gun. Firearm noise resulting from such management activities could affect park visitors and wildlife. Rock Creek Park is an urban park and, while the park is located in an area of high ambient noise, residents have expressed concern for noises related to firearms, and this concern would be taken into consideration in the creation of a deer management plan. It is unlikely that firearm discharge noise would have a substantial impact due to the likelihood that noise suppression devices for the firearms would be recommended as part of the management activity. These devices would render the noise level to be substantially below typical noise associated with vehicle traffic and recreational activities. Current sources of ambient noise in the park include a variety of visitor uses (e.g., traffic, special events, athletic fields, picnicking, etc.), flight paths over the park including helicopters and military flyovers, landscaping activities both within the park by contractors and on adjoining lands, commuter traffic, emergency service vehicles, and the activities of adjacent property owners (i.e., community events at schools or churches), as well as other noises common to urban areas.

Visitors stroll at Rock Creek Park

Visitor Use and Experience

The presence or absence of deer in Rock Creek Park could be an important component of the visitor experience for some park users and alteration of the number of deer through a Deer Management Plan would impact this experience. Many visitors come to Rock Creek Park units to enjoy the natural areas. For some park visitors, seeing a deer is an important part of the park experience and for others, deer are an unwelcome intrusion. At one town hall meeting, approximately half of the participants favored deer in the area and the other half looked upon the presence of deer unfavorably. An overabundance of deer may also have an indirect impact on other park visitors by altering the habitat of other species (i.e., changing the understory so that there are fewer migratory birds) and changing the visitor experience for those visitors that come to see species within that habitat. Deer have direct impacts on the community gardens that are maintained by park users, most of which have been fenced to protect them from deer browsing.

Deer management activities have been, and will continue to be, affected by the public perception of deer and other wildlife. From 2000–2005, the park received two reports of deer running through plate glass windows at neighboring residences. These few instances of damage to personal property resulting from deer influence the public perception within the community. Likewise, park staff have reported that public outreach indicates that a portion of the District of Columbia community has a general fear of wildlife, including deer.

Proposed deer management activities may require certain areas of the park to be closed to the general public during management activities, affecting visitor use and experience. If deer management activities were to decrease the number of deer in the park, chance sightings by visitors would also decrease. Some visitors to the park may view deer sightings as an integral part of their visit. Deer management actions may decrease the potential for visitors to observe deer within the park, causing less visitor satisfaction.

Conversely, as the number of deer increase, other resources that visitors come to see, such as songbirds, may decrease. Increased deer browse has the potential to impact these other resources and impact the satisfaction of these visitors.

Visitor and Employee Health and Safety

Various health and safety concerns could result from implementation of the alternatives described in this plan/EIS. Health and safety applies to Rock Creek Park visitors, local residents, and Rock Creek Park employees. All deer management activities would need to be conducted in a manner to ensure the safety of park visitors and employees.

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. 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 D.C. metro region, including Rock Creek Park, found in comparing data from 1995 and 2003 that traffic volumes remained basically the same or decreased somewhat, while deer/vehicle collisions increased (Metropolitan Washington Council of Governments 2006), indicating that the number of deer may be an important factor in the increased number of accidents occurring. Deer/vehicle collisions within the park are most common along Military Road, Oregon Avenue, Beach Drive, and Rock Creek and Potomac Parkway.

Socioeconomic Resources

An overabundance of deer could lead to increased browsing of landscape vegetation on neighboring properties, having a negative economic impact on those landowners. Current Rock Creek Park deer management activities include communicating with neighboring landowners and addressing questions and concerns. Residents contact the park to complain about deer that have entered private property and have eaten their landscaping, causing aesthetic and economic impacts. The park, in turn, provides advice to the landowners regarding landscape plantings that may be less palatable to deer, methods to exclude deer, as well as recommendations on scare devices and repellents. Certain deer management activities would need to be coordinated with neighbors and would affect neighboring landscaping due to a change in the number of deer present in certain areas of the park.

Park Management and Operations

Deer management activities must take into consideration the deer management actions of adjacent municipalities to enhance deer management success within the park. Rock Creek Park is an urban park with multiple jurisdictions as neighbors, including the District of Columbia and Montgomery County, Maryland. The District of Columbia does not actively manage deer, but does assist Rock Creek Park with responding to deer complaints and has hired several wildlife biologists to address potential deer issues. Deer overbrowsing is listed as a threat to terrestrial ecosystems in the DC Wildlife Action Plan, and NPS participated in developing the plan (Pfaffko 2006). Rock Creek Park and the District of Columbia have collaborated on deer management issues in the past, including the Metropolitan Washington Council of Government's Wildlife Vehicle Collision working group, and will continue to work together on deer-related issues in the future.

Park neighbors

The adjacent jurisdiction of Montgomery County, Maryland has had an active deer management program since 1995 (Montgomery County 1995a). The county and the District of Columbia have stated they would like to be a partner with the park for deer management efforts.

Deer management activities have the potential to impact staffing levels and the operating budget necessary to conduct park operations. Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. Additional deer management activities undertaken by park staff could affect other areas of park operations.

Park interpretive or educational staff would need to allocate additional time and resources to enhance public awareness and understanding of NPS resource management issues, policies, and mandates, as they pertain to deer management. Implementing deer management activities would require conducting public outreach efforts on the part of park staff.

OTHER ISSUES CONSIDERED BUT DISMISSED FROM FURTHER CONSIDERATION

The following impact topics and/or issues were dismissed from further analysis, as explained below:

- Geohazards: A geohazard is an event related to geological features and processes that cause loss of life and severe damage to property and the natural and built environment, such as an earthquake or rock slide. There are no known geohazards within the park that would be affected by the creation or implementation of a white-tailed deer management plan.
- Prime Farmlands: There are no designated prime farmland soils in the park.
- Air Quality: Potential sources of air quality emissions from the implementation of a white-tailed deer management plan include the use of a few vehicles to carry out the prescribed management activities and possibly firearm discharges. Although Rock Creek Park is located in an area classified by the U.S. Environmental Protection Agency as severe nonattainment for ozone, it was determined that the increase in air emissions from these activities would be extremely minimal and short-term, resulting in only negligible impacts to the regional air quality. Therefore, air quality was dismissed as an issue.
- Streamflow Characteristics: The proposed action would not occur in any area or involve management actions that would potentially impact streamflow.
- Marine or Estuarine Resources: There are no marine or estuarine resources in any of the Rock Creek Park units.
- Land Use: Implementation of a white-tailed deer management plan would not affect how surrounding land is used including occupancy, income, ownership, or type of use. The proposed plan would be consistent with surrounding land uses and would not have an effect.
- Unique Ecosystems, Biosphere Reserves, and World Heritage Sites: There are no known biosphere reserves, World Heritage sites, or unique ecosystems listed in the park. Rock Creek Park is part of the Chesapeake Bay Watershed; however, actions related to the deer management plan would not affect the watershed.
- Museum Collections: The implementation of a White-tailed Deer Management Plan in Rock Creek Park would mainly occur within the forested areas of the park and would not have any effects on the park's museum collections.
- Historic Structures: Although there are historic structures that are listed or eligible for listing in the National Register of Historic Places, there would be no negligible impacts on these structures from implementing, or not implementing, a white-tailed deer management plan in Rock Creek Park. Designed landscapes, such as Dumbarton Oaks Park, would be addressed under cultural landscapes.

- Archeological Resources: Any impacts to park archeological resources as a result of deer management activities would be negligible. Although digging for fencing or other land disturbance could occur, this would be limited to small areas and would avoid areas of known archeological resources. Monitoring would occur and installations would be halted should any archeological resources be discovered.
- Ethnographic Resources: No ethnographic resources or issues have been identified at Rock Creek Park.
- Impacts to Soils from Construction: Any deer management actions that would involve construction, such as erecting exclosures under alternative B or digging pits for waste and/or carcass disposal in disturbed areas under alternatives C or D, could potentially impact soils. However, it was determined that such impacts would be no more than negligible because of the small area disturbed for fence construction, and because disposal pits would be constructed in previously disturbed locations. Therefore, this issue was dismissed from further analysis.
- Water Quality Effects other than Sedimentation: Although there could be other effects on water quality from deer droppings or from the limited application of repellents, the impacts would be so minor and/or localized that these aspects of water quality were not carried through for detailed analysis, and the analysis was focused on effects from erosion and sedimentation.
- Energy Resources and Resource Conservation: The implementation of a white-tailed deer management plan would not be expected to affect energy resources or resource conservation within the park.
- Environmental Justice: The actions under this plan are not expected to have a disproportionate or significant adverse effect on any low income or minority populations in the area.
- Greenhouse Gas Emissions and Climate Change: There is strong evidence linking global climate change to human activities, especially greenhouse gas emissions associated with the burning of fossil fuels (IPCC 2007). Some of the activities associated with deer management may result in fossil fuel consumption, such as the use of vehicles to assist in carrying out management activities. However, greenhouse gas emissions associated with the plan would be negligible in comparison to park-related, local, and regional greenhouse gas emissions. Furthermore, implementation of any action alternative that preserves the ability of the forest to replace itself by maintaining its regeneration phase sustains the value that forest has in storing greenhouse gases. Therefore, the issue of the contribution of deer management activities to climate change through greenhouse gas emissions was dismissed from further analysis.

RELATED LAWS, POLICIES, PLANS, AND CONSTRAINTS

NATIONAL PARK SERVICE ORGANIC ACT

By enacting the *Organic Act of 1916*, Congress directed the U.S. Department of the Interior and NPS to manage units of the national park system "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1). The 1978 *Redwood Amendment* reiterates this mandate by stating that the NPS must conduct its actions in a manner that will ensure no "derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress" (16 USC 1 a-1). Congress intended the language of the *Redwood Amendment* to reiterate the provisions of the *Organic Act*, not to create a substantively different management standard. The House Committee report described the *Redwood Amendment* as a "declaration by Congress" that the promotion and regulation of the national park system is to be consistent with the *Organic Act*. The Senate Committee report stated that under the

Redwood Amendment, "The Secretary has an absolute duty, which is not to be compromised, to fulfill the mandate of the 1916 Act to take whatever actions and seek whatever relief as will safeguard the units of the national park system." Although the *Organic Act* and the *Redwood Amendment* use different wording ("unimpaired" and "derogation") to describe what the NPS must avoid, both acts define a single standard for the management of the national park system—not two different standards. For simplicity, NPS *Management Policies 2006* uses "impairment," not both statutory phrases, to refer to that single standard.

Park managers must also not allow uses that would cause unacceptable impacts (NPS 2006, sec. 1.4.7, 12) These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. For the purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would

- be inconsistent with a park's purposes or values, or
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- create an unsafe or unhealthful environment for visitors or employees, or
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- unreasonably interfere with
  - park programs or activities, or
  - an appropriate use, or
  - the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park, or
  - NPS concessioner or contractor operations or services.

Because park units vary based on their enabling legislation, natural resources, cultural resources, and missions, management activities appropriate for each unit, and for areas in each unit, vary as well. An action appropriate in one unit could impair or cause unacceptable impacts to resources in another unit. Since publication of the draft plan/EIS in July 2009, the NPS has issued Interim Guidance for Impairment Determinations in NPS NEPA documents (NPS 2010c). Consistent with the Interim Guidance, a draft plan/EIS written impairment determination only for the preferred alternative is included in appendix B of this final plan/EIS, and the impact analysis for the no-action alternative, alternative A, in the final/plan EIS discusses the potential of alternative A to result in impairment to vegetation and certain wildlife and rare species.

NATIONAL PARK SERVICE MANAGEMENT POLICIES 2006

Several sections from the NPS *Management Policies 2006* (NPS 2006) are relevant to deer management in Rock Creek Park, as described below.

NPS *Management Policies 2006* instruct park units to maintain as parts of the natural ecosystems of parks all native plants and animals. The NPS achieves this maintenance by "preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur" (NPS 2006, sec. 4.4.1).

Furthermore, the NPS "will adopt park resource preservation, development, and use management strategies that are intended to maintain the natural population fluctuations and processes that influence the

dynamics of individual plant and animal populations, groups of plant and animal populations, and migratory animal populations in parks" (NPS 2006, sec. 4.4.1.1).

Whenever the NPS identifies a possible need for reducing the size of a park plant or animal population, the decision will be based on scientifically valid resource information that has been obtained through consultation with technical experts, literature review, inventory, monitoring, or research (NPS 2006, sec. 4.4.2.1). The science team was assembled to complete this task.

Section 4.4.2 of the NPS *Management Policies 2006* also states:

> Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species. The NPS may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the populations of the species or to other components and processes of the ecosystems that support them. The second is that at least one of the following conditions exists (NPS 2006, sec. 4.4.2):

- Management is necessary
  - because a population occurs in unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences
  - to protect specific cultural resources
  - to protect rare, threatened, or endangered species

Section 4.4.2.1 of the NPS *Management Policies 2006* states:

> Where visitor use or other human activities cannot be modified or curtailed, the [NPS] may directly reduce the animal population by using several animal population management techniques, either separately or together. These techniques include relocation, public hunting on lands outside a park or where legislatively authorized within a park, habitat management, predator restoration, reproductive intervention, and destruction of animals by NPS personnel or their authorized agents. Where animal populations are reduced, destroyed animals may be left in natural areas of the park to decompose unless there are human safety concerns regarding attraction of potentially harmful scavengers to populated sites or trails or other human health and sanitary concerns associated with decomposition (NPS 2006, sec. 4.4.2.1).

DIRECTOR'S ORDER 12: CONSERVATION PLANNING, ENVIRONMENTAL IMPACT ANALYSIS, AND DECISION MAKING AND HANDBOOK

NPS Director's Order 12 and its accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with the NEPA. Director's Order 12 and the handbook set forth a planning process for incorporating scientific and technical information and establishing a solid administrative record for NPS projects.

NPS Director's Order 12 requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, AS AMENDED

NEPA section 102(2)(c) requires that an environmental impact statement be prepared for proposed major federal actions that may significantly affect the quality of the human environment.

NATURAL RESOURCES REFERENCE MANUAL, NPS-77 (1991)

The *Natural Resource Reference Manual 77*, which supersedes the 1991 NPS 77: *Natural Resource Management Guideline*, provides guidance for NPS employees responsible for managing, conserving, and protecting the natural resources found in national park system units.

DIRECTOR'S ORDER 28: CULTURAL RESOURCE MANAGEMENT (2002)

This Director's Order (NPS 2002b) sets forth the guidelines for management of cultural resources, including cultural landscapes, archeological resources, historic and prehistoric structures, museum objects, and ethnographic resources. This order calls for the NPS to protect and manage cultural resources in its custody through effective research, planning, and stewardship in accordance with the policies and principals contained in the NPS *Management Policies 2006*.

OTHER LEGISLATION, COMPLIANCE, AND NATIONAL PARK SERVICE POLICY

Endangered Species Act of 1973, as Amended

The purpose of the ESA is to conserve "the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed species. Under the law, species may be listed as either "endangered" or "threatened." Endangered means a species is in danger of extinction; threatened means a species is likely to become endangered. All federal agencies are required to protect listed species and preserve their habitats. The law also requires federal agencies to consult with the USFWS to ensure that the actions they take, including actions chosen under this deer management plan, will not jeopardize listed species.

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act of 1918 implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under this act it is prohibited, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess…any migratory bird, included in the terms of this Convention...for the protection of migratory birds...or any part, nest, or egg of any such bird" (16 USC 703). Since actions of deer or management actions could affect habitat for or disturb migratory birds, this act was considered in the development of this plan.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186 was established on the premise that migratory birds contribute to biological diversity, bring enjoyment to millions of Americans, and are of great ecological and economic value to this county and to other countries. Under this order, federal agencies taking actions that have, or are likely to have, a measurable negative effect on the migratory bird population are directed to develop and implement a Memorandum of Understanding with the USFWS that promotes the conservation of migratory bird populations. This executive order also requires that the environmental analysis of federal actions required by NPS or other established environmental review processes evaluate the effects of the action and agency plans on migratory birds, with an emphasis on species of concern.

National Historic Preservation Act of 1966, as Amended

Section 106 of the NHPA requires that federal agencies consider the effects of their undertakings on properties listed or potentially eligible for listing in the National Register of Historic Places. All actions affecting the park's cultural resources must comply with this regulation.

Historic Sites, Buildings, and Antiquities Act, 1935

The Historic Sites, Buildings, and Antiquities Act establishes "national policy to preserve for public use historic sites, buildings and objects of national significance." It gives the Secretary of the Interior broad powers to protect these properties, including the authority to establish and acquire nationally significant historic sites.

Federal Noxious Weed Act, 1975

The Federal Noxious Weed Act (7 USC 2801-2814, January 3, 1975, as amended 1988 and 1994) provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health. Since actions of deer or management actions could affect the distribution of noxious weeds through seed dispersal, this act was considered in the development of this plan.

Code of Federal Regulations, Title 43

Title 43 of the *Code of Federal Regulations* (CFR) part 24 describes the four major systems of Federal lands administered by the Department of the Interior.

In addition, section 24.4 (i) instructs all Federal agencies of the Department of the Interior, among other things, to "[p]repare fish and wildlife management plans in cooperation with State fish and wildlife agencies and other Federal (non-Interior) agencies where appropriate." It also directs agencies to "[c]onsult with the States and comply with State permit requirements … except in instances where the Secretary of the Interior determines that such compliance would prevent him from carrying out his statutory responsibilities."

Code of Federal Regulations, Title 36

Title 36, Chapter I provides the regulations "for the proper use, management, government, and protection of persons, property, and natural and cultural resources within areas under the jurisdiction of the National Park Service" (36 CFR 1.1(a)). This includes wildlife management, hunting and permits.

Executive Order 11990, Protection of Wetlands

Executive Order 11990 directs federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Executive Order 11988, Floodplain Management

This executive order directs federal agencies to avoid, to the extent possible, long- and short-term impacts associated with occupying and modifying floodplains through development, where a practicable alternative exists.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

The NPS must address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities, including planning projects, on minority populations and low-income populations.

Executive Order 13112, Invasive Species

This executive order requires the NPS to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

Animal Welfare Act, as Amended (7 USC, 2131-2159)

The Animal Welfare Act requires that minimum standards of care and treatment be provided for certain animals bred for commercial sale, used in research, transported commercially, or exhibited to the public. Individuals who operate facilities in these categories must provide their animals with adequate care and treatment in the areas of housing, handling, sanitation, nutrition, water, veterinary care, and protection from extreme weather and temperatures. Although federal requirements establish acceptable standards, they are not ideal. Regulated businesses are encouraged to exceed the specified minimum standards. Deer management alternatives that include trapping, euthanasia, or administration of reproductive controls could be regulated by this act.

RELATIONSHIP TO OTHER PLANNING DOCUMENTS FOR ROCK CREEK PARK AND ADMINISTERED UNITS

The following plans for Rock Creek Park need to be considered in the development of this plan.

Natural Resources Management Plan (NPS 1996)

The Natural Resources Management Plan for Rock Creek Park (NPS 1996a) provides specific management objectives for Rock Creek Park based on the park's Statement for Management. The Natural Resources Management Plan will be updated as a Resource Stewardship Strategy when NPS issues guidelines for the updated plan. Although the NPS has not yet adopted the new guidelines for Resource Stewardship strategies, the Resources Management Plan for Rock Creek Park is used as a general guide to past planning efforts until a new resource stewardship strategy is completed. Resource related management objectives in the existing plan require that the park:

- Seek information, through research or other means, on the natural processes of the park's natural areas in order to perpetuate park resources and to enhance opportunities for resource-compatible public use and enjoyment.
- Preserve and perpetuate the park's plant and wildlife resources in as natural a condition as possible, and reduce the adverse effects of human activities and exotic species on the natural environment.
- Identify, protect, and perpetuate the park's historic resources, including mills, Civil War fortifications, and archeological sites.
- Monitor and evaluate current recreational uses of the park lands and redirect these activities in order to reduce adverse impacts.
- Foster understanding and appreciation of the park's natural and cultural values through interpretive and educational programs focusing on Rock Creek's biological, geological, historic, and prehistoric resources.
- Provide for public use and enjoyment of the park through the provisions of varied facilities, services, and programs that are compatible with perpetuating the park's natural and cultural values.
- Establish contact and cooperation with citizens' associations, governmental agencies, and other groups or individuals that surround and have direct effects on or interests in the welfare of the park.

These management objectives are addressed in a series of project statements which consider natural and cultural resource problems, activities, or issues. The plan does not directly address deer management at the park, but it does recommend a monitoring program to collect information on herd size and impacts to the park and surrounding communities. These monitoring efforts will be used to assess the need for future management actions.

Cultural Landscape Reports and Inventories

The park has completed several cultural landscape reports or inventories that document the history and existing condition of the landscapes and analyze and evaluate the landscape resources. The results and recommendations of these reports were taken into consideration when developing this plan/EIS. These reports include the following:

- Dumbarton Oaks Cultural Landscape Report (NPS 2000a)—The need to document the Dumbarton Oaks Park historic landscape became apparent in 1985 when the NPS recognized that the garden was being managed as a natural, rather than a cultural resource. The landscape report was created to provide guidance for stabilizing existing resources such as focal points and waterway features. This effort led to the 1997 *Preservation Maintenance Plan for Dumbarton Oaks Park*, which details cultural landscape maintenance.
- Peirce Mill Cultural Landscapes Inventory (NPS 2003b)—In 1997, the Peirce Mill landscape was identified as a component landscape of Rock Creek Park (Reservation 339). The landscape is identified as the property owned by Peirce Shoemaker that was transferred to the federal government after the creation of the park in 1890 and is distinctive from the rest of Reservation 339 because of the physical history of the site and the character of the area.
- Linnaean Hill Cultural Landscapes Inventory (NPS 2003a)—In 1997, the Linnaean Hill landscape was identified as a component landscape of Rock Creek Park (Reservation 339). The landscape is the property of Joshua Peirce Klingle that was transferred to the federal government after the creation of the park in 1890 and is distinctive from the rest of Reservation 339 because of the physical history of the site and the character of the area.

Long Range Interpretive Plan (NPS 2010b)

The Rock Creek Park Long Range Interpretive Plan, which was finalized in 2010, provides an assessment of current conditions in the interpretation and educational program for Rock Creek Park, establishes goals for the future direction and development of that program, and establishes priorities necessary to get there.

Fort Circle Parks Final Management Plan/Environmental Assessment (NPS 2004)

The Fort Circle Parks Final Management Plan (NPS 2004b), finalized in September 2004, provides a unifying management concept for significant historic resources associated with the Civil War defenses of Washington that would allow these resources to be preserved for future generations, and interpreted in a coherent, easily understandable manner. This plan sets forth a series of desired visitor experience and resource condition statements to guide the management of these units for the next 10 to 15 years.

Environmental Commitment Statement (NPS 2004)

In July 2004, Rock Creek Park issued a statement (NPS 2004f) that summarizes a commitment to manage park resources and the multiple sites in the District of Columbia under park jurisdiction as outlined by the principles and practices described in the Organic Act of 1916, which state “we are to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

Draft Invasive Exotic Plant Management Plan (NPS 2004)

The Draft Invasive Exotic Plant Management Plan (NPS 2004a) describes the principles under which exotic plant management is prioritized and undertaken for all the natural areas within Rock Creek 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. NEPA compliance is conducted as needed.

Rock Creek Park and Rock Creek and Potomac Parkway Final General Management Plan/Environmental Impact Statement (2005; Record of Decision 2007)

The 2005 *Rock Creek Park and Rock Creek and Potomac Parkway Final General Management Plan* (NPS 2005a) is the basic guidance document for the management of these units for the next 10 to 15 years. The purpose of the plan is to specify resource conditions and visitor experiences to be achieved in the park and parkway, and to provide the foundation for decision-making and preparation of more specific resource plans regarding the management of the park and parkway. The 2005 plan is the first comprehensive plan prepared for Rock Creek Park. The central issue for management planning in Rock Creek Park is how to meet the often conflicting purposes of protecting the scenic, natural, and cultural resources of the park, while concurrently providing for appropriate public use of these resources.

The 2005 *Final General Management Plan*, which was finalized in a 2007 Record of Decision, outlines the following desired conditions for Rock Creek Park and the Rock Creek and Potomac Parkway that would be applicable to a deer management plan:

Natural Resource Management Requirements

- Native species populations that have been severely reduced or extirpated are restored where feasible and sustainable.
- Invasive species are reduced in number and area, or eliminated from natural areas of the park.
- Federal- and District-listed threatened or endangered species and their habitats are protected and sustained.
- Native plant and animal species function in as natural a condition as possible, except where special management considerations are allowable under policy.
- Surface waters and groundwater are protected or restored such that water quality as a minimum meets all applicable District of Columbia water quality standards.

Cultural Resource Management Requirements

- Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable.

Visitor Experience and Park Use Requirements

- Visitor and employee safety and health are protected.
- Visitors have opportunities to enjoy the park in ways that leave park resources unimpaired for future generations.
- Visitors understand and appreciate park values and resources and have the information necessary to adapt to the park's environments.

Special Use Management Requirements

- Resources outside of the park are managed in such a way that the park will be safeguarded.
- The NPS works cooperatively with others to anticipate, avoid, and resolve potential conflicts and address mutual interests.

All alternatives considered for the development of a White-tailed Deer Management Plan were developed within the framework of the park's GMP/EIS.

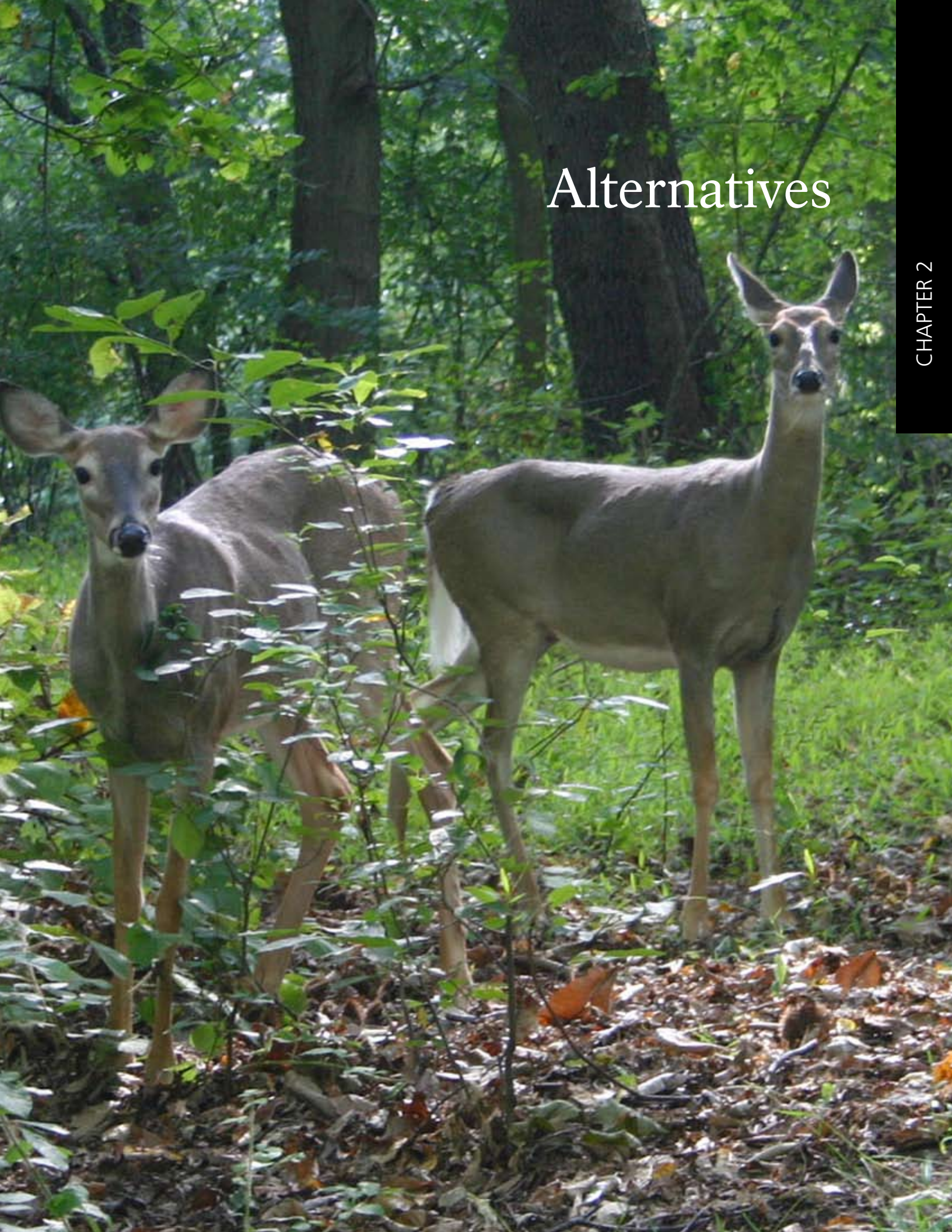
Fire Management Plan (NPS 2004)

Rock Creek Park's Fire Management Plan (FMP; NPS 2004c) is a component of the overall resources management program. It integrates fire management objectives with other resource management programs. The FMP provides a detailed action program that is consistent with NPS Management Policies 2006 and DO/RM-18 (NPS 1999, 2006), and will assist the park in its efforts to preserve, maintain, and protect natural and cultural resources.

The FMP is essentially a fire suppression plan, due to its urban surroundings. This FMP documents the fire management objectives, operational programs, and research required to effectively manage wildland fire at Rock Creek Park. Implementation of the plan allows all wildfires to be suppressed as safely and as quickly as possible. A prescribed fire program is not included in the FMP because Rock Creek Park is an urban park with 72 miles of boundary lines that would severely limit the use of prescribed fires. Air quality standards and visibility requirements for local air traffic further restrict the use of prescribed fire.

Watershed Condition Assessment (Carruthers et al. 2009)

During 2006-2014, the NPS Watershed Condition Assessment (WCA) Program will be completing natural resource condition assessments for each of the 270 parks in the 32 NPS Vital Signs Monitoring networks. Each assessment gives the receiving park a snapshot-in-time evaluation of current condition status, critical data gaps, and resource condition influences relative to a strategic subset of natural resource attributes and indicators. The assessments also strive to provide a holistic, science-based roll-up and report on overall condition status by park areas of greatest management interest (e.g., by watersheds, habitat/ecosystem types, or management zones). Assessments will help park managers and planners describe and quantify characteristics of Desired Conditions for each park's "fundamental" and "other important" natural resources and values. Rock Creek Park's Watershed Condition Assessment was completed in 2009 (Carruthers et al. 2009).



Alternatives

CHAPTER 2

ALTERNATIVES

This "Alternatives" chapter describes the various actions that could be implemented for current and future management of white-tailed deer (*Odocoileus virginianus*) in Rock Creek Park. The *National Environmental Policy Act* (NEPA) requires federal agencies to explore a range of reasonable alternatives and to analyze what impacts the alternatives could have on the human environment, which the act defines as the natural and physical environment and the relationship of people with that environment. The analysis of impacts is presented in "Chapter 4: Environmental Consequences" and is summarized in table 12 at the end of this chapter.

No-Action Alternative — The alternative in which baseline conditions and trends are projected into the future without any substantive changes in management.

The alternatives under consideration must include a "no action" alternative, as prescribed by NEPA regulations at 40 Code of Federal Regulations (CFR) 1502.14. The no action alternative in this document is the continuation of the park's current management actions and policies related to deer and their effects on vegetation.

The interdisciplinary planning team, with feedback from the public and the science team during the planning process, developed three action alternatives. These alternatives meet, to a large degree, the objectives developed for this plan and also the purpose of and need for action as expressed in "Chapter 1: Purpose of and Need for Action." Because these action alternatives would be technically and economically feasible and show evidence of common sense, they are considered "reasonable" (CEQ 1981).

INTRODUCTION AND OVERVIEW OF ALTERNATIVES

This chapter describes the alternatives developed by the interdisciplinary team for this White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), as well as the background information used in setting a deer density goal and an action threshold for implementing the preferred alternative, based on regeneration of tree seedlings. All alternatives were developed to meet the purpose, need, and objectives of this plan. Input from the science team and the public was considered and used to refine the preliminary alternatives as the planning process progressed.

The alternatives selected for detailed analysis are briefly described below. This is followed by a description of Rock Creek's deer density goal and the threshold for taking action, which are needed to fully understand the action alternatives (i.e., alternatives B, C, and D). Next, detailed descriptions of each alternative are presented, followed by a discussion of adaptive management and how it could be applied to the alternatives. The remainder of the chapter addresses alternatives that were considered but eliminated from detailed analysis and the identification of the agency's preferred and the environmentally preferred alternative.

NO ACTION ALTERNATIVE

- ***Alternative A: No Action*** — Current deer management actions and policies would continue under alternative A, including monitoring deer density and relative numbers, monitoring vegetation, data management, and opportunity for research. Protective caging and limited use of deer repellents may also be used to protect rare plants in natural areas and small areas in landscaped and cultural areas. Current educational and interpretive measures, as well as inter-jurisdictional communication, would continue. No new actions would occur to reduce the effects of deer overbrowsing.

ACTION ALTERNATIVES

- ***Alternative B: Combined Non-Lethal Actions*** — Alternative B would include all actions described under alternative A, but would also incorporate several non-lethal actions to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include the construction of large-scale deer exclosures (large fenced areas) and reproductive control of does via sterilization and an acceptable reproductive control agent when feasible. Reproductive control implementation may require construction of temporary holding areas to house captured deer prior to treatment.
- ***Alternative C: Combined Lethal Actions*** — Alternative C would include all actions described under alternative A, but would also incorporate two lethal deer management actions to reduce the herd size. The additional actions would include reduction of the deer herd by either sharpshooting or by implementing capture and euthanasia of individual deer, to be used in limited circumstances where sharpshooting may not be appropriate.
- ***Alternative D: Combined Lethal and Non-Lethal Actions (Preferred Alternative)*** — Alternative D would include all actions described under alternative A, but would also include 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 would be taken initially to quickly reduce the deer herd numbers. Population maintenance would be conducted via reproductive control methods if these are available and feasible; if not, sharpshooting would be used as a default option for maintenance.

DEER DENSITY GOAL AND THRESHOLD FOR TAKING ACTION UNDER THE ACTION ALTERNATIVES

The action alternatives (B, C, and D) contain actions to support forest regeneration and to protect, conserve, and restore native species and cultural landscapes. Before an action alternative may be implemented, the park must first determine (1) when action needs to be taken (i.e., when damage to forest vegetation reaches unacceptable levels); and (2) how many deer would need to be removed (for those alternatives that include deer removal). The following discussion describes both the threshold for taking action (which is related to vegetation impacts from deer browsing) and the deer density goal (which would be used to determine the number of deer that would be removed).

INITIAL DEER DENSITY GOAL

The deer density goal refers to a density that would allow for natural forest regeneration. This deer density would then be used as an appropriate goal for deer reduction under any of the action alternatives that include this action. Research has been conducted on tree regeneration and the impact of white-tailed deer on different forest types in the eastern United States. The predominant forest types in Rock Creek Park include beech (*Fagus* spp.)-white oak (*Quercus alba*)-mayapple (*Podophyllum peltatum*), tulip poplar (*Liriodendron tulipifera*), and chestnut oak (*Quercus prinus*), with mostly sycamore (*Platanus occidentalis*)-green ash (*Fraxinus pennyslvanica*) in floodplains and stream corridors. Research has suggested that in cherry (*Prunus* spp.)/maple (*Acer* spp.) forest types in the Allegheny Plateau (western Pennsylvania, West Virginia, and eastern Ohio), deer density should be 20 to 40 animals per square mile in unmanaged areas, and 15 to 18 animals in managed timber areas, to maintain natural regeneration (Tilghman 1989). Marquis et al. (1992) suggested that tree regeneration fails with deer densities at 32 deer per square mile. This research also demonstrated that a species shift occurs in beech/birch (*Betula* spp.)/maple forests at 18 deer per square mile, while an oak (*Quercus* spp.)/hickory (*Carya* spp.) forest successfully regenerates at 6 deer per square mile (Marquis et al. 1992). Research by deCalesta (1992, 1994) showed that seedling richness begins to decline with just 10 deer per square mile, and that songbird habitat is negatively impacted with 20 to 39 deer per square mile in a cherry/maple forest. Horsley et al.

(2003) showed that negative impacts began in cherry/maple forests at 20 deer per square mile within the Allegheny Plateau from 1979 to 1989. In that study, impacts to forest vegetation were examined at various deer densities (10, 20, 39, and 65 deer per square mile) and data were collected 3, 5, and 10 years after the exclosures were established (Horsley et al. 2003). In a study in the Central Adirondacks in maple/beech/birch, hemlock (*Tsuga* spp.)/birch, and spruce (*Picea* spp.)/fir (*Abies* spp.) forest types, Sage et al. (2003) found good tree regeneration with a density of 13 deer per square mile from 1954 to 2001. In 2006, the deer density at Rock Creek Park was 58 deer per square mile and in 2007 the deer density had climbed to 82 per square mile (K. Ferebee, pers. comm. 2008a); deer densities were lower in 2008–2009 at 66 and 67 deer per square mile, respectively (K. Ferebee, pers. comm. 2010a). These figures exceed all deer density levels recommended for tree regeneration in similar forests.

Based on the science team's recommendation and recent research in forest types similar to Rock Creek, the park adopted a range of 15 to 20 deer per square mile as the initial deer density goal.

As previously described, a science team consisting of scientists and other specialists from a variety of state and federal agencies was formed to provide technical information and input into the planning process (see "Scientific Background" in chapter 1), including a review of density information. The science team suggested that a range would be appropriate for the initial density goal and recommended a range of 15 to 20 deer per square mile. Based on the science team's recommendation and recent research in forest types similar to Rock Creek, the park adopted a range of 15 to 20 deer per square mile as the initial deer density goal. This goal may be adjusted based on the results of vegetation and deer population monitoring, as described in the "Adaptive Management" section.

THRESHOLD FOR TAKING ACTION

The science team also discussed methods of identifying an appropriate threshold for taking action to protect vegetation. Because the deer population is to be managed based on the success of forest regeneration, tree seedlings must be monitored to determine at what point the browsing impacts would warrant implementation of the selected management alternative. The point at which action would be needed is called the "threshold for taking action."

Since 1990, various vegetation-monitoring projects have been conducted within Rock Creek Park. In 1990, 27 long-term plots (unfenced) were randomly located throughout the park to capture general changes in the vegetation over time. These plots have been monitored every four years starting in 1991. Tree seedling data collected from these plots could be used to determine if action needs to be taken to limit deer browsing impacts.

Paired fenced/unfenced plot showing vegetation conditions inside and outside of the fence.

The regeneration standard adopted by the park was developed based on research by Dr. Susan Stout (1998) in a similar eastern hardwood forest environment in Cuyahoga National Recreation Area, now known as Cuyahoga National Park (McWilliams et al.

1995). While ecological histories may vary, there are many similarities between the forests at Cuyahoga and Rock Creek Park which support the use of this research. Dr. Stout's method measures the number of tree seedlings and their heights in circular (1-meter- [3.28-foot-] radius) sampling plots under different levels of deer herbivory. The seedlings were divided into eight height classes. Based on this work, Stout recommended regeneration thresholds for Cuyahoga. These thresholds were converted into Rock Creek's plot size, which includes a sampling area of four 2-meter × 2-meter (6.56-foot × 6.56-foot) subplots contained within each of the 27 long-term unfenced plots. At Rock Creek Park, Stout's results indicated that under conditions of low deer density, successful regeneration would be defined as having 51 seedlings or more within the four 2-meter × 2-meter (6.56-foot × 6.56-foot) subplots (a total sampling area of 16 square meters [172 square feet] or 0.0016 hectares [0.004 acres]) in 67% or more of the long-term monitoring plots (table 3). Low deer density has been defined as that from 13 to 21 deer per square mile relative to levels observed in the Mid Atlantic Region (Horsley et al. 2003) and is in the range of the desired deer density proposed for this plan. High deer density has been defined as 56 to 64 deer per square mile (Horsley et al. 2003). Under high deer densities, successful regeneration is defined as having 153 seedlings per 16 square meters (172 square feet). The following table summarizes this information.

TABLE 3. MINIMUM NUMBER OF SEEDLINGS/PLOT

Deer Density[a] (deer/mi^2)	16 Square Meter Plot
Low	51
High	153

Source: Stout 1998

Note: Low density = 67% of plots have 51 seedlings or more
High density = 67% of plots have 153 seedlings or more

Low density = 13–20 deer/mi^2
High density = 56–64 deer/mi^2
Source: Horsley et al. 2003

Based on the science team's review of the literature, the park decided to use Stout's suggested regeneration standard as the threshold for taking action under this plan. That is, at low deer densities, successful forest regeneration would be indicated when there are 51 seedlings or more within the subplots in 67% or more of the unfenced long-term plots monitored by the park. The park would determine the level of regeneration every four years from data collected from the plots, as described in the monitoring plan presented in appendix A.

Caging — Small scale fencing placed around individual plants to protect them from deer browsing.

ALTERNATIVE A: NO ACTION (EXISTING MANAGEMENT CONTINUED)

Under the "no action" alternative, Rock Creek Park would continue to implement current management actions and policies related to deer and their effects. This would include deer population monitoring (including Distance Sampling), 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.

Because alternative A includes no measures to reduce the white-tailed deer population or to control population growth, it is assumed that the population would stay at high levels, albeit with annual fluctuations and may gradually increase over the life of the plan (15 years). The amount of increase is unknown; however, high deer density is expected to continue to negatively affect vegetation (NPS 2007a), and deer density would likely reach or exceed the previously recorded high of 98 deer per square mile, with numbers fluctuating annually due to factors such as weather, health, removals outside the park (by other agencies), and food availability. This alternative serves as the baseline for analyzing and comparing the effects of the other alternatives.

The actions that would continue under alternative A are described below in detail. These actions would also be common to all action alternatives as well.

CURRENT ACTIONS

MONITORING, DATA MANAGEMENT, AND RESEARCH

Current monitoring of both vegetation impacts and deer population levels would continue and would be modified as necessary to better understand any correlations between the two.

Monitoring and data collection activities that would be common to all alternatives could include any or all of the following:

- Monitoring deer numbers by parkwide observations. The park would continue to use the Distance Sampling method to estimate the deer population density annually using an established protocol (NPS 2004g).
- Use of spotlight surveys to monitor population composition (i.e., age, sex ratios).
- Monitoring tree seedlings to determine the status of forest regeneration. Paired plots would be read annually, while the 27 long-term plots would continue to be read every four years (three times during the 15-year life of this plan).
- Monitoring deer health as the population shows signs of disease or if a disease has been discovered within the region. Appendix C and the following section specifically outline actions being taken to address chronic wasting disease (CWD).
- Tracking of research related to deer management, including the outcome of actions being taken by neighboring jurisdictions, and the latest research on various deer management methods, including reproductive control.
- Monitoring the costs of these actions, including those related to staff time, training, administrative, legal, and public communications, plus the costs of monitoring as described above.

Chronic Wasting Disease (CWD) — A slowly progressive, infectious, self-propagating neurological disease of captive and free-ranging deer, elk, and moose.

Under all of the alternatives, Rock Creek Park may solicit the help of skilled volunteers. Where hunting is not authorized, the use of skilled volunteers, pursuant to the *Volunteers in Parks Act*, to assist the National Park Service (NPS) in reducing deer populations is compatible with existing laws, regulations, and NPS policy. For the purposes of this plan/EIS, skilled volunteers would not be used to implement the administering of reproductive controls or lethal reduction (firearms or chemicals). Safety concerns related to high visitation, park boundaries, and

topography make this an infeasible option. However, skilled volunteers could be used to assist in the implementation of other elements included in the action alternatives. Volunteers could assist park staff with construction of fencing and deer exclosures as well as performing periodic monitoring and maintenance of fencing. Volunteers could also be used to collect data from vegetation monitoring plots and nighttime spotlight counts.

All actions involving direct management of individual animals would be conducted in accordance with American Veterinary Medical Association (AVMA) recommendations for the humane treatment of animals to the greatest extent possible (see AVMA website at <www.avma.org/resources/euthanasia.pdf> for examples). Every effort would be made to minimize the degree of human contact during procedures that require the handling of deer (AVMA 2001).

Specific deer population and vegetation monitoring methods that would be used under alternative A, as well as the other alternatives, are included in appendix A.

CHRONIC WASTING DISEASE

CWD is in the family of diseases known as the transmissible spongiform encephalopathies (TSEs) or prion diseases. Other TSEs include scrapie in sheep, bovine spongiform encephalopathy (BSE or mad cow disease), and Creutzfeldt-Jakob disease (CJD) in humans. Chronic wasting disease causes brain lesions that result in progressive weight loss, behavioral changes, and eventually death in affected cervids, including deer. There is currently no evidence that the disease is transmissible to humans or domestic livestock; however, the disease could limit populations of deer and could result in impacts on the recreational value of these species. Also, although wildlife biologists are still learning about this relatively new disease, studies have shown that greater density of deer and other ungulates increases the likelihood of transmission of CWD (see appendix C).

Generally, the NPS has identified two levels of action pertaining to CWD based on risk of transmission (see appendix C): (1) when the disease is not known to occur within a 60-mile radius of the park; and (2) when the disease is known to occur within the park or within a 60-mile radius of the park. As of 2007, the nearest known case of CWD in free-ranging deer was greater than 100 miles from Rock Creek Park. As of April 2011, the nearest case of CWD to Rock Creek Park was in Gore, Virginia, about 72 miles from the park (confirmed in January 2010). Another case was confirmed in February 2011 in Green Ridge State Forest, Maryland, about 88 miles from the park (S. Bates, pers. comm. 2011a). Therefore, the park would continue to take the following actions under the existing categorical exclusion provisions.

Surveillance/Testing

The park would continue to perform opportunistic surveillance on available carcasses. Opportunistic surveillance means taking biological samples from available dead animals (e.g., road kill, predation). This does not mean animals would be killed for the purpose of CWD surveillance. Opportunistic sampling is likely to be a more sensitive measure of disease detection because it includes testing animals that may have not been able to react quickly to oncoming vehicles or predators due to the effects of the disease.

In addition, the park staff is currently under direction to report any deer exhibiting clinical signs of CWD to the NPS Biological Resources Management Division for direction on additional action or testing. This targeted surveillance generally involves lethal removal and testing of any deer exhibiting clinical signs consistent with CWD. If CWD would be found within 60 miles of the park, opportunistic surveillance efforts would continue and targeted surveillance (lethal removal and testing) may be required.

Coordination

The park would continue to coordinate with the state wildlife agencies and the District of Columbia regarding CWD surveillance methods and results.

Disposal/Consumption

The park would follow NPS Public Health Service guidance pertaining to the donation of meat from a documented CWD area (NPS 2005e). Any deer confirmed with CWD would be disposed of in accordance with NPS Public Health Service disposal guidelines.

LIMITED USE OF SMALL AREA PROTECTIVE FENCING (CAGES)

In areas containing landscape plantings, new restoration plantings, or rare plant species, the park would consider caging of individual plants and small groups of plants to protect them from deer browsing. Landscape plantings typically consist of ornamental vegetation in and around buildings and in other park developed areas. Park staff may erect small cages or tree tubes around trees or seedlings that have been recently planted in restoration areas. If rare understory plant species that deer browse are found in the park, they would be protected with caging.

The caging used would be limited to the immediate area around the plants to be protected, typically less than 43 square feet (4 square meters) total, and would consist of a 5-foot-high, woven wire fence (typically a 1-inch by 2-inch mesh), with netting or other covering over the top as appropriate.

LIMITED APPLICATION OF REPELLENTS

The park may consider use of small amounts of commercially available deer repellents in landscaped areas. Repellents could also be used on plantings in cultural landscape areas where caging would be undesirable because of its visual impact.

Repellents work by reducing the attractiveness and palatability of treated plants to a level lower than that for other available forage. Repellents are more effective on less palatable plant species than on highly preferred species (Swihart and Conover 1991). Repellent performance seems to be negatively correlated with deer density, meaning that the higher the abundance of deer, the less likely the repellent would be effective. Success with repellents is measured as a reduction in damage; total elimination of damage should not be expected (Craven and Hygnstrom 1994).

Deer repellent products are generally either odor- or taste-based. Odor-based repellents incorporate a smell that is supposed to be offensive to deer, such as human hair, soaps, garlic, rotten eggs, blood meal, or seaweed, and they tend to work best in areas where deer have not adapted to close human interaction. Taste-based repellents incorporate a taste that is offensive to deer, such as hot pepper juice. These repellents tend to work in areas where deer have adapted to close human interaction and where odor-based repellents are not effective.

Both repellent types are available in chemical and organic forms. The organic repellents are biodegradable and are expected to be the least harmful to the environment. Some of the more recently available products, such as Plantskydd®, Liquid Fence®, and Deer Busters®, have the longest residence time (period of effectiveness between applications). Many other brands are also commercially available (e.g., Deer Blocker®, Gempler's®, Deer-Off®, Scoot Deer®, and Deer Scram®). Different brands may provide different results; therefore, park staff would experiment with the available products to determine which worked best in each application area. Both types of repellents can have a short residence time when applied to plant material and must be monitored and applied frequently to retain their effectiveness. Many commercial repellents indicate that they persist after normal rain events, with varying persistence of one to six months. In all cases, the NPS Integrated Pest Management Coordinator would approve the repellents used.

Commercially available deer repellents would be used in selected park areas where fencing would cause unacceptable visual impacts and where repellents would likely have some success. Repellents would be applied during the growing season and limited to hand-held sprays. Repeated applications of spray repellents would be necessary due to weather and emergence of new growth. Because the effectiveness of

repellents is variable, they would be used on an experimental basis until the level of effectiveness was established. Large-scale application of repellents is not practical due to high application cost, label restrictions on use, and variable effectiveness.

EDUCATIONAL AND INTERPRETIVE MEASURES

Communication with and input from other organizations and the public would be a key component of alternative A, as well as the other alternatives. Such activities would include continuing education and interpretive programs, displaying exhibits at visitor gathering areas, and producing brochures and publications about deer management issues. The park's website would also be used to discuss what the park is doing related to deer management and relevant articles may be published in local newspapers.

CONTINUED AGENCY AND INTER-JURISDICTIONAL COOPERATION

The park would continue to coordinate with other wildlife management agencies (Maryland National Capital Park and Planning Commission, DC Division of Fisheries and Wildlife) on the implementation of deer management efforts. Chapter 1 ("Purpose of and Need for Action") contains additional information on the neighboring agencies and jurisdictions with whom the park would consult on this planning effort.

IMPLEMENTATION COSTS

The costs associated with alternative A would primarily be for monitoring, plus limited small area protective caging and repellent application, as shown in table 4.

TABLE 4. COST ESTIMATE — ALTERNATIVE A: NO ACTION*

Action	Assumptions	Annual Cost	Cost for the 15-year Planning Period
Population Trend Counts (Spotlight Surveys)	Four nights of survey (three hours each night for three staff) plus data analysis	$1,456	$21,840
Distance Sampling	Three nights of survey (2 ½ hours each night for three staff) plus data analysis	$1,248	$18,720
Vegetation Monitoring of Existing Plots	Data collection and analysis • 16 paired plots • 27 long-term permanent plots	$12,480 annually $22,880 every 4 years	$187,200 $68,640
Maintenance of Existing Monitoring Plots	Assumes five hours labor	$208	$3,120
Small Area Protective Caging	Small areas caged	$104	$1,560
Repellent Use	Limited use around developed/landscaped areas – 5 gallons at $100 per gallon (concentrate)	$520	$7,800
		Total	**$308,880**

*Costs have been adjusted for 4% estimated inflation over two years between the draft plan/EIS and final plan/EIS.

The cost associated with CWD testing is not included in the table, since it is assumed that any lab testing would be conducted by the NPS Biological Research Management Division at no cost to the park. Also, the collection cost (physical collection of a sample from the carcass) is expected to be minimal, since the staff is trained in proper sample collection and handling, and the time needed for this overlaps with labor costs to dispose of the carcass. Therefore, it is assumed that the cost of CWD testing would be covered in existing labor costs and not itemized in table 4.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS — LARGE EXCLOSURES AND REPRODUCTIVE CONTROL OF DOES

In addition to the actions described under alternative A, a combination of non-lethal actions would be implemented under alternative B to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include constructing large-scale fenced exclosures, and controlling doe reproduction through surgical sterilization and use of an approved reproductive control agent.

During the development of the alternatives, it was determined that implementation of any of the non-lethal actions alone would be insufficient to address forest regeneration and would not meet plan objectives. For example, the use of fencing alone would not reduce deer density. The use of reproductive control alone would take longer to have an effect and would not provide immediate protection for tree seedlings or sensitive vegetation. Therefore, alternative B includes a combination of non-lethal actions.

ADDITIONAL ACTIONS PROPOSED UNDER ALTERNATIVE B

LARGE EXCLOSURES

In addition to the small area protective caging that would be installed in select areas under all alternatives, alternative B would include large exclosures to further allow reforestation. A large deer exclosure is defined as a fenced area of more than 5 acres constructed for the purpose of excluding deer from entering. It has been suggested that the minimum area that would need to be fenced at one time to meet the park's forest regeneration goal would be from 5% to 10% of the forested area (T. Bowersox, pers. comm. 2005). Based on this, park staff would construct up to 14 large exclosures of various configurations to fit the landscape, each covering from about 7 to 25 acres or up to a total of approximately 167 acres. This represents approximately 5% of the entire park and approximately 10% of the main park reservation, which is largely forested. The exclosures would be initially located throughout the main park unit (Reservation 339), with their locations based on several criteria: they are relatively easy to access, yet away from high use visitor areas or scenic views; they fit into the park's topography and current trails systems; and they avoid steep slopes and existing long-term vegetation monitoring plots. Areas containing valuable habitats (i.e., areas that are diverse, sensitive, free of invasive plants, and/or relatively pristine) would be targeted for protection. Potential deer exclosure locations are shown in figure 4 and are listed in table 5.

Exclosure — A large area enclosed by fencing to keep out deer and allow vegetation to regenerate.

TABLE 5. PROPOSED DEER EXCLOSURES

Name	Approximate Perimeter in Feet (Meters)	Approximate Acres
Northern Floodplain	3,329 (1,015)	10
Weir Pond	4,050 (1,235)	20
Pinehurst West	4,497 (1,371)	17
Holly Trail	2,440 (744)	8
Rolling Meadows	2,306 (703)	7
Ross Drive	4,592 (1,400)	25
West Spring	2,706 (825)	11
Grant Road	2,900 (884)	9
H3	2,217 (676)	7
Pinehurst Central	3,680 (1,122)	16
Floodplain 2	2,578 (786)	7
Wise Road South	3,293 (1,004)	10
Wise Road North	3,004 (916)	7
Military Road	3,949 (1,204)	13
TOTAL	**45,541 (13,885)**	**167**

Although these locations appear to meet the siting criteria for the most part, these locations may be adjusted based on final field verification of current conditions when the plan is implemented.

The deer exclosures would be a minimum of 8 feet high and would consist of woven wire with 3- to 4-inch openings to allow some small animals to move freely through the fence. Metal posts would be placed approximately every 20 feet along each side of the exclosure, with pressure-treated 4-inch by 4-inch wooden posts set in concrete as corner supports. Electric fencing would not be used in the park based on concerns for visitor safety, difficulty in accessing a power source, and long-term maintenance requirements.

Deer would be driven out of the exclosures by park staff before completion. Visitors would not be able to use the areas included in the exclosures during or after construction for approximately 10 years. Park staff would maintain all exclosures. A visual inspection would be performed once a month and after storm events. Maintenance on the exclosures would be performed on an as needed basis but a minimum of four times a year. If deer are found within an exclosure, they would be removed, as would any other animals that appeared to be trapped within the exclosure and repairs made as needed.

Rock Creek Park
District of Columbia

National Park Service
U.S. Department of the Interior

Proposed Deer Exclosures

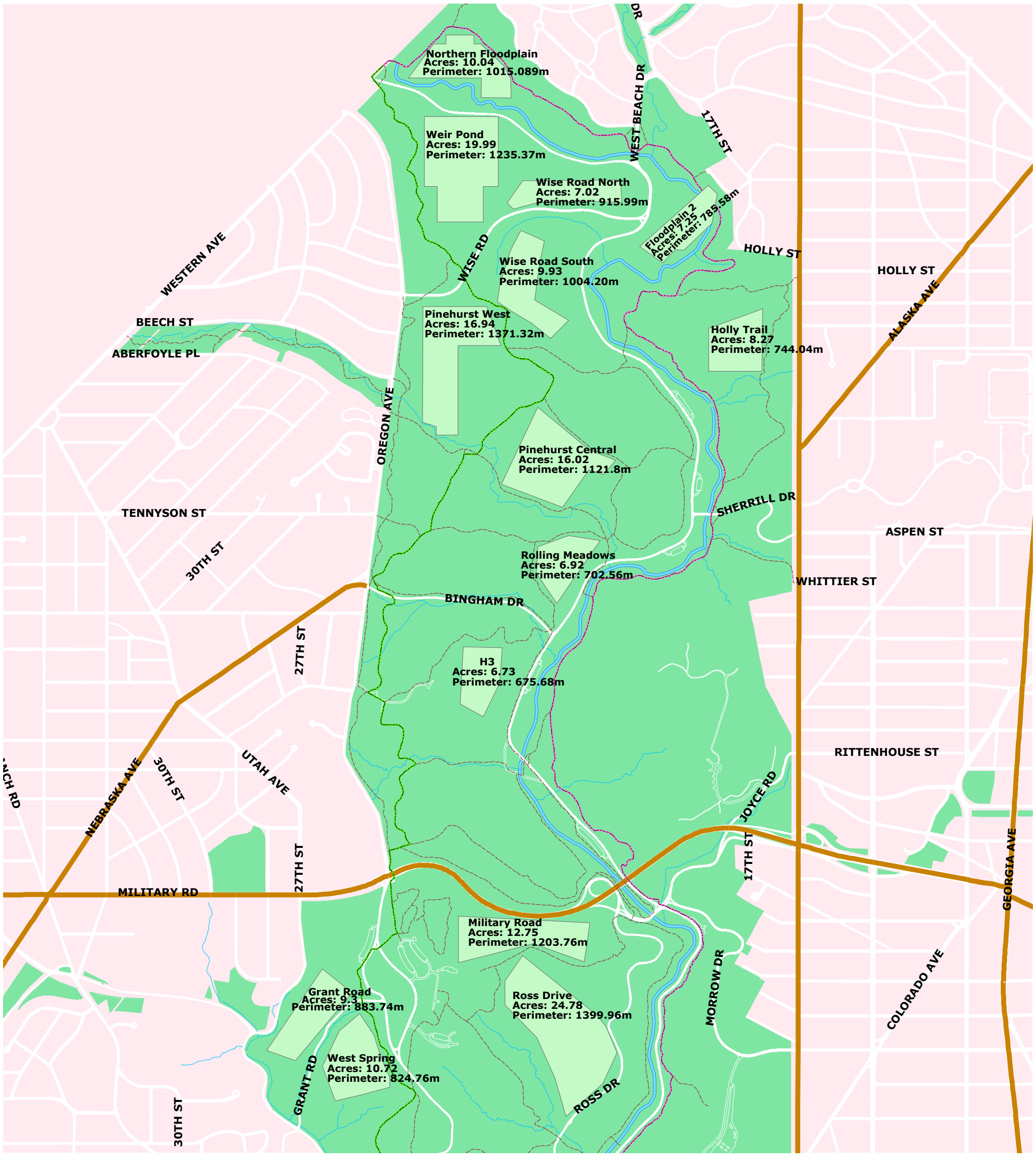


Figure 4. Proposed Deer Exclosures

It is estimated that up to 10 years would be required for seedling growth in the exclosures to exceed the typical deer browsing height (approximately 60 inches or 150 centimeters) (Horsley et al. 2003). After seedlings exceeded this height, the exclosures would be moved to immediately adjacent areas in order to reuse one side of the previous exclosure, thus minimizing relocation and labor costs. This would happen once during the life of this plan.

It is assumed that most of the recovered woody vegetation in the exclosures would persist after 10 years in most of the exclosures. Therefore, for purposes of the plan and the impact analysis presented in "Chapter 4: Environmental Consequences," it is assumed that the exclosures in alternative B would achieve woody forest regeneration in about 5% to 10% of the entire park over the 15-year life of the plan (the 5% originally fenced for the first 10 years that has grown beyond the reach of deer, plus the additional 5% fenced in the second round of fencing in years 11 through 20). However, the herbaceous layer in the original exclosures would be exposed to deer browsing pressure after the exclosure was removed; therefore, the herbaceous regeneration would be met within a maximum of about 5% of the entire park at any one time.

REPRODUCTIVE CONTROL OF DOES

This alternative would use both sterilization of does and use of an acceptable reproductive control agent (when feasible) in a phased approach to control population growth and eventually reduce the size of the population through natural mortality.

Sterilization

Sterilization of does is proposed as the initial action taken, unless another contraceptive method that meets NPS criteria and would be considered effective as an initial treatment would become available for use. Even though both sexes can be treated, surgical sterilization is more effective on females in polygamous populations like white-tailed deer. In addition, males are generally more difficult to capture because they are more wary and less gregarious than does. Sterilization of does is an invasive procedure requiring the surgical removal of ovaries or a tubal ligation. Procedures require full anesthesia and must be conducted by a veterinarian. It is possible to conduct the surgery in the field. However, complications could result due to the potential for higher incidence of infection than in a controlled environment. If field surgery is required, a temporary or mobile field station could be set up to minimize potential for infection and reduce impacts to visitors (Mathews et al. 2005). Because surgical sterilization is permanent, the animal is handled only once.

Few documented studies were found regarding the use of surgical sterilization of white-tailed deer as a population control measure. The Milwaukee County Zoo sterilized 16 deer on zoo grounds (which are fenced) between 1990 and 1995 with positive results. This provided the basis for a study in Highland Park, Illinois, between 2002 and 2005, in which 66 deer were sterilized over the 3-year period (Mathews et al. 2005). The treatment area was approximately 8.5 square miles, unfenced, and consisted of a mix of large residential lots, parks, forest preserves, and golf courses. The deer density was estimated at six to eight deer per square mile prior to the study, with a goal of five deer per square mile. The Illinois Department of Natural Resources believes that this program was not effective and that the high number of road-killed deer was the main factor in keeping deer densities low. Therefore, the program has been suspended (S. Bates, pers. comm. with Marty Jones, Deer Program Manager, Illinois Department of Natural Resources, May 8, 2008, reported in S. Bates, pers. comm. 2008d).

Even though the deer density and density goals in the Highland Park study are different from those identified for Rock Creek Park, the methods for implementation could be applied. Therefore, implementation of this method follows the parameters used in the study; however, actual implementation may be modified as more information is learned about this method of population control.

There are a number of concerns regarding implementing this control method, primarily due to the lack of experience in using it as a population control in free-ranging deer and the limited data available on the structure of the population (age statistics) within the park. Surgical sterilization results in permanent sterilization of the treated deer; therefore, it would require active monitoring of the population to identify the proper number of deer to be treated annually to ensure a long-term population in the park.

A number of factors may influence the efficacy and reduction period of this method, including the amount of immigration/emigration of deer to/from the park, availability of veterinarian and surgical facilities (at zoo or mobile field unit), and mortality and recruitment rates. Based on the ligation procedures used in Illinois (Mathews et al. 2005), the procedure can be done while the doe is pregnant without affecting the fetus(es). Thus, the population would continue to increase in the initial years of implementation, until the recruitment rate drops below the mortality rate.

There is concern that sterilization could affect breeding and social behavior (extended rut) due to loss of production of reproductive hormones. Specific effects are not well documented, but deer would be expected to react in a similar way to deer that have been treated with reproductive control agents (see the "Reproductive Controls" section and appendix D). Monitoring of deer behavior would be part of adaptive management under this alternative. Also, some handling-related mortality could occur under this method due to tranquilizer use and stress on the doe.

Administration of Sterilization

Timing of Application—Surgical sterilization could be administered at anytime during the year; however, it would primarily be conducted between October and April when capturing deer is expected to be easiest and temperatures provide the least amount of stress on the animals. It was assumed that implementation would start in year 1 of the plan, provided that the use of reproductive control agents is not feasible at that time (see criteria under "Reproductive Controls," below).

Number of Does Treated—To effectively reduce population size, treatment with a reproductive control measure must decrease the reproductive rate to less than the mortality rate. In urban deer populations, mortality rates are approximately 10%. Based on research of reproductive controls in a free-ranging deer population, it would be necessary to treat at least 90% of the does annually in order to halt population growth (Hobbs et al. 2000; Rudolph et al. 2000). After several years of application at this rate of treatment, a small (e.g., 5%) reduction in the population could be expected (Hobbs et al. 2000).

Rock Creek's 2009 parkwide deer population is estimated at about 315 deer (67 deer per square mile by 4.69 square miles of parkland). The park has estimated through sampling data that does comprise 65% of the population (or 205 does) (K. Ferebee, pers. comm. 2008g). Therefore, to control population growth, a minimum of 185 does (90% of 205) would need to be treated. However, because of the number of deer in the park and the time it would take to capture and sterilize that many deer, sterilization would need to be phased in over a number of years. It is estimated that up to two does may be treated in a day, depending on veterinarian and staff availability and capture success. Based on this estimate, the park would be able to sterilize up to 45 does per year, resulting in it taking about four years to reach the treatment goal of 90% (about 180 does). It was assumed for the purposes of this plan that up to 10 does per year thereafter would require reproductive control in order to control population growth from the untreated does.

Application Procedures—Treated does would need to be marked for identification to avoid future capture of the same does. This can be accomplished using ear tags. With the ear tag technique, each doe must be captured and handled at least once initially, which would be done at the time of sterilization.

Given the number of does that would need to be treated initially, bait piles would be used to concentrate does in certain locations so that the trapping or darting could be done as efficiently as possible. As many does as possible would be treated annually until 90% of the does had been sterilized. If more does were captured at once than could be treated, temporary holding areas may be necessary to house deer prior to

treatment. Holding areas would be in compliance with AVMA standards and the holding period would not be more than a day.

Visitor access would be restricted in certain areas of the park during the treatment period. The areas targeted for treatment would be chosen based on maximizing deer availability and accessibility, while minimizing disruption to visitor experience. The sterilization of does would be conducted throughout the day depending on vet availability and trapping success and would primarily occur between October and April.

Reproductive Control

Use of acceptable reproductive control agents with does would be phased in under alternative B when feasible, which is defined for this plan as when the following criteria are met:

Reproductive Control Agent Criteria	Rationale for Use
There is a federally approved fertility control agent for application to free-ranging populations.	It is critical that all aspects of a fertility control program be consistent with federal laws and regulations and NPS policies.
The agent provides multiple year (three to five years) efficacy.	Modeling efforts have clearly demonstrated that (1) "the efficacy of fertility control as a management technique depends strongly on the [multi-year] persistence of…the fertility control agent;" and (2) the only scenarios in which fertility control is more efficient than culling at maintaining population size is when a multi-year efficacy is achieved (Hobbs et al. 2000).
The agent can be administered through remote injection.	Remote delivery reduces the frequency of stressful capture and/or drug delivery operations.
The agent would leave no residual in the meat (i.e., meat derived from treated animals should be safe for human consumption according to applicable regulatory agencies).	Any fertility control agent applied in free-ranging wildlife populations that are contiguous with areas or with the same species that are hunted must be safe for human consumption.
Overall there is substantial proof of success with limited behavioral impacts in a free-ranging population, based on science team review and NPS policy.	No study has demonstrated that fertility control works to reduce deer numbers in free-ranging populations to the extent needed at Rock Creek Park to allow for tree regeneration, so it is important that proof of success be demonstrated to a review panel. Also, it is important that any agent used would meet NPS policies including those regarding altered behavior (NPS *Management Policies 2006*, sec. 4.4.1).

Such an agent is not currently available; however, several reproductive control agents are currently being developed and tested for use in deer population control (Fagerstone et al. 2010). These include porcine zona pellucida (PZP) (Naugle et al. 2002; Turner et al. 1996; Kilpatrick et al. 1992); uniquely formulated PZP, such as SpayVac® (Fraker et al. 2002); Gonadotropin Releasing Hormone (GnRH) (Miller et al. 2000, 2001; Curtis et al. 2002; Gionfriddo et al. 2009); prostaglandin $F_{2\alpha}$ (DeNicola et al. 1997); and leuprolide (Baker et al. 2002, 2004). Each of these agents is described in detail in appendix D, which provides a current overview of reproductive control technologies for deer management. Table 6 lists those that could be considered for use in this plan. However, until an agent that meets NPS criteria is available and feasible, sterilization would continue to be used for population control in subsequent years.

TABLE 6. REPRODUCTIVE CONTROL AGENTS

Issue	Standard or Native PZP Vaccine	SpayVac® (PZP vaccine)[a]	GnRH Vaccine (e.g., GonaCon®)	Leuprolide (GnRH agonist)
Mode of Action	Blocks sperm penetration and fertilization; estrous cycles continue	Blocks sperm penetration and fertilization; estrous cycles continue	Prevents secondary hormone (LH and FSH) secretion, which stops folliculogenesis and ovulation	Prevents secondary hormone (LH and FSH) secretion, which stops folliculogenesis and ovulation
How Administered	Injection	Injection	Injection	Injection
Number of Doses	Twice initially and an annual booster	Initially a single injection; if and when antibodies decline, female would need to be retreated	Likely a single injection initially; if and when antibodies decline, retreatment may be required	Current formulation —annually
Timing	Treat prior to breeding season and allow sufficient time for antibody development	Treat prior to breeding season and allow sufficient time for antibody development	Treat prior to breeding season and allow sufficient time for antibody development	Treat immediately prior to breeding season on an annual basis

Notes: FSH = follicle stimulating hormone
LH= luteinizing hormone

Immunocontraceptive — A reproductive control agent that causes an animal to produce antibodies against some protein or peptide involved in reproduction. The antibodies hinder or prevent some aspect of the reproductive process.

Until 2009, no product had been approved by regulatory agencies specifically for the purpose of controlling reproduction in white-tailed deer. In 2009, GonaCon™ was approved and registered by the U.S. Environmental Protection Agency (EPA) for use as a contraceptive to be used to control white-tailed deer populations in areas where they have become a nuisance (EPA 2009). The approved method of application is an injection into a large muscle mass by hand injection only, meaning that this option will require capturing and handling of deer (i.e., there is no approved remote delivery option available at this time). It is recognized that any reproductive control agent used would depend on the regulatory situation at the time of its use and how well it met all the criteria listed above. At the time this plan was first prepared, leuprolide, an agent with single-year application, was selected as an example for the purposes of the analysis and cost estimate for this plan.

Leuprolide is one of the products that had been approved by the U.S. Food and Drug Administration (FDA) for therapeutic (medical) use in either domestic animals or humans. Formerly, these products could be used with a veterinary prescription under the *Animal Drug Use and Clarification Act of 1994*. The prescribing veterinarian and the client (the national park unit) must clearly understand how and why the drug would be used in an off-label manner. It is the responsibility of the prescribing veterinarian to give an appropriate meat withdrawal period for food-producing animals that may enter the human food chain. The veterinarian may determine there is no meat withdrawal period for a particular drug. If this is the case, the animal does not need to be marked. If there is a meat withdrawal period, then the animal needs to be appropriately marked. Currently, the FDA no longer regulates any fertility control drugs/vaccines. The use of reproductive control agents for population management now requires approval from the EPA.

Under alternative B, if the criteria for use of a reproductive control agent were met, the park would initiate a reproductive control program using an approved agent. As previously noted, for purposes of this

discussion, leuprolide or a similar agent is used as an example (see appendix D for more details on reproductive control agents). The park will continue to monitor the status of ongoing reproductive control research. If advances in technology could benefit deer management in the park, then the future choice of a reproductive control agent could change.

Administration of the Reproductive Control Agent

Timing of Application—Leuprolide (or a similar agent) would need to be administered in the two months prior to the deer rut (the breeding season). At Rock Creek Park, the application of leuprolide would occur primarily in September and October.

Number of Does Treated—As previously discussed, to effectively reduce population size, treatment with a reproductive control agent must decrease the reproductive rate to less than the mortality rate, which is approximately 10% in urban deer populations. Under this alternative, it is assumed that it would be necessary to treat at least 90% of the unsterilized does annually in order to halt population growth (Hobbs et al. 2000; Rudolph et al. 2000). After several years of application at this rate of treatment, a small (e.g., 5%) reduction in the population could be expected (Hobbs et al. 2000).

At Rock Creek, assuming 45 does are treated each year, surgical sterilization would be used in years 1 to 5 to treat approximately 90% of the does in the park (about 180 does, based on 2009 data). It was also assumed for purposes of this plan that 10 to 12 does would need to be treated annually starting in year 5, using a reproductive control agent if one is available and feasible, but sterilization would be used as a back-up method if no drugs met the required use criteria. The annual number treated would be managed adaptively to manage population growth and slowly reduce the population size through mortality.

Application Procedures—Depending on the reproductive control agent to be used, treated does would need to be marked for non-consumption. This could be accomplished using ear tags with a unique identifier and a statement "Not for Human Consumption." The ear tag would also facilitate identification of which does have been treated. With the ear tag technique, each doe must be captured and handled at least once initially and may require additional annual treatment. Tracking and capturing previously treated does would require time to locate the doe or to lure it to a trap site so that it could be temporarily restrained and treated. After does have been handled one or more times, successfully capturing them for subsequent treatments can become very difficult (Rudolph et al. 2000). Given that the number of deer to be treated would be small, locating the deer to be treated may be the most time consuming part of implementing this method under this alternative. Radio collars may be considered if tracking becomes prohibitive.

One method that has been developed to deliver treatments without the physical capture or handling of does is a remote application (biobullet) delivered with a dart-type gun (similar to a shotgun). With this method the biobullets remain with the doe and it is not necessary to recover spent darts. Factors for consideration with this method include the maximum distance to the doe that allows the needed penetration for delivery, consistency in dosage delivery, and accurate documentation of which deer have been treated. This method would still require some marking technique to prevent multiple dosing of the same animal.

Telemetry darting would be the primary capture method used because leuprolide has not yet been successfully delivered from a biobullet. With this method a tranquilizer dart is fitted with a radio transmitter, which allows the animal to be located after the tranquilizer has taken effect. The dart is then recovered, the doe marked, the control agent administered, and the doe released. Some handling-related mortality could occur under this method due to tranquilizer use and stress on the doe (DeNicola and Swihart 1997; Kilpatrick et al. 1997); generally a 2 to 5% mortality rate may be expected. The application of annual treatments by remote delivery can be time consuming and expensive, and human and animal safety precautions must be addressed. An alternative capture method would include the use of traps or nets.

Bait piles could be used to concentrate does in certain locations so that the darting could be done as efficiently as possible. As many does as possible would be treated daily until 90% of the unsterilized does had been treated. Visitor access would be restricted in certain areas of the park during the treatment period. The areas targeted for treatment would be chosen based on maximizing deer presence and accessibility, while minimizing disruption to visitor experience. The treatment of does would be conducted during the off-peak visitor hours (early morning and evening) and weekdays to the extent possible, but would need to occur in the period immediately preceding the deer rut (September and October).

Training—Regardless of the technique implemented, NPS employees or their authorized agents trained in the administration of reproductive controls would perform these activities. Training would include safety measures, particularly related to use of the dart gun, to protect both visitors and NPS employees. If more than one shooting location was used to remotely administer controls with dart guns, these areas would be adequately separated for safety reasons. NPS employees or their authorized agents would also be qualified to handle live does in order to prevent disease transmission or any harm to the animal or the employee.

Vegetation sampling within an unfenced plot, which is a specific area that allows effects on deer browsing to be seen when compared to the adjacent fenced plot.

MONITORING

LARGE EXCLOSURES

As deer were excluded from feeding within the large exclosures, open (non-treated) areas would be monitored for changes in vegetation because of probable increased browsing pressure. Forest regeneration would be monitored both inside and outside the exclosures as described under alternative A and appendix A. Additional monitoring of the 14 exclosures (some may have multiple monitoring plots) would also be conducted on a four-year rotation, with up to six large exclosures (and adjacent paired unfenced plots) monitored each year.

REPRODUCTIVE CONTROL

The ability to achieve target levels of infertility in the deer population would require knowledge of the fertility status of individual deer that had been treated (Hobbs et al. 2000). To monitor treated animals, surveys would be conducted in the summer, at which time observations would indicate if reproduction had occurred (referred to as a fawn survey). Additional observations would be made during the annual Distance Sampling surveys conducted in the fall.

CHRONIC WASTING DISEASE

Testing for CWD would occur as described under alternative A, i.e. the park would continue to perform opportunistic and targeted surveillance under the existing categorical exclusion provisions.

IMPLEMENTATION COSTS

Costs of implementing alternative B would include the same costs described under alternative A (continued monitoring programs, limited small area protective caging, and repellent use), plus costs of

constructing and maintaining large exclosures, and reproductive control and monitoring. The overall cost of implementing alternative B would depend on the number of deer treated, methods used, number of personnel, and monitoring costs. These costs are not yet explicitly defined, but estimates based on certain assumptions are provided in table 7.

TABLE 7. COST ESTIMATE — ALTERNATIVE B: NON-LETHAL ACTIONS*

Action	Assumptions	Annual Cost	Cost for the 15-year Planning Period
Same actions as alternative A (common to all alternatives)	See alternative A		$308,880
Large Exclosures			
Construction	14 exclosures (total of 45,540 linear feet of fence at $5 per linear foot, including labor)	$236,808 (first year only)	$236,808
Relocation	Every 10 years at 75% of original cost	$177,606 (once every 10 years)	$177,606
Maintenance	Four visits per year per exclosure plot (48 staff days; $18,236); also storm damage materials and labor cost (varies by year; estimated average $10,730) Monthly inspection of all exclosures - $3,658	$32,624	$489,360
Vegetation Monitoring	Additional vegetation monitoring in six large exclosures per year (three staff, three hours each per exclosure) plus analysis	$5,720	$85,800
Surgical Sterilization	45 deer per year treated in years 1 through 4 at $1,000 per deer	$45,000 in years 1 through 4	$180,000
Reproductive Control[a]	Cost would depend on number of deer treated and current available technology Assume up to 10 does treated each year, beginning at year 5	$1,000 per deer × 10 does = $10,000 for 11 years	$110,000
Additional Deer Population Monitoring	Three days of survey plus data analysis each summer (fawn survey) May include global positioning system tracking of does if radio collars are used on sterilized deer	$5,200	$78,000
		Total	**$1,666,454**

a. Total cost could be reduced considerably if reproductive control costs could be decreased based on improved technology.
* Costs have been adjusted for 4% estimated inflation over two years between the draft plan/EIS and final plan/EIS.

LARGE EXCLOSURES

Large exclosures would be a minimum of 8 feet tall, using woven wire fence, metal fence posts, and wooden 4- by 4-inch posts set in concrete on the corners. Material and installation costs (2007 dollars) are estimated at $5 per linear foot of fence (K. Ferebee, pers. comm. 2008g). The park has estimated approximately 45,540 linear feet of fence needed to construct the 14 large exclosures and that it would take up to 150 working days to construct all exclosures.

Exclosures would be relocated approximately every 10 years. Costs for this are estimated at 75% of the original cost to relocate 14 exclosures.

Maintenance costs could be substantial due to the remoteness of some exclosures and potential vandalism. Labor to inspect and maintain fences is estimated at approximately 12 days with 2 staff, assuming up to

four visits per year. Using an average hourly rate for the two staff and 12 days to cover all of the exclosures per visit, the annual maintenance cost would be $17,535 for labor (2007 dollars). An additional $10,317 per year (2007 dollars) would be needed for maintenance materials and additional visits due to storm damage. Monthly inspections would add another $3,517 annually (2007 dollars). The additional annual vegetation monitoring cost for six exclosures per year would be approximately $5,500 (2007 dollars) (based on annual monitoring and analysis costs used in alternative A). All costs in table 7 have been increased by 4% to account for estimated inflation for the two years between the original estimates provided in the draft plan/EIS and the release of the final plan/EIS.

SURGICAL STERILIZATION

The costs identified by Mathews et al. (2005) were $1,000 per deer, with about $600 for the veterinarian, $150 in drugs, and $250 in labor for capture and monitoring prior to and after release. It is assumed that the $1,000 cost per deer is still a valid estimate for 2009. The labor costs for capturing deer may be the most variable, since they are dependent on the deer and park conditions and the need for construction of temporary holding facilities. The amount of time for post-surgery monitoring may also vary depending on the surgical method used and the length of time and frequency of monitoring for surgery-related mortality. For this analysis, an estimate of $5,000 was used to cover a summer fawn survey and potential for global positioning system monitoring of sterilized does.

REPRODUCTIVE CONTROL

A study in New York (one of the few conducted on a suburban, free-ranging deer population) estimated that the minimum annual time commitment per deer for reproductive control (using PZP) was approximately 20 hours, costing in the range of $450 to $1,000 per deer (Rudolph et al. 2000). Vaccine trials in Connecticut cost $1,128 per deer for 30 deer over two years, with 64% of the cost going to labor (Walter et al. 2002). Cost to administer PZP at Fire Island was $186 per deer for labor and material in 2007. The number of treated deer has dropped from 246 in 1998 to 149 in 2005 but no total population number was given (Naugle and Rutberg 2007). The Northeast Deer Technical Committee (2008) reports a cost of $1,000 per deer for immunocontraception.

Costs per deer would include costs for the reproductive control agent, labor and equipment, and bait piles. The estimated cost of leuprolide is $200 per dose. Additional handling and processing costs associated with delivering the treatment would also apply. In the urban setting at Rock Creek, the expected costs for implementing reproductive controls would likely be at the high end of the range, and for this analysis $1,000 per deer was used. However, these costs could vary based on improved technology and market demand once federal approval is obtained.

The additional monitoring required for reproductive controls would be as described under sterilization, with a summer fawn survey to document the number of fawns.

ALTERNATIVE C: COMBINED LETHAL ACTIONS — SHARPSHOOTING AND CAPTURE AND EUTHANASIA

Alternative C would continue the actions described under alternative A, with two types of lethal action used to reduce and control deer herd numbers. NPS or their authorized agents would conduct sharpshooting and capture and euthanasia to reduce the deer population.

ADDITIONAL PROPOSED ACTIONS UNDER ALTERNATIVE C

SHARPSHOOTING

Sharpshooting would be used to initially reduce the deer population in areas of the park and as a maintenance treatment if needed. Sharpshooting would involve using trained sharpshooters to shoot deer

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).

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.

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

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 is soil 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 x $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.

HOW ALTERNATIVES MEET OBJECTIVES

As stated in chapter 1, all action alternatives selected for analysis must meet all objectives to a large degree. The action alternatives must also address the stated purpose of taking action and resolve the need for action; therefore, the alternatives were individually assessed in light of how well they would meet the objectives for this plan and EIS, which are stated on page 2. Alternatives that did not meet the objectives were not analyzed further (see the "Alternatives Eliminated from Further Consideration" section in this chapter).

Table 10 compares the alternatives by summarizing the elements being considered, while table 11 compares how each of the alternatives described in this chapter would meet the plan objectives. "Chapter 4: Environmental Consequences" describes the effects of each alternative on each impact topic, including the impact on recreational values and visitor experience. These impacts are summarized in table 12.

TABLE 10. COMPARISON OF ALTERNATIVES

	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Management Actions	Continue deer monitoring, data gathering, data management and research, limited use of small area caging and repellents, plus education, outreach, and inter-jurisdictional cooperation	All actions under alternative A, plus: • Construct 14 large exclosures to protect vegetation from deer browsing throughout the main reservation of the park • Implement reproductive control of does, including sterilization for the first four years and subsequent reproductive control if available and feasible, based on criteria for use established by the park	All actions under alternative A, plus: • Use sharpshooting and limited capture and euthanasia to reduce deer herd numbers • Donate meat, if possible	All actions under alternative A, plus use a combination of techniques from alternatives B and C: • Use sharpshooting and limited capture and euthanasia to reduce deer herd numbers • Apply reproductive controls (if feasible) to maintain population size, with sharpshooting used periodically, if needed • Donate meat, if possible
Reduction in Deer Population	None, other than current sources of mortality	Potentially reduce deer population if reproductive controls are successful and then only after the first several years of treatment or until natural mortality exceeded reproduction and reduced the population; population reduction would be very gradual	Initially remove an estimated 157 deer, 95 deer in year 2, and 44 deer in year 3, with fewer deer in subsequent years. To maintain the population at target levels (15 to 20 deer per square mile), remove an estimated 14 deer beginning in year 4. Capture and euthanasia would account for 10 of the deer removed in the first three years and very few additional (five or less) in subsequent years	Similar to alternative C. Potential for future reductions through reproductive control (if feasible) used as a population maintenance tool, with sharpshooting available as back-up
Time Required to Achieve Desired Forest Regeneration	Forest regeneration cannot be achieved without reducing browsing impacts	Five to 10% of park woody vegetation would be protected or regenerated by end of plan due to exclosures; reproductive control would contribute to additional forest regeneration by gradually limiting deer numbers, but desired deer density and subsequent forest regeneration would not be achieved within life of this plan.	Would reduce deer population to desired density by about year 3, with changes in regeneration expected 3-4 years after deer density goal is reached*, and trends toward regeneration success by end of plan *This was achieved at Gettysburg National Military Park (Niewinski et al. 2006)	Same as alternative C

	Alternative A: No Action Alternative	**Alternative B: Combined Non-lethal Actions**	**Alternative C: Combined Lethal Actions**	**Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)**
Handling of Deer	Handling only as required for monitoring	No physical handling of deer required to drive them out of fenced areas Intensive physical handling of deer required for sterilization Reproductive control application could also involve trapping or a telemetry dart application that requires marking and handling of does. Handling and chemical applications would follow AVMA recommendations, but there would be increased stress levels in captured deer	No capture required for sharpshooting; capture and euthanasia requires capture and handling; would follow AVMA recommendations, but there would be increased stress levels in captured deer compared to other methods	Same as alternative B for reproductive control and alternative C for lethal actions
Monitoring	Continued vegetation monitoring and monitoring of deer population numbers to assess impacts	Continued monitoring as described under alternative A, plus monitoring of plants for signs of recovery within exclosures For reproductive control, monitoring of treated deer using additional fawn surveys to determine reproductive control effectiveness	Annual monitoring of plants for six years after deer density goal reached to identify any signs of forest recovery, plus continued monitoring as described under alternative A	Same as alternatives B and C

	Alternative A: No Action Alternative	**Alternative B: Combined Non-lethal Actions**	**Alternative C: Combined Lethal Actions**	**Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)**
Regulatory Considerations	No specific regulatory requirements	Same as alternative A, plus: Formerly, leuprolide could be used with a veterinary prescription under the *Animal Drug Use and Clarification Act of 1994*. The prescribing veterinarian and the client (the national park unit) must clearly understand how and why the drug would be used in an off-label manner. It is the responsibility of the prescribing veterinarian to give an appropriate meat withdrawal period for food-producing animals that may enter the human food chain. Currently, the FDA no longer regulates any fertility control drugs/vaccines, and the Environmental Protection Agency would authorize the use of reproductive control agents.	Same as alternative A plus: Any necessary ATF permits would be obtained Coordination with state/local/ nonprofit/private entities might be needed to donate meat Follow state/local regulatory requirements for any landfill disposal of deer	Same as alternatives B and C
CWD Testing	Testing coordinated with the state; primarily opportunistic surveillance	Same as alternative A	Same as alternative A	Same as alternative A
Park Closure or Restricted Access	None	Restricted access within exclosures or in areas of active reproductive control activities	Park closed or access restricted during management activities; closures or restrictions minimized by conducting activities during periods between dusk and dawn and primarily in late fall/winter for larger reductions	Same as alternatives B (reproductive control) and C

	Alternative A: No Action Alternative	**Alternative B: Combined Non-lethal Actions**	**Alternative C: Combined Lethal Actions**	**Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)**
Adaptive Management	No specific adaptive management included under this alternative	Relocation of vegetation monitoring plots, changes in action thresholds or deer density goals, possible changes in number and locations of large exclosures, possible change in reproductive control agent used and its application procedures	Relocation of vegetation monitoring plots, changes in action thresholds or deer density goals, or possible changes to implementation procedures for this action	Relocation of vegetation monitoring plots, changes in action thresholds or deer density goals, possible change in reproductive control agent used and its application procedures or timing of use, as well as number of removal actions needed
Estimated Cost (15-year Plan) with Leuprolide-type Reproductive Control Agent	$308,880	$1,666,454	$747,280	$1,126,480

TABLE 11. ANALYSIS OF HOW THE ALTERNATIVES MEET OBJECTIVES

Objective	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
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	Does not meet objective: Thresholds for taking action and deer density goal do not apply to the no action alternative	Fully meets objective: Plan provides action thresholds and target deer density for all action alternatives	Fully meets objective: Same as alternative B	Fully meets objective: Same as alternative B
• 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	Does not meet objective: No reduction in deer browsing pressure, resulting in insufficient tree regeneration and adverse effects on native plant species	Partially meets objective: Up to 10% of the park's woody vegetation protected over the life of the plan; a maximum of about 5% of the herbaceous cover totally protected at any one time Deer population would not be reduced to density that allows for forest regeneration within the life of this plan	Fully meets objective: Reduction of deer herd in about three years, helping to ensure tree regeneration and protection of native plants	Fully meets objective: Same as alternative C
• Maintain, restore, and promote a mix of native plant species and reduce the spread of nonnative plant species through effective deer management	Does not meet objective: No mix of native herbaceous plant species because of overbrowsing and continued contribution to the spread of invasive species	Partially meets objective: Mix of native herbaceous plant species in exclosures No native herbaceous species in park areas that cannot be fenced and continued contribution to the spread of invasive species due to overbrowsing outside exclosures	Fully meets objective: Forest regeneration likely because of a smaller deer herd, resulting in a mix of native herbaceous plant species Spread of invasive species due to overbrowsing would be reduced	Fully meets objective: Same as alternative C

Objective	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Wildlife and Wildlife Habitat				
• Allow for a white-tailed deer population within the park while protecting other park resources	Does not meet objective: Deer population not in balance with the forest ecosystem Very limited protection for other park resources	Partially meets objective: A self-sustaining deer population, but at the expense of a healthy forest and other park resources Other park resources protected only within exclosures	Fully meets objective: Allows for a viable deer population and other park resources protected as a result of reducing the herd size	Fully meets objective: Same as alternative C
• Protect the natural abundance, distribution, and diversity of native animal species within the park by reducing excessive deer browsing, trampling, and nonnative seed dispersal	Does not meet objective: Continued browsing pressure would reduce the amount of habitat within the park and adversely affect other wildlife	Partially meets objective: Native habitat would be restored, but only very gradually and exclosures can affect the natural distribution of native species	Fully meets objective: Forest regeneration possible with a smaller deer herd, resulting in a protection of wildlife habitat	Fully meets objective: Same as alternative C
• Protect lower canopy and ground nesting bird habitat from adverse effects of deer browsing	Does not meet objective: No natural regeneration in lower canopy due to continued browsing pressure, reducing the amount of habitat for ground nesting birds within the park	Partially meets objective: Lower canopy and ground nesting bird habitat protected only in exclosures	Fully meets objective: Forest regeneration possible with a smaller deer herd, resulting in a lower forest canopy and ground nesting bird habitat	Fully meets objective: Same as alternative C
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.	Partially meets objective: Some sensitive plant species in limited locations protected by small caged exclosures	Partially meets objective: Caging required to protect sensitive herbaceous species that would never grow out of browse range No protection for species in park areas that cannot be caged	Fully meets objective: Most sensitive species protected if deer density goal is reached	Fully meets objective: Same as alternative C
Cultural Resources				
• Protect the integrity, variety, and character of the cultural landscapes by reducing excessive deer browsing, trampling, and nonnative seed dispersal	Partially meets objective: Landscaped area plantings protected from excessive deer browsing by caging, but no protection for the park's cultural landscapes	Partially meets objective: In addition to landscaped area plantings protected by caging, protection of vegetation within exclosures, but no protection for the park's overall cultural landscape outside exclosures	Fully meets objective: Forest regeneration allowed with a smaller deer herd, thus protecting the forest as a cultural landscape	Fully meets objective: Same as alternative C

Objective	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Visitor 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	Partially meets objective: Education and outreach efforts continued, but with limited emphasis on deer management options	Fully meets objective: Public outreach would address deer management and forest regeneration under all action alternatives	Fully meets objective: Same as alternative B	Fully meets objective: Same as alternative B
• Initiate cooperative efforts to address deer effects on the park and surrounding communities	Partially meets objective: Cooperative efforts exist and are ongoing, but lack of management actions limits what can be done to fully cooperate with surrounding communities	Fully meets objective: Would enable park to cooperate with surrounding communities	Fully meets objective: Same as alternative B	Fully meets objective: Same as alternative B
Park Management and Operations				
• Share information with park staff and other regional parks regarding the deer population and management strategies	Fully meets objective: Would share information as obtained	Fully meets objective: Same as alternative A	Fully meets objective: Same as alternative A	Fully meets objective: Same as alternative A

TABLE 12. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Vegetation	*Direct/Indirect Impact*: 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.	*Direct/Indirect Impact*: 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.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts. Over time as natural forest regeneration occurred, adverse, long-term, major impacts that could be expected if the deer herd continued unchecked would be reduced to minor levels.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through the use of direct reduction and reproductive control would result in beneficial, long-term impacts. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to minor levels.
	Cumulative Impact: Would result in adverse, long-term, major cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate to major adverse cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.
Soils and Water Quality	*Direct/Indirect Impact*: Soil erosion and sedimentation due to loss of vegetation from increased deer browsing could result in adverse long-term, negligible to minor impacts on soils and water quality.	*Direct/Indirect Impact*: If deer displaced by the fenced exclosures concentrated in other areas of the park, resulting in increased loss of vegetation in those areas and a potential increase in soil erosion, adverse, long-term, minor impacts to soils and water quality could occur. Impacts would gradually shift to beneficial in the long term.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on soils and water quality.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on soils and water quality.
	Cumulative Impact: Would result in adverse, long-term, minor cumulative impacts on soil and water quality.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Wetlands and Floodplains	*Direct/Indirect Impact*: Loss of vegetation from increased deer browsing, disturbance to small wetland areas and vernal pools and changes in species composition would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Direct/Indirect Impact*: Use of exclosures to protect many of the park's forested wetlands would gradually result in beneficial long-term impacts to wetlands, although continued long-term minor to moderate adverse impacts would be expected in areas that are not fenced and in smaller wetland areas and seeps. Beneficial long-term impacts would also result from decreased vegetation loss. Construction of exclosures within the 100-year floodplain could result in short-term, minor adverse impacts on the floodplain.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on wetlands and floodplains.	*Direct/Indirect Impact*: Immediately reducing the number of deer in the park and maintaining a sustainable population would result in beneficial, long-term impacts on wetlands and floodplains.
	Cumulative Impact: Would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Cumulative Impact*: Would result in adverse, long-term, moderate impacts on wetlands and floodplains.	*Cumulative Impact*: Would result in adverse, long term, minor to moderate cumulative impacts due mainly to past actions.	*Cumulative Impact*: Would result in adverse, long term, minor to moderate cumulative impacts due mainly to past actions.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
White-tailed Deer	*Direct/Indirect Impact*: Excessive deer browsing that would degrade habitat and limit food sources would result in long-term, moderate adverse impacts.	*Direct/Indirect Impact.* Because the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to deer habitat, and in turn deer, would be adverse, long term, and moderate as a result of habitat degradation and loss of food sources. There could also be long-term, major adverse impacts to individual deer from the physiological, biological, and behavioral effects associated with the use of reproductive control; however, long-term impacts to the population would be minor to moderate because the adverse effects would be offset over time by the benefits of population reduction.	*Direct/Indirect Impact*: The relatively rapid reduction of the deer herd and the resultant regeneration of forage would result in beneficial effects on the deer herd and would reduce adverse impacts to negligible or minor levels over the long term.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure would result in beneficial, long-term impacts to deer and deer habitat. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to negligible to minor levels. If reproductive controls are used, there could also be long-term, major adverse impacts to individual deer from the physiological, biological, and behavioral effects associated with the use of reproductive control; however, long-term impacts to the population would be minor to moderate because the adverse effects would be offset over time by the benefits of population reduction.
	Cumulative Impact: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate adverse cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts on deer herd health.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Other Wildlife and Wildlife Habitat	*Direct/Indirect Impact*: A continued large deer population and related browsing, resulting in decreased plant diversity, increased invasive exotic plants, and reduced forest regeneration would result in adverse effects on other wildlife. A few predator species would benefit from a large deer population and an open understory; however, the impacts of large numbers of deer browsing on vegetation would adversely affect a large percentage of habitats for other wildlife (e.g., ground-nesting birds, frogs, snakes, and turtles), resulting in adverse, long-term, and negligible to potentially major impacts, depending on the species.	*Direct/Indirect Impact*: Construction of large, fenced exclosures over the life of the plan would protect some habitat; however, the remaining habitat would continue to be subject to a high degree of deer browsing, adversely impacting both ground and shrub layer habitat for many other species of wildlife until reproductive controls took effect and reduced the deer population. A few species would tend to benefit from a large deer population and an open understory but overall, impacts to other wildlife would be adverse, long term, and negligible to potentially major, depending on the species.	*Direct/Indirect Impact*: Rapid reductions in deer numbers in the park, thereby reducing deer browsing pressure on woody and herbaceous vegetation and allowing increased abundance and diversity of other wildlife that depend on understory vegetation would result in beneficial long term impacts. Adverse, long-term impacts would be reduced to negligible or minor levels over time.	*Direct/Indirect Impact*: Rapid reductions in deer numbers in the park, thereby reducing deer browsing pressure on woody and herbaceous vegetation and allowing increased abundance and diversity of other wildlife that depend on understory vegetation would result in beneficial long term impacts. Adverse, long-term impacts would be reduced to negligible or minor levels over time.
	Cumulative Impact: Would result in both adverse and beneficial impacts, with adverse, long-term, major cumulative impacts.	*Cumulative Impact*: Would result in both adverse and beneficial impacts, with overall adverse, long term, moderate to major cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Rare, Unique, Threatened, or Endangered Species	*Direct/Indirect Impact*: Impacts to rare, unique, threatened, or endangered species under alternative A would be both beneficial and adverse. Adverse impacts to the federally listed Hay's Spring amphipod (*Stygobromus hayi*) could be long term and negligible to minor. Beneficial impacts to state-listed plants would result from establishing caging around known individual plants and around newly discovered plants in the park. Overall, there would be adverse, long-term, negligible to major impacts to rare, unique, threatened, or endangered species, from excessive deer browsing and the associated habitat degradation that could result in lack of food or cover for such species.	*Direct/Indirect Impact*: Adverse impacts to the federally listed Hay's Spring amphipod could be long term and negligible to minor. Impacts to species listed or considered special status species by Maryland and the District of Columbia would be adverse, long term, and moderate to major, until reproductive controls on the park deer herd were effective. The placement and maintenance of large exclosures would include many species listed or considered special status species by Maryland and the District of Columbia, resulting in beneficial, long-term impacts. However, adverse, long-term, negligible to moderate impacts due to deer browsing would continue outside the exclosures.	*Direct/Indirect Impact*: The reduced deer density would minimize potential impacts on the habitat for the Hay's Spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation. A few predators that use deer as a food source could be adversely affected by a lower deer density, as could scavengers that feed on deer carcasses, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time.	*Direct/Indirect Impact*: The reduced deer density would minimize potential impacts on the habitat for the Hay's Spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation. Adverse, long-term impacts would be reduced to negligible or minor levels over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time.
	Cumulative Impact: Would result in both adverse and beneficial impacts, with overall long-term, minor to major, adverse cumulative impacts.	*Cumulative Impact*: Would result in both beneficial and adverse impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.	*Cumulative Impact*: Would result in long-term, beneficial, cumulative impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Cultural Landscapes	*Direct/Indirect Impact*: The use of small cages and repellents to protect landscape plantings, new restoration plantings, or rare plant species at specified areas could result in beneficial, long-term, minor impacts to these parts of the park's vegetation. However, continued growth of the deer population and the associated ongoing decline in the abundance and diversity of the native plant communities and cultural plantings would result in an adverse, long-term, minor to moderate impact to the park's cultural landscapes.	*Direct/Indirect Impact*: Constructing exclosures over the life of this plan would preserve some vegetation that is part of the cultural landscapes of the park. However, presence of the exclosures would result in long-term minor to moderate adverse impacts to the cultural landscapes in which they are located, and remaining 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. Since the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to cultural landscapes would be adverse, long term, and minor to moderate.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts.	*Direct/Indirect Impact*: Enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population through direct reduction would result in beneficial, long-term impacts.
	Cumulative Impact: Would result in adverse, long-term, minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in long-term, moderate adverse cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.	*Cumulative Impact*: Would result in beneficial, long-term cumulative impacts.
Soundscapes	*Direct/Indirect Impact*: Actions taken to protect plants and monitor the deer population and park vegetation would result in an adverse, short-term, negligible impact on soundscapes.	*Direct/Indirect Impact*: Intermittent construction of exclosures and reproductive control activities would result in short term, negligible to minor, adverse impacts. Individual construction and reproductive control activities would be short term, but would continue indefinitely into the future, resulting in both short- and long-term, negligible to minor, adverse impacts.	*Direct/Indirect Impact*: Sharpshooting would result in adverse impacts, primarily affecting nearby residents. Perception of the intensity of the impacts would vary depending on several factors, including timing, attenuation levels, and distance from the source, resulting in minor to moderate impacts to individuals experiencing the sound.	*Direct/Indirect Impact*: Sharpshooting would result in adverse impacts, primarily affecting nearby residents. Perception of the intensity of the impacts would vary depending on several factors, including timing, attenuation levels, and distance from the source, resulting in minor to moderate impacts to individuals experiencing the sound.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
	Cumulative Impact: Would result in cumulative impacts ranging from minor to moderate and adverse depending on the source, due to the variety and abundance of noise sources that already exist around and within the park.	*Cumulative Impact*: Would result in cumulative impacts ranging from minor to moderate and adverse depending on the source, due to the variety and abundance of noise sources that already exist around and within the park.	*Cumulative Impact*: Would result in adverse, short and long term, and minor to moderate cumulative impacts. However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.	*Cumulative Impact*: Would result in adverse, short and long term, and minor to moderate cumulative impacts. However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.
Visitor Use and Experience	*Direct/Indirect Impact*: Impacts to visitor use and experience would be both beneficial and adverse to those visitors who maybe primarily interested in viewing deer (beneficial in that there would be more deer to see, adverse in that the appearance of the herd could be poor). However, overall impacts related to a decreased ability to view scenery and other wildlife would be long term, minor to moderate and adverse.	*Direct/Indirect Impact*: Visitors would experience adverse, short-term impacts primarily due to aesthetics and closures of certain areas of the park, as well as a slight increase in occasional noise levels. These impacts would be offset by the educational and interpretive information, which would reduce adverse impacts to minor. Short-term impacts would eventually give way to beneficial, long-term impacts as the need for exclosures diminished and the deer population declined, resulting in a restored forest ecosystem throughout the park. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such an impact would be negligible to minor, as opportunities to view deer would still exist.	*Direct/Indirect Impact*: Adverse, short-term impacts that could occur if visitors were exposed to management actions would be offset by educational and interpretive information, resulting in negligible adverse impacts. Beneficial impacts would occur in the long term, as the forest regenerated and visitors could see increased plant and animal diversity, and enjoy enhanced scenery. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such impact would be negligible to minor, as opportunities to view deer would still exist.	*Direct/Indirect Impact*: Adverse, short-term impacts that could occur if visitors were exposed to management actions would be offset by educational and interpretive information, resulting in negligible adverse impacts. Beneficial impacts would occur in the long term, as the forest regenerated and visitors could see increased plant and animal diversity, and enjoy enhanced scenery. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such impact would be negligible to minor, as opportunities to view deer would still exist.
	Cumulative Impact: Would result in both adverse and beneficial (depending on an individual visitor's goals) impacts. Overall cumulative impacts would be long term, minor to moderate and adverse.	*Cumulative Impact*: Would result in mostly beneficial and long term cumulative impacts due to the effects of combined forest regeneration activities.	*Cumulative Impact*: Would result in cumulative impacts that would be primarily beneficial and long term.	*Cumulative Impact*. Would result in cumulative impacts that would be primarily beneficial and long term.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Visitor Safety	*Direct/Indirect Impact*: Because it is expected that no discernible effects to visitor safety would result from deer management actions, but vehicle collisions would continue, adverse, long-term, negligible to moderate adverse impacts could occur.	*Direct/Indirect Impact*: Adverse impacts to visitors would be short and long term and negligible from deer management, although the continued presence of a large number of deer over the life of the plan would continue to contribute to vehicle deer collisions on park roads and result in minor to moderate adverse impacts.	*Direct/Indirect Impact*: The extent of safety measures would result in adverse, short- and long-term, negligible to minor impacts, as it is expected that no discernible effects to visitor safety would occur from deer management actions and the possibility of deer-vehicle collisions would be diminished.	*Direct/Indirect Impact*: The extent of safety measures that would be used and locating activities away from park boundaries would result in adverse, short- and long-term, negligible impacts. The possibility of deer-vehicle collisions would be greatly diminished.
	Cumulative Impact: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.
Employee Safety	*Direct/Indirect Impact*: Because it is expected that no discernible effects to employee safety would occur as a result of deer management actions, impacts would be adverse, long term, and negligible.	*Direct/Indirect Impact*: Adverse impacts to government employees would be short and long term and negligible to minor.	*Direct/Indirect Impact*: Adverse, short- and long-term, negligible to minor impacts would occur.	*Direct/Indirect Impact*: Adverse, short- and long-term, negligible to minor impacts would occur.
	Cumulative Impact: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible cumulative impacts.	*Cumulative Impact*: Would result in adverse, long term, and negligible to minor cumulative impacts.
Socio-economic Resources	*Direct/Indirect Impact*: 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 and could result in varying impacts, ranging from minor to moderate and adverse.	*Direct/Indirect Impact*: Reproductive controls (if successful) would allow for only a gradual reduction in the number of deer, and there could be some displacement of deer from the park due to exclosures. The net effect on surrounding property could result in slightly greater damage to landscaping, the impacts of which would be long term and moderate.	*Direct/Indirect Impact*: The reduction of the existing deer populations in both the short and long term could result in fewer deer leaving the park and browsing landscaping on adjacent lands, with long-term beneficial effects that would reduce adverse impacts to negligible or minor levels.	*Direct/Indirect Impact*: The reduction of the existing deer populations in both the short and long term could result in fewer deer leaving the park and browsing landscaping on adjacent lands, with long-term beneficial effects that would reduce adverse impacts to negligible or minor levels.
	Cumulative Impact: Would result in adverse, long term, and minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in moderate adverse long-term cumulative impacts.	*Cumulative Impact*: Would result in long-term minor cumulative adverse impacts.	*Cumulative Impact*: Would result in long-term minor cumulative adverse impacts.

Impact Topic	Alternative A: No Action Alternative	Alternative B: Combined Non-lethal Actions	Alternative C: Combined Lethal Actions	Alternative D: Combined Lethal and Non-lethal Actions (Preferred Alternative)
Park Management and Operations	*Direct/Indirect Impact*: Long-term demands on park staff and funding for managing the deer herd and protecting other park resources would result in adverse, long term, and minor to moderate impacts.	*Direct/Indirect Impact*: Installing and maintaining large exclosures and implementing and monitoring reproductive controls would result in long-term, moderate adverse impacts.	*Direct/Indirect Impact*: The need for additional staff time for monitoring and coordinating activities under alternative C would result in adverse, moderate impacts initially, reduced to minor over time.	*Direct/Indirect Impact*: The need for additional staff time for monitoring and coordinating activities under alternative C would result in adverse, moderate impacts initially, reduced to minor over time.
	Cumulative Impact: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, minor to moderate cumulative impacts.	*Cumulative Impact*: Would result in adverse, long-term, minor to moderate cumulative impacts.

ALTERNATIVES CONSIDERED BUT REJECTED

The following alternatives were considered but rejected as explained below:

MANAGED HUNT

A managed public hunt was considered as a preliminary alternative to reduce the white-tailed deer population. A public hunting alternative was not carried forward for further analysis because it would be inconsistent with existing laws, policies, regulations, and case law regarding public hunts in units of the National Park System; it would be inconsistent with long-standing basic policy objectives for National Park System units; and the likelihood that the NPS would change its long-standing Servicewide policies and regulations regarding hunting in parks is remote and speculative.

Throughout the years the NPS has taken differing approaches to wildlife management, but for the most part it has maintained a strict policy of not allowing hunting in units of the national park system, except where specifically authorized by Congress. In 1970, Congress passed the *General Authorities Act* and in 1978 the "Redwood Amendment," which clarified and reiterated that the single purpose of the NPS *Organic Act* is conservation. While the *Organic Act* gives the Secretary of the Interior the authority to destroy plants or animals for the purposes of preventing detriment to park resources, it does not give the Secretary authority to permit the destruction of animals for recreational purposes. In 1984, after careful consideration of congressional intent with respect to hunting in national parks, the NPS promulgated a rule that allows public hunting in national park areas only where "specifically mandated by Federal statutory law" (36 CFR 2.2). The NPS re-affirmed this approach in its *Management Policies 2006.*

Congress has not authorized hunting in any legislation for Rock Creek Park. Therefore, in order to legally allow hunting at the park, the current NPS hunting regulation would have to be changed, or Congress would need to specifically authorize hunting. The NPS has a legislative mandate to protect the natural and cultural resources within national parks in order to allow for their enjoyment by future generations. The NPS does not have a mandate to allow public hunting in national parks. At this time, the agency intends to exhaust all other possible alternatives before it attempts to change its governing laws, regulations, or policies due to concerns that such actions may have negative impacts on the visitors and resources of other parks in the national park system.

In addition to legal and policy-related concerns, a managed public hunt was also evaluated based on cost, efficiency, safety, and the likelihood of achieving long-term management goals. A managed hunt has not been shown to be more cost-effective or efficient than other direct reduction methods such as sharpshooting by agency personnel, which is currently allowed under NPS laws and policies. In fact, when compared to sharpshooting, a managed hunt lacks similar efficiency, safety, and the likelihood of successful long-term management.

Based on the literature, costs for managed hunts generally range between $83 and $237 for each deer removed (Warren 1997). A white-tailed deer study in Minnesota that compared four lethal removal methods found that the cost of a managed hunt averaged $117 per deer removed, based on the average net cost per deer after including revenues generated by selling permits to participating hunters (Doerr et al. 2001). Even after considering permit revenue, however, the cost of a managed hunt is not necessarily lower than other removal methods such as sharpshooting. Warren documents that costs for sharpshooting programs have ranged from $72 to $260 per deer harvested (Warren 1997). In the Minnesota study mentioned above, the cost for sharpshooting averaged $121 per deer harvested (compared to $117 per deer harvested in the managed hunt after revenue from license sales was considered; Doerr et al. 2001). Gettysburg National Military Park reported sharpshooting costs averaged $128 per deer (Frost et al. 1997). The range of costs for sharpshooting ($72 to $260 per animal harvested) substantially overlaps the range of costs reported for managed hunts ($83 to $237 per animal harvested), suggesting that there is a minimal to no cost savings by using citizen hunters.

Managed hunts are also less efficient in meeting ungulate reduction project goals when compared to sharpshooting. Doerr et al. noted that the highest harvest rate (0.55 deer per hour) was achieved when sharpshooters shot over bait. This was compared to hunting, which resulted in a rate of 0.03 deer per hour or 31 hunter-hours per deer killed. In addition to harvest rates, sharpshooting is also more selective than hunting. As the reduction in does was the primary goal, 59% of the hunting harvest was females, whereas 63% of the sharpshooting harvest was females (Doerr et al. 2001).

In addition to cost and efficiency, safety is also an issue to consider when using lethal control methods. Sharpshooting offers safety features that a typical managed hunt does not. For example, sharpshooting over predetermined bait sites can establish shooting lanes and backstops. Also, sharpshooting can take place when park visitation is low or absent, reducing or eliminating public safety concerns. It is not suggested that hunts are not safe, and in areas where they are used, safety is a major concern that is addressed. However, the extensive planning and oversight that would be required to ensure a level of safety comparable to wildlife professionals engaged in sharpshooting activities would likely make a managed hunt less feasible.

The safety of park visitors and security in developed areas are concerns at Rock Creek Park. Fully addressing these two issues would reduce the area where a managed public hunt could occur, limiting its usefulness. For example, due to developed areas and potentially occupied buildings, approximately 20% of the park would be closed to a managed hunt. This percentage would increase as buffer zones around roads and parking areas would also be created to ensure visitor safety. In addition, the topography of the park would further limit public hunter access to more remote areas of the park. These necessary safety and security restrictions, as well as the landscape of the park, would make it difficult to meet the purpose, need, and objectives of this planning effort.

Several potential problems associated with a managed hunt could seriously impact its effectiveness as a management tool, especially over the long term. The critical assumption in using managed hunts is that an adequate number of hunters would participate annually. This assumption is extremely important because without adequate hunter numbers, management actions would likely fail or be postponed for a year, allowing ungulate populations to continue to increase. A number of studies that have analyzed managed hunts have shown that retaining adequate hunter numbers is difficult, especially as ungulate densities drop and management enters the maintenance phase. Hansen and Beringer (1997) noted that "managed firearm hunts . . . lasting more than two consecutive days are not cost effective because participation and harvest decline sharply after day 2." In fact, they experienced difficulty in recruiting adequate hunters for areas where hunts had already been conducted. Kilpatrick and Walter documented a 66% decline in hunter applicants in Connecticut from the first to the second year of a controlled hunt. This translated into a 26% decrease in hunter participation after one year (Kilpatrick and Walter 1999). Without consistent annual hunter effort, long-term management through public hunting would likely be unsuccessful.

In conclusion, the NPS considered and rejected a managed public hunt as a reasonable alternative for this plan for the following reasons: (1) implementing a public hunt in this park would require changes to basic NPS regulations and policy or an act of Congress; (2) case law supports dismissing an alternative that would require a major change in long-standing basic policy; (3) other direct removal alternatives, such as using agency personnel as sharpshooters, could be implemented without changing current laws and policies and would better meet the purpose, needs, and objectives of the plan; and (4) other direct removal alternatives raise fewer safety concerns and would have substantially the same environmental effects as a managed hunt.

REPRODUCTIVE CONTROL OF BUCKS

Another form of reproductive control includes sterilization of bucks. In a study of sterilization of feral horses, sterilizing only dominant harem stallions resulted in relatively modest reductions in population growth. Substantial reproduction may occur even when 100% of the dominant harem stallions are

sterilized if other males perform as little as 10% of the breeding. Adequate suppression of population growth may be attained only if a large proportion of all males in the population are sterilized (Garrott and Siniff 1992).

Another study on the use of vasectomy on wolves (*Canis lupis*) suggested that population reduction depends largely on the degree of annual immigration. With high immigration (which could be expected at Rock Creek because of the presence of deer on neighboring parklands), periodic sterilization produced only moderate reductions in population size relative to an untreated population. Similar reductions in population size were obtained by periodically removing large numbers of wolves (Haight and Mech 1997).

Under this alternative, long-term population stability would become an issue, along with genetic variability (a few non-dominant bucks could breed the entire herd). If females did not become pregnant, their estrous cycle could be extended, resulting in later pregnancies and lower survival for fawns born later in the year (as a result of a higher winter-kill potential). The population dynamic and makeup of the herd could suffer under this alternative.

Because of the concerns described above relating to effectiveness, population stability, and genetic variability, this alternative was dismissed from detailed analysis.

WOLF REINTRODUCTION

Relationships between predators and prey are complex, and the impact of predators on herbivore populations is variable (McCullough 1979). Wolves are efficient deer predators, but they have been eliminated from much of the United States. Reintroducing these predators into Rock Creek Park would not be feasible due to a lack of suitable habitat. Wolves have home ranges averaging 30 square miles when deer are the primary prey (Mech 1990), which is much larger than Rock Creek's 4.7 square miles. Most of the park area is surrounded by an urban or suburban environment, making it inappropriate for such predators to be reintroduced (MD DNR 1998). Other native animals, as well as domestic pets, could also become potential prey if wolves were reintroduced to the Rock Creek area.

For the reasons described above relating to effectiveness, habitat limitations, and human safety concerns, reintroduction of wolves was dismissed as a reasonable alternative.

CAPTURE AND RELOCATION

Capturing deer within Rock Creek Park and relocating them would be in violation of NPS policy regarding translocation, outlined in a Director's CWD Guidance Memorandum of July 26, 2002 (NPS 2002a). Even if the policy was not in effect, relocating deer to areas a sufficient distance from the park to ensure that they would not return would require permits, and because of concerns of CWD testing, possible quarantine processes would be required. Given the abundance of deer in Maryland and most of the United States, recipients for such a program would be very limited. Also, live capture and relocation methods can result in high mortality rates among captured and/or relocated deer. Implementation of this alternative could result in the death of more than 50% of the deer during the first year after release (Jones and Witham 1990). In one study only 15% of the relocated deer survived one year after relocation (O'Bryan and McCullough 1985). Due to the concerns discussed above relating to policy, costs, feasibility, and high mortality, capture and release was dismissed as a reasonable alternative.

SUPPLEMENTAL FEEDING

Providing supplemental food sources for deer would potentially decrease browsing pressure on vegetation resources at Rock Creek Park. However, increasing food sources could increase body condition and reproduction, leading to a growing deer population. Few studies have evaluated foraging behavior of deer relative to a supplemental food source. Existing research indicates the deer continue to rely on standing browse regardless of the amount or availability of supplemental food. Additionally, impacts of browsing

may be more significant in areas where deer concentrate around food sources provided as supplements to natural forage (Doenier et al. 1997). Overall, no scientific evidence could be found to suggest that in large, free-ranging deer populations supplemental feeding could reasonably be expected to allow the park to achieve its target level of tree regeneration. In the long term this would compound problems associated with high deer numbers (MD DNR 1998). In addition, the NPS *Management Policies 2006*, sec. 4.4.1, General Principles for Managing Biological Resources, and sec. 4.4.2, Management of Native Plants and Animals, are aimed at allowing natural processes to occur whenever possible. For these reasons, this alternative was dismissed.

FENCING THE ENTIRE PARK (OR EXCLUSIVE USE OF FENCING)

The entire park unit could be fenced to prevent deer from entering or leaving. A fence approximately 8 feet high would be needed to prevent deer from jumping over the barrier. However, vegetation within Rock Creek Park would continue to suffer the effects of deer browsing, the deer population within the fenced area would continue to increase, and the health of the contained herd would suffer. Therefore, all deer within the fenced area would either need to be removed or the deer population within the fence would need to be managed with other methods to meet the objectives of the park management plan. For these reasons, this alternative was dismissed.

Exclusive use of fencing would not be sufficient to protect sensitive plant species and allow for forest regeneration. To protect sufficient area, fencing would need to cover a large portion of the park, and this would result in unacceptable impacts to visitor use, visual quality of the park, the cultural landscape of the park, and other wildlife species. Areas not fenced would be subject to increased pressure from deer browsing. For these reasons, exclusive use of fencing without other action to reduce deer numbers was eliminated as a reasonable alternative, but fencing was included as a component of alternative B.

CONTRAGESTIVES

A contragestive is an abortion drug applied after a doe becomes pregnant that terminates the pregnancy. Therefore, this method would need to be implemented annually. Depending on the stage of pregnancy, the drug could make the delivery of a dead fetus difficult if it is late in the pregnancy; however, if applied too early a doe could become pregnant again. Efficacy is approximately 75% to 80% depending on timing. Contragestive agents provide two distinct differences from contraceptive control methods: the time of application (during pregnancy rather than prior to) and the potential harm to the deer. This method could be used in conjunction with a contraceptive program to supplement their effectiveness, essentially treating animals missed with contraceptive treatments or those where the treatment was not effective. The difficulty then becomes how to determine which deer are pregnant. This would require either substantial monitoring/observation of the deer or recapturing of does to check for pregnancy.

Given the number of deer in the area and the size of the park, implementation of contragestives on a large scale would not be feasible due to the amount of staff time and monitoring required deeming it effective. Even on a limited scale, the use of other reproductive control measures would provide greater efficacy and efficiency than contragestives. In addition, contragestives may be considered inhumane because of their mode of action and there is potential to harm the doe. There is also concern about potential effects to non-target species (through food chain transfer). Therefore, the park has dismissed the use of contragestives as a reproductive control option.

WIDESPREAD USE OF REPELLENTS

Although limited use of commercially available repellents would be considered in small areas around landscaped vegetation, large-scale application of repellents is not practical due to the need for frequent applications resulting in high application cost, label restrictions on use, and variable effectiveness. Repeated applications of spray repellents would be necessary due to weather and emergence of new growth. Because the effectiveness of repellents is variable and is least effective with high deer densities

and size of the areas that would require treatment, repellent use within the park as a management alternative was dismissed.

LANDSCAPE MODIFICATION/PLANTINGS

White-tailed deer are very adaptable animals and they will adjust their diets to available food sources. Therefore, trying to manage a deer population through managing the habitat to manipulate deer feeding behavior and movements in a highly fragmented environment, surrounded by suburban land uses would be extremely complex, inefficient, and likely unsuccessful.

Introducing plantings of non-palatable species on a parkwide scale would not be feasible. Typically, non-palatable plants are those that are nonnative and often invasive, which is counter to the goals of most parks, including Rock Creek. The effort needed to replace existing palatable vegetation with non-palatable would be extensive and the result expected is that deer would eventually adapt to the available food source. Additionally, removal of large areas of existing vegetation would have adverse effects on other wildlife species.

Landscape modification does not appear to be a viable option for reasons described above. Additionally, landscape modification actions to discourage deer density would also negatively impact other wildlife. Drastic landscape modification actions, such as removing large tracts of forests to eliminate deer cover, would require additional NEPA documentation. Based on the reasons above, this alternative was dismissed.

SPEED LIMIT REDUCTION

Vehicle collision is the major source of mortality in the deer population in Rock Creek Park. It is logical to assume that lowering the speed limit parkwide could lower the number of deer vehicle collisions. However, lowering the speed limit could also increase the deer population because of less mortality. Also, the objectives of this plan/EIS are to protect the natural and cultural resources of the park. Reduction of park speed limits will not reduce deer overbrowsing of park vegetation.

Visitor and employee health and safety were identified as an issue requiring further analysis in this plan. The impact of the alternatives on this issue are analyzed; the NPS has not dismissed the issue of vehicle collisions in the plan. However, the NPS has decided that lowering the speed limit as a component of an alternative to achieve the goal of reducing deer browse and increasing tree regeneration does not meet the purpose of this plan.

MAXIMIZING REDUCTION OF DEER OUTSIDE THE PARK WHILE PROTECTING DEER INSIDE THE PARK

One idea brought forth by the public was to maximize lethal reduction of deer outside the park while protecting deer inside the park. The Organic Act provides that NPS shall promote and regulate the use of the federal areas known as national parks, monuments, and reservations; however, it does not provide authority to directly manage lands or resources located on non-federal lands outside the park boundary. Management of game populations (including white-tailed deer) outside the park boundary is the responsibility of the outside property owners including public entities such as Montgomery County and the District of Columbia. The park has a long history of working cooperatively with surrounding jurisdictions to encourage decision-making that promotes the protection of park resources and the control of deer populations, but does not have the authority to act or force action outside of park boundaries.

CONSISTENCY WITH THE PURPOSES OF THE NATIONAL ENVIRONMENTAL POLICY ACT

The *National Environmental Policy Act* requires an analysis of how each alternative meets or achieves the purposes of the act, as stated in Section 101(b). Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The CEQ has promulgated regulations for federal agencies' implementation of NEPA (40 CFR Parts 1500–1508). Section 1500.2 states that federal agencies shall, to the fullest extent possible, interpret and administer the policies, regulations, and public laws of the United States in accordance with the policies set forth in the act (sections 101[b] and 102[1]); therefore, other acts and NPS policies are referenced as applicable in the following discussion.

ALTERNATIVE A: NO ACTION

Alternative A would meet the purpose of NEPA to some extent because limited protection of certain rare species and habitats would be continued. However, this alternative would not fulfill the responsibilities of each generation as the trustee of the environment for succeeding generations and preserving important aspects of our national heritage (criteria 1 and 4), because damage to forest vegetation, rare species, and cultural landscapes would continue as a result of excessive browsing by high numbers of deer. The expected long-term, adverse impacts to resources would not ensure healthful, productive, or aesthetically pleasing surroundings (criterion 2). The park would continue to attain a wide array of beneficial uses (criterion 3), although there would be continued degradation of natural and cultural resources. There would be an adverse impact on resources by allowing excessive deer browsing, which would not do anything to maintain a balance between population and resources (criterion 5). Alternative A would not enhance the quality of renewable forest resources (criterion 6).

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

This alternative would meet some of the criteria within the life of the plan, primarily in the latter years, as fencing and reproductive controls took effect. Fencing would protect part of the environment; however, it would provide only limited direct protection for forest resources (only up to 10% of the park's woody vegetation would be protected by exclosures over the life of the plan). This alternative would also rely

heavily on a technology (reproductive control) that might not be successfully implemented for a large free-ranging deer population.

The gradual progress this alternative provides would meet some but not all of the criteria. In particular, the lack of protection for a large percentage of the park, and the time it would take for any reproductive control to be effective, would mean that succeeding generations might not see desired results for some time (criterion 1), and probably not within the 15-year life of this plan. The large-scale exclosures could detract from aesthetically pleasing surroundings (criterion 2). The installation and movement of fencing could result in damage and loss of resources, and this alternative would rely on technology (reproductive control agents) that has not been proven in large, free-ranging deer populations as a population management tool, both potentially leading to undesirable consequences (criterion 3). The rotational fencing would limit the choices available to the public, as fenced areas would be inaccessible to the public (criterion 4). This alternative would minimally help by maintaining a balance between population and resources by reducing adverse browsing impacts (criterion 5). The limited history of reproductive control success in a large, free-ranging population such as the park's and the limits on how much forest vegetation can be included in exclosures means that it would not be possible to completely approach the maximum attainable recycling of resources (criterion 6).

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Alternative C would succeed to some extent in meeting all of the criteria within the life of the plan. By immediately reducing deer browsing pressure, the alternative would allow vegetation in the park to regenerate for the benefit and enjoyment of future generations (criterion 1). The immediate reduction in the deer population and subsequent improvements in the natural environment would provide a great deal of benefit. There would be some safety concerns associated with implementing alternative C. By implementing proper controls, however, these concerns could be minimized. The result would be safer conditions on local roads and more aesthetically pleasing conditions throughout the park (criterion 2). Alternative C would require closures of some areas of the park during reduction activities during the life of the plan, which would limit their use by visitors. However, these closures would occur at times and places that were not high visitation periods and primarily at night when the park is closed. This alternative also would avoid undesirable consequences (e.g., potential behavioral changes from reproductive controls) and maximize forest regeneration by immediately reducing deer browsing (criterion 3). The closures within the park would limit individual choice, but only for limited periods of time. These closures would allow for the reduction of the deer population, which would protect the park's natural and cultural resources and provide greater choices in the future (criterion 4). This alternative would help to achieve a balance between population and the surrounding park resources by allowing for regeneration to occur at a higher rate than is currently occurring (criterion 5). Finally, by immediately reducing the deer browsing pressure and promoting forest regeneration, this alternative would enhance the quality of renewable resources (criterion 6).

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

Alternative D is similar to alternative C in the extent to which it would meet the intent of NEPA. Both would fulfill the responsibilities of each generation as a trustee of the environment for succeeding generations (criterion 1) to a large degree, because both would immediately reduce deer numbers and sustain that reduction through maintenance actions. As with alternative C, alternative D also would result in safer conditions on local roads and more aesthetically pleasing conditions throughout the park (criterion 2). As with alternative B, alternative D involves some concern about unintended consequences (criterion 3), because an acceptable reproductive control agent is not currently available and it would rely on technology that has not been proven in large, free-ranging deer populations as a long-term management tool. Although the planning team recognized the uncertainties associated with reproductive control agents, it was recognized that the science associated with this technology is developing rapidly

and would provide additional information in the near future. Any safety concerns would be reduced through proper safety controls. As with alternative C, alternative D would also preserve important historic, cultural, and natural aspects of our national heritage in the long term (criterion 4). Alternative D would help to achieve a balance between population and the surrounding park resources by allowing for regeneration to occur at a higher rate than is currently occurring. Finally, although through a different manner than alternative C, alternative D would approach the maximum attainable regeneration of depletable resources (i.e., forest vegetation) by reducing and maintaining the deer population density (criterion 6).

ENVIRONMENTALLY PREFERRED ALTERNATIVE

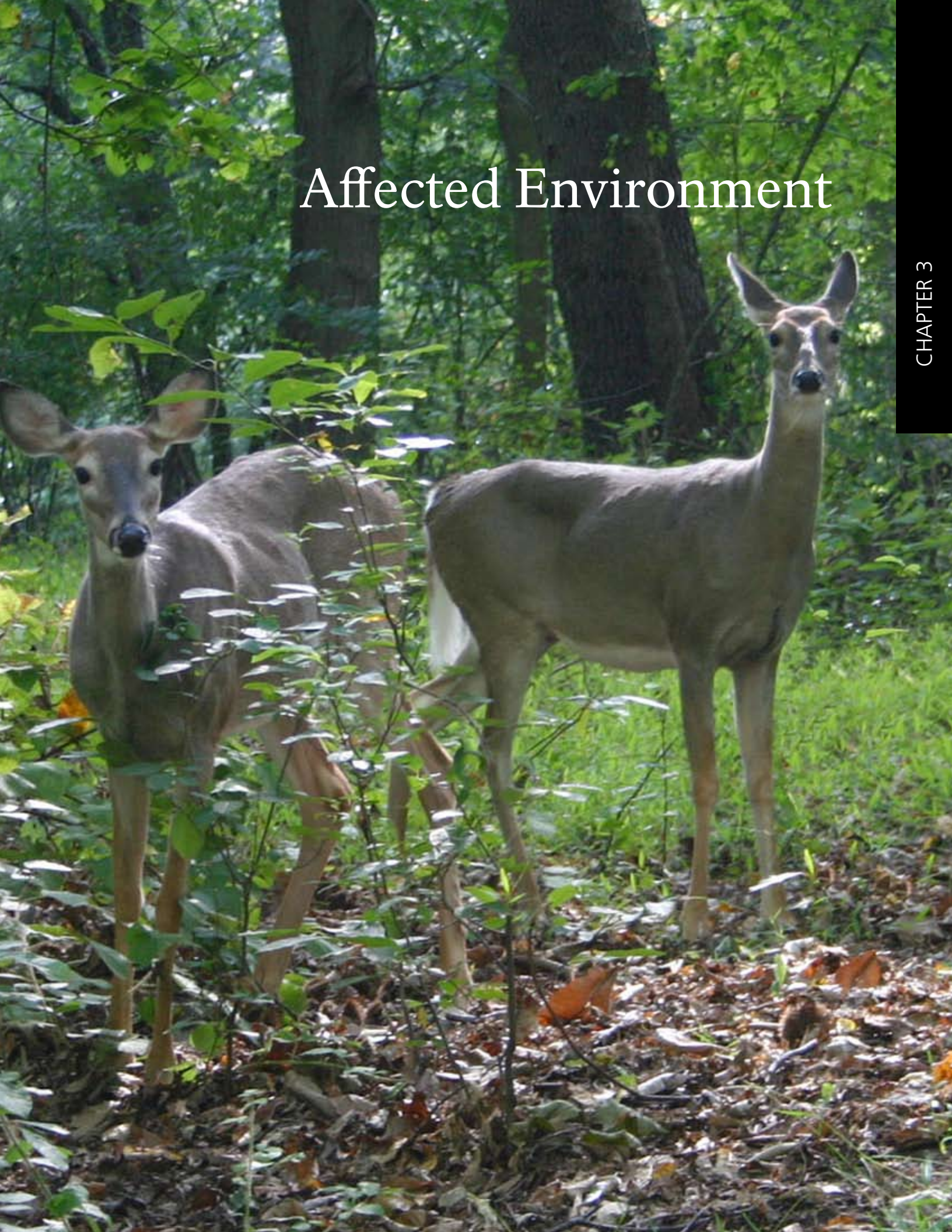
The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment. Guidance from the CEQ states that the environmentally preferred alternative is "the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981). Alternative D was selected as the environmentally preferred alternative, because it is the alternative that would best protect the biological and physical environment by ensuring an immediate reduction in deer population numbers that could be sustained with proven methods over the life of the plan. Alternative D would also best protect, preserve, and enhance the cultural and natural processes that support the park's forests and cultural landscapes by providing multiple management options to maintain low deer numbers. Although alternatives C and D are very close in meeting the guidance for identification of the environmentally preferred alternative, alternative D was selected primarily because it provides the park with the ability to select the least environmentally damaging option as science and technology advance. Alternatives A and B were not considered environmentally preferred because of their lack of effect on the deer population numbers, which would result in potential or continued adverse impacts on the biological and cultural resources of the park over the life of the plan.

NATIONAL PARK SERVICE PREFERRED ALTERNATIVE

To identify the preferred alternative, the planning team evaluated each alternative based on its ability to meet the plan objectives (see table 11) and the potential impacts on the environment ("Chapter 4: Environmental Consequences"). Alternative D was identified as the NPS preferred alternative.

Both alternatives C and D fully meet the plan objectives and are very close in their meeting of all objectives and their relative impacts. However, alternative D provides for the opportunity to use a wider variety of management methods, including reproductive control, which would be an option when the criteria established by the planning team are met. Alternative D provides for an efficient initial removal of deer, and the flexibility to address future removals in different ways. If reproductive control is used, there could be reduced impacts relating to visitors, safety, and the environment, by eliminating the need to close the park for extended periods of time and limiting the time that shooting would occur in the park.

Alternative B partially meets some of the objectives, because of the lack of immediate reduction in deer numbers and the uncertainty that the deer density goal would be achieved even over an extended period of time. Alternative A (no action) fails to meet or fully meet the objectives of the plan, since no action would be taken to reduce deer numbers or effect a change in conditions that are the basis for the purpose of and need for action.



Affected Environment

CHAPTER 3

AFFECTED ENVIRONMENT

The "Affected Environment" describes existing conditions for those elements of the natural and cultural environments that would be affected by the implementation of the actions considered in this White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS). The natural environment components addressed include vegetation; soils and water quality; wetlands and floodplains; wildlife and wildlife habitats (including deer); and rare, unique, threatened, or endangered species. The Rock Creek Park cultural environment includes cultural landscapes, soundscapes, visitor use and experience, visitor and employee safety, socioeconomic resources, and park management and operations. Impacts for each of these topics are analyzed in "Chapter 4: Environmental Consequences."

VEGETATION

CURRENT VEGETATION STATUS AND ROLE OF DEER

Numerous studies within eastern deciduous forests have shown that browsing by white-tailed deer (*Odocoileus virginianus*) at densities greater than 15 to 20 deer per square mile can influence forest regeneration success (Hough 1965; Behrend et al. 1970; Marquis 1981; Tilghman 1989; Redding 1995; Augustine and deCalesta 2003; Bowersox et al. 2002; Horsley et al. 2003; Sage et al. 2003). Deer impacts on plant communities consist of three primary effects: (1) failure to reproduce, especially in slowly maturing woody species where seedlings are killed; (2) alteration of species composition, which occurs where deer remove preferred browse species and indirectly create opportunities for less preferred or unpalatable species to proliferate; and (3) extirpation of highly palatable plants, especially those that were naturally uncommon or of local occurrence (Langdon 1985). For more than 20 years, Rock Creek Park has collected data on the park's white-tailed deer population that has shown that the rising number of deer may be adversely impacting plant communities in the park.

Vegetation monitoring results have demonstrated the role of deer in the current vegetation status of the park. In analyses by Hatfield (2005), data from the long-term (unfenced) vegetation plots 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. The 2007 data (Hatfield 2008) show that all tree seedling counts declined since 1991 and that counts for all height classes were near zero.

Corner marker of long-term plot

The number of tree seedlings to replace the loss of a portion or all of a forest is called the "stocking rate," (or the tree seedling weighted measure, appendix A). Tree seedlings were weighted by height class because the taller seedlings survive better than the shorter seedlings. The tree seedling weighted measures for 1991 through 2003 were all below the recommended level for successful forest regeneration; that is, 67% of the long-term plots had less than 51 tree seedlings in all areas of the park (see discussion of action thresholds in chapter 2). As noted above, data from 2007 (Hatfield 2008) reinforced this result. Seedling counts for all height classes were near zero in 2007, and the tree seedling

weighted measure was 2.26 ± 0.32% for high deer density conditions, far under the recommended value of 67%.

Rossell et al. (2007) showed in analysis of 4 years of paired fenced and unfenced plot data that deer are adversely impacting plant communities in the park. The greatest effects of deer browsing occurred nearest the ground (0 to 30 cm, or about 12 inches) on structure and cover. The vegetation thickness measure is used as an index for wildlife using the habitat for cover or concealment. Vegetation cover at the bottom interval significantly increased by 30% in the paired-fenced plots compared to the paired-unfenced plots, which remained unchanged over the 4 years. A draft 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 (0-30 centimeters, or 0 to about 12 inches) and middle (30-110 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.

OVERVIEW OF ROCK CREEK PARK VEGETATION

Rock Creek Park runs along the topographic break separating the Piedmont Plateau and the Atlantic Coastal Plain provinces. The vegetation in Rock Creek Park bears resemblance to both of these provinces and is closely aligned with vegetation types described in the nearby states of Maryland, New Jersey, Pennsylvania, and Virginia.

Approximately 80% (2,471 acres) of the park is covered with mature second growth forest that is approximately 125 years old. Activities before the park's establishment in 1890, such as timber cutting, farming, and Civil War clearing, removed much of the original forest. A few large oaks (*Quercus* spp.) still living in the park are estimated to be more than 275 years old and may be remnants of virgin growth. Woodlands currently in the park are primarily a mixture of deciduous species typical of the eastern deciduous forest in the later stages of succession (NPS 2005d).

Forest vegetation at Rock Creek Park

Rock Creek Park consists of the largest unbroken forest in the Washington metropolitan area, providing habitat for much of the city's wildlife and acting as an important contributor to the region's biodiversity. Past surveys have shown that the main unit of Rock Creek Park (Reservation 339) serves as a major reservoir of native flora for the region (NPS 2005a). Within Rock Creek Park, the deciduous forested habitat is characterized by an overstory dominated by tulip poplar (*Liriodendron tulipifera*) with fewer numbers of hickory (*Carya*) species, green ash (*Fraxinus pennsylvanica*), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), southern red oak (*Quercus falcata*), and black locust (*Robinia pseudoacacia*). Dominant understory species in the forest include saplings, American holly (*Ilex opaca*), spicebush (*Lindera benzoin*), greenbrier (*Smilax* spp.), Japanese honeysuckle (*Lonicera japonica*), English ivy (*Hedera helix*), and poison ivy (*Toxicodendron radicans*). There are also remnant

Virginia pines (*Pinus virginia*) that occur mostly as scattered individuals or small clusters, as well as pine-oak mixed woodlands. Other vegetative types in the park include maintained lawns with landscaped trees and shrubs, including American holly, pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), and tulip poplar saplings; and shrubs including witch hazel (*Hamamelis* spp.) and smooth serviceberry (*Amelanchier arborea*).

FOREST COMMUNITIES

Figure 5 depicts the primary vegetation cover types found within Rock Creek Park. The primary forest associations in the park are also shown on figure 5, listed in table 13, and described below, based on the summaries provided in the National Biological Survey (NBS)/NPS Vegetation Mapping Program's *Vegetation Classification of Rock Creek Park* (The Nature Conservancy 1998).

The **beech-white oak / mayapple association** is found on moderately dry slopes or gentle gradients on well-drained acidic sandy loam soils. The canopy is dominated by white oak, beech, and tulip poplar, and subcanopy and shrub layer species include American holly, flowering dogwood (*Cornus florida*), and mapleleaf viburnum (*Viburnum acerifolium*), which often forms a well-defined shrub layer. Herbaceous composition ranges from sparse to dense depending on soil type, disturbance history, and moisture. Typical herbaceous species include mayapple and jack-in-the-pulpit (*Arisaema atrorubens)*. Christmas fern (*Polystrichum acrostichoides*) may be locally abundant, typically on hillsides.

Two variants of the beech-white oak/mayapple forest occur in the park; their composition and location relate to the local soil moisture regime. The mixed oak-beech variant occurs on drier sites, while the beech-tulip poplar variant occurs on more mesic (moderately moist) sites. The **mixed oak-beech variant** is characterized by a greater percent cover of oaks and less dominance by tulip poplar. The canopy is co-dominated by a mix of red oak, black oak, white oak, and chestnut oak. Beech usually occurs in the subcanopy and mapleleaf viburnum is common, but spicebush, hornbeam (*Carpinus caroliniana*), and jack-in-the-pulpit are conspicuously lacking or sparse, which distinguishes this from the classic beech-white oak-mayapple association. On the other hand, the **beech-tulip poplar variant** is characterized by a dominance of tulip poplar and beech in the canopy and subcanopy. Hornbeam is very characteristic and spicebush and viburnums (*Viburnum* spp.) are common in the shrub layer. The herb layer may be diverse, with jack-in-the-pulpit more prevalent. This variant often occurs near streams although not on the floodplain itself.

The **tulip poplar association** occurs on mesic, mid-slope to low-slope sites that were cleared and/or cultivated at one time. The canopy is dominated by tulip poplar, with no co-dominants. Tulip poplar and box elder (*Acer negundo*) comprise the subcanopy and spicebush and blackberry (*Rubus allegheniensis*) are present in the shrub layer. These sites tend to be weedy and nonnative plants are often prevalent.

The **chestnut oak forest (chestnut oak-black oak / huckleberry association)** occurs on ridgetops, upper slopes, and south-facing slopes on rocky soils with little organic matter. Surface runoff and erosion are common and of concern. There is a predominance of chestnut oak and blackgum (*Nyssa sylvatica*) and an absence or sparse cover of white oak. Red oak and/or black oak and red maple (*Acer rubrum*) are often present but sparse. Serviceberry (*Amelanchier* spp.) and sassafras (*Sassafras albidum*) are typical in the subcanopy and vines such as greenbrier and grape (*Vitis* spp.) are common. Characteristic shrubs include blueberry (*Vaccinium pallidum*), huckleberry, mountain laurel (*Kalmia latifolia*), and azalea (*Rhododendron periclymenoides*). The herbaceous layer tends to be sparse or absent.

Rock Creek Park Units
District of Columbia

Figure 5. Vegetation - 1998

Legend

- Park Boundary
- District Boundary
- Interstate
- Major Road

Vegetation Legend

- Beech-White Oak/Mayapple Forest (Classic Type)
- Beech/Tulip Poplar Variant of Beech White Oak/Mayapple Forest
- Mixed Oak/Beech Variant of Beech-White Oak/Mayapple Forest
- Tulip Poplar Forest
- Chestnut Oak Forest
- Sycamore-Green Ash Forest
- Loblolly Pine-Mixed Oak Forest
- Virginia Pine-Oak Forest
- Shurb Areas
- Forest Canopy Gap
- Managed Grass/Lawns
- Managed Grass/Lawns with Trees
- Meadow Grasslands
- Water
- Urban Disturbed

MARYLAND
WASHINGTON DC
WASHINGTON DC
VIRGINIA
Walter Reed Army Medical Center
NATIONAL ZOOLOGICAL PARK
NAVAL OBSERVATORY
GEORGETOWN UNIVERSITY
Visitor Center
Alaska Ave
Military Rd
River Rd
Massachusetts Ave
Nebraska Ave
Reno Rd
Tilden St
Porter St
Klingle Rd
Park Rd
Cleveland Ave
Columbia Rd
Florida Ave
Reservoir Rd
Q St
P St
Whitehurst Fwy
Virginia Ave
Pennsylvania Ave
New York Ave
Massachusetts Ave
Maryland Ave
Taylor St
Kenyon St
Irving St
Harvard St
Franklin St
Rhode Island Ave
Monroe St
Michigan Ave
Missouri Ave
Kansas Ave
Arkansas Ave
Georgia Ave
New Hampshire Ave
Blair Rd
North Capitol St
Fort
Tunlaw Rd
Chain Brg
Clara Barton Pkwy
Arizona Ave
MacArthur
New Mexico Ave
Wisconsin Ave
Dalecarlia Pky
Piney Branch Rd
Harewood Rd
Park Pl
Lincoln Rd
Brentwood Rd
Bladensburg Rd
South Dakota Ave
West Virginia Ave
West Mount Olivet Rd
Adams Mill Rd
Sherman Ave
14th St
16th St
13th St
5th St
4th St
6th St
9th St
12th St
15th St
17th St
18th St
19th St
20th St
22nd St
23rd St
7th St
11th St
New Jersey Ave
U St
R St
L St
K St
I St
H St
E St

0 0.5 1 Miles

TABLE 13. FOREST ASSOCIATIONS FOUND WITHIN ROCK CREEK PARK

Forest Type	Major Tree or Shrub Species – Common Name	Major Tree or Shrub Species – Scientific Name	Acreage	Percent Cover in Park
Beech-White Oak / Mayapple Forest	Beech	*Fagus grandifolia*	996.27 (Most widespread association across the park)	33.2%
	White oak	*Quercus alba*		
	Mayapple	*Podophyllum peltatum*		
Mixed Oak-Beech Variant	Beech	*Fagus grandifolia*	619.38	20.7%
	Oak	*Quercus* spp.		
Beech-Tulip Poplar Variant	Beech	*Fagus grandifolia*	194.72	6.5%
	Tulip (yellow) poplar	*Liriodendron tulipifera*		
Tulip Poplar Forest	Tulip (yellow) poplar	*Liriodendron tulipifera*	245.87 (Scattered throughout the park)	8.2%
Chestnut Oak Forest	Chestnut oak	*Quercus prinus*	114.69 (Restricted primarily to hilltops)	3.8%
	Black oak	*Quercus velutina*		
	Huckleberry	*Gaylussacia baccata*		
Sycamore-Green Ash Forest	Sycamore	*Platanus occidentalis*	185.93 (Occurs only in floodplains, along narrow stream corridors in the park)	6.2%
	Green ash	*Fraxinus pennsylvanica*		
Loblolly Pine-Mixed Oak Forest	Loblolly pine	*Pinus taeda*	77.24 (Although uncommon in the park, widespread on the coastal plain from New Jersey, Maryland, Virginia, and south)	2.6%
	White oak	*Quercus alba*		
	Southern red oak	*Quercus falcata*		
	Post oak	*Quercus stellata*		
Virginia Pine-Oak Forest	Virginia pine	*Pinus virginiana*	37.08 (Uncommon in the park)	1.2%
	White oak	*Quercus alba*		
	Southern red oak	*Quercus falcata*		
	Post oak	*Quercus stellata*		
	Black oak	*Quercus velutina*		
TOTAL			**2471.18**	**82.4% (% of acres forested in the park)**

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 (*Euonymous 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.

SOILS AND WATER QUALITY

SOILS

The primary concern related to soils and deer management identified in this plan/EIS is the potential for greater erosion as a result of increased deer browsing, which can reduce vegetative ground cover and result in sedimentation in the waters associated with the Rock Creek watershed. Although deer contribute in a minor way directly to soil erosion, excessive deer browsing has reduced vegetative cover, exposing soil and making it more susceptible to erosion from rainfall. The cumulative effects of heavy visitor use, increased storm water runoff, soil compaction, and vegetation removal are the primary causes of soil erosion in the park.

As detailed in the *1976 Soil Survey for the District of Columbia* (USDA 1976), 25 major soil types are documented within Rock Creek Park. Nearly all of these are moderately erodible, as indicated by their soil erodibility factor (K), which indicates the susceptibility of the whole soil to sheet and rill erosion by water. Possible values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. For the purposes of this analysis, soils with an erodibility factor of 0.20 to 0.40 are considered moderately erodible, and soils with an erodibility factor greater than 0.40 are considered highly erodible. Therefore, based on the available soil survey data, most of Rock Creek Park's soils are identified as being moderately erodible, and two (Beltsville silt loam and Christiana silt loam) are highly erodible (USDA 1976). Both of these are found only in the Fort Circle Parks east of Rock Creek Park where deer are less numerous than in the main section (Reservation 339) of Rock Creek Park.

The degree of erodibility that soils exhibit is determined by physical factors such as drainage, permeability, texture, structure, and percent slope. The rate of erodibility is based on the amount of vegetative cover, climate, precipitation, proximity to water bodies, and land use. Disruptive activities accelerate the natural erosion process by exposing these erodible soils to precipitation and surface runoff, and those erodible soils found on steeper slopes and along the stream banks in the park would be susceptible to impacts from vegetation removal and trampling.

Currently, the park's soil resources are being adversely affected by accelerated erosion, compaction, and deposition caused by human activities inside and outside the park boundaries. Some areas that receive heavy visitor use are subject to soil compaction, removal of vegetation cover, and erosion. This is particularly evident along streambanks, at picnic groves and other popular recreation areas, and along heavily used or infrequently maintained trails. Accelerated streambank erosion is occurring as a result of increased runoff from the upstream watershed in the northern portion of the park. Associated deposition of some of the eroded soils is occurring in the floodplains in the central and southern portions of the park and parkway (NPS 2005a).

WATER QUALITY

ROCK CREEK WATERSHED OVERVIEW

As mentioned above, the primary issue relating to water quality and deer at Rock Creek Park is the potential for siltation from eroding soils or construction of exclosures near streams. Rock Creek is the primary water feature within Rock Creek Park. The creek flows from its headwaters in Laytonsville, Maryland, through Montgomery County, Maryland, and the northwest portion of Washington, D.C., to join with the Potomac River at Georgetown. The watershed is approximately 76.5 square miles with 15.9 square miles contained within the District of Columbia (DCDOH 2004a).

Two major tributaries drain into Rock Creek within Rock Creek Park. Broad Branch, which enters from the northwest, just opposite the intersection of Blagden Avenue and Beach Drive, and Piney Branch,

which enters Rock Creek from the northeast at Piney Branch Parkway, approximately one-half mile south of Broad Branch. Sixteen smaller tributaries enter Rock Creek in Rock Creek Park. Figure 6 depicts the major watercourses and drainages in the Rock Creek watershed.

EXISTING WATER QUALITY

An estimated 500,000 people reside within the Rock Creek Watershed, with approximately 70% of residential development occurring upstream from Rock Creek Park. Much of the developed area consists of impervious surfaces, such as buildings, roads, and driveways. Impervious surfaces (such as concrete and pavement) decrease the amount of rainfall that reaches the soil and increase the volume and velocity of stormwater that enters surface drainages during storms. The high level of development and increase of impervious surfaces within the watershed has led to increased stormwater runoff, which has damaged Rock Creek and its tributaries by increasing the amount of sedimentation in the creek, as well as carrying other pollutants into creek waters (NPS 2005a). Increases in stormwater runoff within the watershed increases the peak flow rates in Rock Creek, which increases the water velocities in the stream channel, resulting in erosion along the stream banks and excessive sedimentation downstream. Stream erosion activity widens the stream, reducing the depth of water during low flow periods and degrading the quality of the stream as aquatic habitat. Within Rock Creek Park, erosion is primarily the result of bank destabilization along drainage ways and tributaries of Rock Creek, and sedimentation and excess turbidity are most apparent in the smaller tributaries that are spring-fed and have less upstream flow (K. Ferebee, pers. comm. 2008a). Areas denuded of vegetation by deer browse, visitor use, or other disturbances also contribute to stormwater runoff and increase the potential for erosion and the transport of sediments and surface pollutants into adjacent water bodies.

Rock Creek

Water quality in the Rock Creek watershed has been adversely affected by inputs from the surrounding urban area, including runoff from bare soils and construction sites (sediment); transportation corridors and parking lots (oils and greases, metals, sediments); and lawns, stables, and leaking sewer lines (coliform bacteria) (NPS 2005a). In 1996, the District of Columbia submitted the Total Maximum Daily Load (TMDL) Priority List and Report to the U.S. Environmental Protection Agency (EPA) containing a list of waters that do not or are not expected to meet water quality standards as required by Sections 303(d) of the *Clean Water Act*. These waters are then considered "impaired" for certain constituents under the *Clean Water Act* definition of impaired, which is not the same as the National Park Service (NPS) definition of that term. The Section 303(d) list was revised in 2002 based on additional water quality data. The TMDL for Rock Creek within the District of Columbia was completed in 2004 (DCDOH 2004a). All segments of Rock Creek in the park are listed as impaired by organics, bacteria, fecal bacteria, and metals (DCDOH 2004a).

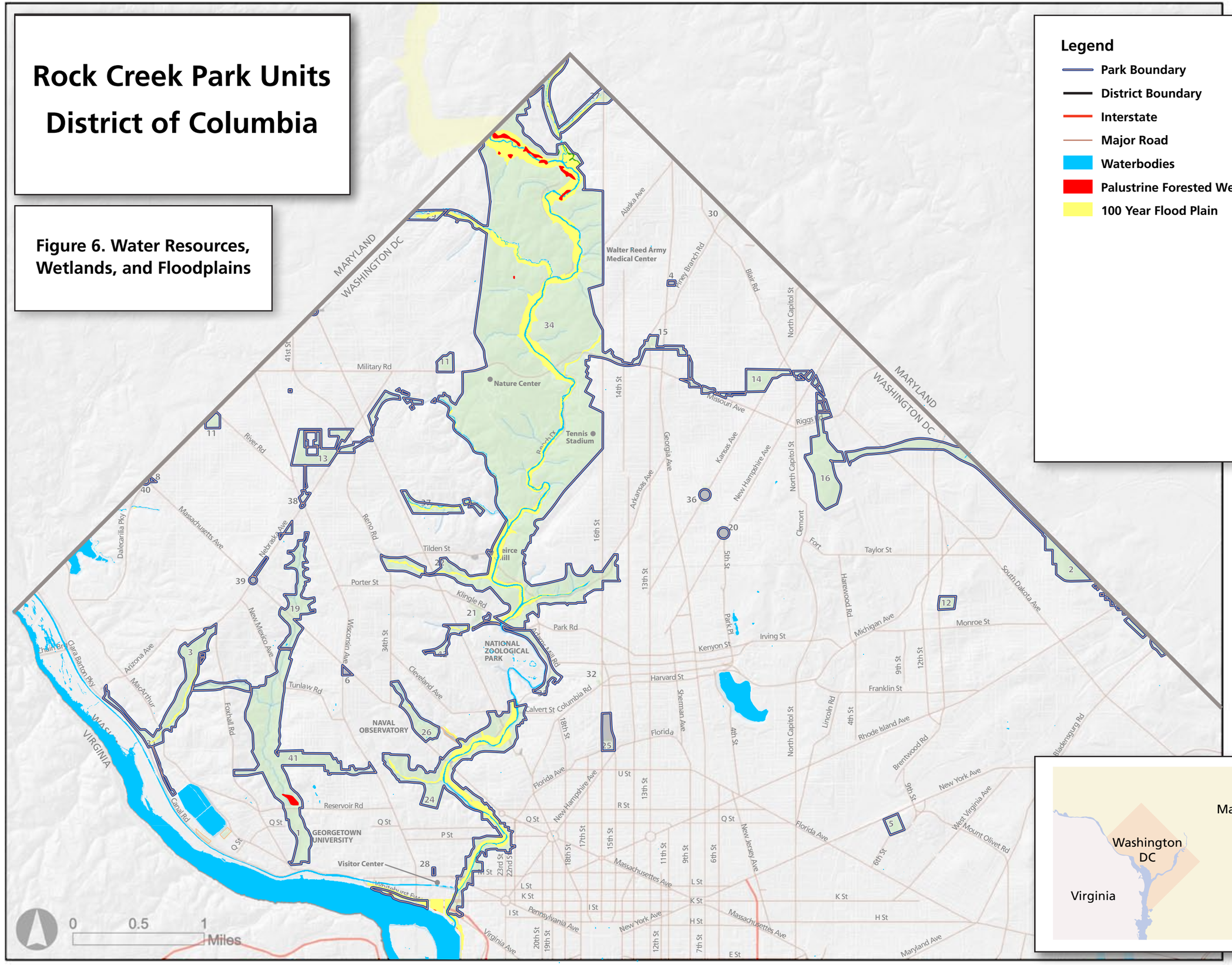
The District also developed TMDLs for Rock Creek tributaries for organics and metals. Only Piney Branch was considered impaired for metals, while all tributaries were considered impaired for organics and fecal coliforms (DCDOH 2004b).

STREAM DESIGNATIONS AND WATER QUALITY STANDARDS

For the purposes of water quality standards, the surface waters of the District of Columbia are classified based both on their current uses and the future uses to which the waters could be restored. Each designation category has applicable water quality standards that are the principal water quality management objectives for the park. The standards and classification of the District's waters are published in the *District of Columbia Register, Chapter 11 of Title 21 DCMR* (NPS 2005a).

Rock Creek Park Units
District of Columbia

Figure 6. Water Resources, Wetlands, and Floodplains



The District of Columbia Water Resources Management Division has designated Rock Creek and its tributaries for restoration to meet all five beneficial use classes. The classes and the status of surface waters in the park in meeting the standards associated with the classes are as follows:

- Class A is for primary contact recreation.
  - These standards are not being met in Rock Creek and its tributaries.
- Class B is for secondary contact recreation and aesthetic enjoyment.
  - These standards are not being met in Rock Creek and its tributaries.
- Class C is for propagation of fish, shellfish, and wildlife.
  - The water quality in some of the tributaries partially supports the Class C designation, but the water quality of Rock Creek does not currently support this designation.

Combined sewer outfall in the park

- Class D is for protection of human health related to consumption of fish and shellfish.
  - The Class D standards are partially supported below the Peirce Mill Dam. However, at the time these standards were designated, the creek above the dam was not assessed for support of the Class D standards, because the dam would continue to be a barrier to the migration of fish until a fish bypass is completed as part of the mitigation program for the Woodrow Wilson Bridge. This bypass has recently been completed.
- Class E is for navigation.
  - The Class E designation is supported in Rock Creek.

Rock Creek and its tributaries have also been designated "Special Waters of the District of Columbia" for their scenic and aesthetic importance (NPS 2005a). It is intended that the water quality of such designated waters be maintained and not allowed to degrade.

WETLANDS AND FLOODPLAINS

Wetlands and floodplains are of concern because the park has some riparian wetlands that border streams, and the 100-year floodplain is found along the major streams and tributaries. Erosion and sedimentation caused by deer trampling and eating/removal of vegetation could affect the quality of wetland habitat similar to the effects described for soils and water quality, above. In addition, the exclosures that are proposed under one of the action alternatives could be constructed in the floodplain.

WETLANDS

The Rock Creek watershed includes only a few areas designated as wetlands, as shown on figure 6. Current National Wetland Inventory (NWI) maps do not classify either the main stem of Rock Creek or its tributaries as wetlands, but do show several forested wetlands within the park boundaries (USFWS NWI 2007). Nine temporarily or seasonally flooded, forested wetlands (NWI designation of "PFO1" or "palustrine forested broad-leaved deciduous") are found along Rock Creek in the northern portion of the park and in the Pinehurst Branch and the Glover Archbold areas. These forested wetlands are located within the primary floodplain of the creeks and are typically covered by a sycamore-green ash forest (see the "Vegetation" section for more detail on this forest type). Other wetlands, not identified by the NWI

(likely due to their small size), are in the narrow alluvial deposits of the Pinehurst Branch, Fenwick Branch, and Joyce Branch drainages (NPS 2005a).

Vernal pools are widely scattered wetland features in the park, which are too small to appear on NWI maps or included within the mapped forested wetlands. These are small, temporary pools or ponds that typically appear during wet periods and are dry at other times. If they persist for four months or more, particularly in the spring and early summer, these limited habitats can be breeding places for frogs, toads, and salamanders. The U.S. Geological Survey Northeast Amphibian Research and Monitoring Initiative has been surveying vernal pools and streams in Rock Creek Park since 2001 as part of a northeast region amphibian monitoring program (NPS 2005a). In a parkwide inventory conducted in 2004, a total of eight vernal pools were located (NPS 2005a). The number of vernal pools in the park today may be reduced from the pre-urbanization era because of past draining or filling activities, stream bed scouring from increased runoff that has resulted from development in the watershed upstream from the park, and lowered water tables from incising of the stream channel or urban groundwater use.

Other important wetland-related features in the park include groundwater springs and seeps. These small, wet areas are fed by relatively dependable flows of pollutant-free water. Several of these wetlands support endemic, aquatic animal species such as amphipods and other macroscopic invertebrates. Researchers from the U.S. Geological Survey Northeast Amphibian Research and Monitoring Initiative identified 35 springs and seeps in the park (NPS 2005a).

FLOODPLAINS

Rock Creek descends over 150 feet from the Maryland/DC line to its confluence with the Potomac River. Flood levels in the park have been substantially affected by urbanization and associated increases in impervious surfaces in the Rock Creek watershed. Stream flows in the main stem of Rock Creek during storms are estimated to be more than double the predevelopment discharge (NPS 2005a).

Within Rock Creek Park, floodplain development is fairly restrictive, limited primarily to Rock Creek itself. According to the Federal Emergency Management Agency's flood insurance rate maps (Washington, D.C., Community-Panel Number 1100010010B and 1100010020B. effective date: November 15, 1985), the 100-year floodplain of Rock Creek ranges from 50 to 500 feet wide, depending upon the topography (FEMA 1985). Figure 6 depicts the 100-year floodplain of Rock Creek and its tributaries.

Four major park buildings are in the 100-year floodplain. Peirce Mill and the Miller Cabin are completely within the 100-year floodplain. Portions of the Lodge House and the Edgewater Stables building are on the fringe of the floodplain, but would not be subject to high velocities or deep water during flooding (NPS 2005a). Normally, the NPS would avoid occupying floodplains within the park. However, except for the Edgewater Stables, these buildings are historic structures that contribute to the significance of the Rock Creek Historic District and their location is integral to their significance. As a result, Director's Order 77-2, with its accompanying Procedural Manual 77-2, *Floodplain Management*, does not apply to these sites (NPS 2003c). Sections of Beach Drive and the Rock Creek and Potomac Parkway are within the 100-year floodplain, as are a number of picnic groves and associated parking areas, picnic shelters, and restrooms.

WILDLIFE AND WILDLIFE HABITAT

Deer can affect other wildlife and/or habitat by reducing habitat diversity through activities such as browsing, trampling, and seed dispersal. Deer are also an integral part of the wildlife in Rock Creek Park. The following subsections address both the white-tailed deer and other wildlife inhabiting the park that could be affected by deer or deer management actions.

WHITE-TAILED DEER

Deer management must take into account the species biology and its interactions with key components of the habitat. It is essential to understand deer ecology, home ranges, population ecology, and factors, such as disease, that can also affect the numbers and viability of deer in the park.

General Ecology

White-tailed deer are medium-sized ungulates, native to North America and regarded as one of the most adaptable mammals in the world (Hesselton and Hesselton 1982). Among the reasons for this adaptability are the hardiness, reproductive capability, wide range of plant species accepted as food, and the tolerance deer exhibit when in close contact with humans.

Most abundant in the eastern woodlands, white-tailed deer are typically forest dwellers, but often frequent wetlands or woodland openings while feeding. Deer also forage along forest margins, in orchards, and on farmlands. When deer populations become excessive, damage to vegetation may result, and in addition, their winter food may be reduced to the point where starvation results (Martin et al. 1951).

Radio collared deer

The diet of white-tailed deer consists of twigs and buds from shrubs and trees, as well as herbaceous (non-woody) plants, which are eaten frequently in spring and summer when they are abundant. Acorns, blackgum fruits, persimmons, and other kinds of fruits are consumed in late summer and fall. Some of the plants that deer browse heavily in the winter season are selected by necessity rather than choice (Martin et al. 1951).

White-tailed deer are well known for their ability to rapidly increase reproductive productivity given abundant food resources, and to limit productivity in the presence of less nutritious forage (Verme 1965; Hesselton and Hesselton 1982). On good range containing abundant food, deer tend to produce more than one young, usually twins and sometimes triplets. Where food is limited, the number of births is typically restricted to a single fawn, and sometimes the doe does not ovulate (Morton and Cheatum 1946; Verme 1965; Hesselton and Hesselton 1982). Nutrition plays an important role in influencing the onset of puberty, with yearling (1.5-year-old) does on submarginal range possibly remaining sexually immature, while doe fawns on nutritious range possibly becoming reproductively active as early as six or seven months of age (Verme and Ullrey 1984). The potential for rapid expansion of deer populations, coupled with the wide variety of plant species deer consume, can result in substantial impacts to plant communities (Marquis 1981; Shafer 1965).

Radio telemetry

Home Range and Deer Movement Outside the Park

The park has performed limited radio telemetry studies. As reported in chapter 1, park staff collared five does with a radio transmitter and recorded their movements from 2002 to 2008. Data collected from these does included the areas they used and the

percent of time that the doe was inside or outside of the park. Data from the observational study indicated that the area used by deer ranged from about 31 to 260 acres, and that time spent outside the park ranged from about 5 to 42% (K. Ferebee, pers. comm. 2008d). Although this was a small and limited survey to provide some basic information on deer movements, results indicated that home range varied considerably among individual deer, with an "average" of 25% of time spent outside the park.

Population Size and Density

Several methods have been used over the years to assess the size of the Rock Creek Park deer population. Spotlight counts have been conducted each September since 1996 to look at possible general population trends over time. Surveys are conducted over a four-night period following the same 22-mile route that covers the majority of Rock Creek Park (Reservation 339) and includes some roads in surrounding neighborhoods. Deer are counted both inside and outside the park boundary. The deer count numbers increased from an average of 16.5 per night in 1996 to a record average of 67.6 deer per night in 2003 (NPS 2005c). In 2009, the average was 65 per night (K. Ferebee, pers. comm. 2011a).

Since 2000, sampling surveys to determine a population density have been conducted in November on a shorter route (10.1 miles) using only park roads and counting only those deer within the park boundaries. Dr. Brian Underwood of the U.S. Geological Survey trained Rock Creek Park staff to conduct the sampling using the computer modeling program "DISTANCE" to calculate population density, estimating 62 deer per square mile within the park in 2000. Since that time, Distance Sampling has been repeated annually in November, over three to four nights each year. Deer density has ranged between 52 and 98 deer per square mile. In 2006, the deer density at Rock Creek Park was 58 deer per square mile and in 2007 the deer density had climbed to 82 deer per square mile (K. Ferebee, pers. comm. 2008a, f); deer densities were lower in 2008–2009 at 66 and 67 deer per square mile, respectively (K. Ferebee, pers. comm. 2010a). The results from the Distance Sampling surveys have not been published to date, but are listed in table 2 (refer to page 16 in chapter 1).

The deer population density in the park has varied and will continue to vary over time depending on factors such as winter temperatures, snow depth and duration, disease, habitat conditions, deer movements, and acorn production. However, based on spotlight surveys and Distance Sampling observations between the mid-1990s and the present, the deer population has increased, and in the absence of any population management measures, this trend is expected to continue over time, with some fluctuations due to weather and other factors.

Factors that Can Affect Deer Health

Deer herds in poor physical condition have typically exceeded the nutritional carrying capacity (the point at which deer herd health is at equilibrium with nutritional value obtained from forage). Poor herd health indicates that the habitat has been stressed and is no longer supporting healthy deer (Eve 1981).

When deer population density is high, signs of nutritional stress, such as low body and internal organ mass, low fecal nitrogen levels, and high prevalence of parasitic infections, typically occur. When deer density is reduced to the nutritional carrying capacity, all of these indicators show improved condition (Sams et al. 1998).

The park does not currently conduct any specific deer health studies. However, visual observations are made of the herd and deer showing visible signs of disease are noted. To date, only parasites have been noted by park staff (K. Ferebee, pers. comm. 2007e). Deer observed from road kills where bone marrow was observed showed no signs of malnutrition (food is available both within and outside the park) and there have been no known cases of deer disease in the park. General appearance of the herd, as noted anecdotally by park staff, is relatively good, although some individuals appear thinner at the end of winter (ribs staring to show), which is normal for that time of year (K. Ferebee, pers. comm. 2008a).

Diseases of Concern

A number of diseases of concern exist in eastern deer populations. These include parasites, malnutrition, bluetongue virus, and epizootic hemorrhagic disease. Chronic wasting disease (CWD) has been documented in West Virginia (more than 100 miles from the park), and more recently in Gore, Virginia, and in Green Ridge State Forest, Maryland, which are 72 and 88 miles from the park, respectively (S. Bates, pers. comm. 2011a). New documented cases are being watched, as it is thought to be spread easily in areas with high concentrations of deer. The various diseases of concern are briefly described below.

Parasitism—Parasitism occurs when an organism grows, feeds, and is sheltered on or in a different organism, resulting in a type of symbiosis in which one species benefits at the expense of the other. There are many varieties of parasites, both internal and external. Parasites can have a variety of consequences from minimal to substantial on an individual or population.

Malnutrition—Malnutrition is the condition that develops when the body does not get adequate amounts of the vitamins, minerals, and other nutrients necessary to maintain healthy tissues and organ function. As described above, malnutrition can be caused by exceeding the nutritional carrying capacity of the habitat.

Bluetongue Virus—Bluetongue virus is an insect-transmitted, viral disease that affects ruminant mammals, including white-tailed deer. A bluetongue virus infection causes inflammation, swelling, and hemorrhage of the mucous membranes of the mouth, nose, and tongue. Inflammation and soreness of the feet also are associated with bluetongue virus. Bluetongue virus is considered by the Office International des Epizooties (the international organization that sets animal health standards) to be a disease that has the potential to spread rapidly. White-tailed deer can be severely affected by bluetongue virus because viral infections cause hemorrhaging and sudden death, and the mortality rate can be extremely high (APHIS 2003).

A ruminant animal is an even-toed, hoofed mammal (such as sheep, oxen, and deer) that chews cud and has a complex three- or four-chambered stomach.

Biting gnats spread bluetongue virus from animal to animal. Animals cannot directly contract the disease from other animals. The disease is most prevalent in the United States in the southern and southwestern states. It is currently almost non-existent in the upper north central and northeastern states, where biting flies do not appear able to transmit the viruses (APHIS 2003).

Bluetongue virus is a seasonal disease that is generally observed in the late summer and early fall. Virus transmission begins in the early spring with the onset of insect flight activity and continues until the first hard frosts (APHIS 2003).

Epizootic Hemorrhagic Disease—Epizootic hemorrhagic disease is an insect-borne viral disease that affects ruminants. The disease causes widespread hemorrhages in mucous membranes, skin, and viscera, the result of disseminated intravascular clotting. Strains of epizootic hemorrhagic disease can cause widespread vascular lesions similar to those described for bluetongue virus. Degenerative changes (focal hemorrhage or dry and gray-white appearance, or both) in striated musculature are prominent in the esophagus, larynx, tongue, and skeletal muscles. Epizootic hemorrhagic disease in white-tailed deer can lead to death. Often, deer are found dead around waterholes, suggesting that they had a high fever and were dehydrated (Stott 1998). In 2007, there were two local confirmed cases of epizootic hemorrhagic disease near Rock Creek Park: one at the National Zoo and one on Theodore Roosevelt Island. There were also five suspect animals observed at the Naval Observatory. Therefore, there is a possibility that this disease may be seen in deer within Rock Creek Park in the future (K. Ferebee, pers. comm. 2007e).

Not all deer infected with epizootic hemorrhagic disease or bluetongue virus will die; this is known because many normal deer have antibodies that indicate prior exposure to various viruses. Deer that

recover develop immunity to the specific virus, which protects against reinfection by the same virus. However, it is not known how well this immunity cross-protects deer against other hemorrhagic viruses. When deer survive infection with a virus from one virus type (epizootic hemorrhagic disease or bluetongue virus), there is good evidence to indicate they are not protected from disease caused by subsequent infection with a different virus strain (Southeastern Cooperative Wildlife Disease Study 2000).

Chronic Wasting Disease (CWD)—CWD belongs to a group of diseases known as transmissible spongiform encephalopathies (TSEs), which include scrapie, bovine spongiform encephalopathy, and Creutzfeldt-Jakob disease. The diseases are apparently caused by infectious agents called prions, which are proteins without associated nucleic acids. Prions have high resistance to both environmental conditions and a range of treatments that typically kill other infectious agents (Williams et al. 2008).

Deer and elk affected by CWD show loss of body condition and changes in behavior. Affected animals may demonstrate a variety of behavioral signs, including slow, repetitive behaviors (such as walking set patterns), showing periods of depression from which they are easily roused, and carrying their heads and ears lowered. Animals in the later stages of the disease become emaciated. Excessive drinking and urination are common in the terminal stages, and many animals in terminal stages exhibit excessive salivation and drooling, incoordination, fine head tremors, and a wide-based stance. Death is inevitable once clinical signs are visible (Williams et al. 2008).

The health risk for humans consuming elk or deer infected with CWD is unknown; however, the risk is likely extremely low and no cases of human disease have been associated with CWD. However, in the absence of complete information and in consideration of the similarities of animal and human TSEs, caution should be taken to avoid exposure (Williams et al. 2008). Appendix C provides additional information on CWD diagnosis and management.

OTHER WILDLIFE

Common fauna likely to occur within Rock Creek Park include species adapted to disturbed habitat associated with an urban environment and transient species associated with the adjacent forested habitat. According to the NPSpecies database, 36 species of mammals, 13 species of amphibians, 6 species of reptiles, and 181 species of birds are present or probably present within park boundaries (NPS 2008b).

Coyote

Mammals

The woodlands in Rock Creek Park provide suitable habitat for a variety of species of mammals, despite their location within the city limits of the District of Columbia. To date, 36 species of mammals have been documented as occurring or likely occurring in the park (NPS2008a). Common species include white-tailed deer, raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteous*), opossum (*Didelphis virginiana*), beaver (*Castor canadensis*), gray squirrel (*Sciurus carolinensis*), and eastern chipmunk (*Tamias striatus*). Coyotes (*Canis latrans*) have been sighted in the park since May 2004 and confirmed by park staff in September 2004 (NPS 2007c). The small coyote population in the park is not a large influence on the deer population, although they are still active in the park and regularly feed on the deer carcasses (K. Ferebee, pers. comm. 2010b). This agrees with a Maryland Department of Natural Resources online publication (MD DNR 2010), which states that "studies show that coyotes regularly use deer as food, but it does not appear that coyote currently limit

deer populations in our area." Other studies have noted varying results regarding coyote predation on deer. The Urban Coyote Project in Chicago has shown that deer remains were in 22% of sampled coyote scats, and that report goes on to state that "Coyotes cannot reduce deer populations because they do not often take adult deer (in the Midwest), but they may slow population growth in high-density areas through their predation on fawns." The habitat in the park provides conditions (e.g., prey, cover) favorable for coyotes to continue to exist, and NPS regulations provide protection from harassment and harvest of coyotes.

Reptiles and Amphibians

The variety and numbers of amphibians and reptiles found in the park in recent years are markedly reduced compared to inventories from the early and middle parts of the 20th century. According to the NPSpecies database, there are currently 13 amphibians present or probably present in the park, and 4 historic reports. For reptiles, there are only 6 species that are present or probably present in the park, but there were 13 historic occurrences that can no longer be confirmed (NPS 2008a).

Some amphibians, such as the gray treefrog (*Hyla versicolor*) and chorus frog (*Pseudacris triseriata*), have disappeared altogether from Rock Creek Park. Others amphibians, such as the spring peeper (*Hyla crucifer*), wood frog (*Rana sylvatica*), and spotted salamander (*Ambystoma maculatum*), can be found in modest numbers in wetland areas. Red-backed salamanders (*Plethodon cinereus*), which are not dependent upon wetlands, are relatively common in moist uplands where they inhabit moist niches under logs and leaf litter.

Relatively protected and abundant moist upland sites, which provide habitat for small snakes, such as the northern ringneck snake (*Diadophis punctatus*), are commonly found. Eastern box turtles (*Terrapene carolina*) and larger snakes, such as the black rat snake (*Elaphe obsoleta*), are much less common due to decreasing areas of suitable habitat.

Birds

According to the NPSpecies database, 181 species of breeding or migrating birds have been documented in Rock Creek Park; there are 18 unconfirmed reports and 2 historic records (NPS 2008a). Most are migrants or seasonal visitors. The National Audubon Society and the American Bird Conservancy recognize Rock Creek Park as an important birding area due to its exceptional diversity of bird species during migration (Maryland/District of Columbia Audubon 2004).

Neotropical migrants are those avian species that breed in the United States and Canada and winter in Mexico, Central America, South America, or the Caribbean Islands (Smithsonian Migratory Bird Center 2003). Ten species of flycatchers, 6 species of vireos, 7 species of thrushes, and 35 species of warblers have been documented in the maintenance yard area based on observer information.

Breeding Bird Census Area—Data on breeding birds have been collected at two locations in Rock Creek Park. There is a breeding bird census area in Glover-Archbold Park between Reservoir Road and New Mexico Avenue that was established in 1959 and is still being surveyed by volunteers every year. Another census area within Rock Creek Park was established in 1948. The longevity of this site in an area of relatively undisturbed natural vegetation provides a baseline of relative abundance against which later data can be compared to determine if changes in bird populations are occurring. Twenty-two to 24 species nest in this breeding bird census area in Rock Creek Park (unpublished data from the Rock Creek Park breeding bird census, 1997 through 1999).

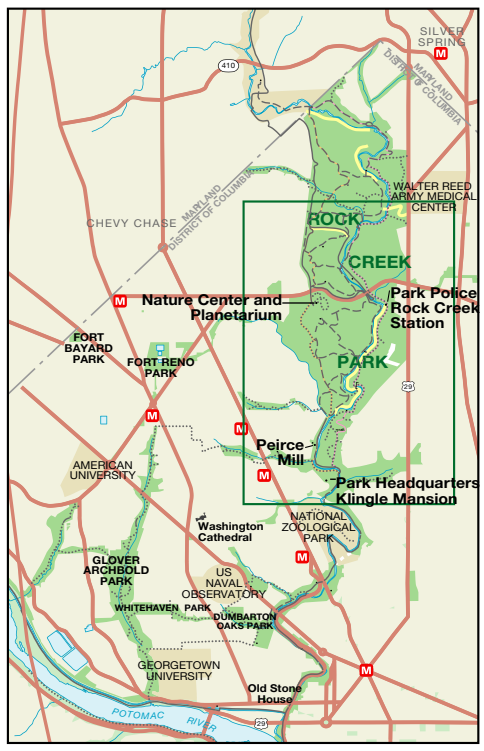
The primary breeding bird census area is an important bird-related resource within Rock Creek Park. The north edge generally extends along the Whitehorse Trail while the west and east sides begin at the public stables and Joyce Road, respectively, and meet at picnic grove 21. The 65-acre census area is roughly triangular in shape (see figure 7). Breeding species are those that spend the nesting season in Rock Creek Park and have been the focus of a breeding bird census conducted by volunteers since 1948.

United States Department of the Interior/National Park Service WASO/January '03/000-00000

Foot trail
Horse and foot trail
Bike and foot trail
West Ridge Trail
Valley Trail
Weekend/holiday road closure
Rock Creek Park
Breeding Bird Census Area

Rock Creek Park
Washington, DC

Figure 7. Breeding Bird Census Area



Source: www2.nature.nps.gov/stats/

Appendix F contains an annual list of all birds identified during breeding bird surveys as potential breeding birds from 1993 through 2002.

Summer resident/potential breeding species at Rock Creek Park include red-eyed vireo (*Vireo olivaceus*), Acadian flycatcher (*Empidonax virescens*), great crested flycatcher (*Myiarchus crinitus*), eastern phoebe (*Sayornis phoebe*), eastern wood-pewee (*Contopus virens*), blue-gray gnatcatcher (*Polioptila caerulea*), veery (*Catharus fuscescens*), wood thrush (*Hylocichla mustelina*), gray catbird (*Dumetella carolinensis*), ovenbird (*Seiurus aurocapillus*), and scarlet tanager (*Piranga olivacea*). Species found as year-round residents/breeding species (NPS n.d.; National Audubon Society n.d.) include great horned owl (*Bubo virginianus*), eastern screech owl (*Megascops asio*), and barred owl (*Strix varia*); red-shouldered hawk (*Buteo lineatus*); northern flicker (*Colaptes auratus*); the red-bellied (*Melanerpes carolinus*), downy (*Picoides pubescens*), hairy (*Picoides villosus*), and pileated woodpeckers (*Dryocopus pileatus*); blue jay (*Cyanocitta cristata*); American crow (*Corvus brachyrhynchos*); tufted titmouse (*Baeolophus bicolor*); Carolina chickadee (*Poecile carolinensis*); white-breasted nuthatch (*Sitta carolinensis*); Carolina wren (*Thryothorus ludovicianus*); American robin (*Turdus migratorius*); northern cardinal (*Cardinalis cardinalis*); and song sparrow (*Melospiza melodia*).

Brown thrasher

Many of the breeding birds found within Rock Creek Park nest on or near the ground. Common ground nesters include the ovenbird, worm-eating warbler (*Helmitheros vermivorus*), Louisiana waterthrush (*Seiurus motacilla*), and American woodcock (*Scolopax minor*). Other species nest in the shrub layer; these include the northern cardinal, gray catbird, Acadian flycatcher, mockingbird (*Mimus polyglottos*), wood thrush, Carolina wren, white-eyed vireo (*Vireo griseus*), American robin, chipping sparrow (*Spizella passerina*), American goldfinch (*Carduelis tristis*), and mourning dove (*Zenaida macroura*). The song sparrow, brown thrasher (*Toxostoma rufum*), eastern towhee (*Pipilo erythrophthalmus*), veery, and common yellowthroat (*Geothlypis trichas*), nest on both the ground and in the shrub layer (K. Ferebee, pers. comm. 2007g). These species depend on understory shrubs and ground vegetation for constructing nests and for concealment when feeding, and can be adversely affected if deer browsing removes this vegetation.

Audubon Christmas Bird Count—Wintering and resident species are surveyed annually during the Washington, D.C. National Audubon Christmas Bird Count. Volunteers count all species and individuals of birds encountered in a 15-mile-diameter circle on one day. A portion of the Washington, D.C. circle covers part of Rock Creek Park. Species identified during the Audubon Christmas bird counts averaged 27 species per year for the Nature Center section and 21 species per year for the Carter Barron section (National Audubon Society n.d.). Some of the species commonly found in the Nature Center and Carter Barron sections during the Audubon Christmas bird count include resident species, such as red-tailed hawk (*Buteo jamaicensis*), red-bellied woodpecker, downy woodpecker, blue jay, tufted titmouse, Carolina chickadee, Carolina wren, and northern mockingbird (*Mimus polyglottos*). Species that spend the winter and are present on the Audubon Christmas bird count (in the amphitheater and Nature Center sections) in most years include brown creeper (*Certhia americana*), golden-crowned kinglet (*Regulus satrapa*)**,** dark-eyed junco (*Junco hyemalis*), and white-throated sparrow (*Zonotrichia albicollis*). Appendix F contains a list of all bird species identified during the annual Audubon Christmas bird counts from 1980 through 2002, including the average number of each species spotted.

Fish

According to the park's *General Management Plan* (NPS 2005a), surveys by the District of Columbia have found approximately 35 species of fish in Rock Creek.

Resident native species include five shiners (*Notropis* spp.), two bullheads (*Ictalurus* spp.), and three sunfish (*Lepomis* spp.). Blacknose dace (*Rhinichthys atratulus*) are relatively common and can be found in the main stream and many tributaries.

Other resident species are introduced, including carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*).

At least two native species, the blueback herring (*Alosa aestivalis*) and the alewife (*Alosa pseudoharengus*), migrate from saltwater up Rock Creek to spawn each spring (i.e., they are anadromous). An abandoned sewer line and an abandoned gauging station near Massachusetts Avenue that interrupted their migrations were removed from Rock Creek in 2001 (NPS 2005a). The recent removal of eight other barriers in Rock Creek and the installation of a fish bypass at the Peirce Mill Dam as part of the Woodrow Wilson Bridge mitigation are expected to allow these species to migrate from the mouth of the creek upstream to Needwood Lake in Montgomery County, Maryland (NPS 2005a).

The American eel (*Anguilla rostrata*) is a species found in Rock Creek that lives in either fresh or brackish water. Eels migrate to the Sargasso Sea to spawn (i.e., they are catadromous). The removal of barriers in Rock Creek as part of the Woodrow Wilson Bridge mitigation is expected to enhance the habitat for this species.

Urban pollution and stormwater runoff problems have adversely affected fish numbers and diversity in the park. Generally, the 16 tributaries of Rock Creek are more severely affected than the main channel. In a 1993 study by NPS staff, no fish were found in nearly half of the tributaries and only one had more than a single species present (NPS 2005a). Flooding and scouring during storms, pollution from runoff, and periodic low flows are likely contributing factors.

Nonnative Species

Several nonnative species of wildlife also occur in Rock Creek Park, including free roaming cats (*Felis catus*), starlings (*Sturnus vulgaris*), and the gypsy moth (*Lymantria dispar*). Free-roaming domestic cats are particularly found near the park borders. Starlings compete with some cavity-nesting birds for nest sites. The gypsy moth has been present in the park for many years and, at times, has become sufficiently abundant to require aerial spraying to prevent deforestation and related impacts.

Current Status of Wildlife and the Role of Deer

There is more research on the effects of deer density on vegetation than on wildlife populations. However, a number of studies have shown distinct changes in bird abundance as a result of reducing deer density by exclosures (McShea and Rappole 2000). One researcher found that seedling richness began to decline with just 10 deer per square mile and that songbird habitat was negatively impacted with 20 to 39 deer per square mile within a cherry/maple forest (deCalesta 1997). Similarly, a nine-year study in the mid-Atlantic region found that a reduction in deer density changed the composition of forest bird populations (McShea and Rappole 2000). Three patterns of change were observed in bird populations within exclosures (where there were no deer): (1) species that preferred open understory (e.g., wood thrush) declined; (2) species that preferred a dense herbaceous ground cover (e.g., Carolina wren) immediately increased, but then decreased as herbaceous species were replaced by woody species; and (3) species that preferred a dense, woody understory (e.g., ovenbird) gradually increased.

The habitat most affected by heavy deer browsing is the herbaceous and woody vegetation in the forest understory. Deer can browse vegetation from ground level to an average of 60 inches (150 centimeters) above the ground, and this is the habitat that is primarily affected. Other wildlife also use this understory habitat.

Other species that compete with deer for available food include squirrels and mice (which feed on acorns and other food from trees) and rabbits (which feed on young woody stems and green vegetation) (McShea

and Rappole 2000). Heavy deer browsing also results in lack of cover for small mammals. Flowerdew and Ellwood (2001) suggested that if rodent densities are lowered, avian and terrestrial predators are likely to suffer reduced breeding success, and tawny owls (*Strix aluco*) may prey more heavily on bank voles (*Myodes glareolus*) if their favored ground cover is reduced (S. Bates, pers. comm. 2008c).

Species that primarily depend on other habitats would be less affected by high deer numbers. Some frogs, snakes, salamanders, and turtles live close to water during much of their lives and are therefore less affected by deer. Similarly, heavy deer browsing would not directly change fish habitat. However, other species (e.g., box turtle) are dependent on vegetation, fruits, and insects found within the understory of the forest, and their habitat is affected by high deer numbers.

Species that would benefit from high deer numbers and resulting habitat changes are those that prey on deer (e.g., coyotes) or that feed on carrion (e.g., vultures and box turtles). Predators would also benefit from hunting other prey, such as mice and squirrels, in areas with less dense cover at ground level, thus allowing better views through the forest and less cover for prey to hide. However, as prey declines due to reduced cover, predators also decline.

The upper canopy of the forest has not changed noticeably to date as a result of high deer numbers (K. Ferebee, pers. comm. 2007e). Therefore, those species that depend on the upper canopy of the forest, such as woodpeckers and other birds that nest high in the trees, have not experienced any noticeable change in their habitat. As the forest ages, improved habitat may become available for cavity-nesting birds and birds that feed on insects as older trees die or become stressed from disease or infestations. However, in the long term with little to no regeneration, the dead trees will not be replaced by new trees, resulting in fewer trees that upper canopy species can use as habitat.

RARE, UNIQUE, THREATENED, OR ENDANGERED SPECIES

The NPS is required under the *Endangered Species Act* (ESA) to ensure that federally listed species and their designated critical habitats are protected on lands within the agency's jurisdiction. In addition, the NPS considers state-listed or other rare species similarly in taking actions that may affect these species. An overabundance of deer and deer management actions have the potential to affect listed species as well as other wildlife.

FEDERAL AND STATE-LISTED AMPHIPODS

Only one federally listed species, the endangered Hay's spring amphipod (*Stygobromus hayi*), is known to inhabit the park. The Hay's spring amphipod was discovered in five groundwater springs in Rock Creek Park in 1998. While Rock Creek Park does not have a formal management plan for the amphipod, conservation measures in the park restrict activities in areas around the springs or in their recharge areas.

The Hay's spring amphipod grows to 0.4 inches (10 mm) or less in length (Pavek 2002). It is colorless, eyeless, and has adaptive hairs for sensing currents and food. It has a life span of eight years or more and a low reproductive rate. *Stygobromus* amphipods spend the majority of their lives in groundwater below the surface, feeding on detritus. Amphipods are subject to a number of predators when they are at surface springs, such as stonefly larvae and salamanders, but probably have few if any predators below the surface.

Another rare species, Kenk's amphipod (*Stygobromus kenki*), also known as the Rock Creek groundwater amphipod, was identified in park springs (NPS 1997a). Kenk's amphipod is not currently listed under the *Endangered Species Act* and it is no longer being considered for future listing by the U.S. Fish and Wildlife Service (USFWS 2007b). In addition, three other *Stygobromus* species of amphipods that are listed by the state of Maryland as rare or uncommon have been located in or near the park (Maryland Department of Natural Resources 2003).

Threats to groundwater amphipods include alterations of groundwater flows, groundwater pollution, loss of detritus as a food source, and disturbance of spring sites. Common pollution problems for amphipods are nitrates in fertilizers, which can result in groundwater oxygen depletion, pesticides, and petroleum leaking from underground storage tanks. The relative abundance of rare amphipods in the park has been attributed to the long-term protection of groundwater quality afforded by the park.

OTHER STATE-LISTED PLANT AND ANIMAL SPECIES

Rare species are also identified by the District of Columbia, Maryland, and Virginia. The Virginia species are not known in the park and it is not likely that they will occur because of the separation from Virginia by the Potomac River, as well as the presence of different habitats. However, there are several plant species that have been or are currently listed as rare by Maryland Department of Natural Resources that have been documented (although rare) in Rock Creek Park. These plants, their state listing status, and their habitat preferences are listed in table 14 (K. Ferebee, pers. comm. 2007d). Several animal species with known occurrences in Rock Creek Park are listed as rare or uncommon by Maryland and are shown in table 15.

The cardinal flower (Lobelia cardinalis) is an uncommon plant in the park. It is not on the list of rare plants, but the park sometimes protects it with fencing.

While the District of Columbia does not provide special protection for listed species, it accepts local state-designated plants and also identifies certain wildlife as species of concern. These animal species are called species of greatest conservation need and are listed in the District's Wildlife Action Plan (District of Columbia 2006). Because of the habitat value provided by Rock Creek Park, many of these species could be found in the park. Habitats preferred by these species generally include springs, seeps, wetlands, and waterways and/or associated moist forested areas. Table 16 lists those species of greatest conservation need that could or do occur in the park.

TABLE 14. RARE PLANTS OF MARYLAND DOCUMENTED IN ROCK CREEK PARK

State Listed Rare Species				
Latin Name	**Common Name**	**Rank**	**Habitat**	**Palatable to Deer?**
Antennaria solitaria	Single-headed pussytoes	S1-DC; S2-MD	Rich woods and clearings	Possibly (Seymour 1997)
Arabis hirsuta	Hairy rock cress	S1S2-VA; S?-DC	Moist to dry rocky woods and ledges	Yes (Crescent Bloom 2004a)
Arisaema dracontium[a]	Green dragon arum	S1S3-DC	Low, rich soils, along streams	Unknown
Aristolochia serpentaria	Virginia snakeroot	SX-DC	Stream banks, floodplain, bottomland	Possibly (NYNHP 2008; gardening web sites)
Doellingeria infirma (*Aster infirmus*)	Cornel-leaf whitetop	S1S3-DC; S3-MD	Deciduous, inland, upland woodlands	Yes (Crescent Bloom 2004b; New England Wild Flower Society 1997)

State Listed Rare Species				
Latin Name	**Common Name**	**Rank**	**Habitat**	**Palatable to Deer?**
Carex hirtifolia	Pubescent sedge	S1-DC; S3-MD	Dry to moist woods and fields	Yes (Crescent Bloom 2004c; Martin et al. 1951)
Castanea dentata	American chestnut	S1S2-DC; S2S3-MD	Well-drained forest	Yes (University of Illinois 2008)
Chrysogonum virginianum	Gold star; green and gold	S?-DC; S3-MD	Rich woods, moist well drained to drier soils	No (Merrifield Garden Center 2008)
Coreopsis verticillata	Whorled coreopsis	S1S3-DC; S3-MD	Dry soils, open woodlands/roadsides	No (Penn State Cooperative Extension 2008; West Virginia University Cooperative Extension 2008; Backyard Gardener 2008a)
Cyperus lancastriensis	Lancaster sedge	S1S3-DC; SU-MD	Dry-mesic soils, floodplains, river banks	Unknown
Kyllinga pumila	Low kyllinga sedge	S1-DC/MD	Damp grasslands, shorelines, ditches	Unknown
Desmodium glutinosum[a]	Pointed-leaved tick-trefoil	S?-DC	Dry, rocky woods	Yes (Kansas Wildflowers & Grasses 2008)
Eupatorium altissimum	Tall boneset	S?-DC; S3-MD	Woods, thickets, favors disturbed areas	Unknown
Gymnocladus dioica	Kentucky coffee-tree	S1-MD	Bottomlands, rich soil along streams/rivers	No (California Dept of Fish and Game 2008; Jull 2001)
Juglans cinerea	Butternut	S1-DC; S2S3-MD	Fertile woods	Yes (Coladonato 1991; Natureserve 2008)
Lycopodium clavatum	Common clubmoss	S1S3-DC	Dry to moist woods or road banks	No (Plants for a Future 2008)
Maianthemum canadense	Two-leaved solomon's-seal	S1S3-DC	Moist to mesic humus rich soils	Yes (Rooney 2001; Russel et al. 2001)
Melica mutica	Narrow melic grass	S1S2-DC; S1-MD	Dry, open woodlands	Unknown
Monarda clinopodia	Basil balm	S1S3-DC; S3-MD	Low woods and thickets	No (Sylvanian Natives 2008)
Passiflora lutea	Yellow passionflower	S1-DC	Low rocky moist woods; thickets	No (Lady Bird Johnson Wild Flower Center 2008;

State Listed Rare Species				
Latin Name	**Common Name**	**Rank**	**Habitat**	**Palatable to Deer?**
				Sunlight Gardens 2008)
Phyllanthus caroliniensis	Carolina leaf-flower	S1S3-DC; S3-MD	Poor, dry soils	Unknown
Physalis virginiana	Virginia ground cherry	S1S3-DC; S3-MD	Dry; upland woods, fields	No (iVillage GardenWeb 2006)
Pinus pungens	Table mountain pine	S1-DC	Appalachians and foothills	Possibly; several members of the Pinus genus listed as deer-resistant, however, the palatability of this particular species is unknown (Jull 2001)
Pyrola elliptica	Elliptic shinleaf	SH-DC; S2-VA	Dry or moist woods	Yes (Crescent Bloom 2004d; Martin et al. 1951)
Quercus imbricaria	Shingle oak	S1S3-DC	Fertile woods	Possibly (Backyard Gardener 2008b; Ohio State University 2008
Quercus lyrata[a]	Overcup oak	SE-DC	Coastal plains, swamp forest	Yes (Sullivan 1993; Gilman and Watson 1994)
Rudbeckia fulgida	Orange coneflower	S1S3-DC; S3-MD	Dry to wet soils, usually in shade	No (Bloomin on the East End 2008; High Country Gardens 2008; Easyliving Wildflowers 2008; University of Illinois Extension 2008)
Sagina decumbens[a]	Decumbent pearlwort	S1S3-DC	Wet places or dry, sandy soils	No (Gardening Guru 2007; University of California Cooperative Extension 2008)
Sagittaria longirostra	Long-beaked arrowhead	S1-DC; SU-MD	Wet areas	Unknown
Scutellaria serrata	Snowy skullcap	S1S3-DC; S3-MD	Rich, upland woods	No (iVillage GardenWeb 2006; Department of the Interior 2000)
Silphium trifoliatum	Three-leaved cup plant	S1-DC; S3-MD	Open areas, woodlands, and thickets	No (Martha's Bloomers 2008; iVillage GardenWeb 2006)

State Listed Rare Species				
Latin Name	**Common Name**	**Rank**	**Habitat**	**Palatable to Deer?**
Solidago hispida	Hispid goldenrod	S1-DC; SH-MD	Dry soils of open woods and rocky slopes	No (Perry 2008; Iowa City 2008; Simons 2008).
Spiranthes tuberosa	Little ladies tresses	S1S3-DC; S3-MD	Dry woodlands and sandy soils	Yes (Conservation Management Institute of VA Tech 1996; Hilty 2006).
Zizia aurea	Golden alexanders	S1S3; S3-MD	Ditch margins, moist meadows, woods	No (McGregor 2008)

Status and rank definitions (Maryland [MD] Rank):

S1 = Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation.

S2 = State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Heritage & Biodiversity Conservation Programs.

S3 = Watch List. Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Heritage & Biodiversity Conservation Programs.

SH = Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SX = Believed to be extirpated in Maryland with virtually no chance of rediscovery.

SU = Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above. These species have been delisted by the state of Maryland but they are still considered rare in the park.

S? = The species has not yet been ranked.

SE = Established but not native to Maryland; It may be native elsewhere in North America.

Note: VA and DC rank definitions are similar to those used by Maryland.

a. Denotes species that have been delisted by U.S. Fish and Wildlife Service or Maryland Department of Natural Resources

TABLE 15. RARE OR UNCOMMON ANIMALS OF MARYLAND THAT COULD BE FOUND IN ROCK CREEK PARK

Common Name	Scientific Name	Maryland Status[a]	Native Habitat	Migratory Status
Appalachian spring snail	*Fontigens bottimeri*	Rare or uncommon; State rank: S2	Freshwater seeps	——
Gray petaltail dragonfly	*Tachopteryx thoreyi*	Rare or uncommon; State rank: S2	Forests, breed in seeps	——
Olive-sided flycatcher	*Contopus cooperi*	Maryland endangered; State rank: SHB	Within coniferous forest biome, most often associated with forest openings, forest edges near natural openings or human-made openings, or open to semi-open forest stands	Migrant
Mourning warbler	*Oporornis philadelphia*	Maryland endangered; State rank: Breeding S1	Thickets and semi-open areas with dense shrubs	Migrant
Blackburnian warbler	*Dendroica fusca*	Maryland threatened; State rank: Breeding S2	Mature coniferous woodlands or mixed woodlands, especially ones containing spruce and hemlocks	Migrant
Nashville warbler	*Vermivora ruficapilla*	Maryland species of concern; State rank: Breeding S2	Open mixed woods and bog habitats	Migrant
Yellow-crowned night-heron	*Nyctanassa violacea*	Rare; State rank: Breeding S2	Riparian	Unknown
Cerulean warbler	*Dendroica cerulean*	Proposed Federal Listing; State rank: Breeding S4	Mature deciduous forests	Migrant
Bicknell's thrush	*Catharus bicknelli*	Proposed Federal Listing; State rank: No status or rank	Dense balsam fir (*Abiesbalsamea*) and red spruce (*Picea rubens*) forests	Migrant

a Source for state rankings – S. Bates, pers. comm. 2008a

TABLE 16. SPECIES OF GREATEST CONSERVATION NEED WITHIN THE DISTRICT OF COLUMBIA

Common Name	Scientific Name	Status within Washington D.C.
Mammals		
Eastern small-footed myotis	*Myotis lebii*	critically imperiled
Gray fox	*Urocyon cinereoargenteus*	vulnerable
Northern river otter	*Lutra canadensis*	critically imperiled
Southern bog lemming	*Synaptomys cooperi*	vulnerable
Southern flying squirrel	*Glaucomys volans*	secure
Virginia opossum	*Didelphis virginiana*	secure
Allegheny woodrat	*Neotoma magister*	possibly extirpated
American mink	*Mustela vison*	critically imperiled
Eastern chipmunk	*Tamias striatus*	secure
Eastern cottontail	*Sylvilagus floridanus*	secure
Eastern red bat	*Lasiurus borealis*	secure
Reptiles		
Common musk turtle	*Sternotherus odoratus*	secure
Bog turtle	*Clemmys muhlenbergii*	presumed extirpated
Corn snake	*Elaphe guttata guttata*	undetermined
Eastern box turtle	*Terrapene carolina*	vulnerable
Eastern garter snake	*Thamnophis sirtalis*	secure
Eastern hognose snake	*Heterodon platirhinos*	possibly extirpated
Eastern mud turtle	*Kinosternon subrubrum*	apparently secure
Spotted turtle	*Chrysemys guttata*	critically imperiled
Eastern ribbon snake	*Thamnophis sauritus*	secure
Eastern worm snake	*Carphophis amoenus amoenus*	secure
Eastern fence lizard	*Sceloporus undulates*	possibly extirpated
Five-lined skink	*Eumeces fasciatus*	secure

Common Name	Scientific Name	Status within Washington D.C.
Northern black racer	*Coluber constrictor constrictor*	secure
Northern brown snake	*Storeria dekayi*	secure
Northern copperhead	*Agkistrodon controtrix*	critically imperiled
Eastern painted turtle	*Chrysemys picta picta*	secure
Northern ringneck snake	*Didophis punctatus edwardsii*	secure
Queen snake	*Regina septemvittata*	critically imperiled
Eastern redbelly turtle	*Pseudemys rubriventris*	secure
Rough green snake	*Opheodrys aestivus*	secure
Northern scarlet snake	*Cemophora coccinea copei*	possibly extirpated
Timber rattlesnake	*Crotalus horridus*	possibly extirpated
Wood turtle	*Clemmys insculpta*	possibly extirpated
Amphibians		
American toad	*Bufo americanus*	medium population abundance
Bullfrog	*Rana catesbeiana*	medium population abundance
Fowler's toad	*Bufo fowleri*	medium population abundance
Marbled salamander	*Ambystoma opacum*	low population abundance
Eastern mud salamander	*Pseudotriton m. montanus*	low population abundance
Northern cricket frog	*Acris crepitans*	low population abundance
Northern dusky salamander	*Desmognathus fuscus*	low population abundance
Northern spring peeper	*Pseudacris crucifer*	medium population abundance
Northern two-lined salamander	*Eurycea bislineata*	medium population abundance
Pickerel frog	*Rana palustris*	medium population abundance
Northern red salamander	*Pseudotriton ruber ruber*	low population abundance
Redback salamander	*Plethodon cinereus*	medium population abundance
Red spotted newt	*Notophthalmus viridescens*	low population abundance

Common Name	Scientific Name	Status within Washington D.C.
Spotted salamander	*Ambystoma maculatum*	medium population abundance
Upland chorus frog	*Pseudacris feriarum feriarum*	low population abundance
Wood frog	*Rana sylvatica*	low population abundance
Fish		
American shad	*Alosa sapidissima*	severely reduced, but rebounding
Greenside darter	*Etheostoma blennioides*	low population abundance
Silver jaw minnow	*Ericymba buccata*	low population abundance
Warmouth	*Lepomis gulosus*	low population abundance
Alewife	*Aloso pseudoharengus*	low population abundance, currently stable
Blueback herring	*Alosa aestivalis*	low population abundance, currently stable
Atlantic sturgeon	*Acipenser oxyrhynchus*	Federal status: threatened, extirpated from District of Columbia
American eel	*Anguilla rostrata*	low population abundance
Central stoneroller	*Campostoma anomalum*	low population abundance
Bowfin	*Amia calva*	extremely low population abundance
Hickory shad	*Alosa mediocris*	rebounding
Shortnose sturgeon	*Acipenser brevirostrum*	Federal status: endangered
Birds		
Bobolink	*Dolichonyx oryzivorus*	undetermined
Acadian flycatcher	*Empidonax virescens*	passage migrant
American bittern	*Botaurus lentiginosus*	local migrant
American black duck	*Ana rubripes*	undetermined
American woodcock	*Scolopax minor*	undetermined
Bald eagle	*Haliaeetus laucocephalus*	migrant and breeder
Black-crowned night-heron	*Nycticorax nycticorax*	migrant and breeder
Broad-winged hawk	*Buteo playtpterus*	imperiled
Brown creeper	*Certhia americana*	resident, local migrant, breeder

Common Name	Scientific Name	Status within Washington D.C.
Brown thrasher	*Toxostoma rufum*	vulnerable
Cerulean warbler	*Dendroica cerulean*	undetermined
Chimney swift	*Chaetura pelagica*	secure
Wilson's snipe	*Gallinago delicate*	undetermined
Eastern meadowlark	*Sturnella magna*	critically imperiled
Eastern towhee	*Piplio erythrophthalmus*	secure
Field sparrow	*Spizella pusilla*	imperiled
Grasshopper sparrow	*Ammodramus savannarum*	undetermined
Great horned owl	*Bubo virginianus*	imperiled
Yellow-crowned night heron	*Nyctanassa violacea*	highly rare

CULTURAL LANDSCAPES

An overabundance of deer and resultant deer browsing could adversely affect the cultural landscapes within Rock Creek Park, as could the erection of fences and large exclosures. Cultural landscapes, as defined by The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes, consist of "a geographic area (including both cultural and natural resources and the *wildlife or domestic animals* therein) [emphasis added] associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (NPS 1996b). The NPS uses 13 typically assessed features to determine if a landscape is significant. There are four general types of cultural landscapes: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. The most common forms of cultural landscapes within Rock Creek Park are historic sites, historic designed landscapes, and historic vernacular landscapes. A historic site is a landscape significant for its association with a historic event, activity, or person (e.g., battlefields). A historic designated landscape, which includes parks and estates, is a landscape that was consciously designed or planned out by a landscape architect, master gardener, architect, or horticulturist. A historic vernacular landscape is a landscape that has evolved over time through use by the people whose activities and occupancy shaped it. Function of this site plays a significant role in these types of landscapes (NPS 1996b).

Created by an act of Congress in 1890, Rock Creek Park encompasses the last major natural landscape in the District. Many areas comprising the park were little modified by human interaction prior to its creation as a park. Since that time, the park has balanced the preservation and maintenance of the valley's natural and cultural resources with the recreational and transportation requirements of modern Washington while incorporating the highest cultural and aesthetic values. As such, Rock Creek Park is considered a significant cultural and historic landscape.

In 1997, the NPS began a cultural landscape inventory of Rock Creek Park. A cultural landscape inventory (CLI) identifies and documents the characteristics of a cultural landscape that make it significant and worthy of preservation. The CLIs permit the NPS to collate and evaluate information on the location, historical development, and features of the cultural landscapes that will assist park managers in their planning, programming, recording treatment, and management decisions.

The results of that inventory concluded that Rock Creek Park met the criteria for listing in the National Register as a historic designed landscape. As part of its ongoing efforts to identify and properly manage its significant cultural resources, the NPS has initiated the identification, documentation, and appropriate treatment of numerous cultural landscapes at Rock Creek Park. As a result of these efforts, the NPS has determined that cultural landscapes exist at the following Rock Creek Park units comprising the study area for this plan/EIS:

- Rock Creek Park
- Rock Creek Tributary Parks (North Portal, Pinehurst Parkway, Soapstone Valley Park, Klingle Valley Parkway, Melvin Hazen Parkway, Normanstone Parkway)
- Dumbarton Oaks Park
- Montrose Park
- Peirce Mill
- Linnaean Hill
- Rock Creek and Potomac Parkway
- Glover-Archbold Park
- Whitehaven Parkway
- Palisades Park
- Little Forest Park
- Fort Circle Parks (Barnard Hill, Battery Kemble, Fort Bayard, Fort Bunker Hill, Fort Reno, Fort Slocum, Fort Stevens, Fort Totten, Fort DeRussy)

Most of these have not been fully inventoried or evaluated for the National Register of Historic Places. Of the above listed cultural landscapes, CLIs have been prepared for the following units:

- Linnaean Hill (including the Peirce-Klingle Mansion) (NPS 2003a) – In 1997, the Linnaean Hill landscape was identified as a component landscape of Rock Creek Park (Reservation 339). The landscape is the property of Joshua Peirce Klingle that was transferred to the federal government after the creation of the park in 1890 and is distinctive from the rest of Reservation 339 because of the physical history of the site and the character of the area.
- Peirce Mill (NPS 2003b) – In 1997, the Peirce Mill landscape was identified as a component landscape of Rock Creek Park (Reservation 339). The landscape is identified as the property owned by Peirce Shoemaker that was transferred to the federal government after the creation of the park in 1890 and is distinctive from the rest of Reservation 339 because of the physical history of the site and the character of the area. A Cultural Landscape Report for Peirce Mill was completed in 2009.

In addition, cultural landscape reports have been published for:

- Dumbarton Oaks Park (NPS 2000a) – The need to document the Dumbarton Oaks Park historic landscape became apparent in 1985 when the NPS recognized that the garden was an important designed landscape that was being managed as a natural, rather than a cultural resource. The landscape report was created to provide guidance for stabilizing existing resources such as focal points and waterway features. This effort led to the 1997 *Preservation Maintenance Plan for Dumbarton Oaks Park*, which details cultural landscape maintenance.

- Montrose Park (NPS 2004d) – Montrose Park is also important as an early-twentieth century example of the adaptation of a country estate as a community park. In addition, Montrose Park is significant as a remnant of a nineteenth-century estate adapted as an early-twentieth-century park to serve the community of Georgetown. The park retains the character of its early years and period of significance (1911–1919), with such features as the topography, large trees, tennis courts, Lodge, Summerhouse, Pergola, and Ropewalk still playing an important role in its landscape character.

ROCK CREEK PARK AND ROCK CREEK AND POTOMAC PARKWAY

Created by an act of Congress in 1890, Rock Creek Park encompasses the last major natural landscape in the District. The area comprising the park was little modified by human interaction prior to its creation as a park. Since that time, the park has balanced the preservation and maintenance of the valley's natural and cultural resources with the recreational and transportation requirements of modern Washington, while incorporating the highest cultural and aesthetic values. In 1997–1998, the NPS, in consultation with the District of Columbia State Historic Preservation Officer, completed a comprehensive survey of structures in Rock Creek Park and the Rock Creek and Potomac Parkway that are eligible for listing in the National Register of Historic Places. The Rock Creek and Potomac Parkway was found to be eligible for listing, and the NPS coordinated with the District of Columbia State Historic Preservation Officer to finalize a nomination. Both Rock Creek Park and the Rock Creek and Potomac Parkway are considered to be significant cultural and historic landscapes.

In 1997, the NPS began a cultural landscape inventory of Rock Creek Park. The results of that inventory concluded that Rock Creek Park and the Parkway met the criteria for listing in the National Register as a historic designed landscape. In addition, the inventory determined that two component landscapes of the park, Linnaean Hill (including the Peirce-Klingle Mansion) and the Peirce Mill contribute to the significance of the Rock Creek Park cultural landscape, and thus comprise individually eligible landscape elements (NPS 1998). These two component landscape inventories have been completed and been entered into the NPS Cultural Landscape Inventory database.

GLOVER-ARCHBOLD PARK AND WHITEHAVEN PARKWAY

Cultural landscape inventories have not been conducted for either Glover-Archbold Park or Whitehaven Parkway units of Rock Creek Park.

TRAFFIC CIRCLES AND OTHER SMALL PARCELS

Chevy Chase Circle is a managed traffic circle that has a CLI, completed in 2005; CLIs for other small parcels along 16th Street have also been completed. The results of the CLI for Chevy Chase Circle determined that it met the criteria for listing in the National Register as a historic designed landscape associated with architect Edward Donn, Jr., the Garden Club of America, and local community development. The circle is also significant for its associations with Senator Francis G. Newlands, the City Beautiful and picturesque suburbs movements, and the development of Chevy Chase. The inventory identified three principal design episodes at the circle that reflected its establishment as a memorial in 1933 and improvements undertaken in ca. 1956 and ca. 1990 (NPS 2005b).

SOUNDSCAPES

NATURAL AND HUMAN NOISE LEVELS

The main issue of concern relating to soundscapes and noise is that certain deer management actions, mainly use of firearms and dart guns, have the potential to cause disturbance to the natural soundscape of the park and surrounding properties. Natural soundscapes encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships

among park natural sounds of different frequencies and volumes (NPS *Management Policies 2006* [NPS 2006, sec. 4.9]). The NPS works to preserve, to the greatest extent possible, the natural soundscapes of parks. The frequencies, magnitudes, and durations of acceptable levels of unnatural sound will vary throughout a park, being generally greater in developed areas (NPS *Management Policies 2006* [NPS 2006, sec. 4.9]).

Noise can be defined as an unwanted sound, such as one that is loud, unpleasant, unexpected, or undesired. Sounds are described as noise if they interfere with an activity or disturb the person hearing them. Sound is measured in a logarithmic unit called a decibel (dB). Noise levels are most commonly expressed in dB. The human ear is not equally sensitive to all sound frequencies; therefore, the A-weighted decibel scale (dBa), which is calibrated to the human's ear response, is often used when analyzing noise levels. Table 17 illustrates common sounds and their associated exposure concern.

Nearly all agencies and organizations with authority over noise-producing sources (including the World Health Organization and the National Research Council) use 55 dB as the threshold for defining noise day-night sound levels in urban areas (Schomer 2001).

The threshold of perception of the human ear is approximately 3 dB, and a 5-dB change is considered to be clearly noticeable. As shown in table 18, a 10-dB change would be perceived to be twice as loud (MN Pollution Control Agency 1999). When decibels are doubled, the sound does not become twice as loud. For most people a 10-dB increase in the measured sound level is perceived as being twice as loud, and a 10-dB decrease is perceived as half as loud (endpcnoise.com n.d.).

TABLE 17. COMMON NOISE SOURCES AND LEVELS

Source	Decibel Level (dB)	Exposure Concern
Leaves rustling	20	Normal safe levels
Soft whisper	30	Normal safe levels
Quiet office; crickets	40	Normal safe levels
Average home; refrigerator; washing machine; bird calls	50	Normal safe levels
Conversational speech	65	Normal safe levels
Highway traffic	75	May affect hearing in some individuals depending on sensitivity and exposure length
Noisy restaurant	80	May affect hearing in some individuals depending on sensitivity and exposure length
Average factory	80 to 90	May affect hearing in some individuals depending on sensitivity and exposure length
Pneumatic drill, thunder	100	May affect hearing in some individuals depending on sensitivity and exposure length
Automobile horn	120	May affect hearing in some individuals depending on sensitivity and exposure length
Jet plane	140	Noises at or over 140 dB may cause pain
Gunshot blast	140	Noises at or over 140 dB may cause pain
Centerfire rifle shot	160	Noises at or over 140 dB may cause pain

Sources: U.S. Department of the Interior n.d.; Musani n.d.; Galen Carol Audio n.d.; Dumond 2000; League for the Hard of Hearing 2003; Rossman 2006.

dB = decibels

TABLE 18. PERCEPTIONS OF INCREASES IN DECIBEL LEVEL

Amount of Change	Decibel Level (dB)
Imperceptible change	1
Barely perceptible change	3
Clearly noticeable change	5
About twice (or half) as loud	10
Fourfold change	20

Source: MN Pollution Control Agency 1999

Many factors affect how an individual responds to noise. Primary acoustical factors include loudness, frequency, and duration, but other non-acoustical factors also play a role in how an individual responds to sounds. These factors include the ambient noise level, time of day and year, location, and socioeconomic conditions, as well as if the receptor perceives the noise as being dangerous or preventable (Suter 1991).

NOISE ATTENUATION

A number of environmental factors mitigate noise emissions in the environment, including absorption of sound by the air and the effect of barriers (structures), hills, and trees on the emitted noise. However, the most important of these factors is likely the distance between the source and the receiver (OPTI 2000).

Distance

Noise levels depend on the distance from the noise source and the attenuation of the surrounding environment. As a sound wave travels through space, the intensity of the sound wave decreases with increasing distance from the source. When the distance from a point source is doubled (over a hard surface with no intervening vegetation), the sound level decreases 6 dBa (MN Pollution Control Agency 1999; Komanoff et al. 2000; OPTI 2002). For example, if a sound level were 95 dB at 50 feet, it would be 89 dB at 100 feet, and 83 dB at 200 feet. If the surface is “soft,” the decrease with distance can increase. Caltrans (1998) reports that “soft” sites with soft dirt, grass, or scattered shrubs or trees would experience a decrease in noise levels of 7.5 dB with doubling of distance from a point source, and that thicker vegetation strips can reduce noise by up to 10 dB over what would be predicted without the vegetation present.

Air Absorption

As sound passes through the atmosphere it collides with the air molecules, converting some of the energy into heat, which decreases the sound energy. The amount of energy that the atmosphere absorbs varies with the weather conditions and the frequency of the sound. The atmosphere can reduce sounds by as much as 3 dBa for every 100 feet, depending on weather conditions (OPTI 2000).

Barriers and Hills

Barriers, such as buildings and other structures, and hills can also attenuate sound in the environment. As sound waves “bend” around obstructions, they lose energy. Therefore, people usually do not hear sounds from sources that are behind hills or buildings. The amount of attenuation provided by an obstruction depends on the how much the sound waves bend. This attenuation is greatest closest to the source, but is less effective at greater distances (OPTI 2000).

Trees

Vegetation can help decrease noise, although not as effectively as barriers. Vegetation must be so high, wide, and dense that it cannot be seen through, and taller than the noise source in order to be effective (FHWA 2000; OPTI 2000). Many areas at Rock Creek Park are heavily vegetated, other areas are more open habitats with sparse understory due to heavy deer browsing.

NOISE LEVELS AT ROCK CREEK PARK

One of the natural resources of Rock Creek Park is the natural soundscape, which includes all of the naturally occurring sounds of the park, such as calling birds, wildlife, cascading and flowing water, as well as the quiet associated with the hiking and horse trails. Noise standards and guidelines applicable to activities in Rock Creek Park include those established by the NPS, federal guidance, the National Capital Planning Commission, and the District of Columbia.

The Rock Creek Park system includes not only the main park, but also numerous additional parks within an urban environment, such as Glover-Archbold and Battery Kemble, scattered throughout the District, encompassing a total of approximately 3,000 acres. Sources of noise within Rock Creek Park units and surrounding areas are those typical of an urban area and include recreational activities, motor vehicle operations, and the noises associated with residential development in an urban setting (e.g., lawn mowers). The park system with the main unit of Rock Creek Park and the Rock Creek and Potomac Parkway contains an extensive roadway network that is the primary source of noise. Commuters frequently use park roads during rush hour periods. Automobile traffic occurs primarily on the surrounding roadway network, including heavily traveled 16th Street NW to the east and entrance and access roads within the park boundary and surrounding areas. A single automobile produces noise levels in the range of 70 dBa near the vehicle, while moderately heavy traffic may produce noise levels in the range of 85 to 90 dBa near the roadway (Miyara 1998). Automobile traffic is also present adjacent to other units of Rock Creek Park, particularly traffic circles and small triangle parks located throughout the city. The NPS-managed circles act in part to manage traffic and are surrounded on all sides by District of Columbia city streets. The Glover-Archbold and Whitehaven units are located between 44th and 37th streets in the northwest section of the District and are surrounded almost entirely by a residential area. The lower portion of the Glover-Archbold borders Georgetown University and Georgetown Hospital. Noises around these units would be the same as those in the vicinity of Rock Creek Park and Rock Creek and Potomac Parkway.

In 1996, the NPS performed a study to characterize noise environments in Rock Creek Park (NPS 1997b). The extensive roadway network is the primary source of noise in the park. The study selected 26 noise-monitoring locations and recorded traffic noise levels at these locations with references to distance to the nearest road. In general, this study found that the lowest noise levels in the park were found at the golf course, about 200 to 225 feet from the Rock Creek and Potomac Parkway, at 58 to 63 dB equivalent sound level, and highest on the jogging trail south of Calvert about 10 feet from the parkway (79 dB equivalent sound level) (NPS 1997b, supplemented by K. Ferebee, pers. comm. 2008a). This study also found noise levels to be constant throughout the day, with peak and off-peak levels differing by 4 dB or less. Areas in the park where noise levels met or exceeded Federal Highway Administration noise abatement criteria included picnic areas south of Military Road within 60 feet of Beach Drive, visitor facilities within 110 to 125 feet of Rock Creek and Potomac Parkway, and segments of recreational trails within 100 feet of Beach Drive and the parkway (NPS 2005a).

In addition, in 1992, the NPS evaluated noise sources at 15 locations near the tennis center (NPS 1993). Background noise levels at the tennis center, or noise levels when no events are underway, were measured at 55 dB (calculated day/night levels as specified by the American Standards Institute). The data for noise levels emanating from the tennis stadium during tennis events indicated that levels rarely violate the D.C.

property line noise standard of 55 dB for times after 9:00 p.m. or 60 dB for times before 9:00 p.m. (NPS 1993).

The two currently operating wireless telecommunication facilities within the main Rock Creek Park unit do generate some level of noise, affecting the park's soundscape. Each facility has a cooling unit, which generates a noise level of 73 dBa at 5 feet from the unit operating at approximately 2- or 3-minute intervals, daily. Additionally, each facility has a generator, which is tested once per week for 40 minutes. The generators emit noise levels similar or slightly higher than the noise levels produced by the cooling units. The noise levels emitted by these facilities comply with all applicable regulations including the NPS, EPA, and the District of Columbia (NPS 2003e).

FIREARM NOISE

Firearms produce an intensely loud noise, which can be characterized as impulse noise that has the characteristics of an explosive burst. Peak sound levels from rifles and pistols similar to those that could be used in lethal management actions can range from about 150 to 165 dB (Musani n.d.).

Noise suppressors may be used in conjunction with sharpshooting to reduce the impact of sound from a firearm. Commercially available rifle suppressors offer suppression that ranges from 25 to 40 dBA, with most closer to 30 dBA. In addition, distance, topography, and vegetation would also affect the level of noise experienced from firearm use.

NOISE LEVELS AND PERCEIVED ANNOYANCE

Noise, by definition, is unwanted sound. It can be an infringement on one's sense of privacy, as well as a source of frustration when the noise is beyond a person's control. Noise has the ability to interfere with a broad range of human activity (i.e., conversation, sleeping, relaxing, listening to television/radio, enjoyment of property, enjoyment of solitude), which ultimately causes annoyance. According to the EPA Levels Document (EPA 1974), approximately 17% of the population will be highly annoyed at an day-night average sound level (Ldn) of 55 dB, and over 40% of the population will be highly annoyed if the Ldn exceeds 70 dB (the maximum safe level the EPA has identified to protect against hearing loss) (EPA 1981). However, Schultz (Schultz 1978) correlated the results from 19 social surveys of annoyance, which resulted in slightly different results than what is depicted in the EPA Levels Document. Schultz concluded that, on average, approximately 4% of the population will be highly annoyed by noise at or below a level of an Ldn of 55 dB; 16% will be highly annoyed by noise at a level of an Ldn of 65 dB; 25% will be highly annoyed by noise at an Ldn of 70 dB; and 37% will be highly annoyed as the noise level reaches an Ldn of 75 dB.

Several factors have been found to influence community reaction to noise. These factors include (Noise Pollution Clearinghouse n.d.):

- duration of intruding noises and frequency of occurrence
- time of year (windows open or closed)
- outdoor noise level in community when intruding noises are not present
- history of prior exposure to the noise source
- attitude toward the noise source
- presence of pure tones or impulses

The particular time of day or year when the sound occurs is important; a few intrusions late at night, at meal times, or during times of relaxation and leisure may produce more annoyance than a constant flow of intrusive sound when people are fully occupied with other activities (Truax 1999).

Certain sounds arouse a negative response because of unpleasant associations surrounding them and what they represent. In some cases, sound annoyance may be traced to actual physical characteristics of the sound, namely loudness, noisiness, or high pitch. Sound phobias and taboos may also reflect social values and personal attitudes towards the sound maker (Truax 1999).

VISITOR USE AND EXPERIENCE

Deer and deer management actions can have many effects on the visitor use and experience in the park. Of concern are the effects on the natural surroundings from overbrowsing, the effect of deer removal, and the effects on visitors using the park from the various proposed management actions that could cause temporary closures or disturbances.

VISITATION

Founded as one of the country's first federal parks, Rock Creek Park is one of the largest forested urban parks in the nation, supporting an average of about 2 million recreational visitors per year. In 2010, park visitation equaled 1,883,457 visitors; from 2000 through 2009, over 2 million visitors came to Rock Creek Park each year (NPS 2011). Another 12 million people use the park annually as commuters (NPS 2003e). Figure 8 shows the popular visitor use areas within Rock Creek Park.

Visitation to Rock Creek Park has increased over 250% since 1973, growing from about 559,000 recreational visits in 1973 to almost 2,000,000 in 2010 (K. Ferebee, pers. comm. 2011f; NPS 2011). While this was a result of a mostly steady increase over the past 27 years, rapid growth occurred in the 1980s when recreational visitation to Rock Creek Park almost doubled, and then stabilized throughout the 1990s. In 1980 there were 1,060,000 recreational visitors. By 1989, this number had risen to 2,050,000 recreational visitors. After this growth, visitation has tended to remain relatively stable at around 2 million visitors per year, with fluctuations from year to year, as shown in figure 9 (NPS 2011).

Rock Creek Park records visitor use numbers for Reservation 339 (the main unit of the park) and its tributaries and Rock Creek and Potomac Parkway only. Yearly visitor counts are not available for the remaining Rock Creek Park units. For example, within Reservation 339 in 2010, visitation to the park's major points of interest included (K. Ferebee, pers. comm. 2011f):

- Old Stone House – 61,921
- Peirce Mill – 2,562
- Nature Center – 31,307
- Carter Barron Amphitheater – 41,079

Historically, the majority of recreational visits to Rock Creek Park occur evenly over the warmer months of spring, summer, and early fall, and drop slightly in the late fall and winter (NPS 2005a). Many visitors are park neighbors, who access the park from their backyards or neighboring public areas. Non-recreational visits, which include those from commuters or others passing through the park, are distributed relatively evenly throughout the year, with an average of 25% of total visits occurring each season. This is particularly true on the Rock Creek and Potomac Parkway where traffic counts show little variation from month to month (NPS 2004h). Table 19 shows that visitation at Rock Creek Park is highest in June, July, August, and October and lowest in February (NPS 2011).

Since 1989, while visitation has remained relatively stable, the number of visits to the park's interpretive centers has decreased. Budget shortfalls have reduced the number of visitor services, resulting in many visitors to Rock Creek Park possibly never knowing that they are in a national park. Many visitors may never have contact with park rangers or receive any basic orientation (NPS 2005a).

Rock Creek Park Units
District of Columbia

Figure 8. Visitor Use Areas

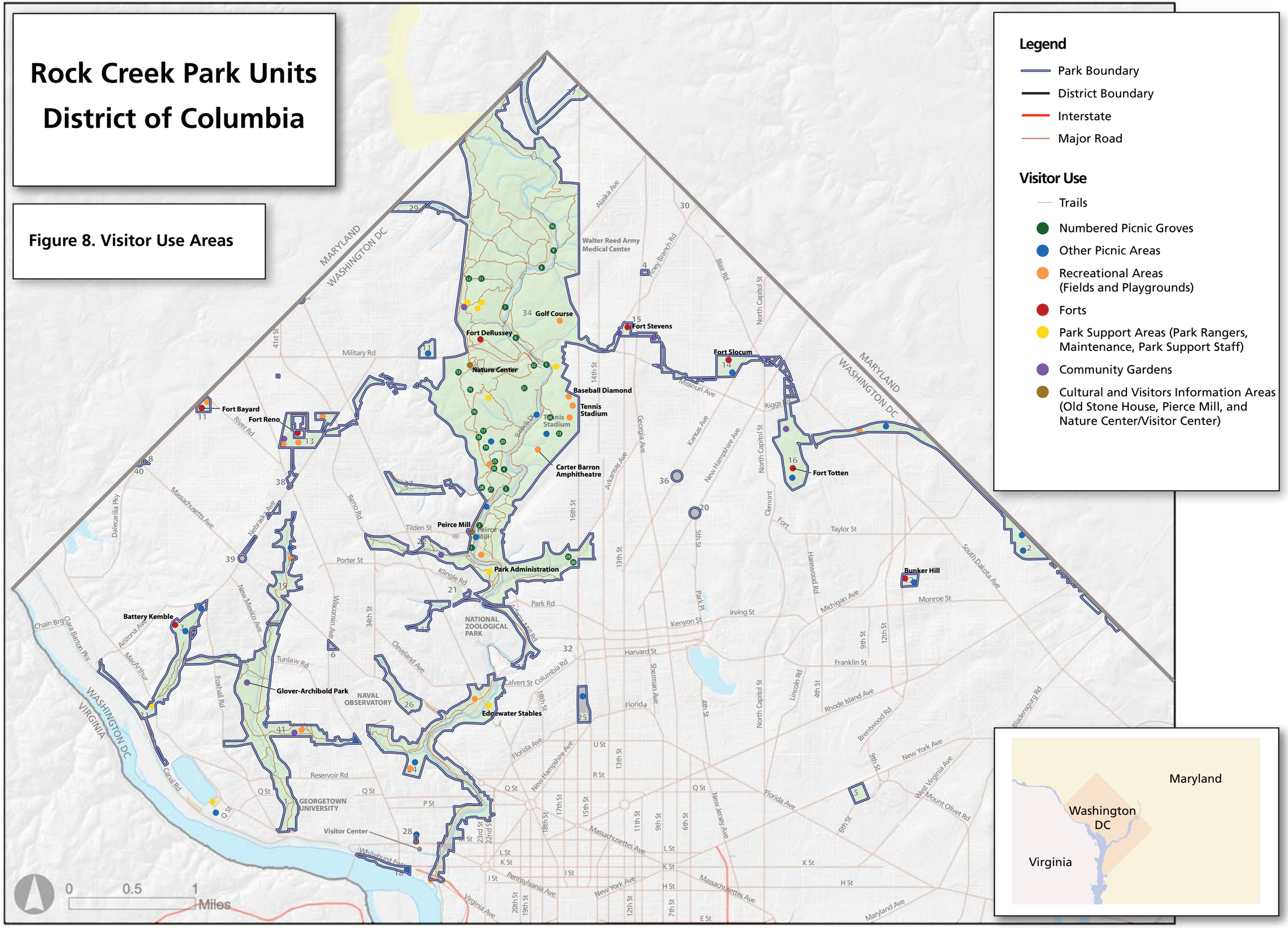


FIGURE 9. ANNUAL VISITATION AT ROCK CREEK PARK

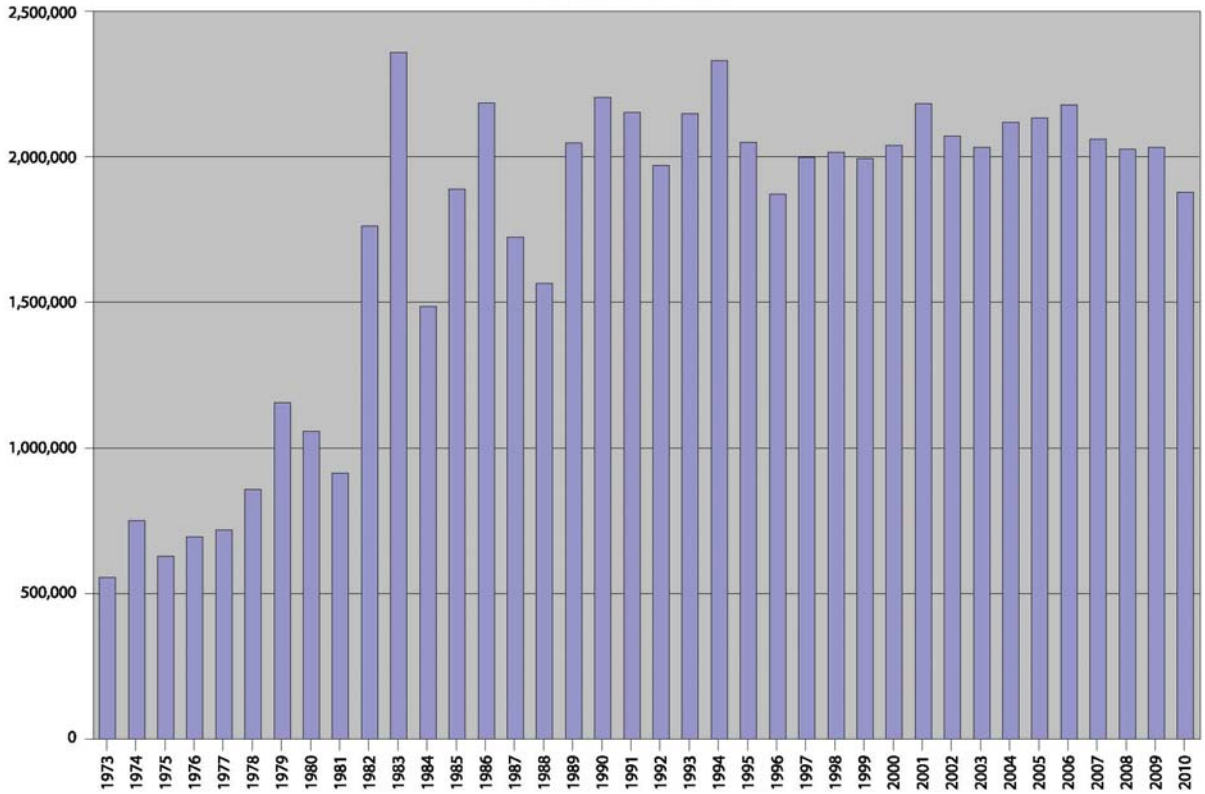


TABLE 19. MONTHLY RECREATIONAL VERSUS NON-RECREATIONAL USE OF ROCK CREEK PARK

Month	Year	Recreational Visits	Non-recreational Visits	Total Visits
January	2010	137,157	1,050,032	1,187,189
February	2010	118,351	950,186	1,068,537
March	2010	97,144	1,053,461	1,150,605
April	2010	165,488	1,019,036	1,184,524
May	2010	170,468	1,050,032	1,220,500
June	2010	207,364	1,019,036	1,226,400
July	2010	204,821	1,051,747	1,256,568
August	2010	205,989	1,051,747	1,257,736
September	2010	157,581	1,019,036	1,176,617
October	2010	194,038	1,050,032	1,244,070
November	2010	148,125	1,019,036	1,167,161
December	2010	76,931	1,053,461	1,130,392
	Totals:	1,883,457	12,386,842	14,270,299

Source: NPS 2011.

VISITOR ACTIVITIES

Rock Creek Park offers a variety of recreation options, including paved multi-use trails, an extensive system of hiking and horseback riding trails, and the Rock Creek Horse Center for public horseback riding and horse boarding. The park also includes an 18-hole public golf course, tennis courts, picnic areas, community gardens, and other recreational areas such as sports fields and playgrounds. Other activities include canoeing and kayaking on Rock Creek and interpretive programs at the Rock Creek Nature Center and Planetarium, Pierce Mill complex, and Old Stone House. The park also manages the Carter Barron Amphitheater, which is a 4,000-seat outdoor theater featuring summer musical and theatrical performances.

A visitor use survey was conducted in Rock Creek Park in the summer of 1999 (Littlejohn 1999). This survey was conducted by interviewing visitors and giving them a questionnaire to mail back to the park. The survey collected information on visitor groups and individual group members. The survey assessed why visitors came to the park, what was important to them at the park, what were their perceptions of the park, and how they rated park amenities. The survey found that the most common activity reported by park visitors was jogging/hiking/walking (44%), followed by bicycling (18%), relaxing/sunbathing and walking the dog (both at 17%), attending concerts (15%), nature study (13%), picnicking (11%), and golfing (10%). All other activities were recorded at less than 10%. Figure 8 shows the locations of some of these popular visitor use areas and activity centers in the park.

Visitors to Rock Creek Park are primarily local residents of the Washington, D.C. metropolitan area and many who live adjacent to the park can readily access the park for jogging, walking, and dog walking (K. Ferebee 2008a). However, because it is a national park, people from across the country and around the world visit the park. The 1999 study found that people visit the park for a wide variety of reasons, including exercise (61%), escaping the city environment (47%), time with family and/or friends (37%), and solitude (30%). Table 20 lists the reasons that respondents mentioned for visiting the park.

TABLE 20. REASONS FOR VISITING ROCK CREEK PARK

Reason	Percent Reporting (%)[a]
Exercise	61
Escaping the city environment	47
Time with family or friends	37
Solitude	30
Enjoy natural history	14
Learn about nature/history	10
Visit a nature center	10
Connect with the past	7
Commute to work	6
Other[b]	29

a. Respondents could indicate more than one reason for visiting, so numbers will exceed 100%.

b. “Other” includes attending a concert, walking the dog, golfing, gardening, enjoying nature, eating lunch, commuting home, visiting the planetarium, and studying.

Visitors were also asked to rate the importance of selected features or qualities of the park. Scenic beauty was ranked very high, with 94% ranking it extremely or very important (73% considering it extremely important and 21% very important). Other rankings that were high included recreational opportunities (93% extremely or very important), clean air (90% extremely or very important), and clean water (86% extremely or very important). Native plants and animals were ranked as extremely or very important by 68% of the respondents (44% extremely important and 24% very important).

The length of a visitor's stay depends on the purpose of the visit. Overall, the majority of visitors (59%) to Rock Creek Park stay two hours or less (Littlejohn 1999). Many people visit Rock Creek Park on a regular basis; 52% of those surveyed visit the park weekly (Littlejohn 1999).

Some of key visitor activities or visitor facilities in the park are described below.

Birding

Rock Creek Park is a popular site in the Washington, D.C. metropolitan area for birding (bird watching). Birding is a growing recreational activity that more than doubled in popularity from 1983 to 2001 (Cordell and Herbert 2002). Some of the preferred areas for birding in Rock Creek Park include the areas around the nature center, stables, maintenance yard, picnic areas 17 and 18, and, in general, the western ridge of the park. Birders visit the park mostly in the spring and fall during bird migration and during the summer bird breeding season (NPS 2005a).

Fishing

Fishing is another activity enjoyed by visitors to Rock Creek Park. Anglers need to have a District of Columbia fishing license to fish. Fishing is allowed from Piney Branch south to the mouth of the creek. Typical catches include bass, catfish, and herring, although herring are only present in the spring when the fish are running upstream. Fishing is not allowed in the original reservation of Rock Creek Park (Reservation 339).

Biking and Hiking

Biking and hiking are also popular activities in the park. Beach Drive is closed to cars in three sections between the Maryland/District boundary and Broad Branch Road from 7 a.m. Saturday to 7 p.m. Sunday and on holidays for biking, hiking, jogging, and rollerblading (NPS 2008b; K. Ferebee, pers. comm. 2011b). There are 11 miles of bike trails not on roads, and about 29 miles of hiking trails (K. Ferebee, pers. comm. 2008e).

Tennis

The Rock Creek Park tennis center surrounds the William H.G. Fitzgerald Tennis Stadium, home of the Legg Mason Tennis Classic, which draws an annual attendance of 60,000 during the week-long tournament. A second tournament is sometimes held each year, with approximately half the attendance of the Legg Mason tournament. The courts are open year-round from 7:00 a.m. to 11:00 p.m. and are used by approximately 90,000 people annually. The amphitheater season extends from May through September, making the area around the tennis center very active during the summer months.

During tournaments, the area surrounding the tennis center is covered with tents and other temporary structures associated with the events.

Nature Center

The Rock Creek Park Nature Center and Planetarium, located north of the maintenance yard, is open Wednesday through Sunday from 9:00 a.m. to 5:00 p.m. and is the major information center and focal point for activities related to the park's natural and cultural history. Guided nature walks and curriculum-based environmental education programs take place daily at the nature center. A wheelchair-accessible, self-guiding nature trail is located near the center.

Horseback Riding

The Rock Creek Horse Center is open to the public Tuesday through Sunday and offers trail rides, riding lessons, pony rides, boarding facilities, and summer day camp sessions. The horse center averages 21,250 visitors per year with the highest use periods occurring from April through October. Trails extending from the horse center provide access to horse riding trails throughout the park. The main access trail extends southeast from the horse center toward Ross Drive and Rock Creek just to the east of the maintenance yard. This is the most heavily used horse trail in the park.

Golf

The Rock Creek Park golf course, located north of the tennis center and maintenance yard, is a 4,798-yard, par-65 public course noted for its hilly and challenging terrain. The course is open every day from dawn to dusk and includes a golf school, a golf shop, putting green, and a snack bar. The highest use period at the golf course, on average, is April through October.

Community Gardens

As well as providing facilities for sports and recreation, the park also contains a number of community gardens (see figure 8). Eight community gardens are tended within the park. Of these gardens, four are fenced to protect crops from deer browsing. Gardens that do not require fences are in areas where deer do not freely roam (K. Ferebee, pers. comm. 2007e).

Motorized Recreation

A popular visitor experience on weekdays is motorized travel on park roads. The principal roadways within the park are the Rock Creek and Potomac Parkway and Beach Drive. The Rock Creek and Potomac Parkway portion of the park road network extends approximately 2.5 miles from the Theodore Roosevelt Bridge in the core of the District of Columbia, north to Calvert Street. The parkway is a four-lane, paved, limited access road with a posted speed limit of 35 miles per hour (District of Columbia 2001a, b). It is heavily used, with daily traffic volumes of 40,000 to 55,000 vehicles per day (NPS 2005a).

Visitor vehicles a Rock Creek Park

The Beach Drive portion of the park road network extends from Calvert Street, approximately 6.5 miles north to the Maryland state line. This road is a two-lane, paved road with a posted speed limit of 25 miles per hour. Commuters and others use Beach Drive as a pleasant way to traverse the city in a north/south direction, even if they do not leave their

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 Klingle 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.

TABLE 22. DISTRICT OF COLUMBIA CENSUS TRACT DATA

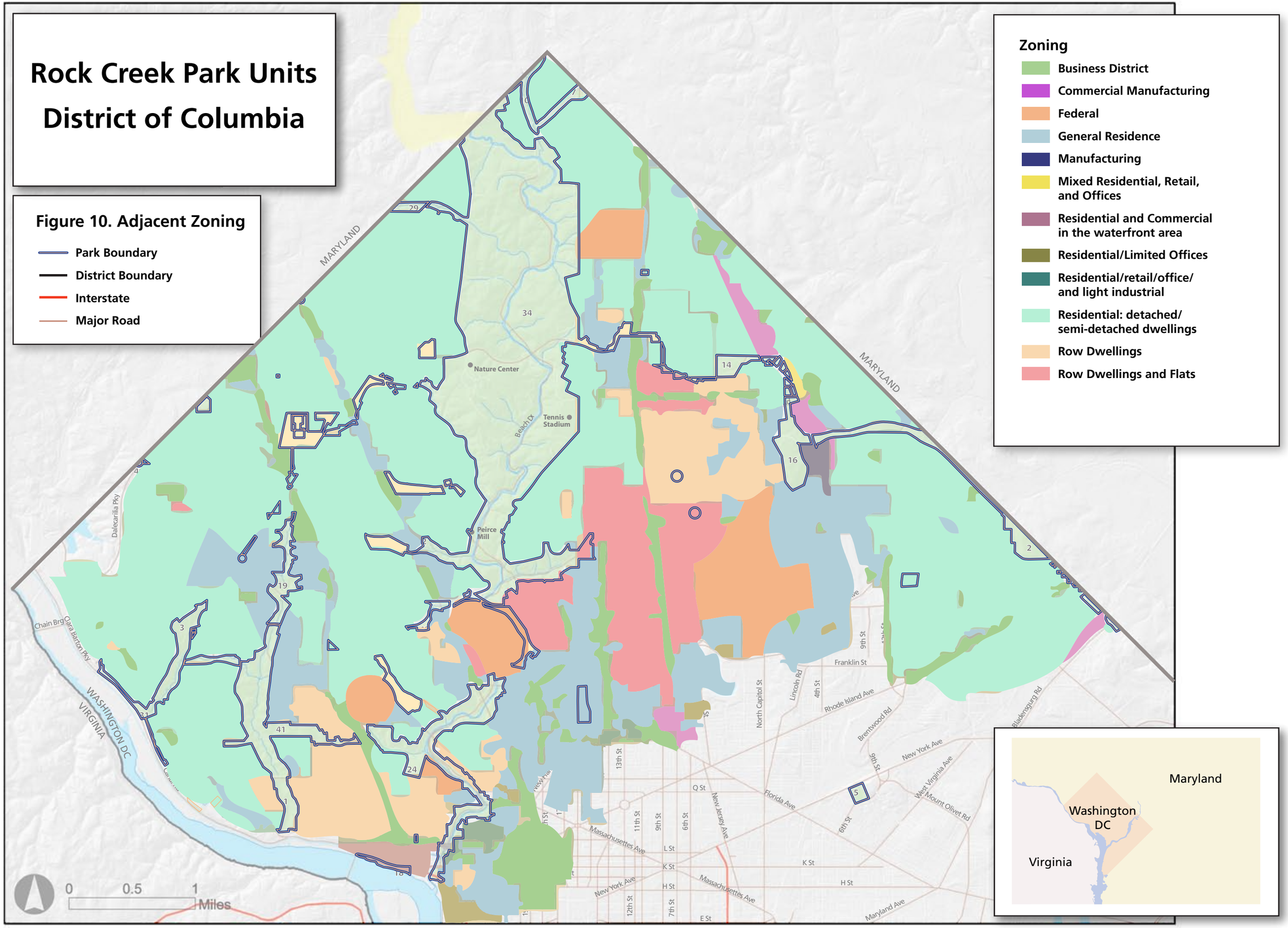
	Population, 2000	Median Household Income, 2000	Median Value for Owner-occupied Units, 2000	Percent of All Housing Units Owner-occupied, 2000
District of Columbia	572,059	$40,127	$157,200	41
Census Tract #				
1	4,674	$92,540	$479,000	53
4	1,501	$129,133	$699,100	68
5.01	2,774	$65,521	$256,600	18
5.02	3,062	$66,815	$451,000	46
6	4,969	$89,507	$412,900	64
13.01	3,747	$68,417	$587,900	31
13.02	6,350	$58,790	$151,600	30
14.02	3,925	$84,105	$340,100	68
15	5,649	$107,917	$411,800	88
16	4,030	$94,624	$327,000	90
18.03	3,066	$34,565	$188,000	20
20.01	2,435	$32,853	$318,000	33
20.02	3,781	$47,619	$164,800	67
26	2,184	$85,180	$383,900	71
27.01	5,742	$35,147	$256,200	22
27.02	6,052	$45,428	$301,300	32
39	4,643	$42,532	$152,900	26
40.01	3,474	$59,008	$272,900	44
41	2,570	$88,170	$450,000	49
55	4,696	$59,609	$186,900	34
56	5,946	$39,286	$164,800	35

Data Source: U.S. Census Bureau 2007; NeighborhoodInfo DC 2007c

Rock Creek Park Units
District of Columbia

Figure 10. Adjacent Zoning

- Park Boundary
- District Boundary
- Interstate
- Major Road



LANDSCAPING AND PROPERTY VALUES

The median property value of owner-occupied units in the District of Columbia was $157,200 as of the 2000 census. Between 1995 and 2005, areas around Rock Creek Park units experienced an increase in property values ranging from 2.7% (the area around the northern half of the main Rock Creek Park) to 5.8% (the area around the southern portion of the Rock Creek Park and Potomac Parkway). In the area around Glover-Archbold Park and Whitehaven Parkway, home values increased by 5.2% during that time period (Neighborhoodinfo DC 2007a). Although home prices are increasing, sales of single-family homes throughout the city have declined overall and were down 11.6% in the third quarter of 2006 from the prior year (Neighborhoodinfo DC 2007b).

Landscaping can have a significant impact on property values, enhancing the resale value of a property by up to 15%, with a treed lot selling for 7% to 14% more than a lot without trees (Nuss 2000). Furthermore, landscaping expenditures are often easily recovered when selling, with 100% to 200% of landscaping costs typically recovered (Taylor 2003). Therefore, improvements to landscaping may be seen as a successful way to improve property values.

Unfortunately, deer can often have a highly destructive effect on landscaping. Their diet experiences seasonal variation, which is typically a function of what is available. Browse, which refers to trees, shrubs, and vines, makes up a substantial part of the diet of the average deer. As habitat dwindles due to development pressure and as deer populations grow, deer may turn to surrounding residential areas for food, particularly in late fall, winter, and early spring, when other food sources may be scarce. An average adult deer consumes approximately 6 to 10 pounds of food per day during late spring, summer, and fall (McDonald and Hollingsworth 2007), which may result in increased pressure on surrounding landscaped areas from deer browsing if available natural habitat cannot support the population. In many residential areas surrounding protected areas, such as Rock Creek Park, deer cause virtually year-round damage to landscaping, which can be costly to replace. Currently, the District Department of the Environment considers overbrowsing to be a serious conservation threat (DDOE 2006).

Deer damage shrubs and landscape vegetation by eating the buds, leaves, flowers, and twigs, and by rubbing on the bark. In home gardens, deer often eat leaves, flowers, stems, or other edible parts. Other less frequent damage includes trampling of plants and damage to trees and shrubs caused by antler rubbing (West Virginia University 1985). Damage typically extends to an average of 6 feet, which is as high as deer can reach. Nearby Fairfax County, Virginia, estimates annual damage to landscaping resulting from deer at approximately $1 million (Fairfax County Park Authority 2004).

Rock Creek Park began compiling a list of people who inquired about the impacts of deer on neighboring landscaping in the early 1990s. This list served as a mailing list and did not track the number of complaints or inquiries the park received on the subject. Calls are received each year about deer issues and the majority involved concerns about deer consuming landscaping plants or road kill clean-up. There have been no reported incidences of deer aggression towards park visitors or park neighbors. This list has not been regularly updated and staff at Rock Creek Park Headquarters continue to handle any complaints, but do not keep records (T. Armstead, pers. comm. 2007).

PARK MANAGEMENT AND OPERATIONS

Deer management actions, even the dissemination of information about deer and their effects on the environment, require time and money, and all alternatives considered would have effects on staffing and operating budgets. The staff of Rock Creek Park is currently organized into three operating divisions: Park Management and Administration, Resource Management and Visitor Services, and Maintenance. Including funded vacancies, there are 65 full-time positions. The permanent staff is augmented by a seasonal or temporary workforce, which changes from year to year due to funding variations. Typically, this seasonal workforce has included 1 to 2 park rangers, 1 biological technician, 10 to 20 laborers and maintenance workers. The park staff is also augmented by 3 to 4 volunteers from the Student

Conservation Association (K. Ferebee, pers. comm. 2007d). Seasonal employees are common from the spring through the fall and are allowed to work a total of 1039 hours annually (K. Ferebee, pers. comm. 2008g).

The 2007–2009 authorized base operating funding for Rock Creek Park is detailed in table 23. The budget for the Resource Management and Visitor Services portion of the total budget is also given. Operation budgets may vary annually with nonrecurring base changes (K. Ferebee, pers. comm. 2011c).

TABLE 23. ROCK CREEK PARK OPERATING BUDGET

Year/Division	Operating Budget
FY 2007	
Total Operating Budget (authorized base plus nonrecurring base changes)	$7,172,100
Resource Management and Visitor Services	$1,139,139
FY 2008	
Total Operating Budget	$7,747,200
Resource Management and Visitor Services	$1,335,128
FY 2009	
Total Operating Budget	$8,363,600
Resource Management and Visitor Services	$1,793,792

Source: K. Ferebee, pers. comm. 2011c

RESOURCE MANAGEMENT AND VISITOR SERVICES

The Chief of Resource Management and Visitor Services is responsible for the overall program management of natural and cultural resources, interpretation, special park uses, and compliance.

Natural Resource Management

Rock Creek Park currently has three full-time employees with duties solely in natural resource management. The natural resource management staff devotes about 10% to 15% of their time to deer management activities, which include erecting and maintaining small exclosures, conducting annual fall spotlight surveys to determine population trends and densities, moving carcasses killed by vehicle collisions, assisting D.C. Animal Control with injured animals, and responding to questions from visitors and neighbors (K. Ferebee, pers. comm. 2007d).

Other duties of the natural resource management staff include water quality monitoring and mitigation of problems affecting these resources; park wildlife management and population monitoring; vegetation management including control of invasive plants; wildland fire management; integrated pest management; and trails management, park boundary management, and geographic information systems.

The NPS Center for Urban Ecology as well as the National Capital Regional Office assist the park resource management staff by providing services related to distance sampling and deer management statistics. The center staff also provides technical assistance on park programs including water quality monitoring, vegetation monitoring, air quality monitoring, invasive plant control, wildlife management, integrated pest management, cultural resource management, and education.

Cultural Resource Management

The park has one full-time employee with duties solely devoted to management of the park's cultural resources. The park manages many properties that are listed on the National Register of Historic Places as well as several sites that are eligible for listing. The cultural resource manager also is responsible for managing the park's collections.

Education and Interpretation

Education and interpretation are a large part of the visitor services offered by this division. The staff provides many educational and interpretive programs focused on the park's natural and cultural history. These programs are focused on school groups, families, and adults. Several programs are presented on the wildlife found in the park, including white-tailed deer and the role they play in the park's ecosystem. Three urban wildlife kits (deer, turtle, owl), designed for pre-kindergarten through grade 3, are available for loan from the Rock Creek Park Nature Center. Each kit contains a teacher's guide, materials, books, and objects for hands-on lessons focusing on adaptations and habitats. The wildlife kits are borrowed an average of four times each year (based on receipts from 1998 to 2005). Teachers keep the kit for three to five weeks. The deer kit has 16 suggested lessons and teachers often create additional activities. Checking the kits in and out requires minimal staff time. Each teacher may teach as many as 10 to 12 lessons for different classes using the kits (L. Illige, pers. comm. 2005).

In addition, park staff and the superintendent have spoken at community association meetings and town hall meetings regarding deer issues in the park. Six "Oh Deer" interpretive programs are given during the year. 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 browse of landscaping vegetation), and disseminating information about the deer population.

The park manages three main visitor contact points: Nature Center and Planetarium, Pierce Mill complex, and Old Stone House. The Nature Center functions as the park's main visitor center where the majority of the public programs are presented; however, programs and visitor assistance are available at the other sites. The park is an integral part of the Bridging the Watershed Program which educates local school groups on the importance and function of the watersheds in the Washington, D.C. metro area.

Special Park Uses

Currently there is one park ranger who manages the park's community gardens and prepares permits for special park uses. Many of the community gardens are experiencing pressure from deer browse, which has required the erection of fencing to protect plots. The park administration staff is consulted on deer and pest issues related to the community gardens (K. Ferebee, pers. comm. 2007f).

Compliance

One permanent full-time park ranger is responsible for project compliance in the park to include preparing environmental assessments, writing right-of-way and special use permits, and monitoring permit compliance by contractors.

MAINTENANCE

Of Rock Creek Park's 38 full-time maintenance positions, few perform general maintenance tasks specifically related to deer management, and no maintenance staff employees are currently assigned to perform deer management tasks, such as applying repellents or erecting small exclosures. As described previously, the natural resource management staff conducts these activities. Maintenance staff will occasionally remove a deer carcass from a park road.

The primary responsibility of the Maintenance Division is to provide for the general upkeep and maintenance of all park buildings and infrastructure, including the Nature Center and Planetarium, one tennis stadium, one large amphitheater, 30 picnic groves, approximately 50 miles of foot, horse, and bike trail, 20 miles of park roadways, and numerous buildings some of which are historic. Park maintenance is also responsible for maintaining all utilities that service park buildings and other park facilities (K. Ferebee, pers. comm. 2007d).

The Maintenance Division is divided up into several areas of responsibility. The tree crew manages hazardous trees and trees that are storm damaged or have fallen across roads, trails, or waterways causing obstruction. The roads and trails crew perform maintenance on park roads and trails to include road surface repair, culvert cleaning and stabilization, construction/rehabilitation of all park trails, sign maintenance, and snow removal. The grounds crew is responsible for litter removal, landscaping bed maintenance, and general grounds maintenance. The building and utilities crew maintains buildings include plumbing, painting, electrical, and heating/air conditioner maintenance. The Maintenance Division also has a mechanic to service vehicles and equipment.

PARK MANAGEMENT AND ADMINISTRATION

This division consists of the Park Superintendent, Deputy Superintendent, administrative assistant as well as the Administrative Officer and other support staff. The primary responsibility of the superintendents is the day-to-day management of the overall park operations. The Administrative Officer oversees purchasing, budget, contract administration, and property management. One additional permanent employee is responsible for the management of the Civil War Defenses of Washington. This position is shared among three National Capital Region parks. Two other permanent employees are shared with another National Capital Region park: a safety officer and an information technology specialist.

The United States Park Police provide law enforcement on all lands administered by Rock Creek Park. They also provide for visitor safety, respond to emergencies, enforce traffic laws, enforce the Code of Federal Regulations, and preserve the natural and cultural resources entrusted to the NPS.

Environmental Consequences

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this *White-tailed Deer Management Plan / Environmental Impact Statement.* This chapter also includes a summary of laws and policies relevant to each impact topic, definitions of impact thresholds (e.g., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by the Council on Environmental Quality (CEQ) regulations implementing the *National Environmental Policy Act* (NEPA), a summary of the environmental consequences for each alternative is provided in table 12 which can be found in "Chapter 2: Alternatives." The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in "Chapter 3: Affected Environment."

SUMMARY OF LAWS AND POLICIES

Three overarching environmental protection laws and their implementing policies guide the actions of the National Park Service (NPS) in the management of the parks and their resources — the *Organic Act of 1916*, NEPA and its implementing regulations, and the *Omnibus Management Act*. For a complete discussion of these and other guiding authorities, refer to the section titled "Related Laws, Policies, Plans, and Constraints" in "Chapter 1: Purpose of and Need for Action." These guiding authorities are briefly described below.

The *Organic Act of 1916* (16 United States Code [USC] 1), as amended or supplemented, commits the NPS to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

The *National Environmental Policy Act of 1969* is implemented through regulations of the CEQ (40 Code of Federal Regulations [CFR] Parts 1500–1508). The NPS has, in turn, adopted procedures to comply with these requirements, as found in Director's Order 12 (NPS 2001) and its accompanying handbook.

The *Omnibus Management Act* (16 USC 5901 et seq.) underscores the NEPA provisions in that both acts are fundamental to park management decisions. Both acts provide direction for connecting resource management decisions to the analysis of impacts and communicating the impacts of those decisions to the public, using appropriate technical and scientific information. Both acts also recognize that such data may not be readily available and they provide options for resource impact analysis should this be the case. Section 4.5 of Director's Order 12 adds to this guidance by stating, "when it is not possible to modify alternatives to eliminate an activity with unknown or uncertain potential impacts, and such information is essential to making a well-reasoned decision, the National Park Service will follow the provisions of the CEQ regulations (40 CFR 1502.22)." In summary, the Park Service must state in an environmental assessment or impact statement (1) whether such information is incomplete or unavailable; (2) the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific adverse impacts that is relevant to evaluating the reasonably foreseeable significant adverse impacts; and (4) an evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community. Collectively, these guiding regulations provide a framework and process for evaluating the impacts of the alternatives considered in this EIS.

GENERAL METHODOLOGY FOR ESTABLISHING IMPACT THRESHOLDS AND MEASURING EFFECTS BY RESOURCE

The following elements were used in the general approach for establishing impact thresholds and measuring the effects of the alternatives on each resource category:

- general analysis methods as described in guiding regulations, including the context and duration of environmental effects
- basic assumptions used to formulate the specific methods used in this analysis
- thresholds used to define the level of impact resulting from each alternative
- methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting park resources

These elements are described in the following sections.

GENERAL ANALYSIS METHODS

The analysis of impacts follows CEQ guidelines and Director's Order 12 procedures (NPS 2001) and is based on the underlying goal of supporting forest regeneration and providing for long-term protection, conservation, and restoration of native species and cultural landscapes at Rock Creek Park. This analysis incorporates the best available scientific literature applicable to the region and setting, the species being evaluated, and the actions being considered in the alternatives.

As described in chapter 1, the NPS created an interdisciplinary science team to provide important input to the impact analysis. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions and impact intensity thresholds.

ASSUMPTIONS

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

Analysis Period

Goals, objectives, and specific implementation actions needed to manage deer at Rock Creek Park are established for the next 15 years; therefore, the analysis period used for assessing impacts is up to 15 years. The impact analysis for each alternative is based on the principles of adaptive management, which would allow the NPS to change management actions as new information emerges from monitoring the results of management actions and ongoing research throughout the life of this plan.

Geographic Area Evaluated for Impacts (Area of Analysis)

The geographic study area (or area of analysis) for this plan includes Rock Creek Park in its entirety. The area of analysis may extend beyond the park's boundaries for some cumulative impact assessments. The specific area of analysis for each impact topic is defined at the beginning of each topic discussion.

Duration and Type of Impacts

The following assumptions are used for all impact topics (the terms "impact" and "effect" are used interchangeably throughout this document):

- *Short-term impacts* — Impacts would last from a few days up to three years following an action
- *Long-term impacts* — Impacts would last longer than three years up to the life of the plan (approximately 15 years)
- *Direct impacts* — Impacts would occur as a direct result of deer management actions
- *Indirect impacts* — Impacts would occur from deer management actions and would occur later in time or farther in distance from the action

Future Trends

Visitor use and demand are anticipated to remain relatively steady over the life of the plan, similar to what has been recorded for the past 10 years. The number of yearly visitors to Rock Creek Park has hovered at about 2 million visitors per year over the past 10 years, with a very slight upward trend since about 1996 (see figure 9 in chapter 3). There are no new facilities, access, or operations planned during the planning period that would affect visitation, and no substantial changes are envisioned in the population of the metropolitan area surrounding the park. In the absence of notable anticipated changes, it is expected that annual visitation over the life of the plan remain at about 2 million visitors per year, with slight variations from year to year.

Impact Thresholds

Determining impact thresholds is a key component in applying NPS *Management Policies* and Director's Order 12. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts. In all cases, the impact thresholds are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

CUMULATIVE IMPACTS ANALYSIS METHOD

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, "Considering Cumulative Effects" (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including alternative A.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects and plans at Rock Creek Park and, if applicable, the surrounding area. Table 24 summarizes these actions that could affect the various resources at the park, along with the plans and policies of both the park and surrounding jurisdictions, which were discussed in chapter 1. Additional explanation for most of these actions is provided in the narrative following the table.

The analysis of cumulative impacts was accomplished using four steps:

Step 1 — Identify Resources Affected

Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in chapters 3 and 4 of the document.

Step 2 — Set Boundaries

Identify an appropriate spatial and temporal boundary for each resource. The temporal boundaries are noted at the top of table 24 and the spatial boundary for each resource topic is listed under each topic.

Step 3 — Identify Cumulative Action Scenario

Determine which past, present, and reasonably foreseeable future actions to include with each resource. These are listed in table 24 and described below.

Step 4 — Cumulative Impact Analysis

Summarize impacts of these other actions (x) plus impacts of the proposed action (y), to arrive at the total cumulative impact (z). This analysis is included for each resource in chapter 4.

TABLE 24. CUMULATIVE IMPACT SCENARIO

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (15 years)
Temporal boundaries for all resources are from the mid-1960s when deer were first sighted in Rock Creek Park to 15 years from the completion of the White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), unless otherwise noted.				
Vegetation	Rock Creek Park and adjacent land owners	Increasing deer population Adjacent property landscaping Park operations and maintenance (especially landscaping and exotic plant control) Boundary encroachment / urban development Pests and disease– gypsy moths (*Lymantria dispar*) and chestnut blight Vandalism (fire) Dumping Illegal camping Off-trail users/social trails Visitor uses Scientific research	Same as past actions plus: Pests and disease – dogwood anthracnose, gypsy moth management—monitoring	Same as current actions plus: Reconstruction of Rock Creek Park and Potomac Parkway and Beach Drive Asian longhorned beetle, emerald ash borer
Soils and Water Quality	Rock Creek Park and Rock creek watershed	Urban development Impervious surface run-off Off-trail users / social trails Dumping Illegal camping Sewer overflows Park maintenance and operations Visitor uses Agricultural discharge in headwaters Flood events	Same as past actions plus: Headwater improvements	Same as current actions plus: Reconstruction of Rock Creek Park and Potomac Parkway and Beach Drive Combined sewer overflow improvements (D.C. Water)
Wetlands and Floodplains	Rock Creek Park	Urban development Off-trail users / social trails Dumping Park maintenance and operations Visitor uses Flood events	Same as past actions	Same as current actions plus: Reconstruction of Rock Creek Park and Potomac Parkway and Beach Drive

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (15 years)
Temporal boundaries for all resources are from the mid-1960s when deer were first sighted in Rock Creek Park to 15 years from the completion of the White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), unless otherwise noted.				
Wildlife and Wildlife Habitat (including deer)	Rock Creek Park and typical deer movement outside park	Increasing deer population Urban development Park management and operations Rabies, West Nile virus Illegal camping Poaching Dumping Traffic/Vehicle collisions Visitor uses Exotic plant control Off-trail users / social trails Nonnative wildlife / unrestrained pets Range expansion (large mammals) Fish passage Improvements Scientific research	Same as past action, plus epizootic hemorrhagic disease (deer), testing for Chronic wasting disease	Same as past actions plus: Possible rabies vaccine trials More development – Metropolitan Branch Trail Chronic wasting disease (deer) West Nile virus
Rare, Unique, Threatened or Endangered Species	Rock Creek Park	Exotic plant control Adjacent property landscaping Park landscaping Vandalism (fire) Dumping Illegal camping Traffic/Vehicle collisions Visitor uses Off-trail users / social trails Boundary encroachment Increasing deer population Gypsy moth management Nonnative wildlife / unrestrained pets Range expansion (large mammals) Fish passage Improvements Groundwater pollution Scientific research	Same as past actions plus: dogwood anthracnose, gypsy moth management—monitoring	Same as current actions plus: Hydrologic regime changes Asian longhorned beetle (*Anoplophora glabripennis*), West Nile virus

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (15 years)
Temporal boundaries for all resources are from the mid-1960s when deer were first sighted in Rock Creek Park to 15 years from the completion of the White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), unless otherwise noted.				
Cultural Landscapes	Rock Creek Park	Park development and maintenance Archeological survey Spread of exotic species Telecommunications facilities development Mountain/motor bikes on earthworks Vandalism (fire) Urbanization Chestnut blight and gypsy moths	Same as past actions	Same as current actions
Soundscapes	Rock Creek Park and adjacent landowners	Park maintenance and operations, including landscaping work Traffic Helicopter use Flight paths over park Emergency services Special and community events	Same as past actions	Same as past actions plus: Increased traffic Reconstruction of Rock Creek Park and Potomac Parkway and Beach Drive
Visitor Use and Experience	Rock Creek Park	Deer – increase in population Park management and operations including trails, interpretative programs Rabies, Lyme disease, West Nile virus Illegal camping Poaching Dumping Exotic plant control Traffic/Vehicle collisions Off-trail users / social trails Nonnative wildlife / unrestrained pets Urban development	Same as past actions plus: Shrinking green space surrounding park Parking	Same as present plus: Reconstruction of Rock Creek Park and Potomac Parkway and Beach Drive Possible rabies vaccine trials Tree canopy trail Trail reconstruction/improvements
Visitor and Employee Health and Safety (including adjacent landowners)	Rock Creek Park and adjacent landowners	Vehicle collisions Urbanization Crime U.S. Park Police operations	Same as past actions	Same as past actions

Impact Topic	Study Area	Past Actions	Current Actions	Future Actions (15 years)
Temporal boundaries for all resources are from the mid-1960s when deer were first sighted in Rock Creek Park to 15 years from the completion of the White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), unless otherwise noted.				
Socioeconomics	Adjacent landowners	Landscaping impacts Exotic plants (from park) Increase in deer population Damage from other pests/animals	Same as past actions	Same as past actions
Park Management and Operations	Rock Creek Park	Park management, maintenance, and operations U.S. Park Police operations Budgetary constraints Traffic	Same as past actions plus: Archeological survey Changes in recreation	Same as current plus: Possibly new U.S. Park Police station

CUMULATIVE IMPACT SCENARIO

ROCK CREEK PARK PLANS, POLICIES, AND ACTIONS

Park Plans and Policies. The Rock Creek Park General Management Plan (NPS 2005a), Natural Resources Management Plan (NPS 1996a), Long Range Interpretive Plan (NPS 2010b), Draft Invasive Exotic Plant Management Plan (NPS 2004a), various cultural landscape reports, and the Fort Circle Park General Management Plan (NPS 2004b) are all park planning documents that include policies, goals, or desired conditions, that, when implemented, could contribute to the cumulative effects on the resources addressed by this plan. These plans are described in the chapter 1 under "Relationship to Other Planning Documents for Rock Creek Park."

Park Operations and Maintenance. Past, present, and future park operation and maintenance activities have the potential to impact numerous resource areas. Activities that would be considered include, but are not limited to:

- hazard tree removal
- exotic plant control
- routine maintenance along roads and picnic grounds
- trail maintenance
- various cultural and natural resource management actions
- interpretive and educational programs
- landscape maintenance (e.g., mowing and trimming)
- volunteer activities (stream and park cleanups)
- future telecommunication facilities

Vehicle Collisions. Starting in 1981, Rock Creek Park began collecting data on wildlife roadkill in Rock Creek Park. The first deer roadkill was recorded in 1989. Because heavy commuter and local use of park roadways, wildlife and deer/vehicle collisions are likely to continue within Rock Creek Park.

Traffic. Rock Creek Park contains a number of park roads that serve as local commuter routes. Beach Drive, which bisects the length of the park from the Maryland state line to the Rock Creek and Potomac Parkway, was designed as an internal park touring road to provide recreational access to the valley. Today, Beach Drive is a multiuse resource within the park that functions as a north-south commuter route during the week. On weekends and holidays, portions of Beach Drive are closed to vehicular traffic and used as a recreational area by pedestrians, bicyclists, and others participating in nonmotorized activities. Rock Creek and Potomac Parkway serves as a travel corridor that connects Beach Drive and Rock Creek Park with Potomac Park.

Visitor Uses

Visitor use itself can contribute to impacts to resources. Examples include active recreation uses, including golf, tennis, horseback riding, as well as trail use.

Horseback Riding. Rock Creek Park contains horse stables, as well as horseback trails throughout the park. Horseback riding has the potential to increase or introduce nonnative species through animal feed or animal wastes, as well as create trail erosion from heavy use.

Rock Creek Park Golf Course. The Rock Creek Park golf course is a 4,798-yard, par-65 public course noted for its hilly and challenging terrain. Park staff have noted that the golf course is an area of high deer density.

Multiuse Trail Rehabilitation. Rock Creek Park currently has plans to rehabilitate a section of multiuse trail from Peirce Mill to Potomac Park. This project will include some widening and realignment. An environmental assessment is currently being completed for this project.

Special and Community Events. Events and facilities in and around Rock Creek Park contribute to the soundscape experienced by visitors and wildlife. These include a tennis center and amphitheatre, which host numerous special events during the year, mainly during the summer months, which can add to the noise within the park. The amphitheater season extends May through September and shares parking with the tennis center. Special events include the Legg Mason tennis tournament and weekly summer events at Carter Barron. In addition to special events within the park, special events are held by park neighbors. Rock Creek Park is bordered by a number of public uses including schools, churches, embassies, and other similar institutions.

Telecommunications Facilities. There are currently two telecommunication towers permitted within Rock Creek Park in Reservation 339, one at the tennis center and one at the maintenance yard. The NPS has developed a telecommunications facilities management plan to assist the park in future decision making regarding potential wireless telecommunications facilities permit applications.

Dumping. Illegal dumping does occur within the park. This takes many forms including the dumping of landscaping waste, which increases the potential for introduction of nonnative species into the park. Dumping of other commercial waste and household waste has the potential to impact sensitive species if the dumping occurs in areas where that habitat is available. Dumping into park water bodies (i.e., illegal drain connections, draining of residential pools, spills) can also affect water quality within the park.

Vandalism. Rock Creek Park is the occasional subject of vandalism, including fire. Intentionally set fires have the potential to destroy large areas of vegetation if the events are frequent or large.

Illegal Camping. Illegal camping occurs throughout the park. Human disturbance in areas where illegal camping occurs includes displacement of wildlife, potential poaching, and vegetation removal.

Off-Trail Users and Social Trails. While there are many established trails, paths, and other use areas in Rock Creek Park, visitors often venture away from designated use areas into the undisturbed forested areas of the park to be nearer the creek or other feature. Some visitors create "shortcuts" between existing trails or to access the park from neighboring properties. If an area is accessed enough, an informal path may develop, becoming a social trail. Off-trail users in the park include geocaching clubs, running clubs, and dog walking. Off-trail users can trample vegetation, potentially during periods critical to the survival of the plants.

Nonnative Wildlife / Unrestrained Pets. In addition to native wildlife, Rock Creek Park is home to nonnative wildlife. Species include English sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), and feral dogs (*Canis lupus familiaris*) and cats (*Felis catus*). Nonnative species compete with native wildlife and/or present indirect competition through utilization of similar habitats. Unrestrained pets cause similar problems, contributing to the potential harassment of native park wildlife. For example, off-leash dogs can run through vernal pools disturbing sediments, which can cover amphibian eggs and interrupt breeding behavior.

Mountain/Motor Bikes on Earthworks. The Fort Circle Parks contain many earthworks and unauthorized recreational use of the earthworks as ramps for mountain and motorbikes negatively affects the resource by contributing to erosion.

Plant Pests and Disease. Several pests or disease can cause adverse impacts to vegetation throughout the park. Since the mid-1970s, the most prevalent pest concern at Rock Creek Park has been **gypsy moth**,

which the park controlled through spraying in 1989 and 1990 and now monitors. Currently, and in the future, additional concerns include **dogwood anthracnose**, **emerald ash borer (*Agrilus planipennis*)**, and the **Asian longhorned beetle**.

Deer and Wildlife Disease (Rabies, West Nile virus, Lyme disease, Chronic Wasting Disease, Epizootic Hemorrhagic Disease). Park habitat and wildlife are influenced by a number of wildlife diseases. In the 1980s, there was an outbreak of **rabies** in raccoons (*Procyon lotor*) living in the park. Rabies vaccine trials have been proposed in the future, but would require additional compliance by the park before implementation. **West Nile virus**, an established factor in avian mortality, has been identified in more than 100 bird species. Many long distance neotropical migrant species are not only affected by the disease, but contribute to the spread of the virus along migration routes. Migratory birds moving through the region may be infected by West Nile virus, and there are documented cases within the region and the park. **Lyme disease** is carried by ticks that are hosted by deer and other animals. **Epizootic hemorrhagic disease** (EHD) has been found at the National Zoo and other places near the park. A future concern related to deer health in Rock Creek Park includes the possibility of occurrence of Chronic Wasting Disease (CWD), as described more fully in the "Affected Environment" section of this plan/EIS.

Range Expansion (Large mammals). Coyote (*Canis latrans*) sightings continue to be reported to park staff, as recently as fall 2010. Coyotes have been seen in several areas of the park and in adjacent neighborhoods. A black bear (*Ursus americanus*) was seen in Rockville in June 2007, and in 2001 a black bear was struck by a vehicle on the Baltimore-Washington Parkway.

Fish Passage Improvements. As a part of the Woodrow Wilson Bridge project, man-made barriers to fish movement in Rock Creek Park were recently removed. The project, which began in December 2003, removed or bypassed several man-made barriers that had prevented herring and other migratory fish from returning to upriver spawning areas. In Rock Creek Park, six fish barriers were removed or modified, while two more were remedied in the adjacent National Zoological Park and a fish ladder was constructed at the Peirce Mill dam. Ongoing maintenance and monitoring at the fish ladder continue.

Flood Events. Rock Creek floods out of its banks once a year on average. About every five years the creek experiences a large flood event. The last major flood was in June 2006, which caused extensive damage in the park. The worst flood ever recorded in the park was caused by Hurricane Agnes in 1972 (K. Ferebee, pers. comm. 2008b).

Hydrologic Regime Changes. Hydrologic regime change is a potential future event; as the creek erodes and the channel deepens itself, the hydrologic regime could be altered.

Groundwater Pollution. Groundwater pollution has occurred in the past through point sources such as illegal dumping and may occur in the future. There have been leaking underground heating oil storage tanks in and adjacent to the park that have had some effect on groundwater. There are many potential sources of groundwater pollution within the urban development that surrounds the park, and it is possible that something could happen at any time to contaminate groundwater.

Parkwide Archeological Survey. Rock Creek Park has completed a parkwide archeological survey. This will provide information necessary to manage the park's historic resources effectively and develop information and material to interpret the history and prehistory of the park.

Scientific Research. Rock Creek Park frequently receives applications for research permits to conduct scientific studies in the park. Permits issued in the past include research on water quality, plant surveys, and wildlife. Requests for scientific research studies are processed as received. These requests are expected to continue into the future.

Reconstruction of Rock Creek and Potomac Parkway and Beach Drive. Rock Creek Park will be reconstructing the Rock Creek and Potomac Parkway from P Street to Calvert Street and Beach Drive

from the Parkway to the Maryland/District of Columbia boundary line to eliminate unsafe driving conditions by reconstruction and rehabilitation. An Environmental Assessment was completed in 2006.

LOCAL/STATE PLANS, POLICIES, AND ACTIONS

Deer Management Plans and Programs of Neighboring Jurisdictions. Neighboring jurisdictions have implemented deer management plans and actions (Montgomery County) or have functions that address control of animals and disease prevention (District of Columbia). These are described in the chapter 1 under "Current Deer Management at Rock Creek Park and in Surrounding Jurisdictions."

Landscaping on Adjacent Properties and within the Park and the Spread of Invasive Exotic Plant Species. Many residential land uses are located along the boundary of Rock Creek Park. On some of these residential properties nonnative vegetation has been planted for landscaping and these exotic plants have spread into Rock Creek Park. Likewise, some of the Rock Creek Park administered units are designed landscapes that include exotic vegetation, which has the potential to expand from outside the designed unit into Rock Creek Park's natural landscapes. Exotic vegetation, when introduced in the park, can compete with native vegetation. Historical plant species that are part of the cultural landscape can be impacted and in some cases replaced by these exotic species as well.

Urban Development and Boundary Encroachment. Rock Creek Park is located in a highly-urbanized area that has undergone much development since the mid-1970s and will continue to develop in the foreseeable future. Some of this development has occurred along the boundaries of Rock Creek Park, and at times on small portions of Rock Creek Park land. For example, Tregaron Estates, a 20-acre wooded parcel adjacent to Reservations 365 and 635, has been proposed for subdivision development. Urbanization of the area has limited, and will continue to limit, the amount of green space and wildlife habitat available in the area, putting more pressure on Rock Creek Park's resources and displacing some wildlife. Bordering neighbors have complained about deer browse on landscape vegetation. Other concerns with urbanization include an increasing amount of impervious surfaces, which would lead to an increase in stormwater runoff.

D.C. Water Combined Sewer Overflows Including Planned Improvements. Approximately one-third of the District of Columbia is served by combined sewers, including the parts of Rock Creek Park south of Piney Branch. When the capacity of a combined sewer is exceeded during storms, the excess flow, a mixture of sewage and stormwater runoff known as combined sewer overflow (CSO), is discharged into Rock Creek and other tributary waters, affecting water quality. The District of Columbia's National Pollutant Discharge Elimination System permit requires the preparation of a Long-Term Control Plan (LTCP) to control CSO discharges to the area waterways. In response to public comments, the final LTCP proposed significant reductions in CSO discharges. In addition, D.C. Water's 10-year capital improvement program through fiscal year 2010 addresses wastewater treatment, CSO, stormwater, and sanitary sewer, as well as water service. D.C. Water's plans include improving some drainage conditions, including separating the combined sewer in Piney Branch to reduce the amount of raw sewage entering the Piney Branch Tributary, and mitigating the stormwater flow into Dumbarton Oaks Park by capturing the flow before it enters the park and piping it around the park. The flow would be discharged at a point below the park to reduce stormwater erosion. As of 2011, D.C. Water has begun to improve drainage conditions by separating several combined sewers along Rock Creek Parkway.

Agricultural Activity in Rock Creek Headwaters. The headwaters of Rock Creek are located in Montgomery County, Maryland. Historically, discharges from agricultural activities in the creek headwaters have affected downstream waters. Currently, and in the reasonably foreseeable future, Montgomery County is implementing measures to reduce these impacts and improve water quality through use of buffers and other measures.

Flight Paths Over Park. These flights include helicopter use, including the presidential helicopter, military plane overflights, and the flight path for Ronald Reagan National Airport, a small portion of

which is located over Glover-Archbold Park and Reservation 404. According to the regional airports website (Metropolitan Washington Airports Authority 2008), there are about 775 flights in and out of the airport daily (based on July 2008 figures). Some of these extend over the Palisades neighborhood, which includes Glover-Archbold Park. According to the Chair of the Airport Noise Committee of the Palisades Neighborhood Association, depending on wind direction and velocity, the neighborhood is overflown by about 400 jet airplane arrivals or departures on weekdays and 300-350 on Saturdays and Sundays (D. Pavek, pers. comm. 2008).

U.S. Park Police. The current Rock Creek District 3 Station is in Rock Creek Park; park police patrol 1,800 acres of Rock Creek Park and adjacent parks, such as Meridian Hill, Glover-Archbold Park, Fort Totten (and other Fort Circle Parks), portions of the C&O Canal, and the newly acquired Capitol Crescent Trail located along a portion of the Potomac River. Depending on funding, a new station may be located outside the park or inside the park at an area known as H3 Park Police Horse Stables, where wood chipping activities currently occur. Also located within Rock Creek Park along the Rock Creek and Potomac Parkway is Edgewater Stables, where U.S. Park Police horses are kept.

Metropolitan Branch Trail. The District of Columbia is currently in the process of planning and implementing the Metropolitan Branch Trail, an 8-mile, multiuse trail that runs from Silver Spring, Maryland to Union Station in the District. The trail will provide a direct access route to seven of the Washington Area Metro Red Line stations and will connect to the Washington area's trail network at the Capital Crescent Trail and the East Coast Greenway. Part of the trail is proposed to cross NPS-owned land at Fort Totten.

VEGETATION

GUIDING REGULATIONS AND POLICIES

The NPS *Organic Act of 1916* and the NPS *Management Policies 2006* (NPS 2006) direct parks to provide for the protection of park resources. The *Management Policies 2006* state that "the Service will not attempt to solely preserve individual species (except threatened or endangered species) or individual natural processes; rather, it will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological ecosystems" (NPS 2006, sec. 4.1). The policies further state, "The Service will not intervene in natural biological or physical processes, except … to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities, or when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities" (NPS 2006, sec. 4.1).

With regard to the restoration of natural systems, the NPS "will reestablish natural functions and processes in parks" and it "will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated" (NPS 2006, sec. 4.1.5).

Rock Creek Park's General Management Plan (2005a) includes the following desired conditions that pertain to vegetation:

- native species populations that have been severely reduced ….are restored where feasible and sustainable
- invasive species are reduced in number and areas, or eliminated from natural areas of the park

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

Maps showing vegetation cover within Rock Creek Park, communications with NPS staff, and past monitoring data were used to identify baseline conditions within the study area. Available information on the condition and composition of the vegetation in the park was compiled. The primary component of the forest that provides the best indicator of successful forest regeneration is the number of tree seedlings observed and their ability to reach heights above the average deer browsing height (60 inches or 150 centimeters). Thresholds identified for taking management action were based on recent research conducted in habitat similar to that at Rock Creek Park and are based on a certain number of seedlings per monitored plot to indicate the degree of regeneration, as described under "Thresholds for Taking Action" in chapter 2. Therefore, the intensity level for major impacts to woody vegetation was based on a similar threshold, assuming that 67% or more of the monitored plots should have 51 or more seedlings to maintain or achieve good forest regeneration at low (desired) deer densities. But, current deer densities are at high levels. This requires that 67% or more of the plots have 153 tree seedlings. The remainder of the impact thresholds were defined qualitatively, based on professional judgment and observations of vegetation cover.

IMPACT THRESHOLDS FOR WOODY AND HERBACEOUS VEGETATION

Negligible: A reduction in vegetation cover would occur, but the change would be so small that it would not be of any measurable or perceptible consequence. Observed seedling density would indicate that very good regeneration was occurring.

Minor: A reduction in vegetation cover would occur, but it would be small, localized, and of little consequence. Observed seedling density would represent that fair to good regeneration was occurring.

Moderate: Some reduction in vegetation cover would occur, and it would be measurable and of consequence to the resource, but localized. Observed seedling density would represent that poor regeneration was occurring.

Major: A noticeable reduction in vegetation cover would occur. The change would be measurable and would result in a possible permanent consequence to the resource. Observed seedling density would represent that little to no regeneration was occurring. Based on Stout's research, 67% or more of the monitored plots would have fewer than 51 seedlings at low deer densities per plot (appendix A).

AREA OF ANALYSIS

The area of analysis for assessing impacts on vegetation is all of Rock Creek Park. The area of analysis for cumulative impacts is the park and adjacent lands encompassing typical deer movement outside the park boundary.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Park staff would continue monitoring the deer population and conducting activities to protect rare and unique plant species and landscaping, such as installation of small area protective caging and limited application of repellents.

WOODY VEGETATION. As described in chapter 3, the park has been monitoring woody vegetation growth within the park for over 19 years, with 27 long-term plots established in 1990. In 2000, plots (fenced plots paired with unfenced plots) were constructed. Monitoring results have shown that the mean tree seedling stocking rates or weighted measure declined substantially from 1991 through 2007, and all yearly action thresholds were below the 67% stocking rate recommended by Stout's research (appendix A). None of the plots that were measured in 2007 had at least 153 seedlings per plot, which is considered the minimum for successful forest regeneration under high deer densities. Data from all nine years of monitoring (Krafft and Hatfield 2011) show that vegetation in plots protected from deer herbivory showed significantly greater vegetative cover compared to open plots, and this effect was most pronounced for woody and shrub cover. With respect to vegetation thickness, the nine-year monitoring of paired plots indicates 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. Data from the open long-term plots (2007) show that the stocking rate for 2007 was at 2.26 $\pm$ 0.32%, well below the recommended 67% stocking rate (Hatfield 2008). Under alternative A, it is expected that the deer population would continue at high densities (albeit with yearly fluctuations) and deer would continue to graze on plants to the extent that seedling densities would remain at or below these levels. Any periodic deer population declines would not be low enough or last long enough for forest regeneration to occur or vegetation to fully recover. Based on the most recent monitoring results and the expected high numbers of deer over the life of the plan, alternative A would have long-term, major adverse impacts on woody vegetation due to the amount of deer browsing and the associated reduction in numbers of stems per plot documented by monitoring.

The park has previously caged woody plant species to protect them from deer browsing, including some planted restoration areas and landscaped areas. These caged areas would continue to be maintained. New caging would be used on a limited basis for any newly identified rare species or for landscaping or plantings sensitive to deer browsing. This action would have long-term beneficial impacts on the plants or areas that were protected by prohibiting deer browsing. However, the impact on the majority of park vegetation that was not caged (as well as on vegetation outside the park boundary that is not caged and is palatable to deer) would continue to be adverse, long term, and major because no measures would be taken to limit or control deer population size or growth under this alternative.

Under this alternative, repellents would continue to be used on a limited basis on landscape plantings. The effectiveness of repellents generally decreases as deer density increases and/or other food availability decreases. Therefore, this action would have short-term, beneficial impacts on plants treated with repellents, but as the deer numbers increased or the food availability in the park decreased, the effectiveness of repellents could be expected to decline. Similar to caging, the impact on the majority of the vegetation within the park that was not treated with repellents would continue to be adverse, long term, and major.

Monitoring vegetation plots and maintaining caged areas would result in very limited trampling of vegetation as staff traveled to and around any caged areas that are not located along trails. However, such impacts would be temporary, as these activities typically take only a few days per year, and the amount of vegetation affected by these actions would be minimal, as they would occur in only a few areas. Therefore, the impact of these activities would be short term, adverse, and negligible.

HERBACEOUS VEGETATION. Under alternative A, the impacts to herbaceous vegetation would be similar to those described for woody vegetation, because no action would be taken to control deer numbers. Based on observations and research conducted within the park, deer browsing has already caused noticeable changes to herbaceous vegetation, including a substantial reduction in plant cover in unfenced plots that can be directly attributed to deer browse (see discussion in Affected Environment - Vegetation). Vegetation outside the park boundary has also been adversely affected to varying degrees, depending on the species. Not controlling the growth of the deer population would result in adverse, long-term, major impacts on herbaceous vegetation, as deer browsing would be expected to cause noticeable changes to the abundance and diversity of herbaceous vegetation throughout the area of analysis.

Activities such as monitoring, caging construction and maintenance, or the application of repellents would not result in any measurable or perceptible change in herbaceous vegetation, resulting in adverse, short-term, negligible impacts. Vegetation within small caged areas would benefit from this level of protection over the long term, and repellent use would have a short-term benefit; however, such benefits would be limited to the small areas of the park.

Cumulative Impacts

Adverse impacts to vegetation within and surrounding the park have occurred and will continue to occur from several actions not related to park operations. Increasing urban development in the areas surrounding the park has resulted in encroachment into park lands and removal of vegetation in limited areas, and adjacent property landscaping has been and continues to be a source of exotic plants that can spread into the park and displace native vegetation, causing long-term minor localized adverse impacts. Acts of vandalism, dumping, illegal camping, and off-trail use, have all had minor localized adverse impacts on vegetation due to trampling and burying of vegetation, or spreading of noxious weed seeds, and will continue to do so in the future. Past fires have affected some areas, which have regrown, but with more nonnative species. Past actions within the park, such as construction of facilities and roads, have resulted in removal of vegetation and adversely affected forest resources to a minor extent in limited areas. Gypsy moths and chestnut blight have had a large, relatively widespread adverse impact in the past, but the park's efforts to control gypsy moths, and other plant diseases and pests, have reversed some of

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 × 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

more than 67% of the plots would have more than 51 seedlings per plot (low deer density, action threshold). Therefore, existing adverse long-term impacts would be reduced from major to moderate and eventually minor levels, with impacts decreasing in intensity over time as regeneration progressed.

A number of other actions would occur as part of sharpshooting, as described in more detail in chapter 2, which would further affect vegetation in limited areas. These actions include setting up bait stations, occupying shooting areas, and dragging deer to locations for processing and transport. Baited areas would be small, the bait would not remain long, and any uneaten bait would be removed after annual sharpshooting efforts had been completed. Sharpshooting might take place from elevated positions, which would require portable tree stands to be temporarily hung in trees. Such portable stands do not damage the tree (no nails or screws) and would not have an adverse impact to woody vegetation. Removing deer carcasses from the kill site could require dragging over vegetation, which would temporarily trample some woody vegetation. All of these actions (bait stations, shooting stations, and dragging deer) would result in some trampling of woody vegetation; however, the area of impact would be small (less than 1% of park vegetation). The impact of trampling under this alternative would be adverse, short term, and negligible.

It is the park's intention to donate as much of the meat as possible to local charitable organizations. If this is done, there would be little waste to be buried or disposed of at an appropriate processing facility. If meat cannot be donated, carcasses may be disposed of in a burial pit that would be constructed in a developed area that has already been disturbed. Disposal pits would be approximately 8 feet wide, 8 feet long, and 5 feet deep. They would be dug prior to direct reduction activities and covered and fenced to prevent entry. Soil removed from the pits would remain onsite and would be covered to prevent erosion. Although these disposal sites could result in the removal of some vegetation, sites would be selected in areas outside historic districts, previously disturbed, and free of trees. Therefore, the impact on woody vegetation would be adverse, short term, and negligible.

Actions related to the capture and euthanasia of deer, which would generally be used in circumstances where sharpshooting would not be appropriate due to safety concerns (e.g., proximity of nearby residences or other occupied facilities), would be similar to those described for sharpshooting in that deer would be removed from the park through lethal means. The difference would be the way in which deer were captured and killed. This method would require physically capturing and handling deer before euthanizing them. Up to 10 deer annually might be taken under this method. Limited trampling would occur with the setting up of traps (rather than setting up bait stations), resulting in adverse, short-term, negligible impacts. Given that this method could be used at any time of the year, and that only up to 10 deer would likely be removed annually, the waste or carcasses would be buried onsite in a previously disturbed area. This would have no noticeable impact on woody vegetation in the park.

HERBACEOUS VEGETATION. Under alternative C, the impacts to herbaceous vegetation would be the same as what was described for woody vegetation. The primary impact within the park would be the result of immediate action taken to control deer numbers. It is expected with rapidly reduced deer browsing pressure, the changes previously observed in herbaceous vegetation would start to reverse, as was found in a number of exclosure studies conducted in the park. Immediately reducing and controlling the growth of the deer population would result in beneficial, long-term impacts on herbaceous vegetation, which could regenerate over time with decreased deer browsing.

Using bait stations, dragging deer carcasses, setting traps, shooting deer, burying waste and/or carcasses, monitoring, and maintaining fences, would not result in any measurable or perceptible change in herbaceous vegetation. These activities would result in adverse, short-term, negligible impacts.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative C. Quickly reducing the park's deer population would provide beneficial, long-term effects,

with adverse impacts being reduced to negligible or minor levels over time. These effects, combined with other beneficial effects, would result in cumulative impacts that would be primarily beneficial. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to vegetation under this alternative would be mostly beneficial and long term.

Conclusion

Enhancing natural forest regeneration by quickly reducing deer browsing pressure under alternative C, and by maintaining a smaller deer population through direct reduction, would result in beneficial, long-term impacts because both woody and herbaceous vegetation throughout the park could thrive and recover where effects have been noted. Over time as natural forest regeneration occurred, adverse, long-term, major impacts that could be expected if the deer herd continued unchecked would be reduced to minor levels. Under alternative C, less than 1% of the park's woody or herbaceous vegetation would be affected by trampling at bait stations, shooting sites, trapping locations, or disposal sites. Therefore, adverse impacts of these actions would be short term and negligible. Past, present, and future activities, when combined with the reduced pressure on woody and herbaceous vegetation and subsequent forest regeneration, would result in beneficial, long-term cumulative impacts.

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

Analysis

Under alternative D, direct reduction as defined in alternative C would be implemented to reduce the size of the deer herd; once the goal of 15 to 20 deer per square mile was obtained and natural forest regeneration could occur, reproductive control and direct reduction (if needed) would be used to maintain the deer population at the reduced level.

WOODY VEGETATION. The repellents and small caged areas described under alternative A would continue to be used under alternative D, but no additional caging or repellent use would occur under this alternative. As described for alternative C, up to 147 deer (approximately one-half) 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 target density goal of 15 deer per square mile was achieved. It is expected with rapidly reduced deer browsing pressure (dropping from about 67 deer per square mile (2009) to about 15 deer per square mile) the number of tree and shrub seedlings would increase, and the number of seedlings surviving to sapling stage would also increase, providing the necessary growth for natural forest regeneration. The closer the deer density was to 15 to 20 deer per square mile, the higher the chance to achieve successful forest regeneration (Bowersox et al. 2002; Horsley et al. 2003; Stout 1998; Marquis et al. 1992).

Providing immediate reduction and control of the deer population would result in beneficial, long-term impacts on the woody vegetation, because deer browsing would be substantially reduced, the abundance and diversity of woody vegetation throughout the park could thrive and recover, and the vegetation would be more resilient in the face of any climate change. As described for alternative C, it is expected that after approximately 10 years monitoring would show that more than 67% of the plots had more than 51 seedlings per plot (low deer density action threshold – see appendix A). As fair to good regeneration began to occur, the adverse impact level would be reduced from major to moderate and eventually minor.

As described for alternative C, a number of other actions would occur as part of implementing sharpshooting, such as setting up bait stations, occupying shooting areas, and dragging deer carcasses to locations for processing and transport. All of these actions would result in some trampling of woody vegetation; however, the area of impact would be small (less than 1% of vegetation), and the impact would be adverse, short term, and negligible given the small size of the affected area and the short duration of the impact. As forest regeneration increased, more woody stems might be affected by each

action; however, the overall amount of vegetation affected would still be small, and the impact would be short term and negligible.

During the sharpshooting process, any waste and/or carcasses of removed deer that would need to be disposed of onsite could result in the removal of some woody vegetation. However, sites selected for disposal would be in previously disturbed areas and free of trees. Therefore, the impact on woody vegetation would be adverse, short term, and negligible.

The actions related to capture and euthanasia could result in trampling of vegetation because of setting up traps (rather than setting up bait stations), with adverse, short-term, negligible impacts. Given that this method could be used at any time of the year, and that only up to 10 deer would be removed by this method, the waste and/or carcasses would likely be buried onsite in a previously disturbed area where woody vegetation would not need to be removed or left to decompose naturally on the surface, so there would be no impact on the woody vegetation in the park.

Reproductive controls would be implemented after direct reduction efforts had initially reduced the population size to maintain the desired deer population level. However, the success of implementing reproductive controls on a deer population that has undergone several years of direct reduction efforts would depend on technological advances, the sensitivity of deer 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 direct reduction efforts due to deer behavior changes in response to previous human interaction. If reproductive control could be successfully implemented, deer numbers could be kept low and impacts on vegetation would be adverse, long term, and minor.

Assuming a park deer population at a density of 15 deer per square mile when reproductive controls were initiated in year 4, there would be a maximum of about 70 deer in the park (approximately 4.69 square miles). Assuming that 65% of the deer are does, there would be 45 does in the population. The majority of the does (90%, or 41 does) would need to be treated so that they could be identified for retreatment in successive years. It is estimated that up to 5 deer per day could be treated (taking about 8 days), given the increased effort to locate deer with lower deer numbers. The population would continue to be monitored for growth. If the deer population increased during the reproductive control application under this alternative or if reproductive control was not available, periodic direct reduction would be initiated to maintain the population density at the identified goal.

Some of the actions involved in implementing reproductive control (similar to implementing constructing fences and sharpshooting) could result in trampling of woody vegetation; however, these actions would last only a few hours to a few days in any location, and the adverse effect on vegetation would be negligible.

Assuming that reproductive controls could be used at a parkwide level to maintain the deer population size, impacts on woody vegetation would be beneficial and long term because a substantial reduction in deer browsing would allow the abundance and diversity of woody vegetation throughout the park to recover.

HERBACEOUS VEGETATION. The impacts to herbaceous vegetation under alternative D would be the same as those described for woody vegetation. The primary impact would be the result of actions taken to immediately reduce deer numbers, thus quickly reducing deer browsing pressure and allowing adverse effects on herbaceous vegetation to be gradually reversed, as found in a number of exclosure studies conducted in the park. Using direct reduction and/or reproductive controls to maintain the lowered deer population would allow herbaceous vegetation to continue regeneration through the life of the plan. Long-term impacts on herbaceous vegetation from reduced deer browsing would be beneficial.

Activities such as using bait stations, dragging deer carcasses, setting traps, shooting or treating deer, monitoring, or maintaining fences would not result in any measurable or perceptible change in herbaceous vegetation, so impacts would be adverse, short term, and negligible.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative D. Rapidly reducing the deer population would relieve browsing pressure on the majority of the park's vegetation, providing long-term beneficial impacts and reducing adverse impacts to minor levels. Some adverse impacts would affect woody and herbaceous vegetation as a result of trampling due to setting bait stations, occupying shooting locations, removing deer carcasses, and using traps. However, these impacts would be isolated, affecting less than 1% of the park, resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would give the forest the opportunity to thrive and regenerate, resulting in beneficial impacts that would combine with other beneficial effects, resulting in cumulative impacts that would be primarily beneficial. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to vegetation under this alternative would be mostly beneficial and long term.

Conclusion

Enhancing natural forest regeneration by quickly reducing deer browsing pressure under alternative D, and by maintaining a smaller deer population through the use of reproductive control (and direct reduction if needed) would result in beneficial, long-term impacts because both woody and herbaceous vegetation could thrive and recover throughout the park. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to minor levels. Under alternative D, less than 1% of the park's woody or herbaceous vegetation would be affected by trampling at bait stations, shooting sites, trapping locations, or disposal sites. Therefore, adverse impacts of these actions would be short term and negligible. Past, present, and future activities, when combined with the reduced pressure on woody and herbaceous vegetation (forest regeneration) expected under this alternative, would result in beneficial, long-term cumulative impacts.

SOILS AND WATER QUALITY

GUIDING REGULATIONS AND POLICIES

The *Clean Water Act* (33 USC 1251 et seq.) protects and restores the quality of natural waters through the establishment of nationally recommended water quality standards. Under the oversight of the U.S. Environmental Protection Agency (EPA), states administer provisions of the *Clean Water Act* by establishing water quality standards and managing water quality. According to EPA regulations, water quality standards must (1) designate uses of the water; (2) set minimum narrative or numeric criteria sufficient to protect the uses; and (3) prevent degradation of water quality through antidegradation provisions.

As described in chapter 3, in administering the *Clean Water Act*, the District of Columbia has identified Rock Creek and its tributaries for all five beneficial use classes and also as "Special waters of the District of Columbia." It is intended that the water quality of such designated waters be maintained and not allowed to degrade.

In supporting federal and state regulations the NPS *Management Policies 2006* state that the NPS will "take all necessary actions to maintain or restore the quality of surface waters and groundwaters within the parks consistent with the *Clean Water Act* and all other applicable federal, state, and local laws and regulations" (NPS 2006, sec. 4.6.3). The policies also instruct park units to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources (NPS 2006, sec. 4.8.2.4).

Rock Creek Park's General Management Plan (2005a) includes the following desired condition that pertains to water quality: surface waters and groundwater are protected or restored such that water quality as a minimum meets all applicable District of Columbia water quality standards.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

Impact intensities for soils and water quality were derived from the available soils information and park staff observations of the effects on soils from loss of vegetation and from water quality observations by park staff. The only aspect of water quality that is being assessed is turbidity, which is primarily affected by sedimentation related to lack of ground cover, assuming that removal of vegetation could result in increased soil erosion, nonpoint runoff, and stream flows. The thresholds for the intensity of an impact are defined as follows.

Negligible: Impacts to soils and water quality would not be detectable or measurable. Water quality would be within historical conditions.

Minor: Soil impacts would be detectable and occur within a small area. Resulting changes in soil erosion rates would cause only detectable and localized impacts to water quality that are within historical or baseline water quality conditions and flows.

Moderate: Impacts to soils would be readily apparent and result in impacts to soil character over a relatively wide area. Resulting changes in soil erosion rates could cause occasional and temporary alterations to historical or baseline water conditions during some storm events.

Major: Impacts to soils would be readily apparent and widespread. Resulting changes in soil erosion rates would cause frequent alterations in the historical or baseline water quality conditions over a large area.

AREA OF ANALYSIS

The area of analysis for assessment of impacts of the various alternatives is the park. For cumulative impacts, the area of analysis is the Rock Creek watershed, which includes the main steam and tributaries in the park and their respective drainage basins.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Since no measures would be implemented to actively reduce the size of the deer population under alternative A, loss of vegetative cover would continue to increase as a result of the expected continued high numbers of deer and associated deer browsing. Park staff would continue activities to protect native plants, such as creating small caged areas; however, such small exclosures would do little to protect against soil erosion and may cause deer to browse elsewhere, reducing cover in small areas and exposing soils to erosion. Installation and maintenance of small caged areas would result in negligible adverse impacts to soils. Although there is no park-specific data connecting deer and the loss of vegetative ground cover, studies have shown that large herbivores, including white-tail deer, have known direct effects on ecosystems through trampling (Persson et al. 2000), soil compaction (Heckel et al. 2010), and known indirect effects such as soil degradation (Wardle et al. 2001) Park- specific data from Culver and Sereg (2004) showed water quality degraded at several of the springs along Rock Creek. Under alternative A it is expected that the deer population would increase or remain at high levels over the life of the plan, albeit with periodic decreases that could occur due to variables, such as herd health or weather conditions in any particular year. The expected loss of vegetative ground cover from increased deer browsing over time could eventually result in increased sedimentation and high turbidity if exposed soils are washed away and into surrounding water bodies by heavy rainfall. This would especially affect the smaller tributaries and around seeps and springs, which have less volume of water to dilute the additional sediment load. Therefore, alternative A would result in adverse, long-term, negligible to minor impacts on the soils and water quality of the park.

Cumulative Impacts

Cumulative impacts on soil and water quality would arise not only from activities within the park, but would also be heavily influenced by past, present, and future actions in the areas adjacent to the park. In particular, adverse effects have occurred and continue to occur from the increase in urban development surrounding the park and in upstream areas. As a result, impervious surface runoff and nonpoint pollution that causes siltation and high levels of turbidity and other pollutants in Rock Creek and its tributaries has increased. This has resulted in short- and long-term minor to moderate adverse impacts. The smaller tributaries are especially susceptible to short-term episodes of high siltation and higher impacts because of their lower size and flows. Sewer overflows and leaks have periodically caused short-term minor to moderate adverse impacts on water quality. The District's LTCP to control CSO discharges to the area waterways proposes significant reductions in CSO discharges, as does D.C. Water's 10-year capital improvement program through fiscal year 2010. DC Water also has plans to improve some drainage conditions, including separating the combined sewer in Piney Branch to reduce the amount of raw sewage entering the Piney Branch Tributary and mitigating the stormwater flow into Dumbarton Oaks Park by

capturing the flow before it enters the park and piping it around the park. The flow would be discharged at a point below the park to reduce stormwater erosion. All these actions would have long-term beneficial impacts on water quality and soil erosion.

Historically, discharges from agricultural activities in the creek headwaters have also affected downstream waters, causing long-term minor to moderate adverse impacts including effects of siltation. Currently, and in the reasonably foreseeable future, Montgomery County is implementing measures to reduce these impacts and improve water quality through use of buffers and other measures, resulting in long-term beneficial impacts on water quality.

Other actions within the park have contributed to soil erosion and stream sedimentation. Off-trail uses, illegal camping, various visitor uses, and park operations and maintenance activities can result in small areas of disturbed soils, causing localized negligible to minor soil erosion and associated adverse impacts on soils and water quality of nearby waters. Dumping can affect water quality, with the impact depending on the type and amount of material dumped, but mostly short-term negligible impacts. Future actions that could cause adverse impacts include utility development and construction of the parkway and Beach Drive, which could have adverse, short- and long-term, negligible to minor adverse impacts on soils and water quality.

All of these activities, when combined with the negligible to minor impacts from continued deer browsing and trampling expected under alternative A, would result in cumulative impacts that would be adverse, long term, and minor.

Conclusion

Adverse, long-term, negligible to minor impacts on soils and water quality could result from soil erosion and sedimentation due to loss of vegetation from increased deer browsing, assuming continued high numbers of deer and possible growth in the population over the life of the plan. Past, present, and future activities both inside and outside the park, when combined with the continued pressure on forest resources expected under this alternative, would result in adverse, long-term, minor impacts on soil and water quality.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Several non-lethal actions under alternative B would be implemented in combination to protect forest resources and reduce the park's deer population. Actions include the use of large-scale exclosures and reproductive control of does.

Under alternative B, approximately 14 exclosures, each encompassing 7 to 25 acres, would be used throughout the park to exclude deer from those areas for at least 10 years. This would allow reforestation within the exclosures, so they would be relocated after 10 years to a new area. The use of large exclosures could have both beneficial and adverse impacts on park soils and water quality. Revegetation within the exclosures would help minimize the potential for soil erosion in approximately 5% of the park at any one time. However, exclosures alone would not decrease overall deer browsing pressure within the park, and the benefits of the exclosures might initially be offset by adverse impacts in other areas or result in a change in browsing patterns. The exclosures would be spaced so as to prevent the funneling of deer into certain areas, and they would be relocated periodically. However, deer displaced from the exclosures might still concentrate in other areas of the park. This could have adverse impacts in those areas by further increasing the loss of vegetative ground cover, resulting in increased soil erosion and sedimentation into park streams. Adverse impacts would be long term and minor, gradually shifting to beneficial as more and more of the forest regenerated due to protection afforded by the exclosures.

Continued use of small cages and repellents would probably have little impact mitigating soil erosion and may cause deer to concentrate browsing elsewhere, resulting in increased loss of vegetation in those areas, which could in turn result in localized increased soil erosion and adverse impacts to water quality at negligible levels.

Impacts of reproductive controls would be limited. Short- to long-term negligible to minor adverse impacts could occur from use of temporary holding pens that may need to be constructed if more does are captured than can be treated in one day. Use of these would involve trampling of any vegetation within the pen areas, which could expose soils to erosion. As previously described under "Vegetation," the use of reproductive control could reduce the deer population to a limited extent if it was successfully implemented, but this would require many years to actually reduce the population, based on modeling efforts (Hobbs et al. 2000; Rudolph et al 2000; Merrill et al 2006) as well as a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008). However, any reduction in the deer population would help decrease the loss of vegetation due to deer browsing, reduce soil erosion, and would be beneficial in the long term to water quality.

Cumulative Impacts

The cumulative impacts under alternative B would be similar to those under alternative A, because the same past, present, and future activities are expected under both alternatives. The beneficial long-term impacts on soil and water quality of alternative B would slightly offset some of the adverse cumulative impacts; however, the majority of the watersheds for the park's creeks lie outside the park, where impacts might or might not be mitigated. Therefore, actions under alternative B would offset only a very small part of the overall cumulative impacts, which would continue to be adverse, long term, and minor.

Conclusion

Adverse, long-term, minor impacts to soils and water quality could occur if deer displaced by the fenced exclosures concentrated in other areas of the park, resulting in increased loss of vegetation in those areas and a potential increase in soil erosion. These impacts would gradually shift to beneficial in the long term as reforestation occurred in the large exclosures, potentially reducing soil erosion. Beneficial long-term impacts would also result from decreased vegetation loss and associated erosion and sedimentation from exposed soils, as reproductive control of the deer population would gradually reduce deer numbers over time. Cumulative impacts would be adverse, long term, and minor due to the large portion of the creeks' watersheds that are outside the park boundary, and beneficial long-term impacts occurring inside the park would offset cumulative impacts slightly.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Sharpshooting and capture and euthanasia, where appropriate, would be used to immediately reduce the number of deer within the park and to maintain a sustainable deer population of 15 to 20 deer per square mile after the third year of implementation. A smaller deer herd would allow reforestation to occur throughout the park and for woody and herbaceous vegetative cover to recover, because deer browsing pressure would be decreased. Regrowth of vegetative ground cover would reduce the potential for soil erosion and sedimentation of park streams, resulting in beneficial, long-term impacts on soils and water quality.

Continued use of small cages and minimal use of repellent would probably have little impact mitigating soil erosion and may cause deer to concentrate browsing elsewhere, resulting in increased loss of vegetation in those areas, a negligible adverse effect.

Cumulative Impacts

The cumulative impacts from alternative C would be similar to those for alternatives A and B, but with a slightly greater beneficial effect from the immediate reduction of deer numbers and the maintenance of a smaller sustainable deer population (15 to 20 deer per square mile) after the fourth year of implementation. However, as with alternative B, the beneficial impacts of this alternative would slightly offset some of the cumulative adverse impacts, since the majority of the watersheds affected lie outside the park where impacts may or may not be mitigated. Therefore, the combined actions of alternative C with other past, present, and future activities would result in adverse, long-term minor impacts.

Conclusion

Beneficial, long-term impacts on soils and water quality would result from immediately reducing the number of deer in the park and maintaining a sustainable population of 15 to 20 deer per square mile after the third year of implementation. Vegetative ground cover would be able to reestablish itself, helping reduce soil erosion and sediment loading in the park's creeks. Cumulative impacts would be adverse, long term, and minor due to the large portion of the creeks' watersheds occurring outside the park boundary; the beneficial, long-term impacts of alternative C would offset cumulative impacts slightly.

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

Analysis

Under alternative D, direct reduction would be used to initially reduce the number of deer within the park and reproductive control of does (and direct reduction if needed) would then be used to maintain a sustainable population of approximately 15 to 20 deer per square mile after the third year of implementation. The reduction and long-term maintenance of a small herd would allow vegetative ground cover to reestablish itself throughout the park and potentially reduce soil erosion, providing beneficial, long-term impacts on the soils and water quality of the park.

Continued use of small cages and repellents would probably have little impact mitigating soil erosion and may cause deer to concentrate browsing elsewhere, resulting in increased loss of vegetation in those areas, a negligible adverse effect. Therefore, overall impacts under alternative D would be beneficial and long term.

Cumulative Impacts

Cumulative impacts to soils and water quality under alternative D would be very similar to those described for alternative C, with the beneficial, long-term effects on soils and water quality resulting from the relatively rapid reduction of deer numbers and the long-term maintenance of a smaller deer herd over the life of the plan. However, as with alternative C, these beneficial effects would slightly offset the other adverse cumulative impacts occurring outside the park boundary, where the majority of the park watersheds occur. Adverse activities on adjacent lands might or might not be mitigated. Overall the cumulative impacts would be adverse, long term, and minor.

Conclusion

Impacts on soil and water quality would be beneficial and long term as a result of immediately reducing the number of deer in the park and maintaining a population of 15 to 20 deer per square mile after the third year of implementation. Vegetative ground cover would be able to reestablish itself, helping mitigate any soil erosion and sediment loading into the park's creeks. Cumulative impacts would be adverse, long term, and minor due to the large portion of the creeks' watersheds that occur outside the park boundary, where adverse actions might or might not be mitigated; the beneficial, long-term impacts of the alternative D actions in the park would slightly offset cumulative impacts outside the park.

WETLANDS AND FLOODPLAINS

GUIDING REGULATIONS AND POLICIES

As described in chapter 1, two federal executive orders (EO), EO 11990 (Protection of Wetlands) and EO 11988 (Floodplain Management) direct federal agencies to avoid adverse impacts to floodplains and wetlands. Director's Order 77-1 establishes policies, requirements, and standards for implementing EO 11990, while Director's Order 77-2 applies to all NPS proposed actions that could adversely affect the natural resources and functions of floodplains. This order states that when it is not practicable to locate or relocate development or inappropriate human activities to a site outside and not affecting the floodplain, the NPS will prepare and approve a Statement of Findings (SOF), in accordance with procedures described in Procedural Manual 77-2: Floodplain Management, and take all reasonable actions to minimize the impact to the natural resources of floodplains. Similarly, if adverse impacts to wetlands would occur from a proposed project, a SOF is prepared, unless the actions are accepted for various reasons provided in Procedural Manual 77-1, section 4.2(A). As described more fully below in the analysis, the actions proposed to manage the deer population would not adversely impact wetlands or floodplains, and no SOF were required for this project.

NPS *Management Policies 2006* specifically address wetlands and floodplains in sections 4.6.4 and 4.6.5, respectively. The policies provide protective provisions for wetlands and floodplains that reiterate the language in the DOs discussed above (NPS 2006).

ASSUMPTIONS, METHODOLOGY, AND IMPACT THRESHOLDS

National Wetland Inventory (NWI) wetland maps and Federal Emergency Management Agency (FEMA) floodplain maps and communications with NPS staff were used to identify baseline conditions for the analysis.

The thresholds for the intensity of an impact on wetlands and floodplains are defined as follows:

Negligible: The structure and function of wetlands or floodplains would not be affected; effects would either be nondetectable, or, if detected, would be considered slight and localized. No measurable or perceptible effects on size, integrity, or connectivity of wetlands would occur.

Minor: Effects on the structure or function of wetlands or floodplains would be measurable, although the effects would likely be small and localized. A small effect on size, integrity, or connectivity of wetlands would occur; however, the overall viability would not be affected. If left alone, an adversely affected wetland would recover and the impact would be reversed. No mitigation measures associated.

Moderate: Effects on the structure or function of wetlands or floodplains would be measurable, but would be relatively localized. The impact would be sufficient to cause a measurable effect on either the size, integrity, connectivity of wetlands or would result in a permanent loss or gain in wetland acreage, but not to large areas. Mitigation could be required and if implemented, would likely be successful.

Major: Effects on the structure or function of wetlands or floodplains would be readily measurable, would have substantial consequences, and would be observable over a relatively large area. The character of the floodplain would be changed so that the functions typically provided by the floodplain would be substantially changed. The impact would result in a measurable effect on wetland size, integrity, and connectivity or a permanent loss or gain of large wetland areas. The character of the wetland would be changed so that the functions typically provided by the wetland would be substantially altered. Mitigation would be required and its success could not be assured.

AREA OF ANALYSIS

The area of analysis for assessing impacts on wetlands is Rock Creek Park. The area of analysis for cumulative impacts includes the park.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Loss of vegetative cover under alternative A would continue to increase as a result of the expected continued high numbers of deer and associated deer browsing, since no measures would be implemented to actively reduce the size of the deer population. Since the deer population would increase or remain at high levels under alternative A over the life of the plan, continued loss of vegetative ground cover and a change in the floodplain forest composition and structure would be expected from increased deer browsing over time in these wetland areas. In forested wetlands, there are some species that are browsed by deer (e.g., young tulip poplar [*Liriodendron tulipifera*] and most herbaceous plants), but other common species (e.g., sycamore [*Platanus occidentalis*]) are not as palatable as some of the upland species (e.g., white oak [*Quercus alba*] and beech [*Fagus grandifolia*]; USFS 2008). Based on the past impacts and the expected high numbers of deer over the life of the plan, alternative A would have long-term, moderate adverse impacts on wetland woody and herbaceous vegetation due to the amount of deer browsing.

Small wet areas (springs and seeps and vernal pools) could also be adversely affected by high deer density, if deer trample these areas while passing through or seeking water sources, causing siltation and erosion in these areas, or if the more intense browsing reduces pool vegetation cover or opens up the canopy, which could allow these pools to dry up faster. Park-specific data from Culver and Sereg (2004) showed water quality degraded at several of the springs along Rock Creek. Impacts would likely be very localized and minor to moderately adverse, depending on the amount of deer present in specific areas.

The park has previously caged woody plant species to protect them from deer browsing, including several in riparian areas that may be small wetlands. These caged areas would continue to be maintained, and construction and maintenance of these caged areas would have negligible adverse impacts in the area of construction. New caging would be used on a limited basis for any newly identified rare species or plantings sensitive to deer browsing. This action would have long-term beneficial impacts on the plants or areas in wetlands that were caged by prohibiting deer browsing. However, the impact on the remainder of park vegetation that was not caged would continue to be adverse, long term, and moderate to major

because no measures would be taken to limit or control deer population size or growth under this alternative.

No occupancy, modification, or development of floodplains is expected under alternative A, other than the small caging described above. The removal of ground vegetation through deer browsing could have the potential to increase stormwater runoff and flood events, but this would likely have a negligible to minor adverse impact on overall floodplain functioning.

Cumulative Impacts

Cumulative impacts on wetlands and floodplains would occur from many of the same actions both inside and outside the park that would affect water quality and vegetation, as previously described. Upstream and surrounding urban development has increased impervious surface runoff that can cause periodic washouts and/or siltation of smaller wetland areas in tributaries and increase flooding, and this is expected to continue into the future. Rock Creek has experienced a large flood event about every five years, and the last major flood (June 2006) caused extensive damage in the park, so impacts to floodplain function have been periodic, but continuing over the long term, moderate and adverse. Most wetland vegetation that naturally occurred along Rock Creek has been eliminated and replaced with seeded and transplanted species as the land was developed, resulting in long-term, minor to moderate adverse impacts. The number of vernal pools in the park today has been reduced from the pre-urbanization era because of past draining or filling activities, stream bed scouring from increased runoff that has resulted from development in the watershed upstream from the park, and lowered water tables from incising of the stream channel or urban groundwater use, resulting in long-term moderate adverse effects on these sensitive areas.

Other actions within the park have contributed to lesser impacts on wetlands and floodplains, including off-trail uses and various visitor uses, such as horseback riding that can disturb floodplain and wetland soils and vegetation. Dogs that are allowed to run free disrupt wetland ground cover and soils and help spread noxious weeds in the floodplain. Dumping in these locations can affect water quality and the ecological integrity of wetland areas and introduce foreign materials into the system, which could be carried away during flooding. Impacts would depend on the type and amount of material dumped, but mostly short-term localized negligible impacts would be expected. Park operations and maintenance activities can result in small areas of disturbed soils or vegetation, causing localized negligible to minor adverse impacts on wetlands. Structures have been located in the 100-year floodplain, although with little impact on floodplain functioning. Future actions that could cause adverse impacts to floodplains include reconstruction of the parkway and Beach Drive, which could have short- and long-term, negligible to minor adverse impacts due to the increase in imperious surface and amount of runoff.

All of these activities, when combined with the moderate impacts to wetlands and negligible to minor to floodplains from continued deer browsing and trampling expected under alternative A, would result in cumulative impacts to wetlands and floodplains that would be adverse, long term, and moderate.

Conclusion

Adverse, long-term, moderate impacts on wetlands and floodplains could result from soil erosion and sedimentation due to loss of vegetation from increased deer browsing, disturbance to small wetland areas and vernal pools from deer trampling and vegetation loss, and changes in species composition, assuming continued high numbers of deer and possible growth in the population over the life of the plan. Past, present, and future activities both inside and outside the park, when combined with the continued pressure on forest resources expected under this alternative, would result in adverse, long-term, moderate impacts on wetlands and floodplains.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Several non-lethal actions under alternative B would be implemented in combination to protect forest resources and reduce the park's deer population. Actions include the use of large-scale exclosures and reproductive control of does.

Under alternative B, approximately 14 exclosures would be used to exclude deer from certain areas in order to allow reforestation to occur. Each exclosure would encompass 7 to 25 acres and would be located throughout the park for at least 10 years, after which time the exclosures would be relocated. Several of these are proposed to be located specifically to protect the forested wetland areas and the associated 100-year floodplains located in the northern portion of the park (see figure 6). The use of large exclosures could have both beneficial and adverse impacts on park wetlands and floodplains. If positioned to enclose wetlands, there would be no direct impacts to wetlands from the construction of the fencing, and revegetation within the exclosures would help minimize the potential for soil erosion and increase vegetation cover in approximately 5% of the park at any one time. However, exclosures alone would not decrease overall deer browsing pressure within the park and the benefits of the exclosures in one location might initially be offset by adverse impacts in other wetland areas. Also, when the exclosures are moved, all herbaceous wetland vegetation would be subject to deer browsing again. Adverse impacts from the use of the exclosures would be long term and negligible to minor, and the protection of these forested wetland areas would have long-term beneficial impacts as more and more of the woody vegetation is regenerated due to protection afforded by the exclosures.

As described under the "Vegetation" topic, the use of reproductive control could reduce the deer population to a limited extent if it was successfully implemented. However, this would require many years to actually reduce the population, based on modeling efforts (Hobbs et al. 2000; Rudolph et al 2000; Merrill et al 2006) as well as a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008). Therefore, adverse impacts to wetland vegetation structure and species composition and to smaller wetlands that are not protected by exclosures would continue to occur over the long term, with intensity depending on site-specific conditions. However, any reduction in the deer population would help decrease the loss of vegetation due to deer browsing and would be beneficial in the long term.

No modification or development of floodplains is expected under alternative B, but the exclosures would be constructed within the 100-year floodplain at several locations where the areas to be protected are forested wetlands or lie in riparian areas. The permanent placement of posts and fencing would present a potential for affecting flood characteristics in local areas if flood debris would catch on these and obstruct the natural flow of water during flood events. This would likely have a negligible adverse impact on overall floodplain functioning, but could result in short-term, minor adverse impacts on flooding during storm events.

Cumulative Impacts

Management actions identified in alternative B, where a few forested wetlands would be protected from browsing, combined with reproductive control, could reduce the deer density after more than 15 years of implementation, would provide some beneficial impacts over the long term, but not immediately. Large exclosures would give certain areas of forested wetlands the opportunity to regenerate, and the exclosures would also keep out trespassing dogs, a long-term benefit. However, adverse effects from increased development and other past cumulative adverse actions, in conjunction with continued deer browsing pressure and possible trampling effects on the other wetlands areas, would not be offset by the beneficial effects of proposed actions. Therefore, cumulative impacts to wetlands under this alternative would be adverse, long term, and moderate.

Conclusion

Use of exclosures to protect many of the park's forested wetlands would gradually result in beneficial long-term impacts to wetlands and many vernal pools located in fenced areas, as reforestation occurred in the large exclosures, although continued long-term minor to moderate adverse impacts would be expected in areas that are not fenced and in smaller wetland areas and seeps. Beneficial long-term impacts would also result from decreased vegetation loss as reproductive control of the deer population would gradually reduce deer numbers over time. Construction of exclosures within the 100-year floodplain would likely have a negligible adverse impact on overall floodplain functioning, but could result in short-term, minor adverse impacts on the floodplain. Past, present, and future activities both inside and outside the park, when combined with the effects expected under this alternative, would result in adverse, long-term, moderate impacts on wetlands and floodplains.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Sharpshooting and capture and euthanasia, where appropriate, would be used to immediately reduce the number of deer within the park and to maintain sustainable deer population of 15 to 20 deer per square mile after the third year of implementation. A smaller deer herd would allow reforestation to occur throughout the park and for woody and herbaceous vegetative cover to recover, including within wetland areas, and would limit the damage from deer trampling in smaller wetland areas, resulting in beneficial, long-term impacts on wetlands.

No occupancy, modification, or development of floodplains is expected under alternative C, other than possibly some of the small caging around specific landscape or rare plants if these were located within wetlands or floodplains. The removal of ground vegetation through deer browsing would be greatly reduced, with long-term, beneficial effects on overall floodplain functioning.

Cumulative Impacts

The cumulative impacts from alternative C would be similar to those for alternatives A and B, but with a slightly greater beneficial effect from the immediate reduction of deer numbers and the maintenance of a smaller sustainable deer population (15 to 20 deer per square mile) after the third year of implementation. However, as with alternative B, the beneficial impacts of this alternative would slightly offset some of the cumulative adverse impacts, since the majority of the impacts to wetlands and flooding have occurred from past actions and upstream development. Therefore, the combined actions of alternative C with other past, present, and future activities would result in long-term, minor to moderate adverse impacts.

Conclusion

Beneficial, long-term impacts on wetlands and floodplains would result from immediately reducing the number of deer in the park and maintaining a sustainable population of 15 to 20 deer per square mile after the third year of implementation. Vegetative ground cover would be able to reestablish itself, reducing flooding velocities and adding to the ecological value of wetland areas. Cumulative impacts would be adverse, long term, and minor to moderate due mainly to past actions, and the beneficial, long-term impacts of alternative C would offset cumulative impacts slightly.

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

Analysis

Under alternative D, direct reduction would be used to initially reduce the number of deer within the park, and reproductive control of does (and direct reduction, if needed) would then be used to maintain a

sustainable population of approximately 15 to 20 deer per square mile after the third year of implementation. The reduction and long-term maintenance of a small herd (either through sharpshooting or reproductive control) would allow vegetative ground cover to reestablish itself in wetland areas, as well as in other areas of the park, and would limit the damage from deer trampling in smaller wetland areas, resulting in beneficial, long-term impacts on wetlands.

Similar to alternative C, no occupancy, modification, or development of floodplains is expected under alternative D, other than possibly some of the small caging around specific landscape or rare plants if these were located within wetlands or floodplains. The removal of ground vegetation through deer browsing would be greatly reduced, with long-term, beneficial effects on overall floodplain functioning.

Cumulative Impacts

Cumulative impacts to wetlands and floodplains under alternative D would be very similar to those described for alternative C, with the beneficial, long-term effects on soils and water quality resulting from the relatively rapid reduction of deer numbers and the long-term maintenance of a smaller deer herd over the life of the plan. However, as with alternative C, these beneficial effects would slightly offset the other adverse cumulative impacts from other past actions and overall cumulative impacts would be adverse, long term, and minor to moderate.

Conclusion

Beneficial, long-term impacts on wetlands and floodplains would result from immediately reducing the number of deer in the park and maintaining a sustainable population of 15 to 20 deer per square mile after the third year of implementation. Vegetative ground cover would be able to reestablish itself, helping reduce flooding velocities and adding to the ecological value of wetland areas. Cumulative impacts would be adverse, long term, and minor to moderate due mainly to past actions, and the beneficial, long-term impacts of alternative D would offset cumulative impacts slightly.

WILDLIFE AND WILDLIFE HABITAT

GUIDING REGULATIONS AND POLICIES

The NPS *Organic Act of 1916*, NPS *Management Policies 2006* (NPS 2006), and NPS *Reference Manual 77: Natural Resource Management* (NPS 1991) direct NPS managers to provide for the protection of park resources. The *Organic Act* requires that wildlife be conserved unimpaired for future generations, which has been interpreted to mean that native animal life are to be protected and perpetuated as part of a park unit's natural ecosystem. Parks rely on natural processes to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. The NPS *Management Policies 2006* make restoration of native species a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006, sec. 4.1). Policies in the NPS *Natural Resource Management Guideline* state, "the National Park Service will seek to perpetuate the native animal life as part of the natural ecosystem of parks" and that "native animal populations will be protected against . . . destruction . . . or harm through human actions."

Rock Creek Park's General Management Plan (2005a) includes the following desired conditions that pertain to wildlife:

- native plant and animal species function in as natural condition as possible, except where special management considerations are allowable under policy
- native species populations that have been severely reduced or extirpated are restored where feasible and sustainable
- invasive species are reduced in numbers and area or eliminated from natural areas of the park

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

The evaluation of wildlife (including deer) was based on a qualitative assessment of how expected changes to park vegetation (as a result of increased or decreased deer browsing pressure), or management actions themselves, would affect both the deer population and other park wildlife or wildlife habitat. The park's wildlife species are directly affected by the natural abundance, biodiversity, and the ecological integrity of the vegetation that comprises their habitat. For purposes of this plan/EIS, impacts to deer were assessed separately from impacts to other wildlife species, but using the same basic methodology and impact thresholds. It is important to note that impacts to deer, as with other wildlife, are analyzed in terms of the desired conditions for the deer population as a whole, including its overall health and ability to function in as natural a condition as possible. Thus, destruction of individual animals and reduction of the herd size alone are not necessarily adverse impacts, if the effect is to improve the overall condition of the deer population as part of the natural ecosystem.

Available information on known wildlife, including unique or important wildlife or wildlife habitat, was compiled and analyzed in relation to the management actions. The thresholds for the intensity of an impact were defined as follows:

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them.

Minor: Impacts on native species, their habitats, or the natural processes sustaining them may not be detectable, and changes to population numbers, population structure, or other demographic factors would not occur. Occasional responses to disturbance by some individuals could be expected, but without interference to factors affecting population levels. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.

Moderate: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and changes to population numbers, population structure, or other demographic factors would occur, but species would remain stable and viable. Frequent responses to disturbance by some individuals could be expected, with some negative impacts to factors affecting population levels. Sufficient habitat would remain functional to maintain the viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and extensive. Population numbers, population structure, or other demographic factors might experience large declines. Frequent responses to disturbance by some individuals would be expected, with negative impacts to factors resulting in a decrease in population levels. Loss of habitat might affect the viability of at least some species.

AREA OF ANALYSIS

The area of analysis for assessment of impacts is Rock Creek Park. The area of analysis for cumulative impacts is the park and the areas that encompass typical deer and wildlife movement outside the park boundary.

IMPACTS OF THE ALTERNATIVES ON THE WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) POPULATION

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

Analysis

Under this alternative, park staff would continue monitoring the deer population and use some controls to protect important resources, none of which would reduce the size of the deer population in the park. The actions under this alternative would be very limited and would reflect what is occurring today. With no control on the deer population, the population would continue to vary depending on conditions; however, the general trend toward increased numbers would continue. In addition, the park would continue to conduct activities to protect sensitive plant species. As additional rare understory plant species are found within the park, they would be protected with additional caging, which would further limit potential food sources for park deer, but at a very small scale, a negligible adverse effect.

Under alternative A, the deer population in Rock Creek Park would continue to degrade the ground/shrub habitat that is important to deer. As detailed in the previous “Vegetation” section, the deer population would remain in excess of the recommended density for forest regeneration and may increase over time.

This would adversely impact the abundance and diversity of native vegetation, including woody and herbaceous plants that provide forage and habitat for deer. High density deer populations that have reached or exceeded the ability of the natural environment to support them are at increased risk for disease and substantial losses due to malnutrition and parasitism, particularly during harsh winters. High deer density populations would also increase the potential for the spread of CWD, if the disease should occur near the park in the future.

Starvation and poor reproduction demonstrated by deer in overpopulated herds is not evidence that the herd is regulating itself. Starvation and disease are not acute mortality factors, such as predation, but rather provide only chronic control over a population (Eve 1981, as cited in Warren 1991). Under these conditions, deer herds can remain at high levels for many years until starvation, disease, or severe winter weather cause a reduction in population size typically lasting two to five years. By this time, adverse ecological effects can already have occurred. Such reductions in the deer herd, as a result of natural die-offs, probably would not allow recovery of the natural community (Warren 1991).

It is expected that unchecked growth of the deer population under alternative A would continue to result in the degradation of habitat and loss of food sources. There would also be increased loss of deer through vehicle collisions, which would have adverse impacts on individual deer, but could keep deer numbers lower. The limitation of available forage and the high density would make individuals susceptible to starvation. Impacts could be severe, but the intensity of effects would depend on the level of stress incurred, and this would be related to how much forage the deer would find outside the park. Therefore, although impacts could be more severe, given the current condition of the deer herd and the likelihood that deer would continue to seek food on neighboring properties, it is expected that alternative A would have long-term, moderate adverse impacts on the deer population.

Cumulative Impacts

Impacts on deer from vehicle collisions and poaching, as well as disturbances from traffic, visitor use (including off-trail users and social trails), illegal camping, and the presence of unrestrained pets would all continue to have long-term, minor adverse impacts by displacing deer and potentially causing some mortality. Although wildlife diseases do not appear to be affecting deer at this time, the potential for these diseases, especially those like CWD and EHD that could affect deer populations, could also contribute to long-term adverse impacts on deer. The return of coyotes to the area could have limited beneficial effects on deer, as they are not expected to influence the population size to such an extent that it would reduce the effects of deer browse on habitat provided in the park. Deer management plans and programs of local, state, and other federal agencies also contribute to long-term, beneficial effects by helping maintain deer densities at lower levels; however, the effects of these programs are limited as evidenced by the continued growth of the deer population at Rock Creek Park. In fact, these programs may actually cause deer to move into the park where there is less pressure, thereby contributing to park deer population growth and associated effects of browsing on the degradation of deer habitat.

Actions resulting in cumulative impacts to deer habitat would be similar to those described for vegetation, since vegetation comprises the habitat that affects deer to a great extent. Urban development in the areas surrounding the park that result in encroachment into park lands and removal of vegetation that provides deer habitat in limited areas have caused, and will continue to cause, long-term minor localized adverse impacts. Acts of vandalism, dumping, illegal camping, and off-trail use have all had minor localized adverse impacts on deer habitat due to trampling and burying of vegetation, or spreading of noxious weed seeds, and will continue to do so in the future. Past fires have affected some areas, which have regrown but with more nonnative species. Past actions within the park, such as construction of facilities and roads, have resulted in removal of vegetation and adversely affected forest resources that support deer to a minor extent in limited areas. Gypsy moths have been a threat, but the park's efforts to control gypsy moths have minimized their impact to deer habitat. The park's exotic plant management efforts would also benefit deer habitat in the long term by removing plants that compete with native species. Continued park

maintenance operations would have long-term minor adverse impacts on edge habitat for deer, limited to the areas affected. Any off-trail visitor uses affect deer habitat to some extent, but particular activities like horseback riding, dog walking, and hiking can lead to more social trails and spread of exotic weed seeds. Scientific research benefits park vegetation and deer habitats by supplying information needed for management decisions, but even the use of an area for research plots limits natural growth in those areas. All of these activities, when combined with the moderate adverse impacts to the deer population from the continued pressure on woody and herbaceous vegetation that makes up the deer habitat 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 moderate.

Conclusion

Under alternative A, there would be no control on the growth of the deer population, which would result in long-term, moderate adverse impacts on the deer population. These impacts would continue due to excessive deer browsing that would degrade habitat and limit food sources. Past, present, and future activities, when combined with the continued pressure on vegetative resources and deer habitat expected under this alternative, would result in adverse, long-term, moderate cumulative impacts.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Under this alternative, several non-lethal actions would be implemented in combination to protect deer habitat and reduce deer numbers in the park. Actions include the use of large, fenced exclosures and reproductive control of does. Small caged areas and repellents would be implemented with negligible adverse impacts on deer food sources, as described under alternative A.

Use of large-scale exclosures and repellents would protect some deer habitat, but would exclude deer from potential food sources in approximately 5% to 10% of the park at any given time. Areas outside the exclosures would be affected by heavy deer browsing, which would have similar effects to those discussed under alternative A, including the degradation of habitat and loss of food sources. As a result, there would be long-term, moderate to major, adverse impacts on deer habitat and associated adverse impacts on the deer population.

If successfully implemented, surgical sterilization, supplemented by the use of reproductive controls when feasible (see chapter 2), would help reduce the impact on deer by gradually decreasing their numbers and allowing habitat to improve over time. . As previously described under “Vegetation,” the use of reproductive control could reduce the deer population to a limited extent if it was successfully implemented, but this would require many years to actually reduce the population, based on modeling efforts (Hobbs et al. 2000; Rudolph et al 2000; Merrill et al 2006) as well as a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008). A number of factors may influence the efficacy and reduction period of this method, including the amount of immigration/emigration of deer to/from the park, availability of veterinarian and surgical facilities (at zoo or mobile field unit), mortality and recruitment rates, the size of the population at the time of initial treatment, and the percentage of the population treated. Other factors, such as untreated deer moving into the park and treated deer leaving the park, would also affect the time required to reduce herd numbers. The benefit of this action would be proportional to the amount of population reduction that it provided; therefore, a benefit could not actually be established until an improvement in vegetation and deer habitat was observed. Based on these factors, it is expected that reproductive controls could stop population growth, but would not reduce the numbers of deer to the initial deer density goal within the life of this management plan using current technology. Therefore, impacts to deer habitat and deer would not be offset by this alternative and would continue to be adverse, long term, and moderate from degradation and

the loss of food sources. Also, continued high deer densities could increase the potential for the spread of CWD, if it were detected near the park in the future.

Specific effects of surgical sterilization on breeding and social behavior (extended rut) that result from the associated loss of reproductive hormones are not well documented. But deer would be expected to react in a similar way to deer that have been treated with reproductive control agents (see the "Reproductive Control" section of chapter 2 and appendix D). The intensity of long-term effects of implementing reproductive control on a free ranging deer herd is difficult to predict given the many variables. The effect on individual deer may be considered a major adverse impact, due to handling stress and the possible physiological or behavioral changes due to the use of sterilization and reproductive control agents. However, it is expected that the long-term adverse affect on the population would be minor to moderate, as the adverse impacts over time would be offset by the beneficial effect of population reduction.

Cumulative Impacts

The same past, present, and future activity impacts 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, plus reproductive control would provide beneficial effects over the long term, but not immediately. Large exclosures would give small patches of deer habitat the opportunity to recover, and reproductive control could eventually help reduce the size of the deer herd, resulting in beneficial impacts that would combine with the beneficial effects of the return of coyotes, other deer management programs, control of gypsy moths and other plant diseases and pests, exotic plant management, and scientific research. However, adverse effects from continued development and other cumulative adverse actions described for alternative A, in conjunction with continued pressure on vegetation resources that make up deer habitat and potential effects of reproductive control, would not be offset by the beneficial effects of the proposed actions. Therefore, cumulative impacts to deer and deer habitat under this alternative would be adverse, long term, and moderate.

Conclusion

Under alternative B, approximately 5% to 10% of the deer habitat in the park would benefit from construction of exclosures over the life of this plan. Remaining habitat would continue to be adversely affected by deer browsing over the long term until reproductive controls became effective and the population decreased. However, because the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to deer habitat, and in turn deer, would be adverse, long term, and moderate as a result of habitat degradation and loss of food sources. There could also be long-term, major adverse impacts to individual deer from the physiological, biological, and behavioral effects associated with the use of reproductive control; however, long-term impacts to the population would be minor to moderate because the adverse effects would be offset over time by the benefits of population reduction. Past, present, and future activities, when combined with continued pressure on vegetative resources and deer habitat expected under this alternative, would result in long-term, moderate adverse cumulative impacts.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Sharpshooting would be used under this alternative, along with capture and euthanasia where appropriate, to reduce the deer herd size. The intent would be to rapidly reduce deer density within the park to allow for the herbaceous vegetation and tree seedlings to recover from browsing pressure. Small caged areas and repellents would be implemented with negligible adverse effects on the deer population, as described under alternative A.

Reducing deer density levels and maintaining these levels would allow vegetation to recover, providing better foraging habitat for deer in the park in the long term. Adverse impacts would still range from minor to moderate during the short term while habitat recovered. But, with increased vegetation and improved foraging habitat, this alternative would have beneficial, long-term effects, and the current adverse impacts to deer and their habitat would be reduced to negligible or minor over the long term as the deer density goal is achieved.

This alternative would result in an impact to the deer population size, reducing the population from approximately 67 deer per square mile (2009) to about 15 deer per square mile. Research indicates that when habitat is stressed it cannot support healthy deer over the long term (Eve 1981, as cited in Warren 1991). When deer density is high, signs of nutritional stress, such as low body and internal organ mass, low fecal nitrogen levels, and high prevalence of parasitic infections, typically occur. When deer density is reduced to the nutritional carrying capacity, all of these indicators show improved condition (Sams et al. 1998). Also, a reduced deer density would help limit the spread of CWD, if this disease should be detected near the park in the future. As described in chapter 2, 15 to 20 deer per square mile is more closely aligned with levels that are in balance with other components of the ecosystem, namely a regenerating forest system. Therefore, reducing the population to this level would have a beneficial effect on the long-term viability of the deer population within the park by minimizing the potential for nutritional stress and disease, and improving habitat.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative C. Relieving deer browsing pressure through rapid reduction in the deer population under alternative C would allow the majority of the park's habitat to regenerate, resulting in beneficial effects and reducing adverse impacts over the long term to negligible or minor levels. These effects, combined with other beneficial effects, would result in cumulative impacts that would be primarily beneficial. These beneficial effects would somewhat offset the adverse impacts from increased development and other cumulative adverse actions. Therefore, cumulative impacts to deer and deer habitat under this alternative would be mostly beneficial and long term.

Conclusion

The relatively rapid reduction of the deer herd and the resultant regeneration of forage under alternative C would result in beneficial effects on the deer herd and would reduce adverse impacts to negligible or minor levels over the long term as the deer density goal was achieved. Adverse impacts would still range from minor to moderate while habitat recovered. Past, present, and future activities, when combined with the reduced browsing pressure expected under this alternative, would result in long-term, beneficial, cumulative impacts on the deer herd.

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

Analysis

Under alternative D, the size of the deer herd would be directly reduced through sharpshooting and capture and euthanasia, and reproductive control or direct reduction (if needed) would be used to maintain the population at the desired level. Small caged areas and repellents would be implemented, as under alternative A.

As with alternative C, the intent of this alternative would be to rapidly reduce the deer density within the park to allow for the native vegetation to recover from deer browsing pressure. Adverse impacts would still range in the minor to moderate level during the short term while habitat recovered; however, as vegetation regenerated, better foraging habitat would be provided for the deer in the park.

Reproductive control (or direct reduction, if needed) would be used to maintain deer at a density that would further encourage forest regeneration and improvement of habitat for deer. As described for alternative B, a number of factors may influence the efficacy of this method, including the amount of immigration/emigration of deer to/from the park, availability of veterinarian and surgical facilities (at zoo or mobile field unit), mortality and recruitment rates, the size of the population at the time of initial treatment, percentage of the population treated, as well as other factors, such as untreated deer moving into the park and treated deer leaving the park. Considering these factors, it is expected that reproductive controls could stop further population growth, allowing the park to maintain the deer density goal for the life of this management plan. With increased vegetation and improved foraging habitat, this alternative would have long-term beneficial effects on deer and deer habitat, and the current adverse impacts to deer and their habitat would be reduced to negligible or minor over the long term as the deer density goal was achieved.

As described for alternative B, surgical sterilization and the associated loss of reproductive hormones is expected to affect deer in a similar way to those that have been treated with reproductive control agents (see the “Reproductive Control” section of chapter 2 and appendix D). As a result, there could be long-term, major, adverse impacts to individual deer due to handling stress and the possible physiological or behavioral changes due to the use of sterilization and possibly reproductive controls. However, it is expected that the long-term, adverse affect on the population would be minor to moderate, as the impacts over time would be offset by the beneficial effect of population reduction.

This alternative would result in an impact to the deer population size, reducing the population from approximately 67 deer per square mile (2009) to about 15 deer per square mile. As described for alternative C, this would minimize the potential for the spread of CWD and for nutritional stress and result in a deer density more closely aligned with levels that are in balance with other components of the ecosystem, namely a regenerating forest system. Therefore, reducing the population to this level would have a beneficial effect on the long-term viability of the deer population within the park.

The impacts of each method (sharpshooting, euthanasia, or reproductive control) on deer and deer habitat would be essentially the same, as long as habitat was improved by reducing deer browsing pressure. Potential differences in impacts would relate to the time required for implementation and the resulting deer population size.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative D. Rapidly reducing deer density levels and maintaining these levels under alternative D would relieve browsing pressure and provide better foraging habitat for deer in the park population. Achieving the deer density goal would result in long-term beneficial impacts and reduce adverse impact to negligible to minor levels.

Rapid deer density reduction would allow the forest to regenerate, resulting in beneficial impacts to deer habitat that would combine with other beneficial effects resulting in cumulative impacts that would be primarily beneficial. These beneficial impacts would offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to deer and their habitat under this alternative would be mostly beneficial and long term.

Conclusion

Enhancing natural forest regeneration by quickly reducing deer browsing pressure under alternative D, and by maintaining a smaller deer population through the use of reproductive control (and direct reduction if needed), would result in beneficial, long-term impacts to deer and deer habitat by allowing vegetation to recover and improving foraging habitat. Over time as natural forest regeneration occurred, adverse, long-term, major impacts would be reduced to negligible to minor levels. Past, present, and

future activities, when combined with the reduced pressure on woody and herbaceous vegetation (forest regeneration) expected under this alternative, would result in beneficial, long-term cumulative impacts.

IMPACTS OF THE ALTERNATIVES ON OTHER WILDLIFE

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

Analysis

Under this alternative park staff would continue monitoring the deer population and conduct activities to protect native plants, such as creating small caged areas and applying limited amounts of repellents in landscaped areas. Maintaining small caged areas or applying repellents to protect individual or groups of plants from deer browsing could restrict other wildlife from using these plants. However, these actions would have little effect on other wildlife because of their small scale and their impact would not be measurable. Therefore, the impact of small caged areas and repellent use under this alternative would be adverse, short term, and negligible.

The vegetation/habitat conditions described in chapter 3, for both vegetation and other wildlife and wildlife habitat indicates that deer have already affected the vegetation, and thus habitat, for other wildlife species within the park. The herbaceous and woody seedling layers of the forest have been browsed by deer, and monitoring results indicate a substantial decline in seedlings in paired unfenced plots compared to fenced plots. McShea and Rappole (2000) found that avian species composition changes as the understory recovers from a period of extended deer browsing. This study is applicable to Rock Creek Park because it was conducted at Shenandoah National Park, another NPS unit that does not manage deer populations. The study documented the statistically significant increase of low forest guild birds as the understory recovered from excessive deer browsing. This included several species that nest at Rock Creek Park (ovenbird [*Seiurus aurocapillus*], eastern towhee [*Pipilo erythrothalmus*], veery [*Catharus fuscesens*], and wood thrush [*Hylocichla mustelina*]). Flowerdew and Ellwood (2001) suggested that deer have indirectly decreased bank vole (*Myodes glareolus*) populations by removing the bramble blackberry (*Rubus fruticosus*) that provides most of their hiding cover (S. Bates, pers. comm. 2008c).Heavy deer browsing also degrades habitat and results in a lack of cover for small mammals, making them vulnerable to predation from hawks, owls, foxes, skunks, raccoons, and coyotes. McShea (2000) found a higher abundance of chipmunks (*Tamias striatus*) and white-footed mice (*Peromyscus leucopus*) in deer exclosures in low mast years, suggesting that deer predation on acorns during low mast years affects small mammal abundance.

Species that use deer as a food source, such as coyotes that now are known to occur in the park, could benefit from high deer density or open understory conditions. Other animals may also feed on deer carcasses, like crows (*Corvus* sp.), raccoons, and vultures. Small predators, such as foxes, hawks, skunks, and raccoons, would also benefit from a more open understory because prey would be easier to find. However, if the habitat of the prey species deteriorated to the point where prey (mice, rabbits, and ground-nesting birds) could no longer maintain viable populations within the park, then predator species would also decline).

Deer impacts to herpetofauna (reptiles and amphibians) and invertebrates have not been well studied. The only documented study took place at Cuyahoga Valley National Recreation Area, an urban NPS unit with a deer population similar to Rock Creek Park. Greenwald et al. (2008) placed coverboards within and outside of deer exclosures and found higher numbers of redback salamanders (*Plethodon cinereus*), and slugs outside of the exclosures. One theory for this result was that soils outside of the exclosures had more nutrients that came from deer droppings and that this attracted the salamanders and snails, in turn attracting the garter snakes that feed on salamanders and slugs. The authors also theorized that given the lack of vegetative cover outside of the exclosures, the coverboards were serving as a refuge for the

salamanders and slugs. Given the small sample size (12 paired plots) and different theories for the results, more research is needed. The authors also noted that redback salamanders and garter snakes are species that do well in disturbed habitats. Species that favor undisturbed habitats were not found outside of the exclosures.

Therefore, the impact of alternative A to other wildlife would be adverse, long term, and would range from negligible to major, depending on the species and its reliance on habitat that is adversely impacted by deer browse. Species that depend on ground cover, young tree species, or understory shrubs for food, cover, or nesting habitat (such as ovenbird, veery, towhee, and wood thrush) could be severely reduced or eliminated over time, resulting in potentially major adverse effects. Impacts to wetland-dwelling herpetofauna and species that depend on the middle to upper canopy, such as woodpeckers and owls, would be negligible.

Cumulative Impacts

Actions resulting in cumulative impacts to wildlife would be similar to those described for the deer population. These include vehicle collisions and poaching, disturbances from traffic, visitor use (including off-trail users and social trails), illegal camping, and the presence of unrestrained pets. These actions would all continue to have long-term, minor adverse impacts by displacing wildlife and potentially causing some mortality. Cell towers may result in bird collisions. The return of coyotes to the area has a beneficial effect on wildlife by helping to reestablish predator-prey relationships. Deer management plans and programs of local, state, and other federal agencies have limited contributions to long-term beneficial effects on wildlife and wildlife habitat by helping maintain a more balanced ecosystem. Past improvements to fish passages in the park also contribute beneficial effects on aquatic habitats and fish.

Actions resulting in cumulative impacts to wildlife habitat would also be similar to those described for deer. This includes urban development that has and would continue to cause long-term minor localized adverse impacts from the loss of habitat; acts of vandalism, and dumping, which have had and would continue to cause minor localized adverse impacts from trampling and burying of vegetation, or spreading of noxious weed seeds; past fires that have affected some areas, which have regrown but with more nonnative species; and past actions within the park, such as construction of facilities and roads that have resulted in removal of habitat. The park's exotic plant management efforts would also benefit wildlife habitat in the long term by removing plants that compete with native species. The future reconstruction of Rock Creek Parkway and Beach Drive and continued park maintenance operations would have long-term minor adverse impacts on edge habitat for wildlife, limited to the areas affected. Any off-trail visitor uses affect wildlife habitat to some extent, but particular activities like horseback riding, dog walking, and hiking can lead to more social trails and spread of exotic weed seeds. Scientific research benefits park vegetation and wildlife habitats by supplying information needed for management decisions, but even the use of an area for research plots limits natural growth in those areas. All of these activities, when combined with the negligible to major impacts of continued pressure on woody and herbaceous vegetation that makes up the wildlife habitat 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 minor to major depending on the species.

Conclusion

Under alternative A, habitat for wildlife species other than white-tailed deer would continue to be adversely affected by a large deer population and related browsing, resulting in decreased plant diversity, increased invasive exotic plants, and reduced forest regeneration (as long as the deer population remained high or increased). A few predator species would benefit from a large deer population and an open understory, enabling them to better see and catch prey. However, the impacts of large numbers of deer browsing on vegetation would adversely affect a large percentage of habitats for other wildlife (e.g.,

ground-nesting birds and small mammals), resulting in adverse, long-term, and potentially negligible to major impacts, depending on the species. Past, present, and future activities, when combined with the continued pressure on forest regeneration expected under this alternative, would result in both adverse and beneficial impacts, with adverse, long-term, major cumulative impacts.

As explained in the conclusion for "Vegetation" above, impairment is tied to the park's purpose and significance, and the enabling legislation calls for the protection of animals within the park. Alternative A would not reverse the expected long-term continued growth in the deer population, and wildlife habitat would likely continue to be degraded. Although not all wildlife species would be affected to the same extent, impairment of those wildlife species that depend on the presence of ground cover and understory vegetation that are heavily browsed by deer could occur under this alternative over the long term.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Under this alternative, several non-lethal actions would be implemented in combination to protect wildlife habitat and reduce deer numbers in the park. Actions include the use of large, fenced exclosures and reproductive control of does. Small caged areas and repellents would be implemented, as under alternative A.

Large, fenced exclosures would be constructed to allow forest regeneration within localized areas of the park. Human presence associated with the installation of fenced exclosures could adversely affect wildlife while the actions were being carried out. However, such small areas of the park would be affected for a short period that the adverse impact would be short term and negligible.

As explained previously in this chapter under "Vegetation," approximately 5% of the park would be protected from deer browsing in this manner at a given time, and about 5% to 10% of the woody vegetation would be protected over the life of the plan. The size of the openings in the fence (4 inches square) would allow small birds and mammals (e.g., songbirds, rabbits, and squirrels) to pass in and out of these exclosures. The added fence posts and fence would also provide perches for some birds, such as hawks. The fence could be an obstacle to other wildlife (e.g., birds or small mammals such as foxes running into the fence). This action would make more ground/shrub layer habitat available to other wildlife than alternative A over the long term. However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside the protected areas would continue to remain high for many years (see following discussion), the beneficial impact to other wildlife would be limited.

Implementation of sterilization would have short-term, negligible adverse effects on other wildlife in the vicinity of the operations from the temporary noise and human presence, as well as the construction of bait stations and temporary holding pens, if needed. The use of reproductive controls could help reduce the impact on other wildlife by reducing effects of deer browsing on wildlife habitat. However, as previously described under "Vegetation," the use of reproductive control could reduce the deer population to a limited extent if it was successfully implemented, but this would require many years to actually reduce the population, based on modeling efforts (Hobbs et al. 2000; Rudolph et al 2000; Merrill et al 2006) as well as a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008). The actual amount of time needed to observe a decrease would depend on a number of factors, such as the type of treatment used, 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 treated. Other factors, such as untreated deer moving into the park and treated deer leaving the park, would also affect the time required to reduce herd numbers. The benefit of this action would be proportional to the amount of population reduction that it achieved, and a corresponding improvement to understory habitat. Based on these factors, it is expected that reproductive controls could stop population

growth, but it would not be possible to achieve the desired deer density goals for the park during the life of this management plan.

Similar to alternative A, a continued high deer density and the associated browsing throughout the majority of the park would reduce the availability of food for species that depend on ground/shrub layer vegetation for survival. These species, including ground and/or shrub-nesting birds (e.g., ovenbirds, wood thrush, and eastern towhee), and mice would decline over time, with potential adverse, long-term, major impacts. Other species that have a more diverse diet (e.g., raccoons) or that spend more time in other habitat (e.g., salamanders and snakes) or the upper canopy (e.g., barred owls [*Strix varia*] and woodpeckers) versus the ground/shrub layer, would be less affected by high or increased deer density. As with alternative A, species that use deer or their carcasses as a food source, such as coyotes, crows, and chickadees (*Parus* spp.), could benefit from the high deer densities. Small predators, such as foxes, hawks, skunks, and raccoons, would also benefit from a more open understory because prey would be easier to find. However, if the habitat of the prey species deteriorated to the point where prey (e.g., mice, rabbits, and ground-nesting birds) could no longer maintain viable populations within the park, then predator species would also decline. As a result, the overall impact to wildlife throughout the park would continue to be adverse, long term, and negligible to potentially major, depending on the species.

Cumulative Impacts

The same cumulative actions described under alternative A would also occur under alternative B. Under alternative B, protecting approximately 5 to 10% of the park's vegetation from deer browsing through use of exclosures, and using reproductive control that could reduce deer density and related browsing impacts after more than 15 years of implementation, would gradually reduce impacts to wildlife habitat. Combined with the effects of exotic plant control, research, and disease and pest control, this would provide some beneficial, long-term impacts. However, these beneficial effects would not be large enough to offset the adverse effects from increased development and other cumulative adverse actions, in conjunction with the continued deer browsing pressure on the majority of the woody and herbaceous vegetation that provides habitat for wildlife in the park. Therefore, overall cumulative impacts to wildlife habitat, and thus to other wildlife species, 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 the construction of large, fenced exclosures over the life of the plan. The remaining habitat, however, would continue to be subject to a high degree of deer browsing, adversely impacting both ground and shrub layer habitat for many other species of wildlife until reproductive controls took effect and reduced the deer population (more than 15 years). A few species would tend to benefit from a large deer population and an open understory, enabling them to better see and catch prey. Overall, impacts to other wildlife would be adverse, long term, and negligible to potentially major, depending on the species. Past, present, and future activities, when combined with the continued pressure on wildlife habitat expected under this alternative, would result in both adverse and beneficial impacts, with overall adverse, long term, moderate to major cumulative impacts on other wildlife.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Under this alternative, sharpshooting would be used to reduce the deer herd size, along with capture and euthanasia where appropriate. The intent of this alternative would be to rapidly reduce deer density within

the park to allow for the herbaceous vegetation and tree seedlings to recover from deer browsing pressure. Small caged areas and repellents would be implemented, as under alternative A.

Unlike alternative A, a reduced degree of deer browsing throughout the majority of the park would increase the availability of food and cover for species that depend on ground/shrub layer vegetation for survival. These species, including ground and/or shrub-nesting birds (e.g., ovenbirds, wood thrush, and eastern towhee), and mice, would be able to maintain viable populations within the park. As the vegetation became more diverse and abundant with reduced browsing pressure, the number of wildlife species that would benefit from these changes would increase. This would be a beneficial, long-term impact on these species. Other species that have a more diverse diet (e.g., raccoons) or that spend more time in other habitat (e.g., frogs and salamanders) or the upper canopy (e.g., barred owls and woodpeckers) would be less affected by a reduced deer density, although a long-term benefit to upper canopy species would be gained in the future as forest regeneration maintained the upper canopy.

Predators that use deer as a food source, such as coyotes, could be somewhat adversely affected by a lower deer density or denser understory conditions. Other animals that feed on deer carcasses, such as crows and raccoons, could also be adversely affected. However, none of these species solely depend on deer as a food source, so the adverse impacts to these species would be long term and minor at most. Predators could find a denser understory more difficult for hunting small prey than the current open condition, but better habitat conditions and an increase in the abundance of prey species could also benefit these predators.

Wildlife, other than deer, would be temporarily disturbed by the presence of humans placing bait stations, shooting deer, setting traps, and observing deer behavior. Bait could provide a beneficial food source to other wildlife during the time reduction activities were conducted; however, the small quantity and short time periods that bait would be available would have a negligible impact on any species. There would be little surface disposal of deer waste and/or carcasses that would provide a beneficial food source to scavengers like the coyotes, crows, and raccoons since it is expected that the majority of carcasses would be disposed of through burial or offsite. The small number of carcasses left for natural decomposition would not be substantially different than what occurs through mortality from disease, old age, and car collisions. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by other wildlife species.

Long-term reduction and controls on deer population growth would allow vegetation used as food and cover for other wildlife to become more abundant. Therefore, the impact of alternative C to other wildlife would be mostly beneficial and long term, depending on the species, and existing adverse impacts to other wildlife would be reduced to negligible or minor levels.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative C. Management actions identified in alternative C, where deer browsing pressure would be drastically reduced through a rapid reduction of the deer population would provide beneficial, long-term impacts to other wildlife. Some adverse impacts would result to habitat as a result of disturbances when qualified federal employees or authorized agents were setting traps, placing bait stations, occupying shooting locations, and removing deer carcasses. However, these impacts would be temporary and isolated, causing little interference with other species activities, resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would allow the forest to regenerate, improving habitat for other wildlife and resulting in beneficial impacts that would combine with the beneficial effects of exotic plant control, research, and disease and pest control. These beneficial impacts would offset adverse effects from

increased development and other cumulative adverse actions. Therefore, cumulative impacts to wildlife habitat, and thus other wildlife species, under this alternative would be mostly beneficial and long term.

Conclusion

Under alternative C, impacts on other wildlife species and habitat would be beneficial and long term as a result of rapid reductions in deer numbers in the park, thereby reducing deer browsing pressure on woody and herbaceous vegetation and allowing increased abundance and diversity of other wildlife that depend on understory vegetation. Adverse, long-term impacts would be reduced to negligible or minor levels over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time. Human disturbances from trampling at bait stations, shooting sites, trapping locations, or deer carcass disposal sites would be temporary and isolated within the park. Therefore, adverse impacts of these actions on other wildlife species would be short term and negligible. Past, present, and future activities, when combined with the reduced browsing pressure on understory habitat expected under this alternative, would result in long-term, beneficial, cumulative impacts to other wildlife.

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

Analysis

Under alternative D, the size of the deer herd would be directly reduced through sharpshooting and capture and euthanasia and reproductive control, or direct reduction (if needed) would be used to maintain the population at the desired level. Small caged areas and repellents would be implemented, as under alternative A.

Similar to alternative C, a reduced degree of deer browsing throughout the majority of the park would increase the availability of food for species that depend on ground/shrub layer vegetation for survival, such as ground and/or shrub-nesting birds (e.g., ovenbirds, wood thrush, and eastern towhee), and mice. These species would be able to maintain viable populations within the park. As the vegetation became more diverse and abundant with reduced browsing pressure, the number of wildlife species that would benefit from these changes would increase. This would be a beneficial, long-term impact on these species. Other species that have a more diverse diet (e.g., raccoons) or that spend more time in other habitats (e.g., salamanders and frogs) or the upper canopy (e.g., barred owls and woodpeckers) would be less affected by a reduced deer density, although a long-term benefit to upper canopy species would be gained in the future as forest regeneration maintained the upper canopy.

Also similar to alternative C, a few species that use deer as a food source, such as coyotes, might be adversely affected by fewer deer or denser understory conditions. Other animals that feed on deer carcasses, such as crows, and chickadees, would also be adversely affected. However, none of these species depends solely on deer as a food source, so the adverse impacts would be minor. Predators such as foxes, hawks, skunks, and raccoons would find a denser understory more difficult to hunt in than the current open condition. However, better habitat conditions and resulting increases in the abundance of prey species would also benefit these predators.

Wildlife other than deer would be temporarily disturbed by the presence of humans placing bait stations, shooting deer, setting traps, implementing reproductive control techniques, and observing deer behavior, similar to alternative C. Bait could provide a beneficial food source to other wildlife during the time that reduction activities were conducted; however, the small quantity and short time periods that bait would be available would have a negligible impact on any species. Limited surface disposal of deer waste and/or carcasses would provide a beneficial food source to scavengers like certain birds; however, under this alternative, it is expected that the majority of carcasses would be disposed of through burial or offsite.

The small number of carcasses left for natural decomposition would not be substantially different than what occurs today through mortality from disease, old age, and car collisions. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by other wildlife species.

Long-term reduction and controls on deer population growth would allow vegetation used as food and cover by other wildlife to become more abundant. Therefore, the impact of alternative D to other wildlife would be mostly beneficial and long term, depending on the species, and existing adverse impacts would be reduced to negligible or minor levels.

The impacts of each method (sharpshooting, euthanasia, or reproductive control) on other wildlife would be essentially the same, as long as habitat was improved by reducing deer browsing pressure. Potential differences in impacts would relate to the time required for implementation and the resulting deer population size.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative D. Rapidly reducing the deer population and alleviating browsing pressure on the majority of park habitat under alternative D would provide long-term beneficial impacts to other wildlife species.

Some adverse impacts would result to other wildlife as a result of disturbance by humans setting traps and bait stations, occupying shooting locations, and removing deer carcasses. However, these impacts would be temporary and isolated, causing little interference with other species' activities, resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would give the forest the opportunity to regenerate, improving habitat for other wildlife and resulting in beneficial impacts that would combine with the beneficial effects of exotic plant control, research, and disease and pest control, resulting in primarily beneficial cumulative impacts. These beneficial impacts would offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to wildlife under this alternative would be mostly beneficial and long term.

Conclusion

Under alternative D, impacts on other wildlife would be long term and beneficial because of rapidly reduced deer numbers in the park, resulting in decreased browsing pressure and natural forest regeneration, allowing increased abundance and diversity of other wildlife that depend on understory vegetation. Adverse, long-term impacts would be reduced to negligible or minor levels over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Other wildlife would be temporarily affected by trampling at bait stations, shooting sites, trapping locations, reproductive control techniques, or deer carcass disposal sites. The adverse impacts of these isolated actions on other wildlife would be short term and negligible. Past, present, and future activities, when combined with the reduced pressure on understory habitat expected under this alternative, would result in beneficial, long-term cumulative impacts to other wildlife.

RARE, UNIQUE, THREATENED, OR ENDANGERED SPECIES

GUIDING REGULATIONS AND POLICIES

The *Endangered Species Act* (16 USC 1531 et seq.) and amendments (1973) mandate that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the NPS determines that an action may adversely affect a federally listed species, consultation with the U.S. Fish and Wildlife Service is required to ensure that the action will not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. In addition, the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act require protection and consideration of effects on migratory bird species and their nests and the named eagle species during any management action.

The NPS *Management Policies 2006* state that potential effects of agency actions will also be considered on state or locally listed species (NPS 2006). The NPS is required to control access to important habitat for such species and to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend. NPS *Management Policies 2006* state that "[the NPS will] manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible" (NPS 2006, sec. 4.4.2.3).

Rock Creek Park's General Management Plan (2005a) includes the following desired conditions that pertain to rare, unique, or listed species:

- federal- and District of Columbia-listed threatened or endangered species and their habitats are protected and sustained
- native species populations that have been severely reduced or extirpated are restored where feasible and sustainable
- native plant and animal species function in as natural condition as possible, except where special management considerations are allowable under policy
- invasive species are reduced in numbers and area or eliminated from natural areas of the park

The endangered Hay's spring amphipod (*Stygobromus hayi*), discovered in five groundwater springs in Rock Creek Park in 1998, is the only known federally listed species that inhabits the park. The analysis also addresses 34 rare plants and 9 rare or uncommon animals (2 invertebrates and 7 birds) of Maryland that have been documented in Rock Creek Park, as well as 11 mammals, 23 reptiles, 16 amphibians, and 12 fish listed as species of greatest conservation need within the District of Columbia (see tables 14, 15, and 16).

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

To assess impacts on listed species, the following process was used:

- identification of which species are in areas likely to be affected by management actions described in the alternatives
- analysis of habitat loss or alteration caused by the alternatives
- analysis of disturbance potential of the actions and the species' potential to be affected by the actions

The information in this analysis was obtained through best professional judgment of park staff and experts in the field (as cited in the text) and by conducting a literature review. The following thresholds were used to determine impacts to sensitive and rare species.

FEDERALLY LISTED SPECIES

The U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries guidance for implementing section 7 consultation under the Endangered Species Act defines the terminology used to assess impacts to listed species as follows (USFWS and NMFS 1998):

No effect: the appropriate conclusion when the action agency determines its proposed action will not affect a listed species or designated critical habitat.

May affect, is not likely to adversely affect: the appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect or evaluate insignificant effects; or (2) expect discountable effects to occur.

May affect, likely to adversely affect: the appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial (see definition of "is not likely to adversely affect"). In the event the overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action "is likely to adversely affect" the listed species. If incidental take is anticipated to occur as a result of the proposed action, an "is likely to adversely affect" determination should be made. An "is likely to adversely affect" determination requires the initiation of formal section 7 consultation.

The following thresholds were used to determine the magnitude of effects on federally listed special status species and their associated habitat, including designated critical habitat that would result from implementation of any of the alternatives. The Endangered Species determinations pursuant to section 7 of the Act are included.

ADVERSE

Negligible: There would be no observable or measurable impacts to federally listed species, their habitats, or the natural processes sustaining them in the proposed project area. This impact intensity would equate to a determination of "no effect" under section 7 of the *Endangered Species Act*.

Minor: Individuals may temporarily avoid areas. Impacts would not affect critical periods (e.g., breeding, nesting, denning, feeding, or resting) or habitat. This impact intensity would equate to a determination of "not likely to adversely affect" under section 7 of the *Endangered Species Act*.

Moderate: Individuals may be impacted by disturbances that interfere with critical periods (e.g., breeding, nesting, denning, feeding, or resting) or habitat; however, the level of impact would not result in a physical injury, mortality, or extirpation from the park. This impact intensity would equate to a determination of "likely to adversely affect" under section 7 of the *Endangered Species Act*.

Major: Individuals may suffer physical injury or mortality or populations may be extirpated from the park. This impact intensity would equate to a determination of "likely to adversely affect" under section 7 of the *Endangered Species Act*.

BENEFICIAL

Negligible: There would be no observable or measurable impacts to federally listed species, their habitats, including critical habitat designated under the *Endangered Species Act*, or the natural processes sustaining them in a park site. This impact intensity would equate to a determination of "no effect" under section 7 of the *Endangered Species Act*.

Minor: Impacts would result in slight increases to viability of the species in the park as species-limiting factors (e.g., habitat loss, competition, and mortality) are kept in check. Nonessential features of critical habitat in a park site would be slightly improved. This impact intensity would equate to a determination of "not likely to adversely affect" under section 7 of the *Endangered Species Act*.

Moderate: Impacts would result in improved viability of the species, population structure, and species population levels in the park, as species-limiting factors (e.g., habitat loss, competition, and mortality) are reduced. Some essential features of critical habitat would be improved. This impact intensity would equate to a determination of "not likely to adversely affect" under section 7 of the *Endangered Species Act.*

Major: Impacts would result in highly noticeable improvements to species viability, population structure, and species population levels in the park, as species-limiting factors (e.g., habitat loss, competition, and mortality) are nearly eliminated. All essential features of the critical habitat would be improved. This impact intensity would equate to a determination of "not likely to adversely affect" under section 7 of the *Endangered Species Act*.

STATE / DISTRICT OF COLUMBIA LISTED AND SPECIAL STATUS SPECIES

The assessment of impacts on both plant and animal species listed by either the state of Maryland or the District of Columbia (but not at the federal level under the *Endangered Species Act*) uses the same thresholds developed for the assessment of impacts on wildlife, as follows:

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them.

Minor: Impacts on native species, their habitats, or the natural processes sustaining them may not be detectable, and changes to population numbers, population structure, genetic variation, or other demographic factors would not occur. Occasional responses to disturbance by some individuals could be expected, but without interference to factors affecting population levels. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species.

Moderate: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and changes to population numbers, population structure, genetic variation, or other demographic factors would occur, but species would remain stable and viable. Frequent responses to disturbance by some individuals could be expected, with some negative impacts to factors affecting population levels. Sufficient habitat would remain functional to maintain the viability of all native species. Some impacts might occur during critical periods of reproduction or in key habitat.

Major: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable and extensive. Population numbers, population structure, genetic variation, or other demographic factors might experience large declines. Frequent responses to disturbance by some individuals would be expected, with negative impacts to factors resulting in a decrease in population levels. Loss of habitat might affect the viability of at least some species.

AREA OF ANALYSIS

The area of analysis for assessing impacts on rare, unique, threatened, or endangered species is Rock Creek Park. The area of analysis for cumulative impacts includes the park.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Federally Listed Species. The one federally listed species in the park, Hay's spring amphipod, is a groundwater species that spends the majority of its life below the surface feeding on detritus and other invertebrates, but that also occurs occasionally at the surface. Although the primary threats to this species are related to degradation of the subsurface groundwater (e.g., change in flows, pollution from fertilizers, pesticides, and petroleum leaks, and loss of detritus), disturbance of surface springs is also a concern. The act of monitoring of the deer population and use of cages for rare, unique, threatened, or endangered plants to protect important resources under alternative A would not affect groundwater or disturb springs and would not impact this species. However, the continued growth of the deer population and related effects of overabundance (i.e., trampling, browsing, nonnative species seed dispersal, etc.) could degrade surface springs by increasing erosion and sedimentation, compacting soils, and altering vegetation composition, in turn affecting the surface habitat in which the amphipod species is found infrequently. However, as described in the analysis for "Soils and Water Quality," the effects would be localized. In addition, the relative abundance of rare amphipods in the park has been attributed to the long-term protection of groundwater quality afforded by the park. This protection is expected to continue despite the growth of the deer population, and therefore, the impacts are not expected to critically affect this species. As a result, there would be long-term, negligible to minor, adverse impacts on the Hay's spring amphipod.

State/District of Columbia Listed and Special Status Species

Amphipods. Four other species of amphipods, including the Kenk's amphipod (*Stygobromus kenki*), have been found in or near the park. As with the Hay's spring amphipod, the primary effects on these species under alternative A would be potential degradation of and water quality impacts to surface springs that

support these groundwater species from the effects of deer overabundance (e.g., trampling, browsing, nonnative species seed dispersal, etc.). If surface erosion can affect the groundwater beneath the spring, this could have long-term, negligible to minor, adverse impacts on these amphipods. Monitoring of the deer population and use of some controls to protect important resources under alternative A would not affect groundwater or disturb springs and would not impact this species.

Invertebrates. Two invertebrates, the Appalachian spring snail (*Fontigens bottimeri*) and gray petaltail dragonfly (*Tachopteryx thoreyi*), are considered rare or uncommon by the state of Maryland. These species are generally found in seeps, which, like the springs described above for amphipods, could be affected by potential degradation of and water quality impacts to surface springs as a result of deer overabundance (e.g., trampling, browsing, seed dispersal, etc.). This could have long-term, negligible to minor, adverse impacts on these invertebrates. Monitoring of the deer population and use of some controls to protect important resources under alternative A would not affect seeps and would not impact these species.

Plants. Based on reviews of available information on plant resistance or palatability to deer, 14 of the 34 listed plants have been identified as palatable or possibly palatable to deer (see table 14 in chapter 3): single-headed pussytoes (*Antennaria solitaria*), hairy rock cress (*Arabis hirsute*), Virginia snakeroot (*Aristolochia serpentaria*), cornel-leaf whitetop (*Doellingeria infirma* [*Aster infirmus*]), pubescent sedge (*Carex hirtifolia*), American chestnut (*Castanea dentata*), pointed-leaved tick-trefoil (*Desmodium glutinosum*), butternut (*Juglans cinerea*), two-leaved solomon's-seal (*Maianthemum canadense*), elliptic shinleaf (*Pyrola elliptica*), shingle oak (*Quercus imbricaria*), overcup oak (*Quercus lyrata*), table mountain pine (*Pinus pungens*), and little ladies tresses (*Spiranthes tuberosa*). Listed plants considered unpalatable or resistant to deer browsing include gold star (*Chrysogonum virginianum*), whorled coreopsis (*Coreopsis verticillata*), Kentucky coffee-tree (*Gymnocladus dioica*), common clubmoss (*Lycopodium clavatum*), basil balm (*Monarda clinopodia*), yellow passionflower (*Passiflora lutea*), Virginia ground cherry (*Physalis virginiana*), orange coneflower (*Rudbeckia fulgida*), decumbent pearlwort (*Sagina decumbens*), snowy skullcap (*Scutellaria serrata*), three-leaved cup plant (*Silphium trifoliatum*), hispid goldenrod (*Solidago hispida*), and golden alexanders (*Zizia aurea*). No information on deer palatability was found on the remaining seven plants (green dragon arum [*Arisaema dracontium*], Lancaster sedge [*Cyperus lancastriensis*], low kyllinga sedge [*Kyllinga pumila*], narrow melic grass [*Melica mutica*], Carolina leaf-flower [*Phyllanthus caroliniensis*], and long-beaked arrowhead [*Sagittaria longirostra*]) listed for the park, but it is likely that some of these are palatable to deer.

Under alternative A, the park would protect rare understory plant species that deer browse with caging if they are found in the park. Placing and maintaining caging around known locations of listed species protect these plants from deer browsing, resulting in localized beneficial, long-term impacts. However, impacts to state-listed species outside of these caged areas would be similar to what was described for vegetation. The primary impact to these species in the park would be the result of not taking action to control deer numbers and the potential for overbrowsing. Based on observations and research conducted within the park, deer browsing has already caused noticeable changes to the vegetation, including a substantial reduction in plant cover.

Browsing impacts to those sensitive species palatable or preferred by deer could result in a reduction of the species in the plant community, either because of mortality resulting directly from browsing or due to impacts to overall plant health, and its ability to produce seed stock or otherwise spread. Continuous browsing of preferred plants over time could result in the loss of individual species from the community. Similar impacts to sensitive species considered to be less palatable to deer would also be expected if food resources were limited due to deer population growth, seasonal or climate variations (e.g., drought), or reductions in plant abundance resulting from disease or insect impacts. As a result, providing no control on the growth of the deer population would have adverse, long-term, moderate to major impacts on the listed plant species not protected by caging.

Wildlife. The vegetation/habitat conditions described in chapter 3, for both vegetation and other wildlife and wildlife habitat indicates that deer have already affected the vegetation, and thus habitat, for other wildlife species within the park, including those listed or considered special status species by Maryland and the District of Columbia. The herbaceous and woody seedling layers of the forest have been browsed by deer, and monitoring results indicate a substantial decline in vegetation in paired unfenced plots compared to paired fenced plots, suggesting that the abundance and diversity of the animals using this understory habitat today is less than what it would be if deer browsing pressure was lower.

As described for "Other Wildlife and Wildlife Habitat," the continued growth of the deer population and heavy deer browsing can degrade habitat and result in lack of food or cover for species that require ground vegetation to maintain viable populations within the park. This includes several species listed or considered special status species by Maryland and the District of Columbia (see tables 15 and 16 in chapter 3), including ground-nesting or feeding birds (e.g., Acadian flycatcher [*Empidonax virescens*], American woodcock [*Scolopax minor*], and eastern towhee [*Piplio erythrophthalmus*]), as well as some small mammals (e.g., eastern chipmunk [*Tamias striatus*]), and possibly some reptiles (e.g., corn snake [*Elaphe guttata guttata*], eastern hognose snake [*Heterodon platirhinos*], eastern worm snake [*Carphophis amoenus amoenus*], northern copperhead [*Agkistrodon controtrix*], northern ringneck snake [*Didophis punctatus edwardsii*]), the eastern fence lizard, and amphibians.

Predatory wildlife listed or considered special status species by Maryland and the District of Columbia (see table 16 in chapter 3), such as the broad-winged hawk (*Buteo playtpterus*), great-horned owl (*Bubo virginianus*), gray fox (*Urocyon cinereoargenteus*), and several snakes (e.g., corn snake, eastern hognose snake, northern copperhead, northern ringneck snake, northern scarlet snake [*Cemophora coccinea copei*], timber rattlesnake [*Crotalus horridus*]) could benefit from a more open understory because prey would be easier to find. However, if the habitat of the prey species deteriorated to the point where prey (mice, rabbits, and ground-nesting birds) could no longer maintain viable populations within the park, then predator species would also decline. Animals that may feed on deer carcasses, like Virginia opossum (*Didelphis virginiana*), could benefit slightly by higher deer densities.

Species that depend primarily on other habitats would be less affected by high or increased deer density. This would include species that occur primarily near wetlands and/or water (e.g., yellow-crowned night-heron [*Nyctanassa violacea*], American bittern [*Botaurus lentiginosus*], American black duck [*Ana rubripes*], black-crowned night-heron [*Nycticorax nycticorax*], and Wilson's snipe [*Gallinago delicate*]; northern river otter [*Lutra canadensis*] and American mink [*Mustela vison*]; queen snake [*Regina septemvittata*]; bullfrog [*Rana catesbeiana*], eastern mud salamander [*Pseudotriton m. montanus*], northern cricket frog [*Acris crepitans*], northern dusky salamander [*Desmognathus fuscus*], northern spring peeper [*Pseudacris crucifer*], northern two-lined salamander [*Eurycea bislineata*], pickerel frog [*Rana palustris*], northern red salamander [*Pseudotriton ruber ruber*], spotted salamander [*Ambystoma maculatum*], and upland chorus frog [*Pseudacris feriarum feriarum*]; and fish); in grasslands (e.g., eastern meadowlark [*Sturnella magna*], field sparrow [*Spizella pusilla*], grasshopper sparrow [*Ammodramus savannarum*]); those that use the canopy and sub-canopy layers (e.g., olive-sided flycatcher [*Contopus cooperi*], blackburnian warbler, cerulean warbler [*Dendroica cerulean*], Bicknell's thrush [*Catharus bicknelli*], bald eagle [*Haliaeetus leucocephalus*], chimney swift [*Chaetura pelagica*], and great horned owl); or those that generally den or roost in tree cavities or behind bark (e.g., southern flying squirrel [*Glaucomys volans*], eastern small-footed myotis [*Myotis lebii*], or eastern red bat [*Lasiurus borealis*). However, some of these species (e.g., birds, snakes, salamanders, and some frogs) are dependent on vegetation, fruits, and/or insects found within the understory of the forest that would be affected by high deer numbers.

Those species noted above that require ground vegetation to maintain viable populations within the park, would be adversely affected by high deer densities (greater than 20 deer per square mile) because available food and cover would be greatly reduced by browsing. In addition, as browsing impacts

increased, more and more species listed or considered special status species by Maryland and the District of Columbia would be adversely affected by these changes.

Therefore, the impact of alternative A to species listed or considered special status species by Maryland and the District of Columbia would be adverse, long-term, and negligible to major, depending on the species. Those that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover for these species could be severely reduced or possibly eliminated from the park, while impacts on species that depend primarily on other habitats (not woodlands) or on the canopy for food and cover would be negligible.

Cumulative Impacts

Actions resulting in cumulative impacts to rare, unique, threatened, or endangered wildlife species would be similar to those described for deer, wildlife, and vegetation. These include vehicle collisions and disturbances from traffic, visitor use (including off-trail users and social trails), illegal camping, and the presence of unrestrained pets. These actions would all continue to have long-term, minor adverse impacts by displacing rare, unique, threatened, or endangered species and potentially causing some mortality. Ground disturbance and erosion caused by off-trail use by visitors, pets, and horses could also adversely affect surface springs inhabited by the federally listed Hay's amphipod. Disease (e.g., rabies and West Nile virus) may also affect some species, and cell towers may result in bird collisions, which has been studied. The return of coyotes to the area has a beneficial effect on rare, unique, threatened, or endangered wildlife by helping to reestablish predator-prey relationships. Deer management plans and programs of local, state, and other federal agencies have limited contributions to long-term beneficial effects on rare, unique, threatened, or endangered species and their habitat by helping maintain a more balanced ecosystem. Past improvements to fish passages in the park also contribute beneficial effects on aquatic habitats and fish considered species of greatest conservation need within the District of Columbia.

Actions resulting in cumulative impacts to the state-listed plants, as well as habitat for rare, unique, threatened, or endangered wildlife, would be similar to those described for vegetation. Urban development has and would continue to cause long-term minor localized adverse impacts from the loss of state-listed plants and habitat for rare, unique, threatened, or endangered species. Other effects would include those from acts of vandalism, dumping, illegal camping, and off-trail use that have had and would continue to cause minor localized adverse impacts from trampling and burying of vegetation, or spreading of noxious weed seeds; past fires that have affected some areas, which have regrown but with more nonnative species; and past actions within the park, such as construction of facilities and roads, that have resulted in removal of habitat. Plant diseases and pests (e.g., gypsy moths) have had a large, relatively widespread adverse impact in the past, but have been somewhat reversed by the park's efforts to control such diseases and pests that continue to benefit forest resources. The park's exotic plant management efforts would also benefit state-listed plants, as well as habitat for rare, unique, threatened, or endangered wildlife, in the long term by removing plants that compete with native species. Continued park maintenance operations would have long-term minor adverse impacts on edge habitat for these species, limited to the areas affected. Nearly all visitor uses affect habitat for rare, unique, threatened, or endangered wildlife, and possibly some state-listed plants, to some extent, but particular activities like horseback riding, dog walking, and hiking lead to more social trails and spread of exotic weed seeds. Scientific research benefits park vegetation and habitat for rare, unique, threatened, or endangered species by supplying information needed for management decisions, but even the use of an area for research plots limits natural growth in those areas. All of these activities, when combined with the negligible to major impacts of continued pressure on woody and herbaceous vegetation that makes up habitat for rare, unique, threatened, or endangered species, 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 minor to major depending on the species.

Conclusion

Impacts to rare, unique, threatened, or endangered species under alternative A would be both beneficial and adverse. Adverse impacts to the federally listed Hay's spring amphipod could be long term and negligible to minor. Beneficial impacts to state-listed plants would result from establishing caging around known individual plants and from establishing caging around newly discovered plants in the park. Overall, there would be adverse, long-term, negligible to major impacts to rare, unique, threatened, or endangered species, from excessive deer browsing and the associated habitat degradation that could result in lack of food or cover for such species. Past, present, and future activities, when combined with the continued pressure on rare, unique, threatened, or endangered species expected under this alternative, would result in both adverse and beneficial impacts, with overall long-term, minor to major, adverse cumulative impacts.

Impairment under alternative A would be possible for some of the state-listed plants, because alternative A would not reverse the expected long-term continued growth in the deer population and damage to vegetation would likely continue, as described under "Vegetation" above. The park's enabling legislation calls for protection of park "timber, animals, and curiosities" in their natural conditions, and the GMP also calls for preservation of ecological resources, which would include special status species. Therefore, it is expected that impairment of certain state-listed plants that are palatable to deer, as well as habitat for rare, unique, threatened, or endangered species, could occur over the long term.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Under this alternative, several non-lethal actions would be implemented in combination to protect wildlife habitat and reduce deer numbers in the park. Actions include the use of large, fenced exclosures and reproductive control of does. Small caged areas and repellents would be implemented, as under alternative A.

Federally Listed Species. The Hay's spring amphipod, a groundwater spring species that spends the majority of its life below the surface feeding on detritus, but also occurs occasionally at the surface, is the only federally-listed species found in the park. The construction of large-scale exclosures and administration of reproductive control agents, including the associated human presence, would not contribute to the primary threats to this species, which are related to degradation of the subsurface groundwater (e.g., change in flows, pollution from fertilizers, pesticides, and petroleum leaks, and loss of detritus). However, disturbance of surface springs is also a concern. Any springs known or with the potential to support the Hay's spring amphipod would be avoided during construction of the exclosures and administration of reproductive control agents, and as a result, the potential for trampling of the surface springs would be limited.

As explained previously in this chapter under "Vegetation," approximately 5% of the park would be protected from deer browsing in this manner at a given time, and about 5% to 10% of the woody vegetation would be protected over the life of the plan. If any of the springs that support Hay's spring amphipod are within an exclosure, there could be long-term beneficial effects by reducing the impacts of deer overbrowsing (i.e., trampling, browsing, seed dispersal, etc.) on the surface springs that connect to the groundwater habitat. However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside the protected areas would continue to remain high for many years (see following discussion), the beneficial impact would be limited.

Under this alternative, the use of reproductive controls would eventually help reduce the deer population in the park, but the time required to see these results could be substantial (Hobbs et al. 2000; Nielsen et al. 1997; Rudolph et al. 2000) (see discussion in analysis for "Wildlife" and "Vegetation"). The benefit of this action would be proportional to the amount of population reduction that it achieved, and the

corresponding reduction in impacts from overbrowsing. However, as previously described under "Vegetation," the use of reproductive control could reduce the deer population to a limited extent if it was successfully implemented, but this would require many years to actually reduce the population, based on modeling efforts (Hobbs et al. 2000; Rudolph et al 2000; Merrill et al 2006) as well as a comparison of field efforts that used lethal (Frost et al. 1997) and non-lethal methods (Rutberg and Naugle 2008). It is expected that reproductive controls could stop population growth, but it would not be possible to achieve the desired deer density goals for the park during the life of this management plan.

Similar to alternative A, the continued growth of the deer population and related effects of overabundance outside the large-scale exclosures could degrade the surface spring by increasing erosion and sedimentation, compacting soils, and altering vegetation composition, in turn affecting the habitat for the amphipod species. However, as described in the analysis for "Soils and Water Quality," the effects would be localized and are expected to be within historical or baseline water quality conditions. In addition, the relative abundance of rare amphipods in the park has been attributed to the long-term protection of groundwater quality afforded by the park. This protection is expected to continue despite the growth of the deer population, and therefore, the impacts are not expected to critically affect this species. As a result, there would be long-term, negligible to minor, adverse impacts on the Hay's spring amphipod under alternative B.

State/District of Columbia Listed and Special Status Species

Amphipods. Four other species of amphipods, including the Kenk's amphipod, have been located in or near the park. As described for Hay's spring amphipod, the construction of large-scale exclosures and administration of reproductive control agents would not contribute to the primary threats to these species, degradation of the subsurface groundwater. Any springs known or with the potential to support these amphipods would be avoided during construction of the exclosures and administration of reproductive control agents, and as a result, the potential for trampling of the surface springs would be minimal. As explained for the Hay's spring amphipod, if any of the springs that support these species are within an exclosure, there could be long-term beneficial effects by reducing the impacts of deer overbrowsing (i.e., trampling, browsing, seed dispersal, etc.) on the surface springs that connect to the groundwater habitat.

However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside protected areas would continue to remain high for many years (see discussion for Hay's spring amphipod), the beneficial impact would be limited. The potential for effects from deer overabundance, including increased erosion and sedimentation, soil compaction, and changes in vegetation composition would continue, and could in turn affect the habitat for the amphipod species outside of the exclosures. As described for alternative A, if surface erosion can affect the groundwater beneath the spring, this could have long-term, negligible to minor, adverse impacts on these species.

Invertebrates. Two invertebrates, the Appalachian spring snail and gray petaltail dragonfly, are considered rare or uncommon by the state of Maryland. These species are generally found in seeps and could be disturbed by human presence during construction of the large exclosures or administration of reproductive control agents under alternative B. However, small areas of the park would be affected for a short period and the adverse impact would be short term and negligible.

As explained for the amphipods, if any of the seeps that support these invertebrates are within an exclosure, there could be long-term beneficial effects by reducing the impacts of deer overbrowsing (i.e., trampling, browsing, seed dispersal, etc.) on the surface springs that connect to the groundwater habitat. However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside protected areas would continue to remain high for many years (see discussion for Hay's spring amphipod), the beneficial impact would be limited.

The potential for effects from deer overabundance, including increased erosion and sedimentation, soil compaction, and changes in vegetation composition, would continue and could in turn affect the habitat

for the Appalachian spring snail and gray petaltail dragonfly outside of the exclosures. As described for alternative A, this could have long-term, negligible to minor, adverse impacts on these species.

Plants. Construction of the large scale exclosures and administration of reproductive control agents would result in ground disturbances, including trampling by workers, which could affect state-listed plant species and their habitat. Exclosure areas would be surveyed for state-listed plants prior to construction and any plants identified would be avoided. Personnel involved in these activities would also be educated about these plants and the potential impacts. In addition, small areas of the park would be affected for only a short period, and as a result, the adverse impact would be short term and negligible.

If any of the state-listed plants are within an exclosure, there could be long-term beneficial effects by removing the impacts of deer overbrowsing (i.e., trampling, browsing, seed dispersal, etc.) in these areas. However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside protected areas would continue to remain high for many years (see discussion for Hay's spring amphipod), the beneficial impact would be limited.

As described for alternative A, 14 of the 34 state-listed plants have been identified as palatable or possibly palatable to deer, 13 are considered unpalatable or resistant to deer browsing, and no information on deer palatability was found on the remaining seven plants listed for the park, but it is likely that some of these are palatable to deer (see table 14 in chapter 3). Based on observations and research conducted within the park, deer browsing has already caused noticeable changes to the vegetation, including a substantial reduction in density. Browsing impacts to those sensitive species palatable to or preferred by deer could result in a reduction of the species in the plant community, either because of mortality resulting directly from browsing or due to impacts to overall plant health, and its ability to produce seed stock or otherwise spread. Continuous browsing of preferred plants over time could result in the loss of individual species from the community. Similar impacts to sensitive species considered to be less palatable to deer would also be expected if food resources were limited due to deer population growth, seasonal or climate variations (e.g., drought), or reductions in plant abundance resulting from disease or insect impacts. As a result, alternative B would continue to have adverse, long-term, moderate to major impacts on the listed plant species not protected by fencing.

Wildlife. Large, fenced exclosures would be constructed to allow forest regeneration within localized areas of the park. Human presence associated with the installation of fenced exclosures could adversely affect wildlife listed or considered special status species by Maryland and the District of Columbia by causing displacement while the actions were being carried out. However, small areas of the park would be affected for such a short period that the adverse impact would be short term, negligible, and localized. In addition, surveys for wildlife listed or considered special status species by Maryland and the District of Columbia would be conducted prior to constructing the exclosures and locations and timing would be shifted as practicable to minimize impacts on wildlife listed or considered special status species by Maryland and the District of Columbia.

As explained previously, approximately 5% of the park would be protected from deer browsing in this manner at a given time, and about 5% to 10% of the woody vegetation would be protected over the life of the plan. The size of the openings in the exclosure fence (4 inches square) would allow small birds and mammals listed or considered special status species by Maryland and the District of Columbia to pass in and out of these exclosures. The added fence posts and fence would also provide perches for some birds, such as hawks, but the fence could be an obstacle to others. This action would make more ground/shrub layer habitat available to wildlife listed or considered special status species by Maryland and the District of Columbia than alternative A. However, because only 5% of the park would be fenced off from browsing deer at any one time, and because deer density outside the protected areas would continue to remain high for many years (see discussion for Hay's spring amphipod), the beneficial impact would be limited.

Implementation of sterilization would have short-term, negligible adverse effects on wildlife listed or considered special status species by Maryland and the District of Columbia in the vicinity of the operations from temporary noise and human presence, as well as the construction of bait stations and temporary holding pens. Bait could provide a beneficial food source to some species during the time reduction activities were conducted; however, the small quantity and short time periods that bait would be available would have a negligible impact on any species. The use of reproductive controls could help reduce impacts to these species; however, the benefit of this action would be proportional to the amount of population reduction that it achieved and a corresponding improvement to understory habitat. As described previously, it is expected that reproductive controls could slow population growth, but it would not be possible to achieve the density goals for the park during the life of this management plan.

Similar to alternative A, a continued high deer density and the associated browsing throughout the majority of the park would reduce the availability of food for wildlife listed or considered special status species by Maryland and the District of Columbia that depend on ground/shrub layer vegetation for survival. This includes (see table 15 in chapter 3) ground and/or shrub-nesting birds (e.g., Acadian flycatcher, American woodcock, and eastern towhee), as well as some small mammals (e.g., eastern chipmunk), reptiles (e.g., corn snake, eastern hognose snake, eastern worm snake, northern copperhead, northern ringneck snake, and northern fence lizard), and amphibians (e.g., marbled salamander [*Ambystoma opacum*] and redspotted newt [*Notophthalmus viridescens*]).

Predatory wildlife listed or considered special status species by Maryland and the District of Columbia (see table 16 in chapter 3), such as the broad-winged hawk, great-horned owl, gray fox, and several snakes (e.g., corn snake, eastern hognose snake, northern copperhead, northern ringneck snake, northern scarlet snake, timber rattlesnake) could benefit from a more open understory because prey would be easier to find. However, if the habitat of the prey species deteriorated to the point where prey (mice, rabbits, and ground-nesting birds) could no longer maintain viable populations within the park, then predator species would also decline. Animals that may feed on deer carcasses, like Virginia opossum, could benefit slightly by higher deer densities.

Species that depend primarily on other habitats would be less affected by high or increased deer density. This would include species that occur primarily near wetlands and/or water (e.g., yellow-crowned night-heron, American bittern, American black duck, black-crowned night-heron, and Wilson's snipe; northern river otters and American minks; queen snake; bullfrog, eastern mud salamander, northern cricket frog, northern dusky salamander, northern spring peeper, northern two-lined salamander, pickerel frog, northern red salamander, spotted salamander, and upland chorus frog, and fish); in grasslands (e.g., eastern meadowlark, field sparrow, and grasshopper sparrow); those that use the canopy and sub-canopy layers (e.g., olive-sided flycatcher, blackburnian flycatchers, cerulean warbler, Bicknell's thrush, bald eagle, chimney swift, and great-horned owl); or those that generally den or roost in tree cavities or behind bark (e.g., southern flying squirrel, eastern small-footed myotis, or eastern red bat). However, some of these species (e.g., birds, snakes, salamanders, and some frogs) are dependent on vegetation, fruits, and/or insects found within the understory of the forest that would be affected by high deer numbers.

Those species noted above that require ground vegetation to maintain viable populations within the park would be adversely affected by high deer densities (greater than 20 deer per square mile) because available food and cover would be greatly reduced by browsing. In addition, as browsing impacts increased, more and more species listed or considered special status species by Maryland and the District of Columbia would be adversely affected by these changes.

Therefore, the impact of alternative B to wildlife species listed or considered special status species by Maryland and the District of Columbia would continue to be adverse, long term, and negligible to major, depending on the species. Those that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover for these species could be severely reduced, while impacts on species that

depend primarily on other habitats (not woodlands) or on the canopy for food and cover would be negligible.

Cumulative Impacts

The same past, present, and reasonably foreseeable actions described under alternative A would also occur under alternative B. All of these actions, when combined with an extended use of large-scale exclosures and a long-term reduction in deer browsing pressure resulting from the use of reproductive controls, would result in both beneficial and adverse cumulative impacts to species listed or considered special status species by Maryland and the District of Columbia. Adverse cumulative impacts would be long term and minor to moderate.

Conclusion

Adverse impacts to the federally listed Hay's spring amphipod could be long term and negligible to minor. Impacts to species listed or considered special status species by Maryland and the District of Columbia under alternative B would be adverse, long term, and moderate to major, until reproductive controls on the park deer herd were effective. The placement and maintenance of large exclosures would protect herbaceous vegetation in about 5% of the park at any one time, and woody vegetation in up to 10% of the park over the life of the plan. The areas selected for exclosures would include many species listed or considered special status species by Maryland and the District of Columbia, resulting in beneficial, long-term impacts. However, adverse, long-term, negligible to moderate impacts due to deer browsing would continue outside the exclosures. Past, present, and future activities, when combined with the continued pressure on species listed or considered special status species by Maryland and the District of Columbia expected under this alternative, would result in both beneficial and adverse impacts.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Under this alternative, sharpshooting would be used to reduce the deer herd size, along with capture and euthanasia where appropriate. The intent of this alternative would be to rapidly reduce deer density within the park to allow for the herbaceous vegetation and tree seedlings to recover from deer browsing pressure. Small caged areas and repellents would be implemented, as under alternative A.

Federally Listed Species. The implementation of sharpshooting and capture and euthanasia (where appropriate) would not contribute to primary threats to the Hay's spring amphipod, which are related to degradation of the subsurface groundwater (e.g., change in flows, pollution from fertilizers, pesticides, and petroleum leaks, and loss of detritus). Bait stations could be used and would be located such that the ground would serve as a backstop for bullets. Although disturbance of surface springs is also a concern, any springs known or with the potential to support the Hay's spring amphipod would be avoided during implementation of sharpshooting or capture and euthanasia, and the potential for trampling of the surface springs would be limited. Any human disturbances related to implementation of alternative C would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by the Hay's spring amphipod.

Under alternative C, a reduced deer density throughout the majority of the park would minimize the potential for surface springs to be degraded by decreasing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, minimize potential impacts on the habitat for the Hay's spring amphipod which would result in long-term, beneficial effects that would reduce adverse impacts to negligible.

State/District of Columbia Listed and Special Status Species

Amphipods. As described for the Hay's spring amphipod, the implementation of sharpshooting and capture and euthanasia (where appropriate) would not contribute to primary threats to state-listed amphipods. Although disturbance of the surface spring is also a concern, any springs known or with the potential to support state-listed amphipods would be avoided during implementation of sharpshooting or capture and euthanasia as practicable. As a result, the potential for trampling of the surface springs would be limited. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat for or responses by these amphipods.

Under alternative C, a reduced deer density throughout the majority of the park would minimize the potential for surface springs to be degraded by decreasing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, minimize potential impacts on the habitat for the state-listed amphipods which would result in long-term, beneficial effects that reduce existing impacts to negligible.

Invertebrates. The two invertebrates considered rare or uncommon by the state of Maryland, the Appalachian spring snail and gray petaltail dragonfly, could be disturbed by trampling during implementation of sharpshooting and capture and euthanasia (where appropriate) under alternative C. However, small areas of the park would be affected for a short period and the adverse impact would be short term and negligible.

As explained for the amphipods, a reduced deer density throughout the majority of the park would minimize the potential for seeps that support the Appalachian spring snail and gray petaltail dragonfly to be degraded by decreasing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, minimize potential impacts on the habitat for the state-listed invertebrates, which would result in long-term, beneficial effects over time.

Plants. The implementation of sharpshooting and capture and euthanasia (where appropriate) would result in ground disturbances, including trampling by workers, that could affect state-listed plant species and their habitat. However, small areas of the park would be affected for only a short period and by relatively few individuals. As a result, the adverse impact would be short term and negligible.

A reduced deer density throughout the majority of the park would promote the growth of sensitive species if suitable habitat characteristics and seed stock were present. A smaller deer herd density would reduce browsing pressure on native plant communities over time, resulting in a reestablishment and an increase in the extent of natural communities in the park. Increased areas of native vegetation would be expected to promote the reestablishment of special concern species. Reducing deer herd density would decrease the potential for deer browsing impacts to sensitive species, resulting in beneficial, long-term impacts. Some browsing of preferred sensitive plant species (see alternatives A and B) occurring outside small, caged exclosures would be expected to occur, even with herd density maintained at target levels (15 to 20 deer per square mile). As a result, potential impacts to palatable sensitive plant species occurring outside exclosures would be reduced to adverse, long term, and minor.

Wildlife. As described for alternative C in the "Wildlife" section of this chapter, wildlife listed or considered special status species by Maryland and the District of Columbia would be temporarily disturbed by the presence of humans placing bait stations, shooting deer, setting traps, and observing deer behavior. Bait could provide a beneficial food source to some species during the time reduction activities were conducted; however, the small quantity and short time periods that bait would be available would have a negligible impact on any species. There would be little surface disposal of deer waste and/or carcasses that would provide a beneficial food source to scavengers like Virginia opossum, because it is expected that the majority of carcasses would be disposed of through burial or off-site. The small number of carcasses left for natural decomposition would not be substantially different than what occurs through

mortality from disease, old age, and car collisions. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by wildlife listed or considered special status species by Maryland and the District of Columbia.

A reduced degree of deer browsing throughout the majority of the park would increase the availability of food and cover for wildlife listed or considered special status species by Maryland and the District of Columbia and that depend on ground/shrub layer vegetation for survival (see table 15 in chapter 3). This includes ground and/or shrub-nesting birds (e.g., Acadian flycatcher, American woodcock, and eastern towhee), as well as some small mammals (e.g., eastern chipmunk), reptiles (e.g., corn snake, eastern hognose snake, eastern worm snake, northern copperhead, northern ringneck snake, and northern fence lizard), and amphibians (e.g., marbled salamander and redspotted newt). These species would be able to maintain viable populations within the park, and as the vegetation became more diverse and abundant with reduced browsing pressure, the number of species that would benefit from these changes would increase. This would be a beneficial, long-term impact on these species.

Wildlife listed or considered special status species by Maryland and the District of Columbia that depend primarily on other habitats would be less affected by a reduced deer density, although a long-term benefit to upper canopy species would be gained in the future as forest regeneration maintained the upper canopy. This would include species that occur primarily near wetlands and/or water (e.g., yellow-crowned night-heron, American bittern, American black duck, black-crowned night-heron, and Wilson's snipe; northern river otter and American mink; queen snake; bullfrog, eastern mud salamander, northern cricket frog, northern dusky salamander, northern spring peeper, northern two-lined salamander, pickerel frog, northern red salamander, spotted salamander, and upland chorus frog, and fish); in grasslands (e.g., eastern meadowlark, field sparrow, and grasshopper sparrow); those that use the canopy and sub-canopy layers (e.g., olive-sided flycatcher, blackburnian flycatcher, cerulean warbler, Bicknell's thrush, bald eagle, chimney swift, and great-horned owl); or those that generally den or roost in tree cavities or behind bark (e.g., southern flying squirrel, eastern small-footed myotis, or eastern red bat).

Predatory wildlife listed or considered special status species by Maryland and the District of Columbia (see table 16 in chapter 3), such as the broad-winged hawk, great-horned owl, gray fox, and several snakes (e.g., corn snake, eastern hognose snake, northern copperhead, northern ringneck snake, northern scarlet snake, timber rattlesnake) would find a denser understory more difficult for hunting small prey than the current open condition. However, better habitat conditions and an increase in the abundance of prey species would also benefit these predators. Other wildlife listed or considered special status species by Maryland and the District of Columbia that potentially feed on deer carcasses, such as Virginia opossum, would also be slightly adversely affected.

Overall, long-term reduction and controls on deer population growth would allow vegetation used as food and cover for other wildlife to become more abundant. Therefore, the impact of alternative C to wildlife listed or considered special status species by Maryland and the District of Columbia would be mostly beneficial and long term, depending on the species and existing adverse impacts would be reduced to negligible or minor levels.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative C. Management actions identified in alternative C, where deer browsing pressure would be drastically reduced through a rapid reduction of the deer population, would provide beneficial, long-term impacts to species listed or considered special status species by Maryland and the District of Columbia. Some adverse impacts would result to habitat as a result of disturbances when qualified federal employees or authorized agents were setting traps, placing bait stations, occupying shooting locations, and removing

deer carcasses. However, these impacts would be temporary and isolated, causing little disturbance and resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would allow the forest to regenerate, improving habitat and reducing impacts of overbrowsing for species listed or considered special status species by Maryland and the District of Columbia. This would result in beneficial impacts that would combine with the beneficial effects of exotic plant control, research, and disease and pest control. These beneficial impacts would offset adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to species listed or considered special status species by Maryland and the District of Columbia under this alternative would be mostly beneficial and long term.

Conclusion

Under alternative C, the reduced deer density would minimize potential impacts on the habitat for the Hay's spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation and allow increased abundance and diversity of other species that depend on understory vegetation. A few predators that use deer as a food source could be adversely affected by a lower deer density, as could scavengers that feed on deer carcasses, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time. Human disturbances from trampling at bait stations, shooting sites, trapping locations, or deer carcass disposal sites would be temporary and isolated within the park. Therefore, adverse impacts of these actions on species listed or considered special status species by Maryland and the District of Columbia would be short term and negligible. Past, present, and future activities, when combined with the reduced browsing pressure on understory habitat expected under this alternative, would result in long-term, beneficial, cumulative impacts to species listed or considered special status species by Maryland and the District of Columbia.

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

Analysis

Under alternative D, the size of the deer herd would be directly reduced through sharpshooting and capture and euthanasia, and reproductive control or direct reduction (if needed) would be used to maintain the population at the desired level. Small caged areas and repellents would be implemented, as under alternative A.

Federally Listed Species. As described for alternative C, the implementation of sharpshooting, capture, and euthanasia (where appropriate), and/or reproductive control would not contribute to primary threats to the Hay's spring amphipod. Although disturbance of the surface spring is also a concern, any springs known or with the potential to support the Hay's spring amphipod would be avoided during implementation of sharpshooting or capture and euthanasia as practicable. As a result, the potential for trampling of the surface springs would be limited. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by the Hay's spring amphipod.

Under alternative D, a reduced deer density throughout the majority of the park would minimize the potential for surface springs to be degraded by decreasing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, minimize potential impacts on the habitat for the Hay's spring amphipod which would result in long-term, beneficial effects that reduce existing adverse impacts to negligible.

State/District of Columbia Listed and Special Status Species

Amphipods. As described for the Hay's spring amphipod, the implementation of this alternative would not contribute to primary threats to state-listed amphipods, and any springs known or with the potential to support state-listed amphipods would be avoided during deer management activities. As a result, the potential for trampling of the surface springs would be limited, and these temporary (less than 30 days per year), adverse impacts from human disturbance would be negligible, as they would not cause any measurable change to the habitat for or responses by these amphipods.

Alternative D would reduce deer density throughout the majority of the park and minimize the potential impacts on surface spring habitat for the state-listed amphipods, by reducing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, result in long-term, beneficial effects that reduce existing impacts to negligible.

Invertebrates. The two invertebrates considered rare or uncommon by the state of Maryland, the Appalachian spring snail and gray petaltail dragonfly, could be disturbed by trampling during implementation of alternative C. However, small areas of the park would be affected for a short period and the adverse impact would be short term and negligible.

As explained for the amphipods, a reduced deer density throughout the majority of the park would minimize the potential for seeps that support the Appalachian spring snail and gray petaltail dragonfly to be degraded by decreasing erosion, sedimentation, and soil compaction, as well as helping to restore native plant communities. This would, in turn, minimize potential impacts on the habitat for the state-listed invertebrates which would result in long-term, beneficial effects that reduce existing adverse impacts to negligible.

Plants. The implementation of alternative D would result in ground disturbances, including trampling by those implementing the alternative, which could affect state-listed plant species and their habitat. However, small areas of the park would be affected for only a short period, and personnel involved in these activities would also be educated about these plants and the potential impacts. As a result, the adverse impact would be short term and negligible.

Alternative D would result in a reduced deer density throughout the majority of the park. As described for alternative C, this would promote the growth of sensitive species, reduce browsing pressure on native plant communities over time, and result in the reestablishment of special concern species. Reducing deer herd density would decrease the potential for deer browsing impacts to sensitive species, resulting in beneficial, long-term impacts. Some browsing of preferred sensitive plant species (see alternatives A and B) occurring outside small, caged exclosures would be expected to occur, even with herd density maintained at target levels (15 to 20 deer per square mile). As a result, potential impacts to palatable sensitive plant species occurring outside exclosures would be reduced to adverse, long term, and minor.

Wildlife. As described for alternative C, wildlife listed or considered special status species by Maryland and the District of Columbia would be temporarily disturbed during implementation of alternative D during sharpshooting activities. The small quantity and short time periods that bait would be available would have a slightly beneficial impact on any species by providing additional food sources. The majority of carcasses would be disposed of through burial or off-site disposal, and the small number of carcasses left for natural decomposition would not be substantially different than what occurs through mortality, resulting in a limited beneficial effect for scavengers like Virginia opossum. These human disturbances would be adverse, but temporary (less than 30 days per year), and negligible, as they would not cause any measurable change to the habitat or responses by wildlife listed or considered special status species by Maryland and the District of Columbia.

A reduced degree of deer browsing throughout the majority of the park would increase the availability of food and cover for wildlife listed or considered special status species by Maryland and the District of Columbia and that depend on ground/shrub layer vegetation for survival (see table 15 in chapter 3). This

includes ground and/or shrub-nesting birds (e.g., Acadian flycatcher, American woodcock, and eastern towhee), as well as some small mammals (e.g., eastern chipmunk), reptiles (e.g., corn snake, eastern hognose snake, eastern worm snake, northern copperhead, northern ringneck snake, and the northern fence lizard), and amphibians (e.g., marbled salamander and redspotted newt). These species would be able to maintain viable populations within the park and as the vegetation became more diverse and abundant with reduced browsing pressure, the number of species that would benefit from these changes would increase. This would be a beneficial, long-term impact on these species.

Wildlife listed or considered special status species by Maryland and the District of Columbia that depend primarily on other habitats would be less affected by a reduced deer density, although a long-term benefit to upper canopy species would be gained in the future as forest regeneration maintained the upper canopy. This would include species that occur primarily near wetlands and/or water (e.g., yellow-crowned night-heron, American bittern, American black duck, black-crowned night-heron, and Wilson's snipe; northern river otter and American mink; queen snake; bullfrog, eastern mud salamander, northern cricket frog, northern dusky salamander, northern spring peeper, northern two-lined salamander, pickerel frog, northern red salamander, spotted salamander, and upland chorus frog, and fish); in grasslands (e.g., eastern meadowlark, field sparrow, and grasshopper sparrow); those that use the canopy and sub-canopy layers (e.g., olive-sided flycatcher, blackburnian flycatcher, cerulean warbler, Bicknell's thrush, bald eagle, chimney swift, and great-horned owl); or those that generally den or roost in tree cavities or behind bark (e.g., southern flying squirrel, eastern small-footed myotis, or eastern red bat).

Predatory wildlife listed or considered special status species by Maryland and the District of Columbia (see table 16 in chapter 3), such as the broad-winged hawk, great-horned owl, gray fox, and several snakes (e.g., corn snake, eastern hognose snake, northern copperhead, northern ringneck snake, northern scarlet snake, timber rattlesnake) would find a denser understory more difficult for hunting small prey than the current open condition. However, better habitat conditions and an increase in the abundance of prey species would also benefit these predators. Other wildlife listed or considered special status species by Maryland and the District of Columbia that potentially feed on deer carcasses, such as the Virginia opossum, would also be adversely affected.

Overall, long-term reduction and controls on deer population growth would allow vegetation used as food and cover for other wildlife to become more abundant. Therefore, the impact of alternative D to wildlife listed or considered special status species by Maryland and the District of Columbia, would be mostly beneficial and long term, depending on the species, and existing adverse impacts would be reduced to negligible or minor levels.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative D. Management actions identified in alternative D, where deer browsing pressure would be drastically reduced through a rapid reduction of the deer population would provide beneficial, long-term impacts to species listed or considered special status species by Maryland and the District of Columbia. Some adverse impacts would result to habitat as a result of disturbances when qualified federal employees or authorized agents were implementing sharpshooting, capture and euthanasia, and/or reproductive control. However, these impacts would be temporary and isolated, causing little disturbance and resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would allow the forest to regenerate, improving habitat and reducing impacts of overbrowsing for species listed or considered special status species by Maryland and the District of Columbia. This would result in beneficial impacts that would combine with the beneficial effects of exotic plant control, research, and disease and pest control. These beneficial impacts would offset adverse effects from increased development and other cumulative adverse actions. Therefore,

cumulative impacts to species listed or considered special status species by Maryland and the District of Columbia under this alternative would be mostly beneficial and long term.

Conclusion

Under alternative D, the reduced deer density would minimize potential impacts on the habitat for the Hay's spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts to negligible. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation and allow increased abundance and diversity of other species that depend on understory vegetation. Adverse, long-term impacts would be reduced to negligible or minor levels over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced to negligible or minor levels over time. Human disturbances from trampling during implementation of sharpshooting, capture and euthanasia, and/or reproductive control would be temporary and isolated within the park. Therefore, adverse impacts of these actions on species listed or considered special status species by Maryland and the District of Columbia, would be short term and negligible. Past, present, and future activities, when combined with the reduced browsing pressure on understory habitat expected under this alternative, would result in long-term, beneficial, cumulative impacts to species listed or considered special status species by Maryland and the District of Columbia.

CULTURAL LANDSCAPES

GUIDING REGULATIONS AND POLICIES

Federal actions that have the potential to affect cultural resources are subject to a variety of laws. The *National Historic Preservation Act* (1966, as amended) is the principal legislative authority for managing cultural resources associated with NPS projects. Generally, Section 106 of the act requires all federal agencies to consider the effects of their actions on cultural resources listed on or determined eligible for listing in the National Register of Historic Places. Such resources are termed historic properties. Agreement on how to mitigate effects to historic properties is reached through consultation with the State Historic Preservation Officer; the Tribal Historic Preservation Officer, if applicable; and the Advisory Council on Historic Preservation, as necessary. In addition, federal agencies must minimize harm to historic properties that would be adversely affected by a federal undertaking. Section 110 of the act requires federal agencies to establish preservation programs for the identification, evaluation, and nomination of historic properties to the National Register of Historic Places. Other important laws or EOs designed to protect cultural landscapes include *EO 11593*, "Protection and Enhancement of the Cultural Environment."

Through legislation the NPS is charged with the protection and management of cultural resources in its custody. This is furthered implemented through Director's Order 28: *Cultural Resource Management*, NPS *Management Policies 2006* (NPS 2006), and the 1995 "Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers." These documents charge NPS managers with avoiding or minimizing to the greatest degree practicable, adverse impacts on park resources and values. Although the NPS has the discretion to allow certain impacts in parks, that discretion is limited by the statutory requirement that park resources and values remain unimpaired, unless a specific law directly provides otherwise.

ASSUMPTIONS AND METHODOLOGY

The NPS categorizes cultural resources as archeological resources, cultural landscapes, historic structures, museum objects, and ethnographic resources. As noted under "Issues and Impact Topics" in chapter 1, only impacts to cultural landscapes have been retained for detailed analysis in this plan/EIS.

The descriptions of effects on cultural resources that are presented in this section are intended to comply with the requirements of both NEPA and Section 106 of the *National Historic Preservation Act*. In accordance with the regulations of the Advisory Council on Historic Preservation on implementing Section 106 (36 CFR Part 800, Protection of Historic Properties), impacts on cultural resources are to be identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed on or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of an adverse effect to affected cultural resources either listed on or eligible to be listed in the national register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected cultural resources eligible for listing in the National Register of Historic Places. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any of the characteristic that qualifies the resource for inclusion in the national register (for example, diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the proposal that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). A determination of *no adverse effect* means there would either be no effect or that the effect would not

diminish in any way the characteristics that qualify the cultural resource for inclusion in the National Register of Historic Places.

Council on Environmental Quality regulations and the NPS Director's Order 12 also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in the intensity of an impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. Cultural resources are nonrenewable resources, and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 of the *National Historic Preservation Act* may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections for cultural landscapes. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) only on cultural resources listed on or eligible for the National Register of Historic Places, based on the criteria of effect and criteria of adverse effect found in the regulations of the Advisory Council on Historic Preservation.

METHODOLOGY AND INTENSITY THRESHOLDS

Cultural landscapes are landscapes that have been adapted for or influenced by human use. Cultural landscapes that are designated within national parks have been determined to have historic significance and integrity.

In analyzing how alternative approaches for deer management would affect the cultural landscape of Rock Creek Park, attention was paid to the program's effect on vegetation as a character-defining feature of the cultural landscape and on views and vistas.

For the assessment of potential impacts to cultural landscapes, the principal sources reviewed were Dumbarton Oaks Park Cultural Landscape Report (NPS 2000a), Montrose Park Cultural Landscape Report (NPS 2004d), Linnaean Hill Cultural Landscape Inventory (NPS 2003a), and Peirce Mill Cultural Landscape Inventory (NPS 2003b).

For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: The impact would be at the lowest level of detection, with neither adverse nor beneficial consequences. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *no adverse effect*.

Minor: **Adverse impact**: Alteration of a pattern(s) or feature(s) of the cultural landscape listed on or eligible for listing in the National Register of Historic Places would not diminish the overall integrity of the landscape. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *no adverse effect*.

Beneficial impact: Preservation of landscape patterns and features would be in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (NPS 1996b), therefore maintaining the integrity of the cultural landscape. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *no adverse effect*.

Moderate: **Adverse impact**: The impact would alter a pattern(s) or feature(s) of the cultural landscape, diminishing the overall integrity of the landscape. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *adverse effect*. A memorandum of agreement would be executed among the NPS and the State Historic Preservation Officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from major to moderate.

Beneficial impact: The landscape or its features would be rehabilitated in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes (NPS 1996b), to make possible a compatible use of the landscape while preserving its character-defining features. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *no adverse effect*.

Major: **Adverse impact**: The impact would alter a pattern(s) or feature(s) of the cultural landscape, diminishing the overall integrity of the resource. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *adverse effect*. Measures to minimize or mitigate adverse impacts could not be agreed upon, and the NPS and the State Historic Preservation Officer and/or Advisory Council on Historic Preservation would be unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial impact: The cultural landscape would be restored in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes (NPS 1996b) to accurately depict the features and character of a landscape as it appeared during its period of significance. For purposes of Section 106 of the *National Historic Preservation Act*, the determination of effect would be *no adverse effect*.

AREA OF ANALYSIS

There are 25 units (listed in chapter 1) in Rock Creek Park covered by the plan/EIS that contain cultural landscapes, as determined by the NPS. For the purpose of this analysis, including cumulative impacts, the area of potential effect includes these 25 units.

IMPACTS OF THE ALTERNATIVES

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

Analysis

One of the greatest impacts on park vegetation has been the growth in the deer population and subsequent deer browsing, which has caused a depletion in the forest's herbaceous and shrub vegetation and has adversely affected numerous cultural landscape plantings. This has a potential impact on cultural landscape elements, both natural and designed, because much of the natural or planted vegetation is a key component of the park's cultural landscapes. For example, the park's *Dumbarton Oaks Cultural*

Landscape Report states that forest vegetation contributes to the significance of the cultural landscape (NPS 2000a).

Under alternative A, park staff would continue monitoring the deer population and would conduct activities to protect native plants, such as creating small caged areas and applying repellents to a small number of landscaped areas. However, deer populations would be expected to remain at high levels or slightly increase over the long term, and browsing would continue throughout the park, causing a decline in the long-term abundance and diversity of native plant species, contributing to further establishment of invasive exotic species within the park, and reducing or eliminating palatable landscape plantings. As a result, the plant species and cultural plantings that have existed historically in the park would continue to be reduced and in some cases could be lost. This continued decline in these plant communities would result in an adverse, long-term, minor to moderate impact to the park's cultural landscape (depending on the landscape and the plant's importance to the landscape), because native and introduced plant communities comprise a component of most cultural landscape character-defining features. The degree of impact would depend on the size of the future deer population and the associated degree of impact on the park plant communities and the susceptibility of the particular planting to deer browse.

Small caged areas and repellents would continue to be used to protect landscape plantings, new restoration plantings, or rare plant species from deer browsing in specified areas. In addition, protection of these landscape features would result in beneficial, long-term, minor impacts in localized areas, but this would not compensate for the severe impacts caused by overbrowsing throughout the park's cultural landscapes.

Cumulative Impacts

Various past and present actions and events have affected the vegetation at Rock Creek Park that is an important component of the cultural landscape. Gypsy moths, which cause large-scale tree defoliation and can lead to mortality, are a serious concern throughout northern Maryland and Washington D.C. They have become sufficiently abundant so as to require aerial spraying to prevent deforestation and related impacts. Fires have affected various areas of the park and suppression has also reduced the number of fire-dependent native species. In the decades before the park was established, a blight destroyed the American chestnut, at one time a major element of the Rock Creek Park forest, as well as most of the eastern deciduous forest. All diseases and activities that affect the native woodlands would also affect the historic character of the site, resulting in adverse, long-term, minor to moderate impacts.

Invasive exotic vegetation is a problem inside and outside the park. Disturbance from natural events or from human activities can make conditions favorable for invasive exotic plant species. The spread of exotic species could have adverse impacts on cultural landscapes if the species overtake the established native and planted species that constitute the cultural landscape. An intensive program to prevent the spread of invasive exotic vegetation in the park over the long term would result in beneficial, minor impacts to the park's cultural landscapes.

Land use changes in areas adjacent to Rock Creek Park affect views and vistas, gradually eroding the sense of place that used to surround the park. Character-defining features of a historic landscape include changes, either individually or collectively, that have occurred over time. Particularly affected is land along the various parkways leading into the main body of Rock Creek Park and other vulnerable sites on the immediate boundary of the park. Development or new construction has the potential to degrade the views of the natural and designed cultural landscapes that comprise the park. Park development and maintenance would have short- and long-term negligible impacts because recognized cultural landscapes would be protected by park policy. Similarly, telecommunications facilities development would have to comply with park policy to preserve cultural landscapes when facilities are sited.

The practice of riding mountain/motor bikes on embankments and Civil War era earthworks contributes to long-term, moderate, adverse impacts on those particular features of the various landscapes within the park units.

Overall, impacts from the actions described above, coupled with the continued decline of native plant communities and cultural plantings under alternative A, would result in adverse, long-term, minor to moderate cumulative impacts to the cultural landscape.

Conclusion

The use of small cages and repellents to protect landscape plantings, new restoration plantings, or rare plant species at specified areas could result in beneficial, long-term, minor impacts to these parts of the park's vegetation. However, continued growth of the deer population and the associated ongoing decline in the abundance and diversity of the native plant communities and cultural plantings would result in an adverse, long-term, minor to moderate impact to the park's cultural landscapes. Adverse, long-term, minor to moderate cumulative impacts would result from the ongoing decline of native plant communities as a result of disease processes, development, vandalism, and deer browsing, despite benefits from the use of small cages and repellents and exotic species control.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Several non-lethal actions would be implemented under this alternative, in addition to actions described under alternative A, to protect forest resources, including the use of large-scale exclosures (figure 4) and reproductive control for does. The large-scale exclosures would vary in size, depending on the landscape, and each would enclose from 7 to 25 acres. Assuming 14 exclosures were erected, 167 acres or about 5% to 10% of the forested area would be protected from deer browsing over the life of the plan, allowing for the regeneration of forest vegetation within the exclosures. This represents approximately 5% of the entire park and approximately 10% of the main park reservation. Although habitat is becoming limited within the park, deer browsing would be more concentrated outside the exclosures and could cause some continued decline in native and landscaped plants in these areas. In addition, the woven-wire, 8-foot fenced exclosures would introduce new structural elements into the park's overall landscape. The exclosures are planned for the Rock Creek unit only; no cultural landscapes in other Rock Creek Park units would be affected. The exclosures would be inconsistent with the park's designed and historic landscapes that reflect the significance of early 1900s buildings, gardens, and natural features. To mitigate potential impacts to the historic landscapes, the exclosures would be located some distance from common visitor use areas so that they would not intrude on these landscapes. The exclosures might be visible during the winter and spring from locations within the park, such as Parkside Drive trail where the views are contributing features to the cultural landscape. However, due to their materials and construction, they would be difficult to see. Regardless, the presence of these exclosures would result in long-term minor to moderate adverse impacts to the cultural landscapes in which they are located.

The regeneration of native vegetation within the exclosures would begin to rehabilitate portions of the cultural landscape. As described in alternative A, small cages and repellents would also be used to protect other character-defining vegetation features. These small-scale cages, combined with the protection afforded by the large exclosures, would result in localized beneficial, long-term, minor impacts to the cultural landscape because of expected vegetation regeneration in these areas.

Reproductive controls under alternative B would involve the use of bait piles and possibly temporary holding pens. Bait piles would be placed in unobtrusive locations so as not to impact the visitor's appreciation of the cultural landscape. The same is true of temporary holding areas or pens; these would be placed in locations away from gardens, structures, and other cultural landscape features, limiting adverse impacts to negligible or minor levels. Reproductive control techniques for does would gradually

limit deer population growth over the longer term and allow for regeneration of native plant communities outside the exclosures, with long-term beneficial minor impacts to the park's cultural landscapes, but, as described under the "Vegetation" analysis, this benefit would not be experienced during the life of this plan. Deer numbers would be expected to remain at high levels over the life of the plan; browsing would continue throughout the park and cause a decline in the long-term abundance and diversity of native plant species, particularly to susceptible cultural and landscape plantings that are integral to many of the park's cultural landscapes. As a result, there would be adverse, long-term, minor to moderate impact to the park's cultural landscapes (depending on the landscape and the plants importance to the landscape) over the life of the plan. The degree of impact would depend on the size of the future deer population and the associated degree of impact on the park plant communities and the susceptibility of the particular planting to deer browse.

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, would provide some beneficial impacts over the long term, but not immediately. Adverse effects from increased development and other cumulative adverse actions, in conjunction with continued deer browsing pressure on the majority of the herbaceous and woody vegetation and delayed reduction in the deer population, would not be offset by the beneficial effects of proposed actions. Therefore, cumulative impacts to cultural landscapes under this alternative would be adverse, long term, and moderate.

Conclusion

Under alternative B, overall approximately 5% of the entire park and up to 10% of the main park reservation would benefit from constructing exclosures over the life of this plan. However, remaining 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. Also, presence of the exclosures would result in long-term minor to moderate adverse impacts to the cultural landscapes in which they are located. Since the benefits of reproductive control would not be fully realized within the life of this plan, overall impacts to vegetation would be adverse, long term, and minor to moderate as the young vegetation and ground cover decreased in quantity and diversity in the majority of the park and cultural plantings would continue to be affected where not fenced. Past, present, and future activities, when combined with the continued pressure on vegetation expected under this alternative, would result in long-term, moderate adverse cumulative impacts.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Under this alternative sharpshooting activities would reduce the herd size, along with capture and euthanasia where appropriate. Similar to alternative A, placing small cages around individual or small groups of plants or landscaping would also be part of this alternative.

Reducing the deer population from 67 deer per square mile (as of 2009) to about 15 deer per square mile within approximately three years would result in diminished browsing pressure. This reduced pressure would allow park plant populations to regenerate and would improve the abundance and diversity of native species within the park over the long term. Decreased browsing, as well as small caged areas and repellent use, would also help protect landscape plantings, new restoration plantings, and/or rare plant species at specified areas. Because native plant populations and cultural plantings are character-defining

vegetation features of the park's cultural landscape, the re-establishment or rehabilitation of this feature would result in beneficial, long-term, moderate impacts to the park and component landscapes.

Sharpshooting activities related to deer reduction, including setting up bait stations, occupying shooting areas, and dragging deer to locations for processing, transport, or burial would have some temporary effects on vegetation and, as a result, the cultural landscape. Sharpshooting could require portable tree stands to be temporarily hung in trees. Removing deer carcasses from the kill site could require dragging over vegetation, which would temporarily trample some herbaceous and woody vegetation. However, the area of impact from these actions would be small (less than 1% of park vegetation), resulting in an adverse, short-term, negligible impact to the park and component landscapes.

The park intends to donate all deer meat to local charitable organizations to the maximum extent possible. If this is done, field dressing would occur in the park and the entrails would be buried or placed in barrels for disposal at a processing facility. Surface disposal methods would occur in areas that would not be visible from or within easy access of trails, roads, facilities, or neighboring properties, resulting in adverse, short-term, negligible impacts. Burial pits would be in previously disturbed sites in or near developed areas of the park that are not components of cultural landscapes. These sites would be generally devoid of vegetation except for weeds and would not be located in designed landscapes or next to historic features. In addition, burial pits would not be located within an area identified as an archeological site or as having archeological resources. These areas would be fully covered, fenced to prevent entry, and reseeded when the weather and season are appropriate. The impact to the component cultural landscapes would be temporary, adverse, short term, and negligible.

Cumulative Impacts

The same past, present, and future impacts described under alternative A would also occur under alternative C. Quickly reducing the park's deer population would provide beneficial, long-term effects, with adverse impacts being reduced to negligible or minor levels over time. These effects, combined with other beneficial effects, would result in cumulative impacts that would be primarily beneficial. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to cultural landscapes under this alternative would be mostly beneficial, minor, and long term.

Conclusion

Enhancing natural forest regeneration by quickly reducing deer browsing pressure under alternative C, and by maintaining a smaller deer population through direct reduction, would result in beneficial, long-term impacts because vegetation in cultural landscapes throughout the park could thrive and recover where effects have been noted. Over time as natural forest regeneration occurred, beneficial, long-term, moderate impacts on cultural landscapes could be expected. Past, present, and future activities, when combined with the reduced pressure on vegetation and subsequent forest regeneration, would result in beneficial, long-term cumulative impacts.

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

Analysis

Direct reduction would be implemented under alternative D to quickly reduce the size of the deer herd and reproductive control and direct reduction (if needed) would be used as a maintenance tool to keep the deer herd at reduced numbers. Small caged areas and repellents would be used as described under alternative A and deer waste and carcasses would be disposed of as described under alternative C. Impacts under this alternative would be the same as alternative C. Native plant populations would be rehabilitated by the direct reduction in deer populations, and other character-defining vegetation features would be potentially protected through some small-scale caging and repellent use, resulting in beneficial,

long-term, moderate impacts to the park and component landscapes. Some adverse, short-term, negligible impacts could also result from sharpshooting and deer waste disposal activities.

Cumulative Impacts

The same past, present, and reasonably foreseeable actions described under alternative A would also occur under alternative D. Rapidly reducing the deer population would relieve browsing pressure on a majority of the park's vegetation, providing moderate, long-term, beneficial impacts to cultural landscapes. Some adverse impacts would affect woody and herbaceous vegetation as a result of trampling due to setting bait stations, occupying shooting locations, removing deer carcasses, and using traps. However, these impacts would be isolated, affecting less than 1% of the park, resulting in adverse, short-term, negligible impacts.

Rapid deer density reduction would give the forest the opportunity to thrive and regenerate, resulting in beneficial impacts that would combine with other beneficial effects, resulting in cumulative impacts that would be primarily beneficial. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions. Therefore, cumulative impacts to vegetation under this alternative would be mostly beneficial, minor, and long term.

Conclusion

Enhancing natural forest regeneration by quickly reducing deer browsing pressure under alternative D, and by maintaining a smaller deer population through the use of reproductive control (and direct reduction if needed), would result in beneficial, moderate, long-term impacts because vegetation that is an important component of cultural landscapes could thrive and recover throughout the park. Under alternative D less than 1% of the park's vegetation would be affected by trampling at bait stations, shooting sites, trapping locations or disposal sites. Therefore, adverse impacts of these actions on cultural landscapes would be short term and negligible. Past, present, and future activities, when combined with the reduced pressure on vegetation (forest regeneration) expected under this alternative, would result in beneficial, long-term cumulative impacts.

NATIONAL HISTORIC PRESERVATION ACT SECTION 106 SUMMARY

This plan/EIS analyzes the impacts of four alternatives on cultural landscapes in Rock Creek Park. The alternatives include a no-action alternative and three action alternatives. All of Rock Creek Park and associated administrative units are potentially eligible for listing in the National Register of Historic Places as a historic cultural landscape. Dumbarton Oaks Park was individually listed in the National Register in 2004, and Montrose Park was individually listed in 2006. Historic districts, or features of cultural landscapes within the park, such as the Rock Creek and Potomac Parkway Historic District, the Civil War Fort Sites, the Peirce-Klingle Mansion, and the Peirce Mill have already been listed in the National Register of Historic Places.

Under alternative A, continued growth in the existing deer population and excessive deer browsing would continue to limit successful regeneration of native plant communities within the park, resulting in an adverse, long-term, moderate impact to the park's cultural landscape. Potential beneficial impacts to the park's cultural landscapes could result from the use of small caged areas to protect small groups of native plants and, if threatened by deer browsing, to protect landscape plantings, reducing the need for replanting trees to maintain the desired landscape. Because there would be a continued decline of native plant communities and little natural tree regeneration due to continued deer browsing, implementation of alternative A would result in an *adverse effect* on the park's cultural landscape.

Under alternative B, large fenced exclosures would be constructed to allow up to 10% of the park's forest, a character-defining vegetation feature in the park's cultural landscape, to regenerate over the life of the plan, resulting in long-term beneficial impacts. The fences would be a new structural element within the

landscape, but they would be temporary and would be placed in areas not easily visible to visitors. Reproductive control measures would take several years to be effective under alternative B, so there would be long-term moderate adverse impacts for the life of this plan, since the deer population would not be reduced enough to reduce impacts on cultural plantings and native vegetation that contributes to cultural landscapes. Therefore, alternative B would result in an *adverse effect* on the park's cultural landscape.

Under alternative C, the quick reduction of the deer population would cause a substantial decline in browsing of native plant populations. Native plants would begin to regenerate, resulting in long-term benefits to native plants, a character-defining vegetation feature in the park's cultural landscape. Therefore, *no adverse effect* would result from actions taken under alternative C.

Alternative D would be a combination of reproductive controls described in alternative B and lethal controls described in alternative C. These combined actions would result in a direct reduction in the deer population and the protection of vegetation that is an identifying characteristic of the cultural landscape, resulting in a *no adverse effect* under alternative D.

In accordance with Section 106 of the *National Historic Preservation Act*, potential adverse impacts (as defined in 36 CFR 800) on cultural landscapes listed on or eligible for listing in the National Register of Historic Places would be coordinated between the NPS and the State Historic Preservation Officer to determine the level of effect on the property and to determine any necessary mitigation measures. Continuing implementation of the *Cultural Resource Management Guideline* (NPS 2002b) and adherence to NPS *Management Policies 2006* (NPS 2006) and the 1995 Servicewide programmatic agreement with the Advisory Council on Historic Preservation and National Conference of State Historic Preservation Officers would all aid in reducing the potential to adversely impact historic properties.

Copies of this plan/EIS will be distributed to the District of Columbia State Historic Preservation Officer *and the Advisory Council on Historic Preservation* for review and comment related to compliance with Section 106 of the *National Historic Preservation Act*.

SOUNDSCAPES

GUIDING REGULATIONS AND POLICIES

The National Park System includes some of the quietest places on earth, as well as a rich variety of sounds intrinsic to park environments. These intrinsic sounds are recognized and valued as a park resource in keeping with the NPS mission (NPS *Management Policies 2006* [NPS 2006, sec. 1.4.6]), and are referred to as the park's natural soundscape. The natural soundscape, sometimes called natural quiet, is the aggregate of all the natural sounds that occur in parks, absent human-caused sound, together with the physical capacity for transmitting the natural sounds (NPS *Management Policies 2006* [NPS 2006, sec. 4.9]). It includes all of the sounds of nature, including such "nonquiet" sounds as birds calling, waterfalls, thunder, and waves breaking against the shore. Some natural sounds are also part of the biological or other physical resource components of parks (e.g., animal communication, sounds produced by physical processes, such as wind in trees, thunder, and running water).

National Park Service policy requires the protection of natural soundscapes from degradation due to noise (undesirable human-caused sound) (NPS *Management Policies 2006* [NPS 2006, sec. 4.9]). The NPS is specifically directed to "take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored" (NPS *Management Policies 2006* [NPS 2006, sec. 4.9]). Overriding all of this is the fundamental purpose of the National Park System, established in law (e.g., 16 USC 1 et seq.), which is to conserve park resources and values (NPS *Management Policies 2006* [NPS 2006, sec. 1.4.3]). National Park Service managers must always seek ways to avoid or to minimize, to the greatest degree practicable, adverse impacts on park resources and values (NPS *Management Policies 2006* [NPS 2006, sec 1.4.3]).

Director's Order 47: Soundscape Preservation and Noise Management, and the methodology being developed for the reference manual for Director's Order 47 states:

> An important part of the NPS mission is to preserve and/or restore the natural resources of the parks, including the natural soundscapes associated with units of the national park system. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the Service's ability to accomplish its mission (NPS 2000b).

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

Impacts to soundscapes were assessed by considering context, time, and intensity. For example, noise for a certain period and intensity would be a greater impact in a highly sensitive context, and a given intensity would be a greater impact if it occurred more often or for a longer duration. It is usually necessary to evaluate all three factors together to determine the level of noise impact. In some cases, an analysis of one or more factors may indicate one impact level, while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases, best professional judgment based on a documented rationale is used to determine which impact level best applies to the situation being evaluated.

National literature was used to estimate the average decibel levels of proposed actions and areas of use by visitors were identified in relation to where the actions were proposed. Other considerations, such as topography, were then used to identify areas where noise levels could be exacerbated or minimized.

The following thresholds were used to determine the magnitude of effects on soundscapes.

Negligible: Natural sounds would prevail; (activity) noise would be very infrequent or absent, mostly immeasurable.

Minor: Natural sounds would predominate in areas where management objectives call for natural processes to predominate, with (activity) noise infrequent at low levels. In areas where (activity) noise is consistent with the park's purpose and objectives, natural sounds could be heard occasionally.

Moderate: In areas where management objectives call for natural processes to predominate, natural sounds would predominate, but (activity) noise could occasionally be present at low to moderate levels. In areas where (activity) noise is consistent with the park's purpose and objectives, (activity) noise would predominate during daylight hours and would not be overly disruptive to noise-sensitive visitor activities in the area; in such areas, natural sounds could still be heard occasionally.

Major: In areas where management objectives call for natural processes to predominate, natural sounds would be impacted by (activity) noise sources frequently or for extended periods of time. In areas where (activity) noise is consistent with the park's purpose and zoning, the natural soundscape would be impacted most of the day; noise would disrupt conversation for long periods of time and/or make enjoyment of other activities in the area difficult; natural sounds would rarely be heard during the day.

AREA OF ANALYSIS

The area of analysis, including assessment of cumulative impacts, is the entire park and immediately adjacent landowners.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Under the "no-action" alternative, Rock Creek Park would continue to implement current management actions and policies related to deer and the deer's effects on the park. Current management 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. Noise from constructing caging around landscape plants and applying repellents by hand would be minimal. Under alternative A, park staff may use trucks to reach areas to be caged or monitored. Traffic, construction, and application sound impacts would likely be adverse, localized, short term, and negligible.

Cumulative Impacts

Adverse impacts to soundscapes within and surrounding the park have occurred and will continue to occur from several actions related to park maintenance and operations, traffic and transportation, and special community events. Past maintenance and operations actions within the park, such as construction of facilities, roads, and landscaping work have all resulted in increased noise levels within the park, thus adversely affecting soundscapes to a minor extent in limited areas. Noise generated from highways, planes, helicopters, and emergency vehicles has, and would continue to further impact the park's natural soundscape in both the short and long term. Although there are places in the park where visitors can experience a natural setting and listen to the sounds of bird calls, water, and animals, complete solitude in the park is unlikely given its urban setting and discontinuous nature. Special and community events, especially at the Carter Barron Amphitheater, have occurred and will continue to occur within the park, thus adversely affecting soundscapes to a minor extent within the park. The future reconstruction of Rock Creek and Potomac Parkway and Beach Drive and continued park maintenance operations would have long-term minor adverse impacts on soundscapes in limited areas within the foreseeable future. All of these activities, when combined with the negligible impacts on soundscapes expected under alternative A, would result in cumulative impacts that would be adverse, short and long term, and minor to moderate.

Conclusion

Under alternative A, the actions taken to protect plants and monitor the deer population and park vegetation would result in a short-term, negligible adverse impact on soundscapes. Cumulative impacts would range from minor to moderate and adverse depending on the source, due to the variety and abundance of noise sources that already exist around and within the park.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

A combination of non-lethal actions would be implemented under alternative B, in addition to the actions described under alternative A, to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include constructing large-scale fenced exclosures and controlling doe reproduction through surgical sterilization and reproductive control. As deer were excluded from feeding within the large exclosures, open (nontreated) areas would be monitored for changes in vegetation because of probable increased browsing pressure. Forest regeneration would be monitored both inside and outside the exclosures as described under alternative A.

Park staff would construct up to 14 large exclosures of various configurations to fit the landscape, each covering from about 7 to 25 acres or up to a total of approximately 167 acres. Construction of the exclosures would require approximately 150 days. This represents approximately 5% of the entire park and approximately 10% of the main park reservation. The exclosures would be initially located throughout the main park unit (Reservation 339), where they would be relatively easy to access, yet away from high use visitor areas or scenic views. Residents and visitors would experience minor, short-term, adverse noise impacts due to construction of fencing and exclosures in specific, localized areas, which would last only during the 150-day construction period. Such construction would not affect all residents and visitors, only those in areas where fencing and exclosures have been identified. The need for additional fencing would result in adverse noise impacts over the long term, as such actions would occur for several years into the future, but the duration of the specific activities and their associated noise would be intermittent and short term.

Minimal noise impacts are expected from administering reproductive control of does. There would be some noise resulting from vehicles entering and exiting the park to set up bait stations, construction activities to set up holding pens, firing of dart guns, and vehicles entering and exiting the park to deliver

the reproductive control agents. Visitors to the park's popular attractions, such as trails and forested areas would most likely be the most affected. However, reproductive control activities would be restricted to remote areas of the park as much as possible so that adverse impacts would be primarily short term and negligible. Therefore, under alternative B, noise impacts to residents and visitors would be primarily short term, negligible to minor (depending on the location), and adverse.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative B. Management actions described in alternative B, where up to 10% of the park's forested area would be protected by large exclosures over the life of the plan, combined with reproductive control of does, would provide short term, negligible to minor adverse impacts on soundscapes within and immediately surrounding the park. Noise generated by highways, planes, helicopters and emergency vehicles, as well as special and community events would continue, as described under alternative A, and would combine with the minimal amount of noise that would be generated under this alternative. Therefore, when combined with the short-term, negligible to minor adverse impacts to soundscapes expected under alternative B, cumulative impacts would be minor to moderate and adverse in the short and long term.

Conclusion

Impacts to soundscapes would be short term, negligible to minor, and adverse under alternative B due to intermittent construction of exclosures and reproductive control activities. The degree of the impact would vary by location. However, even though individual construction and reproductive control activities would be short term, they would continue indefinitely into the future, resulting in both short- and long-term, negligible to minor, adverse impacts. Cumulative impacts due primarily to the variety and abundance of existing noise sources would be minor to moderate and adverse in the short and long term.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Alternative C would continue the actions described under alternative A, with two types of lethal action used to reduce and control deer herd numbers. National Park Service staff or their authorized agents would conduct sharpshooting and capture and euthanasia to reduce the deer population. Bait stations may be used to attract deer. In most locations, high-power, small caliber rifles would be used from close range. Efforts would be made to make the shootings as humane as possible; it is anticipated that only one shot or possibly two would be required per deer as highly trained staff would be used. Noise suppression devices and night vision equipment would be employed to reduce disturbance to the public.

Sharpshooting with firearms would primarily occur at night (between dusk and dawn), primarily 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 overall time of restrictions. If this is done, the areas would be closed to park visitors. In addition, exhibits would be displayed at visitor centers, and information would be posted on the park's website to educate the public regarding deer management actions. Visitor access would be restricted as necessary during the time the reduction is taking place, and the park would be patrolled by NPS personnel and U.S. Park Police to ensure safety of the public. Also, shooting would occur during the winter months, when visitation levels would be low.

Bait stations could be used to attract deer to safe removal locations, concentrate deer, improve removal success, and to allow the use of ground as a backstop. 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 the efficiency and safety of the reduction program.

Noise impacts to park visitors would be minimal, as implementation of this alternative is planned for fall or winter and would primarily occur after sunset, when fewer visitors would be in the park. Local residents would likely experience the most impacts. As described in chapter 3, noise from a small caliber rifle would be approximately 160 dBa (decibels, A-weighted decibel scale) at the source (table 17). Assuming that the sound level decreases 6 decibels (dB) with a doubling of the distance (MN Pollution Control Agency 1999; Komanoff and Shaw 2000; OPTI 2002), an individual approximately 500 feet from the source of a firearm discharged without a suppressor would experience a noise level of about 106 dBa, which is considered very loud and comparable to highway construction noise. However, use of noise suppressors will be required (see chapter 2), which would bring the noise level down to approximately 76 dBa at 500 feet from the source, which is comparable to busy traffic. However, this does not consider attenuation from soft surfaces and topography, factors that would decrease the decibel levels even more, assuming a decrease of 7.5 dB with doubling of distance from a point source (Caltrans 1998), particularly if residents were indoors at night. For example, sound impacts would likely be somewhat less in densely vegetated or hilly areas of the main park unit. Sound would also be attenuated if shooting blinds were carefully positioned in areas that are heavily wooded; beside a hill, or unoccupied structure; and located as far from residences as possible. These conditions would result in a level of about 62.5 dBa at 500 feet from the source in a wooded area, which is considered lower than a conversational speech level (table 17). Because the park intends to perform sharpshooting primarily at night when there is less overall traffic and other day-time noise, the perceived annoyance level to neighboring residents would likely be higher than if conducted during the day. The sounds of such noise during meal times or leisure times could increase levels of annoyance. In addition, efforts would be made to schedule sharpshooting activities during the fall or winter when visitation is lower and to expedite the process as quickly and humanely as possible. Therefore, impacts to soundscapes under this alternative would be adverse, minor to moderate, and short term, given the duration of the action. Long-term impacts would occur as the activity is repeated over time (possibly several years) to maintain herd numbers at a specified level.

The intensity of the adverse impacts would vary depending on several factors, particularly perceived levels of annoyance. Individuals who are farther from the source of the firearm, support the removal efforts, and have experienced hunting efforts in the past would likely experience minor adverse impacts. Individuals who are closer to the source of the firearm would likely experience moderate adverse impacts if such sounds made enjoyment of other activities in the area difficult. However, because most of the park closes at night and visitation is lowest during fall and winter when sharpshooting activities would occur, impacts to visitors would likely be minimized.

Overall, impacts under alternative C would be adverse, both short and long term, and range from minor to moderate, depending on the proximity and attenuation factors between the source and the general public or visitor.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative C. Noise generated by highways, planes, helicopters and emergency vehicles, as well as special and community events would continue, as described under alternative A, and would combine with the firearm noise that would be generated under this alternative. Therefore, when combined with the short-term, minor to moderate adverse impacts to soundscapes expected under alternative C, cumulative impacts would be minor to moderate and adverse in the short and long term. These impacts would be expected to decrease as the need for removal efforts decreases as well.

Conclusion

Impacts to soundscapes from sharpshooting would be adverse, short and long term, and minor to moderate, primarily affecting nearby residents because sharpshooting would occur mostly at night and during off-peak visitation seasons. Perception of the intensity of the impacts would vary depending on

several factors, including timing, attenuation levels, and distance from the source, resulting in minor to moderate impacts to individuals experiencing the sound. Cumulative impacts would be adverse, short and long term, and minor to moderate. However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.

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

Analysis

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 reproductive control, 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).

Noise related to construction of fencing, reproductive control activities, and ensuing monitoring would continue, as described under alternative B. Noise impacts related to this component of this alternative would be short term, adverse, and negligible. Long-term impacts would continue as more fencing, exclosures, reproductive control, and spraying is required; however, the need for such actions is expected to decrease because implementation of this alternative also contains elements to control the size of the overall deer herd.

The greatest impact from noise would be from the use of firearms. As described under alternative C, intensity of noise impacts would vary based on several factors, including proximity to the firearm and perceived annoyance level. In all cases, noise suppression devices would be used to reduce impacts. The need for further sharpshooting efforts would likely decrease over the long term as the effects of this action and the use of reproductive controls would result in a decrease in the size of the deer herd. Therefore, the overall effect of implementation of all components of this alternative would be short and long term, adverse, and minor to moderate, with expected decreases in intensity over the long term.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative D. Noise generated by highways, planes, helicopters and emergency vehicles, as well as special and community events would continue, as described under alternative A, and would combine with the firearm noise that would be generated under this alternative. Therefore, when combined with the short-term, minor to moderate adverse impacts to soundscapes expected under alternative D, cumulative impacts would be minor to moderate and adverse in the short and long term. As explained under alternative C, these impacts would be expected to decrease as the need for removal efforts decreases as well.

Conclusion

Overall impacts to soundscapes under this alternative would be short and long term, adverse, and minor to moderate, particularly due to the use of firearms. Perception of impact intensity would vary based on several factors, particularly timing, distance, and attenuation from the source. However, long-term impacts would be expected to decrease as the overall herd population decreases, reducing the need for direct reduction. Cumulative impacts would be adverse, short and long term, and minor to moderate.

However, these impacts would be expected to decrease in the long term, as deer populations in all affected areas decrease and the need for direct reduction decreases as well.

VISITOR USE AND EXPERIENCE

GUIDING REGULATIONS AND POLICIES

The NPS *Management Policies 2006* (NPS 2006) state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. Management goals include making available to the public traditional outdoor recreational opportunities that are not detrimental to the natural or cultural resources of the park.

While preservation and conservation are key components of the NPS *Management Policies 2006*, they also instruct park units to provide for recreational opportunities. The NPS achieves its preservation and conservation purposes by working to maintain all native plants and animals as parts of the natural ecosystem, emphasizing preservation and conservation over recreation. The NPS will achieve this by preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur (NPS 2006, sec. 4.4.1).

Rock Creek Park's General Management Plan (2005a) includes the following desired conditions that pertain to visitor use and experience:

- visitors have opportunities to enjoy the park in ways that leave park resources unimpaired for future generations
- visitors understand and appreciate park values and resources and have the information necessary to adapt to the park's environments

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

Past visitor use data, comments from the public, and personal observations of visitation patterns were used to estimate the effects of the alternative actions on visitors. It is assumed that annual visitation over the life of the plan will remain relatively steady at about 2 million visitors per year, with slight variations from year to year. The thresholds for the intensity of an impact are defined as follows:

Negligible: The impact would be barely detectable and/or would affect few visitors. Visitors would not likely be aware of the effects associated with management actions.

Minor: The impact would be detectable and/or would only affect some visitors. Visitors would likely be aware of the effects associated with management actions. The changes in visitor use and experience would be slight but detectable; however, visitor satisfaction would not be measurably affected.

Moderate: The impact would be readily apparent and/or would affect many visitors. Visitors would be aware of the effects associated with management actions. Visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied). Some visitors would choose to pursue activities in other available local or regional areas.

Major: The impact would affect the majority of visitors. Visitors would be highly aware of the effects associated with management actions. Changes in visitor use and experience would be readily apparent. Some visitors would choose to pursue activities in other available local or regional areas.

AREA OF ANALYSIS

The area of analysis is the entire park and adjacent landowners, who constitute a large number of visitors, for all alternatives, including cumulative assessments.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Park staff would continue monitoring the deer population under alternative A and would conduct activities to protect native plants, such as creating small caged areas and applying a minimal amount of repellents to landscaped areas.

Based on the results of the Littlejohn visitor use survey (1999), the most common reasons for visiting Rock Creek Park are exercise (61%), followed by escaping the city environment (47%), and spending time with family/friends (37%). The reason least often listed was commuting to work (6%). "Other" reasons included attending a concert, walking the dog, golfing, gardening, enjoying nature, eating lunch, commuting home, visiting the planetarium, and studying (29%) (Littlejohn 1999). Small caged areas would not adversely impact those who visit the park to exercise, as these caged areas would not be located on paths nor recreational areas. Depending on the methods visitors use to escape the city environment, they could be adversely impacted by the sight of small caged areas throughout the park. Conversely, the caged areas protect rare plants and vegetation that visitors would not otherwise see due to excessive deer browsing. Visitors who primarily escape the city environment by driving through the park would be the least affected, as caged areas would be difficult to detect while driving. Visitors who primarily escape the city environment by hiking would be affected to a greater degree, depending on the location of the trail and the number of cages encountered.

Visitors who come to the park primarily to enjoy natural history (14%) or learn about history/nature (10%) would be most affected under this alternative, as impacts to natural and historical vegetation from excessive deer browsing would continue under this alternative, diminishing the likelihood of appreciating such vegetation. Adverse impacts to visitor experience from the heavily browsed vegetation would be long term, localized, and range from minor to moderate. However, 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 this group of visitors, since their activities would not be dependent on the presence of natural cover or denser vegetation.

When asked to rate the importance of selected features or qualities of the park (extremely important, very important, moderately important, somewhat important, or not important), “scenic beauty” received the highest importance ratings when “extremely important” and “very important” ratings were combined (73% ranked it extremely important, and 21% ranked it very important, a total of 94%) (Littlejohn 1999). Under this alternative, visitors who value the scenic beauty could be adversely affected by manmade fences that would disrupt views and by the lack of shrubbery and flowering plants in the forest understory. These impacts would adversely affect a large percentage of the park’s visitors, resulting in adverse, long-term, minor to moderate impacts.

Visitors also placed a high importance on native plants and wildlife in the park, with 44% ranking this as extremely important and 23% as very important. Under this alternative, the deer population would continue to grow and/or remain at high levels, adversely impacting native plants and, as a result, wildlife and wildlife habitat. Therefore, the majority of park visitors who value native plants and wildlife, including the many birdwatchers that use the park, could experience long-term, adverse, minor to moderate impacts as the diversity and abundance of native vegetation in the park decreases as a result of

deer browsing. In addition, overbrowsing by deer gives invasive exotic plant species an opportunity to become established, which could potentially outcompete native plants and contribute to adverse impacts to visitors who value native vegetation. Although it is not known what percent of visitors place a high importance specifically on seeing deer, any visitors who do would have a higher chance of viewing deer under this alternative. However, the condition of the deer may decline as the population grows and food becomes less available. Therefore, if visitors viewed ill or emaciated deer, visitor experience could be adversely affected.

Picnickers, photographers, and visitors who visit historic or cultural sites could be adversely affected by the sight of small cages and the effects of deer browsing on native vegetation and wildlife. However, these visitors are primarily focused on specific activities or areas, and they would be less likely to see cages or notice browsing impacts.

Impacts of alternative A would not likely adversely affect cross-country skiers, or horseback riders to a measurable extent. These visitors comprise a small percentage of overall visitation and engage in specific activities in areas that may not be as affected by deer management activities or the impacts of overbrowsing.

Minimal application of repellents at the park would also result in short-term, negligible adverse impacts to visitors who might view this activity or smell the applied herbicides, as use would be limited primarily to landscaped areas.

Educational efforts included under this alternative, such as communication with the public about deer management activities as described in chapter 2, would help offset adverse impacts to all park visitors, who would be informed of the reasons for implementing the management activities. Monitoring efforts described under this alternative, such as deer population surveys and vegetation monitoring, would have little to no impact on visitors since surveys would be conducted at night when the park is closed, and most visitors would likely interpret vegetation monitoring as consistent with scientific efforts expected at a unit of the National Park System.

Cumulative Impacts

Adverse impacts to visitor use and experience within the park have occurred and would continue to occur under alternative A. The large deer population has adversely affected the scenic quality of the park as extensive deer browsing has reduced the abundance of native vegetation and wildlife that visitors value. Rabies and West Nile virus could be expected to occur in the park, and this could affect wildlife that the public has come to view. Deer would continue to host ticks, which could carry Lyme disease that could affect visitors if they are bitten by an infected tick. Acts of illegal camping, off-trail users, unrestrained pets, poaching, and dumping have all had and continue to have minor localized adverse impacts to visitor use and experience. Exotic plant control has had a primarily beneficial impact on visitor use and experience, as exotic and invasive species have been reduced to allow for the regeneration of native species that comprise the natural beauty of the park. Park management and operations have had, for the most part, beneficial impacts to visitor use and experience, as interpretive programs have been developed, and trails have been established and maintained. Slight short-term negligible to minor adverse impacts from park management and operations have resulted from noise caused from construction of facilities, roads, and landscaping work, which as a result has impacted visitor experience.

Traffic and vehicle collisions have occurred and would continue to occur under alternative A, adversely impacting visitor use and experience. Urban development has impacted visitor use and experience both adversely and beneficially, and would continue to do so under each alternative. While noticeable urban development immediately outside park boundaries may diminish the feeling of “wildness” within the park, this same urban development has increased accessibility for neighboring residents. Current shrinking of green space surrounding the park under alternative A would continue to have negligible to minor adverse impacts on visitor use and experience. The future reconstruction of Rock Creek and

Potomac Parkway and Beach Drive, as well as park trails would have short-term minor adverse impacts on visitor use as it may inconvenience access and local commutes through the park; however, long-term beneficial impacts to visitor use and experience would result from the improvement of park roads and trails.

All of these activities, when combined with the continued pressure on forest resources expected under alternative A from continued deer browsing, would result in both adverse and beneficial cumulative impacts to visitor use and experience. Adverse cumulative impacts would be long term and minor to moderate.

Conclusion

Impacts to visitor use and experience under alternative A would be both beneficial and adverse to those visitors who maybe primarily interested in viewing deer (beneficial in that there would be more deer to see, adverse in that the appearance of the herd could be poor). However, overall impacts related to a decreased ability to view scenery (including native vegetation) and other wildlife, which a large majority of visitors rated as important, would be long term, minor to moderate and adverse. Past, present, and future activities, when combined with the continued pressure on forest resources expected under this alternative, would result in both adverse and beneficial (depending on an individual visitor's goals) impacts. Overall cumulative impacts would be long term, minor to moderate and adverse.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

A combination of non-lethal actions would be implemented under alternative B, in addition to the actions described under alternative A, to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include constructing large-scale fenced exclosures, and controlling doe reproduction through surgical sterilization and reproductive control. As deer were excluded from feeding within the large exclosures, open (nontreated) areas would be monitored for changes in vegetation because of probable increased browsing pressure. Forest regeneration would be monitored as described under alternative A.

Repellents and small caged areas described under alternative A would continue to be used under alternative B, but large fenced exclosures would be constructed to allow reforestation. Park staff would construct up to 14 large exclosures of various configurations to fit the landscape, each covering from about 7 to 25 acres or up to a total of approximately 167 acres. This represents approximately 5% of the entire park and approximately 10% of the main park reservation. The exclosures would be initially located throughout the main park unit (Reservation 339) where they would be relatively easy to access, yet away from high use visitor areas or scenic views. Visitors hiking in the park to view wildlife and scenery would be most affected under this alternative. Birdwatchers, cross-country skiers, and nature photographers who may desire a more natural, primitive park experience would also be adversely affected. Visitors to the park's historic or cultural sites might also be adversely affected by intrusions on the cultural landscape. Those who primarily experience the park by car might not be as affected by the sight of the exclosures, which would probably not be detectable from vehicles. To protect park resources and minimize visual impacts of the exclosures, park staff would consider locating them in areas not visible from visitor use areas.

Visitors would also be affected by fence construction activities, which would result in visual intrusions, such as the presence of work crews and employees in certain areas of the forest. Not all visitors would be impacted, only those in areas where the activities occurred. These adverse impacts would be negligible to minor and short term during construction, but would occur repeatedly over the life of the plan, resulting in long-term impacts.

The use of reproductive controls on does would be based on available technology. Initially, sterilization would be used to reduce the herd's ability to reproduce, followed by use of a reproductive control agent. If more does were captured at once than could be treated, temporary holding areas may be necessary to house deer prior to treatment. Holding areas would be in compliance with American Veterinarian Medical Association standards, and the holding period would not be more than a day. To ensure that visitors would understand the nature of the treatment efforts, the park would conduct educational programs to inform visitors about the procedures and explain why the treatments are necessary. However, visitors may see various aspects of the reproductive control operations, which could result in minor adverse impacts to their visitor experience.

The park plans to implement deer management educational and interpretive efforts under all alternatives, and visitors would be made aware of the reasons for the exclosures and their benefit to forest regeneration, which would beneficially impact visitors with the knowledge that the natural environment would eventually improve. Such information could offset adverse impacts related to visual aesthetics caused by the exclosures. Adverse impacts would be negligible to minor and short term, gradually changing to negligible beneficial in the long term as the forest regenerates due to protection afforded by the exclosures.

With reproductive control, deer would be marked with ear tags. Visitors could be troubled by the sight of deer with artificial markings, particularly those who primarily come to the park to see deer. Again, educational material would alert visitors to deer management activities and explain their purpose and expected outcomes.

As reproductive controls eventually take effect and the deer population begins to decrease over time, some park visitors might notice reductions in the excessive browsing pressure that has been damaging forest resources. There would be an increased ability to view native plants and animals, including birds, wildflowers, and other wildlife. However, as described under "Vegetation," many years would be required to achieve these beneficial impacts. Overall, short-term impacts would be adverse and minor, gradually becoming beneficial in the long term, beyond the life of this plan.

Those visitors who are interested primarily in seeing deer would be adversely affected. However, the herd size would not be reduced to the extent that deer would become rare in the park, rather they would still be visible, but they would be more in balance with other elements of the ecosystem. The herd might be healthier under this alternative as compared to alternative A. Therefore, visitors who value seeing deer might also prefer seeing fewer deer if it means maintaining a healthy, viable herd, which could lessen the intensity of the adverse impact to these visitors to negligible or minor.

Cumulative Impacts

The same past, present, and future actions described under alternative A would also occur under alternative B. Management actions described in alternative B, where approximately 5% to 10% of the park's forested area would be protected by large exclosures, combined with reproductive control of does, would provide short-term, negligible to minor adverse impacts on visitor use and experience in the short term, gradually becoming beneficial in the long term. Therefore, cumulative impacts to visitor use and experience would be mostly beneficial, negligible to minor and long term due to combined forest regeneration activities, which would enhance the overall visitor experience.

Conclusion

Under alternative B, approximately 10% of the main park reservation would benefit from constructing exclosures over the life of this plan. Visitors under alternative B would experience adverse, short-term impacts primarily due to aesthetics and closures of certain areas of the park, as well as a slight increase in noise levels during construction of exclosures and reproductive control efforts that would take place primarily between October and April. These impacts would be offset by the educational and interpretive

information that would explain the purpose of deer management activities, which would reduce adverse impacts to minor. Short-term impacts would eventually give way to beneficial, long-term impacts as the need for exclosures diminished and the deer population declined, resulting in a restored forest ecosystem throughout the park. However, many years would be required to achieve these beneficial results. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such an impact would be negligible to minor, as opportunities to view deer would still exist. Cumulative impacts to visitors would be mostly beneficial and long term due to the effects of combined forest regeneration activities.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Alternative C would continue the actions described under alternative A, with two types of lethal action used to reduce and control deer herd numbers. The NPS or their authorized agents would conduct sharpshooting and capture and euthanasia to reduce the deer population. Visitors would be affected primarily by closures required to conduct the direct reduction activities. Sharpshooting with firearms would primarily occur at night (between dusk and dawn), primarily 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 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 park personnel and U.S. Park Police would patrol public areas to ensure compliance with park closures and public safety measures. Noise suppression equipment would be used to decrease impacts to the soundscape, and visitors would only be affected by noise if sharpshooting occurred during the day and in areas that were not restricted or closed to visitor use.

Because sharpshooting activities would occur when visitation is lower (during fall and winter months), and primarily at night (when the park is closed), adverse impacts to visitors related to closures or noise from high-power, small caliber rifles would be negligible. Impacts would be both short and long term, as limited sharpshooting activities would continue beyond the initial 3-year reduction period to maintain the target population in the future.

Visitors could be adversely affected by deer being removed by archery or by being captured and euthanized in certain circumstances. If archery is used, there is a possibility of a deer not succumbing immediately and fleeing the area, and it could then be seen by the public. However, all sharpshooters would be trained in removal of deer using archery, would shoot only at close range, and would take deer only in limited circumstances. Therefore, the likelihood of this happening is slight. For capture and euthanasia, deer would be captured as humanely as possible using methods such as nets or box traps, which visitors could see if hiking, jogging, walking dogs, etc. However, capture and euthanasia would primarily be used in special circumstances, and activities would occur at dawn or dusk when visitation is low. In most cases, euthanasia would apply to individual deer. If this method was required to remove several deer at one time, the area would be temporarily closed to visitors. Under either circumstance, capture and euthanasia would occur when needed, rather than as a scheduled activity. Because this method would be used only in limited circumstances, the likelihood of visitors being exposed to deer being captured and euthanized would be low. Impacts to visitor use would be sporadic over the life of this plan, adverse, and negligible.

The waste and/or carcasses would be disposed of primarily in pits created at developed areas or offsite. Because the priority would be to donate meat, disposal would only include the few carcasses that might be unsuitable for donation. The majority of carcasses buried would be done so offsite. If onsite surface

disposal were used, it would occur only in remote areas, which would be unlikely to be noticed by visitors. Burial would occur soon after shooting, when the park is closed to visitors. In addition, sharpshooting would occur during fall and winter months when fewer people visit Rock Creek Park. Therefore, few, if any, visitors would be exposed to deer remains or burial activities under this alternative.

The park plans to implement deer management educational and interpretive efforts under all alternatives, and visitors would be made aware of the reasons for the activities and their benefit to forest regeneration.

As under alternative B, long-term beneficial impacts would occur to most visitors because the forest would regenerate, creating increased ability to view foliage and wildflowers, and providing improved habitat for a variety of species. Beneficial impacts and forest regeneration would be realized fairly quickly, as direct reduction would have an immediate impact on the size of the deer herd. Maintaining a viable herd size would help ensure a more balanced ecosystem into the future.

Also mentioned under alternative B, the ability to see deer would decrease, and those visitors who are interested primarily in seeing deer would be adversely affected. However, the herd size would not be reduced to the extent that deer would become rare in the park, rather they would still be visible, but they would be more in balance with other elements of the ecosystem. The herd might be healthier under this alternative as compared to alternative A. Therefore, visitors who value seeing deer might also prefer seeing fewer deer if it means maintaining a healthy, viable herd, which could lessen the intensity of the adverse impact to these visitors to negligible or minor.

Cumulative Impacts

The same past, present, and future activities expected under alternative A would also occur under alternative C. Quickly reducing the park's deer population would provide beneficial, long-term effects, with adverse impacts being reduced to negligible or minor levels over time. These effects, combined with other beneficial effects, would result in cumulative impacts that would be primarily beneficial, negligible to minor, and long term. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions described under alternative A. Therefore, cumulative impacts to visitor use and experience under this alternative would be mostly beneficial and long term.

Conclusion

Few visitors under alternative C would see lethal deer management actions occur, since they would primarily occur during fall and winter and at night, when few, if any, visitors are in the park. These impacts would be offset by the educational and interpretive information that would explain the purpose of the deer management activities. Therefore, adverse impacts would be long term and negligible. Long-term beneficial impacts would occur as a result of forest regeneration, which would have a moderate effect on visitors, due to the restoration of natural resources. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in herd size, but such impacts would be negligible to minor as opportunities to view deer would still exist. As under alternative B, cumulative impacts to visitors would be mostly beneficial and long term due to combined forest regeneration activities.

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

Analysis

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 reproductive control, 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).

Adverse impacts related to sharpshooting activities would be long term and negligible, since they would primarily occur during fall and winter and at night, but beneficial impacts would result from a relatively rapid reduction in deer herd size, which would result in enhanced forest regeneration. Disposal of deer carcasses and waste would occur as described under alternative C. Visitors would only be slightly affected by the continued use of small caged areas and repellents, a negligible impact. Reproductive control would be applied after sharpshooting efforts had reduced the deer population. Therefore, reproductive control activities would augment direct reduction to reduce deer browsing pressure and allow forest regeneration, increasing the quality of Rock Creek Park's scenery and the diversity of its plants and animals. Resulting impacts to visitors would be beneficial and long term. Adverse impacts could occur from visitors being exposed to reproductive control activities and associated area closures. Educational and interpretive activities would help explain why deer management is needed.

As under the other action alternatives, visitors interested primarily in seeing deer could be adversely affected by the long-term reduction in the deer population. However, adverse impacts to these visitors would be negligible for the reasons mentioned under alternatives B and C.

Cumulative Impacts

The same past, present, and future activity impacts described under alternative A would also occur under alternative D. Quickly reducing the park's deer population would provide beneficial, long-term effects, with adverse impacts being reduced to negligible or minor levels over time. These effects, combined with other beneficial effects, would result in cumulative impacts that would be primarily beneficial. These beneficial impacts would somewhat offset the adverse effects from increased development and other cumulative adverse actions described under alternative A. Therefore, cumulative impacts to vegetation under this alternative would be mostly beneficial and long term.

Conclusion

Adverse, short-term impacts could occur if visitors were exposed to direct reduction or reproductive control actions described under alternative D. These impacts would be offset by educational and interpretive information that would explain the purpose of the deer management actions, resulting in negligible adverse impacts. Beneficial impacts would occur in the long term, as the forest regenerated and visitors could see increased plant and animal diversity, and enjoy enhanced scenery. Visitors focused primarily on seeing deer could be adversely impacted by the reduction in the herd size, but such impact would be negligible to minor, as opportunities to view deer would still exist. Cumulative impacts to visitors' ability to enjoy Rock Creek Park's scenery and species diversity, regardless of the type of activity involved, would be primarily beneficial and long term.

VISITOR AND EMPLOYEE SAFETY

The safety of both visitors and NPS employees at Rock Creek Park could be affected by implementation of the proposed deer management actions. Impacts to visitor safety would be related to the presence of fences, the use of dart guns and firearms, as well as any additional associated deer management activities. Impacts to employee safety would be related to the use of firearms and dart guns, and the potential for any accidents that could result from implementation of the other proposed actions.

GUIDING REGULATIONS AND POLICIES

The NPS *Management Policies 2006* state that, "while recognizing that there are limitations on its capability to totally eliminate all hazards, the Service . . . will seek to provide a safe and healthful environment for visitors and employees." The policies also state that "the Service will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education" (NPS 2006, sec. 8.2.5.1).

Rock Creek Park's General Management Plan (2005a) includes the following desired condition that pertains to visitor and employee safety: visitor and employee safety and health are protected.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

The purpose of this impact analysis is to identify the level of impact that implementing each of the proposed alternatives would have on the safety of visitors and employees at Rock Creek Park. Past accident data, park goals, and personal observations of safety issues were used to assess the effects of the alternative actions on the safety of visitors and employees.

VISITOR SAFETY

The impact thresholds for visitor safety are defined below.

Negligible: There would be no discernible effects to visitor safety; slight injuries could occur, but none would be reportable.

Minor: Any reported visitor injury would require first aid that could be provided by park staff.

Moderate: Any reported visitor injury would require further medical attention beyond what was available at the park.

Major: A visitor injury would result in permanent disability or death.

AREA OF ANALYSIS

The study area for this analysis, including analysis of cumulative impacts, is Rock Creek Park and any surrounding properties.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Park staff would continue to erect small cages around sensitive plants and apply repellents to landscaped areas under alternative A. They would also continue monitoring activities and deer population surveys. No accidents or injuries have occurred to visitors as a result of such activities, and no accidents are

anticipated from their continuation, resulting in negligible impacts. However, the high deer population would continue to contribute to vehicle accidents experienced by visitors using park roads, resulting in minor to possibly moderate adverse effects on these visitors. Therefore, adverse, long-term impacts are expected, which could range from negligible (from regular monitoring and maintenance) to moderate (from potential vehicle accidents), with most visitors experiencing no or only slight injuries.

Cumulative Impacts

Visitation at Rock Creek Park is expected to remain relatively steady in future years, with continued pressure for various recreational uses and the potential for accidents and vehicle collisions. In addition, some visitors engage in certain activities at Rock Creek Park that are inherently more dangerous than others, such as horseback riding, and accidents involving trips and falls would always be expected, with negligible adverse impacts to visitor safety. Urbanization and associated crime unfortunately would be expected to continue at some level in the future, despite the continued presence of the U. S. Park Police, who patrol 1,800 acres of Rock Creek Park and adjacent parks. Overall, the impacts to park visitors that have and would be expected to occur, combined with the impacts expected under this alternative, would result in long-term, minor adverse cumulative impacts.

Conclusion

Adverse, long-term, negligible to moderate adverse impacts could occur under this alternative, as it is expected that no discernible effects to visitor safety would result from deer management actions, but vehicle collisions would continue. Cumulative impacts would primarily be related to other injuries that visitors could sustain in the park; these impacts would also be adverse, long term, and minor.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Several non-lethal actions would be implemented under alternative B, including the use of large exclosures and reproductive control of does, which would include sterilization using the services of a veterinarian, use of a dart gun, and possible construction of temporary holding pens. Actions described under alternative A (e.g., use of small cages and limited application of repellents) would continue.

Large exclosures would be constructed throughout the park and would be relocated as vegetation regrowth exceeded deer browsing height (60 inches or 150 centimeters). Visitors would not be able to use the fenced areas during or after construction, which would ensure no one would get hurt trying to get into or out of the exclosures. Park staff would place exclosures in locations so as to minimize impacts to visitor use wherever possible, offsetting any related safety issues. Some visitors could walk off-trail and into an exclosure. However, the likelihood of this happening would be very slight.

Under this alternative, initial sterilization would involve gathering of does for treatment in a confined area around bait piles, possible use of holding pens, and transport of the does to the field station where the procedure would be performed. This would occur in closed areas not near park borders, so injuries to visitors would be negligible. Later, does would be treated with a reproductive control agent that would most likely be administered remotely with a dart gun. The application of annual treatments would also be required. As with sterilization, bait piles would be placed to lure does to certain locations chosen to minimize visitor inconvenience. These areas would be closed to public use for the duration of the activity. Treatment would occur during September and October, but during off-peak visitor hours (early morning and evening). To reduce impacts to visitor safety, preference would be given to conducting the treatment on weekdays. If dart guns were not used, does would be lured into a trap site so that they could be treated with the drugs and tagged. Again, these areas would be closed to visitor use, and precautions would be taken to minimize safety impacts.

No impacts to visitor safety from increased monitoring are expected, as such activities would apply primarily to monitoring exclosures, which would be closed to visitors, and open forested areas, where park staff would exercise safety precautions. However, the continued presence of a large number of deer over the life of the plan would continue to contribute to vehicle deer collisions on park roads and result in minor to moderate adverse impacts.

Cumulative Impacts

The actions described under the cumulative scenario for alternative A would also apply to alternative B. Any increase in overall visitation could lead to an increase in visitor accidents or injuries. However, the combined effects of these actions combined with the accidents expected under alternative B are expected to remain minor, as few visitors engage in higher risk activities. Therefore, cumulative impacts would be adverse, long term, and minor.

Conclusion

This alternative includes measures to protect visitors from accident or injury, such as closing deer-treatment areas to visitor use. In addition, reproductive control activities would be conducted by qualified federal employees or authorized agents, whose training and experience with such activities would help ensure safety. Therefore, any adverse impacts to visitors would be short and long term and negligible from deer management, although the continued presence of a large number of deer over the life of the plan would continue to contribute to vehicle deer collisions on park roads and result in minor to moderate adverse impacts. Cumulative impacts would be adverse, long term, and minor.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Qualified federal employees or authorized agents would conduct direct reduction of the deer herd through sharpshooting, and capture and euthanasia of individual deer would be used where sharpshooting is not appropriate due to safety concerns (e.g., near adjacent residences).

Deer would be shot with high-power, small caliber rifles at close range. Measures taken to ensure the safety of Rock Creek Park's visitors would include shooting at night during late fall or winter months when visitation is low, closing areas to visitors if shooting is required, notifying the public in advance of any park closures, providing exhibits regarding deer management actions in the visitor center, and posting information on the park's website. Law enforcement personnel would also patrol the perimeter areas where sharpshooting would occur, and a safe distance would be maintained from any occupied building. Bait stations would be used to attract deer to safe removal locations. Park staff would approve the location of bait stations before sharpshooting took place. The park would comply with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, and Firearms. The majority of deer reduction activities would occur during the first three years of this plan, decreasing in scope (and the potential for accidents) during ensuing years as the deer population declined.

The safety of visitors and adjacent property owners could also be affected by capturing and euthanizing deer. It is unlikely that visitors would be exposed to such action, which would occur primarily at dawn or dusk. If this method was required to remove multiple deer, the area would be temporarily closed to visitors.

The safety measures used under this alternative would ensure the safety of all visitors, and the sizeable reduction of the deer herd would reduce the number of vehicle-deer collisions on park roads. Therefore, adverse impacts would be primarily negligible to minor. Impacts related to deer management would be mostly short term, as the activities would occur for a short period of time each year over primarily a three-year period. However, long-term impacts would also occur as annual deer removal would be required

following the initial herd reduction in order to maintain the herd at the desired level and the continued presence of deer near park roadways.

Cumulative Impacts

The cumulative scenario described under alternative A would also apply to alternative C. Any increase in park visitation would lead to an increase in the number of visitors potentially exposed to lethal removal activities. Accidents that might occur as a result of high-risk or other visitor activities would combine with the negligible to minor impacts expected under this alternative. However, few visitors engage in higher-risk activities at Rock Creek Park, and park staff would implement precautions to ensure the safety of park visitors. Therefore, cumulative impacts would be adverse, long term, and negligible to minor.

Conclusion

Although this alternative includes actions that could be dangerous to visitors, the extent of safety measures would result in adverse, short- and long-term, negligible to minor impacts, as it is expected that no discernible effects to visitor safety would occur from deer management actions and the possibility of deer-vehicle collisions would be diminished. Cumulative impacts would be adverse, long term, and negligible to minor.

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

Analysis

Under alternative D, direct reduction would be implemented to reduce the size of the deer herd, and reproductive control would be used to maintain reduced herd numbers. Small caged areas and repellents would be used as under alternative A.

As described under alternative A, visitors could experience negligible, short- and long-term, adverse impacts as a result of park staff erecting small caged areas and applying repellents. Sharpshooting and capture and euthanasia would be implemented over the first three years of the plan to reduce the size of the deer herd. Reproductive controls would then be administered if available and feasible, most likely through remote injection with a dart gun. However, in both cases, qualified federal employees or authorized agents trained in safety measures would perform these activities, and areas of the park would be closed to visitation, reducing the potential for injury to visitors under this alternative. Sharpshooting would occur primarily at night during off-peak seasons (fall and winter), and darting would occur primarily on weekdays during off-peak hours (early morning and evening). Sharpshooting would not occur within 100 feet of a building or within 400 feet of the park boundary. Treatment areas would be closed to the public, and educational material would inform visitors of deer management actions and the reasons for them. Bait stations would be used to attract deer to safe treatment locations. Park staff would approve the location of bait stations before sharpshooting took place. The park would comply with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, and Firearms.

If dart guns were not used to administer reproductive controls, deer would be lured into a trap site so they could be treated and tagged. These areas would be closed to visitor use, and precautions would be taken to minimize safety impacts. However, this type of treatment would be more time-consuming than the remote dart gun, likely extending the period of time for performing activities to weekends and times of high visitation. In addition, deer would be more sensitive to either type of reproductive control treatment, as they would have become sensitized to human presence and noise after three years of sharpshooting. This would increase the amount of time required to treat the animals, which could increase the amount of visitor exposure to safety risks.

The safety of visitors could also be affected by capturing and euthanizing deer, similar to alternative C. It is unlikely that visitors would be exposed to such action, which would occur primarily at dawn or dusk. If this method was required to remove multiple deer, the area would be temporarily closed to visitors.

No impacts related to additional monitoring called for under this alternative are expected to affect visitor safety, and the sizeable reduction of the deer herd would reduce the number of vehicle-deer collisions on park roads. Therefore, adverse impacts would be primarily negligible to minor.

Cumulative Impacts

The cumulative scenario described under alternative A would also apply to alternative D. An increase in park visitation would increase the number of visitors potentially exposed to firearm and dart gun activities. Accidents that might occur as a result of high-risk or other visitor activities would combine with the negligible impacts expected under this alternative. However, few visitors engage in higher-risk activities at Rock Creek Park, and the park would implement safety measures to ensure visitor welfare. Therefore, cumulative impacts would be adverse, long term, and negligible to minor.

Conclusion

While deer management actions under this alternative could be dangerous to park visitors, including park neighbors who visit the park, the extent of safety measures that would be used, such as area closures and periods of action, and locating activities away from park boundaries, would result in adverse, short- and long-term, negligible impacts. The possibility of deer-vehicle collisions would be greatly diminished. Cumulative impacts would be adverse, long term, and negligible to minor.

EMPLOYEE SAFETY

The impact thresholds for employee safety are defined below.

Negligible: There would be no discernible effects to employee safety; slight injuries could occur and would be reportable.

Minor: Any reported employee injury would require first aid provided by the park or require a doctor's attention.

Moderate: Any reported employee injury would require medical attention beyond what is available at the park and would result in time off.

Major: An employee injury would result in permanent disability or death.

AREA OF ANALYSIS

The study area for this analysis, including the cumulative impact analysis, is Rock Creek Park.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Park staff would continue to erect small cages around sensitive plants and apply repellents to landscaped areas under alternative A. They would also continue monitoring activities and surveys. No accidents or injuries have occurred to employees as a result of such activities, and no accidents are anticipated from their continuation, as the park is currently meeting its employee safety goals. No discernible effects to employee safety are expected, and impacts would be adverse, long term, and negligible.

Cumulative Impacts

Accidents also affect park employees. Most injuries or accidents have been usually sustained by maintenance staff and park rangers, who often perform manual work outdoors, including research monitoring. This has resulted in a few injuries every year, but below park safety goals, a negligible adverse impact. Other actions anticipated for the future, such as implementation of research monitoring and exotic plant control could increase risks to employees. Any type of law enforcement needs are handled by the U.S. Park Police, which reduces the risk for other park employees. Since the park is currently meeting its employee safety goal and staff engage in a variety of safety-related training activities, impacts from all activities, including any deer management actions, are expected to remain adverse, long term, and negligible.

Conclusion

Impacts would be adverse, long term, and negligible under this alternative, as it is expected that no discernible effects to employee safety would occur as a result of deer management actions. Cumulative impacts would be mainly related to other injuries that employees could sustain while working in the park; these impacts would also be adverse, long term, and negligible.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Several non-lethal actions would be implemented under alternative B, including the use of large exclosures and reproductive control for does. Actions described under alternative A (e.g., use of small cages) would continue.

Large exclosures would be constructed throughout the park and would be relocated as vegetation regrowth exceeded 60 inches or 150 centimeters (deer-browsing height). Employees could be injured while constructing the exclosures; however, park staff typically exercise caution and apply safety techniques in all construction projects, as defined by the park's training and awareness activities.

Under this alternative, initial sterilization would involve gathering of does for treatment in a confined area around bait piles, possible use of holding pens, and transport of the does to the field station where the procedure would be performed. This could involve injuries to employees from deer handling and rounding up (such as being kicked or stabbed by antlers), but use of qualified federal employees or authorized agents, whose training and experience with such activities would help ensure safety, would minimize hazards. Additional reproductive control would involve treating does with a reproductive agent, which would most likely be remotely administered with a dart-type gun. Bait piles would be placed to lure does to treatment locations, concentrating efforts in safe areas. This activity would increase the potential of employee accident or injury. However, safety precautions would be followed, and training in the use of treatment methods would help ensure employee safety. If more than one shooting location was used to administer reproductive controls with dart guns, these areas would be adequately separated. If dart guns were not used, does would be captured and reproductive controls applied manually. Few if any injuries to employees are expected from this method since the capture and treatment of deer would be conducted by qualified federal employees or authorized agents who are professionally trained to perform these tasks. In addition, federal employees or authorized agents would also be qualified to handle live deer in order to prevent disease transmission and prevent harm to employees.

Although the level of employee involvement in deer management activities under this alternative would increase compared to alternative A, impacts would remain negligible to minor due to the safety precautions that would be taken and the use of properly trained personnel. Any adverse impacts to employees would also be short and long term for the reasons described above.

No impacts to park staff are expected from increased monitoring defined under this alternative.

Cumulative Impacts

The cumulative scenario described under alternative A would also apply to alternative B. Accidents that might occur to employees conducting other park tasks, combined with the negligible impacts expected under this alternative, are expected to be adverse, long term, and negligible.

Conclusion

Employees could be injured while constructing exclosures; however, park staff are trained to exercise caution and apply safety techniques in all construction projects. Reproductive control activities described under this alternative would be conducted by qualified federal employees or authorized agents, whose training and experience would help ensure their safety. Therefore, any adverse impacts to government employees would be short and long term and negligible to minor. Cumulative impacts would also be adverse, long term, and negligible.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Qualified federal employees or authorized agents would conduct direct reduction of deer through sharpshooting, and capture and euthanasia of individual deer would be used where sharpshooting would not be appropriate. Small caged areas and repellents would be used as under alternative A.

As described under alternative A, adverse, short- and long-term, negligible impacts related to erecting small caged areas and applying repellents would apply to this alternative as well.

The safety of park employees could be affected by sharpshooting and capture and euthanasia activities proposed under this alternative. Qualified federal employees or authorized agents would conduct the sharpshooting activities, and their experience in such efforts would help ensure the safety of park employees. If more than one shooting location was used to administer reproductive controls with dart guns, these areas would be adequately separated. Qualified federal employees or authorized agents would also capture and euthanize deer, as such actions would occur sporadically on an as-needed basis. Therefore, impacts to the safety of employees could increase from potential injuries (kicks, bites, stabbing with antlers) that could occur during deer handling. Every precaution would be taken to ensure the safety of employees, and employees would apply safety training and awareness activities designed to reduce safety risks. Activities would be in compliance with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, and Firearms. Although more risks would be involved due to the use of firearms, adverse impacts to the safety of employees would be expected to be negligible to minor due to the safety precautions park staff would follow.

Cumulative Impacts

The cumulative scenario described under alternative A would also apply to alternative C. Accidents that could occur to employees conducting other park tasks would combine with the negligible to minor impacts expected under this alternative from increased employee involvement in potentially dangerous deer management activities. Therefore, cumulative impacts would be adverse, long term, and negligible to minor.

Conclusion

Although this alternative includes actions that could be dangerous to employees, adverse, short- and long-term, negligible to minor impacts would occur, due to safety precautions and property trained staff. Cumulative impacts would also be adverse, long term, and negligible.

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

Analysis

Under alternative D, direct reduction would be implemented to reduce the size of the deer herd, and reproductive control would be used to maintain reduced deer herd numbers if feasible. Small caged areas and repellents would be used as under alternative A.

As described under alternative A, adverse, short- and long-term, negligible impacts related to erecting small caged areas and applying repellents would apply to this alternative as well. In addition, as described under alternative C, sharpshooting and capture and euthanasia would be used to reduce the deer herd during the first three years of this plan, which would increase the potential risk of injury due to the use of firearms and the need to capture and euthanize some deer. However, safety precautions taken by park staff would offset these risks, as described under alternative C. Reproductive controls would be implemented as described under alternative B to maintain the lowered deer population level after direct reduction efforts had reduced the population size. This would most likely involve remotely injecting deer with a reproductive control agent using a dart gun. This type of treatment could take more time than under alternative B because deer would probably become sensitive to the presence of humans and guns during the initial sharpshooting activities. Again, safety precautions would be followed to limit the potential for injury. Therefore, overall impacts to employees would be adverse, long term, and negligible to minor as park staff would engage in more potentially dangerous deer management tasks under this alternative. It is expected that any injuries sustained would be treatable by park staff and would result in less than eight hours of lost work time.

Cumulative Impacts

The cumulative scenario described under alternative A would also apply to alternative D. Accidents that might occur to employees conducting other park tasks, combined with the negligible to minor impacts expected under this alternative, would result in long term, negligible to minor adverse cumulative impacts.

Conclusion

Like alternative C, this alternative includes activities that would be potentially dangerous to employees. However, the extent of safety measures that would be employed would result in adverse, short- and long-term, negligible to minor impacts, as it is expected that any injuries sustained would be treatable by park staff and would result in less than eight hours of lost work time. Cumulative impacts would also be adverse, long term, and negligible to minor.

SOCIOECONOMIC RESOURCES

GUIDING REGULATIONS AND POLICIES

The *National Environmental Policy Act* requires that economic and social impacts be analyzed in an EIS when they are interrelated with natural or physical impacts. Economic impacts would potentially result from deer browsing damage to landscaping on private lands adjacent to the park as a result of changes in deer populations at Rock Creek Park; therefore, they are addressed in this document.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY THRESHOLDS

Because of the limited supply of deer forage within the park, deer that frequent the park may also browse on landscaping plants outside the park on adjacent public and private lands. It is assumed that deer that are habituated to the park may seek food sources outside the park as the quality and quantity of browse within the park decreases. The Maryland Department of Natural Resources indicates that the sex and age of the deer and habitat types will result in home foraging ranges of varying sizes. Yearling males will move many miles, whereas adult females usually have smaller, more consistent annual home ranges. Deer in quality habitat will travel less than deer in poorer quality habitat (MD DNR 2005).

Impact threshold definitions for socioeconomic conditions focus on landscaping depredation to neighboring lands and the number of complaints related to deer damage received by the park, and were defined as follows:

Negligible: No effects would occur, or the effects on neighboring landowners or other socioeconomic conditions would be below or at the level of detection.

Minor: The effects on neighboring landowners or other socioeconomic conditions would be small but detectable. The impact would be slight, but would not be detectable outside the neighboring lands and would affect only a few adjacent landowners.

Moderate: The effects on neighboring landowners or other socioeconomic conditions would be readily apparent. Changes in economic or social conditions would be limited and confined locally, and they would affect more than a few landowners.

Major: The effects on neighboring landowners or other socioeconomic conditions would be readily apparent. Changes in social or economic conditions would be substantial, extend beyond the local area, and affect the majority of landowners.

AREA OF ANALYSIS

The area of analysis includes Rock Creek Park and the adjacent landowners.

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

forms of deer control to protect their landscaping. Cumulative impacts would be adverse, long term, and minor to moderate due to the cost to replace landscaping and install deer protection mechanisms.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

A combination of non-lethal actions would be implemented under alternative B, in addition to the actions described under alternative A, to protect forest seedlings, promote forest regeneration, and gradually reduce deer numbers in the park. The additional actions would include constructing large-scale fenced exclosures, and controlling doe reproduction through surgical sterilization and reproductive control. Repellents and small caged areas described under alternative A would continue to be used under alternative B.

Reproductive control of deer, if successful, would gradually reduce the population over the long term. However, deer numbers within the park would not be immediately reduced, and numbers would fluctuate annually. The forage range of the deer could expand due to reduced forage availability due to exclosures, resulting in greater deer browsing outside the park where food may be more plentiful. The number of deer that would seek food sources outside the park could be slightly greater under this alternative because the large-scale exclosures in the park would exclude deer from browsing on about 167 acres or about 10% of the main park reservation at any given time.

Landscaping Damage. Private landowners adjacent to the park could anticipate increased deer browsing on plants within landscaped areas over both the short and long terms. The degree of impact on landscaping could be greater than under alternative A because exclosures would prevent browsing on about 10% of the main park reservation at any one time and reduce the amount of forage in the park available to deer, which would result in the deer going outside the park for a food source. Adverse impacts would likely be moderate. The introduction of reproductive controls could reduce long-term impacts on landscaping to minor.

Protection Mechanisms and Costs. Landowners adjacent to the park would continue to incur additional costs for caging, repellents, and other forms of deer control to protect their landscaping. Because deer would be displaced from the park due to the exclosures, these costs would most likely be greater than in alternative A.

The time and monetary costs associated with additional protection measures would result in adverse, long-term, minor to moderate impacts to private landowners because protection costs could increase, similar to alternative A. The availability and effectiveness of reproductive controls in the future could reduce the intensity of these impacts because the deer population would decrease gradually, minimizing landscaping damage and reducing the need for protection mechanisms.

Cumulative Impacts

The cumulative impacts of alternative B would be similar to those described for alternative A, but with more intensity because of the continued reduction in available foraging areas within the park due to the construction of the large exclosures. This would force the existing deer population, which would not see any immediate decline due to the sterilization methods employed, to forage for food in adjacent properties, increasing the damage to landscaping and the expenditures needed to prevent and recover from deer damage. Over time, the deer population would decline as a result of sterilization of does in the herd; however, those effects would be slowly realized. The result of alternative B, in combination with other cumulative actions as described above, would be long term, adverse, and moderate.

Conclusion

Under alternative B reproductive controls (if successful) would allow for only a gradual reduction in the number of deer, and there could be some displacement of deer from the park due to exclosures. The net effect on surrounding property could result in slightly greater damage to landscaping, the impacts of which would be long term and moderate. Landowners would also incur additional costs for caging, repellents, and other forms of deer control to protect their landscaping. Cumulative impacts would be long term, adverse, and moderate.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Under alternative C, sharpshooting (or capture and euthanasia) activities would quickly reduce the deer population, and subsequent actions would maintain the population at the desired density. This approach would primarily be implemented over 3 years, bringing the population down from the current level of approximately 67 deer per square mile (2009) to about 15 deer per square mile. Actions described under alternative A, such as small caging and use of repellents, would also continue.

Landscaping Damage. The removal of nearly 80% of the existing deer herd in Rock Creek Park in the short and long term would likely result in far fewer deer leaving the park to search for food because the habitat in the park could better support the reduced population. Acreage within the park would most likely provide sufficient browse for a reduced deer population. With this reduction in the deer population, the related reduction in landscaping damage would result in beneficial, long-term impacts to private landowners, assuming that park deer populations are currently foraging on private lands adjacent to the park. Adverse, short- and long-term impacts would be reduced from moderate under alternative A to negligible to minor under alternative C. However, if deer populations outside the park remained high, benefits would be more limited.

Protection Mechanisms and Costs. A corresponding decline in costs for caging, repellents, and other forms of deer control to protect landscaping could also occur as the park deer population was reduced. As a result, reduced time and monetary costs associated with protection measures would reduce adverse, long-term impacts to private landowners to minor because they might still incur protection costs, but the cost would likely decrease noticeably.

Cumulative Impacts

The cumulative impacts of alternative C would be less intense than alternative A, due to the dramatic initial decline in deer population. Although some of the cumulative actions described in alternative A would reduce the availability of land available to deer for foraging, the reduced population would offset this impact; therefore, the deer population would be less likely to venture outside the park for food sources. Although some deer browsing-related damage would continue, it would be reduced, and the impacts would be reduced to a minor level. The result of alternative C, in combination with other cumulative actions, would result in overall long-term, adverse, and minor cumulative impacts to socioeconomics (neighboring landscaping).

Conclusion

The reduction of the existing deer populations by approximately 80% in both the short and long term could result in fewer deer leaving the park and browsing landscaping on adjacent lands, assuming that these private lands are currently within the home range of the park deer population, with long-term beneficial effects that would reduce adverse impacts to negligible or minor levels. A corresponding decline in costs for caging, repellents, and other forms of deer control to protect landscaping could also

occur. Cumulative impacts would be beneficial compared to alternative A; long-term cumulative adverse impacts would be reduced to minor.

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

Analysis

Under alternative D, a combination of certain additional lethal and non-lethal actions would be used 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 also be implemented initially through sterilization. Population maintenance would be conducted via reproductive control, if feasible.

As demonstrated in the analysis for alternative C, direct reduction methods would be the most effective in limiting damage to landscaping resulting from deer. Non-lethal methods, such as small-scale caging and repellents that are analyzed in alternative A, would protect park resources from further damage, but would not reduce landscaping damage on lands adjacent to the park. Of the combined lethal and non-lethal methods under this alternative, the direct reduction method would most affect the degree of landscaping damage. Therefore, the impacts associated with alternative D would be the same as alternative C. Over the long-term, adverse impacts to adjacent landowners would be reduced to negligible or minor.

Cumulative Impacts

Cumulative impacts would be similar to those described for alternative C. Impacts associated with past, present, and future actions, when combined with the overall beneficial impacts of alternative D, would result in beneficial impacts compared to alternative A. Cumulative impacts would be long term, adverse and minor because some level of deer-browsing impacts would continue.

Conclusion

Of the combined lethal and non-lethal methods under this alternative, direct reduction methods would affect landscaping damage to the same degree as alternative C. Therefore, landscaping damage would be reduced, resulting in beneficial impacts. Deer browsing impacts would continue at some level, but adverse impacts to landowners, due to improved harvest yields and preserved landscaping, would be reduced to negligible or minor levels over the short and long term. Costs for caging, repellents, and other forms of deer control to protect landscaping would also decline. Cumulative impacts would be beneficial compared to alternative A, and adverse impacts would be reduced to minor.

PARK MANAGEMENT AND OPERATIONS

Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct park operations.

METHODOLOGY AND INTENSITY THRESHOLDS

The discussion of impacts to park operations focuses on (1) the amount of staff available to ensure visitor and employee safety, and (2) the ability of park staff to protect and preserve resources given current funding and staffing levels. It was assumed that under all alternatives the park's annual budget would be increased to implement a particular alternative. However, this funding is not guaranteed; each alternative discusses the impacts of receiving or not receiving additional funding. Park staff knowledge was used to evaluate the impacts of each alternative, and the evaluation is based on the description of park operations presented in chapter 3. Definitions of impact levels are as follows:

Negligible: Park operations would not be affected.

Minor: Park operations would be affected, and the effect would be detectable, but current levels of funding and staff would be adequate and other park operations would not be reduced.

Moderate: Park operations would be affected, the effect would be readily apparent, and increased staff and funding would be needed or other park operations would have to be reduced and/or priorities changed.

Major: Park operations would be affected, the effect would be readily apparent, increased staff and funding would be needed or other park programs would have to be eliminated.

AREA OF ANALYSIS

The area of analysis is Rock Creek Park, including the cumulative impacts analysis.

IMPACTS OF THE ALTERNATIVES

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

Analysis

Under alternative A, the existing deer management plan which calls for limited caging, use of repellents in landscaped areas, monitoring, and data management and research, would continue, with assistance from the Student Conservation Association (1 to 2 volunteers) and the NPS Center for Urban Ecology. No new deer management actions would be taken. These controls would serve to protect important resources, but they would not affect the size of the deer population in the park.

The park's deer population would continue at high levels and would likely grow over time, although numbers would fluctuate annually due to winter temperatures, snow depths and snow duration, food availability, reproduction and mortality rates due to herd health, and other factors. Existing park staff would be sufficient to continue performing current deer management functions at the present population level. However, as the deer population continued to grow, more time would have to be devoted to these activities, which would leave less time for other duties. Two resource management employees work with deer management activities, and these actions comprise about 10% to 15% of their time. Additional management responsibilities, as well as any additional funding that might be needed to build and maintain

additional caging and purchase repellents, would result in long-term, minor to moderate adverse impacts. Current deer management would become a permanent component of Rock Creek Park's resource management activities, as adverse impacts to forest health would continue indefinitely into the future. The NPS Center for Urban Ecology would continue to provide inventory and monitoring services. The use of the Student Conservation Association would be expected to continue, which includes payment of a stipend and provision of housing.

Under this alternative, Rock Creek Park staff would also monitor the costs of the deer management program, including costs related to staff time, training, administrative, legal, public relations, and monitoring. If deer management costs increased substantially, funds and personnel from other park divisions might have to be reallocated (e.g., from administration and maintenance), resulting in adverse, long-term, minor impacts to other divisions. Also, if a need arose for additional education and interpretation programs conducted at the park, present funding and staffing would need to be supplemented, resulting in a minor adverse effect.

Cumulative Impacts

Needs related to park operations and maintenance have been, and would continue to be, affected by outside influences, as well as demands related to the implementation of other park plans and resource programs. Increased traffic on park roadways and continued high levels of visitation would continue to require staff time and resources to deal with road maintenance, accident response, and visitor needs and inquiries. U.S. Park Police would continue to assist the park with law enforcement, a long-term positive impact. As the cost of goods and services rises faster than the park's operating budget, staff continue to accomplish the park's mission and maintain the visitor experience with fewer financial resources. These demands result in long-term, minor adverse impacts to park operations.

Under alternative A, it is expected that funding would continue for current deer management activities, but the demand for those activities could increase if the deer population continued to grow and/or remain at high levels and cause impacts to park resources. Responding to other needs would result in reduced funding to carry out park activities. Therefore, the effects of all other actions that place demands on park management and operations, along with the expected demands of deer management, would result in, long-term, moderate adverse impacts to park operations and maintenance.

Conclusion

Impacts to park operations and maintenance under alternative A would be adverse, long term, and minor to moderate. Because present deer management actions would continue, the park's deer population is expected to continue to fluctuate and remain at high levels or increase over the long term, resulting in long-term demands on park staff and funding for managing the deer herd and protecting other park resources. Past, present, and future activities, when combined with actions under this alternative, would result in adverse, long-term, moderate cumulative impacts.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Analysis

Under this alternative several non-lethal actions would be implemented to protect forest resources and reduce deer numbers in the park, including the use of large-scale exclosures and doe reproductive control. Repellents and the small caged areas described under alternative A would continue to be used. The participation of the Center for Urban Ecology and the Student Conservation Association in park programs would be expected to continue.

Similar to alternative A, deer populations would continue to remain at high levels, pending the implementation of reproductive controls, and numbers would likely continue to fluctuate annually. The

non-lethal management measures outlined under alternative B would require additional staff time and seasonal staff, for which additional funding would be needed. Additional temporary staff would likely be needed for the initial construction of the large enclosures, and additional staff time would be needed for long-term maintenance. It is anticipated that the construction of 14 exclosures would take up about 150 days to complete (K. Ferebee, pers. comm. 2008d). If staff from other park divisions were used, park operations in those divisions would be adversely affected during the construction period.

In addition to an increase in temporary staffing, additional funding would be required, as the initial cost of installing the 14 exclosures would be approximately $236,808 (2009 adjusted estimates provided throughout this section) for supplies and labor. After the initial construction, the exclosures would be relocated every 10 years, at an estimated cost of $177,606 for supplies and labor. These costs would be in addition to the park's present budget.

Maintaining the large exclosures would require additional staff, especially if large storm events or natural disasters required the exclosures to be repaired or removed. Furthermore, to reduce impacts to visitors as much as possible, some exclosures would be located in more remote areas of the park, adding to maintenance costs. Additional staff time would be needed to inspect and maintain the exclosures, estimated at approximately four visits per year and assuming 48 days to cover all of the exclosures, the yearly labor cost would be approximately $18,236. An additional $10,730 per year would be estimated for materials and additional visits for weather-related maintenance needs. The additional staff time and funds required for regular maintenance of the large exclosures would result in increased funding needs, with adverse, long-term, moderate impacts.

Alternative B would include reproductive control of does, with sterilization completed in the first four years, at an estimated cost of $180,000. Costs for continued reproductive control would depend on the number of deer treated and the current available technology. Assuming the use of leuprolide (or similar agent) as described in chapter 2, costs would be approximately $1,000 per deer. If 10 does are treated, the annual cost would total $10,000, with $5,000 yearly monitoring costs.

Labor for the reproductive control efforts would be provided by qualified federal employees or authorized agents, including funding for a veterinarian to perform the surgery. This option would likely result in adverse, long-term, moderate impacts to the park budget because of the large amount of time and labor involved, most likely reducing the time available for other efforts. Impacts are expected to be adverse, long term, and moderate for reproductive control.

This alternative would also involve increased educational and interpretive activities, and would therefore require additional funding and/or additional staff time to implement these activities. Increased responses to inquiries about the actions taken under this alternative would likely increase the workload of park biologists, rangers, and the Superintendent. This would result in moderate adverse impacts to resource education and resource protection staff, which would decline to minor levels over time.

Overall, the activities associated with alternative B would result in adverse, long-term, moderate impacts for installing large exclosures, conducting reproductive control, and increased educational/interpretive activities.

Cumulative Impacts

The same past, present, and future actions described under alternative A would continue under this alternative, including additional demands on the park's budget for other resource programs and to respond to natural phenomena. In conjunction with actions under this alternative, impacts to park management and operations would be long term, moderate, and adverse.

Conclusion

Alternative B would result in, long-term, moderate adverse impacts on park management and operations from installing and maintaining large exclosures and implementing and monitoring reproductive controls. Past, present, and future activities, when combined with actions under this alternative, would result in adverse, long-term, moderate cumulative impacts.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Analysis

Sharpshooting would be used to quickly reduce the herd size, with capture and euthanasia applied in certain circumstances. The existing deer population would be reduced over a period of three years to about 15 deer per square mile, or a park population of about 70 deer. Additional deer would be removed in subsequent years to maintain the population. Alternative C would include the actions described under alternative A, including limited caging, use of repellents in landscaped areas, monitoring, and data management and research. It is assumed that the participation of the NPS Center for Urban Ecology and the Student Conservation Association in park programs would continue.

The addition of these lethal management measures would require additional staff time to accompany the qualified federal employees or authorized agents conducting sharpshooting activities. Removal activities would require obtaining permits, setting up bait stations, locating deer, sharpshooting, and handling the disposition of meat. In addition to the actual reduction activity, time would be required to coordinate the details of the reduction activity.

Costs to the park for direct reduction through sharpshooting would vary, depending on a number of factors, including the number of deer to be removed each year, access to deer, number and location of bait stations, training requirements, equipment availability, amount of data to be collected from the deer, and processing or disposal requirements. Based on similar removal efforts, the estimated cost for the park to implement direct reduction through sharpshooting would be $200 per deer initially, increasing to $400 per deer as the population decreased and more effort was required to locate deer, including actions to maintain the herd at the reduced level once the initial goal was achieved. Over the 15-year planning period for the deer management plan, sharpshooting efforts are estimated to cost approximately $393,400, with a large portion of that total for support of USPP security and park closure requirements. The majority of project funding, including all deer reduction activities and management of these, would be the responsibility of the park. Any assistance offered by the park's staff would be considered part of regular duties, rather than project specific, and would not require additional project funding. Due to the amount of time required by park staff to participate in these activities and the funding increase that would need to be applied for, impacts would be adverse and moderate during the period of the reduction efforts.

Where direct reduction by sharpshooting was not possible due to safety concerns (e.g., near adjacent properties), capture and euthanasia would be implemented by qualified federal employees or authorized agents. Because this method would only be used in certain situations, the cost would vary depending on the conditions at each removal site, including the location of the removal, accessibility, type of trap or immobilization drug used, how deer were disposed of, and the type of euthanasia used. Based on experience of park personnel and the range of costs identified for capturing deer under the reproductive control action, the costs could range from $100 to $1,000 per deer, and an average of about $500 per deer was assumed for costing purposes. This action would require increased funding and result in adverse, long-term, moderate impacts.

As part of this alternative, both deer population studies and vegetation monitoring would be conducted to document any changes in deer browsing and forest regeneration that may result from reduced deer numbers. This monitoring program would continue after the density goals were reached to determine if vegetation was showing signs of recovery. This monitoring would be similar to current park efforts that

are already scheduled to continue and would result in long-term minor impacts to park operations and maintenance.

This alternative would also involve increased educational and interpretive and management activities, and would therefore require additional funding and/or additional staff time to implement these activities. This would result in moderate adverse impacts to resource education and resource protection staff. Moderate adverse impacts could also be expected due to time needed to answer public inquiries about the actions taken, particularly sharpshooting. This need would likely decline over the years, and adverse impacts would be expected to be reduced to minor levels over time.

The combination of these lethal reduction alternatives would result in a greater reduction of deer over a shorter period of time, when compared to alternative A. As the number of deer declined in the park, the need for deer management and associated educational/interpretative activities would decline, allowing park staff to apply their efforts to other management areas. This would result in a reduction of adverse, long-term impacts from moderate to minor under this alternative.

Cumulative Impacts

Cumulative impacts would be similar to those described under alternative A. Under alternative C, it is expected that funding would continue for current deer management activities and that funding for additional lethal management measures would be received, resulting in minor impacts as discussed above. With the expected funding needed for other resource programs and to respond to natural phenomena, the cumulative impact to park management and operations would be long term, adverse, and minor to moderate, depending on the severity of these future actions.

Conclusion

Alternative C would result in adverse, moderate impacts during the period of direct reduction efforts because of the need for additional staff time for monitoring and coordinating activities. However, the use of qualified federal employees or authorized agents would reduce the amount of park staff time needed for implementation. With the greater reduction of deer over a shorter period of time, park staff would have more time to apply their efforts to other areas of the park when compared to alternative A, which would reduce adverse, long-term impacts from moderate to minor over time. Past, present, and future activities, when combined with actions under this alternative, would result in adverse, long-term, minor to moderate cumulative impacts.

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

Analysis

Alternative D would include the actions described under alternative A plus direct reduction to initially reduce the deer herd. Then reproductive control would be used to maintain the herd at acceptable levels. The participation of the NPS Center for Urban Ecology and the Student Conservation Association in park programs would be expected to continue.

The lethal management measures under alternative D would be the same as those described under alternative C. Costs to the park would vary from $200 to $400 per deer, as described under alternative C. Over the 15-year life of the deer management plan, sharpshooting efforts would cost approximately $232,600, with a large portion of that supporting USPP security and closure activities (assuming this occurs only in years 1-3). The majority of project funding, including all deer reduction activities, and management of these, would be the responsibility of the park. Any assistance offered by the park's staff would be considered part of regular duties. Impacts are expected to be adverse, long term, and moderate.

Where direct reduction by sharpshooting was not possible due to safety concerns, capture and euthanasia would be implemented by qualified federal employees or authorized agents. As described under

alternative C the costs would average about $500 per deer, but could vary based on situation conditions. Although limited staff time would be required since actions would be carried out by qualified federal employees or authorized agents, park staff would be involved in coordinating activities and an increase in funding would be required, resulting in adverse, long-term, moderate impacts.

After the initial reduction in density, alternative D would use reproductive control of the park's deer population by the methods described under alternative B if feasible. Costs for reproductive control are estimated at $570,000, assuming treatment of 41 does annually starting in year 4, including an annual $5,200 cost for additional surveys. Park staff would need to spend additional time and labor to coordinate and monitor activities, resulting in adverse, long-term, moderate impacts.

This alternative would also involve increased educational and interpretive activities, and would therefore require additional funding and/or additional staff time to implement these activities. There would be moderate adverse impacts to resource education and visitor protection staff as a result, which would decline to minor adverse levels over time.

Overall, the combination of non-lethal and lethal management alternatives and the associated educational/interpretive activities would have adverse, long-term, moderate impacts to park management and operations during the period of direct reduction and reproductive control. Once the deer herd was reduced, more staff time would be available for other activities, resulting in adverse, long-term, minor impacts.

Cumulative Impacts

Cumulative impacts would be similar to those described under alternative A. Under alternative D, funding would continue for current deer management activities, resulting in minor to moderate impacts as discussed above. With the expected funding needed for other resource programs and response to natural phenomena, the cumulative impact to park operations and maintenance would be adverse, long term, and minor to moderate, depending on the severity of these future actions.

Conclusion

Alternative D would result in adverse, long-term, moderate impacts, as park staff involvement would be required for coordination and monitoring. Funding for these activities would be applied for and expected to be received. Once the deer herd was reduced, more staff time would be available for other activities, resulting in adverse, long-term, minor impacts. Past, present, and future activities, when combined with actions under this alternative, would result in adverse, long-term, minor to moderate cumulative impacts.

UNAVOIDABLE ADVERSE IMPACTS

The NPS is required to consider if the alternative actions would result in impacts that could not be fully mitigated or avoided (NEPA section 101[c][ii]).

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

Under alternative A, there would be long-term, unavoidable adverse impacts to vegetation (including some wetland vegetation), deer and other wildlife, and rare or unique species due to the continued high number of deer in the park over time and the associated damage to park vegetation. In addition, there would be continued unavoidable minor adverse impacts to soils and water quality due to the removal of vegetation from deer browsing and subsequent erosion and sedimentation, and unavoidable adverse impacts to those wildlife species that depend on ground cover and seedlings for their food and/or cover. There would also be long-term unavoidable adverse impacts on cultural landscapes and on visitor use and experience, because of the lack of vegetation and the associated wildlife and scenery which many park

visitors enjoy, and unavoidable adverse impacts to visitor safety related to deer-vehicle collisions. Unavoidable adverse impacts would continue on park management and operations, due to the demand on park staff related to continued deer monitoring and resource management.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Alternative B would include most of the unavoidable adverse impacts described for alternative A over the life of the plan, since the benefits of reproductive control would not be realized until much later, given the length of time needed to realize a reduction in deer herd numbers based solely on reproductive control. Unavoidable adverse effects may occur to other wildlife species affected by the exclosures. Unavoidable adverse impacts may occur to some sensitive plant species due to the continued high numbers of deer and their browsing; this would be mitigated somewhat by the use of the exclosures, however. Reproductive control may have some unavoidable adverse impacts if the actions taken were visible or disturbingly audible to park visitors. Providing interpretive materials may help mitigate some of this effect; however, reproductive control as proposed under this alternative could occur during relatively high visitor use periods and would require a substantial effort to treat the required number of deer. Unavoidable adverse impacts to park operations and management would increase compared to alternative A, due to the demands on staff for implementation of the program.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Unavoidable adverse impacts for this alternative would be greatly reduced compared to alternatives A and B, because the reduction in deer numbers would occur rapidly and the park's vegetation would begin to recover over the life of the plan. This would mitigate adverse effects to vegetation, deer and other wildlife, and sensitive/rare plants. Some wildlife that prefer more open habitat would be unavoidably impacted as the vegetation recovered. There may be some unavoidable adverse effects to visitors relating to the implementation of the sharpshooting or capture and euthanasia, if the visitors happened to be near areas where this was occurring and were disturbed by these actions. Conducting sharpshooting at night and providing interpretive materials would help mitigate some adverse effects. Unavoidable adverse impacts to park operations and management would increase compared to alternative A, due to the demands on staff for implementation of the program.

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

Unavoidable adverse impacts for this alternative would be essentially the same as those described for alternative C, although use of reproductive controls for long-term maintenance of the deer herd would involve a greater commitment of staff and resources and result in greater unavoidable adverse impacts to park management and operations.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

In accordance with NEPA, and as further explained in Director's Order 12, consideration of long-term impacts and the effects of foreclosing future options should pervade any NEPA document. According to Director's Order 12, and as defined by the World Commission on Environment and Development, "sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their needs." For each alternative considered in a NEPA document, considerations of sustainability must demonstrate the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. This is described below for each alternative.

The NPS must consider if the effects of the alternatives involve tradeoffs of the long-term productivity and sustainability of park resources for the immediate short-term use of those resources. It must also consider if the effects of the alternatives are sustainable over the long term without causing adverse environmental effects for future generations (NEPA section 102(c)(iv)).

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

Alternative A would trade any long-term productivity for short-term use of park resources. The deer population would likely continue to grow over time or remain at high levels, and use the park's vegetation at the expense of the long-term productivity and sustainability of the vegetation and other affected wildlife in the park, as well as the park's cultural landscapes.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Alternative B would involve a similar trade for short-term use of park resources at the expense of long-term productivity for the duration of the plan, since the reproductive controls would not reduce the numbers of deer in the park over the life of the plan. The construction of the exclosures would involve short-term impacts related to their construction and visual impacts to visitors, but they would help preserve some of the park's long-term productivity. They would only protect a small portion of the park's woody vegetation over time, and only 5% of the park's herbaceous vegetation at any one time. This 5% would meet the suggested need to protect a minimum of 5% to 10% of the park's forested area at any one time (T. Bowersox, pers. comm. 2005). For this alternative to be truly sustainable, the reproductive control aspect must be continually managed and successful, and exclosures would need to be relocated to many areas of the park over time.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

Under alternative C, there would be a short-term commitment of human resources and short-term impacts to the park's visitors and environment during deer removal actions, but with the result of long-term productivity of the park's vegetation and habitat and a sustainable use of the resources in the park. To be sustainable, this alternative will require long-term management, including monitoring and adaptive management to protect park productivity.

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

Alternative D would have the same long-term sustainability characteristics as alternative C, except that it would require more resources focused on the reproductive control aspect, since it is experimental in a free-ranging population.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

The NPS must consider if the effects of the alternatives cannot be changed or are permanent (that is, the impacts are irreversible). The NPS must also consider if the impacts on park resources would mean that once gone, the resource could not be replaced; in other words, the resource could not be restored, replaced, or otherwise retrieved (NEPA section 102[c][v]).

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

Under alternative A, impacts to vegetation (particularly the forest understory) from continued overbrowsing by deer could result in irreversible impacts to Rock Creek Park's forests if no actions are ever taken to reduce deer numbers. Exotic plants that are not palatable to deer would continue to exploit openings in the understory, and animal species that rely on native ground vegetation might not remain in or return to Rock Creek Park if the forest understory does not regenerate. Deer browsing has already resulted in the reduction of understory plant species at Rock Creek Park. Even if caging were used to protect some of the sensitive species, it would be impossible to identify all individual plants, and overbrowsing of new plants located outside the caged areas could occur. In addition, the deer herd at Rock Creek Park could suffer irretrievable adverse effects if no action is taken.

ALTERNATIVE B: COMBINED NON-LETHAL ACTIONS

Alternative B has the potential for some irreversible impacts, if some areas of the park's forests are adversely affected to the point of nonregeneration or if invasive exotic plants take over some denuded areas before reproductive controls have had time to stabilize the deer herd numbers. Exclosures will not cover the entire park, and so some of the irreversible impacts described for alternative A would likely occur under alternative B as well.

ALTERNATIVE C: COMBINED LETHAL ACTIONS

This alternative presents the least potential for irreversible or irretrievable commitments of resources. Although deer would be removed, the deer population would continue at a sustainable level. Because the herd would be reduced rapidly, there would be little chance that park vegetation (including sensitive/rare species) or other species that are dependent upon forest understory and native ground cover would be irretrievably lost, since forest regeneration would begin within the life of the plan.

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

This alternative is essentially the same as alternative C, with very little potential for irreversible or irretrievable commitments of resources. Because the herd would be reduced rapidly, there would be little chance that park vegetation (including sensitive/rare species) or other species that are dependent upon forest understory and native ground cover would be irretrievably lost, since forest regeneration would begin within the life of the plan.

Consultation and Coordination

CHAPTER 5

CONSULTATION AND COORDINATION

The intent of the *National Environmental Policy Act* (NEPA) is to encourage the participation of federal and state-involved agencies and affected citizens in the assessment procedure, as appropriate. This section describes the consultation that occurred during development of this White-tailed Deer Management Plan / Environmental Impact Statement (plan/EIS), including consultation with scientific experts and other agencies. This chapter also includes a description of the public involvement process and a list of the recipients of the final document.

HISTORY OF PUBLIC INVOLVEMENT

The public involvement activities for this plan/EIS fulfill the requirements of NEPA and the National Park Service (NPS) Director's Order 12 (NPS 2001).

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal scoping and external or public scoping. Internal scoping involved discussions among NPS personnel regarding the purpose of and need for management actions, issues, management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this planning document and impact statement, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given opportunities to express concerns or views and to identify important issues or even other alternatives.

Taken together, internal and public scoping are essential elements of the NEPA planning process. The following sections describe the various ways scoping was conducted for this impact statement.

INTERNAL SCOPING

The internal scoping process began on July 13, 2005, at Rock Creek Park, Washington, D.C. During the three-day meeting, NPS employees identified the purpose of and need for action, management objectives, issues, and impact topics. Various roles and responsibilities for developing the deer management plan were also clarified. The results of the meetings were captured in an "Internal Scoping Report," now on file as part of the administrative record.

In addition, the park had coordinated with many technical experts for over 10 years prior to starting the planning process and established a Science Team to provide input to this plan, as described in "Chapter 1: Purpose of and Need for Action." Comprised of subject matter experts, the Science Team was chartered to advise and provide technical recommendations to the NPS on matters regarding scientific data and analysis. The team met five times over a period of five months to review and supplement necessary background information and needed data. The team also recommended impact analysis techniques and various management options, and they provided technical review of draft documents. Members of the Science Team are listed with the document preparers in this chapter.

PUBLIC SCOPING

Public Meetings and Comments

In addition to internal scoping within the NPS and with other public officials, public scoping for the plan/EIS began with the publishing of the Notice of Intent in the Federal Register on September 20, 2006, and concluded on December 8, 2006. During this time, two public scoping meetings were held

(November 1 and November 2, 2006) that included an open house, presentation by the NPS, and an opportunity for formal public comment. The purpose of these meetings was to solicit public input, especially on issues and ideas for alternatives. The meetings were held at the Rock Creek Nature Center in Washington, D.C. Notices of the meetings were posted on the NPS's Planning, Environment, and Public Comment (PEPC) website. Additionally, a newsletter was mailed in October 2006 to the project's preliminary mailing list of government agencies, organizations, businesses, and individuals. The newsletter announced the public scoping meetings and summarized the purpose of and need for a deer management plan, the plan objectives, and the history of Rock Creek Park's deer research and management.

During the comment period, 34 pieces of correspondence were received that contained 140 comments. The majority of the public comment received focused on various alternatives and alternative elements. Other comments expressed concern about the impacts to vegetation from the deer herd and while others encouraged the NPS to ensure that the proper methodologies and assumptions were made with regard to the deer population as well as other components of the Rock Creek Park ecosystem.

PUBLIC REVIEW OF THE DRAFT PLAN/EIS

The draft plan/EIS was made available for review through a Notice of Availability (NOA) on July 10, 2009. Following the release of the draft plan/EIS, the public comment period was open between July 13, 2009 and October 13, 2009. This public comment period was announced through the park's website (www.nps.gov/rocr), posted on park kiosks, through postcards that were sent to interested parties, elected officials, and appropriate local and state agencies. Due to the high level of public interest, the comment period was later extended until November 2, 2009, through a park press release and subsequent Federal Register notice. The draft plan/EIS was made available through several outlets, including the NPS Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/ROCR, as well as on CD or hard copy obtainable upon request from the park. Thirty hard copies and 51 CDs of the draft plan/EIS and 38 letters announcing the availability of the document on PEPC were mailed to interested parties, elected officials, and appropriate local and state agencies. A limited number of hard copies were made available at the Cleveland Park Public Library, the Chevy Chase Public Library, the Tenley-Friendship Public Library, the Georgetown Public Library, the Martin Luther King Junior Memorial Library, the Petworth Public Library, and the Palisades Public Library. The public was encouraged to submit comments regarding the draft plan/EIS through the NPS's PEPC website, at the public meeting, or by mailing a letter to the park.

In addition to the public review and comment period, one public meeting was held on September 2, 2009, from 6:30 p.m. to 9:00 p.m. at the Rock Creek Park Nature Center in Washington, D.C. This public meeting was held to obtain community feedback on the draft plan/EIS for deer management at Rock Creek Park. Release and availability of the draft plan/EIS, as well as the public meeting, were advertised as described above.

A total of 127 attendees signed in during the meeting. The meeting began with a brief open-house format where attendees had the opportunity to ask questions and observe displays illustrating the study area; the purpose, need, and objectives of the plan; and summaries of the four proposed alternatives, as well as deer population monitoring, vegetation monitoring, and impacts. Following the open-house format, park staff made a formal presentation explaining the specifics of the plan and the proposed alternatives. The presentation was followed by a formal public comment period/hearing that allowed attendees to provide their comments on the draft plan/EIS.

Attendees could fill out comment forms and submit them at the meeting or mail them to the park at any time during the public comment period, which ended November 2, 2009. Those attending the meeting also received a public meeting informational handout, which provided additional information about the

NEPA process, a comparison of actions under each proposed alternative, and additional opportunities for commenting on the project, including directing comments to the NPS PEPC website.

During the comment period, 414 pieces of correspondence were received, one of which was a form letter containing 339 signatures, and one of which was a petition with 540 signatures for a total of 1,293 signatures on all correspondence. Correspondence was received by the following methods: email, hard copy letter via U.S. mail, comment sheet submitted at the public meetings, transcript recorded during the public meeting, or entered directly into the Internet-based PEPC system. Once all the correspondence was entered into PEPC, each was read, and specific comments within each piece of correspondence were identified. A total of 2,118 comments were derived from the correspondence received.

To categorize and address comments, each comment was given a code to identify the general content of a comment and to group similar comments together. A total of 90 codes were used to categorize the comments received on the draft plan/EIS. During coding, comments were also classified as substantive or non-substantive. A substantive comment is defined in the NPS Director's Order 12 Handbook as one that does one or more of the following (NPS 2001, Section 4.6A):

- Question, with reasonable basis, the accuracy of information presented in the EIS;
- Question, with reasonable basis, the adequacy of the environmental analysis;
- Present reasonable alternatives other than those presented in the EIS; and/or
- Cause changes or revisions in the proposal.

As further stated in Director's Order 12, substantive comments "raise, debate, or question a point of fact or policy. Comments in favor of or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, are not considered substantive." While all comments were read and considered and were used to help create the final plan/EIS, only those determined to be substantive were analyzed for creation of concern statements for response from the NPS. Under each code, all substantive comments were grouped by similar themes, and those groups were summarized with a concern statement prepared for responses. Members of the NPS planning team responded to the concern statements and the responses are included in appendix G. Appendix G includes a content analysis report, concern response report, and comment letters received from businesses, organizations, and agencies.

Approximately 63% of the comments received related to 4 of the 90 codes. These codes were related to general lethal reduction, the combined non-lethal alternative, the combined lethal alternative, and the preferred combined lethal and nonlethal alternative, and were all non-substantive. The majority of the comments were categorized under code *AL3075 – Oppose Lethal Reduction (Non-Substantive)*, which accounted for 18.76% of the total comments received. Comments under code *AL2025 – Support of Alternative B: Non-Lethal Actions (Non-Substantive)* were the second most common comment, representing 16.73% of the total comments made. Comments under code *AL4050: Oppose Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred) (Non-Substantive)* were the third most common comment, representing 14.03% of the total comments made. The fourth most comments fell under code *AL2045 – Oppose Alternative C: Combined Lethal Actions (Non-Substantive)*, with 13.83% of the total comments. Of the 1,293 signatures, 386 (29.85%) came from commenters in the state of 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.

All comments received were carefully considered and incorporated into the final plan/EIS. Changes made in the final plan/EIS as a result of public comment are factual in nature and did not result in changes to the NPS preferred alternative or the outcome of the impact analysis for any of the management alternatives considered.

This final plan/EIS will be made available for public inspection for a 30-day no-action period, which begins with the publication of the EPA Notice of Availability. After the 30-day no action period, a record of decision (ROD) will be prepared that will document approval of the plan, select the alternative to be implemented, and set forth any stipulations required for implementation. The ROD will be signed by the Regional Director of the National Capital Region, after which Notice of availability of the ROD will be published in the Federal Register. This publication will complete the NEPA process, at which time the NPS will begin to implement the selected alternative.

AGENCY CONSULTATION

Letters initiating consultation under Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act , and and/or requesting information or comments, were sent to the following agencies:

- U.S. Fish and Wildlife Service – June 17, 2008
- Maryland Department of Natural Resources Wildlife and Heritage Service – October 27, 2008
- District Of Columbia Historic Preservation Office – June 18, 2008
- National Capital Planning Commission- June 18, 2008
- The Commission of Fine Arts – June 18, 2008

Copies of these letters are provided in appendix H. One response was received on July 18, 2008 from the District Historic Preservation Office; it is included at the end of appendix H. A copy of the draft plan/EIS was sent to the District Historic Preservation Office to complete Section 106 compliance and to U.S. Fish and Wildlife Service to complete Section 7 consultation.

Copies of this final plan/EIS will be sent to all of these agencies.

LIST OF RECIPIENTS OF THE FINAL PLAN ENVIRONMENTAL IMPACT STATEMENT

This plan/EIS will be sent to the following agencies, organizations, and businesses, as well as to other entities and individuals who requested a copy.

CONGRESSIONAL DELEGATES

- Eleanor Holmes Norton, District of Columbia Delegate
- Christopher Van Hollen, Jr., 8th Congressional District, Maryland
- Donna F. Edwards, 4th Congressional District, Maryland
- Barbara Mikulski, U.S. Senate, MD
- Benjamin L. Cardin, U.S. Senate, MD

FEDERAL AGENCIES

- Chesapeake and Ohio Canal National Historic Park
- Smithsonian National Zoo and National Zoo Police
- State Department—Embassies
- U.S. Department of Agriculture, Wildlife Services
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- U.S. Fish and Wildlife Service, Chesapeake Bay Field Office
- U.S. Navy, Naval Observatory

- U.S. Park Police
- U.S. Secret Service

DISTRICT OF COLUMBIA AND LOCAL GOVERNMENTS

- Advisory Neighborhood Commissions
- Commission of Fine Arts
- D.C. City Council
- D.C. Department of Environment, Fisheries and Wildlife Division
- D.C. Department of Health, Animal Disease Prevention Division
- D.C. Department of Recreation, Office of Planning and Policy
- D.C. Department of Transportation
- D.C. Fire and Emergency Services
- D.C. Historic Preservation Office, State Historic Preservation Officer
- D.C. Metropolitan Police Department
- D.C. Office Of Planning
- D.C. Office of Tourism and Promotion
- Maryland Department of Natural Resources, Wildlife and Heritage Service
- Maryland National Capital Park and Planning Commission – Montgomery County
- Metropolitan Washington Council of Governments
- National Capital Park and Planning Commission
- Washington Metropolitan Area Transit Authority

ORGANIZATIONS/OTHER

- AAA Potomac
- Adjacent Property Owners
- American Automobile Association, National Office
- American Recreation Coalition
- Animal Welfare Institute
- Arizona Bowhunters Association
- Audubon Naturalist Society Central Atlantic States
- Audubon Naturalist Society of the District of Columbia
- Blair Road Garden Association
- Chesapeake Bay Foundation, District of Columbia Office
- Chesapeake Bay Program Office, NPS
- Chevy Chase Citizens Association
- Crestwood Citizen's Association
- Defenders of Wildlife
- Earth Justice
- Fort Reno Garden Association
- Fort Stevens Garden Association
- Friends of Animals
- Friends of Montrose and Dumbarton Oaks Park
- Friends of Peirce Mill
- Friends of Rock Creeks Environment (FORCE)
- Friends of the Earth
- Glover Park Garden Association
- Glover Park Citizens' Association
- Golf Course Specialists Inc

- Green Peace
- Hillandale Citizens Association
- Hillwood Museum
- Humane Society of the United States
- Interstate Commission of Potomac River Basin
- Izaak Walton League of America
- Jonathan Woodner C., Woodner Apts.
- Mamie D. Lee Garden Association
- Maryland Native Plant Society
- Maryland Ornithological Society
- Meadowbrook Riding Stables
- Melvin Hazen Garden Association
- National Park Foundation
- National Parks and Conservation Association
- National Wildlife Federation
- National Zoological Park, Smithsonian
- Nature Conservancy
- Oak Hill Cemetery
- Peabody Garden Association
- People for the Ethical Treatment of Animals (PETA)
- Potomac Appalachian Trail Club
- Rock Creek Garden Association
- Rollingwood Citizens Association
- Sierra Club, DC Chapter
- The Northwest Current
- The Shoreham North
- The Washington DC Examiner
- Tilden Gardens
- Trail Riders of Tomorrow (TROT)- 50
- Walter Reed Army Medical Center
- Washington Area Bicycle Association
- Washington City Paper
- Washington Human Society
- Washington Parks and People
- Washington Post
- Washington Regional Network for Livable Community
- Washington Tennis Foundation
- Washington Times
- Whitehaven Garden Association
- William H.G. Fitzgerald Tennis Center
- Woodland Normanstone Neighborhood Association

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Jim Sherald	Chief, Natural Resources and Science (former)	NPS/NCR – Center for Urban Ecology
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Shawn Carter	NCR Inventory and Monitoring Coordinator	NPS/NCR – Center for Urban Ecology
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The Louis Berger Group, Inc.			
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Appendices

APPENDIX A. DEER POPULATION AND VEGETATION / REGENERATION MONITORING METHODS

DEER POPULATION MONITORING METHODS

Park staff will continue to use the Distance Sampling method to annually estimate the deer population density within the park (NPS 2004). Distance Sampling is a reliable analytical method for estimating population densities (Buckland et al. 2001; Thompson et al. 1998).It is conducted by an observer traveling along a transect and recording how far away deer are. The method models the way a person sees so that a proportion of deer further from the observer are expected to be missed. Unbiased estimates of population density can be obtained from the distance data if three assumptions are met: (1) deer on the line or point are detected with 100% certainty, (2) deer are detected at their initial location, and (3) distance measurements are exact (Buckland et al. 2001; Thompson et al. 1998; Underwood et al. 1998). Rock Creek Park uses laser range finders to ensure this last assumption.

A problem with Distance Sampling in past surveys has been the use of roads and trails as the transect. However, the use of roads and trails carries the risk of bias because of an unrepresentative sampling of available habitats (Buckland et al. 2001; Hiby and Krishna 2001).

Buckland et al. (2001) state that few studies have attempted to verify whether the resulting density estimates are unbiased in reference to the wider study area. McShea et al. (2007, unpublished report) used remote digital scouting cameras placed in seven distance categories to test for differences in deer activity with respect to roads used in distance surveys at Catoctin Mountain Park (nearly 100% forest cover). They found no significant difference in deer activity among the distance categories. These conditions are similar for Rock Creek Park.

After eight years of Distance Sampling from 2000 to 2007, National Park Service (NPS) staff at Rock Creek Park were able to detect population change at an annual rate of 4% (Bates 2008e).

Surveys are conducted at night during mid-November; surveys begin no earlier than 30 minutes after sunset (actual time sunset). Deer are most active at night. Most of the tree leaves have fallen by mid-November, allowing for observations at further distances from the road. Surveys take place on weekends because of the heavy commuter traffic on weekday evenings. Surveys are postponed if viewing conditions are poor or observer safety is threatened (e.g., heavy traffic).

Distance Sampling surveys are conducted for a minimum of three nights, depending on the size of the coefficient of variation estimated for the sampling results. Additional surveys are added when the variability in the data exceeds certain statistical standards: specifically, when the coefficient of variation associated with the number of deer groups encountered after three nights of sampling exceeds 20%, or if the detection probability variation exceeded 30%. This is the most important step in ascertaining sufficient sampling. The coefficient of variation and the detection probability variation will not be calculated until the second survey has been completed. The coefficients will be recalculated after each subsequent survey until the above-mentioned criteria are satisfied.

Spotlighting equipment is assembled and checked at least two weeks before the first survey. Laser rangefinders will also be checked for operability and battery life.

Ambient conditions will meet minimum standards (wind is less than 19 mph; rain is less than heavy; normal visibility is greater than two miles at the nearest airport [Reagan National Airport]; temperature is higher than 35°F at sunset), as reported from the nearest official National Oceanographic and Atmospheric Administration weather data site (www.erh.noaa.gov/er/lwx/) before each survey. Surveys are postponed if ambient conditions exceed minimum standards during the survey route.

A minimum three-person crew, consisting of a driver, who serves as data recorder, and two observers, are required to execute each survey. Survey routes are driven at speeds ranging from 6 to 10 mph. Observers use handheld spotlights to illuminate the survey area on both sides of the transect extending the light out; one person observes each side of the transect. Upon detection of a deer, the observer directs the driver to position the vehicle such that the perpendicular distance (90° angle to the transect) is measured.

If the transect is curved, more than one perpendicular distance might be available; the shortest perpendicular distance should be measured (Hiby and Krishna 2001). In cases where a perpendicular distance is not possible, a radial distance may be measured. When measuring a radial distance, the bearing of the transect and the white-tailed deer (*Odocoileus virginianus*) location would be obtained using a handheld compass. The radial distance is multiplied by the sine of the angle (the difference of the bearing measurements) to obtain the perpendicular distance.

In all instances, the distance measured should be to the initial location of the deer prior to any movement. The distance is measured using a laser rangefinder and is measured to an individual deer or, in the case of a group of deer, to the deer closest to the center of a group. In order to detect deer directly on the transect, the driver observes the groups of deer on the transect line and records the distance of the deer or group, if any, from the transect line using the laser range finder.

Deer are categorized by group size (e.g., an individual deer is a group of one, and five deer are a group of five). Deer are partitioned into groups by using behavioral cues and the nearest neighbor criterion (LaGory 1986). For instance, deer that repeatedly look back at other deer are counted as part of a group. Additionally, if an individual deer is less than half the distance from the closest deer than from its next nearest neighbor, then that individual deer is counted as part of a group. When large groups of deer are seen in open fields, group classification is attempted before positioning the vehicle for a distance measurement, which minimizes a flight response. In cases where the deer run away, the observer will note the initial location of the group and obtain a distance measurement to the location of first detection. Data are recorded on a standard deer Distance Sampling datasheet or in a handheld data recorder. Demographic classification is collected only when bucks, does, and fawns are clearly identified; "unknown" is the demographic classification default.

Data is analyzed using the most current version of Distance (which is 5.0 in 2008) (Thomas et al. 2006). With the technical assistance of the National Capital Region Wildlife Biologist, models are generated that provide estimates of population density (deer per square mile) with well-defined confidence intervals. The minimum amount of data required includes the survey dates, park area, transect length, number in group, and distance.

VEGETATION/REGENERATION MONITORING METHODS

Deer populations are managed based on the success of forest regeneration. Tree seedlings are monitored to determine at what point browsing impacts would warrant the implementation of the possible management action. Rock Creek Park has both long-term monitoring and paired (fenced) plots. Long-term monitoring plots show changes in the park's vegetation over time. Paired plots show the size of the impact that deer are having on the vegetation.

Since 1990 various vegetation monitoring projects have been conducted at Rock Creek Park. In 1990, 26 long-term plots (no fencing), each 400 m^2, were established and have been monitored once every four years since 1991. In 2000, 20 paired fenced and unfenced plots were installed in Rock Creek Park and Glover-Archbold Park to look specifically at the amount of deer browse on park vegetation. These plots are 1 × 4 m. The enclosed plot has an 8-foot woven wire fence surrounding it, and its companion plot is located 1 meter outside the fence. These 20 paired plots are measured annually. Of the 20 plots established in 2000, only 16 were measured in 2009. Trees have fallen on two plots, erosion has removed most of one plot next to a small creek, and the other plot was overgrown with nonnative vegetation.

The basic plot design for the long-term plots established in 1990 follows protocols adopted by Russel (1989) and Storm and Ross (1992) for public lands in the Mid-Atlantic States. Rock Creek Park (Reservation 339) was divided into three zones: north, central, and south. Plot locations were randomly selected using GIS. Ten plot locations were selected for each zone. Plots that landed on roads, buildings, or bodies of water were rejected. Twenty-six plots were chosen: 10 in the northern, 7 in the central, and 9 in the southern regions of the park.

The outside dimensions of the plot are 20 x 20 m, making it 1/25th of a hectare. The 20 × 20-m plots have two main diagonals that run from corners A to C and B to D. These diagonals each have a total length of 28.28 m, and a center located at 14.14 m. The "B" corner of the plot was established first and using a tape the "A" corner was established. A new tape was used at corner A and a 45 degree angle was approximated to side AB to establish diagonal AC. At the same time another tape was run from corner B approximately 45 degrees from line AB to establish diagonal BD. The center point of the plot was established at the intersection of the two diagonal tapes at the 14.14-m mark. The two diagonals were extended to 28.28 m to establish the remaining corners C and D. Once all corners and the center point were established, each plot was squared and a piece of rebar was driven into the ground to permanently mark corners A, C, D, and the center point. A reference bench mark with an aluminum dome was set at corner B. The plot number was stamped on the aluminum disc. A live, healthy tree was chosen near each corner of the plot as the place to locate a corner relocation tag. Each corner tag was marked with the plot number and letter of the corner.

Within the plot, smaller subplots were established to measure vegetation of different sizes: 10-m-square quadrants for trees and overall canopy cover, 10-m-linear transects for tree and shrub cover, 1-m-square subplots for herbaceous vegetation and tree seedlings, and 1.7-m-radius circular subplots to detect deer browse.

The long-term plots are measured the same time of year each July and August when the vegetation is fully developed. The first tapes are laid out from corner B to the other corners and then diagonally from opposite corners to reestablish the center point. Next, tapes are laid from the center point (10 m) of each side to divide the plot into four quadrants for tree sampling.

Reference photographs are taken of the center of the plot from the B corner, of the plot center from halfway to the B corner, and the entire 20 × 20-m area from the best angle. Photos should attempt to duplicate placement and orientation of previous years.

Tree sampling occurs in the four 10 × 10-m subplots represented by the quartering of the plot along its cardinal points. Measurements are taken on trees and shrubs at 1.4 m high and 1-cm or greater diameter at breast height (dbh) in each of the 10 × 10-m subplots. The heights of five live trees in each subplot are taken, giving a total of 20 tree heights for each plot.

Species data is entered onto standard data sheets. Trees and shrubs are identified by a six letter code, defined by the first three letters of the genus and species. For a tree branching below the l.4-m mark, the dbh is taken for each stem equal to or greater than 5-cm dbh. Those greater than 5-cm dbh are treated as individual trees but are noted in the tree record. For situations such as shrubs with multiple stems that originate from the same base, the largest stem is chosen and its dbh taken. The vigor is noted for each tree by assigning a number as follows: 1 = living, 2 = dead, and 3 = injured.

The heights of the five tallest living trees in each of the four subplots are recorded. Clinometers are used to measure tree heights, but other instruments can be used. The five trees are visually identified in each subplot and marked with flagging, and a number from 1 to 5 is assigned to each tree in the subplot. The method of measuring tree heights should be recorded on the data sheet.

Browse is estimated as the amount of damage to woody twig ends that occurs during the non-growing season and is measured by the twig-count method (Shafer 1965). It is estimated or "read" by examining

the growing tips of all woody plants below 2.0 m in height in two randomly chosen circular subplots. Browsed and unbrowsed twigs are counted to determine a browsed/unbrowsed ratio.

A random distance (1–8 m) and direction (1–360 degrees) are generated using a random numbers table. The distance is measured in the direction of the bearing from the center of the plot to establish the center of the browse plot. The browse plot is a circle with a 1.69-m radius, giving an area of 9.3 m^2. A tape or length of string is secured at the browse plot center and is used to circumscribe the sampling area. The numbers of woody twigs below 2.0 m that are browsed and unbrowsed are recorded. Species of each twig or stem are recorded.

Shrub cover is measured using two randomly generated transects within the plot, each 10 m long. The extent to which this line is directly covered by the leaves of any qualifying plant material provides an index of shrub cover within the plot. Two sets of random numbers are generated. The first ranges from 1 to 4 and represents one of the four sides of the 20 × 20-m plot. The second random number represents a point on the line, selected by the first random number, in centimeters. The side and location on that side are located, and a 10-m line is run toward the parallel side. Any woody growth intersecting the line is measured. Any intercept up to 2.0 m is measured to the nearest centimeter, even when the layers created by two different individuals overlap. The estimate of cover for each species is calculated by summing the intercept distance for a given species, dividing the result by 2000, and then multiplying by 100. The result is the percent cover.

Tree canopy coverage within each 10 × 10-m subplot is estimated with a densitometer. Counts of dots shown on the densitometer that are shaded by canopy foliage (including vines) are taken from the center of subplots in four directions: towards the marked quadrant corner, at 3 o'clock, toward the plot center, and at 9 o'clock.

Seedling, herbaceous, and substrate data are collected from 1 × 1-m plots selected at random from four possible positions in a given 2 × 2-m subplot within each quadrant of the 20 × 20-m plot. A 2 × 2-m subplot is located at the center point of the diagonal, formed by stretching a tape between the plot center and a plot corner (A–D). From this 2 × 2-m subplot, a randomly selected 1 × 1-m plot was selected to collect data.

All tree seedlings in each of the 1 × 1-m subplots are identified using the six letter identification code and counted, and the heights are measured in centimeters.

Percent cover of substrate in the 1 × 1-m plot is estimated by looking at the amount of horizontal space covered by each of four categories: rock/soil, moss/lichen, leaf litter, and herbaceous. The herbaceous cover should be identified to the species level if possible.

DATA ANALYSIS

Repeated measures analysis of variance (ANOVA), implemented with the mixed models procedure within SAS (2003), tests for differences among regions, years, and their interactions for each variable (Littell et al. 1996). The subject factor for each ANOVA is plot nested within region. Four variance–covariance structures are modeled (compound symmetry, autoregressive, Toeplitz, and unstructured) and the best model is selected via AIC_c comparisons (Littell et al. 1996). Residuals are tested for normality (Kery and Hatfield 2003) and, for many variables, a natural log transformation is used to help achieve normality.

For tree seedling counts and species richness, height class is also included in the model, along with the various interactions. A separate variance is fit for each seedling height class due to a possible pattern of different variances among height classes. Least square means and Tukey's multiple comparison procedure are used to sort out significant differences ($P \leq 0.05$) among years for all variables.

To calculate tree seedling weighted measure and action threshold, see the section below.

Importance Values (Storm and Ross 1992) are calculated for the 10 most important tree species in each of the three regions of Rock Creek Park as of 1991, and then graphed for each region for each of the four years. Importance Values are calculated by taking the sum of the relative dominance, relative frequency, and relative density of each tree species over the plots in each region. As such, they represent a summary measure indicative of the "importance" of each species in the tree community in each region. Increases or decreases in the Importance Value of a species imply that the tree community is changing over time.

EXCLOSURES—METHODS

The second method of vegetation monitoring is by paired fenced and unfenced plots. In 2000, twenty fenced (exclosure) plots and paired unfenced (control) plots, each 4 × 1 m in size, were established in Rock Creek Park and Glover-Archbold Park. Fenced plots are contained within a 5 × 15-foot fence made of woven wire fence, 8 feet high.

The paired plots were created using a stratified random design. Ten plots were located on long-term open vegetation plots that had been randomly selected; 10 were randomly located in other parts of the park where deer were known to be and that were not represented in the long-term plots. Percent cover per species, vertical distribution of vegetation in height classes, and dbh of trees greater than 2 m in height in each plot is recorded.

The paired plots are measured annually in July through early September. A series of 10 transects each 200 cm long and spaced 10 cm apart are laid out within each plot for a total of 200 points per plot. An observer carefully walks along transects and records vegetation that "hits" a vertical string attached to a plumb bob that is held perpendicular to the transect every 20 cm. All vegetation up to 2 m in height is included. At a given point, each species intercepted is recorded. Multiple hits on a species are not recorded. Points not intercepting vegetation are recorded as litter (leaf litter and woody debris less than 1 inch in diameter), wood (coarse woody debris, logs), soil, rock, or moss. For each species, the number of hits divided by 200 provides an estimate of percent cover.

The vertical distribution of vegetation is recorded in each of the following height classes: 0–30 cm, 30–110 cm, 110–200 cm. A Mylar grid comprised of 10 × 10-cm squares is suspended on the wire fence outside each plot, along the long edge. The recorders position themselves 1 m from the opposite edge of the plot and estimate the number of squares covered by foliage, to the nearest ¼ square. The number recorded is divided by the number of squares in each height class. The grid is moved four times along the sides of the fence to cover the entire plot.

The dbh of trees located within the fenced or unfenced plot are measured if greater than 2 m in height.

DATA ANALYSIS

Differences between paired exclosure and control plots are calculated and analyzed for a variety of variables using mixed model repeated measures analysis of variance (SAS 2003, PROC MIXED) to compare data among years 2001–2009. Variables analyzed include cover by various groups of species (woody, herbaceous, natives, non-natives, trees, shrubs, woody vines) and individual dominant species, vegetation thickness, and species richness overall and for woody, herbaceous, native, non-native, trees, shrubs, woody vines. Cover data (including vegetation thickness) are transformed prior to analysis using a natural log transformation to improve normality. Since the difference between exclosure-control may be negative, it is necessary to perform the log transformation by taking the difference of the logs rather than the log of the differences. Four variance-covariance structures are modeled (compound symmetry, autoregressive, Toeplitz, and unstructured) and the best model selected via Akaike's Information Criterion (AICc) comparisons (Littell et al. 1996). Post pairwise comparisons to determine whether the exclosure-control differences varied among years are made using Tukey's Studentized Range Test of Least Squares Means (family-wise error rate with alpha= 0.05). Inspection of the least square means and

associated t-tests are used to determine the significance of differences between exclosed and control plots for each year (alpha=0.05 after Bonferroni correction).

CALCULATING TREE SEEDLING ACTION THRESHOLDS

Forest regeneration dynamics are influenced by environmental and demographic factors. At the seedling stage, tall tree seedlings have a greater likelihood of survival compared to small seedlings. Therefore, to reflect this difference in survival, the number of seedlings needed to ensure the regeneration of a forest, which is called a stocking rate or a **tree seedling weighted measure**, is calculated as the number of tree seedlings weighted by Height Class. A certain proportion of the monitoring plots must equal or exceed this number for sufficient regeneration. This is the **action threshold**, where management action will occur when that proportion is not met.

Stout (1998) recommends weighting the seedlings by size; so if a seedling is taller, it is worth more in the total. The sum of these weighted numbers of seedlings gives the stocking rate or a **tree seedling weighted measure.** For example, following Stout (1998), seedlings that measure less than 30 cm tall have a weight of 1, i.e., the total number of seedlings that are less than 30 cm tall is multiplied by 1. For heights from 30 to 100 cm, the number of seedlings is multiplied by 2. Seedlings from 100 to 150 cm tall have a weight of 15, and for heights greater than 150 cm, the number of seedlings is multiplied by 30. All of the weighted seedling numbers are added up, and this total is the tree seedling weighted measure per plot. In Rock Creek Park the Height Classes were measured in 25-cm intervals, so a weight of 2 is used for seedlings from 25 to 100 cm tall instead of from 30 to 100 cm tall. Otherwise, the weights are identical to those recommended by Stout (1998).

Using a weight of 2 for tree seedlings starting at a height of 25 cm instead of 30 cm may lead to a slightly higher estimated tree seedling threshold for Rock Creek Park, but the bias is probably small, and this modification is conservative given the low stocking rates found in Rock Creek Park. Since the actual seedling heights were measured during 2007, future calculations of stocking rate will follow Stout (1998) without modification.

Stout (1998) recommends that for successful forest regeneration, 67% of the plots (or 18 out of 26 plots in Rock Creek Park) must reach or exceed a tree seedling threshold of 51 per plot at low deer densities (13–21 deer per square mile) and more than 153 per plot at high deer densities (56–64 deer per square mile). These are the **action thresholds** for the management of white-tailed deer.

Action thresholds for tree seedlings in 67% of plots required for successful forest regeneration[1]	
Deer density[2] (deer/mile^2)	**Tree seedling threshold for 18 or more plots** (0.0016 ha each)
Low (13–21)	≤ 51
High (56–64)	≤ 153

[1]Stout 1998

[2]Horsley et al. 2003

ha = hectare (about 2.47 acres)

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APPENDIX B. IMPAIRMENT DETERMINATION

ROCK CREEK PARK WHITE-TAILED DEER MANAGEMENT PLAN/EIS

A determination of impairment is made for each of the resource impact topics carried forward and analyzed in the environmental impact statement for the preferred alternative. The description of park significance in chapter 1 was used as a basis for determining if a resource is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment determinations are not necessary for visitor use and experience, visitor and employee health and safety, socioeconomic resources, and park management and operations, because impairment findings relate back to park resources and values. These impact areas are not generally considered to be park resources or values according to the *Organic Act*, and cannot be impaired the same way that an action can impair park resources and values.

VEGETATION

Rock Creek Park consists of the largest unbroken forest in the Washington metropolitan area, providing habitat for much of the city's wildlife and acting as an important contributor to the region's biodiversity. Approximately 80% (2,471 acres) of the park is covered with mature second growth forest that is approximately 125 years old. Woodlands currently in the park are primarily a mixture of deciduous species typical of the eastern deciduous forest in the later stages of succession (NPS 2005a). Primary overstory species include tulip poplar (*Liriodendron tulipifera*), hickory (*Carya*) species, green ash (*Fraxinus pennsylvanica*), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), southern red oak (*Quercus falcata*), and black locust (*Robinia pseudoacacia*). Dominant understory species in the forest include saplings, American holly (*Ilex opaca*), spicebush (*Lindera benzoin*), greenbrier (*Smilax spp.*), Japanese honeysuckle (*Lonicera japonica*), English ivy (*Hedera helix*), and poison ivy (*Toxicodendron radicans*). There are also remnant Virginia pines (*Pinus virginia*) that occur mostly as scattered individuals or small clusters, as well as pine-oak mixed woodlands. Other vegetative types in the park include maintained lawns with landscaped trees and shrubs, including American holly, pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), and tulip poplar saplings; and shrubs including witch hazel (*Hamamelis spp.*) and smooth serviceberry (*Amelanchier arborea*).

Healthy, native terrestrial vegetation is necessary to fulfill the purposes for which the park was established and is key to the natural integrity and enjoyment of the park. Implementation of the preferred alternative would not impair vegetation because of the low magnitude of adverse effects from management actions and the benefits that would result from reduced deer browsing pressure. The preferred alternative would enhance natural forest regeneration by quickly reducing deer browsing pressure and by maintaining a smaller deer population, resulting in long-term beneficial impacts, because both woody and herbaceous vegetation could thrive and recover throughout the park. Over time as natural forest regeneration occurred, adverse long-term impacts that currently exist due to deer browse would be reduced to impacts that would be small, localized, and of little consequence. Observed seedling density would be expected to show that fair to good regeneration was occurring. Under the preferred alternative, less than 1% of the park's woody or herbaceous vegetation would be affected by trampling at bait

stations, shooting sites, trapping locations, or disposal sites. Adverse impacts of these actions would be short term and the change would be so small that it would not be measurable or perceptible. Because there would be only slight adverse impacts and primarily long-term beneficial impacts, the preferred alternative would not result in impairment to vegetation.

SOILS AND WATER QUALITY

The primary concern related to soils and water quality in this plan/EIS is the potential for greater erosion as a result of increased deer browsing, which can reduce vegetative ground cover and result in sedimentation in the waters associated with the Rock Creek watershed. There are 25 major soil types within Rock Creek Park; nearly all of these are moderately erodible and two are highly erodible (USDA 1976). Currently, the park's soil resources are being adversely affected by accelerated erosion, compaction, and deposition. Some areas that receive heavy visitor use are subject to soil compaction, removal of vegetation cover, and erosion. This is particularly evident along stream banks, at popular recreation areas, and along heavily used or infrequently maintained trails. Accelerated stream bank erosion is occurring as a result of increased runoff from the upstream watershed, and associated deposition of some of the eroded soils is occurring in park floodplains (NPS 2005b).

The Rock Creek watershed is approximately 76.5 square miles with 15.9 square miles contained within the District of Columbia (DCDOH 2004). Two major and sixteen smaller tributaries drain into Rock Creek within the park. The high level of development and increase of impervious surfaces within the watershed has led to increased stormwater runoff, which has damaged Rock Creek and its tributaries by increasing the amount of sedimentation, as well as carrying other pollutants into creek waters (NPS 2005b). Within the park, erosion is primarily the result of bank destabilization along drainage ways and tributaries of Rock Creek, and sedimentation and excess turbidity are most apparent in the smaller tributaries that are spring-fed and have less upstream flow (K. Ferebee, pers. comm. 2008). Areas denuded of vegetation by deer browse, visitor use, or other disturbances also contribute to stormwater runoff. Rock Creek and its tributaries have been designated for restoration to meet all five beneficial use classes under current water quality regulations, and the main creek and tributaries have also been designated "Special Waters of the District of Columbia" for their scenic and aesthetic importance (NPS 2005b).

Maintenance of the park's water quality and conservation of soils are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. Implementation of the preferred alternative would not impair soils or water quality because adverse effects from management actions would not have a measurable effect on these resources, and benefits would result from reduced deer browsing pressure. The preferred alternative would immediately reduce the number of deer in the park and maintain a population of 15 to 20 deer per square mile after the third year of implementation. Vegetative ground cover would be able to reestablish itself, helping mitigate any soil erosion and sediment loading into the park's creeks, a long-term beneficial impact. Actions taken to reduce deer damage including trampling at bait stations, shooting sites, trapping locations, or disposal sites and continued use of small cages and repellents would probably have little impact mitigating soil erosion and may cause deer to concentrate browsing elsewhere, resulting in increased loss of vegetation in those areas, a slight adverse effect that would not be of any measurable or perceptible consequence. Water quality would remain within historical conditions. Because there would be only slight adverse impacts on soils and water quality, and primarily long-term benefits, the preferred alternative would not result in impairment.

WETLANDS AND FLOODPLAINS

The Rock Creek watershed includes only a few areas designated as wetlands, including six temporarily or seasonally flooded forested wetlands in the northern portion of the park and in the Pinehurst Branch area. Other smaller wetlands are found in the narrow alluvial deposits of the Pinehurst Branch, Fenwick Branch, and Joyce Branch drainages (NPS 2005b), and vernal pools are widely scattered wetland features

in the park. Other important wetland-related features in the park include groundwater springs and seeps fed by relatively dependable flows of pollutant-free water. Within Rock Creek Park, floodplain development is fairly restrictive, limited primarily to Rock Creek itself. The 100-year floodplain of Rock Creek ranges from 50 to 500 feet wide, depending upon the topography (FEMA 1985).

Maintenance of the park's wetlands/floodplains is necessary to fulfill the purposes for which the park was established and is key to the natural integrity of the park. Implementation of the preferred alternative would not impair wetlands or floodplains because adverse effects from management actions would not have a measurable effect on these resources, and benefits would result from reduced deer browsing pressure. Under the preferred alternative, the reduction and long-term maintenance of a small deer herd would allow vegetative ground cover to reestablish itself in the primary park wetland areas and would limit the damage from deer trampling in smaller wetland areas, resulting in beneficial, long-term impacts on wetlands. Also, no occupancy, modification, or development of floodplains is expected under the preferred alternative, other than possibly some of small caging around specific landscape or rare plants if these were located within wetlands or floodplains. The structure and function of wetlands or floodplains would not be affected; effects would either be nondetectable, or, if detected, would be considered slight and localized. No measurable or perceptible effects on size, integrity, or connectivity of wetlands would occur from management actions. The removal of ground vegetation through deer browsing would be greatly reduced, with long-term, beneficial effects on overall floodplain functioning. Because there would be only slight adverse impacts on wetlands and floodplains, and primarily long-term benefits, the preferred alternative would not result in impairment to these resources.

WILDLIFE (INCLUDING DEER) AND WILDLIFE HABITAT

As noted in the discussion on vegetation, Rock Creek Park provides habitat for much of the city's wildlife and acts as an important contributor to the region's biodiversity. Common fauna likely to occur within Rock Creek Park include species adapted to disturbed habitat associated with an urban environment and transient species associated with the adjacent forested habitat. According to the NPSpecies database, 36 species of mammals, 13 species of amphibians, 6 species of reptiles, and 181 species of birds are present or probably present within park boundaries (NPS 2008). The National Audubon Society and the American Bird Conservancy recognize Rock Creek Park as an important birding area due to its exceptional diversity of bird species during migration (Maryland/District of Columbia Audubon 2004). Deer are also an integral part of the wildlife in Rock Creek Park. Deer density has ranged between 52 and 98 deer per square mile over the past 10 years, and current (2009) density is estimated at 67 deer per square mile.

Viable wildlife populations and wildlife habitat are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. Implementation of the preferred alternative would not impair wildlife or wildlife habitat because of the low magnitude of adverse effects from management actions and the benefits that would result from reduced deer browsing pressure. The actions in the preferred alternative would have mainly beneficial impacts because quickly reducing deer browsing pressure and maintaining a smaller deer population would enhance forest regeneration and therefore enhance forest habitat by allowing vegetation to recover and improving foraging habitat. Impacts on other wildlife would be long term and beneficial because of rapidly reduced deer numbers in the park, resulting in decreased browsing pressure and natural forest regeneration, allowing increased abundance and diversity of other wildlife that depend on understory vegetation. Adverse, long-term impacts would be reduced over time. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Other wildlife would be temporarily affected by trampling at bait stations, shooting sites, trapping locations, reproductive control techniques, or deer carcass disposal sites. Impacts of these actions on native species, their habitats, or the natural processes sustaining them may not be detectable, and changes to population numbers, population structure, or other

demographic factors would not occur. Occasional responses to disturbance by some individuals could be expected, but without interference to factors affecting population levels. Sufficient habitat would remain functional to maintain viability of all species. Impacts would be outside critical reproduction periods for sensitive native species. For deer, removal would adversely impact individuals, as would reproductive control/surgical sterilization, resulting in potential major adverse impacts to individual deer due to handling stress and the possible physiological or behavioral changes due to the use of sterilization/reproductive controls. However, it is expected that although impacts on deer, their habitats, or the natural processes sustaining them would be detectable, and changes to population numbers, population structure, or other demographic factors would occur, the species would remain stable and viable. Frequent responses to disturbance by some individuals could be expected, but sufficient habitat would remain functional to maintain the viability of the species. For these reasons, and because there would be long-term benefits to both wildlife habitat and the deer population, the preferred alternative would not result in impairment of deer or other wildlife.

RARE, UNIQUE, THREATENED OR ENDANGERED SPECIES

The *Endangered Species Act* requires federal agencies to ensure that their activities would not jeopardize existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Only one federally listed species, the endangered Hay's spring amphipod (*Stygobromus hayi*), is known to inhabit the park. Another rare species, Kenk's amphipod *(Stygobromus kenki*), also known as the Rock Creek groundwater amphipod, was identified in park springs (NPS 1997). Kenk's amphipod is not currently listed under the *Endangered Species Act* and it is no longer being considered for future listing by the U.S. Fish and Wildlife Service (USFWS 2007). Rare species are also identified by the District of Columbia, Maryland, and Virginia. Three other *Stygobromus* species of amphipods that are listed by the state of Maryland as rare or uncommon have been located in or near the park (Maryland Department of Natural Resources 2003).There are also several plant and animal species that have been or are currently listed as rare or uncommon by the Maryland Department of Natural Resources that have been documented (although rare) in Rock Creek Park. The District of Columbia accepts local state-designated plants and also identifies certain wildlife as species of concern. Because of the habitat value provided by Rock Creek Park, many of these species could be found in the park. Habitats preferred by these species generally include springs, seeps, wetlands, waterways, and/or associated moist forested areas.

Viable populations of special status species are necessary to fulfill the purposes for which the park was established and are key to the natural integrity of the park. Under the preferred alternative, the reduced deer density would minimize potential impacts on the habitat for the federally listed Hay's spring amphipod, resulting in long-term, beneficial effects that would reduce adverse impacts such that there would be no observable or measurable impacts to federally listed species, their habitats, or the natural processes sustaining them in the proposed project area. Impacts on species listed or considered special status species by Maryland and the District of Columbia, as well as their habitat, would be beneficial and long term as a result of rapid reductions in deer numbers in the park that would reduce deer browsing pressure on woody and herbaceous vegetation and allow increased abundance and diversity of other species that depend on understory vegetation. There would be no long-term observable or measurable adverse impacts to these species, and impacts would not affect critical periods (e.g., breeding, nesting, denning, feeding, or resting) or habitat. A few predators and scavengers that use deer and their carcasses as a food source could be adversely affected by a lower deer density or denser understory conditions, but this alternative could also increase the availability of other prey. Adverse, long-term impacts would be reduced over time. Human disturbances from trampling during implementation of sharpshooting, capture and euthanasia, and/or reproductive control would be temporary and isolated within the park with no observable or measurable impacts to these species, their habitats, or the natural processes sustaining them in the proposed project area. Because adverse effects would be limited and there would be primarily long-

term beneficial effects, the preferred alternative would not result in impairment to rare, unique, endangered, or threatened species.

CULTURAL LANDSCAPES

Rock Creek Park encompasses the last major natural landscape in the District. The area comprising the park was little modified by human interaction prior to its creation as a park. Since that time, the park has balanced the preservation and maintenance of the valley's natural and cultural resources with the recreational and transportation requirements of modern Washington while incorporating the highest cultural and aesthetic values. As such, Rock Creek Park is considered a significant cultural and historic landscape. The results of a 1997 cultural landscape inventory concluded that Rock Creek Park met the criteria for listing in the National Register as a historic designed landscape. In addition, the inventory determined that two component landscapes of the park, Linnaean Hill (including the Peirce-Klingle Mansion) and the Peirce Mill contribute to the significance of the Rock Creek Park cultural landscape, and thus comprise individually eligible landscape elements (NPS 1998). In addition, cultural landscape reports have been published for Dumbarton Oaks Park and Montrose Park (NPS 2004).

Preservation of cultural landscapes is necessary to fulfill the purposes for which the park was established and are key to the cultural integrity of the park. Implementation of the preferred alternative would not impair cultural landscapes because adverse effects from management actions would not have a measurable effect on these resources, and benefits would result from reduced deer browsing pressure. Under the preferred alternative, enhancing natural forest regeneration by quickly reducing deer browsing pressure and maintaining a smaller deer population would result in beneficial, long-term impacts because vegetation, which is an important component of cultural landscapes, could thrive and recover throughout the park. Less than 1% of the park's vegetation would be affected by trampling at bait stations, shooting sites, trapping locations, or disposal sites. Therefore, adverse impacts of these actions on cultural landscapes would be at the lowest level of detection, with neither adverse nor beneficial consequences. The combined actions under the preferred alternative would result in *no adverse effect* under Section 106 of the NHPA. Because there would be few adverse impacts and primarily long-term beneficial impacts, the preferred alternative would not result in impairment to cultural landscapes.

SOUNDSCAPES

One of the natural resources of Rock Creek Park is the natural soundscape, which includes all of the naturally occurring sounds of the park. Sources of noise within the park and surrounding areas are those typical of an urban area and include recreational activities, motor vehicle operations, and the noises associated with residential development in an urban setting (e.g., lawn mowers). The park system with the main unit of Rock Creek Park and the Rock Creek and Potomac Parkway contains an extensive roadway network that is the primary source of noise.

Natural soundscapes in the park are necessary to fulfill the purposes for which the park was established, and are key to the natural integrity of the park. Implementation of the preferred alternative would not impair soundscapes because adverse effects from management actions would not have a measurable effect on these resources. Overall impacts to soundscapes under the preferred alternative would be limited to the short-term use of firearms for direct reduction (sharpshooting). Natural sounds would predominate for the majority of the year in areas where management objectives call for natural processes to predominate, and noise from deer management actions would be infrequent and would vary based on several factors, particularly timing, distance, and attenuation from the source. Long-term adverse impacts related to implementation of fencing, exclosures, reproductive control, and spraying would be expected to decrease as the overall deer herd population decreases, reducing the need for direct reduction. Because the more intense adverse impacts would be very short term during reduction efforts, and long-term adverse impacts would decrease with a reduction in herd density, the preferred alternative would not result in impairment to soundscapes.

SUMMARY

As described above, adverse impacts anticipated as a result of implementing the preferred alternative on a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or identified as significant in the park's general management plan or other relevant NPS planning documents, would not rise to levels that would constitute impairment.

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APPENDIX C. CHRONIC WASTING DISEASE

This appendix summarizes guidance provided by the National Park Service (NPS) in response to chronic wasting disease (CWD), and it outlines management options available to parks for implementation in the absence of a specific CWD plan.

As of March 2011, CWD has been diagnosed in only two national parks — Rocky Mountain and Wind Cave national parks. However, several national park system units are at high risk because of their proximity to known CWD cases in many areas of the United States. As of April 2011, the closest outbreak of CWD is approximately 72 miles from Rock Creek Park centered near Gore, Virginia. There is a high likelihood that the disease will be detected in other areas of the country following increases in disease surveillance as well as disease spread. CWD presents population decline risks to wild cervids and although there is no evidence to suggest that CWD is transferred to domestic animals or humans these risks are not completely understood. Therefore, CWD has become an issue of national importance to wildlife managers and other interested publics, as well as NPS managers.

NPS POLICY AND GUIDANCE

DIRECTOR'S CWD GUIDANCE MEMORANDUM (JULY 26, 2002)

The NPS director provided guidance to regions and parks on NPS response to CWD in a memorandum dated July 26, 2002. Even though the memo pre-dates current CWD distribution in the national park system, the guidance remains pertinent. The guidance addresses surveillance, management, and communication regarding the disease. It also strictly limits human assisted translocation of deer and elk into or out of national park system units. Deviation from the guidance memo requires a waiver approved by the director.

A NATIONAL PARK SERVICE MANAGER'S REFERENCE NOTEBOOK TO UNDERSTANDING CHRONIC WASTING DISEASE (VERSION 4: JULY 2007)

This notebook serves as an informational reference that summarizes some of the most pertinent CWD literature, management options, and policies as they pertain to units of the national park system. It is not meant to be an all-inclusive review of current literature or management options. CWD is an emerging disease, and the knowledge base is continuing to expand. This document will be updated as necessary to include information pertinent to the NPS.

ELK AND DEER MEAT FROM AREAS AFFECTED BY CHRONIC WASTING DISEASE: A GUIDE TO DONATION FOR HUMAN CONSUMPTION (MAY 2006)

This document provides an overview of the issues surrounding CWD as it relates to public health, and includes NPS recommendations for the use of cervid meat for human consumption from parks affected by CWD surveillance and management actions within or near areas where CWD has been identified or where CWD testing is being conducted.

DESCRIPTION AND DISTRIBUTION

CWD is a slowly progressive, infectious, self propagating, neurological disease of captive and free-ranging mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), Rocky Mountain elk (*Cervus elaphus nelsoni*), and moose (*Alces alces*). The disease belongs to the transmissible spongiform encephalopathy (TSE) group of diseases (similar to scrapie and bovine spongiform encephalopathy). CWD is the only TSE currently found in free-ranging animals. TSEs are characterized by accumulations of abnormal prion (proteinaceous infectious particle) proteins in neural and lymphoid tissues (Prusiner 1982, 1991, 1997).

There is evidence that human-associated movement of cervids has aided in the spread of the disease in captive, and likely free-ranging, deer and elk (Miller and Williams 2003; Salman 2003; Williams and Miller 2003). Localized artificial concentration of cervids in areas with few natural predators likely aids in disease transmission (Spraker et al. 1997; Samuel et al. 2003; Farnsworth et al. 2005, Wild et al. 2011). There is strong evidence to suggest that anthropogenic factors, such as land use, influence CWD prevalence (Farnsworth et al. 2005). Therefore, human influences are likely a significant component of observed CWD distribution and prevalence. CWD is considered a non-native disease process (Wild et al. 2011).

As of March 2011, CWD had been found in captive/farmed cervids in 12 states and 2 Canadian provinces and in free-ranging cervids in 15 states and 2 provinces. The historic area of CWD infection encompasses northeastern Colorado, southeastern Wyoming, and the southwest corner of the Nebraska panhandle (Williams and Miller 2002; Williams et al. 2002b). However, with increased surveillance that has occurred since 2001, the disease has been found with increasing frequency in other geographically distinct areas (Joly et al. 2003).

CLINICAL SIGNS

The primary clinical signs of CWD in deer and elk are changes in behavior and body condition (Williams et al. 2002b). Signs of the disease are progressive. Initially only someone who is quite familiar with a particular animal or group of animals would notice a change in behavior. As the clinical disease progresses over the course of weeks to months, animals demonstrate increasingly abnormal behavior and additional clinical signs (Williams and Young 1992). Affected animals can lose their fear of humans, show repetitive movements, and/or appear depressed but quickly become alert if startled. Affected animals rapidly lose body condition, despite having an appetite (Williams et al. 2002b). In the end stages of the disease they become emaciated. Once an animal demonstrates clinical signs, the disease is invariably fatal. There is no treatment or preventative vaccine for the disease.

DIAGNOSIS AND TESTING

CWD was initially diagnosed in deer and elk by testing a portion of the brain (histopathology techniques) (Williams and Young 1993). While this method is effective at diagnosing relatively advanced cases, it is not sensitive enough to detect early disease stages (Spraker et al. 1997; Peters et al. 2000).

In contrast, immunohistochemistry (IHC) is a sensitive, specific, and reliable test that can be used to identify relatively early stages of chronic wasting disease. This technique can detect CWD prions in many tissues (brain, retropharyngeal lymph nodes, and tonsils) (O'Rourke et al. 1998).

In addition to immunohistochemistry, which takes several days to complete, new rapid tests also employ antibody technology to diagnose CWD. Each has various advantages and disadvantages. Only certified laboratories can perform immunohistochemistry or the rapid CWD tests.

No test available is 100% sensitive for CWD, which means that a negative test result is not a guarantee of a disease-free animal.

TRANSMISSION

There is strong evidence that CWD is infectious and is spread by direct (animal to animal) or indirect (environment to animal) lateral transmission (Miller et al. 2000; Miller and Williams 2003). Bodily secretions such as feces, urine, and saliva have all been suggested as possible means of transmitting the disease between animals and disseminating infectious prions into the environment (Miller et al. 2000; Williams et al. 2002b; Williams and Miller 2003). Maternal transmission cannot be ruled out, but it does not play a large role in continuing the disease cycle in either deer or elk (Miller et al. 1998; Miller et al. 2000; Miller and Williams 2003; Miller and Wild 2004).

Like other contagious diseases, CWD transmission increases when animals are highly concentrated. High animal densities and environmental contamination are important factors in transmission among captive cervids. These factors may also play a role in transmission in free-ranging animals (Miller et al. 2004).

Management actions that increase mortality rates in diseased populations can retard disease transmission by

1) Reducing the average lifetime of infected individuals. Reduced lifespan, in turn, can compress the period of time when animals are infectious, thereby reducing the number of infections produced per infected individual.

2) Reducing population density. The effect of reduced intervals of infectivity is amplified by reductions in population density because there are potentially fewer infectious contacts made. Both of these mechanisms may retard the transmission of disease. If these mechanisms cause the number of new infections produced per infected individual to fall below one, then the disease will be eliminated from the population (Tompkins et al. 2001). The likelihood of this occurring is unknown at this time.

DISPOSAL OF CWD INFECTED ORGANIC MATERIAL

Discarding known or suspect CWD-contaminated organic material, such as whole or partial carcasses, is likely to become an important issue for national park system units in the future. Each state, Environmental Protection Agency region, and refuse disposal area is likely to have different regulations and restrictions for disposal of potentially infected tissues. Currently there is no national standard for disposal. Because infected carcasses serve as a source of environmental contamination (Miller et al. 2004), it is recommended that known and suspect CWD-positive animals be removed from the environment.

Given the type of infectious agent (prions), there are limited means of effective disposal. In most cases, however, off-site disposal of infected material is recommended in approved locations. The available options for each park will vary and will depend on the facilities present within a reasonable distance from the park. Disposal of animals that are confirmed to be infected should be disposed of in one of the following ways:

- Alkaline Digestion — Alkaline digestion is a common disposal method used by veterinary diagnostic laboratories. This method uses sodium hydroxide or potassium hydroxide to catalyze the hydrolysis of biological material (protein, nucleic acids, carbohydrates, lipids, etc.) into an aqueous solution consisting of small peptides, amino acids, sugars, and soaps. During this process the prion proteins are destroyed.

- Incineration — Incineration is another disposal method commonly used by veterinary diagnostic laboratories. This method burns the carcass at intense temperatures (600 – 1000 degrees centigrade).

- Landfill — The availability of this option varies by region, state, and local regulations. Therefore, local landfills must be contacted for more information regarding carcass disposal, to determine if they can and will accept CWD positive carcasses or carcass parts.

MANAGEMENT

Chronic wasting disease has occurred in a limited geographic area of northeastern Colorado and southeastern Wyoming for over 30 years. Relatively recently, it has been detected in captive and free-ranging deer and elk in several new locations, including Nebraska, South Dakota, New Mexico, Utah,

new areas of Wyoming and Colorado, and east of the Mississippi River in Wisconsin, Illinois, West Virginia, New York, Michigan and most recently in North Dakota, Minnesota,Virginia, and Maryland.

The NPS does not have a single overarching plan to manage chronic wasting disease in all parks. However, it has provided guidance to parks in how to monitor for and minimize the potential spread of the disease, as well as remove infected animals from specific areas. Generally, two levels of action have been identified, based on risk of transmission: (1) when CWD is not known to occur within a 60-mile radius from the park, and (2) when the disease is known to occur within the park or within a 60-mile radius.

The chance of finding CWD in a park is related to two factors: the risk of being exposed to the disease (the likelihood that the disease will be introduced into a given population), and the risk of the disease being amplified once a population of animals has been exposed. The first risk is important for national park system units where no CWD cases have been identified within 60 miles of their border. The second risk applies to units where chronic wasting disease is close to or within their borders, as well as in proactive planning efforts. By evaluating the risk of CWD exposure and amplification, managers can make better decisions regarding how to use their resources to identify the disease.

Actions available to identify CWD are linked to the risk factors present in and around the park. When risk factors are moderate, surveillance for chronic wasting disease can be less intense (e.g., opportunistic) than when risk is high (NPS 2005e). When the risk is higher, surveillance of all types should be increased. Other management actions that are in place for the host species may limit risk of exposure or transmission by maintaining biologically appropriate population densities. Whether CWD is within 60 miles of a unit or not, coordination with state wildlife and agriculture agencies when conducting CWD surveillance is strongly encouraged.

OPPORTUNISTIC SURVEILLANCE

Opportunistic surveillance involves taking diagnostic samples for testing from deer found dead or harvested through a management activity within a unit of the national park system. Cause of death may be culling, predation, disease, trauma (hit by car), or undetermined. Opportunistic surveillance has little, if any, negative impact on current populations. Unless deer are culled, for either population management or research goals, relatively small sample sizes may be available for opportunistic testing. Animals killed in collisions with vehicles may be a biased sample that could help detect CWD. Research has indicated that CWD-infected mule deer may be more likely to be hit by vehicles than non-CWD infected deer (Krumm et al. 2005).

Opportunistic surveillance is an excellent way to begin surveying for presence of CWD without changing management of the deer population. This is a good option for park units where CWD is a moderate risk but where it has not yet been encountered within 60 miles of the park. Opportunistic surveillance should also be used in parks in close proximity to the disease.

TARGETED SURVEILLANCE

Targeted surveillance entails lethal removal of deer that exhibit clinical signs consistent with CWD. Targeted surveillance has negligible negative effects on the entire population, removes a potential source of CWD infection, and is an efficient means of detecting new centers of infection (Miller et al. 2000). One limitation to targeted surveillance is that environmental contamination and direct transmission may occur before removal. Targeted surveillance is moderately labor intensive and requires educating park staff in recognition of clinical signs, as well as vigilance for continued observation and identification of potential CWD suspect animals. Training is available through the NPS Biological Research Management Division. Targeted surveillance is recommended in areas with moderate to high CWD risk (within 60 miles of known CWD occurrence) or in park units where CWD has already been identified.

POPULATION REDUCTION

Population reduction involves randomly culling animals within a population in an attempt to reduce animal density, and thus decrease transmission rates. In captive situations, where animal density is high, the prevalence of CWD can be substantially elevated compared to that seen in free-ranging situations. Thus, it is hypothesized that increased animal density and increased animal-to-animal contact, as well as increased environmental contamination, enhance the spread of CWD. Therefore, decreasing animal densities may decrease the transmission and incidence of the disease. However, migration patterns and social behaviors may make this an ineffective management strategy if instead of dispersing across the landscape, deer and elk stay in high-density herds in small home ranges throughout much of the year (Williams et al. 2002b). Population reduction is an aggressive and invasive approach to mitigating the CWD threat. It has immediate and potentially long-term effects on local and regional populations of deer and the associated ecosystem. This may be an appropriate response if animals are above population objectives and/or the need to know CWD prevalence with a high degree of accuracy is vital.

COORDINATION

Regardless of which surveillance method is used, each park should cooperate with state wildlife and agriculture agencies in monitoring CWD in park units, working within the park's management policies. CWD is not contained by political boundaries, thus coordination with other management agencies is important.

Additionally, as stated above, the NPS Biological Resource Management Division provides assistance to parks for staff training (e.g., sample collection, recognizing clinical signs of CWD) and testing (e.g., identifying qualified/approved labs or processing samples).

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APPENDIX D. REVIEW OF WHITE-TAILED DEER FERTILITY CONTROL

INTRODUCTION

Managing the overabundance of certain wildlife species has become a topic of public concern (Rutberg et al. 2004). Species such as Canada geese (*Branta canadensis*), coyotes (*Canis latrans*), and white-tailed deer (*Odocoileus virginianus*) have become either locally or regionally overabundant in many areas in the United States (Fagerstone et al. 2002). Traditional wildlife management techniques such as hunting and trapping are often unfeasible, publicly unacceptable, or illegal in many parks, urban, and suburban areas, forcing wildlife managers to seek alternative management methods (Kilpatrick and Walter 1997; Muller, Warren, and Evans 1997). The use of reproductive control as a wildlife management tool has been studied for several decades.

For reproductive control agents to effectively reduce population size, treatment with an agent must decrease the reproductive rate to less than the mortality rate in a closed population with no immigration or emigration. In an open population, where there is much animal movement into and out of an area being considered for treatment, the use of fertility control agents is not likely to be successful in decreasing a population (Rudolph, Porter, and Underwood 2000). Good estimates of population emigration, immigration, and birth and survival rates are needed before predictive models can be used to approximate the effort required to successfully use contraception as a population management technique.

The purpose of this document is to provide NPS managers at Rock Creek Park with (1) a brief overview of contemporary reproductive control options as they pertain to white-tailed deer; (2) an outline of the primary advantages, disadvantages and challenges related to the application of wildlife fertility control agents including population management challenges, regulatory issues, potential logistical issues, and consumption issues; and (3) an evaluation of current fertility control agents against criteria established by the park for use of a reproductive control agent. This document is not intended to be exhaustive but to provide a scientifically sound basis for understanding and evaluating deer management alternatives that include reproductive control of female deer.

It is important to note that some of the most critical elements of a successful population level fertility control program focus on ecological and logistical questions rather than the efficacy of fertility control agents in individual animals. It should also be noted that technology and regulation is changing rapidly in this field and updated information should be reviewed prior to implementation of a deer management program that involves fertility control.

There is general agreement that because of the logistical difficulties of treating significant numbers of deer that controlling large, open, free-ranging populations of wild ungulates solely with a contraceptive vaccine is impractical and unlikely to succeed (Rutberg et al. 2004; Garrott et al. 1992; Garrott 1995; Warren 2000; Rudolph, Porter, and Underwood 2000; Cowan, Pech, and Curtis 2002; Merrill, Cooch, and Curtis 2003 and 2006). There is also agreement that fertility control as a exclusive means of managing populations cannot reduce wildlife population size rapidly (Rutberg and Naugle 2008a, Kirkpatrick and Turner 2008). The few long-term (> 10 year) research projects evaluating population level effects of PZP on long-lived species (horses and deer) support this statement. At Assateague Island National Seashore, PZP treatments were successful in reducing the wild horse population 16% (from 160 to 135 individuals) between 1994 and 2009 (15 years). The park expects to reach the target population size of 135 horses in another 8-9 years (C. Zimmerman, pers. comm. 2009). At Fire Island National Seashore, park managers report a 33% reduction in overall deer population size (from approximately 600 to 400 individuals) between 1994 and 2009 (M. Bilecki, pers. comm. 2009). In the most intensively treated areas of the park deer population size decreased up to 55% over 15 years (Rutberg and Naugle 2008a). All population level studies have been conducted in relatively closed populations. The appropriateness of fertility control as a deer management tool is heavily dependent on specific park objectives and the purpose and need for management.

CURRENT TECHNOLOGY

The area of wildlife contraception is constantly evolving as new technologies are developed and tested. For the sake of brevity, this appendix will only discuss reproductive control as it applies to female deer. There is a general understanding in white-tailed deer biology that managing the female component of the population is more important than managing the male component. Based on the polygamous breeding behavior of white-tailed deer, treating males with reproductive control would be ineffective when the goal is population management (Warren 2000; Garrott and Siniff 1992).

Regulation of wildlife fertility control agents can be confusing. If a product is intended for use in a food-producing animal, it must be deemed safe for human consumers. Regardless of its use in food animals, a fertility control agent must be considered safe for use in the target species and not present environmental health hazards to non-target species. Until 2006 the Food and Drug Administration (FDA), was the agency responsible for regulation of wildlife contraceptives and their potential for drug residues. Since this time the Environmental Protection Agency (EPA) has assumed responsibility for regulating contraceptives for use in free-ranging wildlife and feral animals (Fagerstone et al. 2010). The EPA, in consultation with the contraceptive manufacturer/sponsor, will determine the safety of the product and marking requirements for free-ranging animals treated with contraceptives. Prior to EPA registration, products can be studied in free-ranging populations to gather safety and efficacy data under an experimental use permit (EUP) which is obtained by the product's sponsor. Until products are registered by the EPA, and marking requirements made explicit, animals treated with any fertility control product should be permanently marked.

Marking is also needed for long-term monitoring of contraceptive efficacy in individual animals, determining which deer have been treated during implementation and for efficient re-treatment, and to monitor population vital rates. Finally, while NPS units have jurisdiction for wildlife management within their borders, parks are strongly encouraged to cooperate and coordinate with state agencies to manage cross boundary wildlife resources whenever possible (43 CFR 24). Therefore, parks should also communicate with appropriate state agencies regarding marking of treated animals in areas where deer may cross park boundaries. The disadvantages of permanent marking are primarily related to the substantial additional labor and costs of the first year's capture and marking of treated animals, sustainability of this effort over the long term, capture associated stress to individual deer (compared to remote delivery), and potential social acceptance concerns. Despite these drawbacks, marking is nearly always warranted when considering a fertility control program.

There are three basic categories of reproductive control technology: (1) immunocontraceptives (vaccines), (2) non-immunological methods (pharmaceuticals), and (3) physical sterilization.

IMMUNOCONTRACEPTIVES

It has been offered that immunocontraceptive vaccines offer significant promise for future wildlife management (Rutberg et al. 2004). Immunocontraception involves injecting an animal with a vaccine that stimulates its immune system to produce antibodies against a protein (antigen) involved in reproduction (Warren 2000). In order to induce sufficient antibody production, an adjuvant is combined with the antigen. An adjuvant is a product that increases the intensity and duration of the immune system's reaction to the vaccine. There are two primary types of antigens used in reproductive control vaccines in deer: porcine zona pellucida (PZP) and gonadotropin releasing hormone (GnRH).

Neither PZP nor GnRH vaccines are 100% effective in preventing pregnancy. Using a two-dose vaccination protocol Curtis et al. (2002) demonstrated approximately 85-90% decrease in the number of fawns born per female after vaccination with either GnRH or PZP immunocontraceptive vaccines in white-tailed deer. Likewise, Rutberg and Naugle (2008a) showed a 75% decrease in annual fawn production using PZP vaccination in two relatively closed white-tailed deer populations. In a more contemporary version of the GnRH vaccine, Gionfriddo et al. (2009) found 88% efficacy the first year

and 47% efficacy the second year at preventing pregnancy in white-tailed deer after a single vaccination. The GnRH vaccine has not been evaluated at the population level. Efficacy generally decreases as antibody production wanes. Reduced pregnancy rates can usually be expected for 1 to 2 years post-treatment with immunocontraceptive vaccines although there is the potential for longer-term or even permanent sterility (Fraker et al. 2002; Miller et al. 2008; Miller et al. 2009). Duration of infertility is strongly related to the conjugate-antigen design, the adjuvant used, how the vaccine is delivered, and the host's immune system (Miller et al. 2008; Kirkpatrick et al. 2009).

Porcine Zona Pellucida (PZP). The majority of immunocontraceptive research in wildlife has been conducted using PZP vaccines. PZP vaccines stimulate production of antibodies directed towards specific outer surface proteins of domestic pig ova (eggs). Pig ova are sufficiently similar to many other mammals' ova that antibodies produced will cross-react with the vaccinated animal's own ovum. PZP antibodies prevent fertilization, presumably by blocking the sperm attachment sites on the zona which surrounds the ovum. There are currently two PZP vaccine products being developed, one is simply called PZP and the other SpayVac®.

SpayVac® (ImmunoVaccine Technologies, Halifax) uses a liposome preparation of PZP mixed with an adjuvant to induce antibody production. This vaccine has been evaluated in a variety of species, including captive and to a lesser extent free-ranging white-tailed deer (Brown et al. 1997; Fraker et al. 2002; Locke et al. 2007; Rutberg and Naugle 2009). The other PZP vaccine, often referred to as "native" PZP, does not use liposome technology but does require a potent adjuvant. Native PZP vaccines have been used extensively in captive wildlife species in the course of investigating its effectiveness (Rutberg and Naugle 2008a; Kirkpatrick et al. 1997; Turner, Kirkpatrick, and Liu 1996; Walter et al. 2002a and 2002b).

The native PZP vaccine has also been tested at length in free-ranging white-tailed deer (Rutberg and Naugle 2008a; Naugle et al. 2002; Rudolph, Porter, and Underwood 2000; Rutberg et al. 2004; Walter et al. 2002a and 2002b; Walter, Kilpatrick, and Gregonis 2003). Potential benefits of the native vaccine include the ability to deliver the vaccine remotely, its safety in pregnant deer and non-target species (Barber and Fayrer-Hosken 2000), and the availability of at least some long-term data on population level effects. The currently available PZP vaccine formulation is effective for two years (Turner et al. 2007; Turner et al. 2008; Rutberg and Naugle 2009), though longer multiyear applications are also being studied. The two-year formulation has received only limited testing in free-ranging white-tailed deer.

SpayVac® provides the same advantages as native PZP but may result in infertility for up to seven years (Miller et al. 2009). Potential advantages of SpayVac® compared to the native PZP vaccine are (1) a more rapid immune response, (2) higher antibody titers, (3) a higher proportion of antibodies that bind to target sites, and (4) longer duration of efficacy (Fraker and Bechert 2007). Although little long-term data on population level effects exists for SpayVac®, it is assumed they are similar to those for the native PZP formulation.

Challenges to the use of both PZP vaccines include lack of regulatory approval for use in free-ranging wildlife populations, behavioral impacts (continued estrous cycling), frequency of treatment (need for booster shots), out of season fawning, and possibly changes in body condition. PZP vaccines are not currently registered for use in free-ranging wildlife but may be in the future (see above for regulatory issues).

PZP based vaccines often cause out of season breeding behavior in treated deer because reproductive hormones which are responsible for estrous cycling are not suppressed (Miller et al. 2009; McShea et al. 1997; Fraker et al. 2002; McShea and Rappole 1997). Repeated estrous cycling has the potential to extend the population breeding season and male/female rutting behaviors. Additionally, extended estrous seasons may result in late pregnancies if the vaccine fails (Fraker et al. 2002; McShea et al. 1997). Fawning later in the summer/fall may lead to higher fawn mortality as winter ensues. Any effect that extends the rut also has the potential for secondary effects to both male and female deer. Increased attempts to breed may

result in increased deer movements. It has been suggested that this may encourage deer-vehicle collisions. However, the only known research evaluating this specific issue reported that deer treated with PZP were at no greater risk of being involved in a deer-vehicle collision than untreated deer (Rutberg and Naugle 2008b).

Increased activity during rut can be energetically costly for both sexes. While this is likely offset by the lack of pregnancy demands in female deer it may have cumulative effects on energy expenditures in male deer (Walter, Kilpatrick, and Gregonis 2003; McShea et al. 1997). Alternatively, PZP-treated females may experience increased body condition and a longer life span compared to untreated individuals as a result of reduced energetic costs of pregnancy and lactation (Warren 2000; Hone 1992). For example, at Assateague Island National Seashore, the life span of horses treated with PZP has been extended from an average age at death of 20 years to 26-30 years (Kirkpatrick and Turner 2008; C. Zimmerman, pers. comm. 2009). Longer life span may extend the time needed to observe a decline in population size (Kirkpatrick and Turner 2008). Studies in white-tailed deer investigating effects on body condition are equivocal (Walter, Kilpatrick, and Gregonis 2003; McShea et al. 1997). There are no long-term studies investigating potential extended survival in free-ranging wild deer.

Successful field application of a fertility control program requires both an effective agent and a practical delivery system (Cowan, Pech, and Curtis 2002). Although PZP vaccines may be successfully delivered remotely through darting, the native PZP vaccine that has been tested most extensively requires a series of two initial doses followed by periodic boosters in order to maintain infertility. The need for multiple doses leads to significant logistical issues when working with free-ranging white-tailed deer, particularly when the number of deer to be treated is high. New research involving controlled-release native PZP formulations incorporates primer and booster immunizations into one injection and may extend the period of infertility (Turner et al. 2008). Turner et al. (2008) provides an overview of the current status of research related to controlled-release components of native PZP contraceptive vaccines. The new native PZP formulations have not yet been delivered through a dart. SpayVac® does not require a first year booster and may prove to be easier to implement because follow-up doses would only be required every 3-7 years (Fraker 2009), however, to our knowledge SpayVac® has not been delivered remotely.

Many studies have modeled and a few field studies have field tested population-level effects of PZP vaccination (Rutberg et al. 2004; Nielsen, Porter, and Underwood 1997; Rudolph, Porter, and Underwood 2000; Rutberg and Naugle 2008a). Research evaluating the effectiveness of PZP in reducing the size of deer populations has focused on moderate to high density deer populations of relatively small size (< 300-500 individuals). Within these populations, long-term (> 10 year) data indicates that population size of may be gradually reduced using PZP treatments (Kirkpatrick and Turner 2008; Rutberg and Naugle 2008a). Rutberg and Naugle (2008a) reported a 27% decline in the size of a small, relatively closed, suburban deer population (approximately 250 deer) between 1997 and 2002, as a result of PZP treatments and potentially other stochastic events. However, level of success in reducing population size varies widely. For example, deer density on Fire Island National Seashore was significantly reduced in some areas but reduced very little in other areas likely due to inability to treat significant numbers of does in certain areas (Rutberg and Naugle 2008a; Underwood 2005). Site specific modeling using accurate population demographic and vital rate data as well as knowledge of local deer behavior, land access availability and likelihood of achieving treatment application goals is needed to determine how fast a population can be reduced and how deep a reduction can be achieved.

Additional information on PZP may be obtained at

http://www.aphis.usda.gov/wildlife_damage/nwrc/research/reproductive_control/index.shtml OR http://www.pzpinfo.org.

Gonadotropin Releasing Hormone (GnRH) Vaccines. GnRH is a small neuropeptide (a protein-like molecule made in the brain) that plays a necessary role in reproduction. It is naturally secreted by the hypothalamus (a region of the brain that regulates hormone production), which directs the pituitary gland

to release hormones (luteinizing hormone and follicle stimulating hormone) that control the function of reproductive organs (Hazum and Conn 1988). In an attempt to interrupt this process, research has focused on eliminating the ability of GnRH to trigger the release of reproductive hormones. One option is vaccination against GnRH. Antibodies produced in response to vaccination likely attach to GnRH in the hypothalamic region and prevent the hormone from binding to receptors in the pituitary gland, thus suppressing the secretion of reproductive hormones and preventing ovulation.

GnRH vaccines have been investigated in a variety of wild and domestic ungulates (hoofed mammals) (Adams and Adams 1990; Curtis et al. 2002; Miller et al. 2000; Miller, Rhyan, and Drew 2004). One GnRH vaccine that has been developed specifically for wildlife contraception is GonaCon™. GonaCon™ is registered with the EPA as a restricted use pesticide to control white-tailed deer fertility. The label requires marking the treated animal and giving the vaccine by hand-injection to limit the potential for non-target animal and environmental exposure to the vaccine.

Potential benefits of this vaccine include a relatively long-lasting contraceptive effect (1-2 years and potentially longer) and possibly the lack of repeated estrous cycles (Curtis et al. 2002). In free-ranging white-tailed deer, GonaCon™ is estimated to be 88% effective in preventing pregnancy during the first year post-treatment, and approximately 47% effective in the second year (Gionfriddo et al. 2009), however long-term field efficacy data currently does not exist. Although the label indicates a minimum of 1 year efficacy, the contraceptive effect typically lasts two years and possibly longer in some individuals (Fagerstone et al. 2008). Repeated estrous cycling and other behavioral changes in white-tailed deer have not been consistently documented in association with GnRH vaccines (Curtis et al. 2008). However, Killian et al. (2008) reported that behavioral expressions of estrus were only decreased for 1-2 years post-treatment and increased in subsequent years despite does remaining infertile and Curtis et al. (2002) reported sporadic and delayed estrous cycling with prolonged fawning season in GnRH vaccinated deer as contraceptive effects waned.

GnRH vaccines have many of the same challenges associated with PZP including the need for repeated treatment to maintain infertility, and the need to mark treated animals. Additionally, as with any vaccine which uses the adjuvant AdjuVac™, immune response to the adjuvant may interfere with determination of the animal's Johne's disease status (a gastrointestinal disease of potential regulatory importance for domestic livestock) (Miller et al. 2008). Managers should be aware of this prior to vaccination if neighboring lands have domestic livestock grazing.

Other challenges to use of GonaCon™ include potential health effects on treated deer, lack of information related to effectiveness at the population level in free-ranging deer, and requirement for hand-injection. Killian et al. 2006 concluded that GonaCon™ was safe for deer and that there were no adverse health impacts associated with unintentional repeated vaccination. However, granulomas and injection site abscesses have been consistently associated with vaccination (Curtis et al. 2008, Gionfriddo et al. 2009). A ganuloma is a localized inflammatory response to the vaccine that occurs at the site of injection and can persist for many years post-treatment. Overall, no debilitating, long-term impacts to health or changes in behavior have been consistently associated with GnRH vaccination in female deer.

Similar site specific modeling and population data are required for evaluating the potential for success in managing a free-ranging deer population with GonaCon™ as was described for PZP immunocontraception.

Additional information may be obtained at:
http://www.aphis.usda.gov/wildlife_damage/nwrc/research/reproductive_control/index.shtml

Non-immunological Reproductive Control Methods

This group of reproductive control agents includes GnRH agonists, GnRH toxins, steroid hormones, and contragestives.

GnRH Agonists. GnRH agonists are highly active analogs of GnRH which are similar in structure and action to the endogenous hormone. These agonists attach to receptors in the pituitary gland. By attaching to the receptors, these agonists reduce the number of binding sites available and thereby temporarily suppress the effect of the GnRH. As a result of this suppression, reproductive hormones are not released (Aspden et al. 1996; D'Occhio, Aspden, and Whyte 1996). Continuous administration of the agonist is necessary to maintain infertility. This can be accomplished with controlled-release formulations or surgically implanted pumps in addition to daily administration.

Not all agonists have the same effects in all species. In fact, some can have an effect that is the opposite of what is intended. The wide variation in response is likely due to a combination of type of agonist, dose, treatment regime, reproductive status, sex, and species (Becker and Katz 1997). Therefore, it is important to fully understand the effects of a product on a given species. Although many GnRH agonists are used in human as well as veterinary medicine only a few have been investigated in wildlife species (Becker and Katz 1997; Vickery 1986). GnRH agonists have been tested primarily in mule deer and elk and been shown to both suppress reproductive hormones and prevent pregnancy (Baker et al. 2005; Baker et al. 2004; Baker et al. 2002; Conner et al. 2007).

- **Leuprolide acetate**. Leuprolide is a GnRH agonist that when administered as a controlled-release formulation, results in 100% pregnancy prevention in treated female elk and mule deer (Baker et al. 2002 and 2004; Conner et al. 2007). In addition, the treatment is reversible, and the effects last only for a single breeding season (Baker et al. 2004; Trigg et al. 2001). Advantages of leuprolide acetate are that it is 100% effective in preventing pregnancy, is safe for human consumption (Baker et al. 2004), can be delivered remotely (Baker et al. 2005), does not result in physiological side effects, and there are few behavioral effects (Baker et al. 2004). Treatment did not suppress reproductive behavior during the breeding season but also did not prolong behaviors into the non-breeding season.

Leuprolide is FDA-approved for use in humans and has been used experimentally in cervids. It is not currently approved for use as a free-ranging wildlife as a fertility control drug. It is not known if this application will be pursued in the future. The need to deliver leuprolide subcutaneously via hand injection has traditionally been considered a significant barrier to the long-term application of this drug as a wildlife management tool. However, Baker et al. (2005) successfully applied the treatment through dart delivery which may extend the practical application of this contraceptive.

Treatment using leuprolide differs from GnRH vaccines in that it does not require an adjuvant and does not induce an antibody reaction. Therefore, inflammatory responses to adjuvant components and other physiological effects, often observed with immunocontraceptives, have not been observed in association with leuprolide. It does, however, require a slow release implant that remains under the skin or in the muscle. Additionally, leuprolide does not likely pose a threat to the environment or nontarget species because the drug is not absorbed through the oral route of administration (Baker et al. 2004). Marking requirements for animals treated with leuprolide implants are currently unknown because it is not a registered wildlife contraceptive.

One drawback to the use of leuprolide is the need to treat animals within a short timeframe prior to the breeding season (Conner et al. 2007). If a female is not retreated each year, she has the same chances of becoming pregnant as an animal that was never treated. The need to treat a potentially large number of individuals within a short period of time on an annual basis reduces the feasibility of leuprolide as a wildlife management tool, particularly for large, free-ranging, open deer populations.

- **Histrelin acetate**. Histrelin acetate is effective in suppressing a key reproductive hormone in white-tailed deer (Becker and Katz 1995). However, testing was administered using a mini-pump that was surgically implanted under the animal's skin. This is an infeasible route of administration in free-ranging animals. In the future, a delivery system with slow release characteristics may help to make this a more feasible option for free-ranging wildlife. It is likely

that histrelin acetate will also suppress ovulation and pregnancy in white-tailed deer, although this remains to be tested.

GnRH Toxins. GnRH toxins consist of a cellular toxin that is combined with a GnRH analog (either agonist or antagoinst). A GnRH analog is a synthetic peptide similar to the body's own gonadotropin-releasing hormone. Using the analog as a carrier, a cellular toxin can be delivered to specific cells in the pituitary which produce reproductive hormones. Internalization of the toxin leads to cell death. When this occurs, the production of reproductive hormones (leuteinizing hormone and follicle stimulating hormone) is affected. This process has been studied in male dogs (Sabeur et al. 2003), domestic sheep (Nett et al. 1999), rats (Kovacs et al. 1997), and female mule deer (Baker et al. 1999) but the technology is still in the developmental stages and not ready for use in free-ranging wildlife.

Steroid Hormones. The field of wildlife contraception began with research examining the manipulation of reproductive steroid hormones (Matschke 1980, 1977a, 1977b). Treatment usually entails the application of synthetic hormones, such as norgestomet, and melangestrol acetate (Jacobsen, Jessup, and Kesler 1995; DeNicola, Kesler, and Swihart 1997a; Fagerstone et al. 2010). Available products are administered via slow release implants or repeated feeding and have demonstrated variable efficacy and duration of infertility. Most products that are available are used in domestic animal or zoological veterinary medicine and have not been used widely in free-ranging wildlife. Issues related to using steroids include difficulties in treating large numbers of animals for extended periods of time, potential reproductive tract pathological side effects experienced by the treated animals, and concerns over the consumption of treated animals by nontarget species and humans. Although many of these hormones are used as growth promotants in domestic food animal production, they are not labeled for use in free-ranging wildlife. Currently, this method of contraception is not being pursued by the wildlife management community.

Contragestives. Contragestives are products that terminate pregnancy. Progesterone is the primary gestational hormone for maintaining pregnancy in mammals. Many contragestives act by preventing progesterone production or blocking its effect, thereby affecting pregnancy. The primary contragestive that has been researched for use in domestic animals and white-tailed deer is an analog of Prostaglandin F2α (PGF2α) (Becker and Katz 1994; DeNicola, Kesler, and Swihart 1997b; Waddell et al. 2001). Lutalyse® is a commercially available form of PGF2α. Unlike many of the other alternatives, there are no issues related to consumption of the meat when the animal has been treated with this product. Challenges with contragestives include timing of administration, efficacy, potential to rebreed if breeding season is not finished, and the potential for aborted fetuses on the landscape. These limitations make their use in free-ranging populations for fertility control purposes infeasible.

Sterilization. Surgical sterilization of females is an effective method of controlling reproduction and has been used extensively in domestic animal medicine. However, implementation requires capture, general anesthesia, and surgery conducted by a veterinarian which is generally considered labor intensive and costly and calls into question the long-term sustainability of sterilization as a wildlife management tool, except under very limited circumstances. Only in rare circumstances is physical sterilization reversible.

Depending on the method of sterilization, this procedure may have behavior effects on both male and female deer. If gonads are removed, then the source of important reproductive hormones will be removed. This is likely to change deer social interactions. If gonads are not removed, females will continue to ovulate and show behavioral signs of estrus and consequently may extend the breeding season.

EVALUATION OF FERTILITY CONTROL AGENTS BASED ON SELECTION CRITERIA ESTABLISHED BY ROCK CREEK PARK

Five criteria were established for Rock Creek Park that reflect minimum desired conditions for using a reproductive control agent. Only when these criteria are met would reproductive control be implemented. These criteria assume that the agent poses no significant health risk to the deer.

1. There is a federally approved fertility control agent for application to free-ranging populations;
2. The agent provides multiple year (three to five years) efficacy;
3. The agent can be administered through remote injection;
4. The agent would leave no residual in the meat (i.e., meat derived from treated animals should be safe for human consumption according to applicable regulatory agencies); and
5. Overall there is substantial proof of success with limited behaviorial impacts in a free-ranging population, based on science team review and NPS policy.

TABLE D-1. EVALUATION OF FERTILITY CONTROL AGENTS BASED ON SELECTION CRITERIA FOR ROCK CREEK PARK

Agent	Criterion 1: Federally Approved	Criterion 2: Multi-year Efficacy (3 to 5 years)	Criterion 3: Capable of Remote Administration	Criterion 4: Meat Safe for Humans	Criterion 5: Success in Free-ranging Populations
Immunocontraceptives					
"Native" PZP	No	No[a]	Yes	Likely, but need EPA approval	Yes, but only in closed populations with relatively high population turn-over
SpayVac®	No	Possibly[b]	Unknown		
GnRH	Yes	Possibly[c]	Possibly[d]	Yes	Untested
GnRH Agonists					
Leuprolide Acetate	No	No	Yes	Likely but need EPA approval	Untested
Histrelin Acetate	No	No	No	Likely but need EPA approval	Untested
Other					
GnRH Toxins	No	Unknown	Unknown	Likely but unknown	Untested
Steroid Hormones	No	No	Unknown	Unlikely, but need regulatory guidance	Untested
Contragestives	No	No	Yes	Yes	Not likely but untested

a Initial research on one-shot, multiyear PZP vaccine has demonstrated 88.3% efficacy in Year 1 and 75% efficacy in the second year post-treatment (Turner et al. 2008). Research is currently on-going to evaluate effectiveness in year 3 and beyond. Dr. Allen Rutberg has indicated that "based on the design of the vaccine and our experience with horses, it's unlikely that the vaccine would have much effect past the third year" (Rutberg 2009). However, research on this vaccine is still developing and is expected to continue into the future.

b SpayVac® has demonstrated 80%-100% efficacy for up to 5-7 years in horses and deer (Fraker 2009; Miller et al. 2009; Killian et al. 2008). The term "possibly is used because long-term studies (>5 years) have been conducted only in captive deer and had a small sample size in each treatment group (N=5) (Miller et al. 2009).

c Recently published research on one-shot, multiyear GnRH vaccine in penned/captive deer indicates GonaCon™ is 88-100% effective in Year 1 and 47-100% effective in year 2 and 25-80% effective up to 5 years post-treatment (Miller et al. 2008). The term "possibly" is used because the multi-year formulation has been used only in captive deer, had a small sample size, and lacks confidence intervals on the data.

d Recent work published in elk used dart delivery to administer the GnRH vaccine (Killian et al. 2009).

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APPENDIX E. ADAPTIVE MANAGEMENT PHASES

The USDI Adaptive Management Technical Guide (Williams et al. 2007) suggests a two-phase approach to adaptive management, as illustrated below:

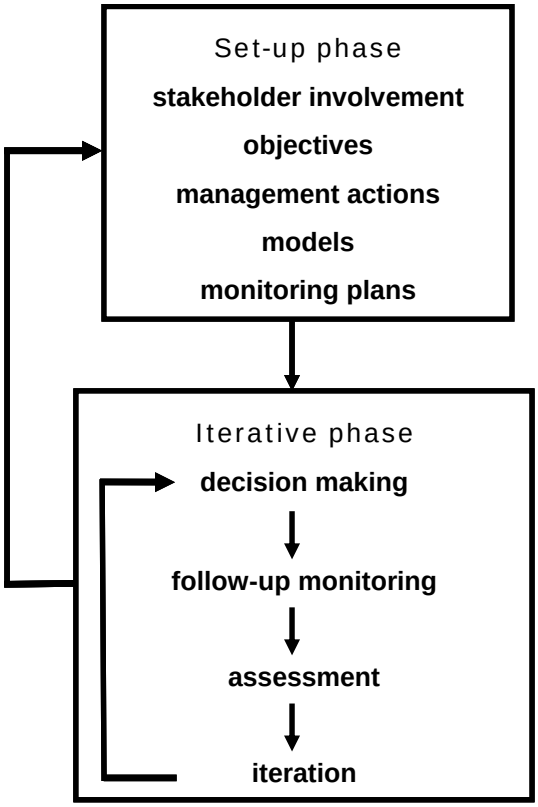

Figure D-1. The two-phase approach to adaptive management (modified from Williams et al. 2007, per B. Williams, pers. comm. 2008)

To implement adaptive management, certain elements must be put into place (the set-up phase), and then used in a cycle of iterative decision-making (the iterative phase) (Williams et al. 2007). For the Rock Creek White-tailed Deer Management Plan, the following are the phases and steps that follow the USDI guidance, with notations made that are specific to this plan.

SET-UP PHASE

Step 1: **STAKEHOLDER INVOLVEMENT** – Without active stakeholder involvement, an adaptive management process is unlikely to be effective. Stakeholders were identified during internal scoping and were conferred with during the public scoping process. The park completed this step at public scoping meetings held in November 2006 as part of the National Environmental Policy Act (NEPA) process. Interested members of the public, local government representatives, D.C. Fish and Wildlife personnel, and the media attended these meetings. Information about the plan has been posted to the park's website throughout the process to continue to keep the public informed. In addition, the NPS convened a team of government scientists (science team) to assist in developing density parameters and metrics to measure effectiveness in meeting plan objectives.

Step 2: **OBJECTIVES** – Objectives were prepared at the internal scoping meeting as part of the NEPA process and are detailed in chapter 1. Thresholds/metrics relating to vegetation condition and deer density were developed to measure success in meeting plan objectives.

Step 3: **ALTERNATIVES** – Alternative management actions were defined in an alternatives development meeting held in February 2007, using input from the public scoping comments and the science team. Elements of the alternatives were discussed and refined by the interdisciplinary team throughout the NEPA process. These actions were developed to test management hypotheses relating to deer management.

Step 4: **MODELS** – Operational models were developed to illustrate the natural resource system. Hypotheses relating to deer management, and specifically related to optimal deer density, are captured in these models, which predict different outcomes and impacts depending on actions taken. Questions that will generate hypotheses for modeling at Rock Creek Park include:

What is the magnitude of the white-tailed deer effects on the forest growth and survival of tree seedlings? (Proposed monitoring: paired plots)

What is the change in forest vegetation over time? (Proposed monitoring: permanent vegetation plots)

What is the density of deer in Rock Creek Park over time? (Proposed monitoring: Distance Sampling)

Step 5: **MONITORING PLANS** – Monitoring programs are created to collect data related to the testing of hypotheses and enhance operational models. The data is used later in the iterative phase to assess whether the objectives are being met. The vegetation data in the paired plots and the long-term vegetation monitoring plots would be used in this assessment. Monitoring data are documented and made available to the public.

ITERATIVE PHASE

Step 1: **DECISION-MAKING** – A management action would be recommended by the park (preferred alternative) and a decision made by the Regional Director. A Record of Decision is completed. A plan is developed to implement the selected alternative and to monitor the results (changes in the resources expected from reduced deer density).

Step 2: **FOLLOWUP MONITORING** – The park will implement the monitoring plan and collect data on key elements that will measure the success of the selected action and of the park meeting its objectives.

Step 3: **ASSESSMENT** – The park will evaluate the results of the monitoring, comparing actual outcome with desired condition or objectives. Monitoring data is analyzed and made available to the public. Based on the assessment, the park may change models, modify the action (e.g., increase or decrease the number of deer taken) or make adjustments in monitoring (look at different parameters or species to measure). The park may perform habitat restoration if vegetation response is slow to meet desired conditions in the timeframe allotted.

Step 4: ITERATION – This step can lead back to the set-up phase if substantial changes are needed or to Step 1 of the iterative phase if there is a need to adjust the management action through subsequent decision-making.

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APPENDIX F. AVIAN SPECIES IDENTIFIED DURING BREEDING BIRD SURVEYS AS POTENTIAL BREEDING SPECIES

Table 1. A.0VIAN SPECIES IDENTIFIED DURING BREEDING BIRD SURVEYS AS POTENTIAL BREEDING SPECIES

Species	1993	1994	1995	1996	1997	1998	2001	2002
Mallard				✓			✓	
Cooper's hawk				✓		✓		
Red-shouldered hawk								✓
Red-tailed hawk				✓			✓	✓
American woodcock			✓	✓				
Rock dove			✓					
Mourning dove	✓	✓	✓	✓	✓	✓	✓	✓
Yellow-billed cuckoo		✓	✓	✓				
Eastern screech owl	✓							
Chimney swift							✓	
Red-bellied woodpecker	✓	✓	✓	✓	✓	✓	✓	✓
Northern flicker	✓	✓	✓	✓	✓	✓	✓	✓
Downy woodpecker	✓	✓	✓	✓	✓	✓	✓	✓
Hairy woodpecker	✓	✓	✓	✓	✓	✓	✓	✓
Pileated woodpecker	✓	✓	✓	✓	✓	✓	✓	✓
Eastern wood-pewee	✓	✓	✓	✓	✓	✓	✓	✓
Eastern Phoebe	✓	✓	✓	✓	✓	✓	✓	✓
Acadian flycatcher	✓	✓	✓	✓	✓	✓	✓	✓
Great crested flycatcher	✓	✓	✓	✓	✓	✓	✓	✓
Eastern kingbird			✓	✓				
Red-eyed vireo	✓	✓	✓	✓	✓	✓	✓	✓
Yellow-throated vireo	✓			✓		✓	✓	✓
Blue jay	✓	✓	✓	✓	✓	✓	✓	✓
American crow	✓	✓	✓	✓	✓	✓	✓	✓
Tufted titmouse	✓	✓	✓	✓	✓	✓	✓	✓
Carolina chickadee	✓	✓	✓	✓	✓	✓	✓	
White-breasted nuthatch	✓	✓	✓	✓	✓	✓	✓	✓
Carolina wren	✓	✓	✓	✓	✓	✓	✓	✓
Blue-gray gnatcatcher	✓	✓	✓	✓	✓	✓	✓	✓
Veery	✓	✓	✓	✓	✓	✓	✓	✓
Wood thrush	✓	✓	✓	✓	✓	✓	✓	✓
American robin	✓	✓	✓	✓	✓	✓	✓	✓
Gray catbird	✓	✓		✓	✓	✓	✓	✓
Northern mockingbird			✓					
Brown thrasher	✓							
European starling		✓			✓		✓	✓
Northern parula						✓		
Black-and-white warbler				✓	✓		✓	✓
Yellow-throated warbler				✓		✓		
Hooded warbler	✓	✓	✓	✓				

Species	1993	1994	1995	1996	1997	1998	2001	2002
Worm-eating warbler	✓							
Ovenbird	✓	✓	✓	✓	✓	✓	✓	✓
Louisiana waterthrush				✓	✓		✓	
Common yellowthroat			✓	✓	✓			✓
Yellow-breasted chat					✓			
American redstart	✓			✓				
Summer tanager				✓				
Scarlet tanager	✓	✓	✓	✓		✓	✓	✓
Eastern towhee	✓	✓	✓	✓	✓	✓	✓	✓
Northern cardinal	✓	✓	✓	✓	✓	✓	✓	✓
Indigo bunting			✓		✓		✓	
Song sparrow				✓	✓		✓	✓
Common grackle	✓	✓				✓	✓	✓
Brown-headed cowbird	✓	✓	✓	✓	✓	✓	✓	✓
House finch		✓	✓		✓	✓		
House sparrow				✓				

Source: Wireless Telecommunications Plan, Rock Creek Park - February 2008

Table 2. WASHINGTON DC AUDUBON CHRISTMAS BIRD COUNT ROCK CREEK PARK - 1980–2002 ANNUAL AVERAGE

Species	Carter Barron	Nature Center	Species	Carter Barron	Nature Center
Mallard	2.2	5.0	Winter wren	0.1	0.6
Wood duck	0.2	0.8	Brown creeper	0.3	1.4
Barred owl	—	0.0	Northern mockingbird	3.2	2.6
Great horned owl	0.0	0.3	Mourning dove	3.6	12.3
Eastern screech owl	0.4	0.8	Rock dove	25.2	4.0
American crow	18.5	38.0	European starling	33.5	21.3
Fish crow	0.4	0.3	Ovenbird	—	0.1
Herring gull	0.3	—	House sparrow	22.7	15.4
Ring-billed gull	40.7	11.5	Eastern towhee	0.0	1.0
American kestrel	—	0.0	White-throated sparrow	10.7	21.9
Belted kingfisher	0.2	0.2	Song sparrow	1.7	8.0
Red-shouldered hawk	0.0	0.1	Dark-eyed junco	11.7	16.1
Red-tailed hawk	0.4	0.7	Purple finch	0.0	0.4
Sharp-shinned hawk	0.2	0.2	House finch	5.5	19.3
Cooper's hawk	0.1	—	American goldfinch	4.4	5.4
Turkey vulture	0.1	0.4	Northern cardinal	8.2	16.0
Black vulture	0.0	0.0	Evening grosbeak	—	0.1
Northern flicker	0.2	1.3	Field sparrow	—	0.2
Red-bellied woodpecker	4.9	9.6	American tree sparrow	—	0.0
Downy woodpecker	3.9	8.7	Fox sparrow	—	0.0
Hairy woodpecker	0.5	1.0	Brown-headed cowbird	—	0.0
Pileated woodpecker	0.8	2.3	Red-winged blackbird	—-	1.9

Species	Carter Barron	Nature Center	Species	Carter Barron	Nature Center
Yellow-bellied sapsucker	0.3	0.7	Common grackle	0.1	28.0
White-breasted nuthatch	6.0	11.9	Blue jay	2.1	3.2
Red-breasted nuthatch	0.0	0.3	Cedar waxwing	1.3	3.5
Golden-crowned kinglet	0.6	3.6	American robin	3.3	2.6
Ruby-crowned kinglet	0.5	0.1	Hermit thrush	—	0.0
Tufted titmouse	13.3	30.7	Gull spp.	0.4	0.1
Carolina chickadee	12.5	43.0	Kinglet spp.	0.3	—
Carolina wren	4.1	8.8			
Total Individuals:	**247.0**	**366.2**			
Total Species:	**21.2**	**27.3**			

APPENDIX G. PUBLIC COMMENT ANALYSIS REPORT

INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA), its implementing regulations, and National Park Service (NPS) guidance on meeting NPS NEPA obligations, Rock Creek Park must assess and consider comments submitted on the White-Tailed Deer Management Plan/Draft Environmental Impact Statement (DEIS) and provide responses to substantive concerns raised in these comments. This report describes how the NPS considered public comments and provides the responses.

The Rock Creek Park DEIS was made available for review through a Notice of Availability (NOA) on July 10, 2009. Following the release of the DEIS, the public comment period was open between July 13, 2009 and October 13, 2009. This public comment period was announced through the park's website (www.nps.gov/rocr), posted on park kiosks, through postcards that were sent to interested parties elected officials, and appropriate local and state agencies. Due to the high level of public interest, the comment period was later extended until November 2, 2009, through a park press release and subsequent Federal Register notice. The DEIS was made available through several outlets, including the NPS's Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/ROCR, as well as on CD or hard copy obtainable upon request from the park. Thirty hard copies and fifty-one CDs of the DEIS and thirty-eight letters announcing the availability of the document on PEPC were mailed to interested parties, elected officials, and appropriate local and state agencies. A limited number of hard copies were made available at the Cleveland Park Public Library, the Chevy Chase Public Library, the Tenley-Friendship Public Library, the Georgetown Public Library, the Martin Luther King Junior Memorial Library, the Petworth Public Library, and the Palisades Public Library. The public was encouraged to submit comments regarding the DEIS through the NPS PEPC website, at the public meeting, or by mailing a letter to the park.

PUBLIC COMMENT MEETING

In addition to the public review and comment period, one public meeting was held on September 2, 2009, from 6:30 p.m. to 9:00 p.m. at the Rock Creek Park Nature Center in Washington, D.C. This public meeting was held to continue the public involvement and to obtain community feedback on the DEIS for deer management at Rock Creek Park. Release and availability of the DEIS, as well as the public meeting, were advertised as described above.

A total of 127 attendees signed in during the meeting. The meeting began with a brief open-house format where attendees had the opportunity to ask questions and observe displays illustrating the study area; the purpose, need, and objectives of the plan; and summaries of the four proposed alternatives, as well as deer population monitoring, vegetation monitoring, and impacts. Following the open-house format, park staff made a formal presentation explaining the specifics of the plan and the proposed alternatives. The presentation was followed by a formal public comment period/hearing that allowed attendees to provide their comments on the proposed DEIS.

Attendees could fill out comment forms and submit them at the meeting or mail them to the park at any time during the public comment period, which ended November 2, 2009. Those attending the meeting also received a public meeting informational handout, which provided additional information about the NEPA process, a comparison of actions under each proposed alternative, and additional opportunities for commenting on the project, including directing comments to the NPS's PEPC website. Public comments received as a result of this meeting are detailed in the following sections of this report.

METHODOLOGY

During the comment period, 416 pieces of correspondence were received, one of which was a form letter containing 339 signatures, and one of which was a petition with 540 signatures for a total of 1,293

signatures on all correspondence. Correspondence was received by the following methods: email, hard copy letter via U.S. mail, comment sheet submitted at the public meetings, transcript recorded during the public meeting, or entered directly into the Internet-based PEPC system. Letters received by email or through the U.S. mail, as well as the comments received from the public meetings, were entered into the PEPC system for analysis. Each of these letters or submissions is referred to as a piece of correspondence.

Once all the correspondence was entered into PEPC, each was read, and specific comments within each piece of correspondence were identified. A total of 2,119 comments were derived from the correspondence received.

To categorize and address comments, each comment was given a code to identify the general content of a comment and to group similar comments together. A total of 90 codes were used to categorize the comments received on the DEIS. An example of a code developed for this project is *VS8000 Visitor Conflict and Safety: Deer/Vehicle Collisions*. In some cases, the same comment may be categorized under more than one code, reflecting the fact that the comment may contain more than one issue or idea. Therefore, while there are only 2,119 unique comments, codes were used 2,559 times during the coding process.

During coding, comments were also classified as substantive or non-substantive. A substantive comment is defined in the NPS Director's Order Handbook as one that does one or more of the following (Director's Order 12, section 4.6A):

- Question, with reasonable basis, the accuracy of information presented in the EIS;
- Question, with reasonable basis, the adequacy of the environmental analysis;
- Present reasonable alternatives other than those presented in the EIS; and/or
- Cause changes or revisions in the proposal.

As further stated in Director's Order 12, substantive comments "raise, debate, or question a point of fact or policy. Comments in favor of or against the proposed action or alternatives, or comments that only agree or disagree with NPS policy, are not considered substantive." While all comments were read and considered and will be used to help create the FEIS, only those determined to be substantive were analyzed for creation of concern statements for response from the NPS, as described below.

Under each code, all substantive comments were grouped by similar themes, and those groups were summarized with a concern statement. For example under the code *CC1000 – Consultation and Coordination: General Comments*, one concern statement identified was "Several commenters suggested additional coordination with other groups such as the Humane Society, the Animal Welfare Institute, and local, state, and federal agencies in the completion of the deer management plan." This one concern statement captured many comments. Following each concern statement are one or more "representative quotes," which are comments taken from the correspondence to illustrate the issue, concern, or idea expressed by the comments grouped under that concern statement.

Approximately 63% of the comments received related to 4 of the 90 codes. These codes were related to general lethal reduction, the combined non-lethal alternative, the combined lethal alternative, and the preferred combined lethal and nonlethal alternative, and were all non-substantive. The majority of the comments were categorized under code *AL3075 – Oppose Lethal Reduction (Non-Substantive)*, which accounted for 18.76% of the total comments received. Comments under code *AL2025 – Support of Alternative B: Non-Lethal Actions (Non-Substantive)* were the second most common comment, representing 16.73% of the total comments made. Comments under code *AL4050: Oppose Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred) (Non-Substantive)* were the third most common comment, representing 14.03% of the total comments made. The fourth most comments fell under code *AL2045 – Oppose Alternative C: Combined Lethal Actions (Non-Substantive)*, with 13.83% of the total comments. Of the 1,293 signatures, 386 (29.85%) came from commenters in the state of

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%**

Correspondence Distribution by Correspondence Type	
Type	**# of Signatures**
Web Form	235
Park Form	8
Letter	42
Email	421
Transcript	48
Petition	540
Total	**1293**

Correspondence Signature Count by Organization Type	
Organization Type	**# of Signatures**
Federal Government	3
University/Professional Society	2
Non-Governmental	12
State Government	2
Conservation/Preservation	5
Unaffiliated Individual	1264
Civic Group	6
Total	**1294**

Correspondence Distribution by State		
State	**# of Signatures**	**Percentage**
the District	172	13.23%
DE	1	0.08%
FL	6	0.46%
GA	2	0.15%
IA	1	0.08%
IL	1	0.08%
MD	386	29.85%
NJ	2	0.15%
PA	1	0.08%
UN	3	0.23%
VA	562	43.46%
WA	1	0.08%
Total	**1294**	**100%**

CONCERN RESPONSE REPORT

Citations in the responses are provided in the main “References” section of the FEIS.

AE9000 - Affected Environment: Vegetation

Concern ID: 22533

CONCERN STATEMENT: Commenters provided observations on the existing conditions within the park, stating that the combined pressures of deer browsing and invasive species have led to a decline in native plant populations within the park. One commenter further stated that deer eat native plants, enabling invasive species to move in, which puts even more pressure on the native plants and creates a monoculture in the understory and completely alters the appearance and structure of the forest.

Representative Quote(s):

Corr. ID: 1 **Organization:** Montgomery Bird Club, Maryland Ornithological Society

Comment ID: 113125 **Organization Type:** Conservation/Preservation

Representative Quote: Places in the park which in autumn once hosted shrubs and vines laden with berries are now denuded and thus, support no feeding birds. This change is obvious now to even the most unobservant birder -- the famous "Ridge" (picnic areas 17 and 18) now has almost no fruiting vines and shrubs where, 10 years ago, native wild grape, poison ivy and chokecherry thrived. In many cases birds have turned to non-native species such as porcelain berry to "fill the food gap." However, an inadvertant result of RCP's otherwise commendable effort to remove invasive plants has been the elimination of these substitute foods. (Unfortunately, there has been no effort to replant native food plants which should have been done at the same time).

Corr. ID: 3 **Organization:** *Not Specified*

Comment ID: 113136 **Organization Type:** Unaffiliated Individual

Representative Quote: When hiking in the park, I see the demise of native plants and the problem with exotic invasive plants.

Corr. ID: 15 **Organization:** *Not Specified*

Comment ID: 113199 **Organization Type:** Unaffiliated Individual

Representative Quote: As the grazing of the ever-increasing population of deer has continued unabated, the loss of undergrowth, shrub cover, and lack of seedling regeneration has had a deleterious effect on the park's appearance and eco-system.

Corr. ID: 24 **Organization:** Friends of Rock Creek Environment (FORCE)

Comment ID: 113556 **Organization Type:** Unaffiliated Individual

Representative Quote: I know that there are too many of them, they are causing erosion in the Park by eating saplings, every plant, even ivy that holds soil in place, all of which jeopardizes the Creek, as well as the forest cover.

Corr. ID: 386 **Organization:** *Not Specified*

Comment ID: 113002 **Organization Type:** Unaffiliated Individual

Representative Quote: The combined threat of deer over-abundance and non-native invasive species are quickly reducing the plant diversity in Rock Creek Park. The forest in the area near where I live is noticably denuded. Every year the decision to act is put off, the

greater the problem will be. The deer eat the native plant species, allowing invasives to move in, putting more grazing pressure on the remaining native plant populations the next year. I can remember when there were so many flower species I could not name them all. Now I am lucky to see more than a handful of different native wildflowers, but I see deer every time I walk in the park. The ground cover is sparse and the understory is all but a monoculture. The continued survival of the forest and all the species that depend on it is in peril.

Response: The National Park Service (NPS) agrees with this concern. "Chapter 3: Affected Environment," Vegetation (page 97 of the Final Environmental Impact Statement [FEIS]) describes the existing conditions of vegetation within the park, including impacts that have resulted from deer browsing.

AL2020 - Alternative B: Combined Non-Lethal Actions

Concern ID: 22559

CONCERN STATEMENT: Several commenters provided suggestions for additional statements, information, or analyses to be included under alternative B including more explicit comparisons between the timing and placement of bait piles for lethal versus non-lethal control, the safety record of porcine zona pellucida (PZP), reanalysis of information pertaining to the effectiveness of fertility control, and any incidences of deer mortality as a result of non-lethal methods.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114997 **Organization Type:** Unaffiliated Individual

Representative Quote: Suggestion: More explicit comparisons need to be made between the timing and placement or bait piles for lethal control as opposed to non-lethal control.

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114991 **Organization Type:** Unaffiliated Individual

Representative Quote: Suggestion: More explicit reference needs to be made to deer death resulting directly (in the case of capture, or treatment related stress and trauma) from a sterilization and/or immunocontraception program. Additionally, NPS should state the acceptable mortality level resulting from non-lethal control methods and indicate its course of action if those levels are exceeded.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115036 **Organization Type:** Non-Governmental

Representative Quote: 2) State that the safety record of PZP is exceptional and that hundreds of treatments have been administered to deer in the field, and several thousand to wild horses. There also do not appear to be any harmful side effects to treated animals or their fawns (Rutberg 2005), and abnormal out-of-season breeding behavior mentioned in some literature has never been demonstrated to harm treated animals or their fawns (Thiele 1999). In addition, the condition of females following treatment with PZP is no worse than, and may be better than, that of untreated animals (McShea et al. 1997, Walter et al. 2003, Rutberg 2005).

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115044 **Organization Type:** Non-Governmental

Representative Quote: 3) State that the Food and Drug Administration (FDA) has never forbidden human consumption of PZP-treated deer, and has not required permanent marking

of PZP-treated deer at all sites. For example, treated deer are not marked at all at Fire Island National Seashore (Naugle et al. 2002). The FDA set 30-day withdrawal periods for PZP-treated deer; because researchers preferred not to have to recapture deer and update their ear tags with the new withdrawal date each time the deer were treated, researchers placed "Do not consume" tags on them instead, which the FDA found acceptable. PZP-treated deer have been hunted in the past, with state wildlife agency oversight (Walter et al. 2003).

Response: Several issues relating to alternative B are discussed in this concern. Regarding use of bait piles, these would be placed in the late summer or early fall for fertility control (see page 56 of the FEIS, Timing of Application) and in the late fall or winter for sharpshooting (FEIS, page 63). Placement would generally be in interior sections of the park several hundred meters from park buildings and residences outside of the park.

Regarding use of PZP, its effects on the deer and the safety of PZP are addressed in appendix C of the DEIS (page 305 of the FEIS). Walter et al. (2003) cite Turner (1996), McShea et al. (1997) and Miller and Killian (2000) as research projects that found immunocontraception caused multiple estrous cycles and that further research was needed. Their report did not mention if multiple estrous cycles occurred in their study. Patton et al. (2005, page 164) state that "…PZP-treated animals may continue to exhibit estrous cycles beyond the typical breeding season, which may result in stress and, ultimately, in health problems for the adults or in young being born out of season." McShea et al. (1997) mention that they provided supplemental feeding to their deer, confounding their ability to determine if body fat reserves were depleted due to multiple estrous cycles in does (page 566) or to determine whether an extended mating season would increase mortality rates for males. Additional information about PZP and other reproductive control agents has been updated and provided in Appendix D of the FEIS.

All factors, including potential side effects of any control method and NPS policies including those that are inconsistent with altered behavior (NPS *Management Policies 2006*, section 4.4.1) would be considered by the NPS before selecting a method for use. The issue of consuming deer treated with PZP was covered extensively in appendix B of the DEIS. PZP may be used under a research permit but not for management.

Regarding the effectiveness of fertility control, the NPS is managing deer to restore the ecological process of tree regeneration. The use of immunocontraception means the NPS would allow tree regeneration to deteriorate since reproductive control alone would not reduce the deer population within the life of this plan to levels needed to allow for regeneration to occur. Lethal control would bring the population below 20 deer per square mile within a 3- to 4-year period and maintain it at that level for the duration of project.

Regarding deer mortality from a surgical sterilization and/or immunocontraception program, the acceptable mortality rate depends on what procedures are being done and what kinds of physical restraint will be used in addition to any drugs. A 2-5% mortality rate is generally acceptable when you are working large numbers of cervids using standard anesthesia methods and do not keep them under sedation for a long period of time (30-60 minutes). However, for sterilization, a higher mortality rate could be expected (Powers, pers. comm. 2010; Peterson et al. 2003 (Wildlife Society Bulletin; Evaluating Capture Methods for Urban White-Tailed Deer)). Any mortality events would be investigated/analyzed and measures would be taken to avoid repeat events.

On page 59 of the FEIS, text has been changed to state that generally a 2-5% mortality rate may be expected.

Concern ID: 22560

CONCERN STATEMENT: One commenter stated that the statistics included in the analysis for population reduction were incorrect and suggested alternative vaccination rates for use in the analysis.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115025 **Organization Type:** Non-Governmental

Representative Quote: As the DEIS indicates, the rapidity of population decreases depends on vaccine effectiveness, proportion of females treated, mortality rates, reproductive rates in untreated animals, immigration, and emigration. Rates of free-ranging deer increase or decline during PZP vaccination programs are directly related to the proportion of deer that are treated each year (Rutberg et al. 2004). For most ungulates, populations decline when more than 60% of females are treated with a contraceptive (Garrott 1995, Rutberg et al. 2004), and yet, the DEIS inaccurately claims that population reduction only occurs after 90% of the does were treated with a fertility agent (DEIS 184).

Response: Large numbers of deer would have to be successfully treated for the population to be reduced to the levels that are the goal for this plan (i.e., 15-20 deer per square mile). Factors such as herd health, management objectives, duration of the immunocontraceptive, and management goals affect the percentage of deer to be treated to reduce population growth (Walter et al. 2003). The citation on page 175 of the FEIS (Hobbs et al. 2000) states that when using a short-duration immunocontraceptive agent, 90% of the does must be treated to keep infertility at 90% (FEIS page 175). Additionally, Hobbs et al. (2000) stated that immunocontraception could succeed only when applied to small populations bounded in space.

Rutberg and Naugle (2008) provide figures for the percentage of does treated at the National Institute of Standards and Technology. In 1997, 39% were treated; in 2000, 83%; and in 2004, 97%. Deer density at the National Institute of Standards and Technology remains 11 times over the number that allows for tree regeneration.

Concern ID: 22562

CONCERN STATEMENT: One commenter stated that by allowing non-lethal reduction of the deer population, the park would be able to obtain better data on plant-deer relationships and determine if deer cause long-term adverse cumulative impacts to vegetation.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114966 **Organization Type:** Non-Governmental

Representative Quote: Adopting Alternative B as the preferred approach to management of the deer herd at RCP would satisfy the need to begin managing the numbers of deer in the park while presenting NPS with far better data on plant-deer relationships than large scale population reduction ever would. The DEIS proposes (DEIS: 168) that "cumulative impacts to vegetation under this alternative [B] would be adverse, long term, and moderate to major." This assumption warrants testing, as do many others in the DEIS that will never be elucidated without NPS conducting alternative management strategies.

Response: Non-lethal methods are part of the preferred alternative if proven to be effective, and after the deer density is at or below the level research shows will allow for forest regeneration. Through continued monitoring of forest recovery, the NPS will gather additional data on deer-vegetation relationships which will be valuable for resource management.

Years of monitoring of vegetation in paired plots has demonstrated impacts of deer browse on vegetation in several National Capital Region parks including Rock Creek Park. Adequate data exists now for a decision and the plan allows for continued monitoring and adaptive management if data indicate that the impacts on vegetation by deer browse are

different than what current research and data indicate.

Concern ID: 22563

CONCERN STATEMENT: One commenter suggested expanding the criteria included under alternative B for selection of acceptable immunocontraceptives to include only those agents that are known to not adversely impact the surrounding environment.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114984 **Organization Type:** Unaffiliated Individual

Representative Quote: Suggestion: Add additional criteria to those outlined on page 55 of the EIS - requiring that an acceptable immunocontraceptive agent should demonstrate that it is not excreted in measurable levels by treated animals, neither would it be environmentally stable enough to leach from unrecovered delivery mechanisms into the watershed in an "active" state. Ultimately, an approved immunoctraceptive agent should be shown to degrade quickly in the environment.

Response: The NPS did not include that as a criterion because any immunocontraceptives that would be considered for use are vaccines that are not passed through the food chain to scavengers or to the environment.

Concern ID: 22566

CONCERN STATEMENT: One commenter expressed support for alternative B but requested that additional alternative options previously dismissed be included in the alternative, including coordination with the Wildlife Rescue League.

Representative Quote(s):

Corr. ID: 395 **Organization:** Wildlife Rescue League

Comment ID: 114297 **Organization Type:** Non-Governmental

Representative Quote: In recommending Alternative B, Combined Non-Lethal Actions, the Wildlife Rescue League supports the methods included but advises that additional initiatives, presently dismissed by the EIS, be re-evaluated. The most likely way for Rock Creek Park to achieve it's desired outcome of ensuring a balanced habitat is to further develop the strategy suggested by Alternative B and implement a methodical, consistent and comprehensive campaign to establish Rock Creek Park as a benchmark for effective, productive and progressive habitat and wildlife stewardship. Currently, in response to the continued frustration of Fairfax County still unable to resolve the issues created by human-deer interaction and the dynamic effect of urbanization, the Wildlife Rescue League is working cooperatively with park and wildlife agencies to develop and implement a more solution-driven management plan. We would welcome the opportunity to expand these initiatives to Rock Creek Park, as well as to other jurisdictions.

Response: The NPS coordinates with all applicable local, state, and federal jurisdictions and agencies and welcomes the input of all interested organizations. All non-lethal methods dismissed, including fencing, supplemental feeding, contragestives, repellants, and landscape modification/plantings would not meet the purpose, need, and objectives of the DEIS.

Concern ID: 22570

CONCERN STATEMENT: Several commenters felt that the DEIS did not fairly present the case for non-lethal methods. These commenters cited inadequate information supporting alternative B, such as failure to provide justification for the criteria used, misapplication of theoretical models to predict the level of effort needed to achieve the desired population level, failure to use the appropriate studies, and lack of a population model with site-specific assumptions to evaluate the effects of PZP treatments on the deer population.

Representative Quote(s):

Corr. ID: 150 **Organization:** *Not Specified*

Comment ID: 114684 **Organization Type:** Unaffiliated Individual

Representative Quote: From the discussion at the meeting I believe your team did not give option B sufficient considerations. I got impression that the Park believes that the birth control did not work fast enough. This information is not correct. Deer population reduced from 300 to less 200 in ten years in NIST. In Fire Island deer population reduced by 10-11% per year by using birth control. Considering the balance of ecosystem is much more complicated than controlling deer population alone, Rock Creek Park should give the program adequate time to work by adopting option B.

Corr. ID: 154 **Organization:** *Not Specified*

Comment ID: 115193 **Organization Type:** Unaffiliated Individual

Representative Quote: As it is now, the option for non-lethal control does not fairly present the case for non-lethal methods. On page 55 of the draft, the NPS introduces a set of criteria for "acceptable reproductive control agents". These are applied up front and without justification for the specific criteria. No other control method is subjected to such restriction.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115016 **Organization Type:** Non-Governmental

Representative Quote: Also, the most well-known and tested immunocontraceptive agent is porcine zona pellucida ("PZP") (Patton et al. 2007), and published and forthcoming scientific literature indicates that PZP largely meets the most of the stated criteria already and could be used now to manage the deer population at ROCR. And yet, when discussing reproductive control studies in Maryland, the DEIS provides a detailed description of the unpublished results of a 2-3 year study on the use of the GonaCon® immunocontraceptive vaccine on female white-tailed deer at the White Oaks Federal Research Center in White Oak, Maryland, but fails to describe the published results of a 15-year long PZP study at NIST in Gaithersburg, Maryland that significantly reduced the deer population and the deer-vehicle collision rate. In fact, the most compelling information that would support and justify the use reproductive control to manage the deer population at ROCR has been relegated to Appendix C.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115015 **Organization Type:** Non-Governmental

Representative Quote: Although the NPS may or may not ultimately use fertility control as a form of reproductive control to achieve the park's deer management objectives, the treatment of the subject in the DEIS appears both inadequate and unfairly slanted against the technology and towards lethal control alternatives. Most egregiously, the DEIS misapplies theoretical models to predict the level of effort needed to achieve population-level effects and the magnitude of those projected effects, while neglecting to report published empirical data on the subject.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115034 **Organization Type:** Non-Governmental

Representative Quote: (1) Update the DEIS text to include data from Rutberg & Naugle 2008a, 2008b, and Turner et al. 2008 (which is the most current report on the effectiveness of 1-shot, multi-year vaccines). PZP is not a hormone, and NPS should reference two papers that demonstrate that PZP is not immunogenic or physiologically active when consumed (Barber and Fayrer-Hosken 2000, Martin et al. 2006). Collectively, these articles will show that PZP now largely meets the four stated criteria. The only exception is that current technology is not yet available for the remote delivery of single-shot, multi-year vaccine. However, it should be noted, with emphasis, that PZP boosters do not require recapturing the animals and can be delivered remotely to deer at multiple sites (Naugle et al. 2002, Walter et al. 2002, Rutberg et al. 2004).

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115032 **Organization Type:** Non-Governmental

Representative Quote: These studies indicate that immunocontraception can stabilize and reduce populations of wild ungulates at the landscape scale, but all the small distortions cited in the DEIS collectively serve to weaken any case for the application of fertility control as a population control agent at RCP or anywhere else for that matter. Given the discrepancy in the data and the absence of most up-to-date literature on the subject in the actual text (including information relegated to Appendix C), the FEIS should include a population model with plausible, site-specific assumptions developed to seriously evaluate the likely effects of PZP treatments on population size at RCP. Such a model ought to incorporate the use of current multi-year, single-shot vaccines, which might well produce more rapid decreases than previous efforts (Rutberg and Naugle 2008b, Turner et al. 2008).

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115074 **Organization Type:** Non-Governmental

Representative Quote: After reviewing our comments and concerns, we sincerely hope that the NPS will reconsider its previous decision and adopt Alternative B - Combined Non-Lethal Actions - as the Preferred Alternative. If updated with more current, accurate data on reproductive control agents and methodologies, the implementation of Alternative B has the potential to revolutionize the standard approach to deer conflict resolution in urban areas from one that can be inefficient, costly, and cruel to one that is technologically advanced, cost-beneficial, and humane. Such an endeavor would be of great benefit not only to our national parks, but also to the citizens of Washington D.C. and the American taxpayer.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115046 **Organization Type:** Non-Governmental

Representative Quote: Further research also indicates that harvest of both sexes does nothing to stop fluctuations in deer populations due to forage competition and natural mortality as a result of severe winter weather (Patterson and Power 2002).

Response: The NPS has jurisdiction over the wildlife on its land and can set criteria for any wildlife management tool to ensure that it is consistent with NPS and park-specific mandates, as well as other federal policies. The criteria included in this plan are relatively straightforward in terms of NPS policy, and there are currently no fertility control agents that fulfill all of the criteria. The rationale for each criterion is outlined below.

Criterion 1: Federally approved fertility control agent for application to free-ranging

populations.

Rationale for criterion 1: It is critical that all aspects of a fertility control program be consistent with federal laws and regulations and NPS policies. The regulation of free-ranging wildlife immunocontraceptives has recently been transferred to the Environmental Protection Agency (EPA) and is administered under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. §136 et seq.1996). Prior to use in a management context, an immunocontraceptive must be registered for use in white-tailed deer. They may be used under an experimental use permit for research purposes only. As such, PZP is not currently available for managing deer population sizes. The GnRH vaccine GonaCon™ is registered, but neither it nor PZP has met more than two of the additional five criteria listed below (criteria 2-6).

Pharmaceutical reproductive control agents (e.g., leuprolide, prostaglandins) are regulated by the Food and Drug Administration (FDA) and can be applied for management purposes under the Animal Medicinal Drug Use Clarification Act within a valid veterinarian-client-patient relationship. Products regulated by the FDA can be used for research purposes under an Investigational New Animal Drug (INAD) exemption. However, none of the potential pharmaceuticals meet all of the additional criteria listed below.

Criteria 2 and 3: Can be remotely injected and has multiple-year efficacy (3 to 5 years).

Rationale for criteria 2 and 3: Modeling efforts have clearly demonstrated that (1) "the efficacy of fertility control as a management technique depends strongly on the [multi-year] persistence of…the fertility control agent;" and (2) the only scenarios in which fertility control is more efficient than culling at maintaining population size is when a multi-year efficacy is achieved (Hobbs et al. 2000). In addition to increasing the efficiency of a fertility control program, these requirements benefit and protect individual deer because they reduce the frequency of stressful capture and/or drug delivery operations.

Criterion 4: Leave no residual in meat (i.e., meat derived from treated animals should be safe for human consumption according to regulatory agencies).

Rationale for criterion 4: Any fertility control agent applied in free-ranging wildlife populations that are contiguous with areas or with the same species that are hunted must be safe for human consumption, either immediately after delivery or after an established withdrawal period. While the NPS understands that antibodies induced by immunocontraceptives do not pose a human health risk, only the regulatory agency can make a claim of appropriateness for human consumption. The text for this criterion has been changed in the FEIS to reflect this more accurately.

Criterion 5: Substantial proof of success in a free-ranging population based on science team review.

Rationale for criterion 5: Two studies have demonstrated that fertility control agents (e.g., PZP) can be used to reduce closed deer populations in small areas (less than 1 square mile; Rutberg and Naugle 2008). However, no study has demonstrated that fertility control works to reduce deer numbers in free-ranging populations to the extent needed at Rock Creek Park to allow for tree regeneration, so it is important that proof of success be demonstrated to a review panel. The rationale for this criterion is further supported when one examines the modeling efforts to date by Hobbs et al. (2000) and Merrill et al. (2006). These studies clearly indicate that meaningful population reductions (e.g., >50%) would be difficult and inefficient (compared to culling) when conducted on free-ranging populations that are more abundant and inhabit larger areas than the aforementioned, small-scale field demonstrations to date (by Rutberg and Naugle 2008). Conversely, there is good evidence that a multi-year fertility control agent can be as efficient or even more efficient (compared to culling) when the goal is to maintain a population at a particular level that has already been realized (Hobbs et al. 2000; this also assumes all animals are marked and identifiable).

In addition to science team review, the NPS would ensure that NPS management policies are met by any non-lethal alternative selected by the park for use. The text for this criterion has been changed in the FEIS to reflect this.

Comment 114684: Misapplication of theoretical models to predict the level of effort needed to achieve the desired population level.

Comment 115193: Failure to use appropriate studies ("Most egregiously, the DEIS misapplies theoretical models to predict the level of effort needed to achieve population-level effects and the magnitude of those projected effects, while neglecting to report published empirical data on the subject.")

Comments 114684 & 115193 – response:

The NPS believes it has researched the appropriate studies and used the best empirical and theoretical data to assess the effectiveness and efficiency of the non-lethal alternative. Hobbs et al. (2000) concluded: "There is no question that culling is more efficient than fertility control when efficiency is defined [as the time required to reduce a population]…when efficiency is defined in terms of number that must be treated [or culled] annually…long-duration fertility control agents can be more efficient than lethal methods if the fertility status of treated animals is known" (pages 486-487). Figure 6 in Hobbs et al. (2000) clearly shows that (1) a lifetime fertility control agent is clearly more efficient than culling when the goal is to maintain a specified population level (versus reduce a population), and (2) a three-year contraceptive is equivalent to culling when the goal is to maintain a specified population level (versus reduce a population). Note that both of these scenarios require permanently marked, identifiable animals. 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. See also response to Concern 23059 (page 345).

Comment 115016: Lack of a population model with site-specific assumptions to evaluate the effects of PZP treatments on the deer population.

Comment 115016 – response:

There is currently no site-specific model available for Rock Creek Park. The model used in support of the Valley Forge deer management plan is not applicable to this plan because it contains no measure of uncertainty and makes assumptions that are not valid at Rock Creek Park, e.g., that contraception would be 100% effective and that there is no movement of deer in or out of the park. However, lack of a site-specific model does not affect the range of alternatives or preferred alternative put forth in this plan. Management decisions regarding alternatives, and in particular the use of lethal and non-lethal control, are based primarily on their ability to meet the objectives of the plan and consistency with NPS *Management Policies 2006*. In addition, modeling efforts to date on white-tailed deer and fertility control characterize the management efforts and tradeoffs associated with culling and/or fertility control programs (Hobbs et al. 2000; Rudolph et al. 2000; Merrill et al. 2006). As science develops and a site-specific model becomes available, the NPS will apply this new data and/or models as part of its adaptive management approach. Also see above and response to Concern 23059 (page 345).

With reference to the comment on the Patterson and Power (2002) paper, the primary objective of the Rock Creek Deer Management Plan / EIS is to attain deer densities that are consistent with a regenerating forest. Once appropriate densities have been reached, they will only be maintained and not further reduced. Appropriate deer densities will be adjusted according to forest monitoring efforts. If deer densities do start to decline due to winter conditions or other factors (as in Patterson and Power 2002), management efforts will be adjusted accordingly and stopped altogether if appropriate.

Text changes have been made to the DEIS to clarify criteria and add a summary of the rationale for their use.

Concern ID: 23051

CONCERN STATEMENT: One commenter stated that sterilizing does is an invasive procedure and is cost prohibitive. They further stated that contraceptives only work when directly administered by humans.

Representative Quote(s):

Corr. ID: 37 **Organization:** *Not Specified*

Comment ID: 114099 **Organization Type:** Unaffiliated Individual

Representative Quote: Sterilizing (spaying) a doe (female deer) is an invasive procedure, is costly for one doe (and prohibitively costly for many does), and could result in the unnecessary death of some does. Contraceptives to control deer births only work if administered by humans to ensure that the contraceptive actually gets into the deer. Also, some deer can actually be harmed by side effects to these drugs.

Response: Sterilization was retained as the initial action proposed under alternative B because it is a currently available method of reproductive control and it is a permanent procedure, requiring the animal to be handled only once. The NPS recognizes that sterilization is invasive and costly and addresses these concerns in the FEIS (pages 55-56 and 61). The NPS could consider other contraceptive methods if they are available and meet criteria at the time action is taken. Measures to minimize infection and mortality associated with sterilization would be taken as described in the DEIS. Also, the NPS wished to retain this as an alternative for Rock Creek Park because it was considered feasible for the situation at the park and a reasonable option to consider in light of the other options for non-lethal control. The cost per deer is estimated at $1,000, approximately the same as for a one-time administration of a reproductive control agent such as leuprolide.

Regarding the second part of this comment, reproductive control agents can work best if administered directly, but a remote injection option was retained due to reduced costs, effort, and stress on the animal.

Text regarding sterilization on page 57 of the FEIS has been revised.

Concern ID: 23059

CONCERN STATEMENT: Commenters questioned the implication in the DEIS that natural processes and non-lethal means of deer population control would neither be feasible nor would successfully reduce the deer population. Commenters felt that with enough effort, a combination of non-lethal methods and natural processes would successfully reduce the deer population.

Representative Quote(s):

Corr. ID: 188 **Organization:** *Not Specified*

Comment ID: 114076 **Organization Type:** Unaffiliated Individual

Representative Quote: Scientific studies repeatedly demonstrate that reducing the deer population by lethal methods does not reduce the population in the long run. Indeed, it compounds the problem because deer populations compensate by producing more young in response to the drop in their numbers. It is apparent-and unfortunate-that NPS appears reluctant to commit to the use of reproductive control as an initial approach,although it is beyond serious dispute that non-lethal, effective methods do exist to control deer populations and have been used elsewhere with good results. There is no excuse for NPS to imply that reproductive control methods might not be "available and feasible". They are the most ethical and most responsible means for contolling deer populations, especially in areas such as parks, which exist as santuaries for them.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115063 **Organization Type:** Non-Governmental

Representative Quote: The DEIS is a defense and justification for the park's preferred alternative, which is for lethal control, followed by contraception. Understandably it focuses on building that case, but it should not do so in a way that suggests a prejudicial push for that alternative. Throughout the document there is an undercurrent of predetermination that argues for the deer population at Rock Creek to be in an ecologically "abnormal" state that requires management.

For example, on page 92 the discussion of alternatives includes the statement: "Alternatives A and B were not considered environmentally preferred because of their lack of effect on deer population numbers" This leaves the reader with the impression that 1) natural processes will not "control" the deer population at Rock Creek and 2) even the contraceptive control of deer as proposed under Alternative B will fail to do so. More objectively with respect to (1) it would be fair to say that we do not know whether or not natural controls would eventually work and for (2) that there is a near certainty with sufficient effort that contraception would lead to a reduction in deer herd size--but that the effort required could be considerable.

Response: Alternative B lacks a reasonable time frame for deer reduction, relative to the life of this plan and its associated objectives. Also, there are currently no fertility control agents that meet all of the criteria listed under alternative B, and it is unknown when such an agent will be available. There is also a large amount of uncertainty regarding the effectiveness and efficiency of using reproductive control to reduce or control free-ranging deer populations when emigration and immigration, annual survival rates, population proportion of breeding females, and density-dependent responses are unknown (Hobbs et al. 2000; Rudolph et al. 2000; Merrill et al. 2006).

The NPS recognizes that 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. First, the studies focused on a fenced population and a relatively small segment of an intensively managed island population; both study areas occupied less than 1 square mile (less than 2.5 square kilometers; pages 495 and 498 in Rutberg and Naugle 2008). Second, 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 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.

There is no evidence that current, natural processes will contribute to reductions in deer population size at Rock Creek Park. Deer were first observed in the park during the 1960s and have steadily increased since this time to the present day density of 67 deer per square mile.

Text changes have been made throughout the description of alternatives and impact analyses where appropriate.

AL2035 - Alternative C: Combined Lethal Actions

Concern ID: 22571

CONCERN STATEMENT: One commenter requested that additional information be included in the DEIS regarding the impact of archery, including a comparison to herd reduction using rifles.

Representative **Corr. ID:** 200 **Organization:** *Not Specified*

Quote(s):

Comment ID: 114379 **Organization Type:** Unaffiliated Individual

Representative Quote: But, the draft EIS does not discuss adequately the means of controlling deer by archery, that people have been controlling deer populations with archery hunting for decades and decades, if not centuries. The EIS needs to discuss that in greater detail and compare it to the use of rifles. I think you'll find that it's, one, safer. Two, it's more acceptable. It doesn't require the cost outlay of as many people in closing down the park while it's being done.

Response: Archery is included as an option in the EIS for use only as a supplemental method where the actions are being taken in areas of the park that are very narrow or close to occupied buildings (FEIS, page 63). Although archery hunting can be effective (Kilpatrick and Walter 1999), it has been shown to not be as efficient as sharpshooting. Kilpatrick et al. (2002) evaluated the effectiveness of archery and shotgun hunting in a 200-acre area in suburban Connecticut. Shotgun hunters removed deer with 38% less effort than archery hunters. Residents reported that they did not see any wounded or dead deer during the hunt.

Concern ID: 22572

CONCERN STATEMENT: One commenter stated that the culling of deer herds has only a short-term impact and would not meet the objectives of the deer management plan in the long term.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 121747 **Organization Type:** Non-Governmental

Representative Quote: The FEIS must also discuss how the park can justify the increased levels of reproduction that are known to occur in white-tailed deer populations subjected to lethal harvest when alternatives are available.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 165567 **Organization Type:** Non-Governmental

Representative Quote: It should also be noted that while PZP and other reproductive control agents and procedures have been shown to effectively reduce deer fertility, lethal control may sometimes have the opposite effect. It has been shown that the reproductive rate of white-tailed deer is greatly reduced at high population densities while deer in areas subjected to periodic harvest have enhanced fertility rates resulting in increased population growth to compensate for harvested animals (Swilhart et al. 1998).

Corr. ID: 395 **Organization:** Wildlife Rescue League

Comment ID: 114008 **Organization Type:** Non-Governmental

Representative Quote: Historical data, experience and the well-researched behavior of white-tailed deer substantiate that attempts to control, manage or reduce deer population by lethal means result in minimal short-term affect on the deer population, no measureable long-term effect and little if any resolution to the issues identified in the EIS. We are happy, upon request, to provide relevant data from the jurisdictions that presently employ these methods to substantiate this statement.

While the public, and park's perception may be affected in a seemingly positive way, that deliberate action is being taken by culling deer herds, that phenomena is short-lived when, after the culling has occurred, the issues continue to persist, and in most cases, increase. Similarly, the perception of affecting the deer population by culling diminishes over time as the deer's natural response to artificial control causes their population to compensate. The WRL will be happy to provide Rock Creek Park with evidence of such throughout the

region.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143046 **Organization Type:** Unaffiliated Individual

Representative Quote: In addition to the ethical problem of simply killing unwanted animals, just exterminating the deer likely will not keep the deer population in check. Surviving deer will have less competition for food and increased nutritional health. Several scientific studies indicate that better-nourished deer have higher productivity, lower neonatal mortality, increased conception rates, and increased pregnancy in yearlings. Hunted populations are more likely to have twins rather than single fawns, and are more likely to reproduce at a younger age, thus helping the population grow even faster.

Response: The NPS recognizes that deer management is not a one-time event. The plan/EIS is intended to guide long-term management of white-tailed deer over the next 15 years to support the long-term protection, preservation, and restoration of native vegetation. For example, Gettysburg National Military Park met their desired deer density goal after 11 consecutive years of deer management. Park-wide deer density at Gettysburg was 325 deer per forested square mile (Bowersox et al. 2002). Montgomery County, Maryland has reduced deer densities from 60-163 deer per square mile to less than 30 per square mile at four parks after 7-9 years of deer management (Montgomery County Department of Parks 2007).

Regarding the "rebound effect" and the belief that sharpshooting will result in more deer, the relationship between deer density and fertility is well known (Swihart et al. 1998). While the reproductive rate of deer may increase in response to a decrease in the overall population, future deer removal actions would take into consideration any population growth and adjust management actions as needed to maintain desired deer density.

AL2063 - Alternatives: Humaneness of Lethal Control Options

Concern ID: 23052

CONCERN STATEMENT: Several commenters questioned whether the lethal reduction elements presented in the DEIS could be considered humane. One commenter also stated that while the method of exsanguination is more humane than other methods of euthanasia, the DEIS does not specify how this method would be performed. Commenters were concerned about wounded or injured deer. Another commenter suggested that sodium pentobarbital (a euthanasia agent) be used, as it is a more humane method of euthanizing deer. Another commenter asked if any animal protection organizations would be available to witness and report on the level of humaneness being carried forward with the plan.

Representative Quote(s):

Corr. ID: 209 **Organization:** *Not Specified*

Comment ID: 114555 **Organization Type:** Unaffiliated Individual

Representative Quote: The euthanasia methods outlined in the DEIS are equally inhumane. All euthanasia methods require capture, which is incredibly stressful for animals such as deer, sometimes in and of itself leading to death, as the DEIS itself acknowledges. The captive-bolt gun can barely be used reliably on sedentary animals such as cows, let alone deer, which are incredibly fast-moving. It is doubtful that the captive bolt gun could be used to reliably induce unconsciousness in a deer on the first try. If more than one attempt is needed, the deer will be in great pain. Lethal injection is generally preferable, but the DEIS would not require this to be administered or even supervised by a veterinarian, but rather, merely supervised by an undefined person known only as a "park practitioner." See DEIS at 62. It is commonly accepted that lethal injection is not humanely accomplished unless it is administered by a licensed veterinarian, under controlled circumstances. Finally, the DEIS provides for "exsanguination," defined in the DEIS only as the "draining of blood."

Presumably this would be accomplished by severing the carotid artery, which, although not a humane method of ca using death, is less inhumane than other methods of "draining of blood." However, the DEIS does not specify exactly how this horrifying act would be accomplished, or whether the animal would be rendered unconscious or attempted to be rendered unconscious first. If exsanguination is accomplished by way of a different artery, the animal can take hours to die, in an acutely painful state.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114970 **Organization Type:** Non-Governmental

Representative Quote: The HSUS also takes exception to the use of "capture and euthanasia," either by netting and captive bolt as well the use of potassium chloride as a euthanasia agent, noting that the AVMA calls for strict standards and direct physical control of animals euthanized under such procedures, conditions that will not be possible in applying euthanasia procedures in the field.

In addition, the 2007 AVMA guidelines state that

"Behavioral responses of wildlife or captive nontraditional species (zoo) in close human contact are very different from those of domestic animals. These animals are usually frightened and distressed. Thus, minimizing the amount, degree, and/or cognition of human contact during procedures that require handling is of utmost importance. Handling these animals often requires general anesthesia, which provides loss of consciousness and which relieves distress, anxiety, apprehension, and perception of pain. Even though the animal is under general anesthesia, minimizing auditory, visual, and tactile stimulation will help ensure the most stress-free euthanasia possible. With use of general anesthesia, there are more methods for euthanasia available."
(http://www.avma.org/issues/animal_welfare/euthanasia.pdf, page 19 under Wildlife).

Darting with capture drugs, immediately followed by euthanasia, may not cause undue stress, but there are other methods in this category that would be primarily used and have the potential to substantially increase the stress, both physical and psychological, that an individual animal experiences. These methods will undeniably increase the time that an animal is held captive, which in and of itself is extremely stressful for a wild animal. To this must be added the stress and pain of any injuries sustained in the process of capturing and holding the animal, and that of restraining the animal for a killing shot. Since the NPS only plans to use this method to remove, at the most, 10 deer a year for the first three years of the program under Alternatives C (DEIS: 65) and D (DEIS: 68), it is incumbent upon NPS to provide evidence that these methods are even necessary, and if so, that these techniques do not, relative to other available methods, cause undue and avoidable pain and suffering. If NPS can provide no such evidence, these methods should be eliminated from the FEIS.

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

Comment ID: 114791 **Organization Type:** Non-Governmental

Representative Quote: Furthermore, the NPS identifies exsanguination (i.e., bleeding to death) as a potential method for killing captured deer. Draft EIS at 62. Exsanguination can't possibly be considered as a "humane" killing method by the NPS or any other responsible agency or organization. This method should be eliminated as an approved technique for killing deer if the proposed action is implemented.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143068 **Organization Type:** Unaffiliated Individual

Representative Quote: 8) How does the Park Service define "humane"? Who made that determination?

9) The Park Service states that one of the "humane" methods it will use to perform euthanasia is exsanguination. How is exsanguination (bleeding to death) consideredto be a

humane method of euthanasia? Who deemed it to be so? How will this be performed?

10) How will you guarantee that the hunt, capture and killing will be done humanely?

11) Which animal protection organizations will act as observers to witness the hunt and to report on its "humane-ness"?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143055 **Organization Type:** Unaffiliated Individual

Representative Quote: There is no such thing as a perfect hunt in which all animals are killed quickly. There WILL be wounded animals who are not killed on the first shot. These injured animals will run or drag themselves away. The gunmen, working in the dark in varied terrain, would then have to track the wounded animals down to kill them -- in order to comply with the Park Service admonition that the killing be "humane."

In their terror and confusion these animals may run closer to human habitation--even into people's yards or the streets. Will the gunmen bring their rifles into our yards and streets to finish the animals off? Under such chaotic circumstances it would be impossible to trap and euthanize the deer. And if the gunmen don't kill injured animals where they find them, the hunt will be even more inhumane.

The Park Service proposes that animals who are unfortunate enough to be found near a residence or other occupied building will be killed with bows and arrows.

Corr. ID: 414 **Organization:** *Not Specified*

Comment ID: 142985 **Organization Type:** Unaffiliated Individual

Representative Quote: It is interesting to note that the NPS did not even propose using sodium pentobarbital, a more humane euthanasia method. I can only assume that is because if NPS used it, they could not donate the meat, thus depriving the NPS of its disingenuous public relations ploy. Donating meat is not a responsibility of the NPS and should not be used to justify the use of inferior means of killing animals.

Response: Capture and euthanasia would be done only if necessary and would be done following American Veterinary Medical Association (AVMA) recommendations for the humane treatment of animals. The captive bolt gun would only be used on deer that have been first immobilized by darting with a tranquilizer gun or an injection. If park practitioners perform this activity, they would be fully trained per NPS Director's Order 77-4, Use of Pharmaceuticals in Wildlife, which describes the training that park resource personnel must complete to become a park practitioner (http://www.nps.gov/policy/DOrders/DO77-4--14-day.htm). The definition of exsanguination in the EIS follows that of the Merriam-Webster Dictionary (http://www.merriam-webster.com/dictionary/exsanguination), and would be done using AVMA-approved methods approved at the time of implementation, and the animal would first be rendered unconscious. This can be accomplished in a number of ways. The two most practical are anesthesia or captive bolt.

The NPS has decided not to include the use of potassium chloride or other chemicals unless absolutely necessary. If sodium pentobarbital is used, the carcass cannot be left in the park to degrade; it must be either incinerated or buried deeply to prevent scavenging, which would add to the logistical aspects of the plan. Any chemical use would preclude donation of meat, so chemicals would be used on a limited basis - mostly in tributary parks and small parks where the NPS would dart deer.

Due to safety concerns and liability issues, the NPS does not intend to allow observers for any of the operations undertaken as part of the plan; participants will be limited to trained and approved personnel only.

Regarding concerns about injured deer and shooting, the personnel used for the proposed deer reductions are trained and highly skilled in this type of work and would use methods that greatly reduce the occurrence of non-lethal injuries. Such injuries are expected to be extremely rare, based on observations of a similar deer reduction action recently taken at

Catoctin Mountain Park. Deer did not flee the area and were concentrated at bait piles located in the interior of the park, as they would be at Rock Creek Park.

Text on page 64 of the FEIS has been revised.

Concern ID: 23053

CONCERN STATEMENT: One commenter stated that the FEIS must address the ethical aspects of the proposed actions, including the humaneness of the alternatives, and address the issue of "unnecessary death" in terms of the NPS *Management Policies 2006*, giving additional information and sufficient attention to the issue of humaneness.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114971 **Organization Type:** Non-Governmental

Representative Quote: Beyond the discussion of humaneness in euthanasia techniques lies a broader issue regarding the ethical and moral basis of management actions themselves. The concept of "unnecessary death" is a relevant and significant issue any time lethal control of wild animals is proposed. Ethical concerns regarding how we treat wild animals, and why we do so, should be addressed in the FEIS and recognized as a first order concern.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114973 **Organization Type:** Non-Governmental

Representative Quote: The FEIS must address the humaneness and unnecessary death issues and make objective declarations concerning the actions NPS proposes to undertake. The FEIS must also acknowledge the concepts of humaneness and such broader ethical issues as "unnecessary death," as a significant part of the public's interest in NPS management policies, approaches and procedures.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114967 **Organization Type:** Non-Governmental

Representative Quote: The DEIS addresses the concept of humaneness only in a brief discussion of standards established by the American Veterinary Medical Association (AVMA) for techniques associated with providing humane death to animals. Even then, NPS proposes to follow these standards only when possible. This gives insufficient attention to this issue, its relevance to the public and the consequences of actions for the welfare of wild animals.

Response: The NPS recognizes the dichotomy between managing populations for the benefit of an ecosystem and considering the welfare of an individual animal. Section 4.4.2 of the NPS *Management Policies 2006* states that the NPS will follow established planning procedures when managing native plant and animal populations. The NPS will strictly follow the AVMA guidelines for the duration of the management plan. The safety plan and operational plan for the EIS will include protocols for the humane treatment of animals to prevent unnecessary harm or injury.

AL4000 - Alternatives: New Alternatives or Elements

Concern ID: 22573

CONCERN STATEMENT: Commenters felt that there was a wider range of non-lethal alternatives that could be implemented, such as use of more volunteers to establish a larger number of bait stations to maximize delivery of immunocontraceptives, use of contraceptive dart stations, implementing public education programs, use of salt substitutes for melting ice to prevent deer from being drawn to roads, creating intercept meadows to the park interior to promote new tree growth at the edge of the meadow; in general, that Rock Creek Park should attempt all non-lethal methods before using lethal techniques for deer management.

Representative Quote(s):

Corr. ID: 34 **Organization:** *Not Specified*

Comment ID: 113173 **Organization Type:** Unaffiliated Individual

Representative Quote: If Alternative B cannot be used, I urge you to formulate an alternative non-lethal action plan for controlling the populations of some of the original inhabitants of this beautiful ecosystem that is the Rock Creek Park area.

Corr. ID: 278 **Organization:** *Not Specified*

Comment ID: 115100 **Organization Type:** Unaffiliated Individual

Representative Quote: At an absolute minimum, the NPS must try all non-lethal deer management strategies first, including those not listed in Alternatives A and B, before even contemplating killing. This has not been done.

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

Comment ID: 114492 **Organization Type:** Non-Governmental

Representative Quote: 2. A more aggressive, non-lethal alternative should also have been considered. This would be similar to Alternative B but would employ a larger number of trained NPS personnel or qualified volunteers to establish a larger number of bait stations to maximize the efficacy of delivering immunocontraceptive agents to a maximum number of deer in the shortest period of time within RCP. This alternative would presume - as is the case - that an effective reproductive control agent that largely meets the standards imposed by the NPS would be available (see discussion below). Though the NPS intimates that treating the required 90 percent of RCP does would be difficult, it is only difficult if funds, personnel and equipment are limited. If this alternative were selected, the NPS would surely be able to enter into cooperative agreements with animal protection organizations to obtain funding, equipment, and perhaps trained personnel to aid with the implementation of this alternative.

Corr. ID: 394 **Organization:** GeesePeace

Comment ID: 114303 **Organization Type:** Unaffiliated Individual

Representative Quote: 1. Use salt substitutes to melt snow and ice. Road salt dissolves and flows along roadway drainage systems eventually polluting the streams of Rock Creek Park. The remaining salt is pushed to the side of the road with the snow or slush when the roads are plowed. The result is a high concentration of salt along the road shoulders. Salt is an important part of deer nutrition. The ready supply of salt along the road shoulder draws them to the road where they become habituated to cars. By eliminating salt along the road shoulders deer will have one less reason to browse along the road shoulder in the evening. Existing salt concentration areas or mineral licks along the road shoulder are located and deactivated.

Corr. ID: 394 **Organization:** GeesePeace

Comment ID: 114304 **Organization Type:** Unaffiliated Individual

Representative Quote: 2. Create intercept meadows in the park interior to promote new tree

growth at the edge of the meadow. The intercept areas are existing open spaces, expanded if necessary, for good sun access & generally, ¼ to one acre. The new seedlings are protected from browsing wildlife. The intercept meadows are designed to be secure and safe habitat for wildlife with browse or vegetation they like. Some intercept areas will provide shelter. The look will be natural. The "4-poster" blacklegged tick elimination are located in the intercept meadows. In some meadows, tree stands or blinds are erected to facilitate contraception of deer with darts. When the deer have sufficient food in the interior of the woodland, they will be less likely to venture across roads to find food in neighborhood gardens. This will translate into reduced deer vehicle collisions. To counter the years of using road salt to deice roads, salt and mineral licks will be placed in the intercept meadows.

Response: The purpose of this plan/EIS is to develop a deer management strategy that supports protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park. The NPS believes it has developed and presented an adequate range of alternatives within the plan/EIS to satisfy the purpose, need and objectives of the plan as required by the National Environmental Policy Act (NEPA).

The NPS considered a wide range of non-lethal alternatives in the DEIS. Many of the alternatives that were considered and rejected are described in the FEIS, starting on page 89. Non-lethal alternatives that were considered and accepted were incorporated into alternatives A and B of the DEIS. The NPS has determined that the alternatives described in the DEIS are technically and economically feasible and show evidence of common sense, which is consistent with the Council on Environmental Quality guidelines for what is “reasonable.”

When a final decision is made on the alternative selected for deer management in Rock Creek Park, a detailed work plan will be developed that will describe a step-by-step approach to implementation of the alternative. Trained park staff or their authorized agents will conduct all aspects of implementation of the selected alternative. Staffing will be determined by available budgets and needs in order to implement necessary procedures. Agreements with trained personnel may be necessary to implement select aspects of the alternative such as sterilization by veterinarians (see response to Concern 22591 (page 362) regarding use of volunteers). Procedures within each alternative will be implemented in a manner that is most efficient and least time consuming while minimizing stress to treated animals.

Rock Creek Park has made improvements in road treatments during winter weather events. The park has gone from spreading pure salt to melt snow and ice to using a mix of sand and salt (five parts sand to one part salt). Park staff has determined that this is the best alternative, given the current park equipment used to treat park roads during weather events. Some of the available salt substitutes would require the purchase of additional equipment for application. The majority of deer killed by vehicles in the park do not occur during the winter months but during the fall rutting season and summer, when salt accumulation along roadsides should not be a factor. The majority of deer struck by vehicles are crossing roads as they are leaving or entering the park.

With regard to intercept meadows, the park already manages meadows and open areas in the park. Currently, 15 meadows -- ranging in size from 0.3 to 4 acres -- are maintained throughout the park to create some diversity in habitat. Many of the park’s picnic groves are open areas, with a large amount of edge habitat that feature good sun and access. However, these open areas and meadows present some of the greatest challenges to controlling invasive plants. Current management guidelines and practices for the park target the control of invasive plants as a top priority. Expansion of open areas to create more deer-friendly habitat would conflict with these policies and practices.

Finally, the DEIS does discuss various public education actions taken by the park for reducing damage caused by deer. Pages 21, 43, and 46 of the FEIS make reference to disseminating information and public education. This includes providing copies of informational materials on fencing, repellents, and non-palatable plants to neighbors upon request.

Concern ID: 22574

CONCERN STATEMENT: Commenters suggested that lethal removal actions use non-toxic ammunition to prevent the consumption of lead bullet fragments by humans.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114978 **Organization Type:** Unaffiliated Individual

Representative Quote: Studies have shown that lead fragments from bullets used to kill game animals can and do make their way into other animals (both human and non-human) consuming the meat (reference: http://www.plosone.org/article/info:doi/10.1371/journal.pone.0005330). Lead fragments can find their way into the venison donated for human consumption. While the loss of an animal shot by sharpshooters is relatively unlikely, use of non-toxic ammunition will decrease the chance that lead fragments would be ingested by wildlife scavenging deer carcasses not recovered by sharpshooters. Non-toxic ammunition is commercially available, and is only incrementally more expensive than traditional lead. Use of non-toxic ammunition would also prevent any (already likely low) possibility of lead bullets or fragments from making their way into RCP's water table.

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114979 **Organization Type:** Unaffiliated Individual

Representative Quote: Suggestion: To prevent consumption of lead bullet fragments from donated and "non-recovered" venison, the EIS should state the requirement that sharpshooters use non-toxic ammunition.

Response: Consistent with a March 4, 2009, memo from the director of the NPS, text has been inserted in the document (page 63 of the FEIS) clarifying that non-lead ammunition will be used for any lethal removal activities that may occur under the selected alternative. This approach also comports with Executive Order 13148, Greening the Government through Leadership in Environmental Management as well as the NPS *Management Policies 2006*.

Concern ID: 22575

CONCERN STATEMENT: One commenter requested additional alternatives, including maximizing lethal population reduction of deer outside the park while protecting deer inside the park.

Representative Quote(s):

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

Comment ID: 114493 **Organization Type:** Non-Governmental

Representative Quote: 3. As previously mentioned, NEPA requires federal agencies to consider reasonable alternatives not within the jurisdiction of the lead agency. The NPS should entertain such an alternative that could theoretically maximize the lethal removal of deer outside of RCP while maintaining protection of deer - as is legally required - in RCP. AWI would not support this alternative but, nevertheless, it should have been considered in the Draft EIS.

Had these and other reasonable alternatives been considered in the Draft EIS, then perhaps the NPS would have been in compliance with NEPA. As present, given the inadequacy of the alternatives in the Draft EIS, the NPS has not satisfied the NEPA requirement to consider a reasonable range of alternatives.

Response: The Organic Act provides that NPS shall promote and regulate the use of the federal areas known as national parks, monuments, and reservations; however, it does not provide authority to directly manage lands or resources located on non-federal lands outside the park boundary. Management of game populations, including white-tailed deer, outside the park boundary, is the responsibility of the outside property owners including public entities such as Montgomery County, Maryland and the District of Columbia. The park has a long history

of working cooperatively with surrounding jurisdictions to encourage decision-making that promotes the protection of park resources and the control of deer populations, but does not have the authority to act or force action outside of park boundaries. Pages 18-21 of the FEIS discuss current deer management efforts of surrounding jurisdictions, and page 48 discusses current agency and inter-jurisdictional cooperation.

Text explaining why this proposal is dismissed as an alternative has been added to the FEIS (page 92 of the FEIS).

Concern ID: 22576

CONCERN STATEMENT: One commenter suggested an alternative that would remove all deer from Rock Creek Park, allow the parkland to regenerate for several years, and then reintroduce a smaller deer species.

Representative Quote(s):

Corr. ID: 168 **Organization:** *Not Specified*

Comment ID: 113675 **Organization Type:** Unaffiliated Individual

Representative Quote: Following NPS approved methods, remove all white tailed deer from Rock Creek Park to allow the parkland to rest and regenerate for several years. When the land is ready to host feeding deer, consider the following step:

(a) Park finances permitting, introduce a subspecies of deer that is smaller in size and weight, and therefore will consume less forest material. Some examples of small deer species are the Coues White Tail Deer, the Key Deer, the European Roe Deer and the Sitka Black Tail Deer. (I do not know if these breeds can be easily introduced to the East Coast or if their temperment is compatible with city living.) Fencing would obstruct incursions by the large White Tailed Deer from the Maryland side of Rock Creek Regional Park and make it easier for the experimental, smaller breed to be ear-tagged and vaccinated for common diseases.

Response: The commenter's suggestion conflicts with NPS *Management Policies 2006*. NPS Management Policy 4.4.1 states that NPS will maintain all plants and animals native to park ecosystems, while also minimizing human impacts on these resources and the processes that sustain them. Coues White Tail Deer are native to southeastern Arizona; the European Roe Deer are native to Eurasia; and the Sitka Black Tail Deer occur along coastal British Columbia and southeastern Alaska. All of these species are exotic to the eastern United States and, according to NPS *Management Policies 2006*, will not be introduced into parks where they are not native or not a closely related race, subspecies, or hybrid of an extirpated species. None of the above-named species is adapted to living in the habitats present in Rock Creek Park.

Management policies also state that any restoration of native plants and animals will be accomplished using organisms taken from populations as closely related genetically and ecologically as possible to park populations. The ungulate species mentioned by the commenter do not meet this standard.

Concern ID: 22578

CONCERN STATEMENT: One commenter suggested an alternative similar to alternative D, but with a longer time frame between implementation options to allow non-lethal methods more time to be effective.

Representative Quote(s):

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

Comment ID: 114487 **Organization Type:** Non-Governmental

Representative Quote: 1. An alternative that incrementally reduced the deer population over time through lethal or non-lethal means to meet certain density goals with sufficient time (5-7 years or more) in between each incremental step to determine the affect of the action. If this alternative were enacted then, instead of reducing the RCP deer population

from 82 deer per square mile to 15-20 per square mile over the course of a handful of years, the NPS would initially reduce the deer population to, for example, a density of 50 deer per square mile and maintain the population at that size (preferably all by non-lethal means) and determine the affects on the ecosystem through appropriate monitoring and surveys.

During this interim period, the NPS could also employ social surveys to better understand visitor preferences regarding deer and alleged deer impacts to see what percentage (if any) of visitors genuinely believe that their park experience has been harmed due to deer.

The results of such a survey could be combined with the results of ecosystem monitoring to adjust future incremental management decisions. If the data suggested that the 50 deer per square mile increment seemed to provide an appropriate balance between protecting park resources and satisfying visitor needs, the deer population would indefinitely be managed at that size. If not, then the NPS would proceed to the next increment, perhaps 40 deer per square mile (again preferably with the use of non-lethal technologies), and repeat the monitoring process.

While this alternative would not reduce the size of the RCP deer population as rapidly as Alternative D in the Draft EIS, it would respect the interests of those who oppose the massive slaughter of protected park deer, it would balance the need to protect park resources with NPS mandates to responsibly and humanely manage park wildlife, it would recognize that just as it took years for the deer population to reach its current density it may take time to address the perceived problems, and it would provide a reasonable response to NPS concerns about the alleged impacts of deer on RCP forest regeneration, herbaceous cover, and cultural landscapes.

Response: This alternative and all other action alternatives use an adaptive management strategy that includes monitoring of tree regeneration during the life of the project. If regeneration goals are met at a density above 20 deer per square mile, then deer densities would be maintained at the higher level, allowing time to review the results of monitoring before taking additional action. Previous research by Horsley et al. (2003) on deer impact to forest vegetation at various densities (10, 20, 39, and 65 deer per square mile) indicated that negative impacts began at 20 deer per square mile; data were collected 3, 5, and 10 years after the exclosures were established. These results support the initial goal selected by the park, and the park does not believe that initially adding time between reduction actions to meet that goal would provide the reduced density needed to enable forest regeneration in a timely manner to meet plan purpose and need. However, adaptive management will be used to make adjustments to the required actions based on the results obtained.

Concern ID: 22580

CONCERN STATEMENT: One commenter suggested selling venison instead of donating it and using the funds for public uses within the park.

Representative Quote(s):

Corr. ID: 232 **Organization:** *Not Specified*

Comment ID: 114110 **Organization Type:** Unaffiliated Individual

Representative Quote: and I am for your combined Number C alternative there for managing the deer. And one of those things is using the proceeds from slaying deer to give the deer to charity, to give the meat to charity. Well, here's an idea. What if we were to -- and I'd like to buy some venison. What if we had a fundraiser? If you cull the deer, let us get some proceeds and let us all buy some venison and then perhaps, with the monies we could build a bike route.

Response: According to federal regulations, the meat could be sold as surplus federal property through an auction or bidding process only. The park would not directly benefit from the proceeds, which would go to the General Treasury, and it would involve considerable staff time and costs to implement such a sale. Therefore, the park will donate as much meat as possible to local charitable organizations (FEIS, page 64).

Concern ID: 22581

CONCERN STATEMENT: One commenter suggested including a hunter training program within the alternatives to educate urban youth.

Representative Quote(s):

Corr. ID: 221 **Organization:** *Not Specified*

Comment ID: 113568 **Organization Type:** Unaffiliated Individual

Representative Quote: How about a hunter training program in the District to expose urban youth to the pleasures of deer hunting?

Response: Public hunting, which would include any youth hunter training program, was dismissed as an alternative for deer management. The "managed hunt" alternative was primarily dismissed because it would be inconsistent with long-standing basic policy objectives of the NPS, and the likelihood that the NPS would change its long-standing servicewide polices and regulations regarding hunting in parks is remote and speculative. Additionally, Congress has not authorized hunting in any legislation for Rock Creek Park. Therefore, in order to legally allow hunting at the park, the current NPS hunting regulation would have to be changed, or Congress would need to specifically authorize hunting. Also, due to issues of the safety of park visitors and security in developed areas, hunting or any associated hunting training program is not an appropriate public use in a national park in an urban setting such as Rock Creek Park.

Concern ID: 22583

CONCERN STATEMENT: One commenter asked that habitat restoration be included in whatever alternative is chosen.

Representative Quote(s):

Corr. ID: 1 **Organization:** Montgomery Bird Club, Maryland Ornithological Society

Comment ID: 113128 **Organization Type:** Conservation/Preservation

Representative Quote: (We would also suggest some effort be made for habitat restoration, perhaps using volunteers)

Response: The U.S. Department of the Interior (USDOI) 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 Code of Federal Regulations [CFR] 1505.2).

Using the adaptive management approach, if data from monitoring -- put in place after the selected alternative is implemented -- indicates the vegetation response is not adequate, then a more aggressive program of habitat restoration could be implemented to reach the desired seedling stocking rate required for forest regeneration. This approach would fall under the assessment done during the iterative phase of adaptive management. Results of monitoring are evaluated to compare actual outcome with the desired condition or objectives. Based on this assessment, the park may modify actions or make adjustments in monitoring.

Text has been added to the Adaptive Management Phases appendix in the document.

Concern ID: 23044

CONCERN STATEMENT: Several commenters stated that the DEIS does not consider a wide enough range of alternatives. One commenter specifically stated that alternative C and alternative D are too similar and that a more aggressive non-lethal option should also be considered. Finally, commenters suggested that the FEIS explore alternatives that involve cooperative deer management with other agencies outside the park.

Representative

Corr. ID: 392 **Organization:** Friends of Animals

Quote(s):

Comment ID: 114307 **Organization Type:** Non-Governmental

Representative Quote: The proposed plan and its consideration of alternatives violate both NEPA and the Organic Act. Under NEPA, the NPS failed to consider an adequate array of alternatives and failed to perform an adequate impact analysis. As for the Organic Act, the NPS failed to comply with Rock Creek's enabling legislation.

Corr. ID: 394 **Organization:** GeesePeace

Comment ID: 114298 **Organization Type:** Unaffiliated Individual

Representative Quote: Our overall conclusion is that the EIS has inappropriately omitted alternatives that are less costly, safer, reduce risk of Lyme disease, reduce deer vehicle collisions and facilitate the recovery of native vegetation and sustained woodland regeneration better than any of the alternatives considered. Moreover, the selected alternative is creating debilitating controversy between people living in neighborhoods surrounding the park.

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

Comment ID: 114472 **Organization Type:** Non-Governmental

Representative Quote: The regulations implementing NEPA requires federal agencies to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment," 40 CFR 1500.2(e), and to "rigorously explore and objectively evaluate all reasonable alternatives." Id. at 1502.14(a).

In this case, the NPS, has failed to meet this standard. The Draft EIS considers only four alternatives including the no-action alternative (Alternative A)(10). The three action alternatives include Alternative B (non-lethal only)(11), Alternative C (only lethal control)(12), and Alternative D (combination of lethal followed by non-lethal)(13). While there are distinct differences between Alternative B and Alternatives C and D, the latter two alternatives are practically the same since both propose to employ sharpshooting primarily to initially reduce the deer population from 385 to 69 or from a density of 82 deer per square mile to 15-20 deer per square mile. Draft EIS at 224, 256. The difference between Alternatives C and D is that the latter will potentially employ non-lethal reproductive controls to maintain the size of the deer population once it has been reduced to its target size.

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

Comment ID: 114209 **Organization Type:** Non-Governmental

Representative Quote: This legal deficiency is in addition to the specific inadequacies inherent in the Draft EIS including a failure to comply with NPS planning processes, the lack of a legitimate purpose and need for the proposed action, failure to disclose all relevant data and information, a lack of reasonable alternatives, and deficiencies in assessing the environmental consequences of the proposed action all of which violate the National Environmental Policy Act (NEPA). The Draft EIS and management plan also squarely conflict with NPS management policies as will be discussed in detail throughout this comment letter.

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

Comment ID: 114465 **Organization Type:** Non-Governmental

Representative Quote: The fact that Montgomery County and Maryland Department of Natural Resources (MDNR) permits the lethal removal of deer from its parks and other lands can be used by the NPS to mitigate the alleged damage that is attributable to deer within RCP. The NPS, for example, is required to consider reasonable alternatives in any NEPA

analysis that are "not within the jurisdiction of the lead agency." 40 CFR 1502.14(c). Though the NPS, in this case, failed to do so, it could have and should have explored such an alternative with these agencies (and with the District of Columbia) in order to potentially devise a strategy - one that would not have been supported by AWI - to reduce the regional deer population without engaging in lethal deer control in RCP.

Response: The NPS believes that it has developed and presented an adequate range of alternatives within the plan/EIS to satisfy the purpose, need, and objectives of the plan as required by NEPA. The actions described in the non-lethal option are those that are considered feasible now or in the future; other non-lethal options were not considered appropriate or viable and are discussed on pages 89-93 of the FEIS. Alternatives that consider different combinations of actions that are already proposed in the DEIS were not carried forward because the alternatives presented in the DEIS represent the combination that the NPS believes is most reasonable to implement, with the highest potential to successfully achieve the purpose and objectives of the plan/EIS. These alternatives capture the full range of options required by the CEQ. All alternatives include cooperative management with neighboring agencies, as described on page 48 of the FEIS.

Concern ID: 25226

CONCERN STATEMENT: One commenter suggested that an ombudsman be appointed to act as a mediator between all interested parties regarding the proposed plan.

Representative Quote(s):

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143060 **Organization Type:** Unaffiliated Individual

Representative Quote: Lastly, I recommend that an ombudsman be appointed on a permanent basis to act as a go-between between the Park Service, the District, local residents, the wildlife, and humane organizations, and to ensure that all interests – including those of wild animals and plant iife -- be represented during such conflicts.

Response: The park has consulted with the District government, Montgomery County, and other interested parties in the process of scoping and developing the DEIS. All concerned parties have had the opportunity on two occasions to provide input into the process of developing a deer management plan for the park. The NPS feels that the concerns of interested parties including animals and plants have been addressed by the current process. At this time, the NPS does not feel that the issue is of such a controversial nature that a permanent ombudsman is necessary to act as a liaison.

Concern ID: None – not in PEPC

CONCERN STATEMENT: One commenter submitted a proposal for a collaborative pilot project to control white-tailed deer using the immunocontraceptive vaccine Porcine Zona Pellucida (PZP) at Rock Creek Park.

Representative Quote(s):

Corr. ID: not applicable **Organization:** *Humane Society of the United States*

Comment ID: not applicable **Organization Type:** Conservation/Preservation

Representative Quote: On behalf of The Humane Society of the United States (The HSUS), we appreciated the opportunity to meet with you and your staff in November 2009 to discuss the possibility of conducting a collaborative pilot project to test the safety, effectiveness, and field suitability of using a one-shot, multi-year vaccine for controlling an urban white-tailed deer (Odocoileus virginianus) population at Rock Creek Park using the immunocontraception vaccine Porcine Zona Pellucida (or PZP). As promised, our staff has prepared the attached proposal for your consideration. [See attachment].

We believe the proposed collaboration presents a unique opportunity for our organization to work with Rock Creek Park to examine the efficacy of this approach to managing white-tailed deer in an urban area. Such a collaboariton could yield scientific results and field research that may be applicable in similar efforts nationwide.

Response: In a March 28, 2011 letter, the National Park Service declined HSUS's offer to conduct a collaborative pilot project to control the white-tailed deer population in Rock Creek Park. The decision was based on the following reasons:

(1) The park must assure the ability of the forest to regenerate. A review of the published results referenced in the HSUS proposal demonstrates that the PZP formulations used in the studies did not reduce deer numbers in free-ranging populations to the extent needed at Rock Creek Park to meet management goals and objectives.

(2) The proposal fails to meet NPS Management Policy 4.4.1, which states the NPS strives to maintain native plants and animals by preserving and restoring the natural attributes of wildlife populations, including behavior. PZP has been proven to lengthen the estrus cycle of white-tailed deer, as noted in the HSUS proposal. The NPS will not accept a management action that alters the natural breeding behavior of deer; and

(3) The agent used in the proposal fails to meet criteria developed for the use of reproductive vaccines in the EIS (see response to comment 22570 (page 341) for a discussion of the criteria and the rationale for their establishment).

Conducting a pilot project as a standalone white-tailed deer management option fails to meet the purpose, need and objectives of the EIS. However, non-lethal methods are included in the preferred alternative when feasible, which is defined for this plan/EIS as when all of the criteria have been met. Should a formulation of PZP meet NPS criteria in the future, it could be used as a non-lethal method to control the white-tailed deer population at Rock Creek Park.

AL4040 - Alternative D: Combined Lethal and Non-Lethal Actions (NPS Preferred)

Concern ID: 22584

CONCERN STATEMENT: Commenters felt that the DEIS does not contain sufficient evidence to mandate a population reduction nor that there is evidence that a cull would support long-term population management.

Representative Quote(s):

Corr. ID: 197 **Organization:** *Not Specified*

Comment ID: 113565 **Organization Type:** Unaffiliated Individual

Representative Quote: Shooting deer in the park or killing them by chemical injection will be ineffective: In the body of the report, the Park Service indicates that in the first year of the program, it intends to remove by lethal means half the deer population. Assuming that the Park Service did so, deer migrating into the park from other areas, as well as rapid repopulation of the stressed resident herd, would rapidly fill the "vacuum" created by the first round of killing; and the process would have to start all over again. Shooting the deer with bullets, arrows, or poison would be a self-perpetuating operation, with all the hazards and grotesque scenarios that would entail.

Corr. ID: 276 **Organization:** Crestwood Citizens Association

Comment ID: 115054 **Organization Type:** Civic Groups

Representative Quote: We did not feel that the National Park Service had provided sufficient scientific documentation as to the sustainability and long-term benefit of the quick-

kill approach.

Response: Please see the response to concerns 22570 (page 341) and 22572 (page 347). The NPS believes that a sustained management plan and effort using adaptive management to monitor results is needed to reduce the deer population to levels that will not be harmful to forest regeneration.

Regarding the comment related to the creation of a vacuum effect by removal of a large number of deer in the park, research by Miller et al. (2010) shows that removal of deer in a localized area created a short-term "vacuum" in a national forest. The vacuum lasted for three years in an area with similar density to Rock Creek Park. Since immigration into Rock Creek Park, which is surrounded by urban landscape and not a rural one, is less than that of a national forest, this "vacuum" effect may extend for a longer period. However, regardless of the method, once deer management has started it will continue and is expected to reach the goal stated in the plan to support adequate forest regeneration. Gettysburg National Military Battlefield met its deer density goal after 11 years, with an initial density twice that of Rock Creek Park.

Concern ID: 22587

CONCERN STATEMENT: One commenter stated that the criteria included for approved non-lethal methods or the provisions related to chronic wasting disease (CWD) were too restrictive and could effectively prevent any non-lethal actions from being implemented under alternative D.

Representative Quote(s):

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

Comment ID: 114478 **Organization Type:** Non-Governmental

Representative Quote: Whether the non-lethal component of Alternative D, however, is ever employed depends on a number of factors including, according to the NPS, development of a non-reproductive control agent that meets self-imposed NPS standards, whether such non-lethal controls are successful in maintaining the size of the deer herd, and the status of Chronic Wasting Disease in or near RCP. If there is no agent that meets NPS standards, if non-lethal control proves not to be effective, and if CWD is found in or near RCP, then the NPS would jettison any non-lethal strategy and return to lethal control presumably indefinitely or until a new management plan is developed. The issue of CWD is addressed later in this letter as is the value and effectiveness of immunocontraception as a non-lethal reproductive control agent in deer.

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

Comment ID: 114480 **Organization Type:** Non-Governmental

Representative Quote: What is worth mention here, however, is that even though the NPS already used immunocontraception to non-lethally control deer populations on Fire Island National Seashore, elk populations at Point Reyes National Seashore (14), wild horses at Assateague Island National Seashore, at RCP (as well as at Valley Forge, Catoctin, and Indiana Dunes) the NPS has developed specific criteria, that is not necessarily consistent between parks, intended to trigger use of this technology. These criteria are, in fact, so restrictive (15) that it would appear as if the NPS has purposefully developed the criteria to prevent or delay the use of this technology so that it can accomplish its primary goal of rapidly reducing park deer populations using lethal means. In other words, while Alternative D is identified as the NPS preferred alternative, the majority of its impacts are identical to Alternative C. Moreover, without a firm commitment by the NPS to employ immunocontraception, regardless of the status of the technology, at a specific time during the course of the plan, there is no guarantee that the NPS will ever switch to non-lethal management of the RCP deer population. Indeed, it would not be surprising if the NPS created Alternative D as a compromise alternative hoping that its non-lethal component would generate sufficient public support to permit the massive slaughter of deer short term

without actually committing the NPS to ever implement a non-lethal option.

Response: See response to concern 22570 (page 341) regarding the rationale for the criteria. Regarding CWD, it is a serious and slow-acting disease. Lethal removal is the only method of assessing the prevalence of the disease or to contain/eradicate the disease.

Concern ID: 22590

CONCERN STATEMENT: One commenter felt that the plan for deer carcass disposal presented in the DEIS would be insufficient because the estimated depth for burial pits would be too shallow to accommodate the number of carcasses described in the plan.

Representative Quote(s):

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

Comment ID: 114801 **Organization Type:** Non-Governmental

Representative Quote: Draft EIS at 64. The NPS provides a summary of its planned deer carcass disposal plan if its elects to embark on a lethal control effort. Specifically, the NPS claims the pit used to bury the carcasses will be five feed deep. A layer of carcasses would be added, followed by a food of dirt, another layer of carcasses, a foot of direct, a third layer of carcasses and then three feed of dirt. Since the deer carcasses will take up some space, the proposed five foot deep pits are not deep enough to handle three layers of deer carcasses and five feet of dirt. The pit will need to be deeper, perhaps as deep as seven or eight feet, in order to handle all of the carcasses and dirt. The deeper the pit, however, the greater the likelihood of potential adverse impacts to groundwater and the water table.

Response: Should the lethal removal option be implemented, most carcasses would be disposed offsite. Waste would be placed in metal barrels, sealed, and removed from the park by a contractor. If on-site burial is needed, then a burial pit 8 feet wide by 8 feet long by 5 feet deep would be dug. One layer of carcasses and/or waste would be placed in the pit and covered with one foot of soil removed from the pit. A second layer of carcasses and/or waste would be placed in the pit and covered with three feet of soil to fill the pit.

Text in page 66 was changed in the FEIS to reflect that two layers of carcasses and/or waste will be placed in each pit versus three layers. The 5-foot depth of the burial pit should be sufficient to accommodate two layers of carcasses and/or waste and fill soil.

AL4055 - Alternatives Dismissed: Substantive

Concern ID: 22591

CONCERN STATEMENT: Commenters stated that qualified members of the public should be considered for sharpshooting activities.

Representative Quote(s):

Corr. ID: 181 **Organization:** National Rifle Association

Comment ID: 115083 **Organization Type:** Non-Governmental

Representative Quote: It may be argued that Rock Creek Park is a small park in an urban setting and therefore its deer management plan cannot be patterned after the elk management plans of the larger and more remote Rocky Mountain or Theodore Roosevelt National Parks. However, there are many qualified hunters who are just as skilled in using firearms and archery equipment as contract sharpshooters. They can just as safely and effectively participate in a culling operation with the same parameters as outlined in the Plan for sharpshooters; that is, locating deer, setting up bait stations, shooting over predetermined bait sites that can establish shooting lanes and backstops, shooting when park visitation is low or absent, safely and humanely dispatching deer, and disposing of the deer according to the Plan requirements.

Corr. ID: 181 **Organization:** National Rifle Association

Comment ID: 115084 **Organization Type:** Non-Governmental

Representative Quote: The NRA opposes the draft Plan as written and strongly recommends that it be amended to include a new alternative that would address the use of qualified members of the public as sharpshooters, a precedent now set in the National Park System.

Corr. ID: 382 **Organization:** Safari Club International

Comment ID: 115029 **Organization Type:** Non-Governmental

Representative Quote: Despite the legality of the participation of qualified agents, the Draft Plan/EIS makes absolutely no mention of even considering the participation of qualified members of the hunting community. Instead, the Draft Plan/EIS simply rejects managed hunting as an option, due in great part to the legal restrictions that the NPS has placed on hunting in many National Parks. The Draft Plan/EIS fails to recognize the distinction between a managed hunt and the contribution of qualified volunteers, acting as agents of the NPS, in a culling operation. In so doing, the Draft Plan/EIS completely overlooks an important resource in the agency's efforts to conserve and manage park wildlife.

Response: The Secretary of the Interior has broad discretion in managing wildlife. Section 4.4.2.1 of NPS *Management Policies 2006* states that the destruction of animals may be carried out by NPS personnel or their authorized agents. In some situations, authorized agents can be volunteers. However, the NPS has determined that Rock Creek Park is not an NPS unit conducive for the use of skilled volunteers as authorized agents for the purposes of handling firearms or administering reproductive controls, due to safety concerns related to high visitation, park boundaries, and topography. While some other areas administered by the NPS have proposed or have begun implementing use of volunteers as sharpshooters in lethal reduction activities, not all locations within national park system units are suitable for use of volunteers to engage in such activities. Typically, those national park system units that are allowing for participation of volunteers as sharpshooters are located in areas with scattered and sparse populations. Additionally, those areas have expanses of wilderness and backcountry that are less likely to have concentrations of users that may inadvertently enter closed areas.

The text of the FEIS (page 47) has been clarified to provide examples of activities volunteers could assist park staff with, including construction of fencing and deer exclosures as well as performing periodic monitoring and maintenance of fencing. Volunteers could also be utilized in collecting data from vegetation monitoring plots and nighttime spotlight counts. On-site volunteer training would be provided by NPS staff to support volunteer involvement.

Concern ID: 22592

CONCERN STATEMENT: One commenter stated that is was not logical to dismiss the reduction of speed limits as an alternative because it did not meet objectives.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115051 **Organization Type:** Non-Governmental

Representative Quote: Also, under "Alternatives Considered but Rejected," the DEIS states that the "Implementation of a reduced speed limit through the park, with the intent to reduce deer/vehicle collisions, was raised by the public in public scoping as a desired action for the park to consider", but was dismissed because the NPS deemed that it was "not consistent with the objectives of the park" and would not "address the problem addressed by" the plan - "the overbrowsing of vegetation by deer." (DEIS: 91). This makes little, if any, sense whatsoever since one would think that any impacts that the deer population may have on public, visitor and/or employee health and safety at ROCR would be a far greater priority for

the NPS than "overbrowsing of vegetation by deer," and therefore, would warrant a more involved analysis of the alternatives available for addressing such an important issue.

Response: Vehicle collision is the major source of mortality in the deer population in Rock Creek Park. It is logical to assume that lowering the speed limit parkwide could reduce the number of deer vehicle collisions. However, lowering the speed limit could also increase the deer population because of less mortality. The objectives of this EIS are to protect the natural and cultural resources of the park. Reduction of park speed limits will not reduce deer overbrowsing of park vegetation.

The General Management Plan identifies the optimum conditions related to visitor use and experience that influence health and safety. These conditions include providing for a safe, healthful environment for visitors and employees, with management actions focused on protecting human life and providing for injury-free visits. A primary safety issue for visitors and local residents related to this plan involves injuries from deer/vehicle collisions. Data collected by park staff from 1989 to 2007 indicate an upward trend in deer/vehicle collisions. An average of 42 deer/vehicle collisions resulting in the death of the deer were recorded annually since 2003, with a high of 52 reported in 2006. Park road speed limits are 25 miles per hour, with the exception of a 35-mile-per-hour limit on the Rock Creek and Potomac Parkway. Most traffic regularly exceeds this speed limit, which may contribute to the higher number of deer/vehicle collisions. Compliance with posted speed limits may reduce collisions just as well as would a reduction in posted speed limits.

Visitor and employee health and safety were identified as an issue requiring further analysis in this plan. The impact of the alternatives on this issue were analyzed in the DEIS and are summarized on page 87 of the FEIS. The NPS has not dismissed the issue of vehicle collisions in the plan. However, the NPS has decided that lowering the speed limit as a component of an alternative to achieve the goal of reducing deer browse and increasing tree regeneration does not meet the purpose of this plan.

Text regarding the discussion of speed limit reduction (page 93 of the FEIS) has been revised.

Concern ID: 22593

CONCERN STATEMENT: One commenter stated that supplemental feeding was not given enough consideration and was improperly dismissed because the evidence used to dismiss the alternative was based on a study in Maryland, not in Rock Creek Park itself.

Representative Quote(s):

Corr. ID: 394 **Organization:** GeesePeace

Comment ID: 114301 **Organization Type:** Unaffiliated Individual

Representative Quote: Rejecting Supplemental Feeding: From page 89 of draft EIS "Supplemental Feeding - Providing supplemental food sources for deer would potentially decrease browsing pressure on vegetation resources at Rock Creek Park. However, increasing food sources would increase deer health and reproduction, leading to a growing deer population. In the long term this would compound problems associated with high deer numbers (MD DNR 1998). For these reasons, this alternative was dismissed."

Our Comment - Rock Creek Park is not Maryland. The deer in Rock Creek Park are not starving or have low birth rates because of nutritional deficiency. Nothing in the draft EIS indicates that the deer in Rock Creek do not have more than adequate sources of food. And they are still shooting deer in MD. This seems to not be the program you want to reference or follow or discard the good alternatives they rejected years ago.

The use of supplementary feeding gives deer an alternative to the local neighborhood landscaped gardens and community agriculture plots. From page 28 of draft EIS "Deer have direct impacts on the community gardens that are maintained by park users, most of which have been fenced to protect them from deer browsing." Deer can continue to eat the native vegetation that the Park wants to protect or restore, or deer can continue to eat the vegetables

in the community gardens or deer can cross the road and continue to eat the flowers and bushes in the neighboring communities. Birth rates will not increase because they get their sustenance from the areas developed for this purpose inside the woodland areas rather than in areas outside the woodlands. Also deer would be less likely to cross roads to find food in the neighboring communities. Deer vehicle collisions will be reduced.

Response: Supplemental feeding was considered but dismissed as a deer management alternative on page 91 of the FEIS. The NPS believes that the information presented is sufficient to eliminate supplemental feeding as a reasonable alternative and that the Maryland study was conducted in an ecosystem comparable with Rock Creek Park and is therefore applicable. However, an additional reference has been added to lend support to the dismissal justification (page 92 of the FEIS). No scientific evidence could be found to suggest that in large, free-ranging deer populations supplemental feeding could reasonably be expected to allow the park to achieve its target level of tree regeneration. In addition, the NPS *Management Policies 2006*, section 4.4.1, General Principles for Managing Biological Resources, and 4.4.2, Management of Native Plants and Animals, are aimed at allowing natural processes to occur whenever possible.

Additional text has been included in the supplemental feeding discussion (pages 91-92 of the FEIS).

Concern ID: 22595

CONCERN STATEMENT: One commenter stated that landscape modification should be analyzed as an alternative option in order to improve shelter and browse areas for deer, keeping deer in the woodland interior and away from roads and gardens. The commenter suggested that junior rangers could assist in development of these modifications.

Representative Quote(s):

Corr. ID: 394 **Organization:** GeesePeace

Comment ID: 114302 **Organization Type:** Unaffiliated Individual

Representative Quote: Our Comment: Unfortunately, the draft EIS did not consider landscape modification in the larger, non-fragmented woodland areas of Rock Creek Park to improve shelter and browse for deer and wildlife and to plant and protect seedlings at the meadow's edge. This would keep the deer in the woodland interior, away from roads and community gardens. And whatever time the deer spent in the interior meadows they would not be eating the understory vegetation the Park wants to protect. This would be an ideal program for junior rangers. Also, the interior meadows would be the right place for the "4-poster system" and when contraceptives are approved in the next year or two a convenient place to dart the deer.

If Rock Creek Park can have a golf course and provide community gardens for people to plant crops, they can certainly provide enhance meadow areas within the woodland interior spaces for wildlife.

Response: See also response to concern 22573 (page 352). The enabling legislation for Rock Creek Park states that natural resources should be retained in their natural condition as nearly as possible. This is further emphasized in NPS *Management Policies 2006*, which state that the NPS will successfully maintain native plants and animals by minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them. Modifying the landscape within the non-fragmented woodland areas would compromise the mission of the NPS in maintaining these areas as naturally functioning forests. Modifying landscapes using interior meadows, as the commenter suggests, would only further fragment the woodland areas, creating more edge habitat favored by invasive plants and animals. The park currently maintains 15 meadow areas and numerous picnic groves, many of which are located in the interior of the woodland areas.

CC1000 - Consultation and Coordination: General Comments

Concern ID: 22596

CONCERN STATEMENT: Several commenters suggested additional coordination with other groups such as the Humane Society, the Animal Welfare Institute (AWI), and local, state, and federal agencies in the completion of the deer management plan, while one commenter posed questions regarding who was consulted during the development of this plan, and if the comments submitted by the public will be available for the public to read.

Representative Quote(s):

Corr. ID: 154 **Organization:** *Not Specified*

Comment ID: 115182 **Organization Type:** Unaffiliated Individual

Representative Quote: I urge the NPS to enlist the aid of HSUS in applying more effective humane methods.

Corr. ID: 261 **Organization:** Animal Welfare Institute

Comment ID: 114503 **Organization Type:** Non-Governmental

Representative Quote: AWI is prepared to work with the National Park Service to develop a comprehensive and humane deer management plan that will achieve the objectives of the Service while also insuring the humane treatment and protection of the Park's deer. For such a cooperative effort, to succeed however, the National Park Service must substantially alter its management mind set and to accept its primary role to protect and not persecute wildlife.

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

Comment ID: 114464 **Organization Type:** Non-Governmental

Representative Quote: Finally, the NPS claims there is a need to cooperate with other jurisdictions in regard to the management of deer. While the NPS attempts to adhere to a "good neighbor" policy in the management of its parks by working cooperatively with other agencies to control and regulate activities outside of parks that may impact park units, the NPS is not required to impose management actions similar to those being used outside the parks within the parks particularly if such actions are inconsistent with NPS legal and policy mandates. (8) The fundamental purpose of such collaborations are to reduce the threat of decisions and issues external to the parks from adversely affecting the natural and cultural resources, wildlife, and historic objects within a park. Thus, the mere fact that the District of Columbia may have an interest in management deer and that Montgomery County, Maryland claims to have a deer overabundance "problem," has developed and updated various management plans to address the "problem," and has implemented sport hunting in many of its parks to ostensibly address the "problem," Draft EIS at 18, 19, 20, does not obligate the NPS to follow suit and permit the wide-scale slaughter of deer within RCP (9).

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143065 **Organization Type:** Unaffiliated Individual

Representative Quote: 5) Aside from a two-day scoping meeting in November 2006 in which comments from the public were gathered, were area residents represented during the development of the plan? Who represented them? If they were not represented, why not?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143063 **Organization Type:** Unaffiliated Individual

Representative Quote: 3) What organizations and individuals (public, private or non-profit) took part in developing the deer management plan? What meetings were held with these groups or individuals? When and where can the public and humane organizations see the minutes of those meetings?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143066 **Organization Type:** Unaffiliated Individual

Representative Quote: 6) Have the comments received by the Park Service during its previous scoping meetings and comment periods been made available for all to see? When and where will they be available? How can the public gage public sentiment on the deer issue unless it can see all the comments submitted to the Park Service?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143064 **Organization Type:** Unaffiliated Individual

Representative Quote: 4) Were any humane organizations consulted during the two-year process of developing the deer management plan? If so, were they a permanent part of the planning group or were they simply consulted? Which humane groups were involved? If no humane groups were invited to become part of the process, and if no humane groups were consulted, why not?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143067 **Organization Type:** Unaffiliated Individual

Representative Quote: 7) When and where will the public be able to see the comments collected during the comment period that ends on Oct. 2? If we cannot see all the comments that are received by the Park Service, how the public learn what percentage of residents oppose or promote the deer kill?

Response: The NPS is collaborating with and will continue to collaborate with other local state and federal agencies, organizations, and universities. The preferred alternative is based upon research not only by the NPS, but by some of these other groups.

Other agencies have been reducing overabundant deer populations in nearby jurisdictions; Montgomery County and the District are both interested in controlling deer populations and were represented at the initial scoping for this plan. The NPS consulted with the District government, Montgomery County, and other interested parties in the process of scoping and developing the DEIS. Consultation and coordination efforts for this plan are described in Chapter 5 of the FEIS. The NPS has also considered comments from nongovernmental organizations and individuals through both public scoping and the public comment period on the DEIS. The alternatives were developed based on research conducted by the NPS and some of these other groups. The NPS will continue to collaborate with local jurisdictions, and has considered comments from other organizations during initial scoping and the subsequent review period on the DEIS.

This public comment response document provides a summary of all comments received during the public review of the DEIS and responses to substantive comments. The full text of all public comments received can be made available pursuant to a Freedom of Information Act (FOIA) request.

With regard to minutes of internal meetings, the internal scoping report has been posted on the Planning, Environment, and Public Comment (PEPC) website and provides a summary of initial NPS scoping discussions. The Federal Advisory Committee Act limits the ability of the NPS to include nongovernmental entities in all aspects of the planning process unless a formal negotiated rulemaking process has been established, which was not the case in this situation. However, the information presented in the FEIS is the result of over five years of internal discussions, public engagement, collection and synthesis of best available scientific information, and analysis of impacts as they relate to white-tailed deer management.

CR1000 - Cultural Resources: Guiding Policies, Regulations And Laws

Concern ID: 22597

CONCERN STATEMENT: One commenter stated that the Organic Act does not require that cultural landscapes be considered in the decision-making process and that the DEIS fails to show that this resource is being impacted beyond a negligible level. Additionally, the commenter questioned the significance of the landscape plantings and stated that the DEIS failed to discuss whether the plantings were of sufficient importance to the cultural landscape to justify deer population reduction. The commenter also stated that the DEIS failed to identify specific areas where the cultural landscape was being impacted and what species were affected.

Representative Quote(s):

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

Comment ID: 114455 **Organization Type:** Non-Governmental

Representative Quote: In regard to the park's cultural landscapes, it should be noted that the NPS Organic Act does not mandate the protection and conservation of such landscapes which can include landscape plantings that act as attractants to deer. This is not to suggest that cultural landscapes should not be protected but the need to protect cultural landscapes in RCP must not be considered during the decision-making process both because of the lack of protection afforded such landscapes in the Organic Act and because the NPS has failed to demonstrate that deer impacts to any of the RCP cultural landscapes are anything more than negligible.

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

Comment ID: 114722 **Organization Type:** Non-Governmental

Representative Quote: The primary alleged impact to cultural landscapes is deer consuming specific cultural and landscape plantings. Draft EIS at 221 (26). This could reduce or cause the loss of palatable landscape plantings that are of apparent historical importance in RCP. What the NPS fails to disclose or discuss is whether landscape plantings for cultural purposes are sufficiently significant and worthy of protection to justify the proposal massive deer slaughter, whether NPS statutory and policy standards require the absolute protection of such cultural plantings, and whether there are alternative cultural and landscape plantings that could be used to retain the cultural landscape while reducing or eliminating alleged damage by deer. In addition, though the NPS identified specific cultural landscapes of concern, Draft EIS at 126, the NPS has failed to identify which areas have been or are being subject to deer overbrowsing, which specific species are being affected, and whether there are non or less-palatable species that could be used to mitigate these impacts.

Response: Although the NPS Organic Act does not specifically call out “that cultural landscapes be considered in the decision-making process,” it does generally require the conservation of cultural resources. In addition, the National Historic Preservation Act of 1966, as amended (36 CFR Part 800), specifically states that federal agencies are required to “take into account the effects of their undertakings on historic properties.” Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. A cultural landscape falls within the defined scope of a historic property. A cultural landscape is defined as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." (National Park Service-Preservation Brief 36-Protecting Cultural Landscapes). Section 106 of the National Historic Preservation Act is the defining regulation that requires the potential effects on cultural landscapes be considered as part of the decision-making process for this project.

The significance of landscape plantings within a cultural landscape is determined during the Cultural Landscape Inventory/Cultural Landscape Report process. This process includes research and analysis of the multiple components of a cultural landscape. A cultural landscape can include the spatial organization, topography, vegetation, the built

environment, land use, and views/vistas. Inventory efforts of cultural landscapes within Rock Creek Park and its administrative units have identified Linnaean Hill, Peirce Mill, Dumbarton Oaks Park, Meridian Hill Park, and Montrose Park as cultural landscapes. Inventories have also been executed at other sites within Rock Creek Park along 16th Street and within the Civil War Defenses of Washington sites. The significance of the historic trails within Rock Creek Park proper as part of a cultural landscape is currently being studied and evaluated. The significance of the plantings as part of the cultural landscape has been determined as part of this process and each of these sites have been listed in the National Register of Historic Places.

CR4000 - Cultural Resources: Impact of Proposal And Alternatives

Concern ID: 22599

CONCERN STATEMENT: One commenter expressed agreement with the finding of no adverse impact to cultural resources and recommended that any exclosure fencing installation related to deer management be monitored by an archaeologist to avoid impacting archaeological resources.

Representative Quote(s):

Corr. ID: 211 **Organization:** District of Columbia State Historic Preservation Office (SHPO)

Comment ID: 113167 **Organization Type:** State Government

Representative Quote: In particular, the construction of "deer exclosure fences" could constitute visual effects on significant landscapes and possibly impact archaeological sites. While the text indicates that the proposed fence sites have been selected to minimize their visibility and to avoid areas of known archaeological potential, it appears that many of the proposed fence locations intersect identified archaeological sites within the park, at least at the scale at which they are shown on the map on p. 51. Although the areas of ground disturbance will be minimal, the actual fences should avoid intersecting archaeological sites by completely including or excluding the sites.

Corr. ID: 211 **Organization:** District of Columbia State Historic Preservation Office

Comment ID: 113168 **Organization Type:** State Government

Representative Quote: For these reasons, the DC SHPO concurs with the NPS determination that implementation of the Preferred Alternative for White-Tailed Deer Management in Rock Creek Park will have "no adverse effect" on historic properties conditioned upon the sites for the exclosure fences being carefully located to avoid or completely contain identified archaeological sites, in consultation with the NPS-NCR Regional Archaeologist, Dr. Stephen Potter. Installation of the fencing should be monitored by an archaeologist meeting the Secretary of Interior's Standards.

Response: The NPS will continue to consult with the District State Historic Preservation Office regarding the implementation of an archaeological monitoring program during ground disturbance activity associated with the selected alternative. If exclosures are part of the alternative that is selected, the location of the exclosures will be coordinated through the Cultural Resource Program Manager for Rock Creek Park in conjunction with the National Park Service-National Capital Region's Regional Archeology program in order to avoid known archaeological sites.

GA1000 - Impact Analysis: Impact Analyses

Concern ID: 22601

CONCERN STATEMENT: Commenters felt that as a whole, the DEIS needs more scientific justification for reduction of the deer population. Commenters felt that much of the analysis was based on assumption and speculation instead of fact and science.

Representative Quote(s):

Corr. ID: 156 **Organization:** *Not Specified*

Comment ID: 114673 **Organization Type:** Unaffiliated Individual

Representative Quote: There isn't conclusive evidence that the environmental impact of the deer is severe, or permanent. There is also no conclusive evidence that the deer will not react to their environment and respond reproductively themselves.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115071 **Organization Type:** Non-Governmental

Representative Quote: The FEIS must include a careful review of the science used and referenced to support and justify the need for action and remove those references and statements that are inconsistent with the purpose and argumentation of the document.

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

Comment ID: 114141 **Organization Type:** Non-Governmental

Representative Quote: The alleged need to use bullets - or preferably immunocontraceptives - to reduce the park's deer population presumes that the population is overabundant, that this situation is unnatural or unacceptable, and that efforts must be taken to mitigate or reduce the alleged adverse impacts of the deer to or on RCP. The Draft EIS fails to provide sufficient compelling evidence to make this case. Yet, as a precautionary effort intended to protect those park resources allegedly or ostensibly impacted by deer, AWI would not oppose the gradual reduction of the RCP deer population size and density solely with the use of immunocontraceptive technologies.

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

Comment ID: 114498 **Organization Type:** Non-Governmental

Representative Quote: When an agency, as is the case here, fails to meet this standard and elects, intentionally or not to limit the disclosure of relevant information it impedes the ability of the public to understand the impacts of the action on the park, its amenities, and resources and it hinders the public from submitting informed and substantive comment. Indeed, in comparing the information disclosed in the RCP GMP with the information in the Draft EIS, the amount of information missing in the latter document is shocking. What's more, most of the claims in the Draft EIS are described by terms such as "if," "may," and "could" suggesting that there is no existing evidence of such impacts. It is entirely inappropriate for the NPS to base the bulk of its analysis on mere conjecture and hyperbole when it is considering such a significant action that will kill hundreds of native deer in direct violation of NPS legal standards. In addition, when the public is short changed as a consequence of too little information, the agency decision-makers are also affected preventing them from having a complete understanding of the impacts when attempting to

render a decision.

Response: As stated in NPS *Management Policies 2006*, section 4.1, "decisions about the extent and degree of management actions taken to protect or restore park ecosystems or their components will be based on...management objectives and the best scientific information available." This information may be obtained through "consultation with technical experts, literature review, inventory, monitoring, or research to evaluate the identified need for management..." (NPS *Management Policies 2006*, section 4.4.2.1). Information provided on the impacts of white-tailed deer on other wildlife species is based on referenced scientific literature that the NPS believes is sufficient to assess the likely effects of deer on these species.

As indicated in the DEIS objectives on page2, the purpose of the FEIS is to develop a deer management strategy to support long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources. Data used to support the need for action (deer population size and forest vegetation) is long-term and park-specific, and is collected using sound scientific methods as described on pages 13 through 18, 94 to 96, and 114 to 115. A science team consisting of scientists and other specialists from a variety of state and federal agencies was formed to provide technical information and input into the planning process (see the FEIS, page 277 for a list of science team members). The science team reviewed all park data and using their expertise and familiarity with deer management established an initial deer density goal and a threshold for taking action (FEIS, pages 44 to 46). Tree regeneration has been selected as the metric used to evaluate plan success rather than wildlife diversity or abundance.

In addition to presenting information based on park-specific data, other information presented in the DEIS related to deer and vegetation is supported by data collected throughout the eastern United States and published in referenced scientific literature. Using scientifically collected data from the park, the NPS has demonstrated a change in park vegetation that is attributable to the deer population in the park. Vegetation monitoring in the park has shown the present level of tree regeneration is not sufficient to sustain the forest into the future. At this time, only assumptions can be made about how vegetation will respond to a decrease in deer browse pressure. Several factors influence the growth of vegetation such as climate, seed bank, and competition. It is difficult to predict what may happen five to ten years in the future; however, relevant information needed to make an informed decision has been included in the DEIS. The NPS believes the data used in the DEIS is sufficient to justify the purpose, need for action, objectives, and supporting analysis.

Concern ID: 22602

CONCERN STATEMENT: One commenter questioned the analysis in the DEIS, stating that it does not address outside factors that may influence the deer population, including disease and predation. The commenter specifically requested an expanded discussion on the potential role of coyotes as predators of deer.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115005 **Organization Type:** Non-Governmental

Representative Quote: The DEIS claim on page 14 that the park experiences a "lack of natural predation." On page 110, it notes that confirmed sighting of coyotes (Canis latrans) were first made in September of 2004, and on page 116, it makes the first mention of coyotes as potential deer predators. Finally, on page 194, it mentions that coyotes could bring a "benefit" as predators of deer, but engages in no discussion of what impact that regulatory influence might have. Yet, an entire section on wolf reintroduction examines the illogic of

that species as a natural control on deer.

he FEIS must address the potential role coyotes can play as predators of deer, particularly fawns, and must include a far more comprehensive review. The current assumption-based description is woefully inadequate and ignores known science on this predator-prey relationship.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115006 **Organization Type:** Non-Governmental

Representative Quote: The DEIS fails to adequately address impacts caused by deer in their ecological context, as well as address and discuss factors that could lead to reduction of the deer herd without direct human intervention. Most significantly with regard to the latter, it does not account for the potential effect of natural disease as a population control mechanism, or predation as a factor influencing survivorship.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115010 **Organization Type:** Non-Governmental

Representative Quote: Notwithstanding the obvious - that deer can and do exert significant influence on forest vegetation - there is no examination in the DEIS of what this means with respect to the long-term consequences of either a continuing, unmanaged deer population or, more importantly, a deer population that is put under a management regime that of necessity will be continuous. NPS does not ask the questions begged here, or propose to examine the deeper issues, but simply charts a traditional management approach in which a blunt instrument will be used to solve a surgical problem. No one is suggesting that nothing should be done to address legitimate, site-specific impacts that deer may have on certain forested areas in ROCR. The point is that ROCR - as a whole - is not a fragile, delicate ecosystem in need of rescue from an alien species, but rather, is a dynamic living community whose ability to withstand the perturbations caused by high or low populations of other ecosystem components must be tested.

Response: The DEIS addresses the influence of disease and predation on the deer population within the cumulative impacts analysis for each alternative, described first under alternative A on page 194 of the FEIS. Wildlife diseases do not appear to be affecting the park's deer population at this time, and the small coyote population in the park (described on page 116-117 of the FEIS) is not a large influence on deer population, although they are still active in the park and regularly feed on deer carcasses (K. Ferebee, pers. comm., 5/27/10). This agrees with a Maryland Department of Natural Resources online publication (MD DNR 2010), which states that "studies show that coyotes regularly use deer as food, but it does not appear that coyote currently limit deer populations in our area." Other studies have noted varying results regarding coyote predation on deer; the Urban Coyote Project in Chicago has shown that deer remains were in 22% of sampled coyote scats, and that report goes on to state that "Coyotes cannot reduce deer populations because they do not often take adult deer (in the Midwest), but they may slow population growth in high-density areas through their predation on fawns." Research conducted by Vreeland et al. (2004) on cause-specific mortality on white-tailed deer fawns in Northcentral Pennsylvania showed that predation was the greatest source of mortality, accounting for 46.2% of 106 mortalities through 34 weeks of age. Black bears accounted for 32.7% and coyotes for 36.7% of the predation events. Duane Diefenbach, adjunct professor of wildlife ecology and leader of the Pennsylvania Cooperative Fish and Wildlife Research Unit, stated on Penn State Live in March, 2010, that there is no question that the coyote population had grown dramatically in

the Northeast in recent decades and that everyone agreed that coyotes do prey on fawns, "but our data tell us that coyote predation is not an issue in Pennsylvania."Diefenbach goes on to say that "the fawn component of the hunter harvest in Pennsylvania has remained largely unchanged for many years. If fewer fawns were surviving because of increased coyote predation, they would not be available to hunters."

Observation data collected on coyote sightings in and around Rock Creek Park do not suggest that the coyote population is increasing. Sightings have steadily decreased since the first sightings in 2004. This could be observer indifference, but park personnel have seen fewer coyotes as well. The small size of Rock Creek Park relative to the average home range of coyotes may be limiting the population size.

The cumulative analysis recognizes that disease (especially epizootic hemorrhagic disease, which has recently been found in deer near the park, and CWD) could affect the deer population in the future, as could a return of coyotes to the area, although it is not possible to accurately predict the effect of disease on deer populations. The NPS will use adaptive management so that too many deer are not removed if there are other significant causes of mortality. The habitat in the park provides conditions (e.g., prey, cover) favorable for coyotes to continue to exist, and NPS regulations provide protection from harassment and harvest of coyotes, but it is not likely that any increase in coyotes would provide the necessary reduction in deer numbers needed to meet plan objectives.

Additional text has been added to the FEIS to expand the discussion on the potential role of coyotes as predators of deer (pages 116-117 of the FEIS).

Concern ID: 22605

CONCERN STATEMENT: One commenter noted that the DEIS does not analyze the impact of funding on the alternatives, as the DEIS states it would.

Representative Quote(s):

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

Comment ID: 114804 **Organization Type:** Non-Governmental

Representative Quote: Draft EIS at 259. The NPS claims that each alternative in this section would include a discussion of the impacts associated with receiving or not receiving additional funding. It is not clear from reviewing the environmental consequences of each alternative that such an analysis was included.

Response: The DEIS analyzes the impact to park operations and management based on the costs of implementing each of the proposed alternatives. Chapter 2: Alternatives examines the total cost of implementing each alternative (table 4 (page 50); table 7 (page 61); table 8 (page 67); and table 9 (page 70)). Chapter 4: Environmental Consequences, Park Operations and Management (page 261 of the FEIS) analyzes the impact of these additional costs within the parameters of the existing park budget and staffing levels. For each alternative, the DEIS distinguishes what activities would require additional budget and/or personnel for successful implementation. Additional funding is required to implement any action alternative, and this funding has been requested.

Concern ID: 22607

CONCERN STATEMENT: One commenter stated that the DEIS does not provide a legitimate rationale for why non-lethal measures could not be used for population control before resorting to lethal measures.

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

Quote(s):

Comment ID: 114119 **Organization Type:** Non-Governmental

Representative Quote: More importantly, though the Draft EIS considers a non-lethal management alternative (Alternative B), the NPS has failed to articulate a compelling rationale for why, at a minimum, non-lethal management should not be attempted first before resorting to lethal control. Instead, the NPS claims that immunocontraception won't fix the "problem" rapidly enough and that immunocontraceptive technologies are not sufficiently advanced to meet the standards set by the NPS - standards that are self-imposed and are intentionally designed to prevent the serious consideration of such non-lethal technologies. Neither argument is legitimate.

Response: It is not evident from case studies in the literature that immunocontraception has reduced deer populations to a level where tree regeneration can occur and to protect rare plant species. For example, in the Fire Island National Seashore West End communities, the density in 1995 was over 80 deer per square mile. This stabilized at 40 per square mile in 2006 (Rutberg and Naugle 2008). Deer have been treated with immunocontraceptives at the National Institute of Standards and Technology since 1997. By 2009 the population had dropped from 315 to 191 (Rutberg and Naugle 2009). This is still well above the level that allows for tree regeneration. Please see response to Concern 22570 (page 341).

Concern ID: 23042

CONCERN STATEMENT: Commenters expressed concern for how environmental impacts were being determined and weighed, specifically with regard to impacts caused by deer. Further, commenters stated that the DEIS failed to present adequate evidence to support the alleged impacts that deer have on the park. One commenter suggested that the FEIS must more carefully weigh environmental threats from deer against threats from other sources.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115065 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS is also repeatedly plagued by digression into speculative arguments that do not contribute to an understating of the issues before NPS. For example, the discussion on page 27 speculates about how deer could increase erosion in the park to the point of threatening the park's single federally listed species, the Hay's Spring amphipod. While it difficult to draw a line as to where environmental threats can and should be identified as a real concern, the expectation under NEPA is that a reasonable and credible process of threat identification will be followed. In a park surrounded by urban development, with over 2 million visitors, and having an aged sewer system running directly through its center, the potential erosive force of deer trampling simply pales in comparison as an identifiable threat.

The FEIS must use common sense to identify and rank threats, and must identify the overall context within which identified threats from deer are weighed against threats from other sources.

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

Comment ID: 114497 **Organization Type:** Non-Governmental

Representative Quote: In addition to its efforts to castigate deer for impacts that cannot be

proven and/or are of miniscule consequence compared to other natural or anthropogenic threats, the NPS also fails to disclose sufficient evidence to substantiate some of the alleged impacts. This deficiency is of particular importance since NEPA requires agencies to ensure the information relevant to the environmental impacts of any action is available to the public and decision-makers before the action is implemented, that the information be of high quality, and that it be subject to accurate scientific analysis. Though the NPS is required to disclose all relevant information, NEPA does provide for situations where some data/evidence may not be available which generally require the NPS to admit when certain information is incomplete or unavailable, describe the relevance of the information to evaluating the impacts of the action on the human environment, and summarize existing credible scientific information about the impacts. Draft EIS at 149 citing 40 CFR 1502.22. The NPS fails to admit to the lack of evidence or inadequacy of its data in the Draft EIS despite the fact that such deficiencies are obvious in many cases.

Response: The methodology used to assess impacts to vegetation was based on the monitoring conducted in the park over many years, where the impacts of deer could be distinguished from impacts of other factors by using closed and open plots (page 170 of the FEIS). Impacts to vegetation/habitat in open plots are directly attributable to deer, as other environmental factors that can and do influence vegetation/habitat do not vary between closed and open plots. Both closed and open plots experience the same or very similar climate, weather, exposure to pests and disease, presence of invasive species, fire (if any), and soil moisture regime. Also, the fencing used for the closed plots allows most small animals to move freely in or over the fences. As described in the impact analysis on page 171of the FEIS, monitoring results have shown that the stocking rate in open plots in 2007 was 2.26 +- 0.32%, and the recommended rate is 67%, so the determination of a major adverse impact caused primarily by deer is well justified. According to a report summarizing the results of the paired plot data from 2001 to 2009 (Krafft and Hatfield 2011), 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.

Impacts to the federally listed Hay's amphipod were described as potential, with the DEIS noting the lack of direct scientific evidence that surface trampling and erosion would result in adverse effects to springs and groundwater upon which the listed species depends. The NPS wanted to disclose this potential impact in the spirit of its management policies that require the NPS to proactively conserve listed species and prevent detrimental effects on these species (NPS *Management Policies 2006*, section 4.4.2.3). However, erosion can be a cause of spring degradation - see response to concern 22630 (page 408). Additional language has been added to the cumulative impacts section to indicate that other sources of ground disturbance and erosion such as off-trail use by visitors and horses, could also affect the amphipod's habitat.

Revisions have been made to the cumulative impacts discussion on the Hay's amphipod in the FEIS (page 212 of the FEIS).

GA3000 - Impact Analysis: General Methodology for Establishing Impacts/Effects

Concern ID: 22610

CONCERN STATEMENT: Several commenters stated that the DEIS did not demonstrate existing impacts on resources within Rock Creek Park and that the studies used to substantiate impacts were from outside Rock Creek Park and therefore not comparable with the conditions in the park.

Representative Quote(s):

Corr. ID: 278 **Organization:** *Not Specified*

Comment ID: 115096 **Organization Type:** Unaffiliated Individual

Representative Quote: The NPS claims that the killing of deer is necessary to protect native vegetation, birds, and other wildlife in Rock Creek Park, but I believe that the NPS has not proven that these alleged effects are occurring in the park, that the deer are solely responsible, or that such drastic action is required to alleviate such effects. Rather,in its deer management proposal, the NPS simply cites studies that were mostly conducted outside the park and claims that by substantially reducing the deer population the entire park will benefit.

Corr. ID: 279 **Organization:** *Not Specified*

Comment ID: 114620 **Organization Type:** Unaffiliated Individual

Representative Quote: but I believe that the NPS has not proven that these alleged effects are occurring in the park, that the deer are solely

esponsible, or that such drastic action is required to alleviate such effects. Rather, in its deer management proposal, the NPS simply cites studies that were mostly conducted outside the park and claims that by substantially reducing the deer population the entire park will benefit.

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

Comment ID: 114535 **Organization Type:** Non-Governmental

Representative Quote: The NPS cites to a number of studies (e.g., Alverson 1988, Anderson, 1994, Augustine and Felich 1998, deCalesta 1994, McShea 2000, McShea and Rappole 2000 (Draft EIS at 13), Hough 1965, Behrend et al. 1970, Marquis 1981, Tilghman 1989, Redding 1995, Augustine and deCalesta 2003, Bowersox et al. 2002, Horsely et al. 2003, Sage et al. 2003 (Draft EIS at 93)) in its attempt to prove the deer browsing can result in substantive adverse impacts to park resources, including forest regeneration, herbaceous cover, and other native wildlife species, including ground-nesting birds. The NPS claims that "an overabundance of deer could possibly alter and affect forest regeneration patterns in the park, as well as the diversity of species within the park, by reducing the understory and affecting the natural diversity of dominant tress species." Draft EIS at 25. Such impacts may be the result of three primary effects: 1) failure to reproduce, especially in slowly maturing woody species where seedlings are killed; 2) alteration of species composition, which occurs where deer removed preferred browse species and indirectly create opportunities for less preferred or unpalatable species to proliferate; and 3) extirpation of highly palatable plants, especially those that were naturally uncommon or of local occurrence. Draft EIS at 93.

Not surprisingly, many if not all of these studies were conducted outside of the RCP on other federal or state lands in the United States. Moreover, many of the studies either provide a broad examination of deer impacts on forest ecosystems or they provide results from studies of other deciduous forest in a number of states. The NPS claims that the forests studied were similar to the forests of RCP yet it fails to either explain what this means or to provide data to document such similarities. For example, how does the species assemblage in RCP compare to those areas studied? Is the topography of the areas comparable? Is the timing and amount of precipitation in RCP and the other areas similar? Are the past and present management schemes for RCP and the studied forest similar? How do the soil profiles compare between RCP and the studied forests? Are the threats to the RCP forests similar to

those faced by the studied forests? These issues and a host of others have to be examined and addressed before studies conducted outside of RCP can be applied to the examination of forest management and deer impacts in RCP.

Response: Information on the impacts of deer on other native wildlife is provided as background information and as a basis for evaluation of impacts as described on pages 122-123 of the FEIS. The evaluation of wildlife (other than deer) and wildlife habitat was based on a qualitative assessment of how expected changes to park vegetation, as described in the Vegetation section of chapter 4, would affect the abundance and diversity of wildlife populations. Change in the quality and quantity of forage, availability of suitable nesting sites, amount of cover, and level of competition for existing resources may lead to changes in the size, reproductive success, rate of predation, and mortality rate for wildlife populations.

As stated in NPS *Management Policies 2006*, section 4.1, "decisions about the extent and degree of management actions taken to protect or restore park ecosystems or their components will be based on...management objectives and the best scientific information available." This information may be obtained through "consultation with technical experts, literature review, inventory, monitoring, or research to evaluate the identified need for management..." (NPS *Management Policies 2006*, section 4.4.2.1). Information provided on the impacts of white-tailed deer on other wildlife species is based on referenced scientific literature that the NPS believes is sufficient to assess the likely effects of deer on these species. The scientific studies used to assess impacts were conducted in eastern deciduous forests that have similar species to those found in Rock Creek Park, and the types of impacts are applicable to the park. It is neither possible nor necessary to have site-specific studies for exactly every type of impact assessed to draw reasonable and ecologically sound conclusions in an EIS, and much of the analysis of effects to wildlife is based on best scientific judgment of the NPS staff/scientists who are familiar with the park and the scientific literature.

Data used to support the need for action (deer population size and forest vegetation) are long-term and are park-specific, taken directly from Rock Creek park paired plot studies (see response to concern 23042 on page 374). As reported in the FEIS, page 98, park-specific research by Rossell et al. (2007) found that deer adversely affect the structure and cover of plant communities nearest the ground in the park. In addition to presenting information based on park-specific data, other information presented in the DEIS related to deer and vegetation is supported by data collected in other similar environments. Additional studies conducted throughout Pennsylvania and published in referenced scientific literature show that abundant deer populations have impeded the establishment and growth of sufficient tree seedlings to regenerate forests, and researchers describe the regeneration problem as "ubiquitous rather than specific to a particular region, owner, or forest type" (McWilliams et al. 2003). NPS believes data used in the DEIS is sufficient to justify plan/EIS purpose, need for action, objectives, and supporting analysis.

Concern ID: 22611

CONCERN STATEMENT: Several commenters stated that deer are part of the natural ecosystem within Rock Creek Park and that the DEIS does not acknowledge that impacts to park resources from the deer population are a component of that natural system. Additionally, commenters noted that due to its urban characteristics, there is no way to clearly define the "natural" condition of Rock Creek Park.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115007 **Organization Type:** Non-Governmental

Representative Quote: The DEIS correctly notes that white-tailed deer are an important part of the ecosystems they occupied before extirpation by humans, and upon return they have entered into highly dynamic interactions with certain ecosystem components, such as the plant communities which have developed without the significant presence of deer for

what literally amounts to several centuries. In calling the impacts of deer to such system components "adverse", we apply human values and judgments to a natural process. While it may be true that the deer population has an influence, and as such, changes within the natural communities have occurred, this in and of itself cannot be taken as an indication that the influence is deleterious, and therefore, "adverse", negative or otherwise unacceptable, nor that deer are directly impeding the mandate and historic mission of the park.

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

Comment ID: 114505 **Organization Type:** Non-Governmental

Representative Quote: The question of what is natural or what constitutes natural conditions with and urban park like RCP is far more difficult to answer. As an initial matter, this question assumes that what currently exists in RCP is not natural. If this is the case, then what is natural? What should the plant and animal species assemblage consist of if RCP was in a natural condition? It is likely that there would be additional species of predators in RCP though it is unknown what species would be present or how many would occupy all or a part of RCP either permanently, seasonally, or as transition habitat. The NPS does not attempt to provide information about RCP before the arrival of European colonists. Assuming there were more predators in the area, what likely occurred is that as the human population increased, development activities increased thereby expanding the urban landscape (which continues to expand to this day). As a consequence, significant amounts of wildlife habitat has been lost and with it went significant numbers of wildlife. Neither the NPS nor deer had anything to do with such declines as they were caused entirely be external forced well beyond the control of the NPS. This, then begs the question of what is natural? Is it what existed prior to the arrival of the colonists and the settlement of Washington, DC, or is it what exists now. The former condition, no matter how natural it may have been, is unattainable now suggesting that what is natural is what we have created. This is not to suggest that the RCP tennis courts, golf course, or playing fields are natural as obviously they are not but the current existence of RCP largely if not entirely surrounded by urban development is a consequence of human settlement and growth and, therefore, could and should be considered as natural as is possible at the present time.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143052 **Organization Type:** Unaffiliated Individual

Representative Quote: The Park Service is concerned about maintaining the natural balance of the Park and allowing the forest to regenerate and renew itself on a regular basis. This is a laudable goal. However, it needs to be pointed out that the park will never be in "natural balance" because human actions have dramatically and irrevocably altered this balance. Humans have crowded out the vast majority of all kinds of animals, have refused to tolerate predators of any kind (except, perhaps, hawks and owls), and have introduced aggressive exotic plant species that are not indigenous to the area. We are trying to make a permanently abnormal system normal -- but it never will be no matter what we do.

Response: Historically, deer were present in the park in numbers that were controlled by predators and subsistence hunting. Humans essentially extirpated the predators -- and then the deer -- in the area where the park is now located during expansion and development of settlements. It is uncertain when deer began to repopulate the District metropolitan area, but observations were not recorded in Rock Creek Park until the 1960s. The deer population slowly began to increase in numbers between the 1970s through the early 1990s. At the latter date, the park's deer population began to increase more rapidly. Changes in vegetation began to be observed and measured using monitoring plots established in the park (see FEIS pages 19, 45-46, and 99). The NPS has determined that the current deer population is above the threshold needed to maintain adequate tree regeneration and above the forest's ability to sustain the deer population. NPS *Management Policies 2006*, section 4.1 states that biological or physical processes altered in the past by human activities may need to be actively managed to maintain the closest approximation of natural conditions when a truly natural system is no

longer attainable. The deer are causing an adverse impact to the park's vegetation and are causing a conflict with the park's mission to preserve its natural resources for future generations.

Rock Creek Park has been managed in a natural condition since its establishment in 1890. The legislation creating the park is clear in its purpose: to establish a public park and pleasure ground for the benefit and enjoyment of the people of the United States. Congress emphasized the preservation of the park's natural resources and landscape scenery in the enabling legislation. Since its creation, the park has been managed as a natural area with amenities for visitors interspersed. It is true that the question of what constitutes natural conditions with an urban park is difficult to answer. However, long-term observations and monitoring have shown that natural processes, such as the breeding of amphibians and birds as well as seed production in plants, still occur. A true natural balance would contain predators that would keep the deer population in check, allowing vegetation to propagate itself. The current deer population is impacting the ability of the vegetation to reproduce and sustain itself over time. The NPS may not be able to create a completely natural balance, but actions taken to reduce the deer population can improve the situation, since lowering the current deer population numbers would allow more of these processes to occur as they should.

The DEIS presents data showing that deer are impacting the park resources, which the NPS is mandated to preserve as best it can. The DEIS analyzes alternatives and its impacts on the different resources in the park. These statements are based on informed decisions that were made using the best available science (see response to Concern 22601 on page 370).

Concern ID: 22612

CONCERN STATEMENT: One commenter noted that time and cost should not be included as factors that would be impacted and should not be taken into consideration when making decisions.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114972 **Organization Type:** Non-Governmental

Representative Quote: Time and economic concerns are irrelevant in a discussion of humaneness, unnecessary death and other welfare consequences. An action is not more or less necessary or humane because it is more or less time-consuming, more or less technically feasible, and/or more or less costly. If after such a procedure, NPS decides to implement a less humane but less time-consuming, easier and/or less costly alternative, it must clearly characterize that choice for the public and the decision maker.

Response: NPS Director's Order 12, Conservation Planning, Environmental Impact Analysis, and Decision Making, states that it is appropriate to include costs of each alternative in the alternatives chapter. The costs of implementing each alternative are included in the DEIS as another way for the reader to compare alternatives. The NPS has not based the decision to choose alternative D as the preferred alternative strictly on the cost of implementing the alternative or on the technical soundness of the alternative. Decisions were based on the impact topics that were analyzed in chapter 1 of the FEIS (pages 27 to 32). However, one of the impact topics is Park Management and Operations. Deer management activities have the potential to impact staffing levels and the operating budget necessary to conduct park operations. Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. Additional deer management activities undertaken by park staff could affect other areas of park operations. It is in this context the cost of implementing alternatives is included in the analysis.

Concern ID: 22613

CONCERN STATEMENT: One commenter noted that the DEIS did not address the impact of invasive species on the native vegetation, which had been described in the General Management Plan, and felt that

invasive species should have been analyzed because they could have more of an impact on vegetation than the deer population.

Representative Quote(s):

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

Comment ID: 114689 **Organization Type:** Non-Governmental

Representative Quote: In addition, as revealed in the GMP and EIS, despite NPS efforts to control nonnative species, such efforts "are not able to keep pace with the rate of invasive plant introduction and spread." GMP and EIS at 143. This indicates that the impact of nonnative, invasive species in RCP may be far more serious than revealed by the NPS in the Draft EIS and that this could, in part, provide an explanation for the alleged reduction in herbaceous cover, saplings, and overall forest regeneration. This is not, again, to suggest that deer don't have any impact, but it provides evidence of other threats/impact to park vegetation that has little connection or association with deer.

Response:

The park has been actively managing and doing research on non-native invasive plants in the park since the late 1970s. Many research projects have been accomplished in the park to determine the environmentally safest and most effective means of controlling selected species in the park. The park completed an invasive exotic plant management plan in 2004, which outlines the principles under which exotic plant management will be prioritized and undertaken for all the natural areas within the park. Technology and methods of treatment have been evolving each year. The plan needs to be updated regularly to reflect changes in treatments and species most threatening the park.

Today, the park uses volunteers, park staff, a contractor, and the National Capital Region Exotic Plant Management Team to control invasive plants in the park's natural areas. In areas where active management is being conducted, some positive results are taking place. Most invasive plants found in the park are concentrated along edges and areas of disturbance. Forest interiors in the park, where fewer invasives are found, still lack herbaceous plants and tree regeneration. Impacts associated with invasive species are acknowledged in the cumulative impact analysis.

The park-prepared General Management Plan is a broad document that identifies and clearly describes specific resource conditions to be achieved, and identifies the types of management that would be appropriate in achieving and maintaining these conditions. Implementation planning focuses on activities and projects needed to achieve desired conditions identified in the General Management Plan. The plan/EIS for deer management is an example of an implementation plan that focuses on deer management and not invasive plant management. These two subjects, although in some ways related, are addressed in two different planning efforts.

Concern ID: 22614

CONCERN STATEMENT: One commenter made several comments stating that the DEIS impact analysis does not match up with the analysis in the General Management Plan. The commenter noted that the General Management Plan does not describe an overpopulation of deer, contain any information regarding deer impacts to vegetation, or provide guidance for deer management, and therefore the General Management Plan does not support a deer management effort. The commenter stated that the deficiencies of the DEIS cannot be revised but instead require amending the General Management Plan and Natural Resource Management Plan and then completing a new analysis.

Representative Quote(s):

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

Comment ID: 114218 **Organization Type:** Non-Governmental

Representative Quote: While the action alternatives evaluated in the GMP all are identified as improving the protection of the park's natural and cultural resources, GMP and EIS at 70,

what is telling is the description of the impacts of Alternative B or the no-action alternative. Concerns associated with the selection of Alternative B include the inadequate condition of the paved recreational trail system, inadequate capability to provide environmental education and interpretation services, impairment of future administration and operation efficiency due to inadequate support facilities, and continued degradation of historic structures used for expanding administrative purposes. GMP and EIS at 70. The NPS does not include any discussion of damage to or loss of park forests and/or other vegetation as a consequence of Alternative B suggesting, again, that, at least as of 2007, deer were not of sufficient concern to the NPS to justify the inclusion of deer management guidance, direction, and goals in the GMP.

Moreover, even within the description and discussion of the action alternatives there is no specific reference to the need for lethal deer control or any form of deer management due to alleged resource impacts/damage attributable to deer. The protection of natural resources afforded under Alternative D (the environmentally preferred alternative) which is similar to Alternative A (which was selected as the preferred alternative) would be limited to improving and upgrading foot and horse trails to remedy adverse effects on soils and working to reduce wildlife roadkill. GMP and EIS at 72. For Alternative A, the GMP states that it "would improve the protection of the park's natural resources" by rerouting poorly designed sections of foot and horse trails while restoring abandoned trail sections to their natural conditions and by implementing measures to reduce mortality to wildlife from collisions with vehicles. EIS and GMP at 73, 77, 79.

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

Comment ID: 114289 **Organization Type:** Non-Governmental

Representative Quote: In some cases, as specified in NPS Management Policies, the "development of an implementation plan may overlap other planning efforts if this is appropriate for the purposes of planning efficiency or public involvement." Management Policies at 2.3.4. Nevertheless, "decisions made for the general management plan will precede and direct more detailed decisions regarding projects and activities," and any "major new development" and major actions or commitments aimed at changing resource conditions or visitor use in a park must be consistent with an approved general management plan." Id. The proposed action in the Draft EIS clearly qualifies as a major action intended to significantly change resource conditions in RCP and, therefore, must be more substantively addressed in the RCP GMP.

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

Comment ID: 114245 **Organization Type:** Non-Governmental

Representative Quote: After a GMP is completed, the next step in the park planning process is program management planning. This process is intended to provide "a bridge between the broad direction provided in the general management plan and specific actions taken to achieve these goals." Management Policies at 2.3.2. A program management plan, which would include a natural resources management plan, "follow the general management plan and provide program-specific information on strategies to achieve and maintain the desired resource conditions and visitor experiences " Management Policies at 2.2 and 2.3.2.

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

Comment ID: 114210 **Organization Type:** Non-Governmental

Representative Quote: The substantive deficiencies, both biological and legal, inherent to the Draft EIS and management plan cannot be fixed simply by amending or tweaking the documents prior to final publication. Instead, the NPS and RCP, if they intend to pursue the wide-scale lethal slaughter of RCP deer, must amend the RCP General Management Plan (GMP), revise the RCP natural resources management plan, and engage in a new analysis that provides an honest and objective review of all relevant science, laws, and policies before

even contemplating such an action.

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

Comment ID: 114215 **Organization Type:** Non-Governmental

Representative Quote: Though the alleged growth in the deer population and an increase in associated impacts to park resources was occurring as the GMP was being completed, the use of park roads was described in the GMP as the "pivotal management issue" to be resolved by the plan and the three key management issues, or decision points, related to traffic and traffic management, visitor interpretation and education, and administration of RCP. Id. at iii and iv, 10, 30, 31, 32, 69. No decision point or key management issue involved the management of deer in RCP. In fact, the NPS concedes in the GMP that "the most controversial management issue to be resolved by this general management plan involves the use of park roads for nonrecreational travel on weekdays" including the "management of traffic in Rock Creek Park and the degree to which park values would be affected by nonrecreational automobile use." GMP and EIS at 9. No where in the GMP is the issue of deer overabundance mentioned as a critical management concern and/or are there any goals or objectives established to address this issue.

Admittedly, in 1996 when the GMP process was initiated the deer "problem" may not have been of concern to RCP and NPS. In 2001, however, when the GMP process was reinitiated after a multi-year lull in progress due to a congressionally directed reorganization and downsizing of NPS planning, design, and construction programs and personnel, GMP and EIS at 294, and in 2007 when the process was completed, it is inconceivable that the deer "problem" was not of increasing concern to RCP/NPS officials.

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

Comment ID: 114214 **Organization Type:** Non-Governmental

Representative Quote: The NPS decision to prepare an EIS on deer management, as stated in the GMP, does not excuse it from providing the foundation for deer management, including clearly defining the desired natural and cultural resource conditions to be achieved and maintained over time and providing indicators and standards for maintaining the desired conditions, in its GMP. In this case, the GMP is entirely devoid of any substantive reference or analysis of the alleged deer overabundance in RCP and the subsequent impacts of deer on RCP resources. Consequently, the GMP provides no guidance, general or specific, for the management of deer in RCP.

Though the RCP GMP establishes its purpose to be "to specify resource conditions and visitor experiences to be achieved in the park and parkway, and to provide the foundation for decision-making and preparation of more specific resource plans regarding the management of the park and parkway," the GMP focuses mainly on RCP roads and traffic control. RCP GMP and EIS at iii and 1 (emphasis added). Furthermore, the intent of the GMP included establishing the direction and values that should be considered in planning to achieve the purposes defined in the park's establishing legislation and to "define management prescriptions that establish the goals of the National Park Service and the public with regard to " natural resources " including the types and locations of resource management activities." GMP and EIS at 1 (4) (emphasis added). These standards or criteria are not contained in the RCP GMP. Instead, the NPS indicates that more detailed plans would be developed which would be based on the "goals, future conditions, and appropriate types of activities established in the general management plan." GMP and EIS at 2.

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

Comment ID: 114223 **Organization Type:** Non-Governmental

Representative Quote: Despite this complete lack of substantive analysis of the deer population and deer management in the GMP, the NPS claims that "all alternatives considered for the development of a White-tailed Deer Management Plan were developed

within the framework of the park's GMP/EIS." Draft EIS at 39. The NPS goes on to identify a number of desired conditions for RCP that it claims were outlined in the GMP including the restoration of native species populations that have been severely reduced or extirpated where feasible and sustainable, the reduction or elimination of invasive species from natural areas of the park, protection of Federal and District-listed threatened or endangered species and their habitats, and management native plant and animal species to allow them to function in as natural a condition as possible except where special management consideration are allowable under policy. Draft EIS at 38, GMP and EIS at 20. Some of these very general desired conditions can be applied to deer management in RCP but, as required by NPS Management Policies, more detail relevant to RCP deer, their impacts, and guidance for their management should have been included in the GMP. This is particularly true considering that the NPS is now, only two years after the GMP was completed, proposing to engage in the massive reduction of the RCP deer population.

Response: The General Management Plan is the basic document for managing Rock Creek Park and the Rock Creek and Potomac Parkway. The purposes of the General Management Plan are to specify resource conditions and visitor experiences to be achieved and provide the basic foundation for decision-making regarding the management of the park and parkway. The General Management Plan does not propose specific actions or describe how particular programs or projects should be ranked or implemented. Those decisions are addressed by more detailed planning associated, in this case, with an implementation plan that addresses deer management in Rock Creek Park.

Page 12 of the General Management Plan describes the purpose statements of Rock Creek Park and the Rock Creek and Potomac Parkway. These purpose statements are the most fundamental criteria against which the appropriateness of all plan recommendations, operational decisions, and actions are to be tested. One purpose of Rock Creek Park is to preserve and perpetuate the ecological resources of the Rock Creek valley (in as natural a condition as possible), the archaeological and historic resources in the park, and the scenic beauty of the park. The purpose of the DEIS is to develop a deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park.

The deer population in the park has been monitored for many years, but since the late 1980s their numbers have substantially increased in the park. On page 146, the General Management Plan states that the deer population is monitored to avoid adverse impacts to park resources, particularly vegetation. The General Management Plan goes on to state that the NPS will be preparing an environmental assessment or an EIS about the impacts of managing the park's deer population.

The commenter is correct that when the General Management Plan process was initiated in 1996, the park's deer population was lower and no data existed to show changes in vegetation. However, in 2005 the long-term vegetation plot data as well as the paired plot data was analyzed and reported. These results were received well after the 2001 restart of the General Management Plan process and were the first data indicating a change in park resources. It was the vegetation plot data that initiated the request for funding to complete a deer management plan/EIS for Rock Creek Park. The deer management plan/EIS started in late 2005 after the General Management Plan has been finalized, although the Record of Decision was not approved until 2007.

The General Management Plan describes actions that the NPS will take to comply with legal and policy requirements related to native species. One of these actions is monitoring native species that are capable of creating resource problems, such as overbrowsing associated with over-population of white-tailed deer. If unacceptable levels of habitat degradation are indicated, humane measures to control the animal population will be implemented. The General Management Plan clearly establishes the fact that the NPS will take action if monitoring indicates a need.

GA4000 - Impact Analysis: Impairment Analysis-General Methodology

Concern ID: 22543

CONCERN STATEMENT: One commenter stated that the NPS incorrectly cites several court cases as support for the proposed actions and felt that these cases provide no legal support for lethal deer management actions. Additionally, the commenter felt that the court cases did not support the NPS use of the impairment standard to justify lethal deer reduction.

Representative Quote(s):

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

Comment ID: 114412 **Organization Type:** Non-Governmental

Representative Quote: Moore involves the spraying of a pesticide in the New River Gorge National River. The Governor of West Virginia and the state's Director of its Department of Natural Resources desired to spray a pesticide in the national park to "reduce and remove the gnat or black fly from the southern counties of West Virginia." The NPS refused to permit such spraying arguing that black flies, no matter how pesky or annoying, are "wildlife" and are therefore protected by NPS statutes and regulations and that, even if such spraying were allowed, the state would be required to obtain a permit before applying the pesticide. In Moore, the court cites to NPS regulations that prohibit the "possessing, destroying, injuring, defacing, removing, digging, or disturbing from its natural state " living or dead wildlife " 36 CFR 2.1(a). In addition, the court cites to New Mexico State Game Commission and the authority of 16 USC 3 to demonstrate that the NPS has the authority to publish rules and regulations for the proper use and management of the parks and to permit the "destruction of such animals and of such plant life as may be detrimental to the use of any of said parks " Thus, again, Moore provides no legal support for the NPS use of the impairment standard to justify its wide-scale slaughter of deer.

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

Comment ID: 114410 **Organization Type:** Non-Governmental

Representative Quote: The NPS attempts to substantiate the use of the impairment standard to justify its lethal deer control plan by citing to New Mexico State Game Commission v. Udall (410 F.2d 1197, 1201 (10th Cir. 1969) and to United States v. Moore (640 F. Supp. 164, 166 (S.D. W.VA. 1986). A review of both cited cases demonstrates that neither provide the support that the NPS alleges for its use of the impairment standard to justify the wide-scale slaughter of deer.

In New Mexico State Game Commission the NPS was sued for its failure to obtain permits from the state to remove up to 50 deer as part of a scientific research project. As an initial matter, there is a significant and substantive difference between lethally removing a limited number of park wildlife as part of a research project and the proposed action which, if implemented, will decimate that RCP deer population by reducing it from an estimated 385 to 69 deer. Draft EIS at 62, 262. Moreover, the New Mexico State Game Commission case is 40 years old and, since then, the NPS has promulgated several versions of its management policies that provide additional guidance for wildlife management in national parks. Thus, while the NPS may continue to permit the lethal removal of wildlife for the purpose of research conducted in the parks, the intent of its current policies are to dissuade the use of lethal strategies to study park wildlife.

Response: NPS believes it does have the authority to use lethal deer management when necessary to protect other park resources. See response to concern 22703, below.

Concern ID: 22703

CONCERN STATEMENT: One commenter stated that the impairment standard established by legislation and NPS policy can be applied only to park uses. The commenter questioned the analysis in the DEIS, stating that the behaviors or ecology of a native park species cannot be considered an action or activity in the park, and thus the action of deer within the park cannot be subject to the impairment standard. However, the commenter stated that any action by the NPS to manage

deer, whether lethal or nonlethal, would be subject to the impairment standard. Finally, the commenter maintained that the impairment standard cannot be used as a justification for any lethal deer management actions.

Representative Quote(s):

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

Comment ID: 114408 **Organization Type:** Non-Governmental

Representative Quote: The plain and indisputable meaning or applicability of the impairment standard as reflected in the Organic Act was not altered by the General Authorities Act of 1979 or by the 1978 amendment to that Act (the "Redwood amendment"). Indeed, if anything that Act, as amended, further affirms that the impairment standard is applicable to activities conducted in the parks and not to the impacts of native species on park vegetation or other resources. The relevant language of the General Authorities Act, as amended, is:

"Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System " shall be consistent with and founded in the purposed established by section 1 of this title ", to the common benefit of all the people of the United States. The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which thee various areas have been established, except as may have been or shall be directly and specifically provided by Congress " (emphasis added).

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

Comment ID: 114290 **Organization Type:** Non-Governmental

Representative Quote: The NPS cites to 16 USC 1 (its Organic Act) as its legal authority to implement the proposed action that will result in the slaughter of hundreds of deer over the course of several years. Specifically, the language relied on by the NPS to justify its plan is the Organic Act language that provides the fundamental purpose of the NPS which is that the agency: "shall promote and regulate the use of Federal areas known as national parks by such means and measures as conform with the fundamental purpose of the parks to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Draft EIS at 12, 31.

The NPS has consistently relied on this language and, specifically, the so-called impairment standard, to justify the slaughter of elk in Rocky Mountain National Park and deer in Catoctin National Park, Valley Forge National Historical Park, and the proposed killing of deer in Indiana Dunes National Lakeshore and in RCP. AWI has consistently argued, and will do so again in this case, that the impairment standard cannot be used to justify the lethal control of deer or any other native species in a national park. An analysis of the quoted statutory language (as well as historical records, and NPS Policies) makes it crystal clear that the impairment standard only applies to activities or uses permitted or authorized in the parks, including public and NPS activities and uses, and was never intended and cannot be used to justify the massive slaughter of hundreds of native deer because they are eating park vegetation.

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

Comment ID: 114418 **Organization Type:** Non-Governmental

Representative Quote: If any additional proof is necessary that the impairment standard is applicable only the enjoyment and uses of the parks, the NPS Management Policies provide even more evidence supporting this indisputable intent.

The most recent iteration of the NPS Management Policies was published in 2006. Prior to that version, an earlier version was published in 2001. The RCP GMP was prepared pursuant

to the 2001 version while the Draft EIS was prepared ostensibly in line with the 2006 version of the Management Policies. The 2001 and 2006 policies are similar but there are some significant differences, some of which will be mentioned below. Adherence to the policy is, however, mandatory unless specifically waived or modified by the Secretary, Assistant Secretary for Fish, Wildlife and Parks, or the Director. Management Policies at Introduction and at 3. The discussion below is based on the 2006 version of the Management Policies unless explicit reference is made to the 2001 policies.

The NPS cannot claim that it was unaware of these policies since, in the Draft EIS, the NPS makes clear that the impairment standard is applicable to actions and activities that cause impacts conceding that it "cannot allow an adverse impact that constitutes a resource impairment." Draft EIS at 32. It is, as previously indicated, inconceivable that the foraging behavior or ecology of a native species could possibly be considered an action or activity within a park. Actions or activities are clearly intended to apply primarily to pubic uses of the parks such a hiking, bicycling, snowmobiling, and rock climbing. They also encompass actions or activities undertaken by the NPS such as facility development, scientific research, and wildlife management practices including the lethal control of wildlife within the parks. To be clear, the role of deer, whether beneficial or adverse to a park, is not an action or activity subject to the impairment standard but any decision by the NPS to manage those deer, through lethal or non-lethal means, would trigger the impairment standard.

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

Comment ID: 114407 **Organization Type:** Non-Governmental

Representative Quote: Indeed, the Organic Act makes clear that such enjoyment is only permitted when it can be done in "such a manner and by such means as will leave (the parks) unimpaired for the enjoyment of future generations." The "such a manner and by such means" language is applicable to the enjoyment of the parks, not to the conservation of park scenery or wildlife. The "and" between "therein" and "to provide" sets apart the final clause of the statutory language that deals with park enjoyment from the conservation mandate. Had Congress intended for the impairment standard to apply to the conservation mandate, it would have structured the statutory language as follows:

"shall promote and regulate the use of Federal areas known as national parks by such means and measures as conform with the fundamental purpose of the parks to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same while ensuring that the parks remain unimpaired for the enjoyment of future generations."

Though many have consistently claimed that the NPS has dual mandates that are conflicting (conservation versus promoting public use), such interpretations are in direct conflict with the plain language of the statute. Moreover, as exhaustively research by Winks (1997), (5) the legislative and historical records demonstrate that not only does the Organic Act not represent a conflicting mandate to the NPS but that the impairment standard was applicable only to the enjoyment of the parks and not to other issues.

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

Comment ID: 114419 **Organization Type:** Non-Governmental

Representative Quote: In regard to the issue and applicability of the impairment standard, NPS Management Policies make clear that said standards are directly tied to activities or uses authorized by the NPS. As an underlying matter, the policies specify that a mandate to conserve park resources and values is the fundamental purpose of the national park system, Management Policies at 1.4.3, and that when there is a "conflict between conserving resources and values and providing for the enjoyment of them, conservation is to be predominant." Id. Since the fundamental mission of the NPS is conservation, it is entirely logical and sensible that the impairment standard would apply to those uses and activities authorized by the NPS to facilitate and promote public enjoyment of the parks. Not only is this interpretation consistent with the Organic Act but it is referenced throughout the NPS

Management Policies.

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

Comment ID: 114409 **Organization Type:** Non-Governmental

Representative Quote: Despite such documentation, there is ample evidence that the NPS is itself confused over how the impairment standard is to be applied to park management. In the RCP GMP, for example, the NPS states that:

"Congress charged it with management lands under its stewardship 'in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (NPS Organic Act, 16 United States Code 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of park resources." GMP and EIS at 68.

While the language quoted is accurate, the interpretation is not since the NPS is claiming that the impairment standard applies broadly "whenever conditions occur that could adversely affect the sustainability of park resources." In other words, the NPS interprets the impairment standard to apply to any condition that affects park resources and not, as is the indisputable intent of the plain language of the statute, to uses and activities permitted, authorized or conducted in the park.

Similarly, the NPS claims that it "will maintain the forests consistent with its charge in the 1916 Organic Act to preserve unimpaired the natural resources and values of the park for this and future generations." GMP and EIS at 142. Again, this statement, as written, delinks the impairment standard from activities and uses of the parks which is not consistent with the plain language of the Organic Act.

Finally, the GMP and EIS claimed that the Organic Act established the mission of the NPS to:

"preserve unimpaired the natural and cultural resources, and values of the national park system for the enjoyment, education, and inspiration of this and future generations." GMP and EIS at 5.

In addition to failing to identify the source of this quote, this interpretation of the Organic Act is simply wrong since it fails to link the impairment standard to public uses or NPS activities in the parks.

Response: As described on page 12 of the FEIS, the NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. In addition to the general mandate to conserve park resources and prevent impairment, section 3 of the NPS Organic Act also expressly authorizes the Secretary of the Interior to 'provide in his discretion for the destruction of such animals and of such plant life as may be detrimental to the use of any' NPS unit. This project is a straightforward exercise of that discretion, and the comment's various legal arguments concerning the impairment standard and section 1.4 of the Management Policies are not relevant. The relevant legal authorities are discussed in the FEIS and the other comment responses. The courts have consistently upheld NPS authority to conduct actions of this sort, at Rocky Mountain National Park, Gettysburg National Military Park, and at Valley Forge National Historical Park.

GR2000 - Geologic Resources: Methodology and Assumptions

Concern ID: 22545

CONCERN STATEMENT: One commenter expressed disagreement with statements in the DEIS that cite deer as the source of soil compaction and erosion, and instead felt that human activities inside and outside the park boundaries were the cause.

Representative Quote(s): **Corr. ID:** 396 **Organization:** Animal Welfare Institute

Comment ID: 114718 **Organization Type:** Non-Governmental

Representative Quote: In regard to RCP soils, the NPS reports that "soil resources are being adversely affected by accelerated erosion, compaction, and deposition caused by human activities inside and outside the park boundaries." Draft EIS at 101 (emphasis added). Such impacts are particularly evident in areas that receive heavy visitor use including areas along streambanks, at picnic groves and other recreational areas, and along heavily used or infrequently maintained trails. Id. The NPS does not implicate deer as a factor adversely impacting RCP soil resources.

Response: The NPS agrees with the commenter that the impact of deer specifically on soil erosion and soil compaction is low. However, excessive deer browsing has reduced vegetative cover, exposing soil and making it more susceptible to erosion from rainfall. It is the cumulative effects of heavy visitor use, increased storm water runoff, soil compaction, and vegetation removal that are the primary causes of soil erosion in the park. The language on page 107 of the FEIS has been revised to show deer as a minor contributing factor to soil erosion in the park.

ON1000 - Other NEPA Issues: General Comments

Concern ID: 22546

CONCERN STATEMENT: Several commenters expressed concern that the NPS has already come to a decision on the final alternative, questioned how public comments were being considered, and suggested that the comments have no weight in the decision-making process. Commenters asked what public meetings are intended to accomplish and asserted that contractors who prepare EISs may have a conflict of interest. Commenters also questioned if the park defined interested public only as the visitors who come to the park and if the park considered the public interest.

Representative Quote(s):

Corr. ID: 54 **Organization:** *Not Specified*

Comment ID: 115111 **Organization Type:** Unaffiliated Individual

Representative Quote: From the presentation at the public meeting, it was clear that the NPS has already come to a decision on "what is the best solution" in their point of view. With such a pre-decided approach, how can NPS be trusted to have an open mind? What is to say that the report has not been created with the end goal in mind?

Corr. ID: 54 **Organization:** *Not Specified*

Comment ID: 115108 **Organization Type:** Unaffiliated Individual

Representative Quote: From my talking to the NPS officials, it appears that the power to make any decisions rests solely with some of the highest officials in NPA - who did not even attend the public meeting. People comments will be "considered" but otherwise it appears they have no weight. As adults, we all know that anything can be considered, then dismissed.

Corr. ID: 54 **Organization:** *Not Specified*

Comment ID: 115107 **Organization Type:** Unaffiliated Individual

Representative Quote: Is there going to be any "moderation" so that only those comments seen "fit" or "substantive" by NPS will be published? Because, it really would be unfair since the NPS clearly has a dog in the fight and cannot be considered a neutral body.

Corr. ID: 408 **Organization:** *Not Specified*

Comment ID: 142979 **Organization Type:** Unaffiliated Individual

Representative Quote: We would like you to meet with Jon Jarvis, the Director of the National Park Service. At that meeting you should:

- Ask him to ensure that the questions and concerns expressed by so many at the September meeting are responded to and the responses made public.
- Inform him of our concerns and ask him for an official response.
- Ask him exactly what public meetings are intended to accomplish.
- Ask him to address our assertion that contractors who prepare EISs are subject to conflict of interest.
- Emphasize, in particular, that we believe that public comment meetings are mere charades, designed to let NPS say it as "considered public input" while merrily moving forward with what it decided to do long ago.
- Ask him if he, himself, would attend any future public meetings if he believed what we have come to believe.

Response: Although the NPS identifies a preferred alternative in the DEIS, it has not made a final decision about deer management at Rock Creek Park at that stage. The DEIS is released to the public and agencies for comment, and all comments are considered in making a final decision. The NPS Director's Order 12 requires that the Service identify in the EA and EIS processes a preferred alternative. "Through identification of the environmentally preferred alternative," the order states "the NPS decision-makers and the public are clearly faced with the relative merits of choices and must clearly state through the decision-making process the values and policies used in reaching final decisions." As part of this decision-making process, the DEIS was released to the public and agencies for comment, and all comments are considered in making a final decision. All public comments are read and analyzed by identifying and addressing common concerns, and those comments can and do result in changes in the plan. Responses to comments may be incorporated into the final decision, or the preferred alternative may be altered in response to public comment. Public meetings are used to solicit and gather public input on the plan, and the NPS considers all questions and comments made at these meetings. The NPS uses contractors at these meetings and to facilitate the process of developing compliance documents, but all decisions are made by NPS with public input.

The analysis in the DEIS regarding visitor use and experience is focused on park visitors, -- including neighboring property owners, who are also park visitors when they enter park property, -- and it is expected that opinions of these visitors are included in the public comments received. The preferences of the visitors as described in the DEIS were derived from data obtained from a visitor use study conducted for the park.

Concern ID: 22549

CONCERN STATEMENT: One commenter stated that the DEIS narrowly defines the interested public as only park visitors and fails to consider the potentially adverse impacts to the human environment. The commenter suggests that the final EIS include a more substantive understanding of the human environment and the interested public.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 114974 **Organization Type:** Non-Governmental

Representative Quote: The DEIS fails to completely evaluate reasonably foreseeable significant adverse impacts on the human environment, a priority in NEPA compliance (DEIS: 149). It does so by not adequately defining the "interested public" and considering its opinions regarding lethal controls. The DEIS instead defines the interested public narrowly as those who come to the park as visitors, and it engages in speculative assumptions about those visitors may or may not care about and value with respect to deer management as opposed to the broader public.

Corr. ID: 391 **Organization:** The Humane Society of the United

States

Comment ID: 115000 **Organization Type:** Non-Governmental

Representative Quote: The FEIS must account for the lack of a substantive understanding of what public opinion is on this issue, remove speculative assumptions about what visitors would or would not like to see, and provide a more thorough and deliberative discussion concerning this highly relevant issue.

Response: The EIS does analyze the effects of proposed actions and no action on visitor use and experience and on certain aspects of the neighboring population that were brought forth as issues during scoping. The interested public includes all of these parties and any others who commented on the plan during its development, beginning with scoping. The "human environment," as defined by CEQ regulations implementing NEPA, includes "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14), and is not a broad public interest category. By soliciting concerns from the public and any interested parties up front in the NEPA process at both the scoping and alternatives stages, and assessing impacts on visitors, park employees, and neighbors, the EIS takes into account many different public opinions and positions, which are not represented by any one group.

Concern ID: 22550

CONCERN STATEMENT: One commenter stated that the DEIS did not describe in enough detail the impact topics eliminated from further analysis and consideration. The commenter also suggested that more impact topics should have been eliminated from further analysis.

Representative Quote(s):

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

Comment ID: 114496 **Organization Type:** Non-Governmental

Representative Quote: The NPS will claim that NEPA requires it to evaluate the impact of the proposed action and its alternatives on a whole host of factors. That is only partially true in that NEPA allows agencies to dismiss from further consideration issues of little relevance and/or for which any impacts are inconsequential. In the Draft EIS, the NPS exercised this authority to dismiss from evaluation several issues. It should have, however, as explained in more detail below, gone further and dismissed other factors, identified below, from any substantive analysis.

Response: The NPS believes that the DEIS provides adequate detail for the impact topics eliminated from further analysis, and explanations are provided where impacts are assessed at negligible or minor levels (pages 27-32 of the FEIS). Additionally, the impact topics carried forward for further analysis have the potential to experience direct or indirect impacts from the existing deer herd or the implementation of the DEIS/plan, and are therefore included. Responses to comments directly relating to specific impact topics or studies used are available under concern statements for those impact topics.

PN1000 - Purpose and Need: Planning Process and Policy

Concern ID: 22553

CONCERN STATEMENT: One commenter stated that the NPS failed to solicit public input on the purpose and need statements for the DEIS and that it was unclear what process was used to create these purpose and need statements and who had input. Finally, the commenter concluded that the park's General Management Plan fails to provide data supporting the claims that deer are causing damage to the park and thus provides no foundation for the purpose and need statements.

Representative Quote(s):

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

Comment ID: 114439 **Organization Type:** Non-Governmental

Representative Quote: The NPS claims that the proposed massive deer cull is needed at this time to address: 1) the potential of deer become the dominant force in the park's ecosystem, and adversely impacting native vegetation and other wildlife; 2) a decline in tree seedlings caused by excessive deer browsing and the ability of the forest to regenerate in Rock Creek Park; 3) excessive deer browsing impact on the existing shrubs and herbaceous species; 4) deer impacts on the character of the park's cultural landscapes; and 5) opportunities to coordinate with other jurisdictional entities currently implementing deer management actions beneficial to the protection of park resource and values.

Independent of the legitimacy of these needs, it is unclear who developed these five need statements, the process used to create such statements, and what role the public played in reviewing these needs. As previously indicated, the RCP GMP provides no data or foundation supporting these need statements. It does not identify deer as a problem in RCP, does not claim that forest regeneration is an issue of concern, fails to provide any evidence of excessive deer browsing, reveals impacts to cultural resources that don't include deer, and does not detail any cooperative relationships with other jurisdictions relevant to deer management. The RCP natural resources management plan published in 1996 may or may not address or provide explicit objectives related to any of these resources (7) but, as conceded by the NPS, it does not "does not directly address deer management at the park." Draft EIS at 37.

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

Comment ID: 114443 **Organization Type:** Non-Governmental

Representative Quote: Considering that the NPS is relying on these need statements to ostensibly justify a significant reduction in RCP deer from 385 to 69 animals primarily through sharpshooting - an action that violates federal law - providing the public with the opportunity or a role in crafting such need statements should have been exercised in this case. Indeed, considering that the NPS is not legally obligated to initiate the lethal deer slaughter (which is illegal) and since public comments on the GMP indicate that RCP "visitors like, and would not want to change, most aspects of Rock Creek Park." GMP and EIS at 214, had the NPS solicited public comment on these or other need statements, it could have concluded that there was no urgent need to address these alleged "problems" attributable to deer and/or that the public would have preferred a non-lethal means of addressing this "problem." AWI concedes that the NPS engaged in the scoping process for the GMP in 1996, when the deer numbers in RCP were much lower, but the GMP process was not completed until 2007 when the deer population, if the NPS estimates are valid, had significantly increased in size.

Response: The five “Need for Action” statements presented in the FEIS (pages 1-2) were first developed by a NPS interdisciplinary team. They were subsequently presented to the public during public scoping meetings held at the Rock Creek Nature Center in November 2006. The exact language for the action statements was displayed on posters at the scoping

meetings and was also included in a mailing to an extensive mailing list. Public comments on the action statements and the purpose of the proposed DEIS were solicited for over 30 days, starting with the publication of the Notice of Intent in the Federal Register on September 20, 2006.

As stated in the response to comment concern 22614 (page 380), the General Management Plan does address deer management from a broad overall prospective. The DEIS addresses the more specific actions needed to address deer management in Rock Creek Park.

The Resource Management Plan (1996) does address deer management in Rock Creek Park. On page 7 it states that the deer population has increased significantly during recent years and that, at that time, it appeared that the habitat in the park was able to sustain them. However, it also noted that continued growth in the herd could result in vegetation degradation, losses of plant species, increased deer/vehicle collisions, and growing conflicts with area residents. Pages 44-45 of the Resource Management Plan list a project statement for deer which outlines what the park should do in the future. The statement outlines population monitoring, vegetation monitoring, and determinations by NPS staff on levels of vegetation damage at which actions to control herd size would be recommended.

Concern ID: 22554

CONCERN STATEMENT: One commenter stated that the NPS has failed to complete a natural resources management plan as required in the park's General Management Plan and NPS *Management Policies 2006*. The commenter also states that although the park's 1996 General Management Plan is adequate, it contains no evidence that deer issues are of concern in the park and provides no direction for deer management within the park, and therefore does not support this DEIS effort.

Representative Quote(s):

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

Comment ID: 114286 **Organization Type:** Non-Governmental

Representative Quote: As the NPS concedes in the GMP and EIS, upon completion of the GMP, "several more specific plans will be prepared to implement the general management plan" including, but not limited to, "an update to the existing natural resources management plan." GMP and EIS at 45/46. RCP has an existing natural resource management plan that was published in 1996. The revised natural resources management plan contemplated in the GMP and EIS "could include an invasive species control plan, erosion reduction plan, and plans to address particularly difficult issues, such as deer management." GMP and EIS at 46. The plan also "would include a bird management plan that would establish habitat protection and improvement objectives and practices for important bird areas." Id.

The development of a natural resources management plan after completion of the GMP is entirely consistent with the logical, incremental, and stepwise planning process required pursuant to NPS Management Policies. While the existing GMP is inadequate as it contains virtually no evidence that deer issues are of concern in RCP and provides no direction for the management of deer, if the NPS had complied with its own policies, the natural resources management plan would have disclosed additional information relevant to deer management, articulated desired future conditions, and delineated objectives and strategies to achieve those conditions.

To date, however, the NPS has not published a revised natural resources management plan for RCP and it is unknown if such a plan is under development or what the timeline is for its publication. Instead, in this case, the NPS has proceeded directly from its completion of the GMP - which contains no substantive information or evidence regarding the RCP deer population or management issues - to the Draft EIS which calls for the near complete removal of deer from RCP. Skipping the development or revision of a natural resource management plan is not permitted under NPS Management Policies.

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

Comment ID: 114288 **Organization Type:** Non-Governmental

Representative Quote: In general, after a program management plan, like a natural resource management plan, is completed, implementation plans will be developed. As described in the NPS Management Policies:

"Implementation planning will focus on how to implement activities and projects needed to achieve the desired conditions identified in the general management plan, strategic plan, and program management planning documents. Implementation plans may deal with complex, technical, and sometimes controversial issues that often require a level of detail and thorough analysis beyond that appropriate for other planning documents." Management Policies at 2.3.4.

The Draft EIS is an example of an implementation plan. In the case of RCP, however, the NPS has proceeded from the GMP to the implementation plan without completing, among other plans, a natural resources management plan as NPS policies require it to do. While this may, to some, be considered a trivial argument, it is actually rather important both because the NPS is required to follow a particular process and structure during planning, because the incremental nature of the planning process allows for a stepwise approach to natural resource management planning, and since a natural resource management plan for RCP would provide the public (and NPS decision-makers) with a better understanding of how the different desired conditions for the varied natural resources in RCP coalesce and how management strategies are structured to achieve these conditions.

Response: The NPS agrees with the commenter that the logical order of planning efforts would be the General Management Plan, followed by an updated Resource Management Plan and then implementation plans. As stated in NPS *Management Policies 2006*, 4.1.1, "(e)ach park with a significant natural resource base will prepare and periodically update a long-range comprehensive strategy for natural resource management." These plans are called Resource Stewardship Strategies. At this time, NPS is developing guidance on how these plans will be written. Several "pilot" parks have developed these Resource Stewardship Strategies as part of the development of guidance. It is anticipated that in the next few years, Rock Creek Park will begin the process of developing its Resource Stewardship Strategies. However, the lack of a Resource Stewardship Strategy does not prevent the NPS from proceeding with implementation planning, such as this plan/EIS.

PN3000 - Purpose and Need: Scope of the Analysis

Concern ID: 22555

CONCERN STATEMENT: One commenter stated that to support the purpose of the DEIS, the NPS must demonstrate both that deer are preventing or hindering the preservation and restoration of both environmental and cultural resources and that using lethal means to eliminate the deer would address the purpose. The commenter felt that the DEIS did neither. The commenter further states that the NPS must also analyze the impacts of other influences in comparison to those of deer.

Representative Quote(s):

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

Comment ID: 114117 **Organization Type:** Non-Governmental

Representative Quote: AWI strongly supports Alternative B with the caveat that, while the NPS has not conclusively demonstrated the need to reduce the RCP deer population, assuming that need can be justified then using non-lethal means is far preferable than the proposed slaughter. It is also consistent with NPS legal authorities.

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

Comment ID: 114432 **Organization Type:** Non-Governmental

Representative Quote: The purpose of the Draft 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." Draft EIS at 1. To be legitimate, the NPS must then demonstrate that RCP deer are preventing or hindering the preservation and restoration of native vegetation and other natural and cultural resources in the park.

While deer, inhabiting any ecosystem, will impact park vegetation, including forest regeneration, understory growth and production, and herbaceous cover, there are other factors that may also influence the ecosystem that can both beneficially and adversely impact a park's floral/vegetative characteristics including, in particular, temperature, precipitation, disease, urban development, visitor use activities, climatic conditions (i.e., drought), vandalism, illegal camping, off-trail use, horseback riding). In this case, the NPS must not only demonstrate that deer are impacting park natural and cultural resources, but it also must disclose and analyze the impact of other influences, it must demonstrate that the proposed action - the killing of hundreds of deer - will actually address the alleged impacts that the NPS has attributed nearly entirely to deer, and that there are no non or less-lethal alternatives available to the proposed action. The NPS has failed to fully disclose or evaluate such factors in the Draft EIS.

Response: The NPS has monitored deer populations in Rock Creek Park for nearly 20 years. Vegetation monitoring plots were installed in 1990 and have been monitored continually in four-year cycles. Paired plots (one fenced and one unfenced) were installed in 2000 and have been continuously monitored annually. Data from these plots has been analyzed twice, in 2004-2005 and in 2008-2010. These analyses have shown that tree seedlings counts across all species generally declined since 1991 and that counts for all height classes were near zero in 2007. The mean seedling stocking rates declined significantly from 1991 to 2007, with a stocking rate of 2.26 in 2007, significantly below the 67% stocking rate recommended for tree regeneration (see Hatfield 2008; Stout 1998; and appendix A). Rossell et al. (2007) analyzed four years of paired plot data and showed that deer are adversely impacting plant communities in the park. There was significantly less plant cover for native species in paired-unfenced plots compared to the paired-fenced plots. A report summarizing the results of the paired plot data for all nine years of paired plot monitoring (2001 to 2009; Krafft and Hatfield 2011) states that vegetation in plots protected from deer herbivory showed significantly greater vegetative cover compared to plots not protected from deer herbivory. This effect was most pronounced for woody and shrub cover. 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.

The commenter is correct in saying that there are other factors that may influence the ecosystem. However, the NPS has concluded that these factors taken individually or in combination are not responsible for the loss of tree regeneration evident in the park today. Deer are becoming the dominant influence on tree regeneration in the park. The purpose of the DEIS is to develop a management plan to change this influence. Many of the factors listed by the commenter are included in the cumulative impacts analysis described in chapter 4 of the FEIS (pages 159-169). Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions.

Concern ID: 23054

CONCERN STATEMENT: One commenter stated that due to a lack of analysis proving that the NPS actions are necessary, the proposed action is inconsistent with the NPS *Management Policies 2006*, and had concerns about genetic diversity.

Representative Quote(s):

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

Comment ID: 142012 **Organization Type:** Non-Governmental

Representative Quote: Finally, in regard to the mandate to protect the natural levels of genetic diversity of the RCP deer populations, the Management Policies require an assessment of that diversity which has not been done or, if done, has not been disclosed in the Draft EIS.

Response:

See response to concern 22556 below for discussion of compliance of the plan in general with NPS *Management Policies 2006* as related to removal of deer.

The scientific literature clearly indicates that the population reduction called for in the preferred alternative in the Rock Creek Deer Management DEIS will not adversely affect the genetic integrity or diversity of the Rock Creek white-tailed deer population. This is based on several lines of evidence, including

1. Genetic diversity and integrity of white-tailed deer is maintained even in the presence of genetic bottlenecks (periods during which only a few individuals survive and become the only ancestors of the future generations of the population) and small founder (initial population member) sizes. DeYoung et al. (2003) state: "Despite experiencing genetic bottlenecks or founder events, allelic diversity and heterozygosity (measures of genetic diversity) were uniformly high in all populations [of white-tailed deer in Mississippi]".

2. DeYoung et al. (2003) also point out several facets of white-tailed deer ecology that maintain genetic diversity even when population sizes are markedly reduced. These factors include: continuous habitat and few geographical barriers (DeYoung et al. 2003), even in the presence of anthropogenic activities and heavily urbanized landscapes (e.g., Swihart et al. 1995; Roseberry and Woolf 1998; Etter et al. 2002); a tending-bond mating system (Hirth 1977) that may decrease variance in male reproductive success; promiscuous females and the potential for multiple lines of paternity per litter (DeYoung et al. 2002); and high rates of productivity and the maintenance of higher effective population sizes relative to other ungulates (Geist 1998).

3. Yearling, male white-tailed deer exhibit high rates of dispersal (greater than 50%) on the east coast (Rosenberry et al. 1999) and elsewhere (Demarais et al. 2000; see also Shaw et al. 2006 and references therein). Such dispersal results in high levels of gene flow and the maintenance of genetic integrity and diversity (e.g., Nelson 1993; DeYoung et al. 2003). The Rock Creek Park deer population is part of a larger metapopulation (a group of spatially separated populations of the same species which interact at some level), and although deer immigration and emigration rates are currently unknown, it is clear that deer can be exchanged between the park and other areas (e.g., deer re-established in the park without human assistance over 40 years ago).

PN4000 - Purpose and Need: Park Legislation/Authority

Concern ID: 22556

CONCERN STATEMENT: Several commenters stated that the proposed action and alternatives are inconsistent with NPS legislation and policies, including the park's 1890 enabling legislation, the Organic Act, and NPS *Management Policies 2006* and that the NPS does not have a legal basis for deer management.

Representative Quote(s):

Corr. ID: 258 **Organization:** *Not Specified*

Comment ID: 114063 **Organization Type:** Unaffiliated Individual

Representative Quote: I saw a quote from the 1890 law which talked about how the Park Service had the mission of protecting the animals from spoilage. Now, it seems to me that shooting them isn't protecting them from spoilage.

Corr. ID: 276 **Organization:** Crestwood Citizens Association

Comment ID: 115056 **Organization Type:** Civic Groups

Representative Quote: Some expressed concern that the killing of the deer would be inconsistent with the mandate and mission of the National Park Service. The purpose is to preserve and protect the wildlife and the enjoyment of the people. Having deer shot in a National Park sends the wrong message and mars the serenity and peace that many of us associate with this national treasure.

Corr. ID: 277 **Organization:** City Wildlife

Comment ID: 115090 **Organization Type:** Conservation/Preservation

Representative Quote: Moreover, lethal methods are inconsistent with the Park Service's 1890 legislative mandate for Rock Creek Park 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."

Corr. ID: 392 **Organization:** Friends of Animals

Comment ID: 114314 **Organization Type:** Non-Governmental

Representative Quote: This Plan/EIS is inconsistent with the Organic Act, the Park's enabling legislation, and NPS management policies. The Organic Act requires the NPS to manage its lands "for one fundamental purpose. . . to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." 16 U.S.C. § 1. The NPS "is to afford the highest standard of protection and care to the natural resources within the National Park System." S. Rep. No. 95-528, at 14 (1977). The Organic Act forbids the NPS from allowing any activity that will cause "derogation of the values and the purposes for which [the area has] been established." 16 U.S.C. § 1a-1.

Shooting free-living white-tailed deer in a national park, such as Rock Creek, does not conform to the fundamental purpose of conserving wildlife within federal parks. Similarly, the impermissible use of hypothetical birth control within the herd is an activity fundamentally out of line with the NPS's mission to protect and conserve the natural resources of a park. Administering birth control and shooting deer in a National Park is a derogation of the values and the purposes for which Rock Creek has been established and is therefore a clear violation of the Organic Act.

Rock Creek's enabling legislation, states the Plan/EIS, created "a public park and pleasure ground for the benefit and enjoyment of the people of the United States" and further observes that in the park's establishment, Congress promulgated regulations "providing for the prevention from injury or spoliation of all timber, animals or curiosities within said park, and their retention in their natural condition, as nearly as possible."

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

Comment ID: 142006 **Organization Type:** Non-Governmental

Representative Quote: In addition to the Management Policies, the RCP enabling legislation also provides guidance on what is permissible within the park. As indicated in the Draft EIS, RCP was established in 1990 for the purpose of creating a "public park and pleasure ground for the benefit and enjoyment of the people of the United States." Draft EIS at 7, 11. Considering that an average of over 2 million people have visited/used RCP annually over the past several years, it is clear that the NPS has satisfied this purpose of RCP regardless of any concerns attributable to deer.

Recognizing the importance of conservation and threats posed by expected urbanization, Congress emphasized the preservation of the park's natural resource and scenery in the park's

enabling legislation. The specific language provided for the promulgation of "regulations 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." Draft EIS at 7, 11. As an initial matter, this language only explicitly calls for the protection of timber, animals or curiosities within RCP. This language would suggest that the NPS has the discretion to protect all or any of these three park amenities. In addition, the language does not call for the protection of other vegetation - shrubs, herbaceous cover - in RCP. Yet, the NPS has interpreted the language in an ecosystem context which may or may not be correct

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

Comment ID: 114208 **Organization Type:** Non-Governmental

Representative Quote: Beyond simply proving that the RCP deer population requires control, the NPS must also have a legal basis for implementing any action intended to implement said control. This is particularly important if the NPS, as is the case here, is proposing the use of lethal force via a regiment of sharpshooters who intend to invade the park under the cover of darkness to initiate the slaughter while perched in tree stands over piles of bait designed to attract the protected and unsuspecting deer to their death. As indicated above, not only has the NPS failed to provide a legitimate legal basis for the proposal, but the legal justification provided is wrong and reflects an improper - likely intentional - misinterpretation of the NPS Organic Act.

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

Comment ID: 114522 **Organization Type:** Non-Governmental

Representative Quote: The principal concern of the NPS in regard to deer in RCP is the alleged impact of deer on park vegetation, timber and non-timber. The enabling or establishing legislation for RCP specifies that the park is to "provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said ark, and their retention in their natural condition, as nearly as possible." GMP and EIS at 5, Draft EIS at 11.

Though the clear intent of the enabling legislation only specifies the protection and preservation of timber, animals and curiosities (i.e., not other vegetation), the NPS interprets the requirement to protect "timber" "in an ecological context to mean not individual trees, but the interrelated plant and animals populations that form the forest community." GMP and EIS at 40, 142. Beyond this self-serving interpretation, the NPS offers no additional evidence to suggest that it is required to protect and preserve non-timber species within RCP. AWI is not suggesting that non-woody/non-timber species are not worthy of protection but there is a compelling argument that can be made, based on the RCP enabling legislation, that the NPS should not use the condition or status of understory and/or herbaceous vegetation as a determining factor in deciding how to manage deer since there is no explicit requirement for the protection of these species in the park's establishing legislation.

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

Comment ID: 114405 **Organization Type:** Non-Governmental

Representative Quote: The Organic Act makes clear that the fundamental purpose of the NPS is to conserve park scenery, natural and historic objects, and wild life. A secondary purpose does not conflict with the fundamental purpose of the NPS, is to permit the enjoyment of the national parks by the public.

Response: The NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. Please see response to Concern 22703 (page 384).

Concern ID: 22558

CONCERN STATEMENT: Several commenters expressed concern that the proposed actions conflict with the NPS mission to preserve and protect wildlife within the park and to not intervene in natural processes. They maintained that by using the proposed lethal and nonlethal actions, the NPS will be manipulating and intervening in the natural ecological cycle of the park, which includes deer.

Representative Quote(s):

Corr. ID: 38 **Organization:** *Not Specified*

Comment ID: 114566 **Organization Type:** Unaffiliated Individual

Representative Quote: 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 nearly as possible." The Draft EIS seems to focus a great deal on preserving plants, but does not make a compelling case, for example, that deer overpopulation is a threat to the deer population or to other fauna. If your charge is "preservation from injury" of all animals, including deer, then I am hard-pressed to see how this plan achieves that vision. Regardless of whether the deer population has increased since the creation of the park, I imagine that the "natural condition" of the park included many more animals (deer and others) than currently live within the Park's boundaries.

Corr. ID: 278 **Organization:** *Not Specified*

Comment ID: 115098 **Organization Type:** Unaffiliated Individual

Representative Quote: Moreover, the centrai mission of the National Park Service is to not intervene in natural processes unless a compelling case can be made that these natural processes have been suspended or prevented through human actions. The deer population in the park has not grown as a result of human actions. Therefore, the NPS should not even be attempting to control the deer population in the park. By doing so, the NPS will be intervening, interfering and manipulating a natural, native biotic community of an ecologically interacting system which it is mandated to conserve.

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

Comment ID: 114514 **Organization Type:** Non-Governmental

Representative Quote: Assuming, without conceding, that the Management Policies are all consistent with the intent of the Organic Act, the only circumstances that permit the NPS to intervene and manipulate or interfere with natural processes, including succession, is to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities, to address a species population that is unnaturally high as a result of human influences if said influences cannot be mitigated, and to protect rare, threatened, or endangered species. In regard to the first standard, we must return to the issue of what is natural and can natural conditions be legitimately restored to RCP given its location and multitude of threats to its wildlife and other resources caused by external factors. The second standard is not relevant in this case both because it hasn't been proven that the RCP deer population is "unnaturally high" but mainly because there are means of mitigating human influences including the use of non-lethal immunocontraceptive technologies and to explore alternative management strategies for deer management outside of RCP with other federal, state, and county agencies. The third standard is also not relevant since the NPS has offered no evidence in the Draft EIS, beyond mere speculation, that deer in RCP are adversely impacting protected species.

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

Comment ID: 114520 **Organization Type:** Non-Governmental

Representative Quote: Based on the NPS interpretation of the RCP enabling legislation, the NPS has concluded that the RCP exists to, among other reasons, "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." Draft EIS at 11. This mandate, to be consistent with the Organic Act and Management Policies, must apply to natural processes that occur in RCP. Consequently, since deer and impacts attributable to deer in RCP are entirely natural and part of a successional process underway in the park, the RCP enabling legislation also provides no basis for implementing the proposed action.

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

Comment ID: 114499 **Organization Type:** Non-Governmental

Representative Quote: While it is, as demonstrated by the NPS, possible to selectively remove specific NPS Management Policies to claim that the NPS has the authority to implement the proposed action, when the Management Policies are considered in total and in the proper context, the use of lethal control to remove native wildlife from a national park is limited to extraordinarily rare circumstances. It is, indeed, clear from the Management Policies that the NPS places considerable emphasis on preserving natural processes, including succession. These are precisely the processes that are playing out within RCP in regard to its deer population and other park resources. It is also clear from the Management Policies that protection and restoring natural conditions is important.

Response: The NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system. Please see response to Concern 22703 (page 384).

PN5000 - Purpose and Need: Regulatory Framework

Concern ID: 22616

CONCERN STATEMENT: One commenter stated that there are no legal restrictions within the NPS *Management Policies 2006* that prevent members of the hunting community from participating in lethal wildlife management within national parks.

Representative Quote(s):

Corr. ID: 382 **Organization:** Safari Club International

Comment ID: 115024 **Organization Type:** Non-Governmental

Representative Quote: 3. The regulations that the Secretary of the Interior has promulgated for the purpose of administering the National Park System do not prohibit the Secretary or a Park Superintendent from managing a park's overabundant wildlife using individuals from the hunting community as a wildlife management resource. Although there are regulations, such as 36 C.F.R. § 2.2, that restrict hunting activities on NPS lands, such rules are overridden by NPS regulations that permit the NPS and its agents to conduct activities necessary to counteract threats to park resources. For example, 36 C.F.R. § 1.2 specifically states that

(d)The regulations contained in parts 2 through 5, part 7, and part 13 of this section shall not be construed to prohibit administrative activities conducted by the National Park Service, or its agents, in accordance with approved general management and resources management plans, or in emergency operations involving threats to life, property or park resources.

Corr. ID: 382 **Organization:** Safari Club International

Comment ID: 115022 **Organization Type:** Non-Governmental

Representative Quote: 1. Nothing in the statutes, regulations and policies that establish the authority of the National Park Service prevent the NPS from utilizing members of the hunting community to assist an individual park and/or the state wildlife management authority in managing, culling or reducing an overabundant wildlife population on park land,

much as the NPS has used professional sharpshooters.

Corr. ID: 382 **Organization:** Safari Club International

Comment ID: 115027 **Organization Type:** Non-Governmental

Representative Quote: 4. Similarly, NPS Management Policies do not prevent the NPS from utilizing members of the hunting community as agents of the NPS or state wildlife management authority for a culling (e.g., non-hunting) operation. For example, policy provision 4.4.2.1, entitled "NPS Actions That Remove Native Plants and Animals" acknowledges the Service's use of "others to remove plants or animals" but does not restrict the term "others" to include only paid sharpshooters. The same policy provisions recognizes the use of "destruction of animals by authorized agents," but does not restrict the term "authorized agents" to individuals who are paid for their sharpshooting skills.

Response: NPS acknowledges that there is nothing in NPS *Management Policies 2006* that prohibits members of the hunting community from assisting the park with culling actions. However, the park has determined that due to a number of concerns, it will not be using skilled volunteers to assist with culling under this plan/EIS. (See response to concern 22591on page 362.)

Concern ID: 24345

CONCERN STATEMENT: One commenter stated that it is within the Secretary of the Interior's authority to use lethal wildlife management actions when research proves the wildlife is detrimental to the use of the park. However, the commenter asserted that with regard to this plan, the NPS has ignored the standard for wildlife removal and has no evidence that deer are detrimental to the park.

Representative Quote(s):

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

Comment ID: 114411 **Organization Type:** Non-Governmental

Representative Quote: Independent of the plain differences between the scenario in New Mexico State Game Commission and the present proposal for RCP, the critical finding in the case was as follows:

Clearly the Secretary has broad statutory authority to promote and regulate the national parks to conserve the scenery and wildlife therein 'in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.' 16 U.S.C. § 1. Anything detrimental to this purpose is detrimental to the park. In addition to this broad authority, the Secretary is specifically authorized 'in his discretion' to destroy such animals 'as may be detrimental' to the use of any park. 16 U.S.C. § 3. The obvious purpose of this language is to require the Secretary to determine when it is necessary to destroy animals which, for any reason, may be detrimental to the use of the park. He need not wait until the damage through overbrowsing has taken its toll on the park plant life and deer herd before taking preventive action no less than he would be required to delay the destruction of a vicious animal until after an attack upon a person. In the management of the deer population within a national park the Secretary can make reasonable investigations and studies to ascertain the number which the area will support without detriment to the general use of the park. He may use reasonable methods to obtain the desired information to the end that damage to the park lands and the wildlife thereon may be averted.

This language supports the interpretation of the Organic Act language that links the impairment standard to the "enjoyment" of the parks. Activities that are detrimental to such "enjoyment" are detrimental to the parks and are impermissible. Moreover, the court identified an entirely different legal standard, 16 USC 3, when determining the authority for the NPS to remove wildlife from the parks when it can be demonstrated that wildlife use is "detrimental to the use of the park." The NPS in RCP is not relying on this standard to justify its wide-scale deer control program and, in fact, as discussed in greater detail below, it would be hard pressed to do so since there is no evidence that the deer in RCP are "detrimental to

the use" of the park.

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

Comment ID: 114426 **Organization Type:** Non-Governmental

Representative Quote: The only other legal authority that the NPS can consider to justify the proposed action is that contained in 16 USC 3. That statute permits the removal of park wildlife only when said wildlife is detrimental to the use of the park. Years ago, the NPS at Grand Canyon National Park relied on this authority to authorize the lethal removal of deer who had become too aggressive toward hikers as a result of being conditioned to receive food handouts. The criteria that must be met to exercise this statutory provision, is that the NPS must demonstrate that the wildlife is detrimental to the use of the park. The term "use" clearly refers to a public use authorized by the NPS. In the case of the RCP, the NPS can't meet this standard since it can point to know evidence, beyond speculation, that RCP deer are adversely impacting the use of the park. Even if the RCP believes that it can satisfy this criteria, it can't simply change course in the middle of its planning process to propose a new, legal justification, for its proposed action. Instead, if the NPS were to choose to pursue this argument, it must prepare a supplemental NEPA document and disclose all of the evidence it may have to meet this legal standard.

Response: The NPS believes that the plan/EIS is in compliance with the Organic Act and associated implementing regulations and policies, as well as the enabling legislation for the park. As described on pages 12-13 of the FEIS, the NPS has broad authority to manage wildlife and other natural resources within the boundaries of units of the national park system.

Section 4.4.2 of the NPS *Management Policies 2006* directs park managers to rely upon natural processes to maintain native plant and animal species and influence natural fluctuations in populations of these species whenever possible. However, when certain conditions exist, there is a recognition that managers may need to intervene to manage individuals or populations of native species. One of these conditions is when a population occurs in an unnaturally high or low concentration as a result of human influences (such as loss of seasonal habitat, the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences. This condition applies to the deer population at Rock Creek Park, as they have no significant natural predators and the park provides an island of habitat in a highly urban environment. Because it is expected that there will be 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.

PN8000 - Purpose and Need: Objectives in Taking Action

Concern ID: 22619

CONCERN STATEMENT: One commenter stated that the objectives in the DEIS would lead to significant change in Rock Creek Park management and would be inconsistent with NPS policy. The commenter also stated that the document fails to provide sufficient evidence to substantiate each objective.

Representative Quote(s):

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

Comment ID: 114471 **Organization Type:** Non-Governmental

Representative Quote: The objectives include, but are not limited to: 1) developing scientifically-based vegetation impact levels and corresponding deer population density to trigger management actions; 2) protect the natural abundance, distribution, and diversity of native plant species by reducing excessive deer browsing, trampling, and nonnative seed dispersal; 3) maintain, restore and promote a mix of native plant species and reduce nonnative plant species; 4) protect the natural abundance, distribution, and diversity of native

animal species within the park by reducing excessive deer browsing, trampling, and nonnative seed dispersal; 5) protect lower canopy, shrub, and ground nesting bird habitat from adverse effects of deer browsing; 6) protect habitat of rare plant and animal species from adverse effects of deer, such as excessive deer browsing, trampling, and nonnative seed dispersal; and 7) sharing information with the public about the deer population, forest regeneration process and diversity, and the role of deer within the ecosystem but not the primary driving force within it. Draft EIS at 2.

A problem with many of these objectives is that they advocate for a significant change in RCP management, including deer management, which is inconsistent with NPS legal standards, including its Management Policies, and for which the NPS has failed, in most cases, to provide sufficient evidence to substantiate each objective. Many of the objectives represent actions that would disrupt natural processes and dynamics in RCP, including natural forest succession processes. Moreover, though the NPS suggests that these objectives must be achieved to protect the long-term health of RCP and its resources, the NPS fails to provide evidence to substantiate the need for these objectives. For instance, the NPS proposes to significantly reduce the RCP deer population to: restore the natural abundance, distribution, and diversity of native plant species; promote a mix of native plant species; reduce nonnative plant species; protect the natural abundance, distribution, and diversity of native animal species within the park; protect lower canopy, shrub, and ground nesting birds would have to be found in the park to satisfy the NPS desire to protect these species, and what rare plant or animals species existing historically in RCP that don't exist now due solely to the impacts of deer.

Response: The NPS disagrees with the comment that the objectives in the DEIS would lead to a significant change in the Rock Creek Park management. The purpose of the DEIS is to develop a deer management plan that will support long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park. The objectives are written as broad statements representing policy that the park is currently mandated to follow. The objectives were developed from enabling legislation, the Organic Act, and other planning documents. NPS *Management Policies 2006* state that natural resources will be managed to preserve fundamental physical and biological processes. Also, if these processes have been altered in the past by human activities, the NPS may need to actively manage these processes to restore them to a natural condition or to maintain the closest approximation of natural condition. The entire DEIS addresses the need to take action to actively manage the park's deer population and presents justification for taking this action. The objectives were developed to measure the success of the proposed action to manage the deer population and do not represent actions to be taken.

Concern ID: 22620

CONCERN STATEMENT: One commenter stated that the issues raised by the purpose and need statements are not adequately discussed or analyzed within the DEIS.

Representative Quote(s):

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

Comment ID: 114454 **Organization Type:** Non-Governmental

Representative Quote: An evaluation of each needs statement provides additional evidence of the failure of the NPS to adequately discuss and analyze these issues in the Draft EIS. For example, the NPS asserts that it does not want deer to become the dominant force in the park's ecosystem. In reality, deer are a dominant species in most ecosystems that they inhabit and their behaviors, including their foraging activities, are intended to alter and modify ecosystems. While this dominance can be limited though hunting or lethal management, within national parks, the dominance of deer is entirely natural and must be protected as a part of the natural processes that shape and mold national parks. While the NPS may not prefer this approach, it has provided no legal basis, as discussed in greater detail below, to justify the reduction of the park's deer herd.

Similarly, the NPS desires to reverse the alleged decline in tree seedlings and forest regeneration in RCP. Far from being unnatural or a "problem" as perceived by the NPS, the lack of tree seedlings and lack of forest regeneration is part and parcel of natural succession. Again, within national parks, such natural processes are to be allowed to influence ecosystem characteristics and dynamics in a park. Deer impacts to RCP shrubs and herbaceous species are also part of natural succession.

Response: The purpose and need statements presented in the EIS focus on the effect deer have on the natural regeneration of tree species and on understory vegetation in the park, which are essential elements of the park's wildlife habitat and cultural landscapes. The EIS thoroughly analyzes the effects of deer on vegetation, tree regeneration, habitat, and cultural landscapes in chapter 4 (Vegetation, Wildlife, and Cultural Landscapes sections). Also, the park-specific monitoring results described in the analysis demonstrate that the lack of regeneration in the park is caused by deer and is not due to natural succession (see also response to concern 23042 on page 374).

Concern ID: 22622

CONCERN STATEMENT: One commenter stated that the nonlethal methods did not meet the objectives of the DEIS because they did not ensure effective reproductive control.

Representative Quote(s):

Corr. ID: 392 **Organization:** Friends of Animals

Comment ID: 114309 **Organization Type:** Non-Governmental

Representative Quote: Moreover, to use the park's deer experimentally is contrary to the goals of the Plan/EIS. For example, experimental fertility control has been known to prolong the lifespan of the Assateague Island mares from six to twenty years due to the elimination of the biological stress of reproduction. Thus, working against the logic of reducing numbers, reproductive control is likely to enable a current population of free-roaming animals to live longer.

Response: See response to concern 23059 (page 345). The NPS agrees that currently there is no agent available that will ensure effective reproductive control in a free-ranging deer population. There are no studies that indicate that fertility control can increase the life span of deer, although that is a possibility. However, it is not evident in the literature that immunocontraception has reduced deer populations to a level where tree regeneration can occur and to protect rare plant species. In the Fire Island National Seashore West End communities, the density in 1995 was over 80 deer per square mile. This stabilized at 40 per square mile in 2006 (Rutberg and Naugle 2008). This density is twice the recommended density for forest regeneration. Densities remained high enough to have repeatedly initiated U.S. Geological Survey (USGS) research proposals to use electric fencing to protect the Sunken Forest, a globally imperiled plant community within the park (personal communication, Brian Underwood, USGS wildlife biologist, 15 June 2009).

Deer have been treated with immunocontraceptives at the National Institute of Standards and Technology since 1997. By 2009 the population had dropped from 315 to 191. The stated goals of the project were to reduce deer-vehicle collisions, improve wildlife habitat, and restore vegetation. While there was not a predefined population goal objective (Rutberg and Naugle 2007), the deer abundance remains well above what is needed to support tree regeneration. No data was presented about the improvement of wildlife habitat or vegetation restoration.

Deer densities at Rock Creek Park have remained between 60-80 deer per square mile during the past ten years of monitoring. It is estimated that immunocontraceptive use at Rock Creek Park would not reduce deer density below 20 deer per square mile within the life of the plan, while sharpshooting would take 3-4 years to reach this goal.

Concern ID: 22624

CONCERN STATEMENT: One commenter suggested that an additional objective regarding the impact to park neighbors should be included.

Representative Quote(s):

Corr. ID: 221 **Organization:** *Not Specified*

Comment ID: 113566 **Organization Type:** Unaffiliated Individual

Representative Quote: It is a major disappointment that the objectives Do Not mention the impact of the Park's Deer on the Park's neighbors.

Response: The objectives that were developed for the DEIS are park-specific and focus on the park resources and park operations. The scope of the DEIS is the administrative unit of Rock Creek Park and the park's resources. The DEIS does not specifically address the areas surrounding the park, although these areas are mentioned in the plan in relationship to impacts of the alternatives on the park's deer population. Creating an additional objective to address park neighbors would not be warranted because: (1) the NPS lacks authority outside park boundaries and (2) the NPS lacks data showing impacts to park neighbors.

Concern ID: 23058

CONCERN STATEMENT: One commenter stated that the reduction of the deer population would not remove the presence of deer-related diseases under alternatives B, C, or D, and therefore disease control could not be used as a valid reason to decrease the size of the herd.

Representative Quote(s):

Corr. ID: 40 **Organization:** *Not Specified*

Comment ID: 114128 **Organization Type:** Unaffiliated Individual

Representative Quote: I live in 16th Street Heights, two blocks from Rock Creek Park. I walk my dog daily in the park. I was diagnosed with neuro-borreliosis (Lyme disease) in 2003, and underwent treatment for 5 years. I know first hand how devastating Lyme disease can be. Due to my illness, I had to stop working, could not drive a car or do everyday tasks such as cook a meal.

While a high concentration of white-tailed deer can contribute to the spread of diseases, such as tick-borne diseases, many other species of mammals do as well. Given Lyme disease is already present in Rock Creek Park, reducing the numbers of deer will have little impact on the prevalence of Lyme disease and other tick-borne diseases, as the black-legged ticks (also known as deer tick) will seek other hosts, including humans.

None of the alternatives proposed in the White-Tailed Deer Management Plan would significantly reduce the presence of Lyme disease in Rock Creek Park. The White-tailed Deer Management Plan and Draft Environmental Impact Statement states (p. 239) that "the presence of rabies, Lyme disease, and West Nile virus would continue under alternative A." But the presence of disease diseases would also continue under alternative B, C, and D; and therefore the presence of diseases is not a valid reason to control the deer population, and it certainly does not justify such drastic measures as lethal control.

Response: Disease control is not the reason behind the proposed act to reduce the size of the herd. The purpose and need for the reduction are described in chapter 1 of the FEIS, pages 1-2, and focus on the adverse impacts of deer on native vegetation and other wildlife and the effects on forest regeneration. Although a change in deer-related disease could occur as a result of a substantial reduction in the deer population, this would be an indirect effect of taking action and not an objective of the plan.

SE4000 - Socioeconomics: Impact of Proposal and Alternatives

Concern ID: 22625

CONCERN STATEMENT: One commenter stated that if the NPS does not reduce the deer population, the agency should be liable for all property loss or damage to adjacent lands.

Representative Quote(s):

Corr. ID: 159 **Organization:** *Not Specified*

Comment ID: 115225 **Organization Type:** Unaffiliated Individual

Representative Quote: Clearly there are accountability issues involved because NPS action or inaction. Your decisions will directly impact citizens and homeowners. If government policies encourage more property damage and loss, I believe NPS can be liable for these losses.

Corr. ID: 159 **Organization:** *Not Specified*

Comment ID: 115223 **Organization Type:** Unaffiliated Individual

Representative Quote: Specifically, if the NPS does not actively work to reduce the herd, who will compensate us for our property losses and future losses? Who is accountable for such destruction?

Response: NPS acknowledges that actions or inactions with regard to the deer population may impact citizens and homeowners. However, deer are considered wild animals. Although many spend a majority of their time in the park, they are not bound by any barriers and can move freely between the park and the neighborhood areas surrounding the park. Because the NPS has management jurisdiction solely within the boundaries of the Rock Creek Park administrative unit, the DEIS only addresses deer management inside the park boundaries.

Concern ID: 22627

CONCERN STATEMENT: One commenter stated that the socioeconomic analysis in the DEIS does not take into consideration the beneficial economic value of the deer herd.

Representative Quote(s):

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

Comment ID: 114793 **Organization Type:** Non-Governmental

Representative Quote: As is frequently the case with the socioeconomic analysis contained in most NEPA documents, the analysis in the Draft EIS is entirely one-sided focused solely on the alleged adverse impact of deer on adjacent homeowners and landscaping. Of course, deer may have both a beneficial and adverse impact on the socioeconomics of RCP and the surrounding urban areas yet these beneficial impacts, as is the case here, are rarely disclosed or evaluated.

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

Comment ID: 114794 **Organization Type:** Non-Governmental

Representative Quote: Considering that the NPS now proposes to engage in a massive slaughter of deer in RCP, the fact that RCP did not, at least in recent years, reinitiate an effort to more accurately record complaints about deer by adjacent landowners is disconcerting. Because of this, the NPS cannot report on the number of such complaints. As a result, there's no way of knowing whether the percentage of complainants is significant or not. It is, in fact, very possible that the proportion of adjacent landowners who actually have complained about deer impacts to their landscaping is quite low. AWI acknowledges and commends the NPS for its efforts to field inquiries/complaints from adjacent landowners and to educate them about deer, deer biology and ecology, how to live with deer, and how to landscape their properties using species and techniques to reduce the potential for deer

damage. However, without data on the number of complaints, the location of the complaints, the type of damage reported, the severity of the damage, the estimated cost of repairing the damage, efforts undertaken to "deer-proof" landscaping (i.e., use of repellents, planting non-palatable or less palatable species, installing fencing), and the success of those efforts to address the "problem" it is impossible to consider this alleged impact in relationship to the broader deer management plan.

As a consequence, unless the NPS discloses and analyzes such data, it cannot rely on the alleged impacts of deer on adjacent landowners and their landscaping to justify or support the proposed action.

Moreover, the NPS must also consider the economic value of deer to balance its analysis of the alleged economic impacts of deer impacts to landscaping. For many persons who reside near or use RCP, deer may be of significant value in terms of their beauty, opportunities to observe them in their natural habitat, and, for some, the ability to observe park deer in their own yards. There are economic values associated with these benefits that must be considered during the planning process.

Response: The socioeconomic analysis included in the DEIS was limited to the effects on neighboring landowners from damage to landscaping by deer browsing because this is the issue that was identified by the public and park staff during scoping for this project. Although some public comments addressed the desire to not have lethal removals or hunting, these did not include concerns about not seeing deer in backyards or the benefits of that experience. A 1997 study by Lori Lynch ("Maryland Deer Valued for Social, Recreational, and Commercial Reasons") states that the majority of Maryland residents are willing to incur some damage to have deer around them (51% of Central Marylanders; 63% of Eastern Marylanders), suggesting a value for deer presence that can be balanced against costs to replace landscaping or to buy repellents or deer-resistant plants. However, during public scoping for the Rock Creek Deer plan, the issue of beneficial economic impact of seeing deer was not identified or raised. The intrinsic benefit of the experience of seeing deer in the park was addressed in the DEIS as part of the visitor use and experience section, which included the park and adjacent landowners in the analysis.

SO4000 - Soundscapes: Impact of Proposal and Alternatives

Concern ID: 22629

CONCERN STATEMENT: One commenter suggested that the soundscapes analysis related to lethal removal actions be revised, taking into account required sound-suppression devices for sharpshooters. Another commenter was concerned that noise suppressors would be recommended but not required.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114980 **Organization Type:** Unaffiliated Individual

Representative Quote: Suggestion: Section on Soundscapes, Alternatives C and D on page ix should be changed to reflect the minimal soundscape impacts of sharpshooting as a result of required sound-suppression devices.

Corr. ID: 209 **Organization:** *Not Specified*

Comment ID: 165717 **Organization Type:** Unaffiliated Individual

Representative Quote: Moreover, the sound of thousands of gunshot blasts will leave District residents, who already deal with one of the highest rates of violent crime in the country, on edge. As the DEIS makes clear, noise suppression devices for the firearms used in any lethal action will not be mandated, but merely "recommended." Since there is thus no guarantee that silencers, which are expensive, will be used, District residents have no reassurance that they will not have to endure repeated gunshot blasts in their community. Many will likely become frightened and call the Metro Police Department, which will only

add to the cost and government burden of the lethal action alternative. Given its proximity to the White House, the Capitol, the State Department, and dozens of embassies and federal buildings, Rock Creek Park may be the most inappropriate place in the entire Nation to implement a shooting plan.

Response: The DEIS analysis under alternatives C and D has taken into account the use of sound-suppression devices. Page 236 of the FEIS details the expected noise levels for both standard small caliber rifles and similar rifles discharged with a suppressor. Text has been changed in the FEIS to clarify that noise suppressors will be used.

TE2000 - Threatened and Endangered Species: Methodology and Assumptions

Concern ID: 22630

CONCERN STATEMENT: One commenter stated that the assumptions and basis for the impact analysis for threatened and endangered species was speculative and baseless and therefore should not be included in the decision-making process.

Representative Quote(s):

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

Comment ID: 114714 **Organization Type:** Non-Governmental

Representative Quote: While the NPS suggests that the continued growth of the deer populations "could degrade surface springs by increasing erosion and sedimentation, compacting soils, and altering vegetation composition," Draft EIS at 204, it concedes that the long-term protection of groundwater quality afforded by the park any future growth in the deer population and the associated impacts "are not expected to critically affect this species." Id. and Draft EIS at 209 Moreover, considering that the NPS apparently has no studies providing a causal link between surface erosion (assuming that even this can be appropriately attributable to deer) leads to impacts on the quality of underground water resources, Draft EIS at 27, 205, the NPS has no scientific foundation upon which to substantiate such claims. Consequently, the alleged, yet entirely baseless, claims that deer may impact this federally protected species must not be a factor considered in the decision-making process.

Response: There are many threats and potential threats that may be degrading the habitat of the federally listed Hay's Spring Amphipod. Rock Creek Park is a heavily used recreation site. The watershed outside the park is highly urbanized. Because Hay's Spring Amphipod inhabits seeps or springs, the quality of the groundwater feeding these habitats is of particular concern. Wet soil is highly vulnerable to erosion, especially when plants and litter are removed and trampled. The general principles are established in the literature of the direct and indirect erosional impacts by animals on land surface, whether animals are wild or domesticated, in large or small numbers depending on habitat (Evans 1998). Overabundant white-tailed deer are widespread throughout the eastern United States. Large herbivores, including white-tail deer, have known direct effects on ecosystems through trampling (Persson et al. 2000), soil compaction (Heckel et al. 2010), decreased detrital accumulation, changed geochemical cycling, secondary production, and other ecosystem processes (Huntly 1991) and known indirect effects such as soil degradation (Wardle et al. 2001).

Park-specific data from Culver and Sereg (2004) showed water quality degraded at several of the springs along Rock Creek within Hay's Spring amphipod's range. Culver and Sereg found that sediments of the spring runs were clogged with fine particles as a result of storm water runoff. This sediment clogging results in habitat degradation of groundwater animals and prevents them from persisting in interstices of gravels. Culver and Sereg went on to make several management recommendations to protect the integrity of the groundwater springs in Rock Creek Park: (1) the recharge and drainage areas, as well as the seeps themselves, need to be protected; (2) existing forested conditions should be maintained in recharge areas; and (3) compaction of soils should be avoided in local areas around springs. This supports the need by Rock Creek Park to protect the fragile wet habitat of hillside seeps

and springs from excessive trampling by the overabundant numbers of white-tailed deer in the park.

In addition, the commenter states that the federally listed species not be a part of the decision-making process of this EIS due to a lack of direct, explicit causal data. It is NPS policy and law (Endangered Species Act and amendments) to consider the protection of federally listed species in any management decision in the park. The Section 7 Endangered Species Act process requires direct and indirect effects of a federal action on a listed species to be considered.

Text changes stemming from this concern statement have been made in the FEIS (page 29 and 206 of the FEIS).

TE3000 - Threatened and Endangered Species: Study Area

Concern ID: 22631

CONCERN STATEMENT: One commenter discussed the habitat for species of greatest conservation need (as listed in the Wildlife Action Plan [WAP]) within the District, noting that Rock Creek Park constituted the majority of this habitat. The commenter felt that the DEIS needed to incorporate the findings of this document.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114987 **Organization Type:** Unaffiliated Individual

Representative Quote: The EIS does refer briefly to D.C.'s WAP (page 29, for example), but it is important to note that the vast majority of the hardwood habitat of D.C. is represented by RCP. The extent to which the WAP refers to threats to this habitat, it refers to RCP. There are 11 mammals are on the WAP's list of animals with the greatest conservation need (note that the white-tailed deer is NOT one of them). These 11 mammals rely on healthy hardwood forest habitat. According to the WAP, D.C.'s hardwood forests (i.e. RCP) are in fair condition, but trending downward.

Response: The 11 mammal species described as species in need of conservation in the WAP are represented by common species (opossums, eastern cottontail, eastern chipmunk, southern flying squirrel, red bat, mink, grey fox, river otter) that can be found in most hardwood forests, regardless of their condition. There are two rare species that have not been recently detected in the District (small-footed bat and southern bog lemming), and one species that has been extirpated from the District (Allegheny woodrat). The forests of Rock Creek Park contribute a great deal of habitat for the common species on the WAP list, and the EIS recognizes this by stating that “because of the habitat value provided by Rock Creek Park, many of these species are found in the park” (FEIS, page 29).

According to the Rock Creek Park Condition Assessment (Carruthers et al. 2009), the forests of the park are in “good” condition (page 77). The high deer population and low native tree seedling diversity contributed a score of zero. The low percentage of impervious surface and high forest connectivity (100%), low number of forest pest species, low presence of exotic trees and shrubs (70%), and diverse forest interior dwelling species (100%) contributed to the “good” rating (page 76), and this good condition helps support rare and other species in the District and surrounding suburbs.

VE2000 - Visitor Experience: Methodology and Assumptions

Concern ID: 22635

CONCERN STATEMENT: One commenter felt that there was no evidence supporting the claim that the public opinion on seeing deer in the park had changed since the General Management Plan planning process and argued that seeing deer may improve visitor experience, regardless of the reason for visiting the park.

Representative Quote(s):

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

Comment ID: 114785 **Organization Type:** Non-Governmental

Representative Quote: Second, as the NPS concedes, the most common reasons for visiting RCP are to exercise (61%), to escape the city (47%), spending time with family/friends (37%), enjoying solitude (30%), and so-called "other" reasons including attending a concert, walking the dog, golfing, gardening, enjoying nature, eating lunch, commuting home, visiting the planetarium, and studying (a combined 29 percent). Draft EIS at 238, 136 (28). With the exception of those who visit the park to enjoy nature which was discussed above, none of the other reported reasons for visiting RCP have any relevance to deer management in the park. However, since most RCP visitors come from the Washington, DC, metropolitan area, it is not out of the question that the opportunity to see one or more deer during their visit actually makes their experience more, not less, enjoyable.

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

Comment ID: 114789 **Organization Type:** Non-Governmental

Representative Quote: Similarly, again during scoping, the NPS reported that "many people commented on the value of seeing wildlife in the parks, especially in contrast to the surrounding urban environment," GMP and EIS at 41, and that "white-tailed deer, the largest and most conspicuous mammal (in RCP) was most frequently mentioned." Id. AWI concedes that the RCP deer population was likely smaller in 1996 than in more recent years but, if those members of the public expressed interest and value in seeing deer in RCP in 1996 why would the public in 2008 or 2009 express a different opinion and what evidence does the NPS have to suggest that public sentiment has changed?

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

Comment ID: 114787 **Organization Type:** Non-Governmental

Representative Quote: Third, as stated by the NPS in the RCP GMP:

"Scoping demonstrated that there is much that the public likes about the park. Indeed, one of the most common comments during scoping was that the park is fine just the way it is today. In particular, people want the traditional character of the park to continue, although many also expressed concern about the effects of traffic on the recreational experience." GMP and EIS at 29 (emphasis added).

While, admittedly, scoping for the GMP was conducted in 1996 when the RCP deer population was reported smaller, the NPS published this statement in its 2007 GMP and EIS without any attempt to update, correct, or explain that what was considered "fine just the way it is today" in 1996 may no longer be applicable in 2007. In fact, based on comments submitted on the Draft GMP, the NPS determined that RCP "visitors like, and would not want to change, most aspects of Rock Creek Park." GMP and EIS at 214. Among the attributes that visitors reported to like were the park's "pleasing appearance and the range of activities." Id. Instead, the NPS apparently elected to make the case that nearly all, with the primary exception of traffic, was well within RCP allowing it to focus, albeit illegally, the GMP on traffic management issues.

Response: The NPS does not claim that public opinion has changed since the General Management

Plan planning process. The General Management Plan recognizes the need for deer management and states that "[d]eer populations are capable of increasing very quickly, and the increases in 1998 and 2003 are consistent with a rapidly expanding deer population. The NPS will be preparing an EA or EIS on the impacts of managing the park's deer population." (General Management Plan, page 146). The park agrees that seeing deer can benefit visitor experience and may affect some visitors more than others, depending on the reasons for visiting. Impacts on visitors wishing to see deer under alternatives C and D are addressed on pages 245-247 of the FEIS, and it is acknowledged that the ability to see deer may be decreased; however, the plan does not eliminate deer from the park, and has an objective of "allowing for a white-tailed deer population in the park" (FEIS, page 2), which all alternatives must meet.

Concern ID: 22636

CONCERN STATEMENT: One commenter had several comments questioning the validity of the Littlejohn study used in the impact analysis. The commenter stated that the statistics are not applicable to the management plan and are inappropriately used, and requested additional information regarding study methodology (which was not included in the DEIS).

Representative Quote(s):

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

Comment ID: 114782 **Organization Type:** Non-Governmental

Representative Quote: The reality is that these statistics, while they may sound impressive and may be of academic interest, are completely meaningless in regard to deer management in RCP since those conducting the survey did not attempt to ascertain how those surveyed perceived the questions asked nor were they asked in the context of deer management. For example, those who claimed that "scenic beauty" was extremely important to them were likely not asked how they define scenic beauty, whether deer add or subtract from their perception of scenic beauty, and/or whether their perception of "scenic beauty" is influenced by the number or density of deer in the park.

While the NPS has inappropriately and selectively attempted to use survey statistics to claim that the bulk of RCP visitors have their park experience literally ruined by deer and the impacts allegedly attributable to deer, other evidence, including some additional statistical evidence in the Draft EIS, demonstrate why the NPS is wrong. First, the NPS concedes that it does not know "what percent of visitors place a high importance specifically on seeing deer." Draft EIS at 238. This was apparently not a question addressed by Littlejohn (1999).

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

Comment ID: 114777 **Organization Type:** Non-Governmental

Representative Quote: Or, for the reported 94 percent of visitors who think "scenic beauty" is extremely or very important, how do they perceive or define "scenic beauty." Is a forest with little understory vegetation beautiful to them or do they even care whether there is abundant herbaceous cover? Is seeing an abundance of deer in their natural habitat - something the visitor may not experience at their home or in their neighborhood - beautiful to them? If RCP vegetation appears healthy, even if locally dominated by exotic species, beautiful to them and/or do they even know that the species are exotic? Do these visitors understand natural succession, do they care if the forest stand is young, diverse, or old-aged, do they worry about or even notice a lack of forest regeneration or are they visiting RCP for a picnic, a hike, a run and, for them, scenic beauty is what they see whether its natural or not?

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

Comment ID: 114781 **Organization Type:** Non-Governmental

Representative Quote: For the reported 67 percent who apparently value native plants and

wildlife, how many actually know which plants are native and which are exotics? Did they express value in native plants because it was perceived as the correct answer to a survey question or did they select the option since the alternative, expressing value for exotic, invasive species, wouldn't be appropriate? Do these individuals visit RCP only to leave disappointed and angry because they were unable to see native species or because there were too many exotics in the park? Do they loathe deer because they associate deer with their inability to see native species (even though the deer themselves are a native species)?

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

Comment ID: 114724 **Organization Type:** Non-Governmental

Representative Quote: The NPS cites to Littlejohn (1999) for these statistics yet it provides no further information about the methodologies used in this survey, when it was conducted, what time span it covered, who was surveyed (i.e., park visitors, Washington DC metropolitan residents), how it was conducted (i.e., by telephone or in-person interview) nor did it provide any examples of the type of questions that were asked. More importantly, there is no way that Littlejohn (1999), the NPS, or the public could know how those surveyed perceived the questions asked. For examples, for the 14 percent of visitors interested in natural history, what specifically were there interests and did they necessarily perceive park deer as adversely impacting their park experience.

Response: The Littlejohn study (1999) used in the DEIS is valid when assessing visitor services in the park. The survey was conducted in July 1999 by interviewing visitors and giving them a questionnaire to mail back to the park. The survey collected information on visitor groups and individual group members. The survey assessed why visitors came to the park, what was important to them at the park, what were their perceptions of the park, and how they rated park amenities. The commenter is correct in saying that many of the terms like "scenic beauty" and "native species" were not defined in the survey and thus it is difficult to judge what visitors thought scenic beauty or native species were; however, the survey does have validity. The survey does show that these concepts are important to visitors and that many come to the park for these reasons.

More specific visitor studies have been done in other parks to look at visitors' and residents' perceptions of deer (see response to concern 22639 on page 413). Although no specific visitor surveys have been conducted in Rock Creek Park, results of these surveys in similar areas can be interpolated.

Pages 144 and 241 of the FEIS have been revised to include more information about the Littlejohn visitor survey conducted in 1999 to include study methodology.

VE4000 - Visitor Experience: Impact of Proposal and Alternatives

Concern ID: 22637

CONCERN STATEMENT: Commenters stated that they did not agree with the level of impact expected under alternative C because of questionable assumptions used to determine visitor experience. These commenters stated that there is no evidence suggesting that visitor use has been adversely affected by the number of deer.

Representative Quote(s):

Corr. ID: 261 **Organization:** Animal Welfare Institute

Comment ID: 114502 **Organization Type:** Non-Governmental

Representative Quote: Moreover, even if it were applicable in this case, Rock Creek Park has offered no evidence to suggest that visitor use has been adversely affected by the number of deer. Not only have visitor numbers for Rock Creek Park remained stable, they might have possibly even increased over the past decade but there is no evidence that the visitor experience has been degraded by the presence of deer or by the alleged impacts that the National Park Service has attributed to these animals.

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

Comment ID: 114783 **Organization Type:** Non-Governmental

Representative Quote: Yet, even for those individuals who the NPS concede may enjoy seeing deer in the park, the NPS claims that their visitor experience could be marred if they saw ill or emaciated deer due to the impacts of the alleged overabundance of deer in the park, Draft EIS at 239, and that they may actually prefer seeing fewer deer if those survivors were healthy and viable. Draft EIS at 241, 243. Both argument exploits the public's general lack of knowledge of ecological process and deer biology/ecology and both, particularly the latter, are entirely based on speculation. While there are likely few people who enjoy seeing ill or emaciated wildlife, the reality is that wildlife in national parks, on other public lands, and on private lands die as a result of disease and/or starvation. Such factors are entirely natural and reflect the difficulty faced by wild species attempting to survive in the wild. The NPS should exploit such natural regulating factors to inform and educate the public that survival in the wild is hard, death is common, but, in many cases, reflect entirely natural causes, and which is critically important to the ecology of any wild area.

Response: The commenter points out that the NPS would employ educational methods to explain to visitors why lethal deer control is necessary. However, the DEIS also states that the park plans to implement deer management educational and interpretive efforts under all alternatives, and visitors would be made aware of the reasons for the activities and their benefits to forest regeneration. If it was required to explain to visitors why deer were emaciated and appear unhealthy, this would be done as well. The park presents many interpretive programs each year to the public and can easily include messages about park operations or events taking place in the park. The commenter is correct in saying that the NPS is speculating regarding the impacts of visitors' experiences. It is reasonable to assume that most people do not like to see animals in emaciated conditions, and that there is a general sympathy felt among people when they see animals suffering. A Cornell University survey (Leong and Decker 2007) conducted a Valley Forge National Historical Park found that many respondents noted that deer-watching was one of the enjoyable activities they experienced at Valley Forge, but many respondents did believe that the sight of malnourished, sick, or injured deer detracted from their experience. In a similar survey, conducted by Cornell University in 2007 of residents of communities near the Great Falls area of the Chesapeake and Ohio Canal National Historical Park, researchers found that 50% of the people surveyed were somewhat or very concerned about unhealthy animals. Both of these areas are similar to Rock Creek Park in area and population around the park. Although no specific visitor surveys have been conducted in Rock Creek Park since the Littlejohn survey in 1999, the NPS believes that it is not unreasonable to make assumptions about visitor experiences when similar studies have been completed in national park areas.

Concern ID: 22640

CONCERN STATEMENT: Several commenters stated that the DEIS should take into account the emotional stress that lethal options may have on park visitors and residents who live nearby, who may hear the sharpshooters or witness deer dying after being shot.

Representative Quote(s):

Corr. ID: 209 **Organization:** *Not Specified*

Comment ID: 114544 **Organization Type:** Unaffiliated Individual

Representative Quote: Even when so-called "sharpshooters" are used, it is rare for an animal as large as a deer to be killed outright by a single shot or a single arrow from a bow. I have had the misfortune of seeing video footage of a deer dying slowly after being struck in the abdomen with an arrow. It is not something that most people can watch without being greatly disturbed. Moreover, deer are agile animals with a heightened fear response who are capable of moving great distances even after being shot. District residents would be traumatized to find a dying deer who had been wounded by an NPS sharpshooter - either in their yard, or upon returning to the Park when it re-opens. This is no idle concern, since, as the DEIS states, the animals shot will be left to decompose wherever they may die. DEIS at

33. This will also cause serious odor and scavenger problems.

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

Comment ID: 114723 **Organization Type:** Non-Governmental

Representative Quote: Federal courts have determined knowing, without actually observing, the killing of wildlife represents a harm that can be redressed by a court. If the mere contemplation of wildlife being killed is sufficient to cause harm to an individual then surely hearing the sounds produced by sharpshooters firing from tree stands at defenseless and unwitting deer consuming intentionally placed bait to lure them to their death must also be considered harm and should have been addressed in the Draft EIS.

Response: It is not the intent of the NPS to cause stress to members of the public who may oppose the management activities. Various mitigation measures are described in chapter 2 of the DEIS that would be implemented to reduce the likelihood of causing stress to the public while deer management activities are going on in the park. Examples of these mitigation measures include sharpshooting at night primarily during late fall and winter months; the use of high-power, small-caliber rifles; and noise suppression devices. The NPS would use qualified federal employees or contractors trained in all aspects of sharpshooting to ensure the removals would be as humane as possible. With regard to the possibility of carcasses being seen by members of the public, page 65 of the FEIS states that carcasses would be moved away from roads and trails and left on the surface in isolated areas away from the public to be naturally scavenged and/or to decompose. Analysis of the impacts to visitor experience from any of the alternatives can be found in chapter 4.

VE5000 - Visitor Experience: Cumulative Impacts

Concern ID: 22643

CONCERN STATEMENT: One commenter disagreed with the language used in the cumulative impacts section to describe visitor experience, stating that the language used is unnecessary and highly relative.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 116717 **Organization Type:** Non-Governmental

Representative Quote: By way of further example, under cumulative impacts on page 241, the statement is made: "As reproductive controls eventually take effect and the deer population begins to decrease over time, some park visitors might notice reductions in the excessive browsing pressure that has been damaging forest resources [emphasis added]." The word "excessive" is unnecessary here, and "damaging" is a highly relative term.

Response: The language used in the cumulative impacts section for visitor use and experience is consistent with the language throughout the DEIS. The use of the word “excessive” is used consistently with browsing, and that damage is evidenced by a decline in tree saplings documented by park-paired plot monitoring and browsing lines visible on the existing shrubs and herbaceous species.

VR2000 - Vegetation and Riparian Areas: Methodology and Assumptions

Concern ID: 22644

CONCERN STATEMENT: One commenter stated that more literature and scientific data needs to be reviewed and incorporated into the DEIS, stating that not enough is known regarding deer and their impact on vegetation.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115011 **Organization Type:** Non-Governmental

Representative Quote: The survey of the literature and discussion of the implications of managing an herbivore population to protect a vegetative community must address more completely the complexities of the issues involved. NPS must not put forward the simple argument that deer are preventing the regeneration of the forest (e.g., FEIS page 105) or having "adverse, long-term, major impacts on herbaceous vegetation" without a fuller and more complete analysis and discussion of what that means within the context of time, landscape dynamics, extrinsic influences, urbanization, and other relevant biological and ecological factors that are significant in addressing the unique and specific mandate of NPS - to allow natural processes to proceed unless compelling evidence exists to demonstrate that human actions prevent them significantly from doing so.

This is not an intellectual exercise - it is a requirement that NPS think ahead significantly, be highly sensitive to and critical about any concept of intervention, and engage, when there is an insufficient understanding of the ecology of an issue, in the necessary investigations to ensure a dynamic - rather than static - scientifically managed environment exists. For example, little or no attention is given to the theory of herbivore-plant community interactions developed around long-term cyclical relationships and oscillation (e.g. Caughley 1981). Nor are the effects of urbanization and landscape structure on biodiversity discussed or the need for long-term baseline data (e.g. Augustine & deCalesta 2003, Potvin et al. 2003, Rogers et al. 2009), or the spatial and temporal context within which ecological phenomena such as regeneration occur (e.g. Mladenoff & Stearns 1993). If it truly a reasonable conclusion that many of the factors that may modify the effects of deer density and vegetation impacts are poorly understood (e.g. Russell et al. 2001) then this should be admitted and implications for the preferred management approach addressed.

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115012 **Organization Type:** Non-Governmental

Representative Quote: The FEIS must review the existing literature on deer-plant community interactions to comprehensively and more accurately capture the scientific debate, the issues involved, and the range of impacts deer may have on the ROCR vegetative community. The analysis of its own data on vegetative communities must account for community-level impacts and interactions that can be interpreted consistently with the findings of other studies of deer-plant interactions.

Response: Rock Creek Park has examined the range of impacts white-tailed deer have on other park resources. As directed by NPS *Environmental Policies 2006*, to protect natural resources, Rock Creek Park "uses the results of monitoring and research to understand detected changes and to develop appropriate management actions." Rock Creek Park has long-term plots in place; monitoring has been conducted since 1991. These plots were supplemented with long-term exclosed-open plot pairs in 2001. Rock Creek Park is committed to adaptive management of its resources, which requires long-term monitoring.

Rock Creek Park has chosen regeneration of the forest as the most important variable to measure and as its threshold for action because of this variable's ability to predict the state of the forest. If there is no overstory, there is no forest. There is a universe of variables in understory, subcanopy, and canopy and associated animal species that Rock Creek Park could measure to inform them about the condition of the forest. However, the open plots allow Rock Creek Park to monitor the change in the forest communities and the exclosed-open paired plots allow Rock Creek Park specifically to estimate the size of the effect of white-tailed deer herbivory on the forest communities. Rock Creek Park had its monitoring design planned by federal scientists and the data have been analyzed by academic and federal scientists. Results have been published in the scientific literature (Rossell et al. 2007). The effect is statistically significant.

Rock Creek Park's deer management plan includes adaptive management, because

management can and must proceed in the absence of complete knowledge. This approach has been carefully considered and even evaluated within the scientific literature (Porter 1991; Porter and Underwood 1999).

Studies relevant to the issues facing Rock Creek Park were provided by USGS and academic scientists in their analyses of Rock Creek Park data. Population and community dynamics of plant-animal interactions are well studied, and reviews of literature spanning decades are available that examine ungulate influence on community composition and on ecosystem processes. There is a topical bibliography on white-tailed deer literature with particular relevance to the national park regions of the United States. (Hoeldtke et al. 1992) and others considering the ecological questions that are involved with growing white-tail deer populations (Warren 1991). Capturing the scientific debate and issues involved are well discussed in the literature (Underwood et al. 1997). Rock Creek Park data analyses are supported and complemented by the overviews and summaries of the impact eastern white-tailed deer have on communities. The cost of overabundant white-tailed deer on biotic communities have been noted for over 50 years (Leopold 1947), and the effect that white-tailed deer have on ecological communities has been known for over 40 years (Paine 1969 in Waller and Alverson 1997; DeCalesta 1997). Thirty years of white-tailed deer literature have been reviewed and published (Cote et al. 2004). In 1997, Waller and Alverson reviewed the evidence in the literature, showing the connection between chronically high densities of white-tailed deer having multiple, substantial, adverse ecological impacts across many regions, and cascading effects through the trophic levels.

Concern ID: 22646

CONCERN STATEMENT: One commenter stated that the analysis should look at the park's vegetation in a historical context, including the historical abundances of plant species and acknowledging that the forest developed largely without the influence of deer browsing from the mid-19th to the late 20th century.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115008 **Organization Type:** Non-Governmental

Representative Quote: Moreover, from a historical and ecological perspective, this myopic fixation on deer impacts on forest vegetation is scientifically and unjustifiably alarmist. When this area (now Rock Creek Park) was first settled by humans, there was undoubtedly the natural occurrence of deer browsing that influenced forest composition. However, from the mid 1800's to nearly the end of the 20th century, deer were reduced to such a level that their direct ecological effects were essentially negligible. This is relevant in the current discussion because the forest that developed without the influence of deer grazing in the 19th and 20th centuries is (by the absence of deer and for many other reasons) not a "natural" ecosystem for this eco-region.

Response: Rock Creek Park's goal to maintain an eastern deciduous forest requires a tree canopy and all the ecological processes preserved with an intact canopy; however, the goal is not preserving a species list of plants that existed in pre-European times, which is a "state" approach, not a "process" approach. Instead, Rock Creek Park is striving to manage for the latter, protecting the processes within its ecosystem. The Rock Creek Park monitoring data show that with the current high white-tailed deer population density, the current forest at Rock Creek Park cannot replace itself if the canopy were lost. The level of tree regeneration is not sufficient. Historically, the ecological disturbances, including browsing, were very different from now. Current management takes into account that Rock Creek Park's fragmented forests are embedded in an urban matrix and extend northward into suburban areas. White-tailed deer are currently at high density levels throughout the eastern United States, far exceeding historical levels of earlier centuries. The approach that is consistent with NPS *Management Policies 2006* is to use the best available information, assess the merits of management alternatives, monitor, and take action under the framework of

adaptive management.

Concern ID: 22650

CONCERN STATEMENT: One commenter stated that the information contained in the DEIS regarding the vegetation survey plots requires additional details to determine whether the plots are pertinent to the analysis and conclusions. The commenter also stated that additional details are needed to determine whether the types of environment in the studies used are comparable to Rock Creek Park and therefore valid for use in this analysis.

Representative Quote(s):

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

Comment ID: 114540 **Organization Type:** Non-Governmental

Representative Quote: The forest regeneration standards being proposed for use in RCP were developed based on research by Dr. Susan Stout in a eastern hardwood forest environment in Cuyahoga National Recreation Area in Ohio. Draft EIS at 43. The NPS claims that the environment is similar to that found in RCP but, again, it fails to provide a description of each environment to prove said similarities. Moreover, the NPS cites to a number of studies documenting forest regeneration rates at different deer densities. What it fails to disclose, however, is how those forests are managed or what they are managed for. This is a significant issue since forest regeneration standards for a forest managed for commercial timber production will be different than forest regeneration standards relevant to a forest in a national park.

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

Comment ID: 114549 **Organization Type:** Non-Governmental

Representative Quote: In addition, the NPS has failed to disclose certain data and information. For example, the unfenced monitoring plots were last measured in 2007 yet the 2007 data on shrub cover and browsing of stems is not disclosed in the Draft EIS. In addition, though the vegetation plots were situated in the northern, central, and southern portions of RCP, the NPS failed to disclose the specific location of the plots, the characteristics of each area, and how the plot locations compare to known population concentrations of white-tailed deer. Such information is crucial.

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

Comment ID: 114670 **Organization Type:** Non-Governmental

Representative Quote: Again, the NPS fails to explain where these plots were located and how those locations were selected, have the plots been surveyed since 2004 and, if so, what were the results, and why has the NPS not disclosed the specific data for each category of vegetation (i.e., nonnative, native, herbaceous, and woody). The facts that the percentages of plant cover for nonnative, native, herbaceous, and woody vegetation were 2-3 times less in unfenced plots compared to fenced plots, doesn't provide the specifics necessary to interpret this data. For example, if the percentage of vegetation in the fenced plot has increased but that increase is entirely due to nonnative species, this would be a significant piece of information.

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

Comment ID: 114554 **Organization Type:** Non-Governmental

Representative Quote: For example, placing vegetation plots in mature, closed canopy forests will inevitably produce data that reveals little to any forest regeneration if sunlight cannot penetrate to the forest floor to stimulate production. Plots located on lands that sloped may not receive as much precipitation (due to runoff) as plots on flatter lands which could influence vegetation production. Finally, since the RCP deer population is not evenly distributed across the RCP (18), placing vegetation monitoring plots in areas where there is

or is likely to be a high concentration of deer will inevitably result in reduced vegetation production data. Admittedly, the NPS established the plots in 1990, before the deer population allegedly significantly increased in size. Nevertheless, to address the relationship between plot location and deer density, the NPS should have presented both vegetation data and deer density data in the vicinity of the vegetation plots so that the relationship between vegetation production and deer numbers can be assessed.

In 2000, the NPS expanded its vegetation monitoring efforts by establishing 20 paired plots in RCP and in Glover-Archibold Park. Draft EIS at 17. According to the NPS, from 2001 to 2004, data from 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." Id. and Draft EIS at 25. The percentages of plant cover for nonnative, native, herbaceous, and woody plants were 2 to 3 times less in unfenced plots compared to their paired fenced plots. Id. and Draft EIS at 94 citing Rossell et al. 2007. The NPS then claims that "these impacts can be directly attributed to deer browsing and indicated deer are affecting the integrity of the understory structure and species composition, diminishing the value of habitat for other wildlife." Draft EIS at 17. Though the NPS also claims that excessive browsing associated with an overabundance of deer in RCP could adversely impact regeneration of vegetation in riparian areas, it then admits that "no data exist on deer impacts to riparian areas within the park." Draft EIS at 25. The alleged impact of deer on vegetation in riparian areas should, therefore, be removed as a factor on which to base a decision since said impact is entirely conjectural.

Response: See response to concern 22630 (page 408) for impact of white-tailed deer on riparian areas. The commenter requests the removal of impacts by white-tailed deer to riparian areas be removed as a factor because the DEIS states that there are no data. However, this impact is a reasonable consequence of having high densities of white-tailed deer within an area that commonly or usually has wet ground, as discussed in the above response.

When using inferential statistics, it is important to have a plot design that follows the assumptions of the tests used to analyze the data. NPS followed this standard, which allows the results based on samples to be extrapolated to the whole population. Rock Creek Park measurements are for long-term monitoring, repeated year after year, so the data are analyzed statistically to account for the likelihood that measurements closer in time are more highly correlated than when they are separated in time; and variances change over time.

Vegetation monitoring plot design for open plots established in 1991 was a randomized complete block. This sampling design allows the results of the variables measured to be extrapolated to the park's entire vegetation; i.e., the samples are taken as representative of the whole. This is also how the white-tailed deer population density is estimated. Samples are "taken," (in this case, a route is driven) and white-tailed deer are counted in a standard way. Detection levels are modeled as deer are further from the observer and the probability of missing some deer increases. The results are analyzed using standard methods (Distance--Buckland et al. 2001; Thompson et al. 2006; Appendix A references). Sampling is important because researchers do not have the time or funds to individually measure every individual. Researchers sample a subset of the whole population and draw conclusions about the population from which the samples came. The white-tailed deer density of the park over time and the results of the vegetation monitoring are correctly inferred to the park level.

In 2001, ten of the open plots were paired with exclosures. In addition, ten (note that three were lost, so seven) more sets of paired exclosed and open plots were established randomly within the park, using a random location generator in ArcView 3.1 (Environmental Systems Institution, Redlands, California). The fences for the exclosures were raised above the ground surface to allow the passage of small mammal herbivores; this allows the size effect over time of herbivory to be entirely attributable to white-tailed deer. The open plots protocol was designed by John Hadidian, the NPS regional wildlife biologist at that time, following Storm and Ross (1992). The park forest was divided into three regions

geographically (north, central, and south), which are the blocks within the analysis. Ten plots were randomly located within each region; four plots were lost over time and not replaced. Data were gathered every four years (1991, 1995, 1999, 2003, and 2007), although not all variables were measured in each plot during each sampling event (e.g., seven plots were not sampled completely during 1999 due to personnel constraints). The 26 plots established in 1991 generated data that were powerful enough to detect changes in many of the vegetation variables over time. Thus, this number of plots is clearly sufficiently powerful to detect such changes at Rock Creek Park. In addition, repeated measures analysis of variance (ANOVA), implemented with the mixed models procedure within SAS (2003), was used to test for differences among regions, years, and their interaction for each variable (Littell et al. 1996). ANOVAs were run separately for native versus exotic species, but the data from exotic species were too sparse for ANOVA analyses, and the results for the native species data were qualitatively similar to the results for natives and exotics combined. Hence, natives and exotics were combined for analysis.

To calculate the tree seedling threshold, Rock Creek Park followed the recommendations of Stout (1998), using the amount of regeneration needed under high white-tailed deer density. Stout (1998) contained a review of literature on regeneration abundance in unmanaged forests and of factors that influence regeneration abundance and outcomes after disturbance with guidance for the park managers. Dr. Stout et al. measured the vegetation in Cuyahoga Valley National Park and made recommendations for regeneration needed to maintain the current forest in the face of natural disturbances. The forest at Cuyahoga is not managed for commercial harvest and has five different plant communities. The Rock Creek Park tree seedling threshold was derived from the U.S. Forest Service work in Cuyahoga. Eighty percent of the natural vegetation at Cuyahoga is deciduous mixed-mesophytic forest, which are impacted by the surrounding urban area, similar to Rock Creek Park. The oak-hickory plant community is the most widespread; others include maple-oak, oak-beech-maple, maple-sycamore, pine-spruce, and hemlock-beech associations. Several large semi-contiguous tracts of forest remain, but most forested areas are heavily fragmented. Rock Creek Park plant communities are currently being updated, but the 1998 vegetation map indicates that Rock Creek has mid-Atlantic mesic mixed-mesophytic hardwood forest, chestnut oak/heath forest, pine-oak forest, sycamore-green ash forest, and successional tulip tree forest.

Additionally, the impacts of white-tailed deer on forest vegetation dynamics have been studied on forests that are managed on a 100-year harvest cycle, comparable to the age of Rock Creek's forest (Horsley et al. 2003; McWilliams et al. 1995).

VR4000 - Vegetation and Riparian Areas: Impact of Proposal and Alternatives

Concern ID: 22654

CONCERN STATEMENT: One commenter questioned the findings in the DEIS that the impacts on park vegetation are adverse.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115009 **Organization Type:** Non-Governmental

Representative Quote: Whether or not a "right" solution is obtainable in the face of human alteration of landscapes and the absence of any good understanding of the role ecological time plays in herbivore-plant community dynamics is difficult, perhaps impossible, to know. The DEIS, however, engages the issue with an almost transparent pre-conviction that changes (impacts) to park vegetation now being observed are "adverse" and comprise a reason for, and justification of, dramatic reduction of the deer herd.

Response: Research in the literature includes modeling animal densities and plant dynamics, showing the consequences of increasing density of animal populations and the subsequent defoliation and repeated herbivory on perennial plants until the point is reached where the forage is no longer available (i.e., plants have died and there is no seed source). Monitoring Rock Creek Park vegetation has continued for almost two decades. Data from the paired exclosed and open plots show that it is white-tailed deer that are responsible for removing the tree seedlings to an unsustainable level, and without trees, there will be no forest. Other small herbivores have access to the exclosed plots because the fence is raised above the surface of the soil. Therefore, the currently overabundant white-tailed deer population is adversely impacting Rock Creek Park's vegetation.

Concern ID: 22655

CONCERN STATEMENT: One commenter questioned the location of the proposed large exclosures and asked whether they would force deer to go into nearby yards to consume shrubs.

Representative Quote(s):

Corr. ID: 293 **Organization:** *Not Specified*

Comment ID: 114639 **Organization Type:** Unaffiliated Individual

Representative Quote: I have one important reservation, however: where will the 40-acre fenced-in plots be located in your park to allow an understory to develop? Morever, will not the inaccessibility of these fenced-in plots to deer force the deer into nearby yards to consume even more shrubbery than they do now?

Response: The exclosure locations will be selected based on several criteria, as described in the FEIS, page 51. The potential initial locations are shown on Figure 4. Given the size and shape of Rock Creek within an urban area, it is highly unlikely that a deer will look for food entirely within the park. However, as stated in the plan, the exclosures will vary in size from 7 to 25 acres, representing up to 10% of the main Rock Creek Park unit. This means that 90% of the main unit and 95% of the entire Rock Creek Park would remain available to the white-tailed deer for continuous shelter and browsing. There should be no change in status for the neighborhood yards and shrubbery, which will remain as preferred food for white-tailed deer, as they currently are. Therefore, it is unlikely that the exclosures will have an effect on the foraging behavior of deer.

Concern ID: 22656

CONCERN STATEMENT: Commenters noted that the DEIS is in conflict with the General Management Plan in terms of impacts to vegetation. The General Management Plan states that the deciduous forest would not be impaired under any of the alternatives, while the DEIS notes that the no action alternative would adversely impact the park's deciduous forest; commenters felt this discrepancy should be addressed. One commenter also noted that the General Management Plan states a wide variety of plant species exist within the park and the DEIS fails to provide evidence that deer are adversely impacting vegetation.

Representative Quote(s):

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

Comment ID: 114679 **Organization Type:** Non-Governmental

Representative Quote: The NPS goes on to assert that "current management practices would continue to protect deciduous forest" under any of the alternatives, including the no-action alternative, considered in the GMP and EIS. GMP and EIS at 124. Moreover, none of the GMP alternatives were determined to cause an impairment to the park's deciduous forests. GMP and EIS, Table 7 at 124. Though the GMP is a different plan, the RCP deer management plan and Draft EIS is tiered off of the GMP. As a consequence, it is of particular interest that while the GMP claimed that even the no-action alternative (i.e., no substantive changes in park management of deciduous forests) would not adversely impact

the forest or result in an impairment, the Draft EIS, published only two years after the GMP, concludes exactly the opposite; that the no action alternative would adversely impact the park's deciduous forests as a result of an alleged overabundance of deer in RCP. Draft EIS at 166. The NPS has to provide some rational explanation for this obvious discrepancy between the conclusions reached in these related documents relevant to the park's deciduous forests.

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

Comment ID: 114531 **Organization Type:** Non-Governmental

Representative Quote: The GMP references an inventory of park vegetation conducted between 1986 and 1994 that documented 656 species of vascular plans in RCP between the National Zoo and the Maryland boundary. GMP and EIS at 143. Reportedly, some 150 species identified in the park in an earlier survey in 1919, were not found during the more recent inventory though the NPS concedes that the reasons for such species loss are unknown. Id. The NPS offers no evidence and does not even intimate that deer were responsible for this loss of species.

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

Comment ID: 114494 **Organization Type:** Non-Governmental

Representative Quote: Despite the alleged overpopulation and excessive browsing by deer in RCP, the NPS indicates that RCP is home to approximately 700 species of vascular plants, including 31 rare or uncommon plants listed by the states of Maryland and Virginia. In addition, RCP provides habitat for 36 species of mammals, 181 species of birds, and 19 species of reptiles and amphibians. Draft EIS at 8. Again, this would appear to be a remarkable biotic assemblage considering that the NPS claims that white tailed deer numbers are increasing, deer are resulting in a substantial effect on the park ecosystem due to heavy browsing, that deer are adversely effecting shrub cover, tree seedling regeneration, and herbaceous cover, and that this, in turn, affects habitat quality for other wildlife. Id.

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

Comment ID: 114716 **Organization Type:** Non-Governmental

Representative Quote: Finally, the NPS claims that Alternative A in the Draft EIS would result in adverse, long-term, and negligible to major impacts depending on the species with species that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover possibly suffering severe reductions or elimination from the park. Draft EIS at 207. Yet, in the GMP, the NPS concludes that even the no-action alternative (Alternative B) would result in no impairment to protected or rare species. GMP and EIS at 124. Again, considering that these documents were published only two years apart, it is seemingly inexplicable how the GMP finds no impairment to protected or rare species despite the known presence of a growing deer population in RCP while the Draft EIS claims that the no-action alternative could possibly cause the elimination of certain protected species. The NPS must provide a rational explanation for this discrepancy.

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

Comment ID: 114676 **Organization Type:** Non-Governmental

Representative Quote: In contrast to the conclusion reached in the Draft EIS, in the GMP and EIS, the NPS reports that neither the preferred alternative (Alternative A) nor the no-action alternative (Alternative B) would constitute an impairment to the deciduous forests within RCP. Specifically, the NPS reported that:

"Alternative B (no-action) would have little effect of the deciduous forests of Rock Creek Park. Protection of the deciduous forest has been a long-term goal at Rock Creek Park. The continuation of current management practices such as avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of or (sic) invasive species, would maintain the deciduous forest in a condition much like that currently seen in the park." GMP

and EIS at 238 and Table 7 at 124.

For Alternative A in the GMP (the preferred alternative) the NPS indicates that it would cause beneficial impacts on the park's deciduous forests including the restoration of unvegetated areas to deciduous woodlands, improvement of poor or impaired soil conditions to accommodate restoration of deciduous tree species, realigning trails away from steeply sloping areas and revegetating the former alignments, and discontinuing the artificial suppression of tree regeneration through periodic cutting or mowing. GMP and EIS at 201. Adverse effects would be limited to the loss of existing forest or conversion of a native species plant assemblage to predominately exotic or invasive plant species. Id.

Response: See responses to concern 22614 (page 380) and 22553 (page 391). The deer population in the park has been monitored for many years, but since the late 1980s their numbers have substantially increased in the park, adversely affecting vegetation. On page 146, the General Management Plan also states that the deer population is monitored to avoid adverse impacts to park resources, particularly vegetation.

VR5000 - Vegetation and Riparian Areas: Cumulative Impacts

Concern ID: 23056

CONCERN STATEMENT: Several commenters noted that the DEIS does not take into account outside influences on vegetation, including climate change, pests, disease, encroachment, recreational trails, and invasive species.

Representative Quote(s):

Corr. ID: 150 **Organization:** *Not Specified*

Comment ID: 114683 **Organization Type:** Unaffiliated Individual

Representative Quote: The change of vegetation on the park land is a complicated issue. While eating by deer is one of the factors, your report failed to discuss other important factors such as the impact of climate change. I have observed some changes of vegetation in my yard and near by landscape including dying of some trees in last two decades while there is no deer eating at these areas. The climate change including the change of precipitation, and competition between different species has much bigger impacts on the vegetation, and the discussion of these impacts is missing in your report.

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

Comment ID: 114685 **Organization Type:** Non-Governmental

Representative Quote: The Draft EIS identifies a number of exotic species (e.g., Asiatic bittersweet, porcelain berry, English ivy) that kill trees along the edges of forest openings; species (e.g., multiflora rose) that form dense thickets and out-compete native shrubs and ground covers; and herbaceous species (e.g., lesser celandine, Japanese stiltgrass) that invade and blanket floodplains crowding out native species and changing soil chemistry to make it harder for native species to recover. Draft EIS at 99. Some invasive species (e.g., Asiatic bittersweet, English ivy, burning bush, privet, viburnums, Japanese barberry, garlic mustard, lesser celandine, and Japanese stiltgrass) can penetrate undisturbed forest interiors thereby reducing light levels to the forest floor, limited forest regeneration, and displacing native shrubs and saplings. Id. and Draft EIS at 22/23. Despite the serious threats represented by nonnative species, the NPS still blames deer for promoting nonnative species through habitat alteration (through trampling and browsing) and through seed dispersal from seeds carried on their coats or found in fecal matter. Id. and Draft EIS at 25.

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

Comment ID: 114548 **Organization Type:** Non-Governmental

Representative Quote: On its face, this data from RCP would appear, as is the intent of the NPS, to demonstrate that deer are responsible for excessive damage to RCP vegetation. This

is not necessarily the case since the NPS has failed to disclose or explain specific information which may provide evidence indicating that deer are not entirely responsible for this alleged damage. AWI is not contesting that deer have an impact on vegetation. Deer, as herbivores, have to eat to survive and, therefore, they will inevitably impact vegetation. The relevant questions, therefore, are what is the severity of the impact, are there other factors that may be affecting vegetation productivity and health, and are the impacts consistent with natural processes. In regard to the latter two questions, there are an abundance of other threats to the RCP forests (see below) and, as indicated previously and contrary to the position of the NPS, deer impacts to native vegetation in RCP are entirely natural (as also discussed below).

Response: The effects of pests and disease on vegetation are taken into account in the cumulative impacts assessment (page 166-167 of the FEIS) and are also addressed in chapter 1, pages 25 of the FEIS. Invasive or exotic species are addressed in chapter 1, pages 24-25, and as part of the affected environment (pages 104-106). Effects of recreational trails (mainly off- trail uses and social trails) are included in the cumulative impacts scenario (page 159-169) and in cumulative impacts discussions for vegetation (page 172). Encroachment of developed areas is accounted for in the affected environment description of the park vegetation; the current acreage and associated community types reflect past encroachment, boundaries, or land use decisions, and no present or future encroachment is expected.

Climate change was not specifically addressed in the DEIS, and this omission will be corrected with the addition of text (pages 33 and 106 of the FEIS) that explains that the actions will not have an impact on climate change (issues considered but dismissed, chapter 2), but that climate change may have an impact on park vegetation /wildlife habitat.

VR6000 - Vegetation and Riparian Areas: Impairment Analyses

Concern ID: 22672

CONCERN STATEMENT: One commenter felt that the impairment standard does not apply to the impacts of native species within a national park and therefore was inappropriately used in the impact analysis within alternative A.

Representative Quote(s):

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

Comment ID: 114675 **Organization Type:** Non-Governmental

Representative Quote: As a result of its smorgasbord of allegations regarding the impact of deer on forest regeneration, herbaceous cover, and the overall health of the vegetation in RCP, not surprisingly the NPS concludes that Alternative A (the no-action alternative) would facilitate the continued destruction of the forest/vegetation of RCP and that this would constitute an illegal impairment. As previously explained, the impairment standard is not applicable to the impacts of a native species foraging within a national park. Therefore, while the NPS is free to suggest that Alternative A may allow deer to continue to browse trees and consume understory/herbaceous cover - which is entirely natural and expected - it cannot claim that such an impact constitutes an impairment.

Response: Please see response to GA4000 Impact Analysis: Impairment Analyses- General Methodology, concern 22703 (page 384).

VS2000 - Visitor Conflicts and Safety: Methodology and Assumptions

Concern ID: 22657

CONCERN STATEMENT: One commenter felt that the estimate of costs associated with public safety surrounding the use of lethal methods was low and that actual costs would far exceed the estimate provided in the DEIS.

Representative Quote(s):

Corr. ID: 209 **Organization:** *Not Specified*

Comment ID: 114556 **Organization Type:** Unaffiliated Individual

Representative Quote: The DEIS underestimates the costs involved in attempting to ensure public safety during the shootings. Given all of the roads, trails, sidewalks, and bridges that cross the park, it will require hundreds of government officers to fully ensure that nobody enters the park during the shootings. Even this will not fully ensure public safety, as many residents with adjacent property likely enter the Park regularly from their own property. Mere "bullet in board" notices, see DEIS at 139, are grossly insufficient to warn residents of the discharge of hundreds and perhaps thousands of rounds from high powered firearms. Thus, a true attempt to protect public safety measure will require direct mailing to every District resident with property adjacent to or near the Park prior to every shooting. The public reasonably expects that better use will be made of the taxpayer funds necessary to pay for those officers and those mailings, especially in the District, where we are reminded every day of the serious crimes that plague our area.

Response: To determine the costs of implementing the action alternatives in the DEIS, the NPS first held meetings with the United States Park Police and other park personnel that focused on the procedures for closing the park during any lethal removal operations. For the first year of implementing alternatives C or D, it was determined that 20 officers were needed for 10 nights to achieve the target of removing 183 deer (based on the 2008 deer density); this estimate would also be reasonable for the number of deer to be removed based on 2009 deer density numbers. The numbers of officers would remain unchanged in years two and three of implementation. However, the number of nights required to reach the removal goal are five and three, respectively, in those years. These officers would work a six-hour shift while removal operations were underway. The majority of the lethal removal operations would occur at night after the park closes and during winter months when visitation is low. The entire park would not be required to be closed at any one time; rather, sections would be closed as needed. Bulletin board notices and mailings would be used to inform park neighbors if alternative C or D is chosen as the management option. The NPS believes that public safety can be adequately protected using the estimates outlined in the DEIS.

VS4000 - Visitor Conflicts and Safety: Impact of Proposal and Alternatives

Concern ID: 22659

CONCERN STATEMENT: Several commenters felt that use of lethal methods within Rock Creek Park would pose a safety risk to visitors, pets, and nearby residents due to stray bullets and the narrow shape of the park and stated that strict public safety precautions for the use of sharpshooters needed to be explicitly laid out in the DEIS and put into place prior to implementation of the preferred alternative. One commenter felt that the DEIS failed to adequately analyze the impacts to human health and safety, stating that the use of sharpshooters represents an unacceptable risk to safety. Another commenter questioned the use and safety of archery, while another commenter requested the use of an alert system. Additional concerns included the possible side effects of both lethal and non-lethal methods, such as making the animals more aggressive toward humans.

One commenter presented multiple questions regarding the use of the proposed sharpshooters under alternative D, such as: what type of qualifications the selected sharpshooters will have, if and when information regarding the credentials of those

administering the euthanasia will be available, how the NPS will prevent animals from dashing into the street once lethal removals commence, and how will the NPS deal with animals that are not killed with the first shot.

Representative Quote(s):

Corr. ID: 10 **Organization:** Crestwood Citizens Association

Comment ID: 113158 **Organization Type:** Unaffiliated Individual

Representative Quote: I assume that you will take proper precautions (e.g., closing the park) when sharpshooters are active. Given that, you have my very strong support.

Corr. ID: 40 **Organization:** *Not Specified*

Comment ID: 114130 **Organization Type:** Unaffiliated Individual

Representative Quote: ethal control of the deer population, using sharpshooters and capture-to-euthanize methods is senseless. It is not only inhumane. Lethal animal control is an outdated method of managing wildlife populations, that has been proved ineffective. Without continued lethal control, population density will soon recover to its pre-control levels. But continued lethal control is simply unacceptable in an urban park with a high density of users, including hikers, joggers, people walking their dogs, families with children, bird viewers, and horseback riders. Sharpshooters would put the users of Rock Creek Park at risk.

Corr. ID: 209 **Organization:** *Not Specified*

Comment ID: 114541 **Organization Type:** Unaffiliated Individual

Representative Quote: The "sharpshooting" element of Alternatives C and D poses a substantial public safety risk. Even if the park is closed to the public, there is no guarantee that humans and pets will be safe from the shooters' weapons. As you know, the Park lies in the middle of a bustling metropolis. Its meandering boundaries run adjacent to thousands of parcels of private and public property. It is criss-crossed by paths, bridges, road s, sidewalks, and other rights-of-way. It has highly varied topography and terrain.
In response to this array of complicating factors that greatly increase the risk of human fatalities, the purported "public safety" measures in the DEIS are cursory, taking up less than a page of analysis, which is repeated in several places in the document. See, e.g., DEIS at 61, 247.

The special limitations established in the DEIS, see DEIS at 248, do not guarantee public safety, as the boundary of the Park is not often clear to one in the field, and does nothing to protect the people who will inadvertently but inevitably enter the Park during the closures. Even if the risk is remote, the consequences of a human fatality far outweigh the perceived benefits of the lethal action, and also present a serious monetary liability to NPS. The estate of someone killed by one of the shooters could easily recover millions, and perhaps tens of millions of dollars from the United States under the Federal Tort Claims Act. It is irresponsible to risk such a large amount of taxpayer funds when non-lethal methods are available.

Corr. ID: 246 **Organization:** *Not Specified*

Comment ID: 114103 **Organization Type:** Unaffiliated Individual

Representative Quote: Are there any side effects to contraception or mass killings, meaning are they going to be -- are the animals going to be more aggressive and are they going to be more like an attack mode because they feel like they're being threatened?

Corr. ID: 269 **Organization:** *Not Specified*

Comment ID: 113752 **Organization Type:** Unaffiliated Individual

Representative Quote: I am concerned with only one thing about Option D and that's the

sharpshooting. At no place is the park more than one mile wide and there are homes right next to the park. I am a little bit afraid of stray bullets that are intended for deer accidentally, you know, exiting the park into someone's home or into the car of a person riving along the perimeter streets. So even if you close the park, you're not going to close Military Road, 16th Street. There's still going to be people driving past, even if the hunt is at 1:00 o'clock in the morning. So I'm a little concerned about that. If there is a way of fixing that, then I have no problems with Option D.

Corr. ID: 271 **Organization:** *Not Specified*

Comment ID: 113656 **Organization Type:** Unaffiliated Individual

Representative Quote: Assuming that Alternative D will be approved, what procedure will be put in place to alert the public as to when the sharpshooters will be active in the park? The draft statement indicates there are currently 82 deer per square mile. At what point would sharpshooters not be necessary to quickly reduce the herd numbers (deer per square mile)? Once the herd is reduced, can the herd numbers be maintained via reproductive control methods?

Corr. ID: 278 **Organization:** *Not Specified*

Comment ID: 115101 **Organization Type:** Unaffiliated Individual

Representative Quote: In addition, because of the unique position of this park inside a densely populated major city, and the fact that some 1,100 homes abut the park, it is much too dangerous to use lethal means in order to control the deer. The District of Columbia has wisely made hunting and trapping against the law within its borders for this reason. I believe that it would be illegal for the NPS to hunt, trap, and/or kill deer in the park since the park lies within the District of Columbia.

Corr. ID: 356 **Organization:** Humane Society of the United States

Comment ID: 114754 **Organization Type:** Unaffiliated Individual

Representative Quote: I am deeply concerned that the hunting options will result in the death and/or injury to the people who live in the park (I've lived on or near the park for over 15 years, have seen park residents and spoken with a few-they have no where else to live) as well as increasing the suffering of the deer.

Corr. ID: 392 **Organization:** Friends of Animals

Comment ID: 114311 **Organization Type:** Non-Governmental

Representative Quote: The NPS has also failed to properly analyze the impact of the proposed plan. First, the plan falls short of accounting for the health and safety of park users and area residents. Rock Creek's urban location, combined with rifle bullets' capacity to travel three miles, makes the introduction of sharpshooters an unacceptable risk to human safety. Additionally, Rock Creek's boundaries are fragmented by the surrounding city and its borders are enclosed, as indicated above, by 1,100 homes and apartments. The park's unique geometry would make it impossible to find a suitable shooting range. One cannot help but wonder how the NPS can view sharpshooting as a safe alternative in an area it describes as "an oasis for urban dwellers . . . located in the heart of a densely populated cosmopolitan area." See Plan/EIS at 11.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143061 **Organization Type:** Unaffiliated Individual

Representative Quote: 1) Who are the so-called "sharpshooters" called for under your preferred plan and what are their qualifications? Were their shooting and archery skills tested? By whom, when, and where? What were the test results? How low of a score must one have achieved to make it onto the killing team? When and where will these test results

be exhibited to the public and humane organizations?

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143057 **Organization Type:** Unaffiliated Individual

Representative Quote: However, it is also folly to use archery inside a major urban area. Bowhunters do not use the same bows and arrows as kids at summer camp do. Compound bows are tremendously powerful and if they miss their mark can travel quite a distance.

Several hunters on a bow-hunting blog on the web all came to the same conclusion when asked, "How far can an arrow travel?" All agreed they could kill a deer at 30 to 35 yards. All agreed that an arrow that missed its mark could travel between 200-300 yards, or one-quarter to one-third of a mile.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143054 **Organization Type:** Unaffiliated Individual

Representative Quote: Residents who are concerned about deer should also be concerned about the danger high-powered rifles and archery will pose to them during the Park Service's proposed killing of deer in Rock Creek Park.

The Park Service proposes to close the Park and shoot Ihe deer on various nights of the year using high-powered rifles -- which have a range of up to one mile or slightly more.

But Rock Creek Park is mostly a mile wide or less. It is just slightly over one mile at its widest point.

More than 1,100 homes abut Rock Creek Park, according to the Park Service. It seems thai DC residents will be in danger of being shot while sitting at their dinner tables. Those driving on roads surrounding Ihe Park would also be in danger of being hit by stray bullets.

The danger of using high-powered rifles in a highly populated area will become more acute during instances in which animals are wounded and flee.

Response: Regarding archery, this type of sharpshooting may be utilized on a limited basis where other methods may not be effective. Archers will be shooting toward the ground from elevated platforms in trees and not horizontally. Arrows missing targets will travel a very short distance before striking the ground. There is very little chance of arrows traveling the distances that the commenter quotes.

The NPS has included several measures to ensure public safety during the implementation of its proposed action at the park. These include restricting visitor access during the treatment period for non-lethal options (page 57 of FEIS) to closing areas of the park if sharpshooting is implemented (page 63 of FEIS). Other precautions that would be taken for sharpshooting are described on page 63 of the FEIS and include use of qualified federal employees or trained contractors only; separation of shooting areas if more than one location were used; conducting the sharpshooting during low visitor use times, most likely at night, with use of night vision equipment; concentrating deer at bait stations away from residential areas and using the ground as a backstop; and patrolling public areas to ensure compliance with closures or restrictions. Alerts for the actions would be distributed to the public through various media. The park will develop a detailed safety plan before implementation of any action and will create a safe zone around the boundary of the park for any sharpshooting action. As for the actions making animals more aggressive, there is no scientific evidence that deer management actions such as those proposed for Rock Creek Park result in increased deer aggression. That type of reaction has not been observed for other similar deer management programs and would not be expected to occur here.

Should a lethal removal option be chosen, the specifics of this removal would be addressed in an action plan and a safety plan once the deer management plan is implemented. These plans would detail the methods and procedures that would be used to implement the removal operation and protect public safety. The sharpshooters utilized for the removal operations would be professional wildlife managers with experience in the required work, such as the

U.S. Department of Agriculture Wildlife Services. This agency has multiple years of experience doing deer management in urban and suburban areas. The NPS would also use designated park practitioners approved by the superintendent to administer any lethal actions such as euthanasia and would also consult with experts at the NPS Biological Resources Management Division and the AVMA for currently accepted practices. All sharpshooting would be done toward the interior of the park and all bait piles would be located in the interior of the park, with a "No shoot" buffer zone around the park boundary.

Additional text has been added to the FEIS (pages 250 and 251 of the FEIS).

Concern ID: 26818

CONCERN STATEMENT: One commenter stated that by allowing lethal actions within the park, the DEIS would open the park to poaching by unauthorized personnel.

Representative Quote(s):

Corr. ID: 240 **Organization:** *Not Specified*

Comment ID: 113676 **Organization Type:** Unaffiliated Individual

Representative Quote: Rock Creek Park has been safe and secure for residents, and visitors. The actions you are proposing, will only open the park to malicious and random poaching by unauthorized personnel.

Response: There have been isolated incidents of poaching occurring in the park in the past. Park police regularly patrol park areas and have apprehended several individuals in the act of poaching deer. Should a lethal removal option be chosen, the actions proposed by the park will be conducted under controlled conditions with limited access to the park, and only skilled and approved sharpshooters and staff would be allowed on location during deer reductions. Park police will be present to ensure no unauthorized persons are present, and sharpshooting will be confined to relatively limited areas within the park (not around park boundaries) where bait piles are placed, not scattered throughout the park. Therefore, poaching would not be facilitated by this approach, and the reduced deer herd would be less susceptible to easy poaching. The proposed actions will not open the park to unauthorized hunting of park animals. Park regulations would still be enforced by park police just as they were before the implementation of any deer management actions.

VS7000 - Visitor Conflict and Safety: Deer Diseases (Lyme, CWD, etc.)

Concern ID: 22662

CONCERN STATEMENT: Several commenters expressed concern regarding the role of the Rock Creek Park deer population in the spread of Lyme disease, stating that a reduction in the population would help control the spread of disease. Commenters noted the severity and prevalence of Lyme disease in the area and expressed concern over the risks of human and pet exposure.

Representative Quote(s):

Corr. ID: 19 **Organization:** *Not Specified*

Comment ID: 113934 **Organization Type:** Unaffiliated Individual

Representative Quote: You have not considered lyme disease. material from NY Times 7-27-09" Deer are the most important reproductive hosts for deer ticks.

The observed tick increase relates directly to deer populations, which are exploding in suburban and even semi-urban areas. Deer are the most important reproductive hosts for deer and Lone Star ticks. In Rhode Island, each deer produces about 450,000 larval deer ticks every year. Add a few deer and it's no wonder that tick populations skyrocket."

Although white-tailed deer are incompetent as reservoirs of the Lyme disease spirochete (Telford et al.1988), they are the primary source of the bloodmeal that each gravid female I. scapularis converts to 3,000 eggs in late spring. Thus, deer are fundamental to the establishment, spread, and, potentially, to the control of this multidisease vector tick. This

fact must be recognized by wildlife managers who, while charged with providing deer for sportsmen and nongame enthusiasts, may also be called upon to manage deer to reduce the risk of tick-borne diseases."

The impact of excess deer populations on public health should be more adequately addressed.

Corr. ID: 51 **Organization:** *Not Specified*

Comment ID: 114530 **Organization Type:** Unaffiliated Individual

Representative Quote: And, the deer host Lyme disease, the victims of which, have grown exponentially in numbers. (In fact, as I write this, I am to be tested for Lyme Disease this week.)

Corr. ID: 119 **Organization:** *Not Specified*

Comment ID: 115218 **Organization Type:** Unaffiliated Individual

Representative Quote: Also, I am aware of people who have contracted Lyme disease as a result of the ticks which are being carried by the deer. Something must be done soon.

Corr. ID: 205 **Organization:** *Not Specified*

Comment ID: 114126 **Organization Type:** Unaffiliated Individual

Representative Quote: Beyond landscaping, growing deer proximity means that both we and our animals are at increasing risk for deer-born diseases (see details, plan page 159), and many neighborhood dog owners now pay for precautionary Lyme disease tests for their pets.

Corr. ID: 267 **Organization:** Advisory Neighborhood Commission 4C

Comment ID: 114610 **Organization Type:** Unaffiliated Individual

Representative Quote: I think about a lot of people coming up to Carter Barron and there's a lot of people that come up there that are poor, that are immigrants who don't know about Lyme disease, who don't know the symptoms, who might not have health insurance to cover if they contract it and you know they might. So I'm imagining kids or whoever playing soccer, baseball up there contracting Lyme disease, not being able to treat it, not recognizing what it is and dying. And quite frankly, I'm more concerned about human beings dying.

Corr. ID: 272 **Organization:** *Not Specified*

Comment ID: 115136 **Organization Type:** Unaffiliated Individual

Representative Quote: I am concerned that reliance upon only non-lethal, long-range methods will continue to expose many thousands of persons who frequent the park, particularly young children, to Lyme disease.

Corr. ID: 273 **Organization:** National Capital Planning Commission

Comment ID: 115236 **Organization Type:** Federal Government

Representative Quote: Lyme and all other deer-lick-borne diseases can be prevented on a regional level by reducing the deer population that the ticks depend on for reproductive success. This has been demonstrated in the communities in Maine, New York, and Connecticut. The black-legged or deer tick (Ixodes scapularis) depends on the white-tailed deer for successful reproduction.

Corr. ID: 356 **Organization:** Humane Society of the United States

Comment ID: 114755 **Organization Type:** Unaffiliated Individual

Representative Quote: While the tick bite problem is urgent and increasing (I suffer from

long term Lyme disease and related problems) the tick problem is also a field mouse problem. So controlling ticks through deer will only take care of some of the problem.

Corr. ID: 412 **Organization:** *Not Specified*

Comment ID: 143051 **Organization Type:** Unaffiliated Individual

Representative Quote: The numbers of ticks can be reduced by reducing the numbers of deer. But the etiology of Lyme disease is complicated. It suggests that there are several species implicated in the development and spread of Lyme, including rodents (mice, chipmunks, squirrels) and wild birds of all kinds, as well as deer. In many areas, more than 90 percent of white-footed mice are infected with the Lyme disease-causing bacterium. Adult "deer" ticks also feed on opossums, raccoons, coyotes, and skunks. Studies have shown that ticks still may be introduced by migrating birds, even with the complete removal of deer.

Sometimes human actions toward nature have unexpected and paradoxical effects. A 2006 study by Penn State, for example, found that reducing the deer population in small areas may lead to higher tick densities resulting in more tickborne infections in rodents and creating a tick "hot spot"--leading, in turn, to a high prevalence of tick-borne encephalitis.

We can't kill all wild animals because they carry ticks. However, it has been observed that tick populations have deciined along with their mice hosts where foxes and snakes take up residence.

Response: The purpose of this plan/EIS is to develop a deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources. Actions to specifically address tick populations/Lyme Disease are outside the scope of the plan/EIS and fail to meet the plan purpose, need, and objectives.

While a reduction in deer density may contribute to a reduction in deer ticks carrying Lyme disease, it is uncertain exactly how much of an effect would occur.

Studies comparing natural variation in deer abundance with that in tick abundance have not been conclusive; some have shown strong associations (Wilson 1998; Stafford et al. 2003; Rand et al. 2003), whereas others have not (Lubelczyk et al. 2004; Jordan and Schulze (2005); Jordan et al. 2007). Mumford Cove, Connecticut, and Monhegan Island, Maine, are commonly cited as two places where the removal or drastic decrease in the deer population resulted in the near eradication of Lyme disease. It should be noted that Mumford Cove is located on a peninsula and is 132 acres in size, and the area of Monhegan Island is one square mile (640 acres); Rock Creek Park is approximately 1,700 acres. Current understanding of Lyme disease dynamics does not allow us to predict whether results obtained in one setting can be extrapolated to other areas with different ecological and geographical factors present, so the effects of deer reduction in Rock Creek Park on Lyme disease prevalence cannot be determined *a priori.*

Concern ID: 22663

CONCERN STATEMENT: One commenter noted that epizootic hemorrhagic disease was mentioned in the DEIS but not fully integrated into the analysis of alternative impacts.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115002 **Organization Type:** Non-Governmental

Representative Quote: The DEIS mentions, on page 109, the potential influence of diseases, especially Epizootic Hemorrhagic Disease (EHD), by citing nearby cases and suggesting EHD may be seen in the park in the future. Yet it fails to integrate this consideration fully into the discussion of alternatives and their impacts. Similarly, on page 189 the DEIS discusses chronic population overabundance and impacts until "...starvation, disease, or severe winter weather causes a reduction in population size?" It goes on to note that "such reductions in the deer herd, as a result of natural die-offs, probably would not

allow the recovery of the natural community (Warren 1991)."

Response: Epizootic hemorrhagic disease occurs sporadically in the region; immunity to the disease is acquired by deer that do not die from the disease. It is not a disease that has led to a permanent reduction in deer populations in our region. An outbreak at Monocacy Battlefield in 2002 decreased the population by 20%; the population returned to 160 deer per square mile the following year. Epizootic hemorrhagic disease is considered in the cumulative analysis of impacts to white-tailed deer for all alternatives in the DEIS.

Additional text regarding epizootic hemorrhagic disease has been added to the FEIS (page 167).

Concern ID: 22666

CONCERN STATEMENT: One commenter stated that the CWD appendix did not state whether the disease was native or exotic. The commenter stated that if the disease was native, then reduction of the deer herd in an effort to eradicate the disease was not in line with the NPS *Management Policies 2006*.

Representative Quote(s):

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

Comment ID: 114799 **Organization Type:** Non-Governmental

Representative Quote: NPS includes an Appendix to the Draft EIS that provides additional information about chronic wasting disease. It claims, for example, that the higher density of deer in RCP increases the likelihood of transmission and that the disease could limit populations of deer and could result in impacts on the species recreational values. Draft EIS at 46, 188. It also provides additional information about the epidemiology, pathology, and ecology of CWD. What is doesn't address, which is most critical, is whether CWD is considered a native organism or if it is an exotic. If the organism that causes CWD is a native to the United States and/or to RCP, the NPS must protect the organism and can't automatically endeavor to eradicate it or those species that it may potentially affect in the future. Indeed, disease is known to be a natural factor that acts to control wildlife populations and, particularly in a national park, endemic disease agents must be allowed to affect wildlife populations (with the exception of ESA-protected species) pursuant to the NPS natural regulation mandate.

Response: Although the precise origins and evolutionary history of CWD are unclear (Wild et al. 2011), it is strongly suspected that CWD is a nonnative disease among cervids (NPS 2002, 2007). It is thought that CWD could be a mutated form of domestic sheep scrapie that has adapted to cervids (Raymond et al. 2000). However, CWD may represent a spontaneous, naturally occurring spongiform encephalopathy of cervids, but with the absence of large predators, the influences of human-assisted movement of infected cervids, and human land use alterations there is an unnatural distribution and prevalence of the disease (Wild et al. 2011). Regardless of the origins of CWD, NPS Management Policies allow for the management of both native and non-native species (NPS *Management Policies 2006*, section 4.4.2.1, 4.4.4.2) to prevent them from interfering broadly with natural habitats, natural abundances, and natural distributions of native species and natural processes.

Text changes have been made to the Appendix C: Chronic Wasting Disease regarding the origin of CWD (FEIS, page 297).

VS7500 - Visitor Conflict and Safety: Deer Diseases (Lyme, CWD, etc.) - Cumulative Impacts

Concern ID: 23047

CONCERN STATEMENT: One commenter felt that the cumulative analysis regarding deer diseases required additional reasoning and explanation on how those impacts were determined.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115068 **Organization Type:** Non-Governmental

Representative Quote: Similarly, under the discussion of cumulative impacts on page 239, the statement: "The presence of rabies, Lyme disease, and West Nile virus would continue under Alternative A, which would affect the wildlife that many visitors come to see." seems completely incongruous, begging explanation of what exactly is intended by the association of these diseases, deer and impacts to the environment.

Response: The intent of this was to recognize that diseases such as rabies and West Nile virus could continue to affect wildlife in the park, which could affect visitors viewing any wildlife that has contracted the disease and is dead or acting strangely. As stated in the cumulative impact scenario discussion (page 159 of the FEIS), the park has had an outbreak of rabies in raccoons, and West Nile virus has occurred in the park (with documented bird mortality). Also, deer would likely continue to host ticks, which could carry Lyme disease that could affect visitors, not so much the deer themselves. These cumulative actions could occur under any of the alternatives. The text on page 242 has been rewritten to clarify this in the FEIS.

VS8000 - Visitor Conflict and Safety: Deer/Vehicle Collisions

Concern ID: 22673

CONCERN STATEMENT: Several commenters felt that deer/vehicle collisions presented a large safety risk to visitors and residents and that the deer population needs to be reduced to alleviate this hazard.

Representative Quote(s):

Corr. ID: 9 **Organization:** *Not Specified*

Comment ID: 113170 **Organization Type:** Unaffiliated Individual

Representative Quote: I am also concerned for both the deer themselves and for drivers who are facing increasing danger as the deer are forced to forage across 16th Street; they seldom used to cross this barrier. I have seen several deer east of 16th and one carcass pulled to the side of 16th, clearly after an encounter with an auto.

Corr. ID: 119 **Organization:** *Not Specified*

Comment ID: 115226 **Organization Type:** Unaffiliated Individual

Representative Quote: If something is not done immediately, the park will die, the food sources in park will be gone and the deer will in hunger range further from the park destroying neighbors yards, becoming weaker and disease-prone from lack of food, wander into streets to be hit by cars, and eventually become aggressive. At that point those that love to have children near them wont find that to be such a pleasant idea.

Corr. ID: 239 **Organization:** *Not Specified*

Comment ID: 114170 **Organization Type:** Unaffiliated Individual

Representative Quote: we have a lot of impacts from the deer. Two days ago, I drove into our driveway and a deer jumped right in front of my car and raced down to my neighbor's lot and I felt like it could have jumped right into the car. My son has had a deer tick which he had the presence of mind keeping and were lucky it did not have Lyme disease, but I fear

for the children in the area.

Response: The NPS agrees that deer/vehicle collisions present a safety risk to visitors and residents. Data collected by the park since 1989 show that reported deer/vehicle collisions that resulted in the death of the deer increased from 1 in 1989 to over 40 in 2008. Deer are often reported in the neighborhoods around the park. Some of these deer invariably cross roads between the neighborhoods and the park and therefore are at risk of collisions with a vehicle. The NPS has developed this DEIS to address an overpopulation of deer in Rock Creek Park that has impacted park resources. Should NPS implement a deer management strategy, deer density in the park should decrease over time and habitat quality should increase over time. This may lead to less movement by deer and fewer collisions.

Concern ID: 22675

CONCERN STATEMENT: One commenter stated that the DEIS requires more information on specific deer/vehicle collision areas and should develop a plan focused on identifying hot-spot areas within the park and developing site-specific actions to reduce the rate of collisions.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115060 **Organization Type:** Non-Governmental

Representative Quote: For these reasons, we would encourage the NPS to reconsider the need to address the deer-vehicle collision issue by including in the FEIS any additional information that may exist, or could be obtained, regarding the characteristics of areas where deer-vehicle collision are most common in the park (i.e. Military Road, Oregon Avenue, Beach Drive, Rock Creek Parkway and Potomac Parkway). That type of data could be used to identify factors that make these sites inherently attractive to deer at ROCR and develop site-specific actions to reduce the rate of collisions at each deer-vehicle "hot-spot."

The FEIS must include a thorough review of the data available on deer-vehicle collisions in the park and how the most up-to-date science could be used to develop management strategies to minimize, to the extent feasible, the park's deer-vehicle collision rate.

Response: The purpose of the DEIS is to develop a deer management strategy that supports long-term protection, preservation and restoration of native vegetation, and other natural and cultural resources in Rock Creek Park (page 1). The action alternatives selected for detailed analysis must resolve the purpose of and need for action and meet the plan objectives (pages 1-2). An objective or action statement related to deer/vehicle collisions was not developed because such a statement is not relevant to the DEIS purpose.

Deer/vehicle collisions are briefly addressed under the section related to visitor and employee health and safety (pages 139-40) and the impacts of the alternatives are analyzed (starting on page 249) for their effects on visitor and employee health. The commenter is correct in identifying several roads in the park that are locations for higher numbers of deer/vehicle collisions. These are identified in the DEIS on pages 19-20 and have also been included elsewhere in the FEIS (page 140).

The park has tracked reported deer/vehicle collisions that have occurred on park roads or roads adjacent to park areas since 1989. Deer crossing warning signs have been installed in most areas of higher occurrences of deer/vehicle collisions. The park also participated in a working group of the Metropolitan Washington Council of Governments (MWCOG). This group was tasked with exploring the issue of deer/vehicle collisions in the area and developing a white paper for metropolitan Washington politicians (with a companion DVD for public education) about deer/vehicle collisions.

Again, the purpose of the DEIS is not to minimize deer/vehicle collisions but to support protection, preservation, and restoration of native vegetation and other park resources.

Additional information has been added to the FEIS regarding warning signs and working group participation.

Concern ID: 22677

CONCERN STATEMENT: Commenters felt that the DEIS did not provide substantial evidence to validate the impact analysis statement that a reduction in the deer population would result in fewer deer/vehicle collisions. One commenter provided a recent study showing that deer population density does not affect the rate of deer/vehicle collisions. Another commenter suggested additional actions that could be taken to prevent deer/vehicle collisions, such as improved signage and a public education program. Additionally, commenters felt that the DEIS was missing critical information pertinent to the deer/vehicle collision statistics, including traffic volume statistics, extenuating circumstances, and specific details regarding the collisions, such as information about damage to vehicles and human injuries incurred.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115050 **Organization Type:** Non-Governmental

Representative Quote: The DEIS states that, "Deer/vehicle collisions are a threat to human safety" (DEIS: 140) and identifies deer-vehicle collisions as "A primary safety issue for visitors and local residents" (DEIS: 139), and yet, the plan to reduce the rate of such incidents at ROCR is woefully inadequate and needs to be enhanced.

First, the DEIS assumes that "the possibility of deer-vehicle collisions would be greatly diminished" by removing a significant proportion of ROCR deer population under either Alternative C or Alternative D, but neglects to cite one study to suggest that reducing the deer population would have any impact whatsoever on the park's deer-vehicle collision rate. Many people believe that reducing the deer population will result in fewer deer car collisions, but in certain communities where data was collected before and after hunting season, surprising results were obtained.

A paper presented at the 30th Annual Meeting of the Southeast Deer Study Group (2008) reported on a study by the Virginia Department of Transportation which assessed hunting pressure, deer density, amount of forest and housing development, presence of crops and corridors and road metrics for 228 road segments (each 250 miles in length) within a county to determine which factors are correlated with deer-vehicle collisions. The logistic regression indicated that deer density was either a non-significant factor or that deer/vehicle collisions were lower in areas of higher deer density. Hunting pressure was also not a significant variable. The conclusion was that "there is little evidence that increased deer harvest reduced deer/vehicle collisions. (McShea et al. 2008). These kinds of data reflect the complexity of deer related problems and the need to make sure the remedy actually addresses the problem.

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

Comment ID: 114792 **Organization Type:** Non-Governmental

Representative Quote: The principal issues of concern to the NPS in regard to visitor and employee safety is the risk of deer/vehicle collisions. The NPS reports that such collisions "are a threat to humane safety and are one of the predominant sources of deer mortality." Draft EIS at 140. The NPS claims that there has been an upward trend in deer/vehicle collisions from 1989- to 2007 with a high of 52 such collisions reported in 2006. Id. While the NPS reports that deer/vehicle collisions are most common along Military Road, Oregon Avenue, Beach Drive, and Rock Creek and Potomac Parkway, it does not disclose: how many deer were killed by year along each road segment, which roads were monitored for deer vehicle accidents (including any adjacent non-park roads), what the speed limit is for the roads where deer/vehicle collisions were reported, the estimated speed of the vehicle involved in the collisions, whether there were any human injuries or fatalities, the estimated amount of damage to the vehicle, and whether there were extenuating circumstances contributing to the accident (i.e., icy/wet roads, darkness, inclement weather, driver impairment). The NPS claims that while deer/vehicle accidents increased in the park, traffic volumes have remained the same or decreased, Draft EIS at 140, though, again, the NPS

fails to disclose the traffic volume statistics or the methodologies used to measure said volume.

Corr. ID: 410 **Organization:** Washington Humane Society

Comment ID: 142971 **Organization Type:** Non-Governmental

Representative Quote: Alternative D also states that the incidents of deer-vehicle collisions would be "greatly diminished" under this measure yet insurance companies in Pennsylvania claim that the number of deer-vehicle collisions claims went up nearly four times when deer hunting season opens. WHS believes that the true way to reduce deer-vehicle collisions is through adequate signage complete with flashing warning lights, putting reflector systems in place such as Stricter-Lite system and a public education campaign on driver safety, which WHS would assist in developing and implementing free of charge. Currently, signage in Rock Creek Park is very limited and antiquated in design. Simple yellow signs depicting a deer are now considered outdated as drivers have become blind to their presence. Signs with warning lights set to flash at peak deer activity times are proving to be more effective then static designed signage. The use of non-salt based protection against ice in the winter also reduces deer-vehicle collisions as the salt acts as an attractant for deer to approach roadsides.

Response: Please refer to the response to concern 22675 (page 433). The purpose of this DEIS is to develop a deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park and not to minimize deer/vehicle collisions. The park has presented data in the DEIS that shows that deer/vehicle collisions increased as the density of deer in the park increased.. Many of the deer/vehicle collisions that occur on park roads and roads adjacent to the park are not reported. Often the only evidence of a collision is a dead deer carcass next to the road. Location, date, sex, and age of the animal are recorded. Occasionally a police report containing additional information will be filed, but this is uncommon. The NPS believes that including more data and traffic volume statistics is not relevant to the purpose of this DEIS.

Regarding the paper presented at the 30th Annual Meeting of the Southeast Deer Study Group (2008) mentioned in comment 115050, the county included in that study (Clarke County, VA) is a rural county with 58 % of its land in agriculture, 38% in forest, and the remainder developed. Traffic volumes are not similar to those found at Rock Creek Park except on the county's primary roads. The county differs from Rock Creek Park in that Rock Creek Park is urban, with a much smaller size, a higher level of development, and more movement of deer across a much smaller area. Therefore, the conclusions of that paper are likely not valid for an urban area such as that found in and around Rock Creek Park. In addition, the referenced paper also states that reducing deer populations has been an effective management tool for mitigating deer-vehicle collisions in urban and suburban areas. The researchers go on to say that they found no evidence within Clarke County that deer density or deer harvest were important for determining the frequency of deer-vehicle collisions at the scale of zones within a county.

Another recent paper by DeNicola and Williams (2008) concluded that reducing suburban deer populations through sharpshooting reduces deer-vehicle collisions. They report that in three suburban communities, sharpshooting management projects reduced deer herds by 54%, 72%, and 76%, with resulting reductions in deer-vehicle collisions of 49%, 75%, and 78%, respectively. These communities were described as typical suburban developments with a matrix of suburban and commercial development and intermingled small agricultural plots and undeveloped open space, which is more similar to the area in and surrounding Rock Creek Park.

Regarding actions the park can take to prevent deer/vehicle collisions, the park has participated in a Metropolitan Washington Council of Governments deer/vehicle collision task force which developed an educational DVD that was produced and distributed to many jurisdictions in the District metropolitan area to be used for public education purposes. The

park has copies of the DVD that can be shown at the Nature Center if needed. The park's website can also be utilized for education. Regarding improved signage, the park is considering enhanced signage to increase awareness of deer/vehicle collisions and has placed current signage at collision "hot spots."

Additional text on how roadkill data is collected has been included in the FEIS (pages 14 and 148 of the FEIS).

WH2000 - Wildlife And Wildlife Habitat: Methodology And Assumptions

Concern ID: 22681

CONCERN STATEMENT: Several commenters expressed concern that the DEIS fails to acknowledge that wildlife populations, such as deer populations, fluctuate naturally over time. Commenters further maintain that these natural population dynamics can explain the increased deer numbers, and that density dependence will eventually reduce the population. One commenter stated that although this conclusion is not expressed in the DEIS, the data presented in the DEIS supports the conclusion. Commenters also suggested that the deer population is reflective of habitat health and that if a large number of deer exist, then the habitat is healthy enough to support them.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115064 **Organization Type:** Non-Governmental

Representative Quote: Finally, the DEIS repeatedly uses the statistic "82 deer per square mile" and implies that the deer population is continuing to increase exponentially in spite of its own spotlight and distance data which suggests that the deer population may have actually reached a state of biological equilibrium. According to Table 2., between 2000 and 2007,the deer population has fluctuated between 52 and 98 animals per square mile (/sq. mile). From 2000 to 2002, the population remained relatively stable (between 60 and 63 deer/sq. mile). Then, the population spiked at 98 deer/sq. mile in 2003 which was immediately followed by a dramatic drop to 52/sq. mile in 2005, and since then, the population steadily rose to 82/sq. mile in 2007. This is a well-established ecological trend with respect to population dynamics, and yet, the DEIS appears to ignore its own data.

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

Comment ID: 114694 **Organization Type:** Non-Governmental

Representative Quote: While such self-regulating factors may not be triggered until the species is at elevated population numbers, the fact that the numbers are elevated suggest that the habitat is capable, at least temporarily, of supporting such growth. Admittedly, variables influencing habitat productivity can change remarkably quickly possibly leading to a abrupt or consistent decline in the species numbers. Whether the impact of the species on other species, ecosystem resources, and processes depends on how the species in question is perceived and the management objectives for the area. For deer, if considered a dominant species that dictates ecosystem conditions, as they should be, then such impacts should be considered entirely natural and appropriate. Similarly, if the habitat is being managed pursuant to a natural regulation mandate - as is the mandate of the NPS - then such impacts, whether beneficial or adverse, should be accepted and protected and not contested or modified as would occur if the proposed lethal deer control program were implemented.

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

Comment ID: 114692 **Organization Type:** Non-Governmental

Representative Quote: Deer health and condition can, at times, be used as an indicator of habitat condition. Signs of nutritional stress, such as low body and internal organ mass, low fecal nitrogen levels, and heavy parasite infections, can be found in deer at high densities. Id.

and Draft EIS at 192. Deer in poor physical condition due to a lack of forage are at an increased risk for disease (20) and mortality due to malnutrition and parasitism, particularly during harsh winters. The NPS claims that starvation and reduced production in a deer herd caused by excessive numbers is not evidence of self-regulation but, rather, provides only chronic control over a population. Draft EIS at 188/189. This is incorrect. Starvation and reduced productivity in a deer population (or any wildlife population) is precisely indicative of self-regulation dictated by habitat or other conditions. Moreover, such impacts are entirely normal and natural in any wildlife population particularly in, but not limited to, wildlife populations that are protected from exploitation.

Response: The purpose of this plan/EIS is to develop a deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources. The desired deer population for this plan/EIS is one that allows the forest to naturally regenerate, while maintaining a deer population within the park. The NPS is managing for a landscape and entire ecosystem, and if the deer population were allowed to grow unchecked or even stay at the current density, there would be changes such as those already seen in ecosystem biodiversity, changes in seral stage, and possibly adverse effects to other wildlife through competition or habitat destruction.

Density dependent regulation is not working for most urban deer populations. The combination of small woodlots and residential gardens (and agriculture in exurban areas) provides the optimal amount of food and cover for deer populations. There is no natural predation on adult deer and rarely any hunting.

The 2007 density figure is used because it was the latest density figure available at the time of printing. As noted, the data reflect the variable nature of population fluctuation is shown in Table 2 of the DEIS. The FEIS has been updated with the 2009 deer density, and calculations will be adjusted accordingly.

Concern ID: 22682

CONCERN STATEMENT: One commenter stated that inaccuracies in the deer population survey techniques may have led to survey results that more closely reflect the regional deer population than the park's deer population.

Representative Quote(s):

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

Comment ID: 114696 **Organization Type:** Non-Governmental

Representative Quote: Spotlight deer surveys have been conducted from 1996 to the present to obtain population trend data only since the "surveys are not based on any specific scientific protocols." Draft EIS at 15. The NPS concedes that such surveys only provide "abundance levels in the area immediately adjacent to the vehicle route." Though the vehicle-route is reported 22 miles in length, any deer population estimates produced from such surveys are of dubious accuracy in actually determining deer numbers and, depending on the estimation methodologies use, may overestimate deer numbers. Indeed, it is likely that the deer trend data, based on spotlight counts, are indeed overestimates since the spotlight survey includes some roads in surrounding neighborhoods. Draft EIS at 108. Thus, the survey results are more accurately considered population trend data for a regional deer population and not the actual RCP population. Based on spotlight count data, the NPS claims that deer numbers in RCP have increased from an estimated 70 in 1996 to 280 in 2007. Draft EIS at 15, Figure 3.

Finally, the NPS, since 2000, has used a distance sampling methodology to estimate animal population density. This methodology reported resulted in estimates of up to 98 deer per square mile in 2003 (the highest estimated deer density in RCP), Draft EIS at 45, followed by what appears to be a nearly 50 percent decline to 52 deer per square mile in 2005 only to allegedly increase again to 82 deer per square mile in 2007. Draft EIS at Table 2 and at 108. Assuming this methodology is accurate, the rapid decline in the RCP deer population between 2003 and 2005 may be indicative of a density dependent effect reducing the deer

population as a result of increased mortality, reduced production, or both. Regardless of why the population apparently declined by nearly half, these data demonstrate that RCP deer numbers are variable, that deer population if left unexploited can be somewhat self-regulating (though not to the density that the NPS would apparently prefer), and that the population will not grow without limits if not subject to a massive, multi-year deer cull.

Response: The objective of the spotlight counts is stated in the EIS; these spotlight abundance counts were included to show trends over time and the history of techniques used at the park. Spotlight count data are not used as the basis of population estimates and may reflect regional abundance. Distance surveys are done using a spotlight count but with a computer model called "Distance" to calculate density. Those surveys only count deer within park boundaries and reflect the deer population in the park. Variation in the Distance survey results is normal variation expected in a wildlife population.

Concern ID: 22684

CONCERN STATEMENT: One commenter questioned the assumptions used for both mortality and growth. The commenter explained that in order to accurately and successfully manage the park's deer population, correct mortality and recruitment estimates must be used.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115004 **Organization Type:** Non-Governmental

Representative Quote: The overall calculation and estimation of mortality should be reexamined. The DEIS mentions mortality in the park as averaging about 10% based on an assumption that "urban" deer mortality falls in that range, while its own data on deer/car accidents cite numbers which range from 42-52 per year. Those numbers alone account for a mortality of 10-13% based on a high estimate of the deer population, which improbably assumes that no other mortality, even to fawns, occurs. In addition, an ongoing deer fertility control study at the National Institute of Science & Technology (NIST) in Gaithersburg, MD determined that the mortality rate there was, at a minimum, 14% with an additional 8% every year representing tagged deer that could not be accounted for due to migration or attrition (Rutberg & Naugle 2008).

Similarly, the estimate of recruitment (DEIS: 63) at 20%, referenced only as a general rate used by deer managers considering reproduction, mortality and recruitment, is too imprecise to allow for an accurate portrait of deer demographics - which is critical to any planning for population manipulation - to be drawn.

The FEIS must discuss all potential mortality factors and account for them fully in impact assessments. A far more rigorous, valid model of deer population dynamics should be presented based on deer demographics and reproductive biology at ROCR itself. Specifically, the FEIS must explain why a reduction in the size of the deer herd as result of natural processes would not "...allow the recovery of the natural community."

Response: The distance surveys provide a clear picture of the deer population at Rock Creek Park. The population has fluctuated between 60-98 deer per square mile since 2000. This is well above levels needed to allow for tree regeneration. Detailed information about mortality and recruitment are not needed when the objective of the EIS is to regulate the deer population while improving the vegetation resources of the park.

Deer management by natural process has been park policy since the establishment of the park. The park has gone from a low population to a high deer population in the last 40 years. There has been no documentation of an eastern United States urban deer population undergoing a reduction in population due to natural processes. The importance of white-tailed deer in affecting forest ecosystems is well-documented (Stromayer and Warren 1997; Waller and Alverson 1997; Healy 1997; Seagle and Liang 1997).

Concern ID: 22687

CONCERN STATEMENT: Several commenters stated that the DEIS claims that deer are one of the main causes for a decline in numerous wildlife species, yet provides no data to support these claims and does not offer sufficient alternative causes for this decline. Commenters suggest that the FEIS include population estimates of wildlife listed as in decline because of the large deer population.

Representative Quote(s):

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

Comment ID: 114704 **Organization Type:** Non-Governmental

Representative Quote: While such rhetoric is commonly used by agencies attempting to justify the lethal removal of deer, what is frequently missing from their arguments is any evidence to substantiate their claims and a complete lack of effort to consider other threats that may be adversely affecting park wildlife. The same is true in the Draft EIS as the NPS fails to cite to a single study to suggest that any native wildlife in RCP have been or are being adversely impacted by deer and alleged deer impacts. The sole exception to this lack of evidence is Flowerdew and Ellwood (2001) who suggested that deer have indirectly decreased bank vole populations by removing the bramble blackberry that provides most of their hiding cover." Draft EIS at 194.

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

Comment ID: 114712 **Organization Type:** Non-Governmental

Representative Quote: For state-listed wildlife species, the NPS claims that "the continued growth of the deer population and heavy deer browsing can degrade habitat and result in lack of food or cover for species that require ground vegetation to maintain viable populations within the park." Draft EIS at 206. The NPS identifies a number of species that could be affected including the mourning warbler, Nashville warbler, bobolink, Acadian flycatcher, American woodcock, brown thrasher, eastern towhee, southern bog lemming, Alleghany woodrat, eastern chipmunk, eastern cottontail, corn snake, easer garter snake, eastern hognose snake, eastern worm snake, northern copperhead, northern ringneck snake, eastern fence lizard, and eastern box turtle. Id. Yet, again, the NPS offers no historical or present day population data thereby preventing the public from understanding if these populations are in decline, the severity of the decline, and whether a massive lethal deer removal program can possibly reverse any declines (assuming they can be documented).

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

Comment ID: 114706 **Organization Type:** Non-Governmental

Representative Quote: While all of these claims may be true in a general sense, there's little to no evidence that deer in RCP are having this impact on other wildlife within the park. For example, the NPS indicates that areas within RCP have traditionally been used for bird counts yet the NPS fails to disclose any of the bird count data to demonstrate any loss of bird species or reductions in their numbers. Similarly, no inventory data or population trend data is provided for any of the other species potentially impacted by deer making it impossible to actually determine if these species have been harmed or if such statements are (as is expected) merely conjecture on the part of the NPS.

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

Comment ID: 114708 **Organization Type:** Non-Governmental

Representative Quote: In regard to reptiles and amphibians, the NPS claims that the variety and numbers of amphibians and reptiles found in the park in recent years are markedly reduce compared to inventories from early and middle parts of the 20th century. At present there are 13 amphibians known to exist or likely to exist in the park with four historic reports. Draft EIS at 111. For reptiles, the NPS reports 6 species that are present or probably present in RCP along with 13 historic occurrences that can no longer be confirmed. Id.

Though not clear, presumably the reference to historic reports or historical occurrences reflect amphibian and reptiles species that no longer exist in RCP. Yet, the NPS provides no population estimates for any reptile or amphibian species of concern or any population trend data. In addition, it failed to consider other threats to these populations that are unrelated to deer.

Response: The EIS includes several specific documented examples of the effects of deer on various wildlife species found in Rock Creek Park and on the vegetation used by park wildlife for food, cover, and shelter. Several species of neotropical migrants that nested in Rock Creek Park were extirpated in the 1950s and 1960s because of forested habitat loss. Several species of ground nesters and lower canopy nesters are still active at Rock Creek Park and several of these species have been shown to be negatively affected by deer browsing (McShea and Rappole 2000).

Additional text and references have been added to substantiate the analysis, and text has been modified to be more specific regarding impacts on reptiles and amphibians (pages 194, 195, 199, 206, 211, 214, 219, and 222 of the FEIS).

Concern ID: 22690

CONCERN STATEMENT: One commenter stated that the DEIS fails to take into consideration the role that park management decisions, landscape alteration, and urbanization play in the increased deer population by creating large, open recreational spaces that provide ideal habitat for deer.

Representative Quote(s):

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

Comment ID: 114153 **Organization Type:** Non-Governmental

Representative Quote: What the RCP appears unwilling to accept or admit is that the park, as a consequence of past NPS decision and increased urbanization (outside of NPS control) fails to provide any semblance of a natural system and, in fact, has been manipulated to be an ideal and productive habitat for deer. Surely the NPS can't claim that playing fields, a tennis stadium, a golf course, an outdoor amphitheatre, and community gardens were part of the natural or historical landscape of RCP. Indeed, some of these alterations to the natural landscape, actually increase the attractiveness and productivity of the landscape for deer.

Response: The commenter is correct in stating that some of the park management decisions since 1890 may have increased the attractiveness and productivity of the landscape for deer. Nearly 80% of the Rock Creek Park administrative unit is managed as a natural area. This has remained relatively unchanged for last 50 years. Under this management structure, Rock Creek Park has become more wooded as deciduous hardwood forests have replaced the open areas, farmland, and pine thickets that existed at the time of the park's creation.

However, the park's enabling legislation states that Rock Creek Park would have roadways, bridle paths, and footways for its purpose as a public pleasuring ground. The park's unique location in the middle of Washington, D.C., has influenced management decisions to add additional visitor facilities. In addition, development around the park and upstream of the park has fragmented or removed forests. Both factors have been key in creating many miles of the edge habitat preferred by deer. With increased forest loss in areas bordering the park, and with the continued presence of developed infrastructure within Rock Creek Park, action is needed at this time to address a decline in tree seedlings by excessive deer browsing and the ability of the forest to regenerate in Rock Creek Park.

WH4000 - Wildlife and Wildlife Habitat: Impact of Proposal and Alternatives

Concern ID: 22680

CONCERN STATEMENT: One commenter expressed concern that if bait piles are used, they may have a negative impact on the behavior and distribution of deer as well as other non-target animals.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114996 **Organization Type:** Unaffiliated Individual

Representative Quote: The presence of bait piles themselves have an impact on behavior and distribution or deer and other non-target animals - and their presence should be considered a negative impact that needs to be minimized.

Response: Bait piles will be rotated in different areas of the park, and their use will be temporary. This will have little effect on wildlife that routinely forage in the park.

Concern ID: 22685

CONCERN STATEMENT: One commenter stated that immunocontraceptives have the potential to negatively impact the environment. The commenter stated that immunocontraceptives have been linked to wildlife abnormalities caused by feeding on the carcasses of treated deer as well as by infiltration into the watershed.

Representative Quote(s):

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114981 **Organization Type:** Unaffiliated Individual

Representative Quote: No mention in the EIS is made of the potential impact on wildlife scavenging deer carcasses that had been under an immunocontraceptive program. A quick scan of the literature cited in the EIS turns up no references to any studies on this topic, despite the fact that the NPS is responsible for the health of all animals within park boundaries. The National Park Service needs to ensure that it is not putting other animals at risk through a deer immunocontraceptive program. This is only relevant to Options B and D.

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114982 **Organization Type:** Unaffiliated Individual

Representative Quote: Add additional criteria to those outlined on page 55 of the EIS - requiring that an acceptable immunocontraceptive agent should not be transmissible to animals scavenging on the carcass of treated deer.

Corr. ID: 178 **Organization:** *Not Specified*

Comment ID: 114983 **Organization Type:** Unaffiliated Individual

Representative Quote: Recent studies have linked trace levels of artificial estrogenic hormones (of which leuprolide and most if not all potential deer immunocontraceptives are members) to a range of wildlife abnormalities, including "intersex" fish in the Potomac River (http://afsjournals.org/doi/abs/10.1577/H07-031.1). While potential lead contamination of Rock Creek, and all downstream, waters can be obviated by use non-toxic ammunition, the very nature of immunocontraceptive agents pose an inherent risk. Artificial hormones can make their way into the watershed through excretion (for example, leuprolide is excreted through urine in lab animals (http://www.springerlink.com/content/kl121um52962n878/) and directly through improper disposal. Immunocontraceptives could find their way into the watershed both by excretion by treated deer and through the non-recovery of any delivery mechanism (i.e. "biodarts" that miss their target, degrade and release the immunocontraceptives directly into the environment).

Response: See response to concern 22563 (page 340).

Concern ID: 22686

CONCERN STATEMENT: One commenter stated that there is a discrepancy between the park's General Management Plan and the DEIS. The commenter notes that the DEIS claims that the no action alternative would result in a long-term, negligible to major adverse impact, depending on the wildlife species, while the General Management Plan concludes that the no action alternative would result in no impairment to wildlife. The commenter requests that this discrepancy be resolved in the FEIS.

Representative Quote(s):

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

Comment ID: 114710 **Organization Type:** Non-Governmental

Representative Quote: Finally, the NPS claims that Alternative A in the Draft EIS would result in adverse, long-term, and negligible to major impacts depending on the other wildlife species with species that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover possibly suffering severe reductions or elimination from the park. Draft EIS at 1957. Yet, in the GMP, the NPS concludes that even the no-action alternative (Alternative B) would result in no impairment to other native wildlife. GMP and EIS at 125. Again, considering that these documents were published only two years apart, it is seemingly inexplicable how the GMP finds no impairment to other native wildlife despite the known presence of a growing deer population in RCP while the Draft EIS claims that the no-action alternative could possibly cause the elimination of certain protected species. The NPS must provide a rational explanation for this discrepancy.

Response: See responses to concerns 22613 (page 379), 22614 (page 380), 22553 (page 391), and 22656 (page 421).

WH7000 - Wildlife and Wildlife Habitat: Rock Creek Park Deer Herd

Concern ID: 22691

CONCERN STATEMENT: One commenter suggested methods that could be used to prevent white-tailed deer from being exposed to tick populations and could also treat the white-tailed deer that have already been exposed.

Representative Quote(s):

Corr. ID: 273 **Organization:** National Capital Planning Commission

Comment ID: 115238 **Organization Type:** Federal Government

Representative Quote: As an additional effort for tick reduction associated with deer, The U.S. Department of Agriculture, Agricultural Research Service (ARS). has developed passive self-treatment methods for white-tailed deer through both systemic (i.e. ivennectin-treated com) and topical application technologies to kill ticks feeding on deer1. A device tenned a '4-Poster' was designed for the application of topical acaricides to white-tailed deer to prevent the successful feeding of adult ticks. It consists of a feeding station with four paint rollers that hold the pesticide. Deer self treat themselves when, because of the design, they are forced to brush against the rollers as they feed on whole kernel corn. Because whitetailed deer are the keystone species for adult blacklegged ticks and lone star ticks, the '4-Poster' was evaluated on free-ranging deer in a multi-year project in the northeastern United States for the control of both tick species at seven 2-square mile sites in five states (MD, NJ, NY, CT, RJ). Treatments reduced blacklegged tick abundance by up to 81% and lone star ticks up to 99.5% in the treated communities in comparison with untreated areas after 3 or more years of use. Similarly, the application of 10% permethrin to a 600-acre fenced population of deer resulted in a 91-100% reduction of larval, nymphal, and adult blacklegged ticks at the Goddard Space Flight Center, Maryland. While usage of the devices by deer was generally

high, presence of deer can be low or sporadic when alternative food sources are available such as heavy acorn production on a year to year basis. Maintenance of the feed and topical insecticide through the tick season is labor intensive.

Response: Please see response to concern 22662 (page 429).

Concern ID: 22700

CONCERN STATEMENT: One commenter questioned the purpose of discussing herd health in the DEIS, stating that the concept of deer herd health is one that derives from management that seeks to maximize productivity in deer, as well as to provide optimal hunting experiences. They further stated that the FEIS must clarify how "healthy" is defined, as well as what interest the NPS has in ensuring healthy deer within the park.

Representative Quote(s):

Corr. ID: 391 **Organization:** The Humane Society of the United States

Comment ID: 115001 **Organization Type:** Non-Governmental

Representative Quote: The DEIS argues that rapid reduction of the deer herd by killing would result in "beneficial effects on deer herd health," (DEIS: vi) a condition that is unproven for this park and one which has little or no bearing on the issue before the public. The HSUS questions the purpose of introducing the concept of herd health into the discussion of deer at Rock Creek at all. The repeated reference to deer health creates confusion as to whether NPS is interested in this as a management objective, believes it will be achieved by killing deer, or feels the public would be concerned by seeing deer in a less than "healthy" condition. On page 269, for example, under the section on "Irreversible Or Irretrievable Commitments Of Resources", one of the consequences of Alternative A is described as: "the health of deer herd at Rock Creek Park could suffer irretrievable adverse effects if no action is taken."

The concept of deer herd health is one that derives directly from management that seeks to maximize productivity in deer, as well as provide optimal hunting experiences (i.e., the state model for deer management), something that certainly seems well at odds with a federal agency working under a mandate to allow natural processes to occur unimpeded by human actions.

The FEIS must clarify what is meant and intended by such statements, how "healthy" is defined and what objective biological criteria (not value-laden) must be satisfied to achieve this standard, as well as what interest NPS has in ensuring "healthy" deer be seen in the park.

Response: The references made to herd health in the DEIS refers to the appearance and vigor of park animals. The NPS does not manage park resources to create better animal specimens or increase the trophy potential of park animals. The NPS is concerned with healthy animals living in a healthy habitat that can sustainably provide what animals need to survive. Unhealthy animals with lower body fat and increased stress are more susceptible to disease. The NPS does understand that disease in wild populations is often a population regulating factor, and does agree with the commenter that we manage the park's natural resources to allow natural processes to occur unimpeded by human actions where possible.

Text on pages 47, 49, 92, 194, and 257 has been revised in the FEIS to eliminate the concept of herd health and will insert language to address the body condition of individual animals and the overall condition of the habitat as it relates to providing forage for deer.

Concern ID: 22701

CONCERN STATEMENT: One commenter suggested that reducing the deer population to levels of 15-20 per square mile would reduce the tick population, thus reducing the potential spread of Lyme disease. The commenter further suggested that a discussion of how herd reduction might improve the general health and welfare of visitors to the park in regard to deer-tick infections should be included in the DEIS.

Representative Quote(s):

Corr. ID: 273 **Organization:** National Capital Planning Commission

Comment ID: 115237 **Organization Type:** Federal Government

Representative Quote: In the northeast United States, it has been noted by various studies that by reducing the deer population to levels of 15-20 per square mile (from levels of 60 or more deer per square mile in the areas of the country with the highest Lyme disease rates), and compared to the estimated 2007 Rock Creek Park level of 82 deer per square mile, tick numbers can be brought down to levels too low to spread Lyme and other tick-borne diseases. A discussion of herd reduction effects toward improving the general health and welfare of visitors to the Park in regard to deer-tick infections should be included in the EIS. The incremental removal, reduction or elimination of deer has been shown to substantially reduce tick abundance in many studies.

Response: The relationship of deer-tick infections and park visitors is not within the scope of this deer management plan. The purpose of the plan is to address the adverse impacts that overbrowsing has had on vegetation and cultural landscapes within the park. For visitor use and experience, the primary objectives of the DEIS are to share information with the public regarding the deer population and forest regeneration process as well as to initiate cooperative efforts to address deer effects on the park and surrounding communities. Currently, the primary safety issue for park visitors in relation to the deer population are deer/vehicle collisions, which is analyzed in the DEIS. See also the response to Concern ID 22662 (page 429).

WQ4000 - Water Resources: Impact of Proposal and Alternatives

Concern ID: 22688

CONCERN STATEMENT: One commenter suggested that the DEIS does not provide evidence that an increase in the white-tailed deer population would lead to increased sedimentation and higher turbidity, or that a decrease in the deer population would lead to a reduction in soil erosion and sedimentation of park streams and a beneficial impact to wetlands.

Representative Quote(s):

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

Comment ID: 114720 **Organization Type:** Non-Governmental

Representative Quote: The NPS then contends that, under the no-action alternative, deer numbers will inevitably rise thereby leading to more overbrowsing of ground cover potentially resulting in increased sedimentation and high turbidity if exposed soils are washed away and into surrounding water bodies. Draft EIS at 176. As evidenced by the NPS' own data, deer population numbers in RCP have fluctuated in recent years. While variability in deer numbers is likely, as the NPS indicates, the RCP deer population, if left protected, would not continue to increase in size given the inevitable influence of density dependence factors. Moreover, if there has been no evidence of high turbidity even when the deer population was at a alleged high of 92 deer per square mile, why would turbidity be a problem in the future even if the deer population increases in size.

Not surprisingly, though the NPS concedes that there is no data at present demonstrating that deer browsing has caused a loss of ground cover resulting in an increase in water turbidity, it claims in its analysis of Alternative C (combined lethal actions) that a "smaller deer herd

would allow reforestation to occur throughout the park and for woody and herbaceous vegetative cover to recover" thereby reducing the potential for soil erosion and sedimentation of park streams. Draft EIS at 178. If there is no evidence that any alleged ground cover loss attributable to deer is presently increasing water turbidity, how does a smaller deer herd lessen an impact that doesn't exist? Again, because there's no evidence currently demonstrating a cause and effect relationship between deer browsing and water turbidity, this factor should not be considered in making a decision about the proposed action.

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

Comment ID: 114719 **Organization Type:** Non-Governmental

Representative Quote: While water turbidity is of relatively little consequence in RCP, the NPS goes on to concede that "the loss of vegetative ground cover park-wide from deer browsing is not currently documented as a problem relating to soils and water quality." Draft EIS at 176. If there is no evidence of a loss of ground cover, then sedimentation leading to an increase in water turbidity is not a relevant factor worthy of analysis in the Draft EIS. Instead, its one example of the NPS blaming deer for alleged impacts that simply don't exist to curry favor for its proposed action among the public, other agency officials, and its own decision-makers.

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

Comment ID: 114721 **Organization Type:** Non-Governmental

Representative Quote: Despite the already heavily impacted and manipulated state of RCP wetlands and floodplains, the NPS alleges that deer, if their numbers were left uncontrolled (Alternative A), a continued loss of vegetative ground cover and a change in forest floodplain composition and structure would be "expected", springs and vernal pools "could" be adversely affected "if: deer trample these areas while seeking water sources resulting in increased siltation and erosion, or these pools "could" dry up entirely if more intense browsing reduced vegetative cover. Draft EIS at 182. Though it is clear that the NPS is largely relying on certain assumptions in regard to its analysis of the no-action alternative, for Alternative C and D, both of which promote lethal control, a reduction in the size of the deer herd "would" allow woody and herbaceous vegetative cover to recover, including within wetland areas, and "would" limit the damage of deer trampling in smaller wetland areas. Draft EIS at 185.

Response: On page 171-172 of the FEIS, it is stated that the loss of vegetative cover could result in increased erosion and associated sedimentation or turbidity. Impacts are characterized as negligible to minor. Similar analysis is presented for actions that would result in a decrease in the deer population. The DEIS acknowledges a potential for a reduction in soil erosion and sedimentation with a reduction in deer numbers. The assumption that increased deer density would lead to increased trampling of soils and vegetation, including streamside vegetation, is based on the evidence of a lack of ground cover and seedlings in monitoring plots open to deer in the park, and other literature that shows that large herbivores, including white-tail deer, have known direct effects on ecosystems through trampling (Persson et al. 2000), soil compaction (Heckel et al. 2010), and known indirect effects such as soil degradation (Wardle et al. 2001). See response to concern 22630 (page 408). Park-specific data from Culver and Sereg (2004) showed water quality degraded at several of the springs along Rock Creek.

Text changes have been made on pages 171-172 and 182 of the FEIS to reflect these revisions.

Correspondence ID 1

Name: Gail B. Mackiernan
Organization: Montgomery Bird Club, Maryland Ornithological Society
Organization Type: P - Conservation/Preservation
Address: 216 Mowbray Road, Silver Spring, MD 20904
Silver Spring, MD 20904
USA

Correspondence Text

Dear Rock Creek Park officials:

I am commenting on the Deer Management Plan both as the Conservation Chair of the Montgomery Bird Club, a chapter of the Maryland Ornithological Society, and as a professional ecologist who has been conducting migratory bird surveys in the Park since 1992. In the past I also conducted vegetation surveys for the U.S. Fish and Wildlife Service Office of Endangered Species, as well as for The Nature Conservancy, so have experience in the problems facing RCP.

During the past 15 plus years, I and other birdwatchers have recorded a steady decline in the quality of habitat for both migratory and resident bird species. This has included loss of understory vegetation, explosve increase of invasive non-native plants species, and loss of native food plants (many of which are shrubs or vines). As a consequence there has been a significant impact on bird populations, including breeding neotropical migrants such as Hooded Warbler (now lost to RCP as a breeder), as well as Ovenbird, Worm-eating Warbler, Wood Thrush and Veery (all much reduced in abundance).

The importance of Rock Creek Park for neotropical migratory birds has been discussed before, both in testimony on siting of telecommunications facilities within the park, and also in comments on RCP's Master Plan a few years ago. Because it represents a green North-South corridor through an ever-growing urban area, coupled with its topography of a high ridge with favorable wind directions, the park hosts a migratory bird spectacle unique in the area. It is nationally famous and the park "regulars" are often joined during spring and fall by visitors from throughout the country and even abroad. RCP has been proposed as an "Important Bird Area" to National Audubon, and may be so designated after sufffficent data are collected.

This phenomenon is, however, threatened. The consistent decline in numbers of neotropical migratory birds has been a scientific puzzle but the pieces are beginning to fall into place. Loss of breeding and wintering habitat are primary, but we have now become aware that the loss of vital "stopover" areas is also a major contributing factor. Migratory birds typically spend 2-3 days in such food-rich areas regaining body fat, before resuming their flights north or south. In the extensive developed Metropolitan Washington area, RCP is (or was) one of the more important stopover points. One reason it was such a wonderful place to observe birds.

However, this is starting to change. Places in the park which in autumn once hosted shrubs and vines laden with berries are now denuded and thus, support no feeding birds. This change is obvious now to even the most unobservant birder -- the famous "Ridge" (picnic areas 17 and 18) now has almost no fruiting vines and shrubs where, 10 years ago, native wild grape, poison ivy and chokecherry thrived. In many cases birds have turned to non-native species such as porcelain berry to "fill the food gap." However, an inadvertant result of RCP's otherwise commendable effort to remove invasive plants has been the elimination of these substitute foods. (Unfortunately, there has been no effort to replant native food plants which should have been done at the same time).

What is the cause of this vegetation change? In a word, deer. A "browse line" can be seen everywhere in the park. Even understory species once immune to deer, such as mountain laurel, devil's walking stick and spicebush, are being severely pruned. The loss of native understory has allowed non-native species which are apparently less attractive to deer, to increase their hold. This understory loss has also been the primary cause of reduction in the breeding birds noted above, as without sufficient cover nests are subject to predation and parasitism by cowbirds.

For this reason, the Montgomery Bird Club, MOS, fully supports Option D of the proposed RCP Deer Management Plan. We have seen similar approaches been successful within Montgomery County and in fact, one of our members Rob Gibbs is the deer control expert for the Montgomery Co. parks (MD/NCPPC). It is the opinon of MBC that lethal control to immediately reduce deer numbers is the only hope for protecting and, ultimately, restoring Rock Creek Park 's native vegetation and thus its role as an important migratory bird stopover area. (We would also suggest some effort be made for habitat restoration, perhaps using vlunteers)

I should also add that the primary users of Rock Creek Park in the very early morning in both spring and autumn are birdwatchers, and this useage pattern should be taken into account when planning sharpshooting events (!). There may be upwards of 100 people present in the Nature Center, Ridge (picnic areas 17 & 18), Equitation Field, Maintenance Yard and Military Field areas of RCP on weekends and a smaller number during the week, from dawn until late morning from late April through the end of May, and from mid-August thrugh the end of October. Sharpshooting confined to the hours of darkness, which is what is the practice in Montgomery Co. parks, woud not present a safety issue, nor would activity during winter months.

If you have any questions or would like further details on bird population trends within RCP, please contact me at the above email address or by telephone at 301-989-1828.

Thany you,
(Dr.) Gail B. Mackiernan

Correspondence ID 166

Name: Fritz Hirst
Organization: Rollingwood Citizens Association
Organization Type: O - Civic Groups
Address: 7502 Wyndale Road
Chevy Chase, MD 20815
USA

Correspondence Text

Dear Ms. Coleman,

On behalf of the Rollingwood Citizens Association (RCA), I am pleased to submit comments on the proposed White-tailed Deer Management Plan and Draft Environmental Impact Statement.

The Rollingwood Citizens Association (RCA) represents a community that includes 832 homes in Chevy Chase, Maryland, bounded by Beach Drive, East-West Highway, Brookville Road and Western Avenue. Our community is situated along the northwest boundary of Rock Creek Park.

As an adjacent neighbor of Rock Creek Park, the park has been and remains a significant attraction for our residents. In recent years, however, explosive growth in the park's deer population has become a significant problem in our community.

In the last several years, many residents have noticed a marked increase in the number of deer roaming the Rollingwood area. At first, these sightings were limited to the early evening and later evening hours. Now, deer in groups of up to five or six can be seen during daylight hours, eating nearby shrubs, flowers, trees and other plantings. We have received numerous complaints about destruction of property caused by the increasing presence of deer in our community.

Deer also pose threats to health and safety. We are very concerned about the presence of deer fecal droppings and reports of a significant increase in ticks on pets, children, and adults with the resultant dramatic increase in lyme disease cases. In addition, residents driving to and from their homes frequently encounter deer on nearby roads, causing near and actual collisions.

All of these factors – destruction of property and threats to human health and safety – necessitate substantial changes to current policies through adoption of more rigorous interventions. Accordingly, RCA strongly endorses "ALTERNATIVE D: COMBINED LETHAL AND NON-LETHAL ACTIONS". This is the position your agency prefers and it appears to be a reasonable approach, given the currently available means of reproductive interventions and their cost compared to the other alternatives. Should the park pursue lethal strategies, we strongly believe they should be conducted with the utmost care to ensure that human populations and pets are completely protected at all times.

If ALTERNATIVE D cannot be selected, RCA would endorse "ALTERNATIVE C: COMBINED LETHAL ACTIONS". We cannot, however, support either ALTERNATIVE A or ALTERNATIVE B.

Thank you for your consideration.

Sincerely,
Fritz Hirst
Board Member
Rollingwood Citizens Association

Correspondence ID 181

Name: Susan Recce
Organization: National Rifle Association
Organization Type: L - Non-Governmental
Address: 11250 Waples Mill Road, Fairfax, VA 22124
Fairfax, VA 22030
USA

Correspondence Text

Dear Superintendent Coleman:

The NRA appreciates the opportunity to provide comments on the Rock Creek Park Deer Management Plan/EIS (Plan).

The NRA supports the use of firearms and archery equipment to reduce the deer population in Rock Creek Park. This position is shared by the National Park Service in its history of addressing the need to reduce populations of ungulates in various units of the National Park System. The Service's final management decision in all cases has been to implement a lethal reduction plan as the most cost effective and efficient means of reducing ungulate populations to desired levels.

However, the NRA cannot support any one of the alternatives in the Plan. Alternatives C and D, which address lethal reduction, intend only to use contract sharpshooters. No consideration has been given to using qualified hunters as sharpshooters.

Until recently, the Service had not been willing to consider the use of qualified members of the public (e.g. hunters) as sharpshooters. That position changed as a result of public comments to the original draft elk management plan for Rocky Mountain National Park. The Park subsequently amended its plan to consider the use of qualified members of the public, and in the final plan released in December 2007 the preferred alternative was to rely on gradual lethal reduction of elk over time by "NPS staff and authorized agents of the National Park Service." The definition of authorized agent includes qualified volunteers. Twenty-two qualified volunteers from the hunting community assisted the Park in the managed elk cull this past winter with great success.

Theodore Roosevelt National Park, which was following closely on the heels of Rocky Mountain National Park in developing an elk management plan, also included qualified members of the public as sharpshooters in its lethal reduction alternative. Specifically, the preferred alternative announced this past August is direct reduction that "would be managed by the NPS and carried out by qualified federal employees and/or authorized agents. Authorized agents include, but are not limited to, NPS and other federal agency personnel and skilled public volunteers."

As stated above, the Plan for Rock Creek Park does not consider the use of qualified members of the public in Alternatives C or D. Instead it limits the implementation of the lethal reduction plan to qualified federal employees or contractors.

The only lethal alternative to culling by federal employees or contract sharpshooters was the consideration of a managed hunt under the "Alternatives Considered But Rejected" section of the Plan. The Service went to great length to explain why a managed hunt would not be effective in reducing the deer numbers to the desired level stating that it would not offer the safety features that sharpshooting would offer and that it would warrant extensive planning and oversight.

The key point and only point to be made in this section is that the Service's regulations do not allow hunting in Rock Creek Park and so a managed hunt is not a viable alternative. The Plan states that "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." Changing existing regulations

would be a protracted process that does not meet the Service's stated need to respond in the near term to the increasing deer population and its adverse affects on the Park's natural resources.

It is an empty exercise for the Service to engage in a comparison of the effectiveness of a sharpshooting operation versus a managed hunt. They cannot be fairly compared because they are two entirely different activities. Sharpshooting is designed to cull using techniques such as shooting over bait at night with lights, using sniper rifles and silencers, and at times and in places with aids not allowed in Federal and state hunting regulations. Hunting regulations are designed for "fair chase," which means that hunters are limited to basic firearms and archery equipment with no additional aids and must hunt in daylight, without bait, and without shooting aids. Sharpshooting is a military-like operation that is implemented without constraint to create a balance that favors the human, whereas hunting is a conservation method where constraints create a balance that favors the animal.

It may be argued that Rock Creek Park is a small park in an urban setting and therefore its deer management plan cannot be patterned after the elk management plans of the larger and more remote Rocky Mountain or Theodore Roosevelt National Parks. However, there are many qualified hunters who are just as skilled in using firearms and archery equipment as contract sharpshooters. They can just as safely and effectively participate in a culling operation with the same parameters as outlined in the Plan for sharpshooters; that is, locating deer, setting up bait stations, shooting over predetermined bait sites that can establish shooting lanes and backstops, shooting when park visitation is low or absent, safely and humanely dispatching deer, and disposing of the deer according to the Plan requirements.

Today, hunters are used by thousands of municipalities across the country in sharpshooting programs that result in the reduction of deer populations to desired levels. Fairfax County, Virginia is an example of a local jurisdiction that has successfully used hunters to control site-specific deer problems for more than a decade – without incident.

The NRA opposes the draft Plan as written and strongly recommends that it be amended to include a new alternative that would address the use of qualified members of the public as sharpshooters, a precedent now set in the National Park System.

Sincerely,

Susan Recce, Director
Conservation, Wildlife, and Natural Resources
National Rifle Association

Correspondence ID 211

GOVERNMENT OF THE DISTRICT OF COLUMBIA
HISTORIC PRESERVATION OFFICE
OFFICE OF PLANNING

August 3, 2009

Ms. Adrienne A. Coleman
National Park Service
National Capital Region
3545 Williamsburg Lane, NW
Washington, DC 20008-1207

RE: Draft White-Tailed Deer Management Plan & Environmental Impact Statement, Rock Creek Park

Dear Ms. Coleman:

Thank you for providing the DC State Historic Preservation Office (DC SHPO) with a copy of the above-referenced document. We have reviewed the document in accordance with Section 106 of the National Historic Preservation Act and the National Environmental Policy Act (NEPA) and are writing to provide our comments regarding effects on historic properties.

As explained in the EIS, implementation of some of the measures proposed within the Preferred Alternative ("Alternative D: Combine Lethal and Non-Lethal Actions") may affect historic properties – namely cultural landscapes and archaeological resources. In particular, the construction of "deer exclosure fences" could constitute visual effects on significant landscapes and possibly impact archaeological sites. While the text indicates that the proposed fence sites have been selected to minimize their visibility and to avoid areas of known archaeological potential, it appears that many of the proposed fence locations intersect identified archaeological sites within the park, at least at the scale at which they are shown on the map on p. 51. Although the areas of ground disturbance will be minimal, the actual fences should avoid intersecting archaeological sites by completely including or excluding the sites. The document specifies that installation will be monitored so that work can be halted if archaeological resources are encountered.

For these reasons, the DC SHPO concurs with the NPS determination that implementation of the Preferred Alternative for White-Tailed Deer Management in Rock Creek Park will have "no adverse effect" on historic properties conditioned upon the sites for the exclosure fences being carefully located to avoid or completely contain identified archaeological sites, in consultation with the NPS-NCR Regional Archaeologist, Dr. Stephen Potter. Installation of the fencing should be monitored by an archaeologist meeting the *Secretary of Interior's Standards*.

If you should have any questions or comments regarding this matter, please contact me (for built environment) at andrew.lewis@dc.gov or 202-442-8841 or Ruth Trocolli (for archaeology) at ruth.trocolli@dc.gov or 202-442-8836. Otherwise, thank you for providing this opportunity to comment.

Sincerely,

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

08-233

801 North Capitol Street, N.E., Suite 3000, Washington, D.C. 20002
202-442-8800, fax 202-741-5246

Correspondence ID 222

Name:	Jorge A. Bogantes Montero
Organization:	Anacostia Watershed Society
Organization Type:	P - Conservation/Preservation
Address:	Anacostia Watershed Society. The George Washington House, 4302 Baltimore Av., Bladensburg, MD 20710 Jorge Bogantes, 3122 19th NW, Washington, D.C., 20010 Washington, DC 20710 USA
E-mail:	jorge@anacostiaws.org

Correspondence Text

The Anacostia Watershed Society (AWS)supports, and publicly endorses, the National Park Service's choice of alternative D (Combined Lethal and Non-Lethal Actions). We think that the alternative D is the best option to tackle the problem, not only in the short term, but also in the long term. There is an incontrovertible and imperative need of managing White-tailed Deer populations in the park for the sake of the woodland ecosystem (mostly its structure, regeneration dynamics, and diversity), and people's safety (considering serious public concerns such as Lyme disease and vehicular collisions).

Correspondence ID 224

Name:	Stephanie Boyles
Organization:	Humane Society of the United States
Organization Type:	L - Non-Governmental
Address:	5200 Glover Road N.W. Washington, DC 20008
E-mail:	

Correspondence Text

My name is Stephanie Boyles. I'm a Wildlife Scientist with the Humane Society of the United States. We have 11 million members nationwide, many of whom are Washingtonians and visitors to our nation's capital that come to enjoy Rock Creek Park. The HSUS is committed to animal protection and we seek to work in a positive 13 manner with government agencies, communities, municipalities to provide guidance and assistance with respect to decisions concerning wildlife and urge that a full and open dialogue take place when controversial issues arise and especially those that involve the possibility of killing wild animals as a means of conflict resolution. We also believe that contemporary wildlife damage management should be practiced as a comprehensive science using multiple strategies and approaches as well as respecting the opinions and positions of all effected stakeholders and we believe in a systematic planning process and we believe it's essential that an orderly and appropriate forum occur so that everybody that is going to be effected by any decision that's made that the National Park Service deems appropriate, everyone has an opportunity to have a say in what's going to happen. And while we understand and appreciate the Park Service's concerns over damage that's been attributed to deer browsing at Rock Creek Park, the HHUS does not believe the lethal control option is either socially acceptable as a practice nor in the long term is going to be the most ecologically sound approach to resolving conflicts with deer at Rock Creek Park.

We believe that deer culling programs in general simply generate an endless succession of removal and replacement which animals die and unnecessarily because the root causes of the problem are not addressed and as long as the habitat in Rock Creek remains attractive and accessible, when we removed a portion of a population, a niche is filled or is open and it will be quickly refilled by the animals reproducing at an accelerated rate. It's a very short-term solution to a very complex long-term problem. Given the controversy surrounding the issue, and the polarization that we're afraid will occur should they decide to proceed with a culling program of some kind, we believe that the NPS should adopt Alternative B, the one that's part of the Environmental Impact Statement that would involve sterilizing does or performing some sort of immunocontraception program and also using exclusionary fencing to protect environmentally sensitive habitats. The HSUS has been a leader in the development of wildlife contraceptions. We have successful programs in Gaithersburg and on Fire Island where we're actually working with the NPS and we would appreciate the opportunity to work with Rock Creek to implement an immunocontraception program to bring the population gradually down over time and then stabilize it so that the animals are kept in at an acceptable level that will not cause the environmental damage that they may be causing at this time. Thank you.

Correspondence ID 227

Name:	David Feld
Organization:	Geese Peace
Organization Type:	L - Non-Governmental
Address:	5200 Glover Road NW Washington, DC 20008
E-mail:	

Correspondence Text

I'm David Feld, born in Brooklyn. We have a tree in Brooklyn. Not much wildlife, but let me say we have Prospect Park. I live in Virginia now, in Lake Barcroft in an urban forest, very nice community. We have a few deer, just maybe about three or four deer roaming through the neighborhood. So we have a budding problem that will eventually be what you're faced with here in Rock Creek Park. Our goal in our community is to solve this problem before it becomes a crisis and before we have big meetings like this and people start to fight with each other who at one time were friends and now find themselves at opposite sides of a very difficult question. So we had that same situation happen on another wildlife issue that was caused by a similar approach that's been taken by the National Park Service. It was the solving of the fact that there weren't enough Canada geese in 1965 because they were all over-hunted. And so what the US Fish and Wildlife Service and every single expert and state agencies did is they began a program of reintroducing migratory birds into the area but they didn't realize the migratory birds became resident birds because they nest where they were born and about 1980 there was a -- and in around 2000 one, when I was President of the Homeowners Association there we had a war in my community about wildlife, which we solved. And we solved it by saying we understand the problem. Instead of fighting about solutions, we're going to work together. We're going to have a better community when we finish. We're going to take the energy of controversy and convert it into the energy of cooperation. We did that successfully and we formed an organization called Geese Peace. And now that's an organization that is of national scope and we have an international program. I'm the national program director for Geese Peace now. My background is I'm a water resource engineer and two years ago, we began to see a process going on with the solution for deer which is very similar to the process that would happen to geese. Solve a problem in a way that maybe solved a unique issue like forestation in a park in an urban forest. And by the way, this is not the same type of forest as they have out in Montana and some of the other areas. This is an urban forest. The things that contain an urban forest are the roads and the people that have homes around it.

If a tree starts to grow on the road shoulder, you're going to cut it down because you're not going to let a tree grow there. And there's not going to be a deer that's going to eat it. A deer might eat it but if the deer wasn't there, there would certainly be somebody from the Highway Department would take that tree. Let me talk a little bit about why I'm here because ordinarily we're a non -- we are a non-activist. Geese Peace is non-activist. We solve problems for communities when ask us. But this, to me, was an end game. This is not any park, this is Rock Creek Park. This is the park of the nation's capital. This is the park that's run by probably the greatest environmental agency in the world, the National Park Service. And what they decide in the national capital surrounded by foreign embassies, is going to be the model not only for the United States but for the world. And we began our program to solve the deer problem. We said how can we solve this in the same way we solved the Canada Geese problem? Well, it was easy. To understand why the problem is there in the first place, because as you said, 15 years ago, you didn't have a deer problem. Something happened, just like something happened with the geese. Let's start. I don't know if Lyme disease is an issue here, but it is in Virginia. It is in Virginia, so as an engineer, I'm thinking, okay, do deer get Lyme disease? No, deer don't get Lyme disease. Do people get Lyme disease? Yeah. Do white mice get Lyme disease? In fact, they do and they transfer it to ticks and then after a couple of years the ticks jump to the deer for their blood meal because they're the largest mammal around in the area and they get their blood meal and they start a three-year cycle of reproduction and some of those ticks might have Lyme disease and some of them might not. So if the deer are out there collecting these ticks, then why not use the deer as deer vacuum cleaner, as a tick vacuum cleaner? I'm finished? Oh, okay, good. Okay,tick vacuum cleaner. We're going to prepare our comments because we've been doing a lot of study on this whole problem of solving the deer. We have not begun a program called Deer Peace. I'm an organization. Okay, sorry. So you do that. The other thing that should not be done any more and will result in better water quality is if you're wondering why deer are on the sides of roads in Rock Creek Park when it snows and they salt the road and they sand the road and the snow plows come in now and push the sand in the sides of the road, what you're doing is creating huge salt licks across every single road you have in Rock Creek Park and by doing so, you're attracting the deer to the road. The deer become habituated to cars. They're not afraid of traffic. I'm finished.

Correspondence ID 233

Keep Private: No
Name: Karin Adams
Organization: Melvin Hazen Community Garden
Organization Type: O - Civic Groups
Address: 5200 Glover Road NW
Washington, DC 20008
E-mail:

Correspondence Text

My name is Karin Adams and I'm the President of Melvin Hazen Community Garden. And that is connected with that venue on Sedwick Street and that's about one block south of Tildon, so it's smack in the middle of town. This is an old Victory Garden. We are 101 plot owners and many have been in the garden for years and years. 2007 the problem started. We got deer jumping in. 2008, we got eaten totally flat. The only thing that they didn't eat was carrot tops, mint and sweet peppers for one reason or another. The rest just went. So what we did as a temporary solution before any more solution can be had, we put up a deer fence and it works like a charm. It's just regular garden sticks, deer fencing. It's a netting that's barely visible and the deer have been out totally, the whole season. It really, really worked. We have rather picky neighbors in the Tilden Apartments which is a very elegant housing and they did not want to have any big heavy netting, steel fencing whatsoever. But this very simple deer fencing worked. Nothing problem. Now, we do have another problem. We had killer rabbits coming in and they dig under the fencing, so you can't win over nature.

Correspondence ID 248

Name: Marc Imlay
Organization: Maryland Native Plant Society
Organization Type: O - Civic Groups
Address: 5200 Glover Road NW
Washington, DC 20008
E-mail:

Correspondence Text

M-a-r-c, I-m-l-a-y. I'm representing the Maryland Native Plant Society which has a DC Chapter, the Anacostia Watershed Society, the Mid-Atlantic Invasive Plant Council and the Maryland Chapter of the Sierra Club. I'm on the Board of all those. Fairfax County has had to shut down three parks. There's no access to those parks because there's so many deer that resulted in so many increase in ticks and the percentage of ticks that have Borelial burgdoferi, a bacteria that cause Lyme disease, has increased even more, just two greater risk of Lyme disease. Let's not shut down -- let's not have to shut down Rock Creek Park five years from now because it's not safe at all to go in there. Lyme disease has doubled in Maryland last year and increased several fold in the decade before that. It's increasing rapidly everywhere. So that, I think, becomes one of our primary concerns as the physician mentioned earlier, that we've got to get the deer number down fast. Sometimes it works and Scott Bates will point out, sometimes not, but let's try it to get the deer numbers down, to get the ticks down and the Lyme disease risk down. People have talked about the other issues. When we have out hunters out there, we are substituting for the wolf and cougar, so it's a natural thing. There are times in some places in the United States we can bring the wolves and cougars back. When I was Natural Resource Manager for the Army National Guard, we did it. We brought the cougar back to Camp Crowder, Missouri and the wolf back to Camp Ripley, Minnesota, but we can't do that here realistically. So we need our hunters to play the same role. In fact, they're really more humane than wolves and cougars are at their job. And I have to accept the -- we support the preferred Alternative Option D, accepting the idea that the non-lethal method won't work fast enough but we will employ that as we can. But let's get the numbers down because we're at a crisis stage right now. Okay, thank you all very much and I thank the Park Service for carrying out this action.

Correspondence ID 260

Name: Dustin Rhodes
Organization: Friends of Animals
Organization Type: L - Non-Governmental
Address: 5200 Glover Road NW
Washington, DC 20008
E-mail:

Correspondence Text

Hi, I'm Dustin Rhodes, D-u-s-t-I-n, R-h-o-d-e-s. I'm here representing Friends of Animals. We're based in Darien, Connecticut. We have an office here in Washington, DC and I'm the Director. And I also live near Rock Creek Park. And we're submitting public -- we're submitting comments, so I'll just keep this brief and say that we support only non-lethal methods.

Correspondence ID 261

Name: Serda Oabenian
Organization: Animal Welfare Institute
Organization Type: L - Non-Governmental
Address: 5200 Glover Road NW
Washington, DC 20008

Correspondence Text

That's S-e-r-d-a, O-a-b-e-n-I-a-n and I'm here representing the Animal Welfare Institute. We have a number of concerns associated with the proposed Deer Management Plan for Rock Creek Park. Sadly, we see this plan as yet another indication that the National Park Service has lost its way, that is has forgotten its legal mandate and that it is ignoring its mission to protect and conserve native wildlife and ecological processes within national parks. This is not the first national park to propose sharpshooting and the capture and euthanasia to solve a perceived deer management problem. Of course, just because one park has implemented or proposed such a massive deer kill does not mean that it is appropriate, justified or legal. AWI asserts that what you have proposed is illegal actually, that it is entirely antithetical to the legal standards that govern the management of wildlife in national parks. The National Park Service was created to protect, conserve and -- conserve wildlife, like I stated and other natural wonders within national parks, not to engage in a wholesale slaughter of native wildlife. The National Park Service justifies its plan by claiming that management action is necessary to prevent deer from causing impairment of Rock Creek Park's forests, vegetation and other wildlife. The problem with this justification is that National Park Service impairment standard is applicable only to public uses of the parks, not to the management of native wildlife. The impairment standard, therefore, applied to activities like snowmobiling in Yellowstone
National Park, mountain biking in Zion National Park as examples. The impairment standard was never intended to be applied to justify the slaughter of native wildlife as is proposed for Rock Creek Park. Admittedly, NPS does have the uthority to destroy wildlife within national parks, but only when those animals are adversely impacting the use of these parks. This authority has been used for example, to justify the removal of individual deer in Grand Canyon National Park, who have become advertently aggressive when seeking food from visitors. This authority, however, was never intended to be used to remove large numbers of wildlife as is proposed here. Moreover, even if it were applicable in this case, Rock Creek Park has offered no evidence to suggest that visitor use has been adversely affected by the number of deer. Not only have visitor numbers for Rock Creek Park remained stable, they might have possibly even increased over the past decade but there is no evidence that the visitor experience has been degraded by the presence of deer or by the alleged impacts that the National Park Service has attributed to these animals. AWI will provide additional evidence to document the lack -- the National Park Service lack of legal authority to engage in these proposed activities such as sharpshooting in our written comments on the plan. Those comments will also provide a detailed analysis of the alleged impacts that the National Park Service is attributing to the deer. The lack of credible evidence to substantiate many of those impacts and the failure of the National Park Service to accurately consider other deer management options that are effective, non-lethal, humane and consistent with your agency's legal mandates. AWI is prepared to work with the National Park Service to develop a comprehensive and humane deer management plan that will achieve the objectives of the Service while also insuring the humane treatment and protection of the Park's deer. For such a cooperative effort, to succeed however, the National Park Service must substantially alter its management mind set and to accept its primary role to protect and not persecute wildlife. Thank you for providing AWI with the opportunity to present these views. And I also just wanted to mention that I am President of Rockville, Maryland as well. Thank you.

Correspondence ID 273

National Capital Planning Commission

401 9th Street, NW · North Lobby, Suite 500 · Washington, DC 20004 · tel 202.482.7200 · fax 202.482.7272 · www.ncpc.gov

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IN REPLY REFER TO:
NCPC File No. 1206/MP203

SEP 17 2009

Ms. Adrienne A. Coleman
Superintendent, Rock Creek Park
3545 Williamsburg Lane, NW
Washington, DC 20008-1207

Dear Superintendent Coleman:

Thank you for the copy of the Draft EIS on White-Tailed Deer Management Plan for Rock Creek Park dated July 2009. We hope our comments below will assist you in preparing the final EIS and its potential resulting decision for action. These comments are limited to the Commission's role as the central planning agency for the federal government in the National Capital and only express our general views on planning and environmental issues.

The Commission staff notes that the final EIS should address the following issue:

Disease vectors supported by White-Tailed Deer-

- Lyme and all other deer-tick-borne diseases can be prevented on a regional level by reducing the deer population that the ticks depend on for reproductive success. This has been demonstrated in the communities in Maine, New York, and Connecticut. The black-legged or deer tick (*Ixodes scapularis*) depends on the white-tailed deer for successful reproduction.

- In the northeast United States, it has been noted by various studies that by reducing the deer population to levels of 15-20 per square mile (from levels of 60 or more deer per square mile in the areas of the country with the highest Lyme disease rates), and compared to the estimated 2007 Rock Creek Park level of 82 deer per square mile, tick numbers can be brought down to levels too low to spread Lyme and other tick-borne diseases. A discussion of herd reduction effects toward improving the general health and welfare of visitors to the Park in regard to deer-tick infections should be included in the EIS. The incremental removal, reduction or elimination of deer has been shown to substantially reduce tick abundance in many studies.

- As an additional effect for tick reduction associated with deer, The U.S. Department of Agriculture, Agricultural Research Service (ARS), has developed passive self-treatment methods for white-tailed deer through both systemic (i.e. ivermectin-treated corn) and topical application technologies to kill

Superintendent Coleman
Page 2

ticks feeding on deer[1]. A device termed a '4-Poster' was designed for the application of topical acaricides to white-tailed deer to prevent the successful feeding of adult ticks. It consists of a feeding station with four pairs rollers that hold the pesticide. Deer self treat themselves when, because of the design, they are forced to brush against the rollers as they feed on whole kernel corn. Because white-tailed deer are the keystone species for adult blacklegged ticks and lone star ticks, the '4-Poster' was evaluated on free-ranging deer in a multi-year project in the northeastern United States for the control of both tick species at seven 2-square mile sites in five states (MD, NJ, NY, CT, RI). Treatments reduced blacklegged tick abundance by up to 81% and lone star ticks up to 99.3% in the treated communities in comparison with untreated areas after 3 or more years of use. Similarly, the application of 10% permethrin to a 600-acre fenced population of deer resulted in a 91-100% reduction of larvae, nymphal, and adult blacklegged ticks at the Goddard Space Flight Center, Maryland. While usage of the devices by deer was generally high, presence of deer can be low or sporadic when alternative food sources are available such as heavy acorn production on a year to year basis. Maintenance of the feed and topical insecticide through the tick season is labor intensive.

The park mission to preserve and perpetuate the ecological resources of Rock Creek valley, and to preserve its scenic value for the enjoyment of the public, is grounded in the park's 1890 enabling legislation which established Rock Creek Park for the purpose of providing a "...public park or pleasure ground for the benefit and enjoyment of the people of the United States." The Commission staff views the proposed efforts of the White-Tailed Deer Management Plan Alternative D as a continued effort to achieve the goals established in the Park's mission.

We appreciate your consideration of the NCPC staff comments at this stage of the EIS development. If you have any questions about our comments, please contact Eugene Keller at (202) 482-7251, regarding the noted issues.

Sincerely,

Michael A. Sherman

Michael A. Sherman, Associate AIA, APA
Director, Policy and Research Division

1. Tick Management Handbook, Revised Edition, Prepared by: Vice Director Kirby C. Stafford III, Ph.D., Chief Entomologist: Connecticut Agricultural Experiment Station. New Haven Support, pp 56 and 57.

Correspondence ID 275

FORCE
Friends of Rock Creek's Environment

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beth@friendsofrockcreek.org

FORCE

PO Box 42680
Washington, DC 20015
(202) 237-8866
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September 30, 2009

Ms. Adrienne Coleman, Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington, DC 20008

Re: Draft White-Tailed Deer Management Plan/Environmental Impact Statement (July 2009)

Dear Ms. Coleman:

Friends of Rock Creek's Environment (FORCE) is a not-for-profit organization working to protect and restore Rock Creek and its watershed. Our primary focus is restoring the water quality of Rock Creek. Our members, most of whom are residents of Montgomery County and Washington, DC, regularly visit Rock Creek Park for recreation and nature study. FORCE also fields hundreds of people each year to participate in volunteer projects, such as water quality monitoring, stream clean-ups, and invasive plant removal, to enhance the park. To promote protection of this valuable resource, we submit the following comments on the National Park Service's Draft White-Tailed Deer Management Plan/ Environmental Impact Statement (DEIS).

The deer population must be reduced to help improve Rock Creek water quality and protect park resources. The DEIS documents and describes how damage to park resources, particularly the vegetation, in turn leads to water quality degradation. The increasing deer population has decimated vegetation to about six feet up from the ground throughout Rock Creek Park. As a result of the deer overpopulation, few native wildflowers bloom and produce seeds. Even fewer tree seedlings are successfully growing from the forest floor. Deer have browsed much of the shrub layer. This loss of native vegetation on the forest floor and the subcanopy layer has resulted in increased invasion of invasive plants species and habitat loss for important species of birds, small mammals, and reptiles.

FORCE members have noticed an increasing number of large trees falling into Rock Creek and others being removed by NPS because they pose a safety hazard. Many of the downed trees along the creek are the result of increased stormwater water runoff from areas outside the park. If young trees cannot flourish on the banks of the creek and throughout the park, the forest ecosystem is sure to suffer. Unless the deer population is reduced, the grazing will continue to prevent seedlings from becoming mature trees.

FORCE members enjoy seeing deer in the park as much as anyone. Yet, the population has reached such a high level, with as many as 82 deer per square mile, that the vegetation that is the foundation of the forest ecosystem cannot survive. For that reason, FORCE concludes that the NPS must take immediate measures to reduce the deer population to levels called for in the DEIS – 15 to 20 deer per square mile. The DEIS makes a strong case that a combination of non-lethal and lethal methods is necessary to reduce the deer herd and maintain it at a level that allows natural forest regeneration and subcanopy layers to thrive. For the above reasons, FORCE endorses the preferred alternative–Alternative D–with a slight modification. We believe that trained, skilled archers are as efficient as sharpshooters, and therefore encourage the Park Service to explore the use of archers in helping to reduce the deer population.

We appreciate the opportunity to further our cooperative partnership with Rock Creek Park on this and other matters. If you have questions about these comments, please contact me at 202-237-8866.

Sincerely,

Beth Mullin

Beth Mullin
Executive Director

Correspondence ID 276

Adrienne Applewhaite-Coleman/ROCR/NPS
10/02/2009 08:00 AM

To Tawana Armstead/ROCR/NPS@NPS
cc
bcc
Subject Fw: Comments

Tawana--please make sure this is added to the administrative record for the deer mgt plan.

Tx

A

----- Forwarded by Adrienne Applewhaite-Coleman/ROCR/NPS on 10/02/2009 07:59 AM -----

"gale black" <gbblack@rcn.com>
10/01/2009 05:03 PM AST

To: <Adrienne_Applewhaite-Coleman@nps.gov>
cc: "Gale Black" <gbblack@starpower.net>, <KARL@KENNEDYGROUPLLC.COM>, "Whatley, Stephen" <Stephen.Whatley@fais.usda.gov>
Subject: Comments

Please accept this as the comments of ANC 4A08 and the Crestwood Citizens Association on the Draft White-Tailed Dee Management Plan / EIS

October 1, 2009

My name is Gale B. Black. I am the President of the Crestwood Citizens Association. I also serve as the Advisory Neighborhood Commissioner for ANC 4A08, which includes the neighborhood of Crestwood.

On behalf of the Crestwood Citizens Association and ANC 4A08, I urge the National Park Service to adopt Alternative B: the Combined Non-Lethal Actions.

This alternative should protect forest resources. It would use reproductive control, fencing [167 acres of deer enclosures] and other effective reproductive control agents to control the proliferation of deer. There is also support in the community for alternative D. However, the overriding majority of residents preferred the non-lethal approach as the first step. There was a strong sense that sharp-shooting should be the last step taken.

The neighborhood of Crestwood borders Rock Creek Park on three sides. It is the geographic area just east of the Peirce Mill. Crestwood falls within ANC 4A08. The ANC district is within Census Tract 26. It is an area that is primarily residential with detached and semi-detached homes that are owner-occupied.

The Crestwood Citizens Association considered this issue at its September 15, 2009 meeting. Residents were provided excerpts from the draft management plan and had a chance to discuss the topic and vote.

We understood the need to reduce the deer population with the goal of reducing the number from an estimate of 82 deer per square mile to a goal of having 15 to 20 deer per square mile. We also understand that the damage that deer can do - first hand. Some of us attended the public meeting that the Park Service held. This was also the topic of discussion at a number of social events.

We did not feel that the National Park Service had provided sufficient scientific documentation as to the sustainability and long-term benefit of the quick-kill approach. We were also concerned with the persuasive testimony we heard that the deer population tends to rebound, if it gets stressed. We also don't understand why killing is authorized, but relocating the deer is not permitted.

Many of us in Crestwood have learned to co-exist with the deer. While we agree that more needs to be done and should have been done long ago, we cannot agree to allowing sharpshooting within a 1/2 mile of our homes.

It is a matter of safety for those of us who live near the Park and concern for some who may be in the line-of-fire - such as homeless who may be living in the woods or pets who stray.

Some expressed concern that the killing of the deer would be inconsistent with the mandate and mission of the National Park Service. The purpose is to preserve and protect the wildlife and the enjoyment of the people.

Having deer shot in a National Park sends the wrong message and mars the serenity and peace that many of us associate with this national treasure.

We encourage the use of the fencing. To the extent feasible, separate the does from the bucks. That should reduce the deer density.

For all of these reasons, we, the residents of the adjacent Crestwood neighborhood and ANC 4A08, recommend Alternative B, the combined Non-Lethal Actions. We also are willing to work with the park on an education campaign or possible participants in the reproductive control applications.

There needs to be a plan to address the non-native invasive plants and pests and the issue of the discharge of sewage into Piney Branch Creek and Rock Creek.

Whether birds, vines, deer, or pollutants, more needs to be done in a way that humanely addresses the future of the Park.

Thank you and I ask that this be made a part of the record. [ideally without my address]

Gale B. Black, President of the Crestwood Citizens Association &
Commissioner for ANC single member district ANC 4A08
c/o 1761 Crestwood Drive, NW

As an addendum. Deer have been around for a long time. According to the history of this area, there was a deer park in the area. I believe it was the Blagden Deer Farm. That history can be found on the crestwood-dc . org website.

Correspondence ID 277

City Wildlife [illegible]

September 30, 2009

Adrienne Coleman, Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington, DC 20008

Re: *Rock Creek Park Draft White-tailed Deer Management Plan/EIS*
July, 2009

Dear Superintendent Coleman:

City Wildlife is a non-profit organization in the District of Columbia whose mission is to assist wildlife in the Washington area through wildlife rehabilitation and education of the public about wildlife issues.

We thank you for the extensive work that has gone into preparing the *Rock Creek Park Draft White-tailed Deer Management Plan/EIS* and for allowing the public an opportunity to comment. Our comments on the recommendations of this report are as follows:

- City Wildlife recognizes the many adverse consequences of the unsustainable deer population in Rock Creek Park and agrees that, as a community and a nation, we need be seeking a humane and effective solution to this growing national problem.

- City Wildlife does not support lethal measures to control deer, and instead supports NPS's Alternative B, which includes non-lethal measures such as fencing and sterilization. We believe sharpshooting to be both ethically undesirable and also a danger to the public and other animals in an intensely used urban park. Moreover, lethal methods are inconsistent with the Park Service's 1893 legislative mandate for Rock Creek Park 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."

- City Wildlife strongly discourages bow-hunting as a solution to the problem, as some citizens have suggested. A well-publicized incident last year in Virginia involving a doe with an arrow shot completely through her head, who survived for months in this condition despite the best efforts of both government and citizens to capture her and remove it, speaks to the inhumane consequences of bow-hunting. (See attached.) This is just one incident, but similar incidents are not uncommon, and it symbolizes the ethical and public relations problems that arise when bow-hunting is permitted.

- City Wildlife urges the National Park Service to find a way to implement contraceptive or other non-lethal control measures immediately in Rock Creek Park. The park's deer population has been increasing since the early 1990s and waiting until December 2010 to take any mitigating steps will merely compound the problem.

- *City Wildlife believes the National Park Service has a responsibility, as the nation's most influential conservation agency, to contribute to the research and development of contraceptive methods that can be used safely, humanely, and without controversy throughout the nation.*

  To date, despite the dedication and resources of several scientific and non-profit organizations, experiments with contraception in an open [i.e. not contained] population of deer have been limited. Rock Creek Park, with its defined yet open borders, offers an excellent opportunity for research that could contribute to an effective and uncontroversial solution to this growing problem. Rock Creek Park was not defoliated in a day; nor can it be restored in a day. A sustained, committed, safe, and humane approach, led by the National Park Service, is the proper solution to this problem and will set an example for communities around the country. Simply subscribing to the "managed hunt" or sharpshooting approach does little to further the image of the National Park Service as a humane and innovative leader in conservation, or to advance the science.

Thank you again for the opportunity to comment on this report.

Respectfully submitted,

Anne Lewis

Anne Lewis, President

Subject: FW: Comments on NPS Deer Proposal
Date: Friday, October 2, 2009 10:18 AM
From: Anne Lewis <annelewis@verizon.net>

Incident Report on Doe with an arrow through her head (October, 2007 – April, 2008)
Spotsylvania, VA
Information provided by Virginia Wildlife Rescue League to City Wildlife, Inc.
October 1, 2009

This doe was observed on October 15, 2007 on property adjacent to a county park in Spotsylvania, VA. Prior to that, the doe had been observed for 3 years, healthy and with no visible injuries.

Page 1 of 3

On the afternoon of October 15, the doe was seen and noticed to have been struck in the back of the neck with an arrow. At that time, the tip of the arrow was lodged in the neck behind the ear with the rest of the arrow protruding.

The citizen attempted to get assistance for the doe from local, county and state agencies, with no success.

Over the course of the next four months, the doe was observed regularly. The arrow was observed to continue to pierce the head of the doe until it eventually came to skewer the head below the eye. The position of the arrow eventually came to make it almost impossible for the doe to feed as the arrow hit the ground whenever the doe attempted to graze.

In the first week of February, the citizen contacted the Virginia Wildlife Rescue League for assistance. At their suggestion, the citizen constructed a feeding and watering station specifically designed to allow the injured doe to feed and drink.

The Wildlife Rescue League contacted agencies throughout the DMV region, private veterinarians and sought the opinions of several national hunting organizations. Responses in favor of assisting the injured doe were unanimous with all parties offering commitments of time, resources and personnel to aid the deer. For four weeks, coordinated attempts were made to capture and assist the deer, but they were unsuccessful. On April 12, 2008, the doe was seen at the feeding station without the arrow, which apparently had broken off and worked its way out. She was spotted several times later and appeared to be healing.

The Wildlife Rescue League receives and responds to numerous calls every year concerning deer that have been struck, but not killed, by an arrow. In most of these cases, the deer die from infection and/or starvation. Death by bow and arrow is never instant, even in the rare case of a perfectly placed heart/lung shot. In almost every case, the hunter shoots the deer, then waits for the deer to run, bleed out and drop from exhaustion and blood loss before even attempting to track it, find it and finish killing it. The statistics, according to hunt clubs, regarding the number of deer recovered versus number of deer struck by a bow are highly disturbing. There is nothing about bowhunting that can be construed as effective, safe or humane.

Page 2 of 3

Correspondence ID 345

5.M.S

UNITED STATES ENVIRONMENTAL PROTECTION AGEN
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

RECEIVED
SEP - 2 2009

September 2, 2009

Ms. Adrienne Coleman
Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington, DC 20008

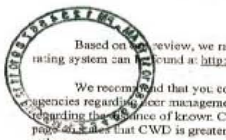
Subject: Draft White Tailed Deer Management Plan, Environmental Impact Statement, Rock Creek Park, Washington, DC July 2009 (CEQ # 20090252)

Dear Ms. Coleman:

In accordance with the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the United States Environmental Protection Agency (EPA) has reviewed the subject document. The purpose of the Draft Environmental Impact Statement (DEIS) is to develop a deer management strategy that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park. Sampling conducted 2007 indicated 82 deer per square mile in the park.

The DEIS evaluates four alternatives. 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. Under Alternative B, several non-lethal actions, such as large-scale enclosures, and reproductive controls 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 Alternative 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.

According to the DEIS approximately half of the deer population (193 individuals) would be removed in the first year of implementation. This would reduce the population to 41 deer per square mile. The second year would remove approximately half the remaining population reducing the population to 25 deer per square mile. The third year would remove half the remaining population reaching the goal of 15 deer per square mile. Future deer removal will follow an adaptive management plan and would depend upon results of the deer population levels and monitoring.



Based on our review, we rate this DEIS, Lack of Objections (LO). A description of our rating system can be found at: http://www.epa.gov/compliance/nepa/comments/ratings.html.

We recommend that you continue to coordinate with the appropriate state and federal agencies regarding deer management issues. In addition, clarification should be provided regarding the presence of known Chronic Wasting Disease (CWD) from the Park. For example, page 60 states that CWD is greater than 100 miles from the park and page 287 states that it is 90 miles away.

Thank you for the opportunity to offer these comments. If you have any questions, please contact Ms. Barbara Okorn at (215)814-3330.

Sincerely,

Barbara Rudnick
NEPA Team Leader
Office of Environmental Programs

Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474

Correspondence ID 378

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Correspondence Text

October 15, 2009
Superintendent Adrienne A. Coleman
Rock Creek Park
3545 Williamsburg Lane NW
Washington, DC 20008

Re: Resolution regarding Draft White-tailed Deer Management Program/Environmental Impact Statement for Rock Creek Park

Dear Superintendent Coleman:

At its regular meeting on October 14, 2009, the Dupont Circle Advisory Neighborhood Commission ("ANC 2B") or ("Commission") considered the above referenced matter. With nine of nine Commissioners in attendance, a quorum at a duly-noticed public meeting, the Commission approved the following resolution by a vote of (6-0-3), with three abstentions:

WHEREAS, Dupont Circle ANC 2B is the elected body representing approximately 20,000 residents of the Dupont Circle neighborhood of Washington, DC, and

WHEREAS, the western border of Dupont Circle ANC 2B includes a portion of Rock Creek Park, and

WHEREAS, deer ticks spreading Lyme Disease have become a serious health hazard in areas of the park bordering on ANC 2B, with several constituents reporting they and/or their pets have suffered tick bites and/or Lyme Disease, with some areas of the park so overrun by ticks that they are now avoided completely, and

WHEREAS, the National Park Service is seeking public comment on its plan to manage the population of white tailed deer within Rock Creek Park, a population that has been growing steadily in recent years in the absence of any predators,

THEREFORE, BE IT RESOLVED that Dupont Circle ANC 2B supports the need to immediately reduce and bring the white tailed deer population within the Park under control, as a matter of public health and safety, and

BE IT FURTHER RESOLVED that Dupont Circle ANC 2B urges the National Park Service to do so as safely and humanely as possible.

I am the Commission's representative in this matter. You can reach me at mike.silverstein@dupontcircleanc.net or by telephone at 202-833-4440 for further information. ON BEHALF OF THE COMMISSION.

Sincerely,

Mike Silverstein, Chairman, Dupont Circle ANC 2B

Correspondence ID 382

Name:	Anna Seidman
Organization:	Safari Club International
Organization Type:	L - Non-Governmental
Address:	501 2nd Street NE Washington, DC 20002 USA
E-mail:	aseidman@safariclub.org

Correspondence Text

Safari Club International
501 2nd Street NE
Washington, D.C. 20002
202-543-8733

November 2, 2009

Adrienne Coleman, Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington, D.C. 20008

Re: Comments on Draft White-Tailed Deer Management Plan/Environmental Impact Statement for Rock Creek Park

Dear Superintendent Coleman:

Safari Club International and Safari Club International Foundation (SCI and SCIF) submit these comments in response to the Draft White-Tailed Deer Management Plan/Environmental Impact Statement for Rock Creek Park ("Draft Plan/EIS"). SCI and SCIF endorse the culling component of the strategy adopted by the NPS for Rock Creek Park's deer management, but challenge the NPS's failure to even mention, let alone consider, the assistance of qualified volunteer agents to assist in the lethal removal of the park's deer. SCI and SCIF recommend that the NPS take advantage of the experiences acquired by other National Park Service units throughout the country, and consider developing a qualified volunteer program for deer management in Rock Creek Park as well. Qualified volunteers could prove to be an important resource for Rock Creek Park since the Draft Plan EIS reveals that the park is considering the use of archery as a means of reducing the deer population. Volunteer participants from the bowhunting community could make a valuable and strategic contribution to the park's wildlife management efforts.

Safari Club International, a nonprofit IRC § 501(c)(4) corporation, represents approximately 53,000 members worldwide and promotes the interests of millions of members in the hunting community. SCI's missions include the conservation of wildlife, protection of the hunter, and education of the public concerning hunting and its use as a conservation tool. Many SCI members and other hunters live in the areas surrounding Rock Creek Park and/or recreate in Maryland, Virginia and other neighboring states. Many of these members and hunters are qualified to assist as volunteers and agents of the National Park Service and/or the state wildlife management agencies in the effort to reduce the park's deer population.

Safari Club International Foundation is a nonprofit IRC § 501(c)(3) corporation. Its missions include the conservation of wildlife, education of the public concerning hunting and its use as a conservation tool, and humanitarian services. More specifically, the conservation mission of SCIF is: (a) to support the conservation of the various species and populations of game animals and other wildlife and the habitats on which they depend; and (b) to demonstrate the importance of hunting as a conservation and management tool in the development, funding and operation of wildlife conservation programs.

SCI and SCIF have long supported the participation of qualified volunteers in the management of wildlife on National Parks. SCI has submitted numerous comment letters to the NPS in support of volunteer participation in culling programs at units such as Rocky Mountain National Park, Theodore Roosevelt National Park, Wind Cave National Park, Indiana Dunes National Seashore, and Catoctin Mountain Park. SCI and SCIF also are currently participating in litigation to defend a volunteer program being implemented to reduce elk overpopulation in Rocky Mountain National Park.

Happily, the NPS now acknowledges the legality of the participation of qualified volunteers in National Park Service wildlife management. Unfortunately, some groups and individuals still erroneously claim that volunteers who participate in a cull of wildlife on a National Park are engaging in illegal "hunting" in the park. These invalid claims should be no barrier to consideration of the use of qualified volunteers in National Park Service units, including Rock Creek Park.

As SCI and SCIF, together with other sportsmen's organizations, wrote to NPS Director Mary Bomar on March 19, 2007:

We believe that the National Park Service can use qualified hunters to help manage park wildlife, in methods similar to those that the Service has implemented through its own staff or through contract sharpshooters. The use of qualified members of the hunting community can be supported ecologically, economically, socially, politically and legally. It will also help the Service fulfill its obligations to protect park resources and property, particularly where overpopulation ungulates have destroyed habitat for other wildlife species.

In support of that recommendation, SCI and SCIF provided Director Bomar with a legal analysis of why members of the hunting community may assist in reducing overabundant wildlife populations on national park lands. That analysis included the following points:

1. Nothing in the statutes, regulations and policies that establish the authority of the National Park Service prevent the NPS from utilizing members of the hunting community to assist an individual park and/or the state wildlife management authority in managing, culling or reducing an overabundant wildlife population on park land, much as the NPS has used professional sharpshooters.

2. The National Park Service Organic Act grants the Secretary of the Interior the authority to provide "in his discretion" for the destruction of such animals or such plant life as may be detrimental to the use of any of said parks, monuments, or reservations. 16 U.S.C.A. § 3.

3. The regulations that the Secretary of the Interior has promulgated for the purpose of administering the National Park System do not prohibit the Secretary or a Park Superintendent from managing a park's overabundant wildlife using individuals from the hunting community as a wildlife management resource. Although there are regulations, such as 36 C.F.R. § 2.2, that restrict hunting activities on NPS lands, such rules are overridden by NPS regulations that permit the NPS and its agents to conduct activities necessary to counteract threats to park resources. For example, 36 C.F.R. § 1.2 specifically states that

(d)The regulations contained in parts 2 through 5, part 7, and part 13 of this section shall not be construed to prohibit administrative activities conducted by the National Park Service, or its agents, in accordance with approved general management and resources management plans, or in emergency operations involving threats to life, property or park resources.

4. Similarly, NPS Management Policies do not prevent the NPS from utilizing members of the hunting community as agents of the NPS or state wildlife management authority for a culling (e.g., non-hunting) operation. For example, policy provision 4.4.2.1, entitled "NPS Actions That Remove Native Plants and Animals" acknowledges the Service's use of "others to remove plants or animals" but does not restrict the term "others" to include only paid sharpshooters. The same policy provisions recognizes the use of "destruction of animals by authorized agents," but does not restrict the term "authorized agents" to

individuals who are paid for their sharpshooting skills.

5. Members of the hunting community should not be excluded simply because they are willing to volunteer their services to assist the NPS in wildlife management and because they are willing to dispose of their take either through personal use or through donation to charities that feed the hungry. Paid sharpshooters are not the only individuals available who have the sharpshooting skills to efficiently take members of the park's overabundant deer population. These volunteers can be managed by NPS personnel or alternatively personnel from the state wildlife management authority. It is fiscally irresponsible to ignore this valuable wildlife management resource that could potentially save the NPS and the state millions of dollars.

Despite the legality of the participation of qualified agents, the Draft Plan/EIS makes absolutely no mention of even considering the participation of qualified members of the hunting community. Instead, the Draft Plan/EIS simply rejects managed hunting as an option, due in great part to the legal restrictions that the NPS has placed on hunting in many National Parks. The Draft Plan/EIS fails to recognize the distinction between a managed hunt and the contribution of qualified volunteers, acting as agents of the NPS, in a culling operation. In so doing, the Draft Plan/EIS completely overlooks an important resource in the agency's efforts to conserve and manage park wildlife.

Hunters and sportsmen, including bowhunters, are among the most accomplished and safety-conscious marksmen. Many have military and/or law enforcement training, experience with night optics, as well as knowledge of wildlife behavior and habitat. Moreover, the NPS has the ability to institute stringent selection criteria and training, such as that being used at Rocky Mountain National Park to test the marksmanship and safety practices of those who wish to volunteer.

SCI and SCIF wish to remind the NPS that qualified agents are assisting state and community wildlife managers in ongoing programs for the reduction of deer populations in densely populated suburban communities here on the east coast. Data collected by the New Jersey Department of Environmental Protection, Division of Fish and Wildlife reveals that the use of volunteers, even when compared to professional sharpshooting contractors, is an efficient and cost-effective population reduction tool. For example, for the last 13 years, the State of New Jersey has been using volunteers from the hunting community for deer management. On Watchung Reservation in Union County New Jersey, hunting has been prohibited since at least 1900 and the deer population has risen significantly, resulting in damage to vegetation and increased vehicle accidents on the roads surrounding the Reservation. In 1994, the County established a program using qualified volunteers from the hunting community to reduce the deer population. Volunteer hunters qualify for the program via a marksmanship test and are stationed in predetermined locations in the Reservation. Deer are culled over bait. In the first year of the program, over a four day period, 92 volunteers removed 88 deer. The program has continued in every year but 2002, with similar success. During 2006-2007, 12 qualified volunteers from the hunting community removed 70 deer during 2 days. The cost per deer removed in 2006-2007 was between $55 and $65. The per deer costs are attributable almost entirely to butchering fees. The program has resulted in thousands of pounds of venison going to food banks. Volunteers who participate at least one and one half days in the program are given 20 lbs of venison as compensation for their efforts. Further information about this project and New Jersey's Community Based Deer Management Program, is available from the New Jersey Division of Fish and Wildlife. http://www.njfishandwildlife.com/cbdmp.htm.
The success of the Watchung Reservation effort has prompted New Jersey to institute a similar program in Essex County at the South Mountain Reservation, using 15 qualified volunteers from the hunting community. By comparison, other New Jersey Townships have opted to pay contract sharpshooters to reduce their deer herds. Their costs are significantly higher than the $55 to $65 per deer being incurred at the Watchung and South Mountain Reservations. Townships including Millburn, Bernards, Bridgewater, Watchung, Mountain Lakes and Summit have hired Deer Management Systems, a private company, to reduce township deer populations. The Deer Management Systems employees used shotguns and operate from tree stands at pre-baited sites. Deer Management Systems charge the townships $190 per deer, which includes the butchering fee.
Princeton Township, New Jersey has hired a Connecticut-based company called White Buffalo, Inc. to reduce their deer population. Employees of White Buffalo Inc. use high-powered rifles and suppressors (silencers) to cull deer at pre-baited sites on both private and public lands during day and night time hours. Princeton Township has spent in excess of $100,000 annually on their deer reduction effort. http://www.njfishandwildlife.com/cbdmp.htm
In simply ignoring the potential participation of qualified volunteers for deer population reduction in Rock Creek Park, the NPS has ignored valid evidence of a strategy that is being successfully and economically employed for deer management. SCI and SCIF strongly recommend that it is the NPS's responsibility to give adequate consideration to a tool that could enhance the alternative designated by the EIS.

Please contact Anna Seidman at aseidman@safariclub.org or Doug Burdin at dburdin@safariclub.org, or call 202-543-8733, if you have any questions or we can provide any further assistance.

Sincerely,

Lawrence Rudolph
President,
Safari Club International
Safari Club International Foundation

Correspondence ID 391

Name:	Stephanie L. Boyles
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Address:	700 Professional Drive Gaithersburg, MD 20879 USA
E-mail:	sboyles@hsus.org

Correspondence Text

Via electronic submission

November 2, 2009

Ms. Adrienne Coleman, Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington D.C. 20008

Website:
http://parkplanning.nps.gov/commentForm.cfm?parkID=198&projectID=14330&documentId=28397

Re: Comments on the Draft White-tailed Deer Management Plan/Environmental Impact Statement

Dear Ms. Coleman:

On behalf of The Humane Society of the United States (The HSUS), the nation's largest animal protection organization with more than 11 million members and supporters nationwide, we appreciate the opportunity to provide comments on the Draft White-tailed Deer Management Plan/Environmental Impact Statement (DEIS) for Rock Creek (ROCR).

While we understand the National Park Service's (NPS) concerns over the perceived adverse impacts caused by white – tailed deer (Odocoileus virginianus), the HSUS maintains that lethal control is neither a socially acceptable practice nor, in the long-term, the most ecologically sound approach to resolving conflicts with deer. Instead, we endorse Alternative B: Combined Non – Lethal Actions that would protect forest seedlings, promote forest regeneration through the strategic use of exclosures and repellents to immediately reduce damage attributed to deer to acceptable levels while using reproductive controls to gradually reduce and stabilize the deer population over time.

The HSUS asserts that this alternative will better serve the stated purposes of ROCR: to "preserve and perpetuate…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" for future generations while providing "opportunities for the public to experience, understand, and appreciate the park in a manner appropriate to the preservation of its natural and cultural resources."

Our specific comments are contained herein:

I. Why Alternative B is The HSUS' Preferred Alternative

The DEIS addresses alternatives for the management of white-tailed deer at RCP that require the park enter into a prolonged period of directly manipulating the deer population. The justification for management is based upon concerns for deer-plant community interactions that are widespread throughout the Eastern and Midwestern States and numerous units within the National Park System, and for some of which planning is currently underway to conduct deer management activities. The mandates for management vary across these, depending on the purpose and designation of the park, as well as ecological and landscape factors, such as park size, history and structure of vegetative communities, and the duration of deer presence, among others.

What NPS is currently looking to implement is a management action across a variety of circumstances that should be treated themselves as an experimental condition. By selecting only a single one of these (intense population reduction followed by stabilization), the Service will not only deny itself the opportunity to satisfy unanswered questions about the consequences of its management actions, both with respect to the natural as well as the human environment, it will also miss the chance to initiate what could potentially be the most innovative, effective deer management program in the country. Such a program would generate widespread public support rather than spur the enormous controversy and polarization that will undoubtedly occur with the implementation of a lethal control program. Continuing with only the Service's current, monotypic approach to managing white-tailed deer would be an opportunity lost.

Adopting Alternative B as the preferred approach to management of the deer herd at RCP would satisfy the need to begin managing the numbers of deer in the park while presenting NPS with far better data on plant-deer relationships than large scale population reduction ever would. The DEIS proposes (DEIS: 168) that "…cumulative impacts to vegetation under this alternative [B] would be adverse, long term, and moderate to major." This assumption warrants testing, as do many others in the DEIS that will never be elucidated without NPS conducting alternative management strategies.

II. Humaneness

The DEIS addresses the concept of humaneness only in a brief discussion of standards established by the American Veterinary Medical Association (AVMA) for techniques associated with providing humane death to animals. Even then, NPS proposes to follow these standards only when possible. This gives insufficient attention to this issue, its relevance to the public and the consequences of actions for the welfare of wild animals.

Euthanasia

As stated previously, The HSUS maintains that non-lethal methods can and should be used to mitigate any environmental damage attributed to deer at ROCR. Whereas The HSUS recognizes that the NPS may deem it necessary to use lethal methods to remove some deer from the park that does not absolve the agency from its moral and legal obligation to capture and end these animals' lives as quickly and painlessly as possible using the most humane methods available.

The HSUS has a long record of noting in NEPA comments that humaneness is more than a subjective concept. There are certain and definitive means by which people can identify and measure animal pain, suffering, stress, distress, and other physiological and psychological factors associated with what can be called an animal's "welfare state."

For example, according to the 2007 AVMA guidelines, "the term euthanasia is derived from the Greek terms eu meaning good and thanatos meaning death. A "good death" would be one that occurs with minimal pain and distress." In the context of the AVMA's euthanasia guidelines, "euthanasia is the act of inducing humane death in an animal" and it is our responsibility as "human beings to ensure that if an animal's life is to be taken, it is done with the highest degree of respect, and with an emphasis on making the death as painless and distress free as possible."
(http://www.avma.org/issues/animal_welfare/euthanasia.pdf, page 1 under Introduction).

The 2007 AVMA guidelines also state that "Conditions found in the field, although more challenging than those that are controlled, do not in any way reduce or minimize the ethical obligation of the responsible individual to reduce pain and distress to the greatest extent possible during the taking of an animal's life."
(http://www.avma.org/issues/animal_welfare/euthanasia.pdf, page 19 under Wildlife).

In consideration of this, The HSUS feels that the NPS must remove two methods of killing deer from the FEIS that were specifically mentioned in the DEIS: archery and capture-and-euthanasia for the specific

reasons outlined below.

Archery

Archery, or bow-hunting, is not even listed among the acceptable, or conditionally acceptable, methods for euthanizing large wild mammals in the 2007 AVMA Euthanasia Guidelines and is considered one of cruelest forms of recreational hunting due to exceedingly high wounding rates. According to a summation of results from 19 different reports and studies, the average bow-hunting wounding rate is 55%, and in fact, several studies indicate that bow-hunting yields more than a 58 percent wounding rate. That means for every animal dragged from the woods by a bow hunter, at least one animal is left to suffer and die a slow, excruciating death.

Not to mention, bow hunters routinely spend hours tracking the blood trails of deer struck by arrows, and even when the animal is found, it takes an average of 17 arrows (i.e. average shots per kill) before the animal finally bleeds to death. Even under the "best" of circumstances, when the most modern archery equipment was used, high proficiency required, and assistant trackers were on hand to help track wounded deer, the average wounding rate was as high as 18% in one highly controlled hunt. By no minimal standards can this technique be considered humane (Appendix 1).

The DEIS acknowledges that "if archery is used, there is a possibility of deer not succumbing immediately and fleeing the area," but then claims, without any substantiation, that "the likelihood of this happening is slight" (DEIS: 242). Even when using trained sharpshooters at close range over bait piles, the wound rate would be high compared to firearms. Should a visitor capture and release photos or footage of a wounded animal at ROCR into the public domain, the inevitable negative response would significantly decrease public support for park's deer management program in general and certainly outweigh any perceived short-sighted benefits of using this particular method to kill deer at ROCR.

Such a scenario is far from hypothetical. As City Wildlife illustrated in its comments submitted to NPS on the DEIS, last year, despite the best efforts of citizens and the authorities to capture and treat her, a wounded doe in Virginia suffered for months after a bowhunter shot her in the head with an arrow. A quick search of the internet for stories on bow-hunting forums and press articles demonstrates how often these types of incidents occur and the amount the negative public reaction that is generated when they do.

Capture and Euthanasia

The HSUS also takes exception to the use of "capture and euthanasia," either by netting and captive bolt as well the use of potassium chloride as a euthanasia agent, noting that the AVMA calls for strict standards and direct physical control of animals euthanized under such procedures, conditions that will not be possible in applying euthanasia procedures in the field.

In addition, the 2007 AVMA guidelines state that
"Behavioral responses of wildlife or captive nontraditional species (zoo) in close human contact are very different from those of domestic animals. These animals are usually frightened and distressed. Thus, minimizing the amount, degree, and/or cognition of human contact during procedures that require handling is of utmost importance. Handling these animals often requires general anesthesia, which provides loss of consciousness and which relieves distress, anxiety, apprehension, and perception of pain. Even though the animal is under general anesthesia, minimizing auditory, visual, and tactile stimulation will help ensure the most stress-free euthanasia possible. With use of general anesthesia, there are more methods for euthanasia available." (http://www.avma.org/issues/animal_welfare/euthanasia.pdf, page 19 under Wildlife).

Darting with capture drugs, immediately followed by euthanasia, may not cause undue stress, but there are other methods in this category that would be primarily used and have the potential to substantially increase the stress, both physical and psychological, that an individual animal experiences. These methods will undeniably increase the time that an animal is held captive, which in and of itself is extremely stressful for a wild animal. To this must be added the stress and pain of any injuries sustained in the process of capturing and holding the animal, and that of restraining the animal for a killing shot. Since the NPS only plans to use this method to remove, at the most, 10 deer a year for the first three years of the program under Alternatives C (DEIS: 65) and D (DEIS: 68), it is incumbent upon NPS to provide evidence that these methods are even necessary, and if so, that these techniques do not, relative to other available methods, cause undue and avoidable pain and suffering. If NPS can provide no such evidence, these methods should be eliminated from the FEIS.

Unnecessary Death

Beyond the discussion of humaneness in euthanasia techniques lies a broader issue regarding the ethical and moral basis of management actions themselves. The concept of "unnecessary death" is a relevant and significant issue any time lethal control of wild animals is proposed. Ethical concerns regarding how we treat wild animals, and why we do so, should be addressed in the FEIS and recognized as a first order concern.

The HSUS maintains that unnecessary death should be avoided unless compelling justification (immediate threat to human health and safety, for example, if such action has been shown to reduce the threat) for actions exists. Lethal control of animals without action to prevent recurrence of problems (either before or after control) is unacceptably shortsighted and inappropriate.

Time and economic concerns are irrelevant in a discussion of humaneness, unnecessary death and other welfare consequences. An action is not more or less necessary or humane because it is more or less time-consuming, more or less technically feasible, and/or more or less costly. If after such a procedure, NPS decides to implement a less humane but less time-consuming, easier and/or less costly alternative, it must clearly characterize that choice for the public and the decision maker.

The FEIS must address the humaneness and unnecessary death issues and make objective declarations concerning the actions NPS proposes to undertake. The FEIS must also acknowledge the concepts of humaneness and such broader ethical issues as "unnecessary death," as a significant part of the public's interest in NPS management policies, approaches and procedures.

III. Impact on the Human Environment

Interested Public

The DEIS fails to completely evaluate reasonably foreseeable significant adverse impacts on the human environment, a priority in NEPA compliance (DEIS: 149). It does so by not adequately defining the "interested public" and considering its opinions regarding lethal controls. The DEIS instead defines the interested public narrowly as those who come to the park as visitors, and it engages in speculative assumptions about those visitors may or may not care about and value with respect to deer management as opposed to the broader public.

For example, public opposition to lethal control has led to greater demand for humane, socially acceptable, and ecologically-sound wildlife damage management methods. Public opinion surveys demonstrate that there is a growing appreciation of wildlife in the U.S., as well as a desire that wildlife conflicts be handled with non-lethal methods that avoid unnecessary animal pain, suffering, and death (e.g., Kellert 1979, Reiter et al. 1999).

One study on public attitudes toward wildlife management in the United States concluded that a majority of Americans favor the use of nonlethal methods in managing wildlife (Reiter et al. 1999). In ranking factors to be considered when selecting management methods, the study found that human safety ranked first among eight factors, with animal suffering, effectiveness, environmental impacts, severity of the problem and ability to target the specific problem animal following in order.

Such shifting public values have been reflected in public ballot initiatives in recent years. Over the past decade, citizens in five states have voted to outlaw certain traditional wildlife management methods including use of body-gripping traps and predator poisons.

Visitor Use and Experience

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.

On page 265 under Unavoidable Adverse Impacts, the DEIS notes:
There would also be long-term unavoidable adverse impacts on cultural landscapes and on visitor use and experience, because of the lack of vegetation and the associated wildlife and scenery which many parks visitors enjoy, and unavoidable adverse impacts to visitor safety related to deer-vehicle collisions.

Besides aggregating two very separate issues (impacts to vegetation and deer-vehicle collisions), this statement disregards the obvious argument that more people could easily enjoy the opportunity to view deer than would be appreciative of vegetation, whether or not there were obvious conflicts in values associated with that opportunity.

On page 238 the DEIS speculates that visitors "…placing high importance on native plants and wildlife in the park would suffer because of impacts to plants…" another highly speculative, assumption-based and confusing admixture of concepts that somehow disregards deer as wildlife and an object of viewing pleasure. For example, the NPS' proposal will lead many of The HSUS' constituents to the conclusion that the Service wants to kill deer to save plants – a position that our constituents are highly unlikely to support since there are alternative, non-lethal deer management methods available that could resolve any perceived deer-plant conflict over time.

These are just a couple of examples of the weak grasp the DEIS displays on the human side of the deer-human conflict. NEPA requires analysis of impacts to both the natural and human environment. Regulations specifically enumerate social and economic impacts among the required impacts to be analyzed in every EIS (40 CFR 1508.14). This DEIS does not adequately examine these types of impacts.

The FEIS must account for the lack of a substantive understanding of what public opinion is on this issue, remove speculative assumptions about what visitors would or would not like to see, and provide a more thorough and deliberative discussion concerning this highly relevant issue.

IV. Deer Ecology and Population Management

Deer Health

The DEIS argues that rapid reduction of the deer herd by killing would result in "beneficial effects on deer herd health," (DEIS: vi) a condition that is unproven for this park and one which has little or no bearing on the issue before the public. The HSUS questions the purpose of introducing the concept of herd health into the discussion of deer at Rock Creek at all. The repeated reference to deer health creates confusion as to whether NPS is interested in this as a management objective, believes it will be achieved by killing deer, or feels the public would be concerned by seeing deer in a less than "healthy" condition. On page 269, for example, under the section on "Irreversible Or Irretrievable Commitments Of Resources", one of the consequences of Alternative A is described as: "…the health of deer herd at Rock Creek Park could suffer irretrievable adverse effects if no action is taken."

The concept of deer herd health is one that derives directly from management that seeks to maximize productivity in deer, as well as provide optimal hunting experiences (i.e., the state model for deer management), something that certainly seems well at odds with a federal agency working under a mandate to allow natural processes to occur unimpeded by human actions.

The FEIS must clarify what is meant and intended by such statements, how "healthy" is defined and what objective biological criteria (not value-laden) must be satisfied to achieve this standard, as well as what interest NPS has in ensuring "healthy" deer be seen in the park.

Mortality Factors

The DEIS mentions, on page 109, the potential influence of diseases, especially Epizootic Hemorrhagic Disease (EHD), by citing nearby cases and suggesting EHD may be seen in the park in the future. Yet it fails to integrate this consideration fully into the discussion of alternatives and their impacts. Similarly, on page 189 the DEIS discusses chronic population overabundance and impacts until "...starvation, disease, or severe winter weather causes a reduction in population size…" It goes on to note that "such reductions in the deer herd, as a result of natural die-offs, probably would not allow the recovery of the natural community (Warren 1991)."

The overall calculation and estimation of mortality should be reexamined. The DEIS mentions mortality in the park as averaging about 10% based on an assumption that "urban" deer mortality falls in that range, while its own data on deer/car accidents cite numbers which range from 42-52 per year. Those numbers alone account for a mortality of 10-13% based on a high estimate of the deer population, which improbably assumes that no other mortality, even to fawns, occurs. In addition, an ongoing deer fertility control study at the National Institute of Science & Technology (NIST) in Gaithersburg, MD determined that the mortality rate there was, at a minimum, 14% with an additional 8% every year representing tagged deer that could not be accounted for due to migration or attrition (Rutberg & Naugle 2008).

Similarly, the estimate of recruitment (DEIS: 63) at 20%, referenced only as a general rate used by deer managers considering reproduction, mortality and recruitment, is too imprecise to allow for an accurate portrait of deer demographics – which is critical to any planning for population manipulation – to be drawn.

The FEIS must discuss all potential mortality factors and account for them fully in impact assessments. A far more rigorous, valid model of deer population dynamics should be presented based on deer demographics and reproductive biology at ROCR itself. Specifically, the FEIS must explain why a reduction in the size of the deer herd as result of natural processes would not "...allow the recovery of the natural community."

Coyotes

The DEIS claim on page 14 that the park experiences a "…lack of natural predation." On page 110, it notes that confirmed sighting of coyotes (Canis latrans) were first made in September of 2004, and on page 116, it makes the first mention of coyotes as potential deer predators. Finally, on page 194, it mentions that coyotes could bring a "benefit" as predators of deer, but engages in no discussion of what impact that regulatory influence might have. Yet, an entire section on wolf reintroduction examines the illogic of that species as a natural control on deer.
The FEIS must address the potential role coyotes can play as predators of deer, particularly fawns, and must include a far more comprehensive review. The current assumption-based description is woefully inadequate and ignores known science on this predator-prey relationship.

V. Incomplete Ecological Analysis

The DEIS fails to adequately address impacts caused by deer in their ecological context, as well as address and discuss factors that could lead to reduction of the deer herd without direct human intervention. Most significantly with regard to the latter, it does not account for the potential effect of natural disease as a population control mechanism, or predation as a factor influencing survivorship.

Impacts on Vegetation

The DEIS correctly notes that white-tailed deer are an important part of the ecosystems they occupied before extirpation by humans, and upon return they have entered into highly dynamic interactions with certain ecosystem components, such as the plant communities which have developed without the significant presence of deer for what literally amounts to several centuries. In calling the impacts of deer

to such system components "adverse", we apply human values and judgments to a natural process. While it may be true that the deer population has an influence, and as such, changes within the natural communities have occurred, this in and of itself cannot be taken as an indication that the influence is deleterious, and therefore, "adverse", negative or otherwise unacceptable, nor that deer are directly impeding the mandate and historic mission of the park.

Moreover, from a historical and ecological perspective, this myopic fixation on deer impacts on forest vegetation is scientifically and unjustifiably alarmist. When this area (now Rock Creek Park) was first settled by humans, there was undoubtedly the natural occurrence of deer browsing that influenced forest composition. However, from the mid 1800's to nearly the end of the 20th century, deer were reduced to such a level that their direct ecological effects were essentially negligible. This is relevant in the current discussion because the forest that developed without the influence of deer grazing in the 19th and 20th centuries is (by the absence of deer and for many other reasons) not a "natural" ecosystem for this eco-region.

We simply do not know what would happen over the long term with deer-plant community interactions if we chose to let them go unimpeded by human action; nor do we have as yet a good idea about what parks with deer present over a long term should or would "look like" with respect to their vegetative communities; nor do we have any idea what natural areas "looked like" historically with deer, predators, natural events, and significantly larger undisturbed forests than anywhere intact today.

The NPS is in an unenviable position in having to make management decisions in the face of so much uncertainty, and using available science that has been derived from natural communities under significantly different management regimes. The research upon which NPS draws to summarize deer influences on tree regeneration (e.g. Tilghman 1989, Marquis et al. 1992, de Calesta 1992, 1994, and Horsley et al. 2003) are certainly suggestive of impacts to seedling recruitment, bird distribution and herbaceous plant survival, but still largely produce such varying results and conclusions about preferred deer density as to suggest that site-specific studies would be mandated. The DEIS implicitly recognizes this by calling for adaptive management of the deer population, but still proposes in Alternatives C and D such extensive depopulation as to make this concept irrelevant.

Whether or not a "right" solution is obtainable in the face of human alteration of landscapes and the absence of any good understanding of the role ecological time plays in herbivore-plant community dynamics is difficult, perhaps impossible, to know. The DEIS, however, engages the issue with an almost transparent pre-conviction that changes (impacts) to park vegetation now being observed are "adverse" and comprise a reason for, and justification of, dramatic reduction of the deer herd.

Beyond the prima facie assumption made in the DEIS that deer are "overabundant" are qualified statements that give judgmental value to that overabundance: such as on page 25 where the DEIS notes "An overabundance could possibly affect forest regeneration patterns;" on page 8 that increasing numbers of deer are resulting in a "substantial" effect on the park ecosystem due to heavy browsing; on page 13 that NPS wishes to make sure the deer population does not "…jeopardize the ecological integrity of the park;" and again on page 25 where the study made of paired plots "…indicates deer are affecting the integrity of the understory structure and species composition, diminishing the value of habitat for other wildlife."

Notwithstanding the obvious – that deer can and do exert significant influence on forest vegetation – there is no examination in the DEIS of what this means with respect to the long-term consequences of either a continuing, unmanaged deer population or, more importantly, a deer population that is put under a management regime that of necessity will be continuous. NPS does not ask the questions begged here, or propose to examine the deeper issues, but simply charts a traditional management approach in which a blunt instrument will be used to solve a surgical problem. No one is suggesting that nothing should be done to address legitimate, site-specific impacts that deer may have on certain forested areas in ROCR. The point is that ROCR – as a whole – is not a fragile, delicate ecosystem in need of rescue from an alien species, but rather, is a dynamic living community whose ability to withstand the perturbations caused by high or low populations of other ecosystem components must be tested.

The survey of the literature and discussion of the implications of managing an herbivore population to protect a vegetative community must address more completely the complexities of the issues involved. NPS must not put forward the simple argument that deer are preventing the regeneration of the forest (e.g. DEIS page 93, 116) or having "…adverse, long-term, major impacts on herbaceous vegetation…" without a fuller and more complete analysis and discussion of what that means within the context of time, landscape dynamics, extrinsic influences, urbanization, and other relevant biological and ecological factors that are significant in addressing the unique and specific mandate of NPS - to allow natural processes to proceed unless compelling evidence exists to demonstrate that human actions prevent them significantly from doing so.

This is not an intellectual exercise – it is a requirement that NPS think ahead significantly, be highly sensitive to and critical about any concept of intervention, and engage, when there is an insufficient understanding of the ecology of an issue, in the necessary investigations to ensure a dynamic - rather than static – scientifically managed environment exists.
For example, little or no attention is given to the theory of herbivore-plant community interactions developed around long-term cyclical relationships and oscillation (e.g. Caughley 1981). Nor are the effects of urbanization and landscape structure on biodiversity discussed or the need for long-term baseline data (e.g. Augustine & deCalesta 2003, Potvin et al. 2003, Rogers et al. 2009), or the spatial and temporal context within which ecological phenomena such as regeneration occur (e.g. Mladenoff & Stearns 1993). If it truly a reasonable conclusion that many of the factors that may modify the effects of deer density and vegetation impacts are poorly understood (e.g. Russell et al. 2001) then this should be admitted and implications for the preferred management approach addressed.

Finally, the concept of overabundance itself as it relates to both conservation theory (e.g. Garrott et al. 1993), research approaches (e.g. Healy et al. 1997, deCalesta & Stout 1997), as well as NPS specifically (e.g. Porter et al. 1994, Porter & Underwood 1999, Wright 1999) calls for greater examination.

The FEIS must review the existing literature on deer-plant community interactions to comprehensively and more accurately capture the scientific debate, the issues involved, and the range of impacts deer may have on the ROCR vegetative community. The analysis of its own data on vegetative communities must account for community-level impacts and interactions that can be interpreted consistently with the findings of other studies of deer-plant interactions.

VI. Deer Population Management

Immunocontraception

The HSUS maintains that the DEIS has not sufficiently demonstrated that the deer population at ROCR requires control measures to ensure forest viability and survival. However, we are aware that the NPS perceives an "overabundance" of deer at the park, and therefore, if some form of population control is deemed necessary and appropriate, reproductive control is a viable option and should be implemented by RCP.

Although the NPS may or may not ultimately use fertility control as a form of reproductive control to achieve the park's deer management objectives, the treatment of the subject in the DEIS appears both inadequate and unfairly slanted against the technology and towards lethal control alternatives. Most egregiously, the DEIS misapplies theoretical models to predict the level of effort needed to achieve population-level effects and the magnitude of those projected effects, while neglecting to report published empirical data on the subject.

The DEIS states that instead of implementing a reproductive control program immediately under Alternative B, a reproductive control program would begin under Alternative D - the preferred alternative - "in year 4" following drastic lethal population reduction measures, but only if:

- "there is a federally approved method fertility control agent available for application to free-ranging populations;
- the agent provides multiple year (more than three years) efficacy
- the agent can be administered through remote injection;
- the agent would leave no residual in the meat (meat would be safe for human consumption;) and

• overall there is substantial proof of success in free-ranging population, based on science team review" (DEIS: 55)

The DEIS also states that, "For the purposes of this discussion, it is assumed that leuprolide or a similar agent would be used." However, given the aforementioned criteria and leuprolide's limitations compared to other known and available fertility control agents [i.e. requirements for autumn delivery, absence of remote delivery (even of boosters), maximum longevity of one year to name a few], NPS' decision to identify this substance as its prospective fertility control agent is incomprehensible.

Also, the most well-known and tested immunocontraceptive agent is porcine zona pellucida ("PZP") (Patton et al. 2007), and published and forthcoming scientific literature indicates that PZP largely meets the most of the stated criteria already and could be used now to manage the deer population at ROCR. And yet, when discussing reproductive control studies in Maryland, the DEIS provides a detailed description of the unpublished results of a 2-3 year study on the use of the GonaCon® immunocontraceptive vaccine on female white-tailed deer at the White Oaks Federal Research Center in White Oak, Maryland, but fails to describe the published results of a 15-year long PZP study at NIST in Gaithersburg, Maryland that significantly reduced the deer population and the deer-vehicle collision rate. In fact, the most compelling information that would support and justify the use reproductive control to manage the deer population at ROCR has been relegated to Appendix C.

According to information included in Appendix C, the mechanism by which PZP renders mammals infertile is relatively simple. Immunocontraception is a process by which the immune system of a mammal is stimulated to attack elements of the reproductive system, thereby inhibiting pregnancy. All mammalian eggs have an outer layer known as the zona pellucida. Antigens from the zona pellucida of pigs are isolated and injected into females of other species with an adjuvant (Patton et al. 2007). This stimulates the development of antibodies in the recipient, which then interact with the zona pellucida of their own eggs, blocking fertilization by sperm (Paterson and Aitken 1990).

PZP is delivered to deer with an initial injection with Freund's Modified Adjuvant, and a follow-up injection with Freund's Incomplete Adjuvant (Deigert et al. 2003; Lyda et al. 2005). Freund's Modified Adjuvant is non-toxic to humans, with no known pathologies associated with it, so animals could be treated safely, without marking as is done successfully for white-tailed deer on Fire Island National Seashore.

PZP was first shown to block pregnancy in white-tailed deer in captivity (Turner et al. 1992, Turner et al. 1996). Subsequent studies showed effective delivery to free-ranging deer (Kirkpatrick et al. 1997, Curtis et al. 2002, Naugle et al. 2002; Rutberg et al. 2004). These formulations required repeated initial shots and annual boosters, so timed release delivery systems have been developed (Turner et al. 2007, Turner et al. 2008). In wild horses an initial injection followed by a booster of timed release PZP pellets achieves two years of fertility control (Turner et al. 2007).

Past and recent field studies have now shown that management of deer populations with PZP immunocontraception can be achieved (Naugle et al. 2002, Rutberg and Naugle 2008). Fire Island, including the National Seashore of the same name, is a 22.5 km2 island in New York. Native white-tailed deer are found in abundance on the island and a hunt to control population size was stopped by public outcry and a lawsuit (Rutberg and Naugle 2008). A program of immunocontraception with PZP was initiated to address legitimate concerns about habitat degradation resulting from deer abundance. Deer were not marked or tagged and all vaccines were delivered remotely using darts (Rutberg and Naugle 2008). The darts contained a dye to mark the deer to help avoid retreatment. In the most closely monitored portion of the island, the deer population decreased 10–11% per year during the program.

These population studies were conducted by an independent entity, the Biological Resources Division of the U. S. Geological Survey, of the U.S. Department of the Interior. Similar population declines were obtained in smaller areas where white-tailed deer were treated with PZP (Rutberg et al. 2004). Clearly in these field studies, the observed population effects are far more dramatic than those hypothesized in the DEIS which states that the "best case scenario" in population reduction using any known reproductive agent is 5% over several years."(DEIS: 184).

As the DEIS indicates, the rapidity of population decreases depends on vaccine effectiveness, proportion of females treated, mortality rates, reproductive rates in untreated animals, immigration, and emigration. Rates of free-ranging deer increase or decline during PZP vaccination programs are directly related to the proportion of deer that are treated each year (Rutberg et al. 2004). For most ungulates, populations decline when more than 60% of females are treated with a contraceptive (Garrott 1995, Rutberg et al. 2004), and yet, the DEIS inaccurately claims that population reduction only occurs after 90% of the does were treated with a fertility agent (DEIS 184).

The PZP vaccines used at these other NPS sites require annual boosters to be effective, but significant progress has been made since 2002 on multi-year single shot PZP vaccines. Furthermore, new information about the efficacy of contraceptive approaches on deer populations is available (Patton et al. 2007, Rutberg and Naugle 2008). The effects of the vaccine are reversible after three years of treatment, and no adverse health effects have been apparent among treated deer or among fawns they carried at the time of treatment.

These studies indicate that immunocontraception can stabilize and reduce populations of wild ungulates at the landscape scale, but all the small distortions cited in the DEIS collectively serve to weaken any case for the application of fertility control as a population control agent at RCP or anywhere else for that matter. Given the discrepancy in the data and the absence of most up-to-date literature on the subject in the actual text (including information relegated to Appendix C), the FEIS should include a population model with plausible, site-specific assumptions developed to seriously evaluate the likely effects of PZP treatments on population size at RCP. Such a model ought to incorporate the use of current multi-year, single-shot vaccines, which might well produce more rapid decreases than previous efforts (Rutberg and Naugle 2008b, Turner et al. 2008).

The discussion of PZP as a means of reproductive control should also be enhanced in FEIS by inclusion of the following items:

1) Update the DEIS text to include data from Rutberg & Naugle 2008a, 2008b, and Turner et al. 2008 (which is the most current report on the effectiveness of 1-shot, multi-year vaccines). PZP is not a hormone, and NPS should reference two papers that demonstrate that PZP is not immunogenic or physiologically active when consumed (Barber and Fayrer-Hosken 2000, Martin et al. 2006). Collectively, these articles will show that PZP now largely meets the four stated criteria. The only exception is that current technology is not yet available for the remote delivery of single-shot, multi-year vaccine. However, it should be noted, with emphasis, that PZP boosters do not require recapturing the animals and can be delivered remotely to deer at multiple sites (Naugle et al. 2002, Walter et al. 2002, Rutberg et al. 2004).

2) State that the safety record of PZP is exceptional and that hundreds of treatments have been administered to deer in the field, and several thousand to wild horses. There also do not appear to be any harmful side effects to treated animals or their fawns (Rutberg 2005), and abnormal out-of-season breeding behavior mentioned in some literature has never been demonstrated to harm treated animals or their fawns (Thiele 1999). In addition, the condition of females following treatment with PZP is no worse than, and may be better than, that of untreated animals (McShea et al. 1997, Walter et al. 2003, Rutberg 2005).

3) State that the Food and Drug Administration (FDA) has never forbidden human consumption of PZP-treated deer, and has not required permanent marking of PZP-treated deer at all sites. For example, treated deer are not marked at all at Fire Island National Seashore (Naugle et al. 2002). The FDA set 30-day withdrawal periods for PZP-treated deer; because researchers preferred not to have to recapture deer and update their ear tags with the new withdrawal date each time the deer were treated, researchers placed "Do not consume" tags on them instead, which the FDA found acceptable. PZP-treated deer have been hunted in the past, with state wildlife agency oversight (Walter et al. 2003).

4) And finally, while neither the FDA nor the Environmental Protection Agency (EPA) has "approved a product specifically for the purpose of controlling reproduction in white-tailed deer," this is not necessarily a requirement for use of these products, and as such, should not necessarily deter the NPS from using a fertility control agent to reduce and stabilize the deer population at ROCR.

Fertility Control versus Lethal Control

It should also be noted that while PZP and other reproductive control agents and procedures have been shown to effectively reduce deer fertility, lethal control may sometimes have the opposite effect. It has been shown that the reproductive rate of white-tailed deer is greatly reduced at high population densities while deer in areas subjected to periodic harvest have enhanced fertility rates resulting in increased population growth to compensate for harvested animals (Swilhart et al. 1998). Further research also indicates that harvest of both sexes does nothing to stop fluctuations in deer populations due to forage competition and natural mortality as a result of severe winter weather (Patterson and Power 2002).

Contraception is superior to lethal control in that it leaves animals in a population as "placeholders" that are reproductively "dead ends" yet continue to occupy consistent home ranges and exhibit natural herding behaviors. The presence of these adult "placeholders" ensures continuity in the social framework of the herd while limiting the number of young and more mobile animals that might pose increased risks of collisions with vehicles and dispersal to adjoining private properties.

Based upon available research, the FEIS must seriously re-evaluate the usefulness of fertility control to stabilize and reduce the deer population density at ROCR. It behooves the Park to more closely examine these options especially in light of the social and political controversy that surrounds lethal deer management. The FEIS must also discuss how the park can justify the increased levels of reproduction that are known to occur in white-tailed deer populations subjected to lethal harvest when alternatives are available.

VII. Deer-Vehicle Collision Prevention and Rate Reduction

The DEIS states that, "Deer/vehicle collisions are a threat to human safety" (DEIS: 140) and identifies deer-vehicle collisions as "A primary safety issue for visitors and local residents" (DEIS: 139), and yet, the plan to reduce the rate of such incidents at ROCR is woefully inadequate and needs to be enhanced.

First, the DEIS assumes that "the possibility of deer-vehicle collisions would be greatly diminished" by removing a significant proportion of ROCR deer population under either Alternative C or Alternative D, but neglects to cite one study to suggest that reducing the deer population would have any impact whatsoever on the park's deer-vehicle collision rate. Many people believe that reducing the deer population will result in fewer deer car collisions, but in certain communities where data was collected before and after hunting season, surprising results were obtained.

A paper presented at the 30th Annual Meeting of the Southeast Deer Study Group (2008) reported on a study by the Virginia Department of Transportation which assessed hunting pressure, deer density, amount of forest and housing development, presence of crops and corridors and road metrics for 228 road segments (each 250 miles in length) within a county to determine which factors are correlated with deer-vehicle collisions. The logistic regression indicated that deer density was either a non-significant factor or that deer/vehicle collisions were lower in areas of higher deer density. Hunting pressure was also not a significant variable. The conclusion was that "there is little evidence that increased deer harvest reduced deer/vehicle collisions. (McShea et al. 2008). These kinds of data reflect the complexity of deer related problems and the need to make sure the remedy actually addresses the problem.

Also, under "Alternatives Considered but Rejected," the DEIS states that the "Implementation of a reduced speed limit through the park, with the intent to reduce deer/vehicle collisions, was raised by the public in public scoping as a desired action for the park to consider", but was dismissed because the NPS deemed that it was "not consistent with the objectives of the park" and would not "address the problem addressed by" the plan – "the overbrowsing of vegetation by deer." (DEIS: 91). This makes little, if any, sense whatsoever since one would think that any impacts that the deer population may have on public, visitor and/or employee health and safety at ROCR would be a far greater priority for the NPS than "overbrowsing of vegetation by deer," and therefore, would warrant a more involved analysis of the alternatives available for addressing such an important issue.

For these reasons, we would encourage the NPS to reconsider the need to address the deer-vehicle collision issue by including in the FEIS any additional information that may exist, or could be obtained, regarding the characteristics of areas where deer-vehicle collision are most common in the park (i.e. Military Road, Oregon Avenue, Beach Drive, Rock Creek Parkway and Potomac Parkway). That type of data could be used to identify factors that make these sites inherently attractive to deer at ROCR and develop site-specific actions to reduce the rate of collisions at each deer-vehicle "hot-spot."

The FEIS must include a thorough review of the data available on deer-vehicle collisions in the park and how the most up-to-date science could be used to develop management strategies to minimize, to the extent feasible, the park's deer-vehicle collision rate.

VIII. Structure and Content

Size

The DEIS is a lengthy work, comprising more than 400 pages of information related to the Service's vision for deer management in Rock Creek Park. It could be substantially reduced in size without compromising the central purpose, simply by eliminating repetitive information or unnecessary filler language (e.g., pages 143-149) that do not contribute to an understanding of the issue or alternatives for management. Why, for example, is there a discussion, such as on page 26, of the park's efforts to improve fish habitat? And what possible relevance to white-tailed deer is the statement on page 195 that "Cell towers may result in bird collisions?" Taken individually such inclusions might be regarded as trivial, but collectively they could easily have the effect of inhibiting readers and confusing the public about exactly what issues are or are not relevant to the presence of deer. Many readers might be intimidated by the sheer bulk of the document.
The FEIS should be carefully edited to remove unnecessary repetition and irrelevant information.

Objectivity

The DEIS is a defense and justification for the park's preferred alternative, which is for lethal control, followed by contraception. Understandably it focuses on building that case, but it should not do so in a way that suggests a prejudicial push for that alternative. Throughout the document there is an undercurrent of predetermination that argues for the deer population at Rock Creek to be in an ecologically "abnormal" state that requires management.

For example, on page 92 the discussion of alternatives includes the statement: "Alternatives A and B were not considered environmentally preferred because of their lack of effect on deer population numbers…" This leaves the reader with the impression that 1) natural processes will not "control" the deer population at Rock Creek and 2) even the contraceptive control of deer as proposed under Alternative B will fail to do so. More objectively with respect to (1) it would be fair to say that we do not know whether or not natural controls would eventually work and for (2) that there is a near certainty with sufficient effort that contraception would lead to a reduction in deer herd size—but that the effort required could be considerable.

By way of further example, under cumulative impacts on page 241, the statement is made: "As reproductive controls eventually take effect and the deer population begins to decrease over time, some park visitors might notice reductions in the excessive browsing pressure that has been damaging forest resources [emphasis added]." The word "excessive" is unnecessary here, and "damaging" is a highly relative term.

Finally, the DEIS repeatedly uses the statistic "82 deer per square mile" and implies that the deer population is continuing to increase exponentially in spite of its own spotlight and distance data which suggests that the deer population may have actually reached a state of biological equilibrium. According to Table 2., between 2000 and 2007,the deer population has fluctuated between 52 and 98 animals per square mile (/sq. mile). From 2000 to 2002, the population remained relatively stable (between 60 and 63 deer/sq. mile). Then, the population spiked at 98 deer/sq. mile in 2003 which was immediately followed by a dramatic drop to 52/sq. mile in 2005, and since then, the population steadily rose to 82/sq. mile in 2007. This is a well-established ecological trend with respect to population dynamics, and yet, the DEIS appears to ignore its own data.

Together, the issues contribute to the overall negative image cast on deer throughout the document.

The FEIS must involve a careful review and revision of such language to reflect greater objectivity, even though such issues should have been addressed in the draft.

Incongruous Argumentation

The DEIS is also repeatedly plagued by digression into speculative arguments that do not contribute to an understating of the issues before NPS. For example, the discussion on page 27 speculates about how deer could increase erosion in the park to the point of threatening the park's single federally listed species, the Hay's Spring amphipod. While it difficult to draw a line as to where environmental threats can and should be identified as a real concern, the expectation under NEPA is that a reasonable and credible process of threat identification will be followed. In a park surrounded by urban development, with over 2 million visitors, and having an aged sewer system running directly through its center, the potential erosive force of deer trampling simply pales in comparison as an identifiable threat.

The FEIS must use common sense to identify and rank threats, and must identify the overall context within which identified threats from deer are weighed against threats from other sources.

The HSUS also maintains that some of the references to science are so out of place, irrelevant, or weakly defended that they warrant exclusion from the final document altogether. For example on page 194, reference is made to findings from one study:

Flowerdew and Ellwood (2001) suggested that deer have indirectly decreased bank vole (Myodes glareolus) populations by removing the bramble blackberry (Rubus fruticosus) that provides most of their hiding cover (S. Bates, pers. comm.. 2008c),

That quote simply begs the question: why not present data from North America? If the DEIS cites sources which "suggest" "indirect" impacts then it to us it is stretching beyond the reach of the good science required in such documentation.

Similarly, under the discussion of cumulative impacts on page 239, the statement: "The presence of rabies, Lyme disease, and West Nile virus would continue under Alternative A, which would affect the wildlife that many visitors come to see." seems completely incongruous, begging explanation of what exactly is intended by the association of these diseases, deer and impacts to the environment.

The FEIS must include a careful review of the science used and referenced to support and justify the need for action and remove those references and statements that are inconsistent with the purpose and argumentation of the document.

IX. Conclusions

After reviewing our comments and concerns, we sincerely hope that the NPS will reconsider its previous decision and adopt Alternative B – Combined Non-Lethal Actions – as the Preferred Alternative. If updated with more current, accurate data on reproductive control agents and methodologies, the implementation of Alternative B has the potential to revolutionize the standard approach to deer conflict resolution in urban areas from one that can be inefficient, costly, and cruel to one that is technologically advanced, cost-beneficial, and humane. Such an endeavor would be of great benefit not only to our national parks, but also to the citizens of Washington D.C. and the American taxpayer.

Thank you for the opportunity to comment on this Draft EIS. If you wish to discuss any of the information contained in these comments, do not hesitate to contact me directly.

Sincerely,

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Correspondence Text

Comment for the official record, on the White-Tailed Deer Management Plan/Environmental Impact Statement ("Plan/EIS") for Rock Creek Park.

Date: 2 November 2009

From:

Dustin Rhodes (Washington, DC), Capital Correspondent, Friends of Animals
Lee Hall, JD (PA), Legal Director for Friends of Animals

To:

National Park Service
Adrienne A. Coleman, Superintendent

We submit this letter on behalf of Friends of Animals ("FoA") and its members. FoA is a non-profit, international advocacy organization incorporated in New York in 1957, with its principal place of business in Darien, Connecticut. FoA seeks to free animals from cruelty and exploitation around the world, and to promote a respectful view of free-living and domestic animals. FoA engages in a variety of advocacy programs in support of these goals. FoA has a longstanding interest in advocating for the dignity and interests of deer and other animals in biocommunities that include deer.

Dustin Rhodes also submits these comments this letter as a Washington, D.C. resident and frequent visitor of Rock Creek Park ("Rock Creek").

Rock Creek is a haven in the heart of Washington, D.C. -- a national park nestled in a densely populated urban setting. In the words of the National Park Service ("NPS"), "Rock Creek Park is truly a gem in our nation's capital. It offers visitors an opportunity to reflect and soothe their spirits through the beauty of nature. Fresh air, majestic trees, wild animals, and the ebb and flow of Rock Creek emanate the delicate aura of the forest."

This delicate aura, and specifically the wild animals contributing to it, is in danger.

The park's lands are fragmented; firearms are especially unlikely to be appropriate or safe in such an oddly shaped, highly urban park. Residential and commercial areas of Washington, D.C. and Maryland surround

all of the park units. Over 1,100 homes and apartments abut the park units along 72 sprawling miles of the park boundary. The largest of the 99 reservations, Rock Creek Park (Reservation 339), consists of 1,754 acres of Rock Creek and the surrounding valley from the Maryland state line south to the National Zoological Park.

As required by the National Environmental Policy Act ("NEPA"), the NPS has recently proposed a deer management plan for Rock Creek. The goal, as presented at a recent public meeting, is to develop a strategy that supports long-term protection, preservation and restoration of native vegetation and other natural and cultural resources. The plan considers four alternatives:

• Alternative A: No action. Under this option, NPS would not shoot the deer or introduce contraceptive substances to the population. This would, however, allow for the strategic use of fencing and green corridors, which, when combined with native, deterrent plants, could respectfully control the deer population.

• Alternative B: Combined "non-lethal" actions. This option calls for the use of fencing and reproductive control.

• Alternative C: Combined lethal actions. This option calls for the use of sharpshooters, and, in the words of the NPS, "capture and euthanasia." The latter term refers to a systematic slaughter of the deer population.

• Alternative D: Combined lethal and "non-lethal" actions. This option combines the unnatural method of pharmaceutical reproductive control and sharpshooting.

The proposed plan and its consideration of alternatives violate both NEPA and the Organic Act. Under NEPA, the NPS failed to consider an adequate array of alternatives and failed to perform an adequate impact analysis. As for the Organic Act, the NPS failed to comply with Rock Creek's enabling legislation.

NEPA

NEPA sets forth broad principles and goals for the nation's environmental policy. 42 U.S.C. §§ 4321 – 4370a. It serves as "the continuing policy of the Federal Government to use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony." 42 U.S.C. § 4331(a).

Alternative Analysis

In furtherance of that goal, NEPA requires all federal agencies to analyze the environmental impact of a major federal action before proceeding with that action. 42 U.S.C. § 4332(2)(C)(ii). In this case, one of the primary alternatives considered – reproductive control – is fundamentally unacceptable.

No contraceptive has been approved by the Food and Drug Administration for use on deer in the United States. Testing of such contraceptives has yielded extremely harmful results. These have included "immunological castration, compromised libido and abnormal antler development."[1] Abscesses, inflammation, pain, reduced fat content in bone are some of the side effects observed in other studies. Not only have there been documented health effects, but controlling the fertility of free-ranging animals is physically intrusive and can alter the social structure of the entire group.

At the September 2, 2009 park meeting, the Humane Society of the United States and other animal protection groups promoted the use of contraceptives on deer. However, they did not address the potential impact that the introduction of contraceptive substances could have on the environment and the natural food web. In addition, they did not consider how the dramatic reduction in the number of deer could catalyze changes in other wildlife.

Moreover, to use the park's deer experimentally is contrary to the goals of the Plan/EIS. For example, experimental fertility control has been known to prolong the lifespan of the Assateague Island mares from six to twenty years due to the elimination of the biological stress of reproduction. Thus, working against the logic of reducing numbers, reproductive control is likely to enable a current population of free-roaming animals to live longer.

As birth control is an unviable alternative, the NPS failed to provide a clear basis for choice among the alternatives and effectively limited the viable alternatives to two extremes: fencing and shooting. By including reproductive control as a viable option, the NPS has artificially inflated its range of alternatives.

Impact Analysis

The NPS has also failed to properly analyze the impact of the proposed plan. First, the plan falls short of accounting for the health and safety of park users and area residents. Rock Creek's urban location, combined with rifle bullets' capacity to travel three miles, makes the introduction of sharpshooters an unacceptable risk to human safety. Additionally, Rock Creek's boundaries are fragmented by the surrounding city and its borders are enclosed, as indicated above, by 1,100 homes and apartments. The park's unique geometry would make it impossible to find a suitable shooting range. One cannot help but wonder how the NPS can view sharpshooting as a safe alternative in an area it describes as "an oasis for urban dwellers . . . located in the heart of a densely populated cosmopolitan area." See Plan/EIS at 11.

Second, the plan will have an extremely negative impact on the perception of NPS conservation. Introducing a counterintuitive conservation method (slaughtering deer in an effort to preserve nature) would bewilder those citizens who witness it. Rock Creek, however, is a park unit that will attract not only local residents, but also visitors from around the world. The public perception of NPS conservation would be extremely skewed if visitors based their judgment on this highly visible park's deer management policy.

Third, sharpshooting would be ineffective at achieving the goals of the NPS. Killing deer will not protect local gardeners' azaleas from disoriented deer looking for a safe spot to eat. Nor will it stop cars from crashing into deer in icy midwinter. If the park's plan were to be accepted, frightened deer will inevitably scatter, in attempts to avoid the danger posed by sharpshooters. Additionally, after the deer are slaughtered and removed from the park, the population, following their nature, will rebound with extra fawns in spring. It is unreasonable to kill deer or other wildlife for eating the plants that sustain them – especially after officials have so fragmented their habitat with parking lots, roadways, running, hiking and biking trails.

The Organic Act, Rock Creek's enabling legislation, and National Park Service management policies

This Plan/EIS is inconsistent with the Organic Act, the Park's enabling legislation, and NPS management policies. The Organic Act requires the NPS to manage its lands "for one fundamental purpose. . . to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." 16 U.S.C. § 1. The NPS "is to afford the highest standard of protection and care to the natural resources within…the National Park System." S. Rep. No. 95-528, at 14 (1977). The Organic Act forbids the NPS from allowing any activity that will cause "derogation of the values and the purposes for which [the area has] been established." 16 U.S.C. § 1a-1.

Shooting free-living white-tailed deer in a national park, such as Rock Creek, does not conform to the fundamental purpose of conserving wildlife within federal parks. Similarly, the impermissible use of hypothetical birth control within the herd is an activity fundamentally out of line with the NPS's mission to protect and conserve the natural resources of a park. Administering birth control and shooting deer in a National Park is a derogation of the values and the purposes for which Rock Creek has been established and is therefore a clear violation of the Organic Act.

Rock Creek's enabling legislation, states the Plan/EIS, created "a public park and pleasure ground for the benefit and enjoyment of the people of the United States" and further observes that in the park's establishment, Congress promulgated regulations "providing for the prevention from injury or spoliation of all timber, animals or curiosities within said park, and their retention in their natural condition, as nearly as possible."

Using firearms and chemically engineered birth control is clearly not preventing animals from "injury or spoliation"; nor is it consistent with Congress's charge to retain the animals in their "natural condition."

While the NPS has the authority to manage the wildlife in its parks, the taking, feeding, touching, and harassing of wildlife is prohibited. As to whether hunting, fishing, or trapping is allowed within the park, each national park is guided by its own enabling legislation. If the enabling legislation does not specifically allow for these activities, they are prohibited on NPS lands. The Rock Creek enabling legislation does not specifically allow for hunting, fishing or trapping; thus, it is prohibited within the park. However, hunting and trapping is exactly what the plan proposes.

In January 2009, a study was published in Proceedings of the National Academy of Sciences that made headlines worldwide. The study found that this type of management is not only detrimental to the deer slaughtered, but also to the surviving population, for the more highly controlled the environment, the lower the genetic diversity. These changes make no evolutionary sense and ultimately threaten the viability of a species.

Conclusion

The deer population in a given amount of space tends to rise in concentrated green areas (yet, obviously, be lowered on actual sites of construction) due to gardening practices, construction and a lack of respect for or dearth of natural predators such as coyotes. The deer then balance their own numbers (even by absorption of the embryo, if necessary) as they cannot exceed the food and foliage that provides needed shelter and sustenance. To co-exist with animals in a park we should enjoy the presence of its fresh air, majestic trees, and wild animals -- and we must also act respectfully. Human factors that can be altered must be given attention, or the calls of "too many deer" and the pressure to shoot at them when they are deemed inconvenient will be cyclical.

Environmental degradation to the park has taken place over many years and is also impacted by previous, deliberate removals of natural vegetation, by vehicle exhaust, construction, and the activity of human residents and other factors. The government's proposal is not an environmental fix so much as a plan of convenience, demonstrating a poverty of innovation needed to advance ecologically respectful policy. Killing deer is not the answer.

We must work diligently to foster respect for indigenous animals where they survive, and keep the biocommunity in the balance it evolved to maintain. And where we've made mistakes, we should resolve not to condone still worse ones. Alternative A, no action against these deer, is the right thing to promote. No shooting and no pharmaceutical control. The "too many of them" claim everywhere paves the way for the domination and control of free-roaming animals – first predators, then the prey. It's extremely disingenuous to kill and foist lab-created fertility control vaccines on members of the natural community and claim to save that community as a whole.

The NPS's plan is extreme, short-sighted and severe. It does not reflect the careful reasoning required by NEPA, nor does it further the purpose set out by Congress upon the establishment of Rock Creek. The NPS should reconsider the options available and take a hard look at the real and significant consequences that will result from its proposed and favored action. Friends of Animals and the specific signatories to this statement strongly support "Alternative A: no action" on the deer in Rock Creek Park.

Sincerely,

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Correspondence Text

Comments on Draft EIS, Rock Creek Park

From: M. David Feld, National Program Director, GeesePeace and Director, DeerPeace Program
Contact: 703 608 2274 (cell); email - davidfeld@geesepeace.org

Thank you for the opportunity to comment on the proposed and the selected alternatives developed to support the long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Rock Creek Park.

Part I – Our Assessment

Our overall conclusion is that the EIS has inappropriately omitted alternatives that are less costly, safer, reduce risk of Lyme disease, reduce deer vehicle collisions and facilitate the recovery of native vegetation and sustained woodland regeneration better than any of the alternatives considered. Moreover, the selected alternative is creating debilitating controversy between people living in neighborhoods surrounding the park.

Rock Creek Park is not just another park. It is the largest woodland park area of Washington, DC. It contains the National Zoo and is surrounded by foreign embassies. The National Park Service is renown for excellence in planning and forest stewardship. When the National Park Service decides that killing deer is the best way to restore a healthy woodland understory in an urban area, this will be copied by others who actually think you have it right because the National Park Service surely thought this through and considered all alternatives.

The draft EIS is too flawed to proceed to a final EIS.

Perhaps, alternatively you will implement more effective practices that do not have negative environmental impacts, just positive impacts … and do not cause debilitating controversy but rather get people working together. In Part V we provide "Alternative E" for your consideration.

Part II – Errors and Omissions

Two inappropriately rejected alternatives:

(1) Supplemental Feeding for deer in interior meadows

(2) Habitat Modification to create enhanced interior meadows/Plantings and protecting new trees along the edge of the interior meadows.

Five good tactics not consider at all:
(1) 4-poster" Tick elimination station for deer to reduce/eliminate risk of Lyme disease

(2) Mixing native vegetation seeds with the corn in the "4-poster" station so the deer will spread the native specie seeds with their droppings.

(3) Use of salt substitutes for road deicing so as not to create long salt licks along road shoulders and reduced pollution of streams and wetlands.

(4) Placing salt and mineral licks in the interior meadows to keep deer away from road shoulders

(5) Deactivating existing salt and mineral licks along road shoulders

Part III – Wrong Assumptions and Conclusions

Rejecting Supplemental Feeding: From page 89 of draft EIS "Supplemental Feeding - Providing supplemental food sources for deer would potentially decrease browsing pressure on vegetation resources at Rock Creek Park. However, increasing food sources would increase deer health and reproduction, leading to a growing deer population. In the long term this would compound problems associated with high deer numbers (MD DNR 1998). For these reasons, this alternative was dismissed."

Our Comment - Rock Creek Park is not Maryland. The deer in Rock Creek Park are not starving or have low birth rates because of nutritional deficiency. Nothing in the draft EIS indicates that the deer in Rock Creek do not have more than adequate sources of food. And they are still shooting deer in MD. This seems to not be the program you want to reference or follow or discard the good alternatives they rejected years ago.

The use of supplementary feeding gives deer an alternative to the local neighborhood landscaped gardens and community agriculture plots. From page 28 of draft EIS "Deer have direct impacts on the community gardens that are maintained by park users, most of which have been fenced to protect them from deer browsing." Deer can continue to eat the native vegetation that the Park wants to protect or restore, or deer can continue to eat the vegetables in the community gardens or deer can cross the road and continue to eat the flowers and bushes in the neighboring communities. Birth rates will not increase because they get their sustenance from the areas developed for this purpose inside the woodland areas rather than in areas outside the woodlands. Also deer would be less likely to cross roads to find food in the neighboring communities. Deer vehicle collisions will be reduced.

Rejecting Landscape Management/Plantings: From Page 90 of Draft EIS "White-tailed deer are very adaptable animals and they will adjust their diets to available food sources. Therefore, trying to manage a deer population through managing the habitat to manipulate deer feeding behavior and movements in a highly fragmented environment, surrounded by suburban land uses would be extremely complex, inefficient, and likely unsuccessful. Introducing plantings of non-palatable species on a parkwide scale would not be feasible. Typically, nonpalatable plants are those that are nonnative and often invasive, which is counter to the goals of most parks, including Rock Creek. The effort needed to replace existing palatable vegetation with nonpalatable would be extensive and the result expected is that deer would eventually adapt to the available food source. Additionally, removal of large areas of existing vegetation would have adverse effects on other wildlife species. Landscape modification does not appear to be a viable option for reasons described above. Additionally, landscape modification actions to discourage deer

density would also negatively impact other wildlife. Drastic landscape modification actions, such as removing large tracts of forests to eliminate deer cover, would require additional NEPA documentation. Based on the reasons above, this alternative was dismissed."

Our Comment: Unfortunately, the draft EIS did not consider landscape modification in the larger, non-fragmented woodland areas of Rock Creek Park to improve shelter and browse for deer and wildlife and to plant and protect seedlings at the meadow's edge. This would keep the deer in the woodland interior, away from roads and community gardens. And whatever time the deer spent in the interior meadows they would not be eating the understory vegetation the Park wants to protect. This would be an ideal program from junior rangers. Also, the interior meadows would be the right place for the "4-poster system" and when contraceptives are approved in the next year or two a convenient place to dart the deer.

If Rock Creek Park can have a golf course and provide community gardens for people to plant crops, they can certainly provide enhance meadow areas within the woodland interior spaces for wildlife.

Part IV – Urban Woodlands

The loss of native vegetation in the woodland areas of Rock Creek Park and the increase of invasive plant species are symptomatic of woodlands in urban areas. If
Rock Creek Park was a sliver in the forests of Montana or located in a remote rural area, natural processes (including natural predators) would keep the woodland and park areas healthy and the balance of wildlife and vegetation at sustainable levels.

However, in a urban woodland if a seedling sprouts along a road shoulder, road crews will take it down. If a seedling sprouts in one of the open park recreational space, parking lot or picnic areas, park ranges will take it down. If a seedling sprouts in one of the landscaped areas of a neighboring private home, the owner will take it down. We limit the expansion of the woodland as a natural consequence of its location in an urban area.

Thus new tree growth or regeneration may only occur in the woodland interior with most tree species requiring sunlight for sustained and healthy growth. In urban woodlands open spaces are formed by the death of old or diseased trees, lighting strikes or blow downs. Controlled/managed burns in urban woodlands are dangerous and accidental fires are quickly contained.

In Rock Creek Park open spaces were created and maintained for recreational activities (Golf course, community gardens, picnic areas) or for ranger facilities or park maintenance yards, buildings or offices. Rock Creek Park also maintains a system of trails with many passing by natural open spaces visited by people who are hiking or taking an easy stroll in the park. The open spaces are inviting areas to rest or to explore. Sometimes new seedlings are trampled.

Part V - The missing Alternative E – We call it DeerPeace.

The DeerPeace program uses adaptive program management. As each DeerPeace program component is implemented results are monitored. Protocols, emphasis and timing are continuously adjusted to sustain or increase benefits.

The Goal - A better Rock Creek Park with sustainable woodlands, wetlands and streams for the people who visit the park, who work there and the wildlife that live there.

Guiding Principal - Wildlife live within and at the fringe of our landscapes and communities which sometimes places them in conflict with us. Our challenge is to devise and implement the means for wildlife to live benignly in the transitional space with minimal harm to the wildlife or disruption of the human community, wildlife habitat or natural areas.

The principle components of the DeerPeace strategy are:

1. Use salt substitutes to melt snow and ice. Road salt dissolves and flows along roadway drainage systems eventually polluting the streams of Rock Creek Park. The remaining salt is pushed to the side of the road with the snow or slush when the roads are plowed. The result is a high concentration of salt along the road shoulders. Salt is an important part of deer nutrition. The ready supply of salt along the road shoulder draws them to the road where they become habituated to cars. By eliminating salt along the road shoulders deer will have one less reason to browse along the road shoulder in the evening. Existing salt concentration areas or mineral licks along the road shoulder are located and deactivated.

2. Create intercept meadows in the park interior to promote new tree growth at the edge of the meadow. The intercept areas are existing open spaces, expanded if necessary, for good sun access … generally, ¼ to one acre. The new seedlings are protected from browsing wildlife. The intercept meadows are designed to be secure and safe habitat for wildlife with browse or vegetation they like. Some intercept areas will provide shelter. The look will be natural. The "4-poster" blacklegged tick elimination are located in the intercept meadows. In some meadows, tree stands or blinds are erected to facilitate contraception of deer with darts. When the deer have sufficient food in the interior of the woodland, they will be less likely to venture across roads to find food in neighborhood gardens. This will translate into reduced deer vehicle collisions. To counter the years of using road salt to deice roads, salt and mineral licks will be placed in the intercept meadows.

3. Reduce the risk of Lyme disease by treating deer with tickicide. The system is called "4-poster". It was developed by the USDA Agriculture Research Service and has a proven record of success. In one trial, 97% of ticks were eliminated. Deer collect ticks as they pass through wooded areas and open spaces. They do not carry Lyme disease. Reducing the number of deer at Rock Creek Park will not reduce the ticks that may carry Lyme disease. Treating the deer with tickicide will. The "4-poster" attracts the deer with small amounts of corn. As the deer eat the corn the tickicide is transferred from paint rollers to the head and neck of the deer.

4. Mix seeds of native specie vegetation to the corn of the "4-poster" system. When the deer eat the corn and seeds mixture some of the seeds will be dispersed in the deer droppings as the deer move between intercept areas. Deer will actually contribute to native specie regeneration in the woodland areas.

5. In one or two years, contraceptives will be licensed and approved for deer. Dart stations will be located in the intercept meadows. Although the deer in Rock Creek Park are free ranging deer, the does will stay in the area. The contraceptives that are available may be administered several times without harm to the deer or poisonous or dangerous to humans. Some deer may be darted several times.

M. David Feld
National Program Director – GeesePeace
Director –DeerPeace Program

GeesePeace – "When birds of a different feature, Flock together"

Correspondence ID 395

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Correspondent Text

Response and Recommendations to Rock Creek Park EIS

Thank you for the opportunity to respond.

The Wildlife Rescue League currently operates the only wildlife assistance hotline in the DMV region. We receive and respond to over 4,000 calls a year concerning human-wildlife conflict, wildlife education and injured and orphaned wildlife assistance. While we are located in Northern Virginia, we provide service to the DC Shelter as well as respond to calls from the public in the District. The WRL also participates in the Metropolitan Council of Governments Animal Services Committee and the Wildlife Subcommittee and PR/Humane Education Subcommittee of the MWCOG Animal Services Committee in order to more effectively address wildlife issues by encouraging regional cooperation. Our non-profit organization, which is all-volunteer and currently receives no county or state funding provides services which are driven entirely by public demand. The WRL, through private donations and commitments of limited funding developed and implemented the first regional campaign to reduce deer-vehicle collisions and routinely serves as the primary referral for regional wildlife education and assistance.

We appreciate the opportunity to comment on both the issues and challenges that exist at Rock Creek Park as well as offer a response to the proposed actions. Our interest in the opportunity is founded solely in an effort to encourage Rock Creek Park and NPS to invest time, money and resources in measures that will result in solutions to the existing conflicts.
Our reading of the EIS leads us to believe that at this time, the primary concern is the identified damage to existing shrubs and herbaceous species and the decline in forest seedlings caused by deer browsing. Of equal concern is the perception of deer presence on the park's cultural landscape and the possibility of deer adversely affecting native vegetation and other wildlife species.

Our reading of the EIS also suggests an interest and willingness of Rock Creek Park to work cooperatively with other jurisdictions in order to address common issues at a regional level.

The Wildlife Rescue League appreciates the concerns that exist, the desire to avoid a potential increase of those concerns and the wisdom of participating in a regional approach to managing human-wildlife conflict.
The Wildlife Rescue League encourages Rock Creek Park to adopt a strategy that provides the most likely opportunity to experience long-term, sustainable management of the issues listed above. We support Alternative B, with a recommendation to broaden the included initiatives to produce the most favorable outcome:

Alternative B: Combined Non-Lethal Actions

Historical data, experience and the well-researched behavior of white-tailed deer substantiate that attempts to control, manage or reduce deer population by lethal means result in minimal short-term affect on the deer population, no measureable long-term effect and little if any resolution to the issues identified in the EIS. We are happy, upon request, to provide relevant data from the jurisdictions that presently employ these methods to substantiate this statement.

While the public, and park's perception may be affected in a seemingly positive way, that deliberate action is being taken by culling deer herds, that phenomena is short-lived when, after the culling has occurred, the issues continue to persist, and in most cases, increase. Similarly, the perception of affecting the deer population by culling diminishes over time as the deer's natural response to artificial control causes their population to compensate. The WRL will be happy to provide Rock Creek Park with evidence of such throughout the region.

The Wildlife Rescue League advises Rock Creek Park to appreciate the intrinsic implications of employing lethal methods. Although other jurisdictions have actively engaged in culling deer in the past with little reaction from the public, the present state of affairs in Fairfax County should serve to alert Rock Creek Park to the potential negative effect on the park's reputation and the committee's credibility. The deer management plans that exist in other jurisdictions were created, in some cases, over a decade ago and implemented with the benefit of a relatively uninvolved constituency. Today, there is significant reason to consider the public's reception and reaction is generated and substantiated by their ability to evaluate and form opinions based on statistics and facts of what is rather than ten years ago when all that was available to them "was what might be". Our experience with the public's response to the use of lethal means under the guise of "deer management" is much more sophisticated, educated and informed than it was ten years ago.

In recommending Alternative B, Combined Non-Lethal Actions, the Wildlife Rescue League supports the methods included but advises that additional initiatives, presently dismissed by the EIS, be re-evaluated. The most likely way for Rock Creek Park to achieve it's desired outcome of ensuring a balanced habitat is to further develop the strategy suggested by Alternative B and implement a methodical, consistent and comprehensive campaign to establish Rock Creek Park as a benchmark for effective, productive and progressive habitat and wildlife stewardship. Currently, in response to the continued frustration of Fairfax County still unable to resolve the issues created by human-deer interaction and the dynamic effect of urbanization, the Wildlife Rescue League is working cooperatively with park and wildlife agencies to develop and implement a more solution-driven management plan. We would welcome the opportunity to expand these initiatives to Rock Creek Park, as well as to other jurisdictions.

Rock Creek Park has the opportunity to benefit from the experience garnered by other jurisdictions in the region and apply the knowledge with well-developed, thoughtful and viable solutions to the existing and potential challenges faced by every park, every jurisdiction, every region and every state in our country. The precedent it will set demands a thorough, considered and meaningful campaign in light of the responsibility the park has to conduct and promote responsible stewardship of our countries greatest resources, the environment, our wildlife and our citizens.

We thank you for your considered response.

Correspondence ID 396

November 2, 2009

BY ELECTRONIC AND REGULAR MAIL:

Ms. Adrienne A. Coleman

Superintendent

Rock Creek Park

3545 Williamsburg Lane, NW

Washington, D.C. 20008

Dear Superintendent Coleman:

The Animal Welfare Institute (AWI) hereby submits the following comments in response to the Rock Creek Park Draft White-Tailed Deer Management Plan and Environmental Impact Statement (hereafter "Draft EIS").

AWI strongly opposes the proposed alternative (Alternative D) and, specifically, the proposal to initiate a massive multi-year lethal deer sharpshooting/culling program in Rock Creek Park (RCP). Not only does the evidence presented in the Draft EIS fail to substantiate the need for such an action, but the proposed action is not legal. AWI strongly supports Alternative B with the caveat that, while the NPS has not conclusively demonstrated the need to reduce the RCP deer population, assuming that need can be justified then using non-lethal means is far preferable than the proposed slaughter. It is also consistent with NPS legal authorities.

Of all the federal agencies that have a public trust responsibility in regard to the management of wildlife on public lands, the National Park Service (NPS) is unique in that its mandate is based on the conservation and protection of native wildlife. The NPS does not, with limited exceptions, permit public hunting of wildlife within national parks nor is it responsible for ensuring multiple uses of the national parks. If any federal agency is capable, both philosophically and physically, of implementing unique and creative strategies to address a perceived or alleged overabundance of wildlife, it is the NPS. Indeed, far from establishing any type of precedent, the NPS has already demonstrated leadership in the non-lethal management of wildlife with, for example, deer management on Fire Island National Seashore, Tule elk management at Point Reyes National Seashore, and wild horse management at Assateaque Island National Seashore.

Sadly, the progressive attitudes demonstrated at those park facilities is not reflective of an agency-wide commitment to using non-lethal methods, despite their availability and effectiveness, to address all alleged wildlife overabundance issues. In recent years, the NPS, from coast to coast, has developed management plans that illegally promote lethal control through sharpshooting and capture/trapping and euthanasia of native park wildlife. At present such cruel methods have been, are being, or will be employed at Gettysburg National Military Park, Eisenhower National Historical Park, Point Reyes National Seashore (for fallow and axis deer), Rocky Mountain National Park, Catoctin National Park, and Valley Forge National Historical Park. It is anticipated that Indiana Dunes National Lakeshore will soon join this list of NPS units that has elected to illegally use bullets instead of non-lethal strategies to address perceived wildlife overabundance issues.

RCP must not continue this trend by electing to employ lethal control to substantially reduce the size of its white-tailed deer population. Not only does the available evidence not support such a drastic response but the NPS has offered no legitimate legal grounds to justify this plan. More importantly, though the Draft EIS considers a non-lethal management alternative (Alternative B), the NPS has failed to articulate a compelling rationale for why, at a minimum, non-lethal management should not be attempted first before resorting to lethal control. Instead, the NPS claims that immunocontraception won't fix the "problem" rapidly enough and that immunocontraceptive technologies are not sufficiently advanced to meet the standards set by the NPS – standards that are self-imposed and are intentionally designed to prevent the serious consideration of such non-lethal technologies. Neither argument is legitimate.

As will be discussed in this comment letter, immunocontraception is a viable management option that the NPS and RCP should employ in RCP to address the alleged overabundance of deer. If the NPS expressed the intent to emphasize such an approach and indicated its interest in cooperating with animal protection and advocacy organizations to implement such a program, there is no question that it would receive both commendation and both physical and financial support. Indeed, as detailed below, there is no reason to believe that an immunocontraception program, if designed and implemented to obtain maximum impact, would not produce many of the same beneficial impacts that the NPS attributes to lethal deer slaughter over the duration of the management plan.

While RCP may not have the grandeur of Yellowstone National Park and its scenic beauty may not rival that of the Grand Canyon or Yosemite National Parks, given its location in Washington, DC, RCP is America's park. Beyond providing an aesthetically pleasing travel corridor for persons living and working in our nation's capital or a respite from the urban chaos inherent in the DC metropolis, RCP represents the national park concept – a concept born in America – to those who visit Washington, DC from all over the world. As such, the NPS and RCP should not become a nighttime white-tailed deer slaughterhouse but, instead, should be a demonstration to America and the world how a single agency with a unique mission that is responsible for many of America's most cherished wild places can devise and implement a progressive plan that is based on protection and compassion to address a perceived management dilemma. To do otherwise and to use bullets to resolve its "problem" will only reaffirm that the NPS has, as it has in the past, lost its way, ignored its statutory and regulatory mandates, circumvented its own policies, let down the American public, and sacrificed protected native wildlife in favor of convenience and expediency.

The alleged need to use bullets – or preferably immunocontraceptives – to reduce the park's deer population presumes that the population is overabundant, that this situation is unnatural or unacceptable, and that efforts must be taken to mitigate or reduce the alleged adverse impacts of the deer to or on RCP. The Draft EIS fails to provide sufficient compelling evidence to make this case. Yet, as a precautionary effort intended to protect those park resources allegedly or ostensibly impacted by deer, AWI would not oppose the gradual reduction of the RCP deer population size and density solely with the use of immunocontraceptive technologies.

What the RCP appears unwilling to accept or admit is that the park, as a consequence of past NPS decision and increased urbanization (outside of NPS control) fails to provide any semblance of a natural system and, in fact, has been manipulated to be an ideal and productive habitat for deer. Surely the NPS can't claim that playing fields, a tennis stadium, a golf course, an outdoor amphitheatre, and community gardens were part of the natural or historical landscape of RCP. Indeed, some of these alterations to the

natural landscape, actually increase the attractiveness and productivity of the landscape for deer. Thus, while the prospect of restoring "natural conditions" may be, in part, a long-term objective within RCP, using this as a justification for the proposed deer slaughter is like trying to bail water out of a boat that has a hole in it. In other words, attempting to restore to a more "natural condition" a park that has been highly manipulated both by the NPS and external factors is unattainable. Similarly, killing native deer to ostensibly control numbers that may be larger than what would exist or what is desired because the deer adapted to intentional human manipulations of the area to facilitate human recreation is wholly inappropriate.

Beyond simply proving that the RCP deer population requires control, the NPS must also have a legal basis for implementing any action intended to implement said control. This is particularly important if the NPS, as is the case here, is proposing the use of lethal force via a regiment of sharpshooters who intend to invade the park under the cover of darkness to initiate the slaughter while perched in tree stands over piles of bait designed to attract the protected and unsuspecting deer to their death. As indicated above, not only has the NPS failed to provide a legitimate legal basis for the proposal, but the legal justification provided is wrong and reflects an improper – likely intentional – misinterpretation of the NPS Organic Act.

This legal deficiency is in addition to the specific inadequacies inherent in the Draft EIS including a failure to comply with NPS planning processes, the lack of a legitimate purpose and need for the proposed action, failure to disclose all relevant data and information, a lack of reasonable alternatives, and deficiencies in assessing the environmental consequences of the proposed action all of which violate the National Environmental Policy Act (NEPA). The Draft EIS and management plan also squarely conflict with NPS management policies as will be discussed in detail throughout this comment letter.

The substantive deficiencies, both biological and legal, inherent to the Draft EIS and management plan cannot be fixed simply by amending or tweaking the documents prior to final publication. Instead, the NPS and RCP, if they intend to pursue the wide-scale lethal slaughter of RCP deer, must amend the RCP General Management Plan (GMP), revise the RCP natural resources management plan, and engage in a new analysis that provides an honest and objective review of all relevant science, laws, and policies before even contemplating such an action. Preferably, however, the NPS will embrace a far less invasive and cruel non-lethal and innovative approach to understanding and mitigating alleged deer conflicts within and outside of RCP. AWI is prepared to assist the NPS if it does embrace responsible management and protection over persecution for the long-term management of deer in America's park.

The remainder of this comment letter will address the specific legal and scientific deficiencies in the Draft EIS and management plan and the procedures used to develop the plan. As a preface to substantive comments, AWI would like to express its thanks to the NPS for agreeing to extend the deadline for public comments on the document until November 2, 2009.

1. The proposed deer slaughter is premature and the NPS has failed to justify its need through its own planning policies:

NPS planning processes are intended to "bring logic, analysis, public involvement, and accountability into the decision-making process." Management Policies at 2.1.1. Individual parks must be able to demonstrate how the decisions made during the park planning process "relate to one another in terms of a comprehensive, logical, and trackable rationale." Id. To be orderly, park planning efforts "will generally flow from broad general management plans to progressively more specific implementation plans," Management Policies at 2.3, and analysis will be interdisciplinary and tiered.[1] Management Policies at 2.1.2.

One of the first and most broad planning documents is the General Management Plan (GMP). The GMP is "a broad umbrella document that sets the long-term goals for the park …"[2] A GMP is intended to clearly define "the desired natural and cultural resource conditions to be achieved and maintained over time." "clearly defines the necessary conditions for visitors to understand, enjoy, and appreciate the park's significant resources," "identifies the kinds and levels of management activities, visitor use, and development that are appropriate for maintaining the desired conditions" and "identifies indicators and standards for maintaining the desired conditions."[3] Management Policies at 2.2. (emphasis added). Statutorily, a GMP must include, among other requirements, "the types of management actions required for the preservation of park resources." NPS Policies at 2.3.1.1 citing 16 USC 1a-7b.

The NPS reported that a GMP was needed for RCP to: 1) clarify the minimum levels of resource protection and public use that must be achieved for the park and parkway based on the park's purpose, laws, and policies; 2) determine the best mix of resource protection and visitor experiences beyond what is prescribed by law and policy based on the park's mission, public expectations/concerns, park resources, and economic costs; and 3) establish the degree to which the park should be managed to preserve and enhance its natural and cultural resources, provide recreation, and control nonrecreational traffic. GMP and EIS at 4.

Broad public involvement is considered to be a key element in the GMP process and is to be relied on to identify the scope of issues addressed in a GMP, developing the range of alternatives evaluated in a GMP, providing the NPS with the venue to disclose its rationale for decisions about the park's future, sharing information about issues and proposed management directions, learning about the values relevant to the park, and building support for GMP implementation. NPS Policies at 2.3.1.5.

The RCP GMP, completed in 2007, fails to provide a foundation for the deer cull proposed in the Draft EIS. A careful review of the RCP GMP reveals that the alleged overpopulation of white-tailed deer in RCP and all of the direct and indirect consequences of the excessive numbers of deer were hardly a concern during the GMP process. Indeed, within the nearly 400-page document, any references to deer within RCP were few and far between and were limited to:

> "Monitor native species that are capable of creating resource problems, such as overgrazing associated with over-population of white-tailed deer. If unacceptable levels of habitat degradation are indicated, implement humane measures to control animal population." GMP and EIS at 21.

> "The National Park Service will be preparing an environmental assessment or environmental impact statement on the impacts of managing the park's deer population." GMP and EIS at 146.

[1] Tiering is a staged approach to environmental analysis that addresses broad programs and issues in initial or systems-level analyses. Site-specific proposals and impacts are analyzed in subsequent studies. Management Policies at 2.1.2.
[2] See also NPS Management Policies Glossary in which a GMP is defined as "a plan which clearly defines direction for resource preservation and visitor use in a park, and serves as the basic foundation for decision making. GMPs are developed with broad public involvement."
[3] See also, NPS Management Policies at 2.3.1 ("the purpose of each general management plan … will be to ensure that the park has a clearly defined direction for resource preservation and visitor use").

The NPS decision to prepare an EIS on deer management, as stated in the GMP, does not excuse it from providing the foundation for deer management, including clearly defining the desired natural and cultural resource conditions to be achieved and maintained over time and providing indicators and standards for maintaining the desired conditions, in its GMP. In this case, the GMP is entirely devoid of any substantive reference or analysis of the alleged deer overabundance in RCP and the subsequent impacts of deer on RCP resources. Consequently, the GMP provides no guidance, general or specific, for the management of deer in RCP.

Though the RCP GMP establishes its purpose to be "to specify resource conditions and visitor experiences to be achieved in the park and parkway, and to provide the foundation for decision-making and preparation of more specific resource plans regarding the management of the park and parkway," the GMP focuses mainly on RCP roads and traffic control. RCP GMP and EIS at iii and 1 (emphasis added). Furthermore, the intent of the GMP included establishing the direction and values that should be considered in planning to achieve the purposes defined in the park's establishing legislation and to "define management prescriptions that establish the goals of the National Park Service and the public with regard to … natural resources … including the types and locations of resource management activities." GMP and EIS at 1[4] (emphasis added). These standards or criteria are not contained in the RCP GMP. Instead, the NPS indicates that more detailed plans would be developed which would be based on the "goals, future conditions, and appropriate types of activities established in the general management plan." GMP and EIS at 2.

Though the alleged growth in the deer population and an increase in associated impacts to park resources was occurring as the GMP was being completed, the use of park roads was described in the GMP as the "pivotal management issue" to be resolved by the plan and the three key management issues, or decision points, related to traffic and traffic management, visitor interpretation and education, and administration of RCP. Id. at iii and iv, 10, 30, 31, 32, 69. No decision point or key management issue involved the management of deer in RCP. In fact, the NPS concedes in the GMP that "the most controversial management issue to be resolved by this general management plan involves the use of park roads for nonrecreational travel on weekdays" including the "management of traffic in Rock Creek Park and the degree to which park values would be affected by nonrecreational automobile use." GMP and EIS at 9. No where in the GMP is the issue of deer overabundance mentioned as a critical management concern and/or are there any goals or objectives established to address this issue.

Admittedly, in 1996 when the GMP process was initiated the deer "problem" may not have been of concern to RCP and NPS. In 2001, however, when the GMP process was reinitiated after a multi-year lull in progress due to a congressionally directed reorganization and downsizing of NPS planning, design, and construction programs and personnel, GMP and EIS at 294, and in 2007 when the process was completed, it is inconceivable that the deer "problem" was not of increasing concern to RCP/NPS officials.

Each of the RCP GMP EIS alternatives, for example, provided different strategies primarily for the management of park roads and recreational and non-recreational vehicle use of those roads ranging from not changing anything (the no action alternative – Alternative B) to permanently closing several segments of park roads to facilitate and improve non-motorized recreational access into RCP. The action alternatives, including the preferred alternative (Alternative A) also addressed interpretation and education issues, improvement in the use of park resources including cultural resources, rehabilitating trails and historical features, moving administrative/law enforcement offices, and upgrading RCP facilities. Not one of the alternatives contains any specific direction in regard to improvements or changes to the management of natural resources in RCP with the exception of the anticipated minimal reduction in wildlife road kill as a result of changes in road use and traffic management.

This is not to suggest that natural resource issues are not addressed in the GMP. They are, but in such general terms that attempting to glean from the GMP the goals and objectives of RCP for natural resources management is impossible. For example, the GMP indicates that "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." GMP and EIS at 12 (emphasis added). A RCP mission goal is identified as to protect, preserve, and maintain in good condition the natural and cultural resources and associated values of RCP. Id. at 14. In addition, the GMP includes a number of "management prescriptions." A management prescription is defined as "an approach for administering or treating the resources or uses of a specified area that is based on desired outcomes." GMP and EIS at 51. Management prescriptions may be the same throughout a park or can be different within various park zones.

In RCP GMP the zones and management prescriptions of relevance to deer management are limited to the Forest Zone. The GMP describes this zone as "largely undisturbed forests" providing "opportunities for solitude, birding, and other nature study, and wilderness-like scenery." GMP and EIS at 52. The desired resource conditions or desired outcomes within the Forest Zone are "natural processes … with relatively little interference except for restorative actions to protect or promote native biota, mitigate pollution, and control erosion." GMP and EIS at 56. There is no reference within the description of the Forest Zone or in any analysis of the condition of the Forest Zone in RCP that the forests or associated vegetation are being excessively or over-browsed by deer or that forest regeneration, or lack thereof, is a concern. Indeed, the NPS indicates that under Alternative A (the preferred alternative), Alternative B (the no action alternative), Alternative C, and Alternative D there "would be no major change in the management of forested areas of the park from current management practices." GMP and EIS at 74, 89, 96, 109. This is in stark contrast the proposed action in the Draft EIS which is to significantly reduce the park's deer population for the purpose of substantially altering the composition, health, and structure of the forested areas in RCP. This discrepancy is more than a mere oversight since the GMP and Draft EIS are related documents and because there were published only two years apart. Without a rational explanation by the NPS, it would appear that the NPS is claiming that RCP forests are now in desperate need of improvement now when two years ago no changes in forest management were deemed to be necessary.

While the action alternatives evaluated in the GMP all are identified as improving the protection of the park's natural and cultural resources, GMP and EIS at 70, what is telling is the description of the impacts of Alternative B or the no-action alternative. Concerns associated with the selection of Alternative B include the inadequate condition of the paved recreational trail system, inadequate capability to provide environmental education and interpretation services, impairment of future administration and operation efficiency due to inadequate support facilities, and continued degradation of historic structures used for expanding administrative purposes. GMP and EIS at 70. The NPS does not include any discussion of damage to or loss of park forests and/or other vegetation as a consequence of Alternative B suggesting, again, that, at least as of 2007, deer were not of sufficient concern to the NPS to justify the inclusion of deer management guidance, direction, and goals in the GMP.

Moreover, even within the description and discussion of the action alternatives there is no specific reference to the need for lethal deer control or any form of deer management due to alleged resource impacts/damage attributable to deer. The protection of natural resources afforded under Alternative D (the

[4] The GMP EIS provides additional guidance as to the intent of the GMP and its importance as part of the RCP planning process. For example, the need for the GMP is to "determine the best mix of resource protection and visitor experiences beyond what is prescribe by law and policy based on the … resources occurring within the park" and to "establish the degree to which the park should be managed to preserve and enhance its natural and cultural resources…" GMP and EIS at 4.

environmentally preferred alternative) which is similar to Alternative A (which was selected as the preferred alternative) would be limited to improving and upgrading foot and horse trails to remedy adverse effects on soils and working to reduce wildlife roadkill. GMP and EIS at 72. For Alternative A, the GMP states that it "would improve the protection of the park's natural resources" by rerouting poorly designed sections of foot and horse trails while restoring abandoned trail sections to their natural conditions and by implementing measures to reduce mortality to wildlife from collisions with vehicles. EIS and GMP at 73, 77, 79.

Despite this complete lack of substantive analysis of the RCP deer population and deer management in the GMP, the NPS claims that "all alternatives considered for the development of a White-tailed Deer Management Plan were developed within the framework of the park's GMP/EIS." Draft EIS at 39. The NPS goes on to identify a number of desired conditions for RCP that it claims were outlined in the GMP including the restoration of native species populations that have been severely reduced or extirpated where feasible and sustainable, the reduction or elimination of invasive species from natural areas of the park, protection of Federal and District-listed threatened or endangered species and their habitats, and management native plant and animal species to allow them to function in as natural a condition as possible except where special management consideration are allowable under policy. Draft EIS at 38, GMP and EIS at 20. Some of these very general desired conditions can be applied to deer management in RCP but, as required by NPS Management Policies, more detail relevant to RCP deer, their impacts, and guidance for their management should have been included in the GMP. This is particularly true considering that the NPS is now, only two years after the GMP was completed, proposing to engage in the massive reduction of the RCP deer population.

The lack of specific direction in the GMP in regard to deer management in RCP cannot be corrected in the Draft EIS. Rather, the NPS must either replace and update the GMP or seek to amend or revise the GMP as permitted under NPS Management Policies. Management Policies at 2.3.1.12.

After a GMP is completed, the next step in the park planning process is program management planning. This process is intended to provide "a bridge between the broad direction provided in the general management plan and specific actions taken to achieve these goals." Management Policies at 2.3.2. A program management plan, which would include a natural resources management plan, "follow the general management plan and provide program-specific information on strategies to achieve and maintain the desired resource conditions and visitor experiences …" Management Policies at 2.2 and 2.3.2.

As the NPS concedes in the GMP and EIS, upon completion of the GMP, "several more specific plans will be prepared to implement the general management plan" including, but not limited to, "an update to the existing natural resources management plan." GMP and EIS at 45/46. RCP has an existing natural resource management plan that was published in 1996. The revised natural resources management plan contemplated in the GMP and EIS "could include an invasive species control plan, erosion reduction plan, and plans to address particularly difficult issues, such as deer management." GMP and EIS at 46. The plan also "would include a bird management plan that would establish habitat protection and improvement objectives and practices for important bird areas." Id.

The development of a natural resources management plan after completion of the GMP is entirely consistent with the logical, incremental, and stepwise planning process required pursuant to NPS Management Policies. While the existing GMP is inadequate as it contains virtually no evidence that deer issues are of concern in RCP and provides no direction for the management of deer, if the NPS had complied with its own policies, the natural resources management plan would have disclosed additional information relevant to deer management, articulated desired future conditions, and delineated objectives and strategies to achieve those conditions.

To date, however, the NPS has not published a revised natural resources management plan for RCP and it is unknown if such a plan is under development or what the timeline is for its publication. Instead, in this case, the NPS has proceeded directly from its completion of the GMP – which contains no substantive information or evidence regarding the RCP deer population or management issues – to the Draft EIS which calls for the near complete removal of deer from RCP. Skipping the development or revision of a natural resource management plan is not permitted under NPS Management Policies.

According to the Draft EIS, the NPS intends to update the RCP natural resources management plan as a "Resource Stewardship Strategy" when NPS issues guidelines for the updated plan. Draft EIS at 36. It is unclear what this means (i.e., what updated plan the NPS is issuing guidelines for) and the intent of a Resource Stewardship Strategy is unknown. Nevertheless, the NPS claims that the 1996 RCP natural resources management plan includes an objective to "preserve and perpetuate the park's plant and wildlife resources in as natural a condition as possible, and reduce the adverse effects of human activities and exotic species on the natural environment." Draft EIS at 36. Not only does this objective fail to provide direction for deer management in RCP but it also cannot be interpreted or used to justify the NPS proposal to initiate a wide-scale lethal deer control program. Indeed, the NPS concedes that the RCP natural resources management plan "does not directly address deer management at the park." Draft EIS at 37.

In general, after a program management plan, like a natural resource management plan, is completed, implementation plans will be developed. As described in the NPS Management Policies:

> "Implementation planning will focus on how to implement activities and projects needed to achieve the desired conditions identified in the general management plan, strategic plan, and program management planning documents. Implementation plans may deal with complex, technical, and sometimes controversial issues that often require a level of detail and thorough analysis beyond that appropriate for other planning documents." Management Policies at 2.3.4.

The Draft EIS is an example of an implementation plan. In the case of RCP, however, the NPS has proceeded from the GMP to the implementation plan without completing, among other plans, a natural resources management plan as NPS policies require it to do. While this may, to some, be considered a trivial argument, it is actually rather important both because the NPS is required to follow a particular process and structure during planning, because the incremental nature of the planning process allows for a stepwise approach to natural resource management planning, and since a natural resource management plan for RCP would provide the public (and NPS decision-makers) with a better understanding of how the different desired conditions for the varied natural resources in RCP coalesce and how management strategies are structured to achieve these conditions.

In some cases, as specified in NPS Management Policies, the "development of an implementation plan may overlap other planning efforts if this is appropriate for the purposes of planning efficiency or public involvement." Management Policies at 2.3.4. Nevertheless, "decisions made for the general management plan will precede and direct more detailed decisions regarding projects and activities," and any "major new development … and major actions or commitments aimed at changing resource conditions or visitor use in a park must be consistent with an approved general management plan." Id. The proposed action in the Draft EIS clearly qualifies as a major action intended to significantly change resource conditions in RCP and, therefore, must be more substantively addressed in the RCP GMP.

2. The NPS has no legal authority to initiate a lethal deer control operation as proposed in the Draft EIS:

There are a handful of laws, regulations, and policies that provide the primary directives for the management of national parks. These standards include statutes (i.e., the NPS Organic Act), a park's enabling legislation, NPS regulations, and NPS policies.

The NPS Organic Act:

The NPS cites to 16 USC 1 (its Organic Act) as its legal authority to implement the proposed action that will result in the slaughter of hundreds of deer over the course of several years. Specifically, the language relied on by the NPS to justify its plan is the Organic Act language that provides the fundamental purpose of the NPS which is that the agency:

> "…shall promote and regulate the use of Federal areas known as national parks … by such means and measures as conform with the fundamental purpose of the parks … to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Draft EIS at 12, 31.

The NPS has consistently relied on this language and, specifically, the so-called impairment standard, to justify the slaughter of elk in Rocky Mountain National Park and deer in Catoctin National Park, Valley Forge National Historical Park, and the proposed killing of deer in Indiana Dunes National Lakeshore and in RCP. AWI has consistently argued, and will do so again in this case, that the impairment standard cannot be used to justify the lethal control of deer or any other native species in a national park. An analysis of the quoted statutory language (as well as historical records, and NPS Policies) makes it crystal clear that the impairment standard only applies to activities or uses permitted or authorized in the parks, including public and NPS activities and uses, and was never intended and cannot be used to justify the massive slaughter of hundreds of native deer because they are eating park vegetation.

The Organic Act makes clear that the fundamental purpose of the NPS is to conserve park scenery, natural and historic objects, and wild life. A secondary purpose does not conflict with the fundamental purpose of the NPS, is to permit the enjoyment of the national parks by the public. Such enjoyment is not open-ended or without limitations. Indeed, the Organic Act makes clear that such enjoyment is only permitted when it can be done in "such a manner and by such means as will leave (the parks) unimpaired for the enjoyment of future generations." The "such a manner and by such means" language is applicable to the enjoyment of the parks, not to the conservation of park scenery or wildlife. The "and" between "therein" and "to provide" sets apart the final clause of the statutory language that deals with park enjoyment from the conservation mandate. Had Congress intended for the impairment standard to apply to the conservation mandate, it would have structured the statutory language as follows:

> "…shall promote and regulate the use of Federal areas known as national parks … by such means and measures as conform with the fundamental purpose of the parks … to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same <u>while ensuring that the parks remain unimpaired for the enjoyment of future generations</u>."

Though many have consistently claimed that the NPS has dual mandates that are conflicting (conservation versus promoting public use), such interpretations are in direct conflict with the plain language of the statute. Moreover, as exhaustively research by Winks (1997)[5], the legislative and historical records demonstrate that not only does the Organic Act not represent a conflicting mandate to the NPS but that the impairment standard was applicable only to the enjoyment of the parks and not to other issues.

The plain and indisputable meaning or applicability of the impairment standard as reflected in the Organic Act was not altered by the General Authorities Act of 1979 or by the 1978 amendment to that Act (the "Redwood amendment"). Indeed, if anything that Act, as amended, further affirms that the impairment standard is applicable to activities conducted in the parks and not to the impacts of native species on park vegetation or other resources. The relevant language of the General Authorities Act, as amended, is:

> "Congress further reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System … shall be consistent with and founded in the purposed established by section 1 of this title …, to the common benefit of all the people of the United States. <u>The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which thee various areas have been established</u>, except as may have been or shall be directly and specifically provided by Congress …" (emphasis added).

Despite such documentation, there is ample evidence that the NPS is itself confused over how the impairment standard is to be applied to park management. In the RCP GMP, for example, the NPS states that:

> "… Congress charged it with management lands under its stewardship 'in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (NPS Organic Act, 16 United States Code 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of park resources." GMP and EIS at 68.

While the language quoted is accurate, the interpretation is not since the NPS is claiming that the impairment standard applies broadly "whenever conditions occur that could adversely affect the sustainability of park resources." In other words, the NPS interprets the impairment standard to apply to any condition that affects park resources and not, as is the indisputable intent of the plain language of the statute, to uses and activities permitted, authorized or conducted in the park.

Similarly, the NPS claims that it "will maintain the forests consistent with its charge in the 1916 Organic Act to preserve unimpaired the natural resources and values of the park for this and future generations." GMP and EIS at 142. Again, this statement, as written, delinks the impairment standard from activities and uses of the parks which is not consistent with the plain language of the Organic Act.

Finally, the GMP and EIS claimed that the Organic Act established the mission of the NPS to:

> "preserve unimpaired the natural and cultural resources, and values of the national park system for the enjoyment, education, and inspiration of this and future generations." GMP and EIS at 5.

[5] Winks, Robin W. The National Park Service Act of 1916: A Contradictory Mandate? 74 Denv U.L. Rev. 575 (1997).

In addition to failing to identify the source of this quote, this interpretation of the Organic Act is simply wrong since it fails to link the impairment standard to public uses or NPS activities in the parks.

The NPS attempts to substantiate the use of the impairment standard to justify its lethal deer control plan by citing to New Mexico State Game Commission v. Udall (410 F.2d 1197, 1201 (10th Cir. 1969) and to United States v. Moore (640 F. Supp. 164, 166 (S.D. W.VA. 1986). A review of both cited cases demonstrates that neither provide the support that the NPS alleges for its use of the impairment standard to justify the wide-scale slaughter of deer.

In New Mexico State Game Commission the NPS was sued for its failure to obtain permits from the state to remove up to 50 deer as part of a scientific research project. As an initial matter, there is a significant and substantive difference between lethally removing a limited number of park wildlife as part of a research project and the proposed action which, if implemented, will decimate that RCP deer population by reducing it from an estimated 385 to 69 deer. Draft EIS at 62, 262. Moreover, the New Mexico State Game Commission case is 40 years old and, since then, the NPS has promulgated several versions of its management policies that provide additional guidance for wildlife management in national parks. Thus, while the NPS may continue to permit the lethal removal of wildlife for the purpose of research conducted in the parks, the intent of its current policies are to dissuade the use of lethal strategies to study park wildlife.

Independent of the plain differences between the scenario in New Mexico State Game Commission and the present proposal for RCP, the critical finding in the case was as follows:

> Clearly the Secretary has broad statutory authority to promote and regulate the national parks to conserve the scenery and wildlife therein 'in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.' 16 U.S.C. § 1. Anything detrimental to this purpose is detrimental to the park. In addition to this broad authority, the Secretary is specifically authorized 'in his discretion' to destroy such animals 'as may be detrimental' to the use of any park. 16 U.S.C. § 3. The obvious purpose of this language is to require the Secretary to determine when it is necessary to destroy animals which, for any reason, may be detrimental to the use of the park. He need not wait until the damage through overbrowsing has taken its toll on the park plant life and deer herd before taking preventive action no less than he would be required to delay the destruction of a vicious animal until after an attack upon a person. In the management of the deer population within a national park the Secretary can make reasonable investigations and studies to ascertain the number which the area will support without detriment to the general use of the park. He may use reasonable methods to obtain the desired information to the end that damage to the park lands and the wildlife thereon may be averted.

This language supports the interpretation of the Organic Act language that links the impairment standard to the "enjoyment" of the parks. Activities that are detrimental to such "enjoyment" are detrimental to the parks and are impermissible. Moreover, the court identified an entirely different legal standard, 16 USC 3, when determining the authority for the NPS to remove wildlife from the parks when it can be demonstrated that wildlife use is "detrimental to the use of the park." The NPS in RCP is not relying on this standard to justify its wide-scale deer control program and, in fact, as discussed in greater detail below, it would be hard pressed to do so since there is no evidence that the deer in RCP are "detrimental to the use" of the park.

Moore involves the spraying of a pesticide in the New River Gorge National River. The Governor of West Virginia and the state's Director of its Department of Natural Resources desired to spray a pesticide in the national park to "reduce and remove the … gnat or black fly from the southern counties of West Virginia." The NPS refused to permit such spraying arguing that black flies, no matter how pesky or annoying, are "wildlife" and are therefore protected by NPS statutes and regulations and that, even if such spraying were allowed, the state would be required to obtain a permit before applying the pesticide. In Moore, the court cites to NPS regulations that prohibit the "possessing, destroying, injuring, defacing, removing, digging, or disturbing from its natural state … living or dead wildlife …" 36 CFR 2.1(a). In addition, the court cites to New Mexico State Game Commission and the authority of 16 USC 3 to demonstrate that the NPS has the authority to publish rules and regulations for the proper use and management of the parks and to permit the "destruction of such animals and of such plant life as may be detrimental to the use of any of said parks …" Thus, again, Moore provides no legal support for the NPS use of the impairment standard to justify its wide-scale slaughter of deer.

If any additional proof is necessary that the impairment standard is applicable only the enjoyment and uses of the parks, the NPS Management Policies provide even more evidence supporting this indisputable intent.

The most recent iteration of the NPS Management Policies was published in 2006. Prior to that version, an earlier version was published in 2001. The RCP GMP was prepared pursuant to the 2001 version while the Draft EIS was prepared ostensibly in line with the 2006 version of the Management Policies. The 2001 and 2006 policies are similar but there are some significant differences, some of which will be mentioned below. Adherence to the policy is, however, mandatory unless specifically waived or modified by the Secretary, Assistant Secretary for Fish, Wildlife and Parks, or the Director. Management Policies at Introduction and at 3. The discussion below is based on the 2006 version of the Management Policies unless explicit reference is made to the 2001 policies.

The NPS cannot claim that it was unaware of these policies since, in the Draft EIS, the NPS makes clear that the impairment standard is applicable to actions and activities that cause impacts conceding that it "cannot allow an adverse impact that constitutes a resource impairment." Draft EIS at 32. It is, as previously indicated, inconceivable that the foraging behavior or ecology of a native species could possibly be considered an action or activity within a park. Actions or activities are clearly intended to apply primarily to pubic uses of the parks such a hiking, bicycling, snowmobiling, and rock climbing. They also encompass actions or activities undertaken by the NPS such as facility development, scientific research, and wildlife management practices including the lethal control of wildlife within the parks. To be clear, the role of deer, whether beneficial or adverse to a park, is not an action or activity subject to the impairment standard but any decision by the NPS to manage those deer, through lethal or non-lethal means, would trigger the impairment standard.

In regard to the issue and applicability of the impairment standard, NPS Management Policies make clear that said standards are directly tied to activities or uses authorized by the NPS. As an underlying matter, the policies specify that a mandate to conserve park resources and values is the fundamental purpose of the national park system, Management Policies at 1.4.3, and that when there is a "conflict between conserving resources and values and providing for the enjoyment of them, conservation is to be predominant." Id. Since the fundamental mission of the NPS is conservation, it is entirely logical and sensible that the impairment standard would apply to those uses and activities authorized by the NPS to facilitate and promote public enjoyment of the parks. Not only is this interpretation consistent with the Organic Act but it is referenced throughout the NPS Management Policies. For example:

> "In the administration of mandated uses, park managers must allow the use; however, they do have the authority to and must manage and regulated the use to ensure, to the extent possible, that impacts on park resources from that use are acceptable. In the administration of authorized uses, park managers have the discretionary authority to allow and manage the use, provided that the use will not cause impairment or unacceptable impacts." Management Policies at 1.4.3.1. (emphasis added).

> "The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or

inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment." Management Policies at 1.4.4. (emphasis added).

"An impact that may, but would not necessarily, lead to impairment may result from visitor activities, NPS administrative activities[6]; or activities undertaken by concessioners, contractors, and others operating in the park." Management Policies at 1.4.5. (emphasis added).

"Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision-maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values." Management Policies at 1.4.7. (emphasis added).

"When an NPS decision-maker becomes aware that an ongoing activity might have led or might be leading to an impairment of park resources or values, he or she must investigate and determine if there is or will be an impairment." Management Policies at 1.4.7. (emphasis added).

"The Service will do this (avoid impairment) by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable." Management Policies at 1.4.7.1. (emphasis added).

"The Service cannot conduct or allow activities in parks that would impact park resources and values to a level that would constitute impairment. To comply with this mandate, park managers must determine in writing whether proposed activities in parks would impair natural resources. Park managers must also take action to ensure that ongoing NPS activities do not cause the impairment of park natural resources." Management Policies at 4.1. (emphasis added).

"Although studies involving physical impacts to park resources or the removal of objects or specimens may be permitted, studies and collecting activities that will lead to the impairment of park resources and values are prohibited." Management Policies at 4.2. (emphasis added.

"The 1970 National Park System General Authorities Act, as amended in 1978, prohibits the Service from allowing any activities that would cause derogation of the values and purposes for which the parks have been established (except as directly and specifically provided by Congress). Taken together, these two laws establish for NPS managers (1) a strict mandate to protect park resources and values; (2) a responsibility to actively manage all park uses: and (3) when necessary, an obligation to regulate their amount, kind, time, and place in such a way that future generations can enjoy, learn, and be inspired by park resources and values and appreciate their national significance in as good or better condition than the generation that preceded them." Management Policies at 8.1. (emphasis added).

"In exercising its discretionary authority, the Service will allow only uses that are (1) appropriate to the purpose for which the park was established, and (2) can be sustained without causing unacceptable impacts. Recreational activities and other uses that would impair a park's resources, values, or purposes cannot be allowed." Management Policies at 8.1.1. (emphasis added).

"Superintendents must continually monitor and examine all park uses to ensure that unanticipated and unacceptable impacts do not occur." Management Policies at 8.1.2. (emphasis added).

"Superintendents will develop and implement visitor use management plans and take action, as appropriate, to ensure that recreational uses and activities in the park are consistent with its authorizing legislation or proclamation and do not cause unacceptable impacts on park resources or values." Management Policies at 8.2.2.1. (emphasis added).

When the statutory language is combined with these policies, it is indisputable that the impairment standard cannot be used to legally justify the proposed action.

The only other legal authority that the NPS can consider to justify the proposed action is that contained in 16 USC 3. That statute permits the removal of park wildlife only when said wildlife is detrimental to the use of the park. Years ago, the NPS at Grand Canyon National Park relied on this authority to authorize the lethal removal of deer who had become too aggressive toward hikers as a result of being conditioned to receive food handouts. The criteria that must be met to exercise this statutory provision, is that the NPS must demonstrate that the wildlife is detrimental to the use of the park. The term "use" clearly refers to a public use authorized by the NPS. In the case of the RCP, the NPS can't meet this standard since it can point to know evidence, beyond speculation, that RCP deer are adversely impacting the use of the park. Even if the RCP believes that it can satisfy this criteria, it can't simply change course in the middle of its planning process to propose a new, legal justification, for its proposed action. Instead, if the NPS were to choose to pursue this argument, it must prepare a supplemental NEPA document and disclose all of the evidence it may have to meet this legal standard.

3. The NPS has failed to substantiate the purpose and need for the proposed action:

The purpose of the Draft 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." Draft EIS at 1. To be legitimate, the NPS must then demonstrate that RCP deer are preventing or hindering the preservation and restoration of native vegetation and other natural and cultural resources in the park.

While deer, inhabiting any ecosystem, will impact park vegetation, including forest regeneration, understory growth and production, and herbaceous cover, there are other factors that may also influence the ecosystem that can both beneficially and adversely impact a park's floral/vegetative characteristics including, in particular, temperature, precipitation, disease, urban development, visitor use activities, climatic conditions (i.e., drought), vandalism, illegal camping, off-trail use, horseback riding). In this case, the NPS must not only demonstrate that deer are impacting park natural and cultural resources, but it also must disclose and analyze the impact of other influences, it must demonstrate that the proposed action – the killing of hundreds of deer – will actually address the alleged impacts that the NPS has attributed nearly entirely to deer, and that there are no non or less-lethal alternatives available to the proposed action. The NPS has failed to fully disclose or evaluate such factors in the Draft EIS.

The NPS claims that the proposed massive deer cull is needed at this time to address: 1) the potential of deer become the dominant force in the park's ecosystem, and adversely impacting native vegetation and other wildlife; 2) a decline in tree seedlings caused by excessive deer browsing and the ability of the forest

[6] In other words, decisions made by the NPS to, for example, tear down an existing structure, construct a building, replace an old road or trail, or to engage in the lethal management of a native, protected species within a park would be subject to the impairment standard. The impact of a native species on park vegetation or other resources, however, would not as that does not constitute a visitor use, an NPS administered activity, or activities undertaken by concessioners, contractors or others.

to regenerate in Rock Creek Park; 3) excessive deer browsing impact on the existing shrubs and herbaceous species; 4) deer impacts on the character of the park's cultural landscapes; and 5) opportunities to coordinate with other jurisdictional entities currently implementing deer management actions beneficial to the protection of park resource and values.

Independent of the legitimacy of these needs, it is unclear who developed these five need statements, the process used to create such statements, and what role the public played in reviewing these needs. As previously indicated, the RCP GMP provides no data or foundation supporting these need statements. It does not identify deer as a problem in RCP, does not claim that forest regeneration is an issue of concern, fails to provide any evidence of excessive deer browsing, reveals impacts to cultural resources that don't include deer, and does not detail any cooperative relationships with other jurisdictions relevant to deer management. The RCP natural resources management plan published in 1996 may or may not address or provide explicit objectives related to any of these resources[7] but, as conceded by the NPS, it does not "does not directly address deer management at the park." Draft EIS at 37.

Considering that the NPS is relying on these need statements to ostensibly justify a significant reduction in RCP deer from 385 to 69 animals primarily through sharpshooting – an action that violates federal law – providing the public with the opportunity or a role in crafting such need statements should have been exercised in this case. Indeed, considering that the NPS is not legally obligated to initiate the lethal deer slaughter (which is illegal) and since public comments on the GMP indicate that RCP "visitors like, and would not want to change, most aspects of Rock Creek Park." GMP and EIS at 214, had the NPS solicited public comment on these or other need statements, it could have concluded that there was no urgent need to address these alleged "problems" attributable to deer and/or that the public would have preferred a non-lethal means of addressing this "problem." AWI concedes that the NPS engaged in the scoping process for the GMP in 1996, when the deer numbers in RCP were much lower, but the GMP process was not completed until 2007 when the deer population, if the NPS estimates are valid, had significantly increased in size.

An evaluation of each needs statement provides additional evidence of the failure of the NPS to adequately discuss and analyze these issues in the Draft EIS. For example, the NPS asserts that it does not want deer to become the dominant force in the park's ecosystem. In reality, deer are a dominant species in most ecosystems that they inhabit and their behaviors, including their foraging activities, are intended to alter and modify ecosystems. While this dominance can be limited though hunting or lethal management, within national parks, the dominance of deer is entirely natural and must be protected as a part of the natural processes that shape and mold national parks. While the NPS may not prefer this approach, it has provided no legal basis, as discussed in greater detail below, to justify the reduction of the park's deer herd.

Similarly, the NPS desires to reverse the alleged decline in tree seedlings and forest regeneration in RCP. Far from being unnatural or a "problem" as perceived by the NPS, the lack of tree seedlings and lack of forest regeneration is part and parcel of natural succession. Again, within national parks, such natural processes are to be allowed to influence ecosystem characteristics and dynamics in a park. Deer impacts to RCP shrubs and herbaceous species are also part of natural succession.

[7] Efforts by AWI to obtain a copy of the 1996 Natural Resource Management Plan have gone unanswered. AWI sent two e-mail, one directly to Superintendent Coleman, and left a voice mail message for the Superintendent seeking a copy of the 1996 plan and two other documents cited in the bibliography of the Draft EIS but, to date, received neither an acknowledgement of the request or the requested documents.

In regard to the park's cultural landscapes, it should be noted that the NPS Organic Act does not mandate the protection and conservation of such landscapes which can include landscape plantings that act as attractants to deer. This is not to suggest that cultural landscapes should not be protected but the need to protect cultural landscapes in RCP must not be considered during the decision-making process both because of the lack of protection afforded such landscapes in the Organic Act and because the NPS has failed to demonstrate that deer impacts to any of the RCP cultural landscapes are anything more than negligible.

Finally, the NPS claims there is a need to cooperate with other jurisdictions in regard to the management of deer. While the NPS attempts to adhere to a "good neighbor" policy in the management of its parks by working cooperatively with other agencies to control and regulate activities outside of parks that may impact park units, the NPS is not required to impose management actions similar to those being used outside the parks within the parks particularly if such actions are inconsistent with NPS legal and policy mandates.[8] The fundamental purpose of such collaborations are to reduce the threat of decisions and issues external to the parks from adversely affecting the natural and cultural resources, wildlife, and historic objects within a park. Thus, the mere fact that the District of Columbia may have an interest in management deer and that Montgomery County, Maryland claims to have a deer overabundance "problem," has developed and updated various management plans to address the "problem," and has implemented sport hunting in many of its parks to ostensibly address the "problem," Draft EIS at 18, 19, 20, does not obligate the NPS to follow suit and permit the wide-scale slaughter of deer within RCP[9].

The fact that Montgomery County and Maryland Department of Natural Resources (MDNR) permits the lethal removal of deer from its parks and other lands can be used by the NPS to mitigate the alleged damage that is attributable to deer within RCP. The NPS, for example, is required to consider reasonable alternatives in any NEPA analysis that are "not within the jurisdiction of the lead agency." 40 CFR 1502.14(c). Though the NPS, in this case, failed to do so, it could have and should have explored such an alternative with these agencies (and with the District of Columbia) in order to potentially devise a strategy – one that would not have been supported by AWI – to reduce the regional deer population without engaging in lethal deer control in RCP.

In addition to the need statements, the NPS also developed a series of objectives that it uses to justify and measure the success of its actions. These objectives were ostensibly based on the park's enabling legislation, mandates, direction in other planning documents, management policies and the Organic Act. Draft EIS at 2. The objectives include, but are not limited to: 1) developing scientifically-based vegetation impact levels and corresponding deer population density to trigger management actions; 2)

[8] Though 43 CFR 24.2(i)(1) advises Department of the Interior agencies to prepare fish and wildlife management plans in cooperation with state fish and wildlife agencies and other federal (non-interior) agencies where appropriate, Draft EIS at 35, this does not mandate the NPS to initiate lethal deer control to placate Montgomery County, MD, the MDNR, or the Washington, DC government or to assist them in meeting their deer control objectives. Indeed, 43 CFR 24 et seq. is applicable to all federal agencies under the jurisdiction of the DOI which includes the U.S. Fish and Wildlife Service, Bureau of Land Management, and Bureau of Reclamation. Given the unique statutory protections afforded NPS lands and wildlife, in most parks, emulating state or local management practices would be illegal. Thus, while engaging MD or DC authorities in RCP management, including deer management, is expected, the needs or desires of those authorities should not and must not dictate the decisions made by the NPS.

[9] Indeed, as indicated by the NPS, deer management programs, including lethal control programs, administered by the MDNR and Montgomery County, MD "may actually cause deer to move into the park where there is less pressure, thereby contributing to park deer population growth and associated effects of browsing on the degradation of deer habitat."

protect the natural abundance, distribution, and diversity of native plant species by reducing excessive deer browsing, trampling, and nonnative seed dispersal; 3) maintain, restore and promote a mix of native plant species and reduce nonnative plant species; 4) protect the natural abundance, distribution, and diversity of native animal species within the park by reducing excessive deer browsing, trampling, and nonnative seed dispersal; 5) protect lower canopy, shrub, and ground nesting bird habitat from adverse effects of deer browsing; 6) protect habitat of rare plant and animal species from adverse effects of deer, such as excessive deer browsing, trampling, and nonnative seed dispersal; and 7) sharing information with the public about the deer population, forest regeneration process and diversity, and the role of deer within the ecosystem but not the primary driving force within it. Draft EIS at 2.

A problem with many of these objectives is that they advocate for a significant change in RCP management, including deer management, which is inconsistent with NPS legal standards, including its Management Policies, and for which the NPS has failed, in most cases, to provide sufficient evidence to substantiate each objective. Many of the objectives represent actions that would disrupt natural processes and dynamics in RCP, including natural forest succession processes. Moreover, though the NPS suggests that these objectives must be achieved to protect the long-term health of RCP and its resources, the NPS fails to provide evidence to substantiate the need for these objectives. For instance, the NPS proposes to significantly reduce the RCP deer population to: restore the natural abundance, distribution, and diversity of native plant species; promote a mix of native plant species; reduce nonnative plant species; protect the natural abundance, distribution, and diversity of native animal species within the park; protect lower canopy, shrub, and ground nesting bird habitat from adverse effects of deer browsing; and protect habitat of rare plant and animal species from adverse effects of deer. Yet, it fails to disclose what constitutes a restoration of native plant species, what mix of native plant species existed historically in RCP, what the abundance and diversity was of native animal species in RCP in the past, what specific numbers and species of ground nesting birds would have to be found in the park to satisfy the NPS desire to protect these species, and what rare plant or animals species existing historically in RCP that don't exist now due solely to the impacts of deer.

4. The NPS has failed to include a reasonable range of alternatives in the Draft EIS:

The regulations implementing NEPA requires federal agencies to "identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment," 40 CFR 1500.2(e), and to "rigorously explore and objectively evaluate all reasonable alternatives." Id. at 1502.14(a).

In this case, the NPS, has failed to meet this standard. The Draft EIS considers only four alternatives including the no-action alternative (Alternative A)[10]. The three action alternatives include Alternative B (non-lethal only)[11], Alternative C (only lethal control)[12], and Alternative D (combination of lethal followed by non-lethal)[13]. While there are distinct differences between Alternative B and Alternatives C and D, the latter two alternatives are practically the same since both propose to employ sharpshooting primarily to initially reduce the deer population from 385 to 69 or from a density of 82 deer per square mile to 15-20 deer per square mile. Draft EIS at 224, 256. The difference between Alternatives C and D is that the latter will potentially employ non-lethal reproductive controls to maintain the size of the deer population once it has been reduced to its target size.

Whether the non-lethal component of Alternative D, however, is ever employed depends on a number of factors including, according to the NPS, development of a non-reproductive control agent that meets self-imposed NPS standards, whether such non-lethal controls are successful in maintaining the size of the deer herd, and the status of Chronic Wasting Disease in or near RCP. If there is no agent that meets NPS standards, if non-lethal control proves not to be effective, and if CWD is found in or near RCP, then the NPS would jettison any non-lethal strategy and return to lethal control presumably indefinitely or until a new management plan is developed. The issue of CWD is addressed later in this letter as is the value and effectiveness of immunocontraception as a non-lethal reproductive control agent in deer.

What is worth mention here, however, is that even though the NPS already used immunocontraception to non-lethally control deer populations on Fire Island National Seashore, elk populations at Point Reyes National Seashore[14], wild horses at Assateague Island National Seashore, at RCP (as well as at Valley Forge, Catoctin, and Indiana Dunes) the NPS has developed specific criteria, that is not necessarily consistent between parks, intended to trigger use of this technology. These criteria are, in fact, so restrictive[15] that it would appear as if the NPS has purposefully developed the criteria to prevent or delay the use of this technology so that it can accomplish its primary goal of rapidly reducing park deer populations using lethal means. In other words, while Alternative D is identified as the NPS preferred alternative, the majority of its impacts are identical to Alternative C. Moreover, without a firm commitment by the NPS to employ immunocontraception, regardless of the status of the technology, at a specific time during the course of the plan, there is no guarantee that the NPS will ever switch to non-lethal management of the RCP deer population. Indeed, it would not be surprising if the NPS created Alternative D as a compromise alternative hoping that its non-lethal component would generate sufficient public support to permit the massive slaughter of deer short term without actually committing the NPS to ever implement a non-lethal option.

The problem with the slate of alternatives considered in the Draft EIS is that: 1) the NPS has not considered enough alternatives; 2) the NPS has not considered an aggressive non-lethal only alternatives; and 3) the NPS has failed to consider alternatives that involve changes in deer management outside of RCP. The following information is provided solely to demonstrate the inadequacies with the existing alternatives contained in the Draft EIS and, unless noted, AWI may or may not support one or more of these new alternatives. In addition, as reported in this comment letter, the NPS has failed to sufficiently justify, either biologically or legally, any sound basis for any lethal control of RCP deer. Thus, any suggested new alternative that includes a lethal control option necessarily includes a requirements that the NPS disclose the evidence indicating that such controls are both biologically necessary and consistent with the law.

Additional alternatives that could and should have been considered by the NPS include:

[10] Alternative A, the no-action alternative, would include ongoing monitoring of deer density and relative numbers, monitoring vegetation, data management, research opportunities, use of protective caging and repellents to protect rate plants in natural area and small areas in landscaped and cultural areas, and continuation of educational and interpretive measures.

[11] Alternative B would include all actions under Alternative A but would also include the construction of large-scale deer exclosures to protect forest seedlings and to promote forest regeneration as well as the used of non-lethal reproductive control of does.

[12] Alternative C would include all actions under Alternative A but would also include sharpshooting and capture and euthanasia to rapidly and lethally reduce deer numbers.

[13] Alternative D would include all of the actions under Alternative A as well as components of Alternatives B and C.

[14] At Point Reyes National Seashore the NPS is also experimenting with the use of immunocontraceptive agents in non-native deer while primarily relying on lethal means to eradicate these deer populations.

[15] Though, as discussed in detail in this comment letter there is now compelling scientific evidence indicating that despite NPS efforts to delay the use of immunocontraception, the technology has advanced to the point where many of the NPS criteria can now be met.

1. An alternative that incrementally reduced the deer population over time through lethal or non-lethal means to meet certain density goals with sufficient time (5-7 years or more) in between each incremental step to determine the affect of the action. If this alternative were enacted then, instead of reducing the RCP deer population from 82 deer per square mile to 15-20 per square mile over the course of a handful of years, the NPS would initially reduce the deer population to, for example, a density of 50 deer per square mile and maintain the population at that size (preferably all by non-lethal means) and determine the affects on the ecosystem through appropriate monitoring and surveys.

During this interim period, the NPS could also employ social surveys to better understand visitor preferences regarding deer and alleged deer impacts to see what percentage (if any) of visitors genuinely believe that their park experience has been harmed due to deer.

The results of such a survey could be combined with the results of ecosystem monitoring to adjust future incremental management decisions. If the data suggested that the 50 deer per square mile increment seemed to provide an appropriate balance between protecting park resources and satisfying visitor needs, the deer population would indefinitely be managed at that size. If not, then the NPS would proceed to the next increment, perhaps 40 deer per square mile (again preferably with the use of non-lethal technologies), and repeat the monitoring process.

While this alternative would not reduce the size of the RCP deer population as rapidly as Alternative D in the Draft EIS, it would respect the interests of those who oppose the massive slaughter of protected park deer, it would balance the need to protect park resources with NPS mandates to responsibly and humanely manage park wildlife, it would recognize that just as it took years for the deer population to reach its current density it may take time to address the perceived problems, and it would provide a reasonable response to NPS concerns about the alleged impacts of deer on RCP forest regeneration, herbaceous cover, and cultural landscapes.

2. A more aggressive, non-lethal alternative should also have been considered. This would be similar to Alternative B but would employ a larger number of trained NPS personnel or qualified volunteers to establish a larger number of bait stations to maximize the efficacy of delivering immunocontraceptive agents to a maximum number of deer in the shortest period of time within RCP. This alternative would presume – as is the case – that an effective reproductive control agent that largely meets the standards imposed by the NPS would be available (see discussion below). Though the NPS intimates that treating the required 90 percent of RCP does would be difficult, it is only difficult if funds, personnel and equipment are limited. If this alternative were selected, the NPS would surely be able to enter into cooperative agreements with animal protection organizations to obtain funding, equipment, and perhaps trained personnel to aid with the implementation of this alternative.

3. As previously mentioned, NEPA requires federal agencies to consider reasonable alternatives not within the jurisdiction of the lead agency. The NPS should entertain such an alternative that could theoretically maximize the lethal removal of deer outside of RCP while maintaining protection of deer – as is legally required – in RCP. AWI would not support this alternative but, nevertheless, it should have been considered in the Draft EIS.

Had these and other reasonable alternatives been considered in the Draft EIS, then perhaps the NPS would have been in compliance with NEPA. As present, given the inadequacy of the alternatives in the Draft EIS, the NPS has not satisfied the NEPA requirement to consider a reasonable range of alternatives.

5. The NPS has failed to disclose information relevant to the description of the affected environment and its analysis of the environmental consequences of the proposed action and its alternatives is entirely inadequate:

Despite the alleged overpopulation and excessive browsing by deer in RCP, the NPS indicates that RCP is home to approximately 700 species of vascular plants, including 31 rare or uncommon plants listed by the states of Maryland and Virginia. In addition, RCP provides habitat for 36 species of mammals, 181 species of birds, and 19 species of reptiles and amphibians. Draft EIS at 8. Again, this would appear to be a remarkable biotic assemblage considering that the NPS claims that white tailed deer numbers are increasing, deer are resulting in a substantial effect on the park ecosystem due to heavy browsing, that deer are adversely effecting shrub cover, tree seedling regeneration, and herbaceous cover, and that this, in turn, affects habitat quality for other wildlife. Id.

Indeed, based on the claims contained in the Draft EIS, it appears that the NPS has intentionally attempted to cast white-tailed deer in the worst light possible in order to gain public support for the proposed massive deer cull and, perhaps, to assuage its own concerns about the excessiveness and cruelty inherent to its proposal. The NPS has accomplished this, in part, by claiming that deer "can" or "may" have an adverse impact on a variety of park amenities and resources including vegetation, native wildlife, protected and rare species, soils, water quality, wetlands and floodplains, visitor experiences, visitor health and safety, and socioeconomics. In most cases, however, there is no actual data or evidence to substantiate such claims many of which are based on mere rhetoric that clearly demonstrates a blatant bias against deer – a native wildlife species that the NPS is required to protect.

The NPS will claim that NEPA requires it to evaluate the impact of the proposed action and its alternatives on a whole host of factors. That is only partially true in that NEPA allows agencies to dismiss from further consideration issues of little relevance and/or for which any impacts are inconsequential. In the Draft EIS, the NPS exercised this authority to dismiss from evaluation several issues. It should have, however, as explained in more detail below, gone further and dismissed other factors, identified below, from any substantive analysis.

In addition to its efforts to castigate deer for impacts that cannot be proven and/or are of miniscule consequence compared to other natural or anthropogenic threats, the NPS also fails to disclose sufficient evidence to substantiate some of the alleged impacts. This deficiency is of particular importance since NEPA requires agencies to ensure the information relevant to the environmental impacts of any action is available to the public and decision-makers before the action is implemented, that the information be of high quality, and that it be subject to accurate scientific analysis. Though the NPS is required to disclose all relevant information, NEPA does provide for situations where some data/evidence may not be available which generally require the NPS to admit when certain information is incomplete or unavailable, describe the relevance of the information to evaluating the impacts of the action on the human environment, and summarize existing credible scientific information about the impacts. Draft EIS at 149 citing 40 CFR 1502.22. The NPS fails to admit to the lack of evidence or inadequacy of its data in the Draft EIS despite the fact that such deficiencies are obvious in many cases.

When an agency, as is the case here, fails to meet this standard and elects, intentionally or not to limit the disclosure of relevant information it impedes the ability of the public to understand the impacts of the action on the park, its amenities, and resources and it hinders the public from submitting informed and substantive comment. Indeed, in comparing the information disclosed in the RCP GMP with the information in the Draft EIS, the amount of information missing in the latter document is shocking. What's more, most of the claims in the Draft EIS are described by terms such as "if," "may," and "could" suggesting that there is no existing evidence of such impacts. It is entirely inappropriate for the NPS to base the bulk of its analysis on mere conjecture and hyperbole when it is considering such a significant action that will kill hundreds of native deer in direct violation of NPS legal standards. In addition, when the public is short changed as a consequence of too little information, the agency decision-makers are also affected preventing them from having a complete understanding of the impacts when attempting to render a decision.

Prior to addressing the various resource issues evaluated in the Draft EIS, it is necessary to briefly summarize the relevant NPS Management Policies applicable to resource, and wildlife management, in national parks.

The management of wildlife in national parks is subject to a number of provisions contained in NPS statutes, regulations, park enabling legislation, and NPS policies. The Organic Act makes clear that park wildlife are to be conserved and protected. It provides only limited authority to physically remove native wildlife from a park (either by live capture or through lethal removal). As previously explained in great detail, the impairment standard cannot used to justify such removals. Instead, the NPS is limited to the restricted authority provided under 16 USC 3 which permits the removal of native wildlife only under those circumstances when it can be demonstrated that that wildlife is detrimental to the use of the park.

NPS Management Policies specify that "the National Park Service will strive to understand, maintain, restore, and protect the inherent integrity of the natural resources, processes, systems, and values of the parks while providing meaningful and appropriate opportunities to enjoy them." Management Policies at 4 (Introduction). Furthermore, the NPS recognizes that natural process, including biological resources such as native plants, animals, and communities and biological processes such as photosynthesis, succession, and evolution, and species are evolving, and it will allow this evolution to continue – minimally influenced by human actions. The term "natural conditions" as used in the Management Policies describes "the condition of resources that would occur in the absence of human dominance over the landscape." Id.

According to Management Policies:

> "Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The Service will not attempt to solely preserve individual species (except threatened or endangered species) or individual natural processes; rather, it will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems. Just as all components of a natural system will be recognized as important, natural changes will also be recognized as an integral part of the functioning of natural systems." Management Policies at 4.1.

The NPS will not intervene in natural biological or physical processes, except "to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities." Management Policies at 4.1. It is required, per Management Policies, to "maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems."[16] Management Policies at 4.4.1. This will be one by "preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur" and by "restoring native plant and animal populations in parks when they have been extirpated by past human-caused actions." Id.

In regard to the management of native plants and animals, "whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species." Management Policies at 4.4.2. The NPS may intervene to manage these species only when such management will not cause unacceptable impacts to the species populations or to other park components and/or ecosystem processes and when such intervention is needed to, among other reasons: 1) because a population occurs in an unnaturally high or low concentration as a results of human influences (such as … the extirpation of predators, the creation of highly productive habitat through agriculture or urban landscapes) and it is not possible to mitigate the effects of the human influences; or 2) to protect rare and threatened or endangered species. Management Policies at 4.4.2. Finally, when "native plants or animals are removed for any reason – such as to reduce unnatural population conditions resulting from human activities – the NPS "will maintain the appropriate levels of natural genetic diversity."

While it is, as demonstrated by the NPS, possible to selectively remove specific NPS Management Policies to claim that the NPS has the authority to implement the proposed action, when the Management Policies are considered in total and in the proper context, the use of lethal control to remove native wildlife from a national park is limited to extraordinarily rare circumstances. It is, indeed, clear from the Management Policies that the NPS places considerable emphasis on preserving natural processes, including succession. These are precisely the processes that are playing out within RCP in regard to its deer population and other park resources. It is also clear from the Management Policies that protection and restoring natural conditions is important.

The question of what is natural or what constitutes natural conditions with and urban park like RCP is far more difficult to answer. As an initial matter, this question assumes that what currently exists in RCP is not natural. If this is the case, then what is natural? What should the plant and animal species assemblage consist of if RCP was in a natural condition? It is likely that there would be additional species of predators in RCP though it is unknown what species would be present or how many would occupy all or a part of RCP either permanently, seasonally, or as transition habitat. The NPS does not attempt to provide information about RCP before the arrival of European colonists. Assuming there were more predators in the area, what likely occurred is that as the human population increased, development activities increased thereby expanding the urban landscape (which continues to expand to this day). As a consequence, significant amounts of wildlife habitat has been lost and with it went significant numbers of wildlife. Neither the NPS nor deer had anything to do with such declines as they were caused entirely be external forced well beyond the control of the NPS. This, then begs the question of what is natural? Is it what existed prior to the arrival of the colonists and the settlement of Washington, DC or is it what exists now. The former condition, no matter how natural it may have been, is unattainable now suggesting that what is natural is what we have created. This is not to suggest that the RCP tennis courts, golf course, or playing fields are natural as obviously they are not but the current existence of RCP largely if not entirely surrounded by urban development is a consequence of human settlement and growth and, therefore, could and should be considered as natural as is possible at the present time.

[16] This particular requirement is likely not consistent with the intent of the NPS Organic Act which mandates the NPS permit natural factors to regulate park ecosystems recognizing that by doing so, certain species may become locally extirpated. This is not applicable to federally protected species, however, that are subject to the provisions of the Endangered Species Act.

Assuming, without conceding, that the Management Policies are all consistent with the intent of the Organic Act, the only circumstances that permit the NPS to intervene and manipulate or interfere with natural processes, including succession, is to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities, to address a species population that is unnaturally high as a result of human influences if said influences cannot be mitigated, and to protect rare, threatened, or endangered species. In regard to the first standard, we must return to the issue of what is natural and can natural conditions be legitimately restored to RCP given its location and multitude of threats to its wildlife and other resources caused by external factors. The second standard is not relevant in this case both because it hasn't been proven that the RCP deer population is "unnaturally high" but mainly because there are means of mitigating human influences including the use of non-lethal immunocontraceptive technologies and to explore alternative management strategies for deer management outside of RCP with other federal, state, and county agencies. The third standard is also not relevant since the NPS has offered no evidence in the Draft EIS, beyond mere speculation, that deer in RCP are adversely impacting protected species. Finally, in regard to the mandate to protect the natural levels of genetic diversity of the RCP deer populations, the Management Policies require an assessment of that diversity which has not been done or, if done, has not been disclosed in the Draft EIS.

In addition to the Management Policies, the RCP enabling legislation also provides guidance on what is permissible within the park. As indicated in the Draft EIS, RCP was established in 1990 for the purpose of creating a "public park and pleasure ground for the benefit and enjoyment of the people of the United States." Draft EIS at 7, 11. Considering that an average of over 2 million people have visited/used RCP annually over the past several years, it is clear that the NPS has satisfied this purpose of RCP regardless of any concerns attributable to deer.

Recognizing the importance of conservation and threats posed by expected urbanization, Congress emphasized the preservation of the park's natural resource and scenery in the park's enabling legislation. The specific language provided for the promulgation of "regulations … 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." Draft EIS at 7, 11. As an initial matter, this language only explicitly calls for the protection of timber, animals or curiosities within RCP. This language would suggest that the NPS has the discretion to protect all or any of these three park amenities. In addition, the language does not call for the protection of other vegetation – shrubs, herbaceous cover – in RCP. Yet, the NPS has interpreted the language in an ecosystem context which may or may not be correct.

Based on the NPS interpretation of the RCP enabling legislation, the NPS has concluded that the RCP exists to, among other reasons, "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." Draft EIS at 11. This mandate, to be consistent with the Organic Act and Management Policies, must apply to natural processes that occur in RCP. Consequently, since deer and impacts attributable to deer in RCP are entirely natural and part of a successional process underway in the park, the RCP enabling legislation also provides no basis for implementing the proposed action.

Vegetation:

The principal concern of the NPS in regard to deer in RCP is the alleged impact of deer on park vegetation, timber and non-timber. The enabling or establishing legislation for RCP specifies that the park is to "provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said ark, and their retention in their natural condition, as nearly as possible." GMP and EIS at 5, Draft EIS at 11.

Though the clear intent of the enabling legislation only specifies the protection and preservation of timber, animals and curiosities (i.e., not other vegetation), the NPS interprets the requirement to protect "timber" "in an ecological context to mean not individual trees, but the interrelated plant and animals populations that form the forest community." GMP and EIS at 40, 142. Beyond this self-serving interpretation, the NPS offers no additional evidence to suggest that it is required to protect and preserve non-timber species within RCP. AWI is not suggesting that non-woody/non-timber species are not worthy of protection but there is a compelling argument that can be made, based on the RCP enabling legislation, that the NPS should not use the condition or status of understory and/or herbaceous vegetation as a determining factor in deciding how to manage deer since there is no explicit requirement for the protection of these species in the park's establishing legislation.

The GMP references an inventory of park vegetation conducted between 1986 and 1994 that documented 656 species of vascular plans in RCP between the National Zoo and the Maryland boundary. GMP and EIS at 143. Reportedly, some 150 species identified in the park in an earlier survey in 1919, were not found during the more recent inventory though the NPS concedes that the reasons for such species loss are unknown. Id. The NPS offers no evidence and does not even intimate that deer were responsible for this loss of species.

The NPS cites to a number of studies (e.g., Alverson 1988, Anderson, 1994, Augustine and Felich 1998, deCalesta 1994, McShea 2000, McShea and Rappole 2000 (Draft EIS at 13), Hough 1965, Behrend et al. 1970, Marquis 1981, Tilghman 1989, Redding 1995, Augustine and deCalesta 2003, Bowersox et al. 2002, Horsely et al. 2003, Sage et al. 2003 (Draft EIS at 93)) in its attempt to prove the deer browsing can result in substantive adverse impacts to park resources, including forest regeneration, herbaceous cover, and other native wildlife species, including ground-nesting birds. The NPS claims that "an overabundance of deer could possibly alter and affect forest regeneration patterns in the park, as well as the diversity of species within the park, by reducing the understory and affecting the natural diversity of dominant tress species." Draft EIS at 25. Such impacts may be the result of three primary effects: 1) failure to reproduce, especially in slowly maturing woody species where seedlings are killed; 2) alteration of species composition, which occurs where deer removed preferred browse species and indirectly create opportunities for less preferred or unpalatable species to proliferate; and 3) extirpation of highly palatable plants, especially those that were naturally uncommon or of local occurrence. Draft EIS at 93.

Not surprisingly, many if not all of these studies were conducted outside of the RCP on other federal or state lands in the United States. Moreover, many of the studies either provide a broad examination of deer impacts on forest ecosystems or they provide results from studies of other deciduous forest in a number of states. The NPS claims that the forests studied were similar to the forests of RCP yet it fails to either explain what this means or to provide data to document such similarities. For example, how does the species assemblage in RCP compare to those areas studied? Is the topography of the areas comparable? Is the timing and amount of precipitation in RCP and the other areas similar? Are the past and present management schemes for RCP and the studied forest similar? How do the soil profiles compare between RCP and the studied forests? Are the threats to the RCP forests similar to those faced by the studied forests? These issues and a host of others have to be examined and addressed before studies conducted outside of RCP can be applied to the examination of forest management and deer impacts in RCP.

The NPS does not entirely rely on studies, including inapplicable studies, of other forest ecosystems to claim that deer are adversely affecting RCP vegetation. Since 1990, RCP has maintained 27 long-term vegetation management plots (unfenced) in the north, central, and southern portions of the park. These

plots are read every four years (most recently in 2007) and, according to the NPS, reveal an increase in stems browsed from 3.1 ± 0.9% in 1991 to 31.1 ± 2.9% in 2003 while shrub cover decreased from 54.63 ± 5.9% in 1991 to 14.92 ± 2.2% in 2003. Draft EIS at 17 citing Hatfield (2005) and Draft EIS at 43, 93, 164. None of the plots measured in 2003 had at least 153 seedlings per plot which is considered the minimum for successful forest regeneration under high deer densities. Draft EIS at 44, 93,164, 284. Moreover, the NPS contends that tree seedling stocking rates declined significant from 1991 to 2007 with a stocking rate of 2.26 ± 0.32% in 2007 which is far below the 67% stocking rate being used by the NPS for forest regeneration.[17] Id.

The forest regeneration standards being proposed for use in RCP were developed based on research by Dr. Susan Stout in a eastern hardwood forest environment in Cuyahoga National Recreation Area in Ohio. Draft EIS at 43. The NPS claims that the environment is similar to that found in RCP but, again, it fails to provide a description of each environment to prove said similarities. Moreover, the NPS cites to a number of studies documenting forest regeneration rates at different deer densities. What it fails to disclose, however, is how those forests are managed or what they are managed for. This is a significant issue since forest regeneration standards for a forest managed for commercial timber production will be different than forest regeneration standards relevant to a forest in a national park.

On its face, this data from RCP would appear, as is the intent of the NPS, to demonstrate that deer are responsible for excessive damage to RCP vegetation. This is not necessarily the case since the NPS has failed to disclose or explain specific information which may provide evidence indicating that deer are not entirely responsible for this alleged damage. AWI is not contesting that deer have an impact on vegetation. Deer, as herbivores, have to eat to survive and, therefore, they will inevitably impact vegetation. The relevant questions, therefore, are what is the severity of the impact, are there other factors that may be affecting vegetation productivity and health, and are the impacts consistent with natural processes. In regard to the latter two questions, there are an abundance of other threats to the RCP forests (see below) and, as indicated previously and contrary to the position of the NPS, deer impacts to native vegetation in RCP are entirely natural (as also discussed below).

In addition, the NPS has failed to disclose certain data and information. For example, the unfenced monitoring plots were last measured in 2007 yet the 2007 data on shrub cover and browsing of stems is not disclosed in the Draft EIS. In addition, though the vegetation plots were situated in the northern, central, and southern portions of RCP, the NPS failed to disclose the specific location of the plots, the characteristics of each area, and how the plot locations compare to known population concentrations of white-tailed deer. Such information is crucial.

For example, placing vegetation plots in mature, closed canopy forests will inevitably produce data that reveals little to any forest regeneration if sunlight cannot penetrate to the forest floor to stimulate production. Plots located on lands that sloped may not receive as much precipitation (due to runoff) as plots on flatter lands which could influence vegetation production. Finally, since the RCP deer population is not evenly distributed across the RCP[18], placing vegetation monitoring plots in areas where there is or is likely to be a high concentration of deer will inevitably result in reduced vegetation production data. Admittedly, the NPS established the plots in 1990, before the deer population allegedly significantly increased in size. Nevertheless, to address the relationship between plot location and deer density, the NPS should have presented both vegetation data and deer density data in the vicinity of the vegetation plots so that the relationship between vegetation production and deer numbers can be assessed.

In 2000, the NPS expanded its vegetation monitoring efforts by establishing 20 paired plots in RCP and in Glover-Archibold Park. Draft EIS at 17. According to the NPS, from 2001 to 2004, data from 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." Id. and Draft EIS at 25. The percentages of plant cover for nonnative, native, herbaceous, and woody plants were 2 to 3 times less in unfenced plots compared to their paired fenced plots. Id. and Draft EIS at 94 citing Rossell et al. 2007. The NPS then claims that "these impacts can be directly attributed to deer browsing and indicated deer are affecting the integrity of the understory structure and species composition, diminishing the value of habitat for other wildlife." Draft EIS at 17. Though the NPS also claims that excessive browsing associated with an overabundance of deer in RCP could adversely impact regeneration of vegetation in riparian areas, it then admits that "no data exist on deer impacts to riparian areas within the park." Draft EIS at 25. The alleged impact of deer on vegetation in riparian areas should, therefore, be removed as a factor on which to base a decision since said impact is entirely conjectural.

Again, the NPS fails to explain where these plots were located and how those locations were selected, have the plots been surveyed since 2004 and, if so, what were the results, and why has the NPS not disclosed the specific data for each category of vegetation (i.e., nonnative, native, herbaceous, and woody). The facts that the percentages of plant cover for nonnative, native, herbaceous, and woody vegetation were 2-3 times less in unfenced plots compared to fenced plots, doesn't provide the specifics necessary to interpret this data. For example, if the percentage of vegetation in the fenced plot has increased but that increase is entirely due to nonnative species, this would be a significant piece of information.

As a result of its smorgasbord of allegations regarding the impact of deer on forest regeneration, herbaceous cover, and the overall health of the vegetation in RCP, not surprisingly the NPS concludes that Alternative A (the no-action alternative) would facilitate the continued destruction of the forest/vegetation of RCP and that this would constitute an illegal impairment. As previously explained, the impairment standard is not applicable to the impacts of a native species foraging within a national park. Therefore, while the NPS is free to suggest that Alternative A may allow deer to continue to browse trees and consume understory/herbaceous cover – which is entirely natural and expected – it cannot claim that such an impact constitutes an impairment.

In contrast to the conclusion reached in the Draft EIS, in the GMP and EIS, the NPS reports that neither the preferred alternative (Alternative A) nor the no-action alternative (Alternative B) would constitute an impairment to the deciduous forests within RCP. Specifically, the NPS reported that:

> "Alternative B (no-action) would have little effect of the deciduous forests of Rock Creek Park. Protection of the deciduous forest has been a long-term goal at Rock Creek Park. The continuation of current management practices such as avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of or (sic) invasive species, would maintain the deciduous forest in a condition much like that currently seen in the park." GMP and EIS at 238 and Table 7 at 124.

For Alternative A in the GMP (the preferred alternative) the NPS indicates that it would cause beneficial impacts on the park's deciduous forests including the restoration of unvegetated areas to deciduous woodlands, improvement of poor or impaired soil conditions to accommodate restoration of deciduous tree species, realigning trails away from steeply sloping areas and revegetating the former alignments, and discontinuing the artificial suppression of tree regeneration through periodic cutting or mowing. GMP and

[17] Appendix A of the Draft EIS provides a summary the methodologies used for deer population and vegetation/regeneration monitoring. The data analysis section of that document was not included in Appendix A despite the fact that it was supposed to be completed in June 2009. Draft EIS at 283.

[18] For example, the NPS reports that deer exist at high density near the RCP golf course as would be expected, Draft EIS at 158, but that deer density is either low or deer are non-existent in the vicinity of unfenced community gardens. Draft EIS at 138. This evidence along with common sense demonstrates that deer are not evenly distributed across RCP.

EIS at 201. Adverse effects would be limited to the loss of existing forest or conversion of a native species plant assemblage to predominately exotic or invasive plant species. Id.

The NPS goes on to assert that "current management practices would continue to protect deciduous forest" under any of the alternatives, including the no-action alternative, considered in the GMP and EIS. GMP and EIS at 124. Moreover, none of the GMP alternatives were determined to cause an impairment to the park's deciduous forests. GMP and EIS, Table 7 at 124. Though the GMP is a different plan, the RCP deer management plan and Draft EIS is tiered off of the GMP. As a consequence, it is of particular interest that while the GMP claimed that even the no-action alternative (i.e., no substantive changes in park management of deciduous forests) would not adversely impact the forest or result in an impairment, the Draft EIS, published only two years after the GMP, concludes exactly the opposite; that the no action alternative would adversely impact the park's deciduous forests as a result of an alleged overabundance of deer in RCP. Draft EIS at 166. The NPS has to provide some rational explanation for this obvious discrepancy between the conclusions reached in these related documents relevant to the park's deciduous forests.

Contrary to the efforts made by the NPS to largely blame deer for impacts to park vegetation, there are a number of other factors that threaten park habitat including increasing urban development which is resulting in encroachment into park lands and removing vegetation, vandalism, dumping of garbage, illegal camping, and off-trail use as a result of trampling, burying vegetation, or spreading noxious seeds which contributes to the growing problem with non-native species. Draft EIS at 165, 189. Moreover, gypsy moths and chestnut blight have had a large, relatively widespread adverse impact in the past though RCP control efforts have reversed some of the adverse effects. Draft EIS at 165.

Based on the vegetation monitoring data disclosed in the Draft EIS, it is clear that the NPS is attributing nearly all impacts on forest regeneration and reduction in understory and herbaceous vegetation on deer. Not only is this incorrect but it, again, reflect a bias inherent in the Draft EIS. What's even more alarming about the NPS efforts to castigate deer as the evil-doers responsible for the vast destruction of RCP vegetation and the park's scenic beauty is the fact that the Draft EIS contains an abundance of other evidence demonstrating that there are multiple threats to the vegetation of the park.

Exotic invasive plant species, for example, "seriously threaten the integrity of native habitats, including eastern deciduous forest, by aggressively displacing and killing native plants, alternative native habitat, and stifling forest regeneration." Draft EIS at 99. The exotics problem is "particularly acute in urban parklands where extensive edges and frequent human disturbance enhance opportunities for aggressive exotic plants to become established." Id.

The Draft EIS identifies a number of exotic species (e.g., Asiatic bittersweet, porcelain berry, English ivy) that kill trees along the edges of forest openings; species (e.g., multiflora rose) that form dense thickets and out-compete native shrubs and ground covers; and herbaceous species (e.g., lesser celandine, Japanese stiltgrass) that invade and blanket floodplains crowding out native species and changing soil chemistry to make it harder for native species to recover. Draft EIS at 99. Some invasive species (e.g., Asiatic bittersweet, English ivy, burning bush, privet, viburnums, Japanese barberry, garlic mustard, lesser celandine, and Japanese stiltgrass) can penetrate undisturbed forest interiors thereby reducing light levels to the forest floor, limited forest regeneration, and displacing native shrubs and saplings. Id. and Draft EIS at 22/23. Despite the serious threats represented by nonnative species, the NPS still blames deer for promoting nonnative species through habitat alteration (through trampling and browsing) and through seed dispersal from seeds carried on their coats or found in fecal matter. Id. and Draft EIS at 25.

While the NPS has initiated various studies and strategies to better understand the ecology of nonnative species in RCP and to attempt to control their spread, there are 286 nonnative vascular plants known to exist in RCP with 56 species of particular concern due to their ability to negatively impact the park's natural resources. Draft EIS at 100. The NPS does concede, however, that exotic plants have spread into RCP as a result of their use by adjacent property owners for landscaping and that even some of the RCP's own administration unites are landscaped with exotic species which also pose a threat to native vegetation in RCP[19]. Draft EIS at 160.

In addition, as revealed in the GMP and EIS, despite NPS efforts to control nonnative species, such efforts "are not able to keep pace with the rate of invasive plant introduction and spread." GMP and EIS at 143. This indicates that the impact of nonnative, invasive species in RCP may be far more serious than revealed by the NPS in the Draft EIS and that this could, in part, provide an explanation for the alleged reduction in herbaceous cover, saplings, and overall forest regeneration. This is not, again, to suggest that deer don't have any impact, but it provides evidence of other threats/impact to park vegetation that has little connection or association with deer.

Deer:

Deer are remarkably adaptable species able to co-exist with humans in even heavily urbanized landscapes. This is not to suggest, however, that deer populations, if not limited by hunting, lethal control, or as a result of automobile/deer collisions, will continue to grow indefinitely. As a deer population grows, density dependent factors will kick in to regulate the size of the deer population either through increased mortality, reduced production or both. Unfortunately, largely as a consequence of human ignorance about deer, absurd fears about lyme disease (which actually does not require the presence of deer to be found in an area), unwillingness to try to live with deer, and desire for convenience, the size of a deer population when it reaches its so-called biological carrying capacity is generally larger than what would be acceptable as a cultural carrying capacity. Both of these "carrying capacity" concepts are highly variable with the former constantly changing as a results of myriad natural and artificial or anthropogenic factors while the latter can change as societal and individual attitudes changes and people become more educated about deer.

The condition of deer habitat is a key ingredient in determining the size of the deer population. On good range with abundant food, deer can produce more than one young annually. Where food is limited, however, deer give birth to a single fawn or the deer do not ovulate at all. Draft EIS at 107. Nutritional condition, as indicated by the NPS, also affects the onset of puberty with deer consuming nutritious forage possibly becoming sexually mature at 6-7 months of age while those on submarginal range remaining sexually immature for a longer period of time. Id.

Deer health and condition can, at times, be used as an indicator of habitat condition. Signs of nutritional stress, such as low body and internal organ mass, low fecal nitrogen levels, and heavy parasite infections, can be found in deer at high densities. Id. and Draft EIS at 192. Deer in poor physical condition due to a lack of forage are at an increased risk for disease[20] and mortality due to malnutrition and parasitism, particularly during harsh winters. The NPS claims that starvation and reduced production in a deer herd caused by excessive numbers is not evidence of self-regulation but, rather, provides only chronic control over a population. Draft EIS at 188/189. This is incorrect. Starvation and reduced productivity in a deer

[19] The NPS also reports that horseback riding has the potential to increase or introduce nonnative species through animal feed or animal wastes. Draft EIS at 157. Despite the possible role of the recreational use of horses as a contributing factor in the spread of exotic species in RCP, the NPS still permits the use.

[20] Potential deer diseases include CWD, bluetongue virus, epizootic hemorrhagic disease, and others. Draft EIS at 188, 192.

population (or any wildlife population) is precisely indicative of self-regulation dictated by habitat or other conditions. Moreover, such impacts are entirely normal and natural in any wildlife population particularly in, but not limited to, wildlife populations that are protected from exploitation.

While such self-regulating factors may not be triggered until the species is at elevated population numbers, the fact that the numbers are elevated suggest that the habitat is capable, at least temporarily, of supporting such growth. Admittedly, variables influencing habitat productivity can change remarkably quickly possibly leading to a abrupt or consistent decline in the species numbers. Whether the impact of the species on other species, ecosystem resources, and processes depends on how the species in question is perceived and the management objectives for the area. For deer, if considered a dominant species that dictates ecosystem conditions, as they should be, then such impacts should be considered entirely natural and appropriate. Similarly, if the habitat is being managed pursuant to a natural regulation mandate – as is the mandate of the NPS – then such impacts, whether beneficial or adverse, should be accepted and protected and not contested or modified as would occur if the proposed lethal deer control program were implemented.

In RCP there is no evidence of malnutrition in deer, no known cases of deer disease, and the general appearance of the herd is considered good. Draft EIS at 108. If true, this indicates that the deer herd has either not reached the ecological carrying capacity for the park or that the deer are relying on non-park lands to find forage to sustain themselves. Considering the variety of habitats within the park that deer can use, including a golf course, picnic areas, road shoulders, and sports fields that have been created by humans to facilitate recreational activities, along with the availability of landscaped properties outside of RCP, it is not surprising that RCP deer, even if existing at high densities, remain in good physical condition.

Though the NPS clearly considers the current density to be too high given alleged impacts on park vegetation and other resources, it's actually an entirely natural response to current habitat conditions which, again, have been highly manipulated to facilitate human recreation without any consideration apparently given to how it would affect native wildlife.

The NPS uses various techniques to study deer within RCP. The use of radio telemetry is very limited with only five deer collared in 2002. Based on data obtained from the collared deer, the NPS reports that RCP deer range are 31 to 260 acres in size, that time spent by deer outside of RCP ranges from 5 to 42% (average of 25%), and that deer typically move approximately .25 miles outside the park boundary. Draft EIS at 15, 108. Forward Looking Infrared Surveys were used briefly in RCP but were abandoned in 1999 due to an unacceptable error rate. Draft EIS at 16.

Spotlight deer surveys have been conducted from 1996 to the present to obtain population trend data only since the "surveys are not based on any specific scientific protocols." Draft EIS at 15. The NPS concedes that such surveys only provide "abundance levels in the area immediately adjacent to the vehicle route." Though the vehicle-route is reported 22 miles in length, any deer population estimates produced from such surveys are of dubious accuracy in actually determining deer numbers and, depending on the estimation methodologies use, may overestimate deer numbers. Indeed, it is likely that the RCP deer trend data, based on spotlight counts, are indeed overestimates since the spotlight survey includes some roads in surrounding neighborhoods. Draft EIS at 108. Thus, the survey results are more accurately considered population trend data for a regional deer population and not the actual RCP population. Based on spotlight count data, the NPS claims that deer numbers in RCP have increased from an estimated 70 in 1996 to 280 in 2007. Draft EIS at 15, Figure 3.

Finally, the NPS, since 2000, has used a distance sampling methodology to estimate animal population density. This methodology reported resulted in estimates of up to 98 deer per square mile in 2003 (the highest estimated deer density in RCP), Draft EIS at 45, followed by what appears to be a nearly 50 percent decline to 52 deer per square mile in 2005 only to allegedly increase again to 82 deer per square mile in 2007. Draft EIS at Table 2 and at 108. Assuming this methodology is accurate, the rapid decline in the RCP deer population between 2003 and 2005 may be indicative of a density dependent effect reducing the deer population as a result of increased mortality, reduced production, or both. Regardless of why the population apparently declined by nearly half, these data demonstrate that RCP deer numbers are variable, that deer populations if left unexploited can be somewhat self-regulating (though not to the density that the NPS would apparently prefer), and that the population will not grow without limits if not subject to a massive, multi-year deer cull.

Impacts to other wildlife:

As expected, the Draft EIS is replete with claims that the alleged overabundance of deer in RCP and their excessive browsing will alter park habitat thereby adversely impacting a host of other native wildlife including birds, reptiles, amphibians, and other mammals. These impacts are ostensibly caused by reductions to habitat diversity as a result of browsing, trampling and seed dispersal. Draft EIS at 106.

While such rhetoric is commonly used by agencies attempting to justify the lethal removal of deer, what is frequently missing from their arguments is any evidence to substantiate their claims and a complete lack of effort to consider other threats that may be adversely affecting park wildlife. The same is true in the Draft EIS as the NPS fails to cite to a single study to suggest that any native wildlife in RCP have been or are being adversely impacted by deer and alleged deer impacts. The sole exception to this lack of evidence is Flowerdew and Ellwood (2001) who suggested that deer have indirectly decreased bank vole populations by removing the bramble blackberry that provides most of their hiding cover." Draft EIS at 194.

The NPS concedes that there has been more research done on the impact of deer on vegetation than their impact on other wildlife (though it should be noted that there has been no actual studies undertaken to assess the impact of deer on other wildlife within RCP).

Deer impacts to birds, based on deer exclosure studies, included a reduction in bird species that preferred an open understory declines, species that preferred a dense herbaceous ground cover increased (as the herbaceous layer increased) but then declined when the herbaceous species were replaced by woody species, and species preferring a dense, woody understory gradually increased. Draft EIS at 115. For other species, those who compete with deer for food, like squirrels, mice, and rabbits can be directly affected by increased deer numbers. Draft EIS at 194. Those who prosper in areas with substantial cover can be impacted as a result of deer browsing and, in turn, predators that prey on the impacted species would also be affected. Draft EIS at 115, 194. Other species, like some frogs, snakes, salamanders and turtles that live close to the water would be less affected by deer as are fish whose habitat is not likely to be directly impacted by heavy deer browsing. Id. and Draft EIS at 116, 194. Some reptiles, like the box turtle, that depend on forest understory plants for survival can be affected by high deer numbers, yet box turtles, coyotes, vultures (e.g., species that prey on deer or consume deer carrion) and predators whose prey are more susceptible in open understory conditions can benefit from an abundance of deer. Draft EIS at 116, 194.

While all of these claims may be true in a general sense, there's little to no evidence that deer in RCP are having this impact on other wildlife within the park. For example, the NPS indicates that areas within RCP have traditionally been used for bird counts yet the NPS fails to disclose any of the bird count data to demonstrate any loss of bird species or reductions in their numbers. Similarly, no inventory data or

population trend data is provided for any of the other species potentially impacted by deer making it impossible to actually determine if these species have been harmed or if such statements are (as is expected) merely conjecture on the part of the NPS.

In regard to birds, the NPS reports 181 species of breeding or migrating birds documented in RCP, most of which are migrants or seasonal visitors. Draft EIS at 111. A number of bird species that are known to exist in RCP nest on or near the ground. Ground nesters included the ovenbird, worm-eating warbler, Louisiana waterthrush, and American woodcock. Id. Species that nest in the shrub layer include the northern cardinal, gray catbird, Acadian flycatcher, mockingbird, wood thrush, Carolina wren, white-eyed vireo, American robin, chipping sparrow, American goldfinch, and the mourning dove. Id. Finally, the song sparrow, brown thrasher, rufous-sided towhee, veery, and common yellowthroat nest on both the ground and in the shrub layer. Id. Because of where these species nest, the NPS claims they have been impacted adversely by the overabundant deer in RCP and their overbrowsing.

Despite these claims, the NPS concedes that "there are no park-specific data to show that impacts to ground-nesting species have occurred from deer browsing." Draft EIS at 26. To its credit, the NPS acknowledges that West Nile virus is "an established factor in avian mortality," Draft EIS at 159, but then fails to consider this or the host of other factors (i.e., other diseases, destruction of habitat in other portions of the migratory range, climate changes) that have all been documented to adversely impact bird populations when evaluating the threats to RCP birds.

The only actual evidence provided in the Draft EIS regarding deer impacts on RCP wildlife is that "the upper canopy of the forest has not changed noticeably to date as a result of high deer numbers," Draft EIS at 116, indicating that species that depend on the upper canopy of the forest have not experienced any noticeable change in their habitat. In addition, the NPS indicates that certain cavity-nesting species and birds whose prey consist primarily of insects may benefit as the RCP forests mature, die off, or become stressed from disease or infestation. Id. In the long term, the NPS cautions, such species will also decline if there is no forest regeneration, id., which is precisely what would and should be expected through forest succession which is an entirely natural process; a process that the NPS is mandated to protect not to manipulate as it is proposing to do.

In regard to reptiles and amphibians, the NPS claims that the variety and numbers of amphibians and reptiles found in the park in recent years are markedly reduce compared to inventories from early and middle parts of the 20th century. At present there are 13 amphibians known to exist or likely to exist in the park with four historic reports. Draft EIS at 111. For reptiles, the NPS reports 6 species that are present or probably present in RCP along with 13 historic occurrences that can no longer be confirmed. Id. Though not clear, presumably the reference to historic reports or historical occurrences reflect amphibian and reptiles species that no longer exist in RCP. Yet, the NPS provides no population estimates for any reptile or amphibian species of concern or any population trend data. In addition, it failed to consider other threats to these populations that are unrelated to deer.

In regard to fish, the NPS alleges that changes in water quality from the removal of ground vegetation as a result of the overabundance of deer and their activities (i.e., trampling, browsing, creating paths) may adversely affect fish habitat in RCP. Draft EIS at 26. Yet, it previously concluded in its analysis of impacts to wetlands and floodplains that there was no evidence that deer activities were adversely impacting groundwater. If this is the case, then any potential impacts to fish are, at best, inconsequential and, at worst, reflect an intentional bias of the NPS against deer.

In contrast to its analysis of reptiles/amphibians and birds where the NPS failed to consider the host of non-deer factors that may be contributing to the alleged decline of these species, the NPS identified such threats to fish. Specifically, the NPS conceded that:

> Urban pollution and storm water runoff problems have adversely affected fish numbers and diversity in the park. Generally, the 16 tributaries of Rock Creek are more severely affected than the main channel. In a 1993 study by NPS staff, no fish were found in nearly half of the tributaries and only one had more than a single species present (NPS 2005A). Flooding and scouring during storms, pollution from runoff, and periodic low flows are likely contributing factors." Draft EIS at 115.

Despite whatever efforts are undertaken in RCP to protect wildlife and wildlife habitat, other threats, both internal and external, will continue to affect park wildlife. Such threats include vehicle collisions, poaching, disturbances from traffic, visitor use (including off-trail use), illegal camping, presence of unrestrained pets, and existence of cell towers. Draft EIS at 195. Threats to wildlife habitat include urban development, vandalism, dumping resulting in trampling and burying of vegetation, spread of noxious weed seeds, as well as horseback riding, dog walking, and hiking that can lead to an increase in social trails and the spread of exotic weed seeds. Id. Moreover, the NPS reports in the GMP that "terrestrial and semi-aquatic wildlife habitat on privately owned land throughout the region would continue to be lost and fragmented because of continued high-density urban development and in-filling." GMP and EIS at 208.

Finally, the NPS claims that Alternative A in the Draft EIS would result in adverse, long-term, and negligible to major impacts depending on the other wildlife species with species that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover possibly suffering severe reductions or elimination from the park. Draft EIS at 1957. Yet, in the GMP, the NPS concludes that even the no-action alternative (Alternative B) would result in no impairment to other native wildlife. GMP and EIS at 125. Again, considering that these documents were published only two years apart, it is seemingly inexplicable how the GMP finds no impairment to other native wildlife despite the known presence of a growing deer population in RCP while the Draft EIS claims that the no-action alternative could possibly cause the elimination of certain protected species. The NPS must provide a rational explanation for this discrepancy.

Rare, Unique, Threatened, or Endangered Species

Though the NPS "is not under any legal obligation to protect rare plants or animals identified by the adjoining states of Maryland and Virginia," NPS Management Policies specify that consideration will be given to the impact of agency actions on state or locally listed species, Draft EIS at 201, and that the NPS will "manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible." Id. and Management Policies at 4.4.2.3.

According to the NPS, there are several rare plant and animal species listed by Maryland that are found (although rare) in RCP.[21] Table 14 in the Draft EIS at 117 lists the Maryland rare plants that are known to

[21] The GMP and EIS includes several tables listing rare species in RCP and state-listed species in Arlington County, VA, Montgomery County, MD, and in the state of Maryland. See GMP and EIS at Appendix E. With the exception of the rare plants in Rock Creek Park listed in Table E-2, the remaining lists do not indicate whether the species are or are not found in RCP.

existing in RCP. Of the 34 identified species, 13 are not palatable to deer, 7 species are of unknown palatability, 4 species are possibly palatable, and the remainder are considered palatable.[22]

The NPS, however, fails to disclose any information about historical abundances of these protected species and how their current numbers compare to what existed in the past. Nor does it indicate, for protected plants, which species already have population protected by fencing installed by NPS personnel and whether those protected populations are recovering. While the NPS identifies those protected plant species that are or may be palatable to deer, it does not disclose other species-specific threats such as climate change, climatic events (i.e., drought), seasonal variations, pests, and disease. Draft EIS at 205. Instead, the threats identified by the NPS are largely speculative based on allegations regarding potential impacts attributable to deer and no specific data or evidence is presented to substantiate the claims.

For state-listed wildlife species, the NPS claims that "the continued growth of the deer population and heavy deer browsing can degrade habitat and result in lack of food or cover for species that require ground vegetation to maintain viable populations within the park." Draft EIS at 206. The NPS identifies a number of species that could be affected including the mourning warbler, Nashville warbler, bobolink, Acadian flycatcher, American woodcock, brown thrasher, eastern towhee, southern bog lemming, Alleghany woodrat, eastern chipmunk, eastern cottontail, corn snake, easer garter snake, eastern hognose snake, eastern worm snake, northern copperhead, northern ringneck snake, eastern fence lizard, and eastern box turtle. Id. Yet, again, the NPS offers no historical or present day population data thereby preventing the public from understanding if these populations are in decline, the severity of the decline, and whether a massive lethal deer removal program can possibly reverse any declines (assuming they can be documented).

There is a single federally listed species that inhabits RCP; the Hay's spring amphipod. This amphipod is a groundwater species that spends the majority of its life below the water surface. Draft EIS at 204. The primary threats to this species are, as indicated in the Draft EIS, "related to degradation of the subsurface groundwater (e.g., change in flows, pollution from fertilizers, pesticides, and petroleum leaks, and loss of detritus), disturbance of surface springs is also a concern.[23]" Id. While the NPS suggests that the continued growth of the deer populations "could degrade surface springs by increasing erosion and sedimentation, compacting soils, and altering vegetation composition," Draft EIS at 204, it concedes that the long-term protection of groundwater quality afforded by the park any future growth in the deer population and the associated impacts "are not expected to critically affect this species." Id. and Draft EIS at 209 Moreover, considering that the NPS apparently has no studies providing a causal link between surface erosion (assuming that even this can be appropriately attributable to deer) leads to impacts on the quality of underground water resources, Draft EIS at 27, 205, the NPS has no scientific foundation upon which to substantiate such claims. Consequently, the alleged, yet entirely baseless, claims that deer may impact this federally protected species must not be a factor considered in the decision-making process.

Finally, the NPS claims that Alternative A in the Draft EIS would result in adverse, long-term, and negligible to major impacts depending on the species with species that depend on ground cover, young tree seedlings, and the habitat they provide for food or cover possibly suffering severe reductions or elimination from the park. Draft EIS at 207. Yet, in the GMP, the NPS concludes that even the no-action alternative (Alternative B) would result in no impairment to protected or rare species. GMP and EIS at 124. Again, considering that these documents were published only two years apart, it is seemingly inexplicable how the GMP finds no impairment to protected or rare species despite the known presence of a growing deer population in RCP while the Draft EIS claims that the no-action alternative could possibly cause the elimination of certain protected species. The NPS must provide a rational explanation for this discrepancy.

Soils and Water Quality:

In regard to RCP soils, the NPS reports that "soil resources are being adversely affected by accelerated erosion, compaction, and deposition caused by human activities inside and outside the park boundaries." Draft EIS at 101 (emphasis added). Such impacts are particularly evident in areas that receive heavy visitor use including areas along streambanks, at picnic groves and other recreational areas, and along heavily used or infrequently maintained trails. Id. The NPS does not implicate deer as a factor adversely impacting RCP soil resources.

The NPS claims that the allegedly overabundant deer in RCP will, as a result of sedimentation caused by a lack of ground which is the result of excessive deer overbrowsing will increase the turbidity of RCP water quality. In the Draft EIS, water turbidity is the only aspect of water quality this is being assessed. Water turbidity is, however, one of the less consequential aspects of water quality in regard to RCP.

The Draft EIS, for example, reports that RCP water quality is impacted by an increase in impervious surfaces leading to increased storm water runoff which, in turn, has contributed to an increase in sedimentation in Rock Creek and has carried more pollutants into creek waters. Draft EIS at 102. An increase in storm water runoff also increases peak flow rates in Rock Creek resulting in stream bank erosion and excessive sedimentation. Combined sewer overflow, which is a mixture of sewage and storm water runoff, is discharged directly into Rock Creek and its tributary waters when the capacity of a combined sewer is exceeded during storms. Draft EIS at 160. Water quality in RCP has been adversely impacted from inputs from the surrounding urban area including runoff from construction sites, roads, parking lots, lawns, stables and leaking sewer lines. Draft EIS at 102.[24]

As disclosed in the RCP GMP, some park creeks have been routed into storm sewers "some of which receive untreated sewage in association with storm events. GMP and EIS at 47[25]. Other threats to surface waters include pollutants from roadways and parking lots after precipitation events, GMP and EIS at135,

[22] Conversely, in the RCP GMP the NPS identifies only 17 rare plant species, not 34, occurring in RCP. Five of these species are designated as highly state rare – critically imperiled while 12 species are classified as watch list – rare or uncommon. GMP and EIS at 145. Fourteen of these species are non-woody, herbaceous species that typically occur in a single population within the park, id., which would suggest that they could be easily protected with fencing. The remaining three species are timber species. The reason for the significant discrepancy in the number of rare plants reported in RCP between the GMP and Draft EIS is unknown.

[23] See also, Draft EIS at 116 and GMP and EIS at 145 ("threats to groundwater amphipods include alterations of groundwater flows, groundwater pollution, loss of detritus as a food source, and disturbance of spring sites. Common pollution problems for amphipods are nitrates in fertilizers (which can result in groundwater oxygen depletion), pesticides, and petroleum leaking from underground storage tanks").

[24] See also, Draft EIS at 159 ("groundwater pollution has occurred in the past through point sources such as illegal dumping and may occur in the future. There have been leaking underground heating oil storage tanks in and adjacent to the park that have had some effect on groundwater. There are many potential sources of groundwater pollution within the urban development that surrounds the park, and it is possible that something could happen at any time to contaminate groundwater").

[25] See also, GMP and EIS at 28 ("Rock Creek Park has ongoing special use concerns associated with the presence of sanitary and storm sewer lines within the park, including the antiquated, combined sanitary and storm water sewers that discharge raw sewage into Piney Branch and Rock Creek in association with storm events"); GMP and EIS at 135 ("29 combined sanitary/storm sewer overflow structures on Rock Creek … contribute 49 million gallons of combined storm water and sewage to the creek in an average year").

sediment from unvegetated soil at construction sites and agricultural fields, GMP and EIS at 136, and runoff from lawns, stables, and leaking sewer lines. GMP and EIS at 139. Specific sources of water pollution in RCP include the police stables, gold course, maintenance yard, and parking lots. GMP and EIS at 139. The Draft EIS also references adverse impacts associated with sewer overflows and leaks as well as off-trail use, illegal camping, various visitor uses, and park operations/maintenance activities causing increased water turbidity. Draft EIS at 176, 177. According to Banta (1993), 58 percent of the tributaries of Rock Creek were classified as severely impaired for habitat quality and biological water quality while the remaining 42 percent of the tributaries were moderately impaired. GMP and EIS at 139.

While water turbidity is of relatively little consequence in RCP, the NPS goes on to concede that "the loss of vegetative ground cover park-wide from deer browsing is not currently documented as a problem relating to soils and water quality." Draft EIS at 176. If there is no evidence of a loss of ground cover, then sedimentation leading to an increase in water turbidity is not a relevant factor worthy of analysis in the Draft EIS. Instead, its one example of the NPS blaming deer for alleged impacts that simply don't exist to curry favor for its proposed action among the public, other agency officials, and its own decision-makers.

The NPS then contends that, under the no-action alternative, deer numbers will inevitably rise thereby leading to more overbrowsing of ground cover potentially resulting in increased sedimentation and high turbidity if exposed soils are washed away and into surrounding water bodies. Draft EIS at 176. As evidenced by the NPS' own data, deer population numbers in RCP have fluctuated in recent years. While variability in deer numbers is likely, as the NPS indicates, the RCP deer population, if left protected, would not continue to increase in size given the inevitable influence of density dependence factors. Moreover, if there has been no evidence of high turbidity even when the deer population was at a alleged high of 92 deer per square mile, why would turbidity be a problem in the future even if the deer population increases in size.

Not surprisingly, though the NPS concedes that there is no data at present demonstrating that deer browsing has caused a loss of ground cover resulting in an increase in water turbidity, it claims in its analysis of Alternative C (combined lethal actions) that a "smaller deer herd would allow reforestation to occur throughout the park and for woody and herbaceous vegetative cover to recover" thereby reducing the potential for soil erosion and sedimentation of park streams. Draft EIS at 178. If there is no evidence that any alleged ground cover loss attributable to deer is presently increasing water turbidity, how does a smaller deer herd lessen an impact that doesn't exist? Again, because there's no evidence currently demonstrating a cause and effect relationship between deer browsing and water turbidity, this factor should not be considered in making a decision about the proposed action.

Wetlands and Floodplains:

Wetlands and floodplains in RCP have been adversely affected over the decades by a number of factors including, in particular, increased urban development on lands surrounding RCP resulting in a greater amount of impervious surfaces leading to increases in flooding and periodic washouts and/or siltation of smaller wetland areas. Draft EIS at 106, 183. Major floods occur only periodically but, when they do occur, the impacts can be extensive. The number of vernal pools in RCP has been reduced due to past draining or filling activities, stream-bed scouring from increased runoff, and a lowering of the water table as a result of stream channel manipulation and urban groundwater use. Id. Wetland vegetation that naturally occurred in RCP has mostly been eliminated and replaced with seeded and transplanted species. Id. Finally, other uses including off-trail activities, various visitor uses, and horseback riding in RCP can affect the park's wetlands and floodplains.

Despite the already heavily impacted and manipulated state of RCP wetlands and floodplains, the NPS alleges that deer, if their numbers were left uncontrolled (Alternative A), a continued loss of vegetative ground cover and a change in forest floodplain composition and structure would be "expected", springs and vernal pools "could" be adversely affected "if: deer trample these areas while seeking water sources resulting in increased siltation and erosion, or these pools "could" dry up entirely if more intense browsing reduced vegetative cover. Draft EIS at 182. Though it is clear that the NPS is largely relying on certain assumptions in regard to its analysis of the no-action alternative, for Alternative C and D, both of which promote lethal control, a reduction in the size of the deer herd "would" allow woody and herbaceous vegetative cover to recover, including within wetland areas, and "would" limit the damage of deer trampling in smaller wetland areas. Draft EIS at 185.

Cultural Landscapes:

The primary alleged impact to cultural landscapes is deer consuming specific cultural and landscape plantings. Draft EIS at 221[26]. This could reduce or cause the loss of palatable landscape plantings that are of apparent historical importance in RCP. What the NPS fails to disclose or discuss is whether landscape plantings for cultural purposes are sufficiently significant and worthy of protection to justify the proposal massive deer slaughter, whether NPS statutory and policy standards require the absolute protection of such cultural plantings, and whether there are alternative cultural and landscape plantings that could be used to retain the cultural landscape while reducing or eliminating alleged damage by deer. In addition, though the NPS identified specific cultural landscapes of concern, Draft EIS at 126, the NPS has failed to identify which areas have been or are being subject to deer overbrowsing, which specific species are being affected, and whether there are non or less-palatable species that could be used to mitigate these impacts.

Other factors that may affect cultural landscapes in RCP include gypsy moths, other timber/vegetation diseases, activities used to combat such pests/diseases, fire its suppression, invasive exotic vegetation, human activities including the use of mountain/motor bikes on Civil War era earthworks and embankments, and land use changes including urban development. Draft EIS at 222.

Soundscapes:

The NPS asserts that the impacts to the RCP soundscape as a result of the proposed action would be minimal because sharpshooting would be conducted during late fall and winter when park visitation is at its lowest, because most shooting would be done at night when the park is closed, and since silencers could be used to reduce the noise generated by rifles used to kill park deer. Draft EIS at 232, 233. The perception of the impacts of the proposed action would vary, as indicated by the NPS, and would depend on timing, attenuation levels, and distance from the source. Draft EIS at 234.

The NPS claims that individuals who support the removal efforts would likely find the disturbance caused by the shooting would only experience minor adverse impacts. Conversely, individuals who are closer to the source of the firearm would experience moderate adverse impacts. Drat EIS at 233. The NPS does not, however, evaluate the impact of the shooting operation and the inherent sounds of shooting that may be heard by those who live in communities surrounding RMP to those specific individuals who chose to live near RCP because of its scenic beauty and protected wildlife and who are totally opposed to the proposed action.

[26] A "cultural landscape" is defined in the GMP as "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." GMP and EIS at 158.

Federal courts have determined knowing, without actually observing, the killing of wildlife represents a harm that can be redressed by a court. If the mere contemplation of wildlife being killed is sufficient to cause harm to an individual then surely hearing the sounds produced by sharpshooters firing from tree stands at defenseless and unwitting deer consuming intentionally placed bait to lure them to their death must also be considered harm and should have been addressed in the Draft EIS.

Visitor Use and Experience:

The NPS contends that if the RCP deer were left unmanaged (i.e., Alternative A – no action alternative – were selected), RCP visitors who come to the park to enjoy natural history, to learn about history/nature, those who value native plants and wildlife, or those who visit to enjoy the park's scenic beauty would be adversely affected as a result of excessive deer browsing. This would diminish the likelihood of appreciating park vegetation, cause a lack of shrubbery and flowering plants in the forest understory, and reduce the diversity and abundance of native vegetation in the park.

The NPS attempts to substantiate these claims through the use of visitor survey statistics. For example, the NPS claims that 14 percent of RCP visitors primarily come to enjoy natural history, 10 percent come to learn about history/nature, a whopping 94 percent rank scenic beauty as extremely or very important, and 68 percent rank the existence of native plants and wildlife as important. Draft EIS at 238, 136, 137.

Overall, as reported in the Draft EIS, RCP supports an average of more than 2 million visitors each year, Draft EIS at 131, with visitation increasing over 250% since 1973. Draft EIS at 132. Another 12 million people use RCP as commuters. Id. Unlike a traditional, more remote or rural, national park (i.e., Yellowstone, Yosemite, Grand Canyon), RCP has been highly manipulated over the years to provide a diversity of visitor opportunities not found in many parks including an 18-hole public golf course, tennis courts, community gardens, sports fields, playgrounds, and a 4000-seat amphitheater. Draft EIS at 136. As previously indicated, NPS decisions to permit some of these developments, given that they have increased the quality and quantity of deer habitat thereby contributing to the alleged overabundance of RCP deer, likely constitute illegal impairments that the NPS has a legal obligation to remedy.[27]

The NPS cites to Littlejohn (1999) for these statistics yet it provides no further information about the methodologies used in this survey, when it was conducted, what time span it covered, who was surveyed (i.e., park visitors, Washington DC metropolitan residents), how it was conducted (i.e., by telephone or in-person interview) nor did it provide any examples of the type of questions that were asked. More importantly, there is no way that Littlejohn (1999), the NPS, or the public could know how those surveyed perceived the questions asked. For examples, for the 14 percent of visitors interested in natural history, what specifically were there interests and did they necessarily perceive park deer as adversely impacting their park experience.

[27] During the RCP GMP process the NPS briefly entertained a proposal to close the community gardens, public horse stables, and the golf course but, in the end, due to nearly universal public opposition to such closures, the NPS rejected this proposal. RCP GMP at 294. Nevertheless, NPS Policies require the continual evaluation of park uses and activities to ensure that they do not cause an impairment or pose unacceptable impacts to the parks and that such uses are appropriate. There is no indication that the NPS even considered whether these uses represent an impairment of the park during the GMP process (as required by the NPS 2001 Management Policies) or whether they are consistent with the standards imposed in the NPS 2006 Management Policies. In addition, if there is nearly universal opposition to the proposed lethal deer slaughter program, the NPS would seemingly also have to reject it to be consistent.

Or, for the reported 94 percent of visitors who think "scenic beauty" is extremely or very important, how do they perceive or define "scenic beauty." Is a forest with little understory vegetation beautiful to them or do they even care whether there is abundant herbaceous cover? Is seeing an abundance of deer in their natural habitat – something the visitor may not experience at their home or in their neighborhood – beautiful to them? If RCP vegetation appears healthy, even if locally dominated by exotic species, beautiful to them and/or do they even know that the species are exotic? Do these visitors understand natural succession, do they care if the forest stand is young, diverse, or old-aged, do they worry about or even notice a lack of forest regeneration or are they visiting RCP for a picnic, a hike, a run and, for them, scenic beauty is what they see whether its natural or not?

For the reported 67 percent who apparently value native plants and wildlife, how many actually know which plants are native and which are exotics? Did they express value in native plants because it was perceived as the correct answer to a survey question or did they select the option since the alternative, expressing value for exotic, invasive species, wouldn't be appropriate? Do these individuals visit RCP only to leave disappointed and angry because they were unable to see native species or because there were too many exotics in the park? Do they loathe deer because they associate deer with their inability to see native species (even though the deer themselves are a native species)?

The reality is that these statistics, while they may sound impressive and may be of academic interest, are completely meaningless in regard to deer management in RCP since those conducting the survey did not attempt to ascertain how those surveyed perceived the questions asked nor were they asked in the context of deer management. For example, those who claimed that "scenic beauty" was extremely important to them were likely not asked how they define scenic beauty, whether deer add or subtract from their perception of scenic beauty, and/or whether their perception of "scenic beauty" is influenced by the number or density of deer in the park.

While the NPS has inappropriately and selectively attempted to use survey statistics to claim that the bulk of RCP visitors have their park experience literally ruined by deer and the impacts allegedly attributable to deer, other evidence, including some additional statistical evidence in the Draft EIS, demonstrate why the NPS is wrong. First, the NPS concedes that it does not know "what percent of visitors place a high importance specifically on seeing deer." Draft EIS at 238. This was apparently not a question addressed by Littlejohn (1999).

Yet, even for those individuals who the NPS concede may enjoy seeing deer in the park, the NPS claims that their visitor experience could be marred if they saw ill or emaciated deer due to the impacts of the alleged overabundance of deer in the park, Draft EIS at 239, and that they may actually prefer seeing fewer deer if those survivors were healthy and viable. Draft EIS at 241, 243. Both argument exploits the public's general lack of knowledge of ecological process and deer biology/ecology and both, particularly the latter, are entirely based on speculation. While there are likely few people who enjoy seeing ill or emaciated wildlife, the reality is that wildlife in national parks, on other public lands, and on private lands die as a result of disease and/or starvation. Such factors are entirely natural and reflect the difficulty faced by wild species attempting to survive in the wild. The NPS should exploit such natural regulating factors to inform and educate the public that survival in the wild is hard, death is common, but, in many cases, reflect entirely natural causes, and which is critically important to the ecology of any wild area.

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.

Second, as the NPS concedes, the most common reasons for visiting RCP are to exercise (61%), to escape the city (47%), spending time with family/friends (37%), enjoying solitude (30%), and so-called "other" reasons including attending a concert, walking the dog, golfing, gardening, enjoying nature, eating lunch, commuting home, visiting the planetarium, and studying (a combined 29 percent). Draft EIS at 238, 136[28]. With the exception of those who visit the park to enjoy nature which was discussed above, none of the other reported reasons for visiting RCP have any relevance to deer management in the park. However, since most RCP visitors come from the Washington DC metropolitan area, it is not out of the question that the opportunity to see one or more deer during their visit actually makes their experience more, not less, enjoyable.

Third, as stated by the NPS in the RCP GMP:

> "Scoping demonstrated that there is much that the public likes about the park. Indeed, one of the most common comments during scoping was that the park is fine just the way it is today. In particular, people want the traditional character of the park to continue, although many also expressed concern about the effects of traffic on the recreational experience." GMP and EIS at 29 (emphasis added).

While, admittedly, scoping for the GMP was conducted in 1996 when the RCP deer population was reported smaller, the NPS published this statement in its 2007 GMP and EIS without any attempt to update, correct, or explain that what was considered "fine just the way it is today" in 1996 may no longer be applicable in 2007. In fact, based on comments submitted on the Draft GMP, the NPS determined that RCP "visitors like, and would not want to change, most aspects of Rock Creek Park." GMP and EIS at 214. Among the attributes that visitors reported to like were the park's "pleasing appearance and the range of activities." Id. Instead, the NPS apparently elected to make the case that nearly all, with the primary exception of traffic, was well within RCP allowing it to focus, albeit illegally, the GMP on traffic management issues.

Similarly, again during scoping, the NPS reported that "many people commented on the value of seeing wildlife in the parks, especially in contrast to the surrounding urban environment," GMP and EIS at 41, and that "white-tailed deer, the largest and most conspicuous mammal (in RCP) was most frequently mentioned." Id. AWI concedes that the RCP deer population was likely smaller in 1996 than in more recent years but, if those members of the public expressed interest and value in seeing deer in RCP in 1996 why would the public in 2008 or 2009 express a different opinion and what evidence does the NPS have to suggest that public sentiment has changed?

The experience of park visitors and, perhaps more importantly, adjacent landowners, including children, are also of relevance though the NPS failed to provide any discussion of the impacts of the proposed action on RCP neighbors. This is of particular concern given the proposed use of archery to kill RCP deer under some circumstances, including near residences. Draft EIS at 61. Bow hunting is considered to be a particularly cruel form of hunting due to the significant wounding rate that some claim is as high as 50 percent (i.e., for every animal killed with an arrow another is only wounded and either recovers or dies a very painful, and potentially slow death). The NPS concedes that deer targeted by archers may not succumb immediately and could flee the area. Draft EIS at 242. These deer, if not found and killed by NPS agents, could be seen by the public either after they have died in someone's yard or while struggling to survive after being impaled by an arrow. This would represent a particularly traumatic experiences for anyone, including children, who live near the park and who may have chosen to reside near the park to benefit from the opportunities to observe and enjoy deer. The NPS has to consider and evaluate this potential impact or, preferably, eliminate archery as a method of lethal control.

Furthermore, the NPS identifies exsanguination (i.e., bleeding to death) as a potential method for killing captured deer. Draft EIS at 62. Exsanguination can't possibly be considered as a "humane" killing method by the NPS or any other responsible agency or organization. This method should be eliminated as an approved technique for killing deer if the proposed action is implemented.

Visitor and Employee Safety:

The principal issues of concern to the NPS in regard to visitor and employee safety is the risk of deer/vehicle collisions. The NPS reports that such collisions "are a threat to humane safety and are one of the predominant sources of deer mortality." Draft EIS at 140. The NPS claims that there has been an upward trend in deer/vehicle collisions from 1989- to 2007 with a high of 52 such collisions reported in 2006. Id. While the NPS reports that deer/vehicle collisions are most common along Military Road, Oregon Avenue, Beach Drive, and Rock Creek and Potomac Parkway, it does not disclose: how many deer were killed by year along each road segment, which roads were monitored for deer vehicle accidents (including any adjacent non-park roads), what the speed limit is for the roads where deer/vehicle collisions were reported, the estimated speed of the vehicle involved in the collisions, whether there were any human injuries or fatalities, the estimated amount of damage to the vehicle, and whether there were extenuating circumstances contributing to the accident (i.e., icy/wet roads, darkness, inclement weather, driver impairment). The NPS claims that while deer/vehicle accidents increased in the park, traffic volumes have remained the same or decreased, Draft EIS at 140, though, again, the NPS fails to disclose the traffic volume statistics or the methodologies used to measure said volume.

Socioeconomics:

As is frequently the case with the socioeconomic analysis contained in most NEPA documents, the analysis in the Draft EIS is entirely one-sided focused solely on the alleged adverse impact of deer on adjacent homeowners and landscaping. Of course, deer may have both a beneficial and adverse impact on the socioeconomics of RCP and the surrounding urban areas yet these beneficial impacts, as is the case here, are rarely disclosed or evaluated.

Prior to addressing this specific deficiency, it must be noted that the NPS is under no legal obligation to prevent park wildlife from emigrating beyond park borders and/or to eliminate or mitigate wildlife impacts to private or non-parks lands adjacent to RCP. National parks were never intended to be managed as zoos where the animals are contained in specific areas unable to exhibit natural behaviors, including migration or range expansion. Indeed, the original concept for national parks embraced the sanctuary concept where wildlife would be protected within the parks while allowed to be used outside of the parks. This was intended to not only create potential hunting opportunities but to provide opportunities to enjoy and observe wildlife both within and outside of parks. As a consequence, it is indisputable that, for those

[28] The NPS also cites to Littlejohn (1999) in the RCP GMP and the visitor use statistics cited in that document are different than the statistics ostensibly cited from the same study in the Draft EIS. In the RCP GMP the NPS reports that RCP visitors participated in walking/hiking/jogging (44%), bicycling (18%), walking the dog (17%), communing with or studying nature (13%), picnicking and family reunions (11%), golfing (10%), in-line skating (6%), tennis (4%), studying history (3%), creating art (3%), horseback riding (1%), and other activities (16%). GMP and EIS at 161.

interested in wildlife, the opportunity to live adjacent to a national park, including an urban park, is of immense value.

The NPS reports that "landscaping can have a significant impact on property values, enhancing the resale value of a property by up to 15% and that 100-200% of landscaping costs can typically be recovered when a home is sold. Draft EIS at 142. Yet, according to the NPS, due to the ravenous appetites of deer, they "cause virtually year-round damage to landscaping, which can be costly to replace." Draft EIS at 142. While such statements suggest that RCP deer are known to adversely impact landscaping on adjacent properties, the Draft EIS includes some completely conflicting statements raising questions about whether RCP deer are in fact impacting adjacent properties. For example, in addressing deer impacts to adjacent landowners, the NPS assumes that park deer populations are currently foraging on private lands adjacent to the park and that these private lands are currently within the home range of the park deer population. Draft EIS at 256. The NPS can't have it both ways; it can't assume that deer are adversely impacting landscaping on adjacent properties while, at the same time, denigrating deer for causing such impacts.

Conveniently, though RCP began compiling a list of people who inquired about deer impacts on landscaping in the early 1990s, it did not track the number of complaints or inquiries received on the subject nor has the list been regularly updated to track or reflect all such complaints/inquiries. Draft EIS at 142.

Considering that the NPS now proposes to engage in a massive slaughter of deer in RCP, the fact that RCP did not, at least in recent years, reinitiate an effort to more accurately record complaints about deer by adjacent landowners is disconcerting. Because of this, the NPS cannot report on the number of such complaints. As a result, there's no way of knowing whether the percentage of complainants is significant or not. It is, in fact, very possible that the proportion of adjacent landowners who actually have complained about deer impacts to their landscaping is quite low. AWI acknowledges and commends the NPS for its efforts to field inquiries/complaints from adjacent landowners and to educate them about deer, deer biology and ecology, how to live with deer, and how to landscape their properties using species and techniques to reduce the potential for deer damage. However, without data on the number of complaints, the location of the complaints, the type of damage reported, the severity of the damage, the estimated cost of repairing the damage, efforts undertaken to "deer-proof" landscaping (i.e., use of repellents, planting non-palatable or less palatable species, installing fencing), and the success of those efforts to address the "problem" it is impossible to consider this alleged impact in relationship to the broader deer management plan.

As a consequence, unless the NPS discloses and analyzes such data, it cannot rely on the alleged impacts of deer on adjacent landowners and their landscaping to justify or support the proposed action.

Moreover, the NPS must also consider the economic value of deer to balance its analysis of the alleged economic impacts of deer impacts to landscaping. For many persons who reside near or use RCP, deer may be of significant value in terms of their beauty, opportunities to observe them in their natural habitat, and, for some, the ability to observe park deer in their own yards. There are economic values associated with these benefits that must be considered during the planning process.

Reproductive control:

Alternatives B and D in the Draft EIS both contemplate the use of non-lethal reproductive control as a means to reduce the growth of the RCP deer herd and eventually reduce the herd's numbers. Several reproductive control techniques are considered in the Draft EIS with additional analysis of the techniques provided in Appendix C of the document. As indicated in the Draft EIS, the NPS will not use reproductive control until an "acceptable reproductive control" agent for use on does is found. A "successful reproductive control agent" is defined by the following criteria: 1) there is a federally approved fertility control agent for application to free-ranging populations; 2) the agent provides multiple year (more than three years) efficacy; 3) the agent can be administered through remote injection; 4) the agent would leave no residual in the meat (meat would be safe for human consumption); and 5) overall there is substantial proof of success in a free-ranging population, based on science team review. Draft EIS at 55. The NPS then claims that "such an agent is not currently available," id., but that research is ongoing on various immunocontraceptive agents including porcine zona pellucida, SpayVac, Gonadotropin Releasing Hormone (GnRH), and leuprolide. Id.

Recently published studies on immunocontraception efficacy and long-term viability call into question the accuracy of the NPS conclusion that an immunocontraceptive agent is not currently available. Before addressing the inaccuracy of that conclusion, however, the self-serving criteria that the NPS has developed to determine when a reproductive control agent is available must be examined.

First, in regard to federal approval of a fertility control agent for use in free ranging deer populations, the NPS must surely be aware that the lack of approval is not a result of the inadequacy of lack of safety associated with current immunocontraceptive agents but, instead, has been mired in politics generated by state wildlife management agencies and pro-hunting organizations who are active and complicit in efforts to prevent any such federal approval due to a presumed, but not real, threat to sport hunting. Instead of using this lack of federal approval as an excuse not to implement non-lethal reproductive control, the NPS should assist in compelling the relevant federal agencies who have jurisdiction over such decisions to expedite approval of these agents. If the NPS insisted that it required use of said agents in order to responsibly and humanely manage select wildlife species in America's national parks in a manner consistent with federal law, this could force the authorizing agencies to look beyond the political monkey-wrenching tactics being employed by those agencies and organizations that unduly fear immunocontraceptive technologies.

Even without such federal approval, the NPS is not prevented from using these agents pursuant to a veterinary prescription under the Animal Drug Use and Clarification Act of 1994. The NPS admits to this option in the Draft EIS. Draft EIS at 55.

Second, the requirement for a reproductive control agent with multiple years of efficacy is clearly related to concerns about personnel time, costs, and workload. Considering that RCP is a national park where native wildlife are required by law to be protected and where the convenience of using bullets to control a native species is only to be authorized under the most stringent and rare conditions (unlike the current practices of the NPS in, for example, Valley Forge National Historical Park, Catoctin National Park), convenience should not be a prerequisite for the use of non-lethal reproductive control. It just so happens, however, that immunocontraceptive technologies have improved to the point where vaccines have been proven to be effective in preventing conception/births for multiple years thereby satisfying this specific criteria.

Even the NPS concedes that "current formulations of GonaCon last up to four years," Draft EIS at 67. Yet, the NPS claims that GonaCon does not meet all of the NPS self-imposed criteria for a reproductive control agent and, therefore, can't be used to non-lethally address the perceived deer overpopulation "problem." Though not specified it is presumed this conclusion is based on the GonaCon research conducted at the White Oaks Federal Research Center in White Oak, MD. If this is the case, the NPS may claim that while the agent reduced production in some treated deer for up to four years, it wasn't consistently successful in reducing production in all treated deer over that time frame. There are, however, even more recently published studies that provide additional evidence of the effectiveness of

GnRH based immunocontraceptives over a number of years. See Attachments. The porcine zona pellucida immunocontraceptive agent may also now be effective over several years as research to accomplish this objective has been ongoing for a number of years.

Third, both PZP and GnRH-based immunocontraceptive agents have been delivered to a wide variety of species successfully via remote injection.

Fourth, if the immunocontraceptive agent is used off-label, the prescribing veterinarian is responsible for determining an appropriate meat withdrawal period for food producing animals that may enter the human food chain. If the veterinarian determines that there is no meat withdrawal period for a particular drug, then there is not need for the animal to be marked and vice-versa. Draft EIS at 55. Since the need to mark treated animals to prevent their consumption substantially increases the cost of immunocontraception and the time required to treat each animal, the NPS could and should consider alternatives to avoid this need. For example, since NPS studies indicate that RCP deer ranges only extend a minimal distance outside of RCP, if immunocontraception were employed in RCP the chances of anyone hunting a treated deer would be minimal. Since there presumably still would be a concern about that possibility, the NPS could work with MDNR, DC, and Montgomery County authorities on an public information and education effort to advise persons hunting in areas open to hunting near RCP to not consume any deer until the NPS or one of its partners can determine if the deer has been treated. Presumably there is a simple blood test that could be used for this purpose. If the deer has been treated, the hunter would be asked to provide it to one of the agencies and would, if necessary, be offered another hunting permit or tag free of charge. This type of program has been used in CWD-infected areas in the West providing hunters the opportunity to have their elk or deer tested for CWD before choosing to consume the meat.

Fifth, in regard to the success of the immunocontraceptive agents, the attached studies provide an ample demonstrate of such effectiveness.

Chronic Wasting Disease:

Thought the closest known case of chronic wasting disease is more than 100 miles from RMP, Draft EIS at 46, the Draft EIS includes provisions to address CWD whether it remains absent from RCP deer or known cases are found closer RCP or in RCP deer. The trigger for changing management actions is whether CWD is found within 60 miles of RCP. Id. If it remains beyond the 60 mile barrier then opportunistic surveillance of deer found dead or killed in RCP would be taken to test for CWD. If found within the 60 mile barrier then targeted surveillance would be undertaken in RCP to remove and test deer that exhibit clinical symptoms of the disease. Draft EIS at 290.

NPS includes an Appendix to the Draft EIS that provides additional information about chronic wasting disease. It claims, for example, that the higher density of deer in RCP increases the likelihood of transmission and that the disease could limit populations of deer and could result in impacts on the species recreational values. Draft EIS at 46, 188. It also provides additional information about the epidemiology, pathology, and ecology of CWD. What is doesn't address, which is most critical, is whether CWD is considered a native organism or if it is an exotic. If the organism that causes CWD is a native to the United States and/or to RCP, the NPS must protect the organism and can't automatically endeavor to eradicate it or those species that it may potentially affect in the future. Indeed, disease is known to be a natural factor that acts to control wildlife populations and, particularly in a national park, endemic disease agents must be allowed to affect wildlife populations (with the exception of ESA-protected species) pursuant to the NPS natural regulation mandate.

6. Minor corrections:

Draft EIS at 64. The NPS provides a summary of its planned deer carcass disposal plan if its elects to embark on a lethal control effort. Specifically, the NPS claims the pit used to bury the carcasses will be five feed deep. A layer of carcasses would be added, followed by a food of dirt, another layer of carcasses, a foot of direct, a third layer of carcasses and then three feed of dirt. Since the deer carcasses will take up some space, the proposed five foot deep pits are not deep enough to handle three layers of deer carcasses and five feet of dirt. The pit will need to be deeper, perhaps as deep as seven or eight feet, in order to handle all of the carcasses and dirt. The deeper the pit, however, the greater the likelihood of potential adverse impacts to groundwater and the water table.

Draft EIS at 244. Current language refers to the "… cumulative impacts to vegetation under this alternative …" and should be "… cumulative impacts to visitor use and experience ..."

Draft EIS at 259. The NPS claims that each alternative in this section would include a discussion of the impacts associated with receiving or not receiving additional funding. It is not clear from reviewing the environmental consequences of each alternative that such an analysis was included.

Conclusion:

The foregoing analysis provides compelling evidence that the proposed action as described in the Draft EIS is illegal. Moreover, even if the NPS could legally implement the proposed massive lethal deer control program, it has not provided sufficient information or adequate analysis to justify such a program. Alternatively, if the NPS is convinced that it must act to control the RCP deer population, the use of non-lethal reproductive control agents is a viable option that should be chosen by the NPS to gradually reduce its deer population in a manner that is entirely consistent with NPS legal mandates. Therefore, considering the analysis presented in this letter, AWI strongly encourages the NPS to select Alternative B or a modified version of this alternative that will permit an expanded effort to use immunocontraceptive agents to remedy the perceived "problem" with deer in RCP.

Thank you for the opportunity to submit these comments. Any future correspondence on this matter should be directed to D.J. Schubert, Animal Welfare Institute, 3121-D Fire Road, PMB#327, Egg Harbor Township, NJ 08234.

Sincerely,

D.J. Schubert

Wildlife Biologist

Correspondence ID 397

Christina Schoppert
<christina.schoppert@gmail.com>
Sent by: Site Administrator
<humanesociety@hsus.org>

09/22/2009 12:24 PM

Please respond to
Christina Schoppert
<christina.schoppert@gmail.com>

To roer_superintendent@nps.gov
cc
bcc
Subject Please implement deer management alternative B: Combined non-lethal actions

Sep 22, 2009

Superintendent Adrienne Coleman
3545 Williamsburg Ln., NW
Washington, DC 20008-1207

Dear Superintendent Coleman,

As a concerned citizen, I oppose killing deer at Rock Creek Park and do not support the implementation of Alternative C or D -- both of which would involve the use of lethal methods to reduce the park's deer population. Instead, I urge the NPS to support Alternative B -- combined non-lethal actions -- as the preferred alternative for managing the deer population.
Any perceived conflicts with the deer population at Rock Creek can be resolved using combination of non-lethal techniques including strategically designed fencing, repellents, tick control devices, and if necessary, reproductive controls that would gradually reduce the deer populaton over time.
Thank you for your consideration.

Sincerely,

Ms. Christina Schoppert
1213 S East Ave
Baltimore, MD 21224-5013

3

Correspondence ID 398

Sep 23, 2009

Ms. Adrienne A. Coleman

Dear Ms. Coleman,

I was dismayed to learn that National Park Service (NPS) officials are considering a deer-management plan that would allow hunters to kill

deer living in and around Rock Creek Park with some of the most archaic weapons available: bows and arrows! Bow hunting is among the cruelest forms of hunting. Many deer who are shot are merely wounded by arrows. Bow hunters routinely spend hours tracking the blood trails of deer struck by arrows before finding them. Three decades of research tells us that for every one or two animals struck by arrows and retrieved by bow hunters, another wounded animal disappears, never to be found. And the slaughtered deer aren't the only victims: Mass killings tear apart families, leaving young and weak animals vulnerable to starvation, dehydration, and predators.
Please take bow hunting off your list of deer-management methods and instead explore long-term methods that are more effective and humane.

Sincerely,

Leslie Hawkins
10302 Bridgetown Pl
Burke, VA 22015-2867
(703) 319-5834

Correspondence ID 401

Advisory Neighborhood Commission 4A

District of Columbia Government
7600 Georgia Avenue NW, Suite 404
Washington, DC 20012
(202) 291-9341

Adrienne Coleman, Superintendent
Rock Creek Park
3545 Williamsburg Lane, NW
Washington, DC 20008

November 4, 2009

Re: Comments on Draft White-Tailed Deer Management Plan Environmental Impact Statement

Dear Superintendent Coleman:
Please accept this written follow-up for the ANC comments that were submitted first by ANC commissioner for ANC 4A08. Those comments were first sent electronically on Thursday, October 01, 20094:03 PM. On Tuesday, October 6, 2009, at a public ANC meeting at which there was a quorum, the ANC formally voted to also adopt Alternative B as its preferred option. These are similar to the comments of ANC 4A08 and the Crestwood Citizens Association on the Draft White-Tailed Dee Management Plan / EIS.

My name is Stephen Whatley. I am the Chair of the Advisory Neighborhood Commission 4A. On behalf of ANC 4A, I urge the National Park Service to adopt Alternative B: the Combined Non-Lethal Actions. This alternative should protect forest resources. It would use reproductive control, fencing [167 acres of deer enclosures] and other effective reproductive control agents to control the proliferation of deer. There is also support within the community for alternative D. However, the majority of ANC commissioners voted on October 6,2009 for the non-lethal approach. There was a strong sense that sharp-shooting should be the last step taken.

The neighborhoods of ANC 4A border Rock Creek Park. The ANC district area is primarily residential with detached and semi-detached homes that are owner-occupied. We understand the need to reduce the deer population and the goal of reducing the number from an estimate of 82 deer per square mile to a goal of having 15 to 20 deer per square mile. Many of us also understand that the damage that deer can do - first hand. Some of us attended the public meeting that the Park Service held. We did not feel that the National Park Service had provided sufficient scientific documentation as to the sustainability and long-term benefit of the quick-kill approach. We were also concerned with the persuasive testimony that some of us heard that the deer population tends to rebound, if it gets stressed. We also don't understand why killing is authorized, but relocating the deer is not permitted. Many of us have learned to co-exist with the deer. While we agree that more needs to be done and should have been done long ago, we cannot agree to allowing sharpshooting within a *1/2* mile of our homes. It is a matter of safety for those of us who live near the Park and concern for some who may be in the line-of-fire - such as homeless who may be living in the woods or pets who stray. Some expressed concern that the killing of the deer would be inconsistent with the mandate and mission of the National Park Service. The purpose is to preserve and protect the wildlife and the enjoyment of the people. Having deer shot in a National Park sends the wrong message and mars the serenity and peace that many of us associate with this national treasure.

We encourage the use of the fencing. To the extent feasible, separate the does from the bucks. That should reduce the deer density. For all of these reasons, ANC 4A recommends Alternative B, the combined NonLethal Actions. We also are willing to work with the park on an education campaign or possible participants in the reproductive control applications. Whether birds, vines, deer, or pollutants, more needs to be done in a way that humanely addresses the future of the Park.

Thank you and ANC 4A asks that this be made a part of the record. If you have any questions concerning, this letter please feel free to contact me at 202-720- 4590.

Sincerely,
Stephen Whatley Chair
ANC4A

APPENDIX H. LETTERS OF CONSULTATION

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
Rock Creek Park
3545 Williamsburg Lane, N.W.
Washington, D.C. 20008-1207

IN REPLY REFER TO:

H3019 (NCA-ROCR)

JUN 17 2008

Mary Ratnaswamy, Program Supervisor
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

Dear Ms. Ratnaswamy:

The National Park Service (NPS), Maryland National Capital Parks and Planning Commission (MNCPPC), and the District of Columbia Department of the Environment (DCDOE) are currently collaborating on an Environmental Impact Statement (EIS) for white-tailed deer management. The EIS will include an assessment of the park's deer population and a range of herd management alternatives to preserve park resources. The NPS is the lead agency and MNCPPC and DCDOE are Cooperating Agencies. In accordance with Section 7 of the Endangered Species Act, we wish to begin informal consultation with your agency so that we may fully evaluate the potential effects of deer management actions on federally listed species.

The EIS formally began with publication of the Notice of Intent on September 20, 2006. Two public scoping meetings were held in November 2006 and we are now working on the Draft EIS. Based on results of internal and public scoping, we have defined the geographic scope of the management actions considered in the EIS to include the entire administrative unit of Rock Creek Park. The EIS will govern deer management on park areas capable of sustaining a deer population.

We wish to request the most current list of Rare, Threatened and Endangered species that potentially inhabit Rock Creek Park, along with any pertinent critical habitat designations. We also understand that the Kenk's amphipod (*Stygobromus kenki*), which is known to occur in Rock Creek Park, was recently denied listing as endangered because its petition did not present substantial scientific or commercial information to demonstrate listing was warranted at that time.

For more technical information on the EIS, call or e-mail Natural Resource Specialist Ken Ferebee on 202-895-6221, ken_ferebee@nps.gov. You may also wish to visit the website at www.nps.gov/rocr which provides a link in which to view documents related to the EIS.

Sincerely,

for Adrienne A. Coleman
Superintendent, Rock Creek Park

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
Rock Creek Park
3545 Williamsburg Lane, N.W.
Washington, D.C. 20008-1207

IN REPLY REFER TO:

N1615 (NCA-ROCR)

JUN 18 2008

David Maloney, State Historic Preservation Officer
Historic Preservation Office
Office of Planning
801 North Capitol Street, NE, #400
Washington, D.C. 20002

Dear Mr. Maloney:

The National Park Service (NPS), Maryland National Capital Parks and Planning Commission (MNCPPC), and the District of Columbia Department of the Environment (DCDOE) are currently collaborating on an Environmental Impact Statement (EIS) for white-tailed deer management. The EIS will include an assessment of the park's deer population and a range of herd management alternatives to preserve park resources. The NPS is the lead agency, and MNCPPC and DCDOE are Cooperating Agencies. In accordance with the National Historic Preservation Act of 1966 (NHPA), as amended, and the regulations of the Advisory Council on Historic Preservation, the NPS wishes to formally begin consultation with your office. We will be submitting the Draft EIS to your office for your review. The NPS wishes to coordinate the Section 106 review with its responsibilities under the National Environmental Protection Act (NEPA) as identified in 36 CFR 800.3(a)(2)(b). In accordance with 36 CFR 800.8(c)(2)(i), the Draft EIS will serves as the Determination of Effect for cultural resources under Section 106 of the NHPA.

The EIS formally began with publication of the Notice of Intent on September 20, 2006. Two public scoping meetings were held in November 2006 and we are now working on the Draft EIS. Based on results of internal and public scoping, we have defined the geographic scope of the management actions considered in the EIS to include the entire administrative unit of Rock Creek Park. The EIS will govern deer management on park areas capable of sustaining a deer population.

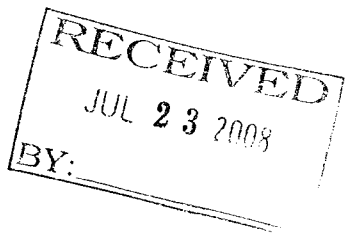
If you have any questions regarding the project, please contact Cultural Resource Specialist Simone Monteleone Moffett at (202) 895-6011. Please forward all Section 106 compliance concerns to my office. You may also wish to visit the website at www.nps.gov/rocr which provides a link in which to view documents related to the EIS. We look forward to hearing from you soon.

Sincerely,

for Adrienne A. Coleman
Superintendent, Rock Creek Park

Bcc:
ROCR- CCox
ROCR- MHagerty
ROCR-SMoffett
rocr.files.deer

GOVERNMENT OF THE DISTRICT OF COLUMBIA
HISTORIC PRESERVATION OFFICE
OFFICE OF PLANNING



July 18, 2008

Ms. Adrienne A. Coleman
National Park Service
National Capital Region
3545 Williamsburg Lane, NW
Washington, DC 20008-1207

RE: Environmental Impact Statement for White-Tailed Deer Management, Rock Creek Park

Dear Ms. Coleman:

Thank you for contacting the DC State Historic Preservation Office (SHPO) regarding the above-referenced undertaking. We have reviewed the project information in accordance with Section 106 of the National Historic Preservation Act and are writing to provide our initial comments regarding effects on historic properties.

As you are aware, Rock Creek Park is listed in the National Register of Historic Places and the DC Inventory of Historic Sites. Therefore, we look forward to reviewing the Environmental Impact Statement (EIS) and to assisting the National Park Service in its efforts to ensure that its white-tailed deer management strategies will not have an adverse effect on historic properties.

If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841. Otherwise, we thank you for providing this opportunity to comment and we look forward to receiving the EIS as soon as it becomes available.

Sincerely,

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

08-233

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
Rock Creek Park
3545 Williamsburg Lane, N.W.
Washington, D.C. 20008-1207

IN REPLY REFER TO:

TAKE PRIDE IN AMERICA

N1615 (NCA-ROCR)

JUN 18 2008

Marcel Acosta, Acting Executive Director
National Capital Planning Commission
401 9th Street, NW, Suite 500
Washington, D.C. 20004

Dear Mr. Acosta:

The National Park Service (NPS), Maryland National Capital Parks and Planning Commission (MNCPPC), and the District of Columbia Department of the Environment (DCDOE) are currently collaborating on an Environmental Impact Statement (EIS) for white-tailed deer management. The EIS will include an assessment of the park's deer population and a range of herd management alternatives to preserve park resources. The NPS is the lead agency, and MNCPPC and DCDOE are Cooperating Agencies.

The EIS formally began with publication of the Notice of Intent on September 20, 2006. Two public scoping meetings were held in November 2006 and we are now working on the Draft EIS. Based on results of internal and public scoping, we have defined the geographic scope of the management actions considered in the EIS to include the entire administrative unit of Rock Creek Park. The EIS will govern deer management on park areas capable of sustaining a deer population. We would appreciate any comments or suggestions you may have regarding important factors that should be considered and if there are any concerns within the project area that your agency feels needs to be addressed, please inform us.

If you have any questions regarding the project, please contact Cultural Resource Specialist Simone Monteleone Moffett at 202-895-6011. Please forward all concerns to my office. You may also wish to visit the website at www.nps.gov/rocr which provides a link in which to view documents related to the EIS. We look forward to hearing from you soon.

Sincerely,

Gridin Cox

for Adrienne A. Coleman
Superintendent, Rock Creek Park

Bcc:
ROCR- CCox
ROCR- MHagerty
ROCR-SMoffett
rocr.files.deer

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
Rock Creek Park
3545 Williamsburg Lane, N.W.
Washington, D.C. 20008-1207

IN REPLY REFER TO:

N1615 (NCR-ROCR)

JUN 18 2008

Thomas Luebke, Secretary
The Commission of Fine Arts
National Building Museum
401 F Street, NW, Suite 312
Washington, D.C. 20001

Dear Mr. Luebke:

The National Park Service (NPS), Maryland National Capital Parks and Planning Commission (MNCPPC), and the District of Columbia Department of the Environment (DCDOE) are currently collaborating on an Environmental Impact Statement (EIS) for white-tailed deer management. The EIS will include an assessment of the park's deer population and a range of herd management alternatives to preserve park resources. The NPS is the lead agency, and MNCPPC and DCDOE are Cooperating Agencies.

The EIS formally began with publication of the Notice of Intent on September 20, 2006. Two public scoping meetings were held in November 2006 and we are now working on the Draft EIS. Based on results of internal and public scoping, we have defined the geographic scope of the management actions considered in the EIS to include the entire administrative unit of Rock Creek Park. The EIS will govern deer management on park areas capable of sustaining a deer population. We would appreciate any comments or suggestions you may have regarding important factors that should be considered and if there are any concerns within the project area that your agency feels needs to be addressed,please inform us.

If you have any questions regarding the project, please contact Cultural Resource Specialist Simone Monteleone Moffett at 202-895-6011. Please forward all concerns to my office. You may also wish to visit the website at www.nps.gov/rocr which provides a link in which to view documents related to the EIS. We look forward to hearing from you soon.

Sincerely,

Cynthia Cox

for Adrienne A. Coleman
Superintendent, Rock Creek Park

Bcc:
ROCR- CCox
ROCR- MHagerty
ROCR-SMoffett
rocr.files.deer

United States Department of the Interior

NATIONAL PARK SERVICE
National Capital Region
Rock Creek Park
3545 Williamsburg Lane, N.W.
Washington, D.C. 20008-1207

IN REPLY REFER TO:

OCT 27 2008

N1615 (NCA-ROCR)

Lori A. Byrne
DNR Wildlife and Heritage Service
580 Taylor Avenue
Tawes Office Building E-1
Annapolis, Maryland 21401

Dear Ms. Byrne:

The National Park Service (NPS), Rock Creek Park, Maryland National Capital Parks and Planning Commission (MNCPPC) and the District of Columbia Department of the Environment (DCDOE) are currently collaborating on an Environmental Impact Statement (EIS) for white-tailed deer management. The EIS will include an assessment of several alternatives to manage an increasing deer population in the park in order to preserve park resources. The NPS is the lead agency; MNCPPC and DCDOE are Cooperating Agencies.

Rock Creek Park is located within the District of Columbia but does share boundaries with Montgomery County, Maryland and the lower portion of Rock Creek Regional Park (see enclosed park brochure). We would like to request a list of any known rare, threatened, or endangered species that are known to exist or potentially could be found in the areas of common boundary between the NPS and Maryland. This species list will be incorporated into the impact analysis of the management alternatives being developed.

This National Environmental Protection Act (NEPA) process was started in 2006 and is targeted for completion in 2009-2010. A Draft EIS will be released to the public for comment in 2009. Please contact Natural Resource Specialist Ken Ferebee on 202-895-6221 if you have any questions or require additional information. Thank you for your assistance.

Sincerely,

Adrienne A. Coleman,
Superintendent, Rock Creek Park

Enclosure:
Rock Creek Park brochure

COPY FOR YOUR INFORMATION

References

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PERSONAL COMMUNICATIONS

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2011e Personal communication with Nancy Van Dyke, The Louis Berger Group, Inc., via telephone, regarding injuries related to deer management, April 18, 2011.

2011f Personal communication with Nancy Van Dyke, The Louis Berger Group, Inc., via multiple emails, regarding visitation to certain locations within park, June 13 and June 19, 2011.

Gunther, R. Rock Creek Park

2007 Personal communication with Lori (Gutman) Fox, the Louis Berger Group, Inc., regarding park visitation numbers and visitor safety. August 16 2007.

2008 Personal communication with Nancy Van Dyke, the Louis Berger Group, Inc., regarding recent accident statistics. April 8, 2008.

Hamilton, William

2008 Personal communication with Nancy Van Dyke, the Louis Berger Group, Inc., regarding Montgomery County managed deer hunts. January 11, 2008.

Illige, Laura. National Park Service, Rock Creek Park

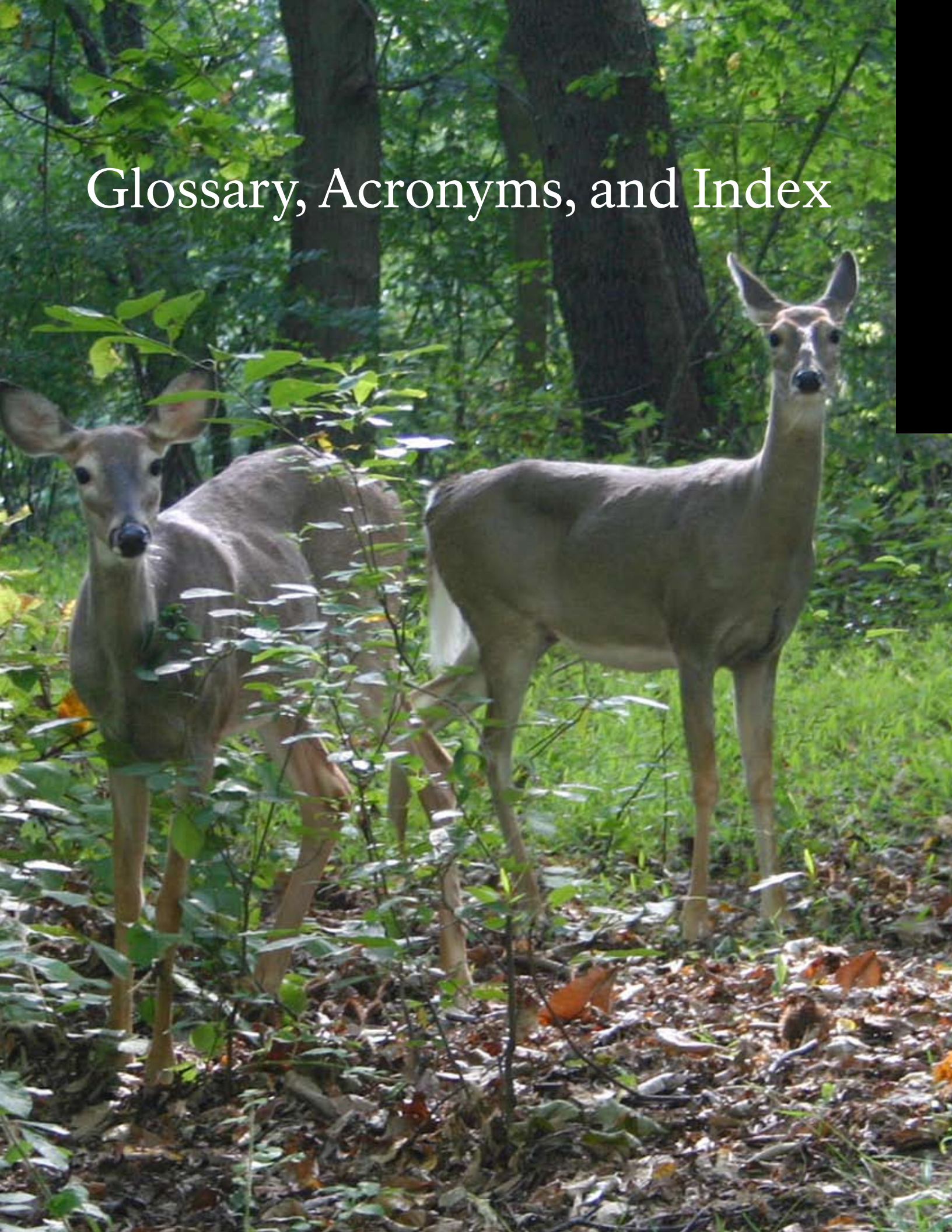
2005 Personal communication with Lori (Gutman) Fox, the Louis Berger Group, Inc., August 25, 2007.

Pavek, Diane

2008 Personal communication with Nancy Van Dyke, The Louis Berger Group, and Melissa Behrent, NPS EQD, regarding Palisades neighborhood airplane flyovers. September 12, 2008.

Sherald, Jim
2008 Personal communication with Ken Ferebee, NPS Rock Creek Park., regarding Watershed Condition Assessments. July 9, 2008.

Glossary, Acronyms, and Index



GLOSSARY

Action Alternative — An alternative that proposes a different management action or actions to address the purpose, need, and objectives of the plan; one that proposes changes to the current management. Alternatives B, C, and D are the action alternatives in this planning process. See also: "No-Action Alternative."

Adaptive Management — The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from research and the period evaluation of management actions and the conditions they produce to either reinforce the viability of objectives, strategies, and actions prescribed in a plan or to modify strategies and actions in order to more effectively accomplish management objectives.

Affected Environment — A description of the existing environment that may be affected by the proposed action (40 CFR 1502.15).

Antibody — An immunoprotein that is produced by lymphoid cells in response to a foreign substance (antigen), with which it specifically reacts.

Antigen — A foreign substance, usually a protein or polysaccharide, which stimulates an immune response upon introduction into a vertebrate animal.

Anthracnose — Any of several plant diseases caused by certain fungi and characterized by dead spots on the leaves, twigs, or fruits.

Biobullet — A single dose, biodegradable projectile comprised of an outer methylcellulose casing containing a solid, semi-solid, or liquid product (usually a vaccine or chemical contraceptive), propelled by a compressed-air gun.

Blight — Any of numerous plant diseases that result in sudden and conspicuous wilting and dying of affected parts, especially young growing tissues.

Bluetongue Virus — An insect-transmitted, viral disease of ruminant animals, including white-tailed deer, which causes inflammation, swelling, and hemorrhage of the mucous membranes of the mouth, nose, and tongue.

Browse Line — A visible delineation at approximately six feet below which most or all vegetation has been uniformly browsed.

Caging — Small scale fencing that is placed around individual plants to protect them from deer browsing; caging is common to all alternatives in this document.

Carrying Capacity — The maximum number of organisms that can be supported in a given area or habitat.

Cervid — A member of the deer family, such as white-tailed deer, mule deer, elk, moose, and caribou.

Chronic Wasting Disease (CWD) — A slowly progressive, infectious, self-propagating neurological disease of captive and free-ranging deer, elk, and moose. CWD belongs to the transmissible spongiform encephalopathy (TSE) group of diseases and is characterized by accumulations of abnormal prion proteins in neural and lymphoid tissue.

Contragestive — A product that terminates pregnancy.

Cultural Landscape — A geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

Cumulative Impacts — Those impacts on the environment that result from the incremental effect of the action when added to the past, present, and reasonable foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Deer Herd — The group of deer that have common characteristics and interbreed among themselves. For the purposes of this plan, this term is synonymous with deer population.

Deer Population — See Deer Herd, above.

Demographic — Referring to the intrinsic factors that contribute to a population's growth or decline: birth, death, immigration, and emigration. The sex ratio of the breeding population and the age structure (the proportion of the population found in each age class) are also considered demographic factors because they contribute to birth and death rates.

Depredation — Damage or loss.

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

Distance Sampling — An analytical method to estimate population density that involves an observer traveling along a transect and recording how far away objects of interest are.

Endemic — Native to or confined to a particular region.

Ecosystem — An ecological system; the interaction of living organisms and the nonliving environment producing an exchange of materials and energy between the living and nonliving.

Epizootic Hemorrhagic Disease (EHD) — An insect-borne viral disease of ruminants that causes widespread hemorrhages in mucous membranes, skin, and visceral organs.

Environment — The sum total of all biological, chemical, and physical factors to which organisms are exposed; the surroundings of a plant or animal.

Environmental Assessment (EA) — A concise public document, prepared in compliance with NEPA, that briefly discusses the purposes and need for an action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Environmental Consequences — Environmental effects of project alternatives, including the proposed action, any adverse environmental effects which cannot be avoided, the relationship between short term uses of the human environment, and any irreversible or irretrievable commitments of resources which would be involved if the proposal should be implemented (40 CFR 1502.16).

Environmental Impact Statement (EIS) — A detailed written statement required by Section 102(2)(C) of NEPA, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short term uses of the environment versus the maintenance and enhancement of long term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

Ethnographic Resource — Any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

Euthanasia — Ending the life of an animal by humane means.

Exclosure — A large area enclosed by fencing to keep out deer and allow vegetation to regenerate.

Exotic Species — Any introduced plant, animal or protist species that is not native to the area and may be considered a nuisance; also called non-native or alien species.

Extirpated Species — A species that is no longer present in an area where it once lived.

Exsanguination — The action or process of draining blood.

Fenced Plot — An area enclosed by a fence to keep deer out so vegetation can grow without the influence of deer browsing.

Folliculogenesis — the maturation of the ovarian follicle (see below)

Follicle — one of the small ovarian sacs containing an immature egg

Follicle Stimulating Hormone — a hormone synthesized and secreted by the pituitary gland that (in females) stimulates the growth of immature follicles to maturation.

Forest Regeneration — For the purposes of this plan, the regrowth of forest species and renewal of forest tree cover such that the natural forest sustains itself without human intervention.

Genetic Variability — The amount of genetic difference among individuals in a population.

Habitat — The environment in which a plant or animal lives (includes vegetation, soil, water, and other factors).

Hectare — A metric unit of area equal to 2.471 acres.

Herbaceous Plants — Non-woody plants; includes grasses, wildflowers, and sedges and rushes (grass-like plants).

Herbivore — An animal that eats a diet consisting primarily of plant material.

Histopathology — The study of the microscopic anatomical changes in diseased tissue.

Home Range — The geographic area in which an animal normally lives.

Hypothesis — A tentative explanation for an observation or phenomenon that can be tested by further investigation.

Immunocontraception — The induction of contraception by injecting an animal with a compound that produces an immune response that precludes pregnancy.

Immunocontraceptive — A contraceptive agent that causes an animal to produce antibodies against some protein or peptide involved in reproduction. The antibodies hinder or prevent some aspect of the reproductive process.

Impairment (NPS Policy) — As used in NPS Management Policies, "impairment" is an impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is necessary to fulfi ll specifi c purposes identified in theestablishing legislation or proclamation of the park, or key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or identifi ed in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment (Clean Water Act) — As used in conjunction with the Clean Water Act and associated state water quality programs, a water body is "impaired" if it does not meet one or more of the water quality standards established for it. This places the water body on the "impaired waters list", also known as the "303(d) list" for those pollutants that exceed the water quality standard.

Infrared — The range of invisible radiation wavelength just longer than the red in the visible spectrum.

Irretrievable — A term that applies to the loss of production, harvest, and consumptive or nonconsumptive use of natural resources. For example, recreation experiences are lost irretrievably when

an area is closed to human use. The loss is irretrievable, but the action is not irreversible. Reopening the area would allow a resumption of the experience.

Irreversible — A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.

Landscape/Habitat Fragmentation — The breaking up of large, contiguous blocks of habitat or landscape into small, discontinuous areas that are surrounded by altered or disturbed lands.

Leuprolide — A reproductive control agent that prevents secondary hormone secretion, which stops the formation of eggs and ovulation. Leuprolide is a GnRH agonist (see appendix D for additional details).

Luteinizing Hormone — a hormone which triggers ovulation in females.

Monitoring — A process of collecting information to evaluate if an objective and/or anticipated or assumed results of a management plan are being realized (effectiveness monitoring) or if implementation is proceeding as planned (implementation monitoring).

National Environmental Policy Act of 1969 — A law that requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and utilize public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and prepare appropriate NEPA documents to facilitate better environmental decision making. NEPA requires Federal agencies to review and comment on Federal agency environmental plans/documents when the agency has jurisdiction by law or special expertise with respect to any environmental impacts involved (42 U.S.C. 4321-4327) (40 CFR 1500-1508).

Naturally Regenerating and Sustainable Forest — A forest community that has the ability to maintain plant and animal diversity and density by natural (non-human facilitated) tree replacement.

No-Action Alternative — The alternative in which baseline conditions and trends are projected into the future without any substantive changes in management (see CEQ 1981, Question 3). Alternative A is the no-action alternative in this planning process.

Opportunistic Surveillance — Taking diagnostic samples for CWD testing from deer found dead or harvested through a management activity within a national park unit.

Paired Plot — Two plots used for monitoring that include a fenced and an unfenced plot.

Palatability — The property of being acceptable to the taste or sufficiently agreeable in flavor to be eaten.

Parasitism — A symbiotic relationship in which one species, the parasite, benefits at the expense of the other, the host.

Penetrating Captive Bolt Gun — A gun with a steel bolt that is powered by either compressed air or a blank cartridge. When fired, the bolt is driven into the animal's brain and renders it instantly unconscious without causing pain.

Population (or Species Population) — A group of individual plants or animals that have common characteristics and interbreed among themselves and not with other similar groups.

Prion — Protinaceous infectious particle; a microscopic particle similar to a virus but lacking nucleic acid, thought to be the infectious agent for certain degenerative diseases of the nervous system such as CWD.

Record of Decision (ROD) — A concise public record of decision prepared by a federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives, a statement

as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Recruitment — Number of organisms surviving and being added to a population at a certain point in time.

Reproductive Control — A method or methods used to limit the numbers of animals in a population by decreasing the reproductive success of the animals, such as contraception or sterilization.

Rut — An annually recurring condition or period of sexual excitement and reproductive activity in deer; the breeding season.

Sapling — A young tree, generally not over 4 inches in diameter at breast height.

Scoping — An early and open process for determining the extent and variety of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).

Seedling — A young plant grown from seed; a young tree before it becomes a sapling.

Seral — A phase in the sequential development of a climax community.

Sex Ratio — The proportion of males to females (or vice versa), in a population. A sex ratio of 50:50 would mean an equal number of does and bucks in a deer population.

Sharpshooting — The authorized shooting of animals by specially trained professionals using appropriate weapons for means of effective and efficient lethal control.

Species Diversity — The variety of different species present in a given area; species diversity takes into account both species richness and the relative abundance of species.

Species Richness — The number of species present in a community.

Spotlight Survey — A method used to estimate deer numbers in an area by shining spotlights at night and counting the number of deer observed. This technique provides an estimate of deer numbers but not density.

Sterilization — a surgical technique leaving a male or female unable to reproduce.

Targeted Surveillance — Lethal removal of deer that exhibit clinical signs of CWD, such as changes in behavior and body condition, and testing to determine if CWD is present.

Transect — A line along which sampling is performed.

Transmissible Spongiform Encephalopathies (TSEs) — A group of diseases characterized by accumulations of abnormal prion proteins in neural and lymphoid tissues, which cause distinctive lesions in the brain and result in death.

Turbidity — Visible undissolved solid material suspended in water.

Unfenced Plot — A specific unfenced area that allows effects on deer browsing to be seen and to be measured.

Ungulate — A hoofed, typically herbivorous, animal; includes horses, cows, deer, elk, and bison.

Vaccine — A suspension of killed or attenuated microorganisms that, when introduced into the body, stimulates an immune response against that microorganism.

Vascular Plant — A plant that contains a specialized conducting system consisting of phloem (food-conducting tissue) and xylem (water-conducting tissue). Ferns, trees, and flowering plants are all vascular plants.

Viable White-tailed Deer Population — A population of deer that allows the forest to naturally regenerate, while maintaining a healthy deer population in the park.

Woody Plants — Plants containing wood fibers, such as tress and shrubs (see "Herbaceous Plant").

ACRONYMS

APHIS	Animal and Plant Health Inspection Service
ATF	Alcohol, Tobacco, and Firearms
AVMA	American Veterinary Medical Association
BSE	bovine spongiform encephalopathy (mad cow disease)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CJD	Creutzfeldt-Jakob disease
CLI	cultural landscape inventory
CLR	cultural landscape report
CSO	combined sewer overflow
CWD	chronic wasting disease
dB	decibel
dBa	A-weighted decibel scale
DC	District of Columbia
DCDOH	District of Columbia Department of Health
DM	Departmental Manual
DO	Director's Order
EA	Environmental Assessment
EHD	Epizootic Hemorrhagic Disease
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDA	U.S. Food and Drug Administration
FEMA	Federal Emergency Management Agency
FLIR	Forward Looking Infrared Surveys
FMP	Fire Management Plan
FSH	follicle stimulating hormone
GCIV	GonaCon™ immunocontraceptive vaccine
GIS	Geographic Information System
GMP	general management plan
GnRH	gonadotropin releasing hormone
IHC	immunohistochemistry

K	soil erodibility factor
Ldn	day-night average sound level
LH	luteinizing hormone
LTCP	long-term control plan
M-NCPPC	Maryland National Capital Park and Planning Commission
NBS	National Biological Survey
NCPC	National Capital Planning Commission
NCR	National Capital Region
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIST	National Institute of Standards and Technology
NPS	National Park Service
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
PEPC	Planning, Environment, and Public Comment
PFO1	palustrine forested broad-leaved deciduous
plan/EIS	White-tailed Deer Management Plan and Environmental Impact Statement
PZP	porcine zona pellucida
SOF	Statement of Findings
TMDL	Total Maximum Daily Load
TSE	transmissible spongiform encephalopathy
USC	United States Code
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture – Wildife Services
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USPP	U.S. Park Police
WASA	D.C. Water and Sewer Authority

INDEX

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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