



RECORD OF DECISION

Final White-tailed Deer Management Plan and Environmental Impact Statement

Cuyahoga Valley National Park, Ohio

INTRODUCTION

The Department of the Interior, National Park Service (NPS), has prepared this Record of Decision (ROD) for the Cuyahoga Valley National Park Final White-tailed Deer Management Plan and Environmental Impact Statement (final plan/EIS). This ROD clearly identifies and describes the selected action/decision, including mitigation measures; describes the other alternatives considered and analyzed in detail; identifies the environmentally preferable alternative; and includes a brief discussion of the rationale for the decision reached. A non-impairment determination for the selected action, which is required by NPS *Management Policies 2006* (NPS 2006), is appended to this ROD. Complete references for in-text citations used in the ROD and the non-impairment determination are included in the final plan/EIS.

PURPOSE AND NEED FOR THE PLAN/EIS

The purpose of the plan/EIS is to develop a white-tailed deer management plan that supports long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources in Cuyahoga Valley National Park. The white-tailed deer is a native species of Ohio and is a component of the natural ecosystems that are protected and maintained by the NPS. Past and current changes in land use and habitat availability, as well as changes in predator populations and hunting activity, have affected the deer population in the Cuyahoga Valley and surrounding area. After being nearly extirpated in the late 1800s and early 1900s, the Ohio deer population began to recover due to emigration, transplant activities, changes in land use, and herd management, as well as decreased mortality due to declines in natural predation (McCabe and McCabe 1984). Deer density has varied and has decreased in many areas of the park in recent years, but there are large annual fluctuations and the densities remain above levels considered desirable for forest regeneration.

Studies show that excessive deer browsing reduces forest regeneration, resulting in adverse changes to forest structure and composition, and to wildlife habitat. Long-term ecological monitoring and exclosure studies at the park have found that deer browsing is severely impeding the growth of seedlings, limiting the height of tree seedlings, and suppressing the growth of native groundcover. Deer browsing has also been found to be related to a lower abundance of forest songbirds. Because the population of the deer herd has grown and continues to exist at relatively high densities that can have adverse effects on the park's vegetation, action is needed to provide the park with a long-term plan to address deer management and to ensure the following:

- Deer do not become the dominant force in the ecosystem adversely impacting forest regeneration, sensitive vegetation, and other wildlife.

- Natural distribution, abundance, and diversity of plant and animal species are not adversely affected by the large number of white-tailed deer in Cuyahoga Valley National Park.
- Declining forest regeneration is addressed and deer browsing does not continue at a level that eliminates or substantially reduces forest regeneration, and that unacceptable adverse changes to wildlife habitat and forest structure and composition do not occur.
- The park's cultural landscape preservation goals and mandates are not compromised by the large number of white-tailed deer in Cuyahoga Valley National Park.
- Deer management actions are coordinated with other jurisdictional entities and other stakeholders.

The objectives of the final plan/EIS are listed below.

MANAGEMENT METHODOLOGY

- Develop and implement informed, scientifically defensible vegetation and wildlife impact levels and corresponding measures of deer population size that would serve as thresholds for taking adaptive management actions in the park.

WILDLIFE AND WILDLIFE HABITAT

- Reduce adverse effects of deer behavior, including browsing, trampling, and seed dispersal, on the natural abundance, distribution, and diversity of native wildlife species within the park.
- Protect habitat of wildlife species of concern, including rare, threatened, or endangered species, from adverse impacts related to deer behavior, including browsing, trampling, and seed dispersal.
- Maintain a viable white-tailed deer population within the park while protecting other park resources.

VEGETATION

- Reduce adverse effects of deer behavior, including browsing, trampling, and seed dispersal, on the natural abundance, distribution, and diversity of native plant species.
- Protect native plant species of concern, including rare, threatened, or endangered species, from adverse impacts related to deer behavior, including browsing, trampling, and seed dispersal.
- Reduce adverse effects of deer behavior on native plant species through dispersal, spread, and facilitation of exotic, invasive species.

CULTURAL RESOURCES

- Protect the integrity, variety, and character of the rural landscape by minimizing the effects of deer behavior on the rural landscape.

VISITOR EXPERIENCE

- Enhance public awareness and understanding of NPS resource management issues, policies, and mandates, especially as they pertain to deer management.

- Ensure that visitors have the opportunity to view deer in the natural environment at population levels that do not adversely impact visitors' enjoyment of other native species in the natural landscape.

DESIRED CONDITIONS

The desired conditions for the park, which are connected to the purpose, need, and objectives of the final plan/EIS are as follows:

Sustainable forest - a mature eastern deciduous forest with adequate native regeneration and understory growth and minimal invasive species growth.

Viable deer population - one that is balanced; that is, it has representation of all age classes and a sex ratio that ensures long-term reproductive success.

BACKGROUND

Cuyahoga Valley National Park began to address the issues associated with excessive deer numbers and overbrowsing impacts over 20 years ago, and since then has been conducting studies of both deer density and the effects of deer browsing on park resources. The following describes some of that history leading up to the decision to develop a long-term deer management plan.

In 1993 a deer management task force was established by the Cuyahoga Valley Communities Council to identify the nature and extent of problems caused by deer and to recommend appropriate solutions. The task force included the park (at that time Cuyahoga Valley National Recreation Area), along with 11 representatives from six local municipalities and townships, both municipal park districts (Cleveland Metroparks and Summit Metro Parks), the Ohio Farm Bureau, and the Ohio Department of Natural Resources (ODNR). The purpose of the partnership was to work together to foster communication, realize opportunities, and resolve problems for the mutual benefit of its members (Shafer-Nolan 1997). The task force studied the issue of the deer population within a 178-square-mile area of concern that was centered on the park and included public and private lands. Its recommendations, which were first presented to Cuyahoga Valley Communities Council in 1996 (NPS 2002d), consisted of four methods of deer population control:

- Public sport hunting in areas where legal, practical, feasible, and safe;
- Specially controlled hunting on isolated land areas of greater than 5 acres;
- Sharpshooting in areas not suitable for public sport hunting or specially controlled hunting; and
- Capture/euthanasia in developed areas where other methods are not practical or safe (NPS 1997a).

The task force recommended deer population control within the area of concern because:

- Measures to reduce human conflicts with deer would help, but were not sufficient;
- The extent of damage to residential gardens, landscaping, and farm crops and the number of roadway accidents supported the need to reduce the deer population;

- The density of the deer population exceeded the level at which substantial impacts on natural resources were associated, and it was well within the range at which intolerable conflicts with human activities were associated; and
- There was public support for deer population control. A task force public survey found that 52 percent of respondents agreed that problems warranted control; however, the survey item did not suggest a type of control method (NPS 1997a).

Following the task force recommendations, the NPS completed an *Environmental Assessment and Management Plan for White-tailed Deer* (NPS 1997a). The Animal Protection Institute and other animal advocacy groups challenged that plan in U.S. District Court (*Animal Protection Institute v. Stanton*, Civil Action No. 97-2563; D.D.C. Dec. 10, 1997). On December 10, 1997, the court granted a preliminary injunction against the proposed deer removal. Shortly thereafter, the NPS withdrew the plan (and the plaintiffs agreed to the dismissal of the case). However, deer management efforts, primarily sharpshooting activities, have been undertaken by neighboring agencies, including the Metroparks organizations and adjacent municipalities. Existing planning documents for the park do not specifically address deer management; thus, no deer management actions have been implemented by the park other than surveying and monitoring actions, and the need for a long-range plan still exists due to continued deer-related damage.

DECISION (SELECTED ACTION)

DEER MANAGEMENT

The NPS decision is to implement alternative D (hereinafter referred to as the “selected action”), which was identified as the NPS preferred alternative in the final plan/EIS. The selected action will utilize an adaptive management strategy, which is described below and in Section 2.8 of the final plan/EIS. Under the selected action, the NPS will continue current park deer management actions including: research, monitoring, and data management; protection of restoration plantings; education and coordination; and enforcement of the existing wildlife feeding ban as described in the final plan/EIS in Section 2.3. In addition, the NPS will incorporate a combination of lethal and nonlethal actions to address high deer density. Lethal actions (including sharpshooting, with very limited capture/euthanasia if necessary) will be taken initially to reduce deer densities quickly. It is anticipated that in years one through four, 335 deer will be removed by sharpshooting (in addition to small numbers of deer removed by capture and euthanasia) to meet the deer density goal described below. Population maintenance will follow the initial reduction, and could be conducted by nonsurgical reproductive control methods, if an acceptable agent is available, or by sharpshooting. Both maintenance methods are included in the selected action to maintain maximum flexibility for future management. All actions will be carried out by NPS personnel or authorized agents, as described in Section 2.4 of the final plan/EIS.

Before an action can be implemented, the park must first determine (1) where an action needs to be taken, (2) when the action needs to be taken (i.e., when an action threshold is reached), and (3) how many deer will need to be treated or removed. The following discussion describes the deer management zones established within the park, the threshold for taking action (which is related to vegetation damage from deer browsing), and the deer density goal (which will be used to determine the number of deer that will be treated or removed).

DEER MANAGEMENT ZONES

Deer management actions may be implemented independently within any of the five deer management zones as shown in “Figure 1-2: Cuyahoga Valley National Park Deer Management Zones,” in Chapter 1 of the final plan/EIS. The deer management zones are numbered counter-clockwise starting at the north end of the park. Zone 1 (3,219 acres) covers the northern finger of the park. Zones 2 and 5 are generally located north of I-80, with zone 2 (2,751 acres) to the west of the Cuyahoga River and zone 5 (3,355 acres) to the east. Zones 3 and 4 are south of I-80, with zone 3 (7,258 acres) to the west of the river and zone 4 (9,553 acres) to the east. These deer management zone boundaries are defined along existing divides, such as roads and the river, and are consistent with vegetation monitoring zones. They logically subdivide deer survey routes into relatively equal units that allow for the best density estimation.

These deer management zones may be modified as necessary to accommodate for changes in monitoring needs. For instance, adjustments to these deer management zones (such as the number and size of the zones) may be made to maintain sufficient sample sizes of deer surveyed in a given zone to determine accurate densities.

THRESHOLD FOR TAKING ACTION

Because the deer population will be managed based on the success of forest regeneration, vegetation will be monitored to determine at what point browsing impacts warrant actions to reduce deer impacts. The point at which action is needed is called the threshold for taking action, or the action threshold. A two-level threshold to incorporate both herbaceous and woody plant metrics, as recommended by the science team, is included in the selected action. The first threshold is a level of concern, defined as when more than 25 percent of the plots monitored for either the herbaceous plant or the woody plant metric indicate that regeneration is insufficient. The second threshold is a level of action, defined as when more than 50 percent of the plots monitored for either metric indicate insufficient regeneration, or when more than 25 percent of the monitored plots for both metrics (herbaceous plants and woody plants) indicate insufficient regeneration. Appendix B in the final plan/EIS provides more detail on the data to be collected for each plant community.

The following provides information about the metrics that have been selected to assess the status of both herbaceous and woody vegetation and how the monitoring results will be used to determine if action is necessary to reduce deer impacts. Additional details about the threshold for taking action are included in Section 2.2 of the final plan/EIS.

Herbaceous Plant Metric: Mean Stem Height of Mature Trillium Plants

This metric is designed to measure the success of forest regeneration by monitoring the growth and reproduction of herbaceous understory vegetation. Trillium, a perennial that occurs in the understory of deciduous woodlands throughout the Great Lakes region, was recommended by the science team and selected as the species to be used as the indicator of deer browsing impacts. It was selected because it is both a preferred browsing species and a species that needs to reach stem heights of 4.7 to 5.5 inches for successful reproduction (Anderson 1994). Repeated browsing of plants results in progressively smaller individuals. Because plants must attain a minimum size to reproduce (Hanzawa and Kalisz 1993; Anderson 1994), and because deer preferentially browse on larger and flowering plants (Anderson 1994), the number of plants in flower also decreases with increasing browsing intensity. The park currently has 26 trillium monitoring plots (paired)—7 plots within zone 3, 13 in zone 4, and 6 in zone 5. Because there are no trillium monitoring plots in zones 1 and 2, for this metric to be used as an action threshold in all

management zones, the park will add 4 to 6 trillium monitoring plots to both zones 1 and 2 (8 to 12 additional plots in total, each 1 square meter (about 11 square feet) in size).

Woody Plant Metric: Change in Growth of Tallest Seedling

This metric has been selected to measure the success of forest regeneration by monitoring the change in growth of selected, native tree seedlings. Seedling growth is measured by the change in the height of the tallest seedling in each plot from one sampling period to the next (NPS 2002b). Little growth or zero growth indicates the need to take action to reduce deer browse. Seedling growth will be monitored with paired plots in each deer management zone. This metric will use 12 existing paired plots (fenced/unfenced) in bottomland and upland, which are monitored every 3 years. (Existing plots are located as follows: 1 plot in zone 1, 2 in zone 2, 4 in zone 3, 2 in zone 4, 3 in zone 5). This metric will require the park to add 13 additional plots (10 × 10 meter (about 33 feet) exclosures), resulting in a total of 5 plots per zone. The monitoring protocol to be used for determining when to take action is included in Appendix B of the final plan/EIS.

INITIAL DEER DENSITY GOAL

The deer density goal for Cuyahoga Valley National Park is defined as the number of deer per square mile that will allow for natural forest regeneration and restoration of native species. Based on the science team's recommendation, the park selected a range of 15 to 30 deer per square mile as the initial deer density goal. The park believes this is appropriate for the initial goal, given the variability of current deer densities within the different deer management zones in the park. The range is supported by recent findings and research for regeneration in forest types similar to those in Cuyahoga Valley National Park. This goal may be adjusted based on the results of vegetation and deer population monitoring, as described in Section 2.8 of the final plan/EIS.

METHODS

Sharpshooting

Direct reduction by sharpshooting will be used to initially reduce the deer population and as a possible maintenance treatment. Qualified federal employees or contractors will be used to implement the selected action. All employees and contractors assisting with sharpshooting activities will have the appropriate training, will be experienced with sharpshooting methods, and will have the necessary sharpshooting qualifications. They typically will 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-powered, small-caliber rifles will be used from close range. Non-lead ammunition will be used for any lethal removal of deer, whether for culling or for dispatching sick or wounded wildlife. The use of non-lead ammunition for these activities, whether by contract or NPS staff, will preserve the opportunity to donate the meat or to leave it in the field for scavenging wildlife. Every effort will be made to make the lethal removal as humane as possible. Deer injured during the operation will be put down as quickly as possible to minimize suffering. Noise suppression devices (silencers) and night vision equipment will be used, as necessary, to reduce disturbance to the public. Activities will comply with all federal firearm laws administered by the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF).

Sharpshooting will primarily occur at night (between dusk and dawn) during late fall and winter months when deer are more visible and few visitors are in the park. In some areas, sharpshooting might be conducted during the day or at other times of year if needed to maximize effectiveness and minimize overall time of visitor restrictions. Areas could be temporarily closed to park visitors, and NPS park rangers will patrol public areas to ensure compliance with park closures and public safety measures. The public will be notified of any park closures in advance. Information regarding deer management will be available at visitor contact facilities, and information will be posted on the park's website to inform the public of deer management actions. If more than one shooting location is used, areas will be adequately separated to ensure safety.

Bait stations could be used to attract deer to safe removal locations and will consist of small grains, apples, hay, or other food placed on the ground. The stations will 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 will vary depending on the type of bait (e.g., corn, apples) used and the number of deer in the immediate area.

Number of Deer Removed

Based on the 2013 survey, the park deer population is estimated at 1,632 deer. Park staff will determine the number of deer to be removed from the park based on the most recent population survey and the initial deer density goal of 15 to 30 deer per square mile, as well as experience by Cleveland Metroparks and other deer management programs. Based on parkwide deer density, it is estimated at this time that about four years will be required to reach the midpoint of the desired deer density goal, given the number of deer that could be successfully removed.

Several factors could influence the actual number of deer removed, the zones targeted for removal, and actual densities within the zones. For example, if deer densities remain lower in all zones except zone 5, efforts to remove deer and the desired removal number would likely be set higher for zone 5, where densities have been between 60 and 80 deer per square mile over many years and deer density remains high. Removals could be concentrated in zones where vegetation monitoring continues to show the most severe adverse impacts on herbaceous and/or woody vegetation. Several factors could influence the number of years required to reach the initial deer density goal. As the deer population decreases through successful reduction efforts, deer might become adapted to the sharpshooting 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 are higher and mortality lower than estimated, the population growth would be greater, and more deer will need to be removed; this will potentially increase the time to reach the initial density goal or call for a greater number of deer to be removed, if feasible given available resources. The converse will be true if reproduction rates are lower and mortality rates higher than estimated, resulting in fewer deer having to be removed and the deer density goal being reached in less time. Immigration of deer into the park could also have an effect on the number of deer to be removed (Porter, Underwood, and Woodard 2004). Thus, monitoring will be an essential part of the selected action, and management actions could be adjusted as described in Section 2.8 of the final plan/EIS.

The number of females in the population will also influence reproduction rates. Because does will be preferentially removed (see "Gender Preference" below), reproduction rates should decrease because fewer females will be reproducing.

Gender Preference

Both does and antlered deer (bucks) will be removed based on opportunity, although there will be a preference for removing does because this will reduce the population level more efficiently over the long term. Buck-only removal will not control population growth, as deer populations are largely dependent on the number of does with potential for reproduction (West Virginia University 1985). Records will be kept on the age and gender of all deer removed from the park to aid in defining the local population composition.

Capture and Euthanasia

Capture and euthanasia will be implemented sparingly in areas where sharpshooting is not possible or in circumstances where sharpshooting is not appropriate due to safety or security concerns. This procedure will include trapping or immobilizing deer using a technique designed to create the least amount of stress. It is assumed that 15 deer will be removed using this method in each year.

The preferred technique for this method will be for qualified federal employees or authorized agents to trap deer, approach them on foot, and euthanize them. Activities will primarily occur at dawn or dusk when fewer visitors are in the park.

Because capture and euthanasia will typically result in increased stress levels in captured deer compared to sharpshooting, this method of population control will be used only in select situations and will supplement the sharpshooting method described earlier only when necessary. The number of deer removed by capture and euthanasia will be recorded, as well as the age and sex of the deer, location of removal, circumstances requiring capture and removal, and lethal method used.

Capture Methods

Deer will be captured with nets or traps, similar to the trapping described under the “Nonsurgical Reproductive Control of Does” section below. The method of capture will be selected based on the specific circumstances (e.g., location, number of deer, accessibility, and reasons why sharpshooting is not advised) for each deer or group to be removed. Deer could also be immobilized by darting with a tranquilizer gun in cases where deer are not successfully attracted to a trap area (Schwartz et al. 1997).

Euthanasia Methods

Euthanasia methods will be in accordance with the most recent guidelines on euthanasia from the American Veterinary Medical Association, and could include a combination of firearm techniques, penetrating captive bolt gun and potassium chloride, or other humane techniques. If for some reason the firearm technique or penetrating captive bolt gun could not be used to euthanize a trapped animal, injecting a lethal dose of a drug (under supervision of a veterinarian or NPS park practitioner) could be used (AVMA 2013). However, if chemicals are used either for immobilization or for euthanasia, it will not be possible to donate the meat from that animal as food, and the carcass might be unsuitable for surface disposal. In this case, the carcasses will be taken to a local landfill as described in Section 2.4 of the final plan/EIS.

Qualifications/Training

NPS staff and authorized agents trained in the use of penetrating captive bolt guns, firearms, or tranquilizer guns will perform these euthanasia actions. Training will include safety measures to protect authorized agents, visitors, and NPS employees. Authorized agents may also need to be qualified to

handle live deer in order to prevent disease transmission and prevent any harm to the handler. Appropriate safety measures will be followed when setting drop nets or box traps.

Nonsurgical Reproductive Control

Nonsurgical reproductive control could be implemented to maintain the deer population at the deer density goal following the initial reduction of the deer population and when an acceptable nonsurgical reproductive control agent becomes available, as described below. The number of does to be treated will depend on the actual deer density at the time nonsurgical reproductive control is implemented.

The population will continue to be monitored for growth. If the deer population increases during the time reproductive control is used, periodic direct reduction may need to be conducted in conjunction with the reproductive control to maintain the population density at the identified goal.

The success of implementing reproductive control on a population that has undergone direct reduction for several years will depend on advances in reproductive control technology, sensitivity of the deer herd to humans, methods used by the sharpshooters in direct reduction, methods used to administer reproductive control agents, changes in immigration with reduced deer density, and general deer movement behavior (Porter, Underwood, and Woodard 2004; Naugle et al. 2002).

Nonsurgical Reproductive Control Agents

Several nonsurgical reproductive control agents are currently being developed and tested for use in deer population control (Fagerstone et al. 2010). Those that could be considered for use are described briefly in Table 2-3 and discussed in more detail in Appendix D of the final plan/EIS, which provides an overview of reproductive control technologies for deer management. Particular product names were included in the final plan/EIS for analysis purposes only. The NPS is not limited to using the particular products listed or analyzed in the final plan/EIS and will evaluate products based on the criteria in Table 1 below to determine whether a suitable agent exists for park implementation.

If reproductive control is used, female deer will be treated with a chemical reproductive control agent to reduce population growth. The status of research related to nonsurgical reproductive control technologies provides highly variable results related to key elements such as efficacy and duration of contraceptive effect. There are also logistical issues related to the administration of these drugs that could affect success of implementation and sustainability of a reproductive control program at the park. Therefore, only when the criteria listed in Table 1 below are met will reproductive control be implemented as a management technique.

Table 1

Reproductive Control Agent Criteria	Rationale for Criteria
1. 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.
2. The agent provides multiyear (3-5 years) efficacy.	Modeling efforts have clearly demonstrated that (1) “the efficacy of fertility control as a management technique depends strongly on the [multiyear] 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 multiyear efficacy is achieved (Hobbs, Bowden, and Baker 2000).
3. The agent can be administered through remote injection.	Remote delivery reduces the frequency of stressful capture and/or drug delivery operations. Capture will be necessary for the initial application because the animals will need to be marked, but the agent should be able to be delivered remotely for any subsequent doses.
4. The agent will leave no hormonal residue in the meat (i.e., meat derived from treated animals should be safe for human consumption according to applicable regulatory agencies and safe for consumption by other animals).	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 consumption by humans and other animals.
5. Overall, use of the agent results in an acceptable level of reduction in the free-ranging deer population with limited behavioral impacts.	No study has demonstrated that fertility control works to reduce deer numbers in free-ranging populations to the extent needed at the park to allow for tree regeneration, so it is important that the ability to successfully reduce a free-ranging deer population be demonstrated. Also, it is important that any agent used meet NPS policies, including those regarding altered behavior (NPS 2006, Section 4.4.1).

No reproductive control agents are currently available that meet all of these criteria; however, some of the criteria are met by certain agents. It is possible that an agent that meets all the criteria could be developed during the lifetime of this plan. The use of any reproductive control agents for population management will require approval from the Environmental Protection Agency (EPA). The NPS will monitor the status of ongoing reproductive control research on a periodic basis through consultation with subject matter experts and review of new publications. When there are advances in technology that could benefit deer management in the park, the choice of an appropriate agent will be determined based on how well the criteria above are met, availability, cost, efficacy, duration, safety, and feasibility.

Administration of Reproductive Control

Timing of Application—Timing of application will depend on the agent used; however, many of the current agents require administration prior to the breeding season. Actual timing and frequency of administration may be adjusted based on the efficacy of the agent used. If long-term studies show that efficacy is prolonged with repeated vaccinations, reapplication may be less intensive than currently anticipated. Administration of any reproductive control agent will most likely be done during the months of late October through March, because this is when the deer are easier to capture, when the least number of visitors will be in the park, and when there will be less stress on the deer. Summer months will be avoided because of potential heat stress on the deer.

Number of Does Treated—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 percent in urban deer populations. Based on research of reproductive control in a free-ranging deer population, it will be necessary to treat at least 90 percent of the does annually in order to begin to reduce population growth (Hobbs, Bowden, and Baker 2000; Rudolph, Porter, and Underwood 2000). The number of does to be treated will depend on the actual deer density at the time nonsurgical reproductive control is implemented.

Application Procedures

If reproductive control is used, does will need to be initially captured for marking to avoid multiple treatments of the same does in the same year and to facilitate tracking for future applications in subsequent years. Several methods of wildlife trapping could be used, including but not limited to drop nets and box traps. Deer could also be immobilized by darting with a tranquilizer gun (Schwartz et al. 1997). This method could be used in cases where deer had not been successfully attracted to a trap area.

Most trapping methods involve using bait to attract deer to a specific area or trap. Box traps involve a confined space that safely holds the deer so that staff can approach it. Drop net traps also often use bait to attract deer to the drop zone, where suspended nets are triggered to drop over the deer and restrain it for staff to approach (Lopez et al. 1998). The method of capture will be selected based on the specific circumstances (e.g., location, number of deer, accessibility, and reasons why immobilization by darting with a tranquilizer gun is not advised) for each deer or group to be treated. Given the large number of does that will need to be treated, bait piles will be used to concentrate does in certain locations so that trapping could be done as efficiently as possible. Marking will likely be accomplished using ear tags.

Some capture and handling-related mortality could occur due to tranquilizer use and stress on the doe (DeNicola and Swihart 1997; Kilpatrick, Spohr, and DeNicola 1997); generally, a 2 to 5 percent mortality rate would be expected. After the first application, the agent selected for use will be delivered by remote injection. Injection will likely be remotely delivered by dart or biobullet (plastic bullets impregnated with an immunocontraceptive), using a dart-type gun (similar to a shotgun). With the biobullet method, the biobullet remains with the doe and it is not necessary to recover spent darts.

As many does as possible will be treated daily until 90 percent of the does are treated. Visitor access will be restricted in certain areas of the park during the treatment period. The areas targeted for treatment will be chosen based on maximizing deer presence and accessibility while minimizing visitor inconvenience.

Qualifications

Regardless of the technique implemented, qualified federal employees or authorized agents will perform these activities under the supervision of a qualified veterinarian, if required. Federal employees or

authorized agents will be qualified to handle live does in order to prevent disease transmission or any harm to the animal or the handler.

Monitoring

Current monitoring of both vegetation impacts and deer population levels will continue and could be modified as necessary to better understand any correlations between the two or to account for current conditions. Monitoring and data collection activities may include any or all of the following methods:

- Monitoring deer numbers by parkwide observations, using the distance sampling method to estimate the deer population density annually using an established protocol (Underwood, Verret, and Fischer 1998)
- Using spotlight surveys (conducted as part of distance sampling) to monitor population composition (i.e., age, sex ratios)
- Conducting fecal pellet counts (NPS 2004c) as a secondary measure of relative deer abundance on a 3-year rotation in conjunction with vegetation measurements at long-term ecological monitoring sites
- Monitoring tree seedlings using an existing vegetation monitoring protocol to determine the status of forest regeneration (NPS 1997b, 1999b), and measuring growth of trillium in paired plots to assess effects of deer browsing on herbaceous vegetation
- Conducting surveillance for evidence of deer overbrowsing where deer are found in high densities; this could include the erection of additional deer exclosures as experimental controls
- Monitoring deer health as the population shows signs of disease, or if a disease has been discovered within the region
- Monitoring the costs of the monitoring actions, including staff time, training, administrative, legal, and public communications costs

Specific deer population and vegetation monitoring methods that will be used are described in Appendix B of the final plan/EIS.

Vegetation

Throughout the removal actions, vegetation monitoring will be conducted to document any changes in deer browsing and forest regeneration that might result from reduced deer numbers, following the monitoring protocol outlined in Appendix B of the final plan/EIS. Vegetation monitoring will be conducted annually to document vegetation recovery. If the park objectives are being met and forest regeneration is successful at the initial deer density goal, maintenance actions will be implemented to keep the deer population at the target density. However, it will take several years for vegetation to respond to lower deer numbers and this response will directly depend on how quickly the population is reduced. The number of deer to be removed in subsequent years will be adjusted based on the success of previous removal efforts, projected population size, and vegetation and deer monitoring results. Park management could adjust the removal goal in either direction from the initial density goal depending on how well the park's forest regeneration objectives are met. Additional details are included in Section 2.8 of the final plan/EIS.

Deer Population Monitoring

Deer population numbers will be monitored through the ongoing monitoring efforts discussed under the No-action alternative and in “Chapter 1: Purpose of and Need for Action” of the final plan/EIS. The park will use annual spotlight surveys and distance sampling to document trends in population size.

Chronic Wasting Disease Surveillance and Testing

Until October 2014, the closest case of chronic wasting disease (CWD) was in a captive deer in Pennsylvania, approximately 140 miles from the park boundary (Ratchford, pers. Comm. 2014). However, in late October 2014, a confirmed case of CWD was identified in a captive deer herd in Ohio within 60 miles of the park (ODA and ODNR 2014). Based on current NPS CWD guidance, park staff will implement both opportunistic and targeted surveillance for CWD in the park.

Opportunistic surveillance involves taking diagnostic samples for CWD testing from deer found dead or harvested within the park. Cause of death may be hunting, culling, predators, disease, trauma (e.g., from deer/vehicle collision), or undetermined. It is assumed that opportunistic sampling will create a random sample; however, it is acknowledged that this method is likely to be a more sensitive measure of disease recognition (i.e., animals found dead are more likely to be diseased).

Targeted surveillance involves lethal removal and testing of any deer exhibiting clinical signs consistent with CWD. Targeted surveillance will remove a potential source of CWD infection, and will be an efficient means of detecting new foci of infection. Park employees or authorized agents will be trained to recognize and report deer exhibiting clinical symptoms of CWD, to monitor deer exhibiting clinical signs, and to implement the targeted surveillance in a manner consistent with NPS guidance.

NPS staff or authorized agents will conduct visual surveys for deer exhibiting clinical signs of CWD during their daily work activities, which often involve travel throughout the park or direct interaction with deer (e.g., deer surveys, deer/vehicle collision response). Under targeted surveillance, NPS staff will remove deer exhibiting clinical signs of CWD under the existing protocol for euthanasia of wildlife.

Park staff will coordinate with the ODNR, other appropriate state wildlife and/or agriculture agencies, and certified laboratories as necessary regarding surveillance methods, sample sizes, testing, and results. As CWD is detected in closer proximity to the park, the park will increase coordination with state agencies and will pool samples to ensure adequate sample size to evaluate disease presence and to monitor and evaluate changes in CWD risk to the park. The park will pursue whether test results could be combined with the state’s larger sample until a statistically valid sample size has been reached to ensure reasonable certainty that CWD is not present within the park’s deer population. The time necessary to reach a statistically valid sample size will vary depending on the opportunities available annually and on the population size. If there are positive test results from deer in the park, the park will coordinate with the state in designating a disease control unit to collect deer for further testing. A disease control unit, as defined by *Ohio’s Chronic Wasting Disease Surveillance and Response Plan* (ODA CWD Plan) (ODA 2006), is an area 6 miles in radius established to identify a location of gathering samples for additional surveillance by culling deer. If there are no positive results, the park will continue to conduct opportunistic and/or targeted surveillance depending on the proximity of the nearest positive case.

Donation for Consumption or Disposal of Carcasses

The NPS will donate deer meat (e.g., to local and regional charitable organizations, nonprofit food banks) to the maximum extent possible, as permitted by regulations and NPS guidelines (NPS 2012b). If

donation is not possible, then carcasses will be disposed of. Further details on donation and disposal are summarized below and described in detail in Section 2.4 of the final plan/EIS.

Donating deer meat will depend on the suitability of meat for donation. Deer removed through lethal reduction will be transported by federal employees or authorized agents to a central location for temporary storage during removal actions and collection of biological data and tissue samples for CWD testing. Testing will occur to the maximum extent possible and to the required detection level of confidence. Deer will only be donated for consumption if they are confirmed CWD-negative deer or if the required detection confidence level indicates that CWD is not present within the population.

In cases where one to a few deer at a given site are shot or euthanized (without chemical use) and when CWD is not known to exist within 60 miles of the park, the waste or carcasses could be moved away from roads and trails and scattered and left on the surface to be naturally scavenged and/or decomposed. In cases where the meat from deer is unsuitable for donation to charity or for surface disposal and CWD was not present, the carcasses and waste will be collected for disposal in an approved local landfill.

Should a CWD-positive case be identified within the park's deer population, the park will remove deer carcasses from the environment to minimize the potential for carcasses to become a source of environmental contamination. The park will dispose of CWD-positive carcasses and any other deer parts in accordance with the NPS CWD Reference Notebook (NPS 2012b) and the ODA CWD Plan (ODA 2006) and will coordinate with state agencies as appropriate. This will require off-site disposal through alkaline digestion or incineration or disposal at a local licensed municipal solid waste landfill.

MITIGATION

A number of mitigation measures will be implemented as part of the selected action. These measures include the following:

- Non-lead ammunition will be used for any lethal removal of deer to preserve the opportunity to donate the meat or for the carcass to be left in the field for scavenging wildlife.
- Sharpshooting will primarily occur at night (between dusk and dawn) during late fall and winter months when deer are more visible and few visitors are in the park. In some areas, sharpshooting might be conducted during the day or at other times of year if needed to maximize effectiveness and minimize overall time of visitor restrictions.
- Visitor access could be limited as necessary, including temporary closures, to provide for public safety during reduction or treatment operations. NPS personnel will patrol public areas to ensure compliance with park closures and public safety measures. The public will be notified of any park closures in advance. Information regarding deer management will be available at visitor contact facilities and posted on the park's website.
- For sharpshooting, noise suppression devices and night vision equipment will be used, as necessary, to reduce disturbance to the public. Activities will comply with all federal firearm laws administered by the ATF.
- Adequate spatial separation between lethal removal locations will be determined to ensure safety.
- Bait stations will be placed in park-approved locations away from public use areas to maximize the efficiency and safety of the reduction program.

- Capture and euthanasia will be used in circumstances where sharpshooting is not appropriate due to safety or security concerns. These actions will primarily occur at dawn or dusk when fewer visitors are in the park to the extent possible to minimize potential impacts on visitors.
- Does treated with a reproductive control agent will be marked with ear tags or some equivalent marking in order to avoid multiple treatments of the same does in the same year or to facilitate tracking for future application in subsequent years.
- The park will dispose of CWD-positive carcasses and any other deer parts in accordance with the NPS CWD Reference Notebook and the ODA CWD Plan and will coordinate with state agencies as appropriate. This will require off-site disposal through alkaline digestion or incineration or disposal at a local licensed municipal solid waste landfill.
- Only NPS staff and authorized agents will be used to administer lethal removal or reproductive control agents.
- To the extent practicable, new monitoring plots will be constructed in locations and in a manner that will minimize impacts to vegetation, wildlife, the visitor experience, and the rural landscape.
- Deer carcasses will not be buried on historic properties within the park.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The NPS, in accordance with the Department of the Interior NEPA Regulations (43 CFR Part 46) and CEQ's Forty Questions, defines the environmentally preferable alternative as the alternative that best promotes the national environmental policy expressed in NEPA (Section 101(b)) (516 DM 4.10). The CEQ's Forty Questions (Q6a) further clarify the identification of the environmentally preferable alternative stating, "this means 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."

The NPS has identified alternative D (the selected action) as the environmentally preferable alternative because it is the alternative that will 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 will 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 preferable 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 preferable because of their lesser effect on 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.

ALTERNATIVES CONSIDERED BUT NOT SELECTED

ALTERNATIVE A: NO ACTION (CONTINUATION OF EXISTING MANAGEMENT)

Under the "no action" alternative, current management actions would continue to be implemented, including deer population monitoring (e.g., spotlight surveys, distance sampling, and fecal pellet counts), vegetation monitoring (e.g., trillium plots, deer exclosures, long-term ecological monitoring plots), and activities to protect restoration plantings (e.g., protective tree tubes). Current monitoring efforts would continue to record forest regeneration and deer population numbers within the park, although specific

monitoring actions could be modified or discontinued over time, depending on the results and the 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 stakeholders would continue. No additional deer management actions would take place under this alternative.

The actions that would continue under alternative A are described in detail on pages 2-8 to 2-14 of the final plan/EIS.

ALTERNATIVE B: COMBINED NONLETHAL ACTIONS

Under Alternative B, a combination of nonlethal actions would be implemented in addition to the actions described under Alternative A and those common to all action alternatives (as described in the final plan/EIS, pages 2-10 through 2-14). To protect forest seedlings and promote forest regeneration, deer exclosures (fencing) would be used along with reproductive control measures to manage deer population growth and to gradually reduce deer numbers in the park. The construction of large-scale fenced exclosures would enable forest regeneration. To restrict population growth and gradually reduce deer numbers, the park would implement nonsurgical reproductive control of does if an appropriate agent were to meet the criteria listed in Table 1 above. All actions would be carried out by NPS personnel and/or their authorized agents.

The actions that would take place under alternative B are described in detail on pages 2-14 to 2-22 of the final plan/EIS.

ALTERNATIVE C: LETHAL ACTIONS (SHARPSHOOTING AND CAPTURE/EUTHANASIA)

Alternative C would continue the actions described under Alternative A in addition to those common to all action alternatives. Additional actions would include the combination of lethal reduction through sharpshooting with firearms and the use of capture and euthanasia in circumstances where sharpshooting would not be appropriate to reduce the deer population. These actions would be used to achieve an initial deer density goal of 15 to 30 deer per square mile, and the population would be maintained at an appropriate density over time as determined by adaptive management. All actions would be managed by NPS personnel and carried out by qualified federal employees and/or their authorized agents.

The actions that would take place under alternative C are described in detail on pages 2-22 to 2-31 of the final plan/EIS.

BASIS FOR DECISION

In selecting alternative D (Combined Lethal and Nonlethal Actions) for implementation, the NPS considered a number of factors, including the impact analysis of each of the alternatives; public and other agency comments received during the planning process; the degree to which the selected action meets the objectives of the final plan/EIS and resolves the purpose and need for taking action; economic and technical considerations; and other factors.

Alternatives C and D both meet the plan objectives to a large degree and have similar environmental impacts, but Alternative D could result in fewer environmental impacts than alternative C. Although the costs of implementation are higher under Alternative D, this alternative provides for the opportunity to use a wider variety of management methods, including lethal and non-lethal actions. Alternative D provides for an efficient initial removal of deer and the flexibility to address future removals using multiple management methods. If reproductive control is used, there could be reduced impacts relating to

visitors, safety, and the environment, by reducing the need to close the park for extended periods of time and limiting the time that shooting will occur in the park.

Alternative B only 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. Many impacts on park resources, especially impacts on vegetation, wildlife habitat, and cultural landscapes, would be greater under alternative B because of the length of time required before deer numbers will be reduced, thus continuing the adverse impacts of deer browse on vegetation in the park. 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.

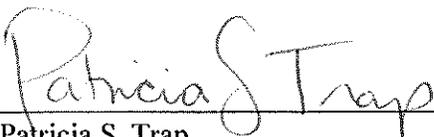
CONCLUSION

Overall, among the four alternatives considered, the selected action best meets the purpose, need, and objectives of the plan/EIS and is expected to support the long-term protection, preservation, and restoration of native vegetation and other natural and cultural resources at Cuyahoga Valley National Park. The selected action incorporates all practical means to avoid or minimize environmental harm and will not result in the impairment of park resources and values.

The required 30-day no-action period before approval of the ROD was initiated on December 5, 2014, with the U.S. Environmental Protection Agency's *Federal Register* notification of the filing of the final plan/EIS (Volume 79, No. 234). The no-action period ended on January 5, 2015, and a ROD may be signed any time after that date.

The official responsible for implementing the selected action is the Superintendent of Cuyahoga Valley National Park, Ohio.

APPROVED BY:



Patricia S. Trap
Acting Regional Director, Midwest Region



Date

Appendix A: Non-Impairment Determination

Pursuant to the National Park Service (NPS) Guidance for Non-Impairment Determinations and the NPS National Environmental Policy Act (NEPA) Process (NPS 2011), a non-impairment determination for the selected action is included here as an appendix to the Record of Decision.

Chapter 1 of the final plan/EIS describes the related federal laws and policies regarding the prohibition against impairing park resources and values in units of the national park system. The prohibition against impairment originated with the National Park Service (NPS) Organic Act, which directs that the NPS shall:

promote and regulate the use of the National Park System by means and measures that conform to the fundamental purpose of the System units, which purpose is to conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (54 U.S.C. 100101).

According to NPS *Management Policies 2006*, an action constitutes an impairment when its impact “would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006, section 1.4.5). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006, section 1.4.5).

As stated in the NPS *Management Policies 2006* (NPS 2006, section 1.4.5), an impact on any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation 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.

The resource impact topics carried forward and analyzed for the NPS-selected action, which is the same as the preferred alternative (alternative D) in the final plan/EIS, and for which a non-impairment determination has been completed, include: vegetation; white-tailed deer, other wildlife and wildlife habitat, special status species, and rural landscapes.

VEGETATION

Cuyahoga Valley National Park contains a complex set of vegetation community types. There are 44 plant communities in the park, consisting of 18 upland forests, two upland shrub communities, and five upland herbaceous communities, plus seven wetland forests, four wetland shrub communities and eight different wetland herbaceous communities. Although deer may browse on plants in all of the plant communities within the park, communities most susceptible to deer browse effects on forest regeneration are the upland forest communities (excluding conifer plantations of Norway spruce, various pines, European

larch), and wetland forests. Results of a deer forest/field enclosure study demonstrate that tree seedlings within fenced plots are able to grow and succeed through taller height categories, while seedlings in unfenced plots generally do not grow above 40 cm (16 inches) in height. Yet, seedlings are becoming established in unfenced plots, and there was a significantly higher density of small seedlings in unfenced plots compared with fenced plots in two of the four measurement years. Because the primary difference between fenced and unfenced plots is the exclusion of deer, these data indicate that deer browse outside of enclosures is impeding the growth of seedlings into taller height categories, thereby impacting regeneration of forests.

Healthy, native vegetation is necessary to fulfill the purposes for which the park was established and is key to the natural and cultural integrity and enjoyment of the park. Vegetation contributes to the cultural landscapes of the park, including the Virginia Kendall Historic District, which is a recreational cultural landscape, and the park's rural landscape, a type of cultural landscape representing the agricultural theme. Park planning documents recognize the park's natural resources, including vegetation, as being important to the regional ecology and historic context of the park. The Cuyahoga Valley National Park Foundation Document (NPS 2013) identifies the "Forest Ecosystem" as one of the fundamental resources and values of the park, and states that these should merit primary consideration during planning and management processes. The park contains some of the largest remaining stands of deciduous and mixed forests in the Northeastern Ohio region, and supports a rare and large mix of biodiversity, providing corridors for migratory species and serving as a biological refuge in the context of development and climate change.

The overall impact on vegetation under the selected alternative will be long-term and beneficial because the relatively rapid deer herd reduction will allow the abundance and diversity of vegetation throughout the park to recover. The selected action will enhance natural vegetation regeneration by quickly reducing deer browsing pressure and by maintaining a smaller deer population. It is expected that by rapidly reducing the deer browsing pressure, the number of tree and shrub seedlings and the number of seedlings surviving to sapling stage will increase, providing the necessary growth for natural forest regeneration. Herbaceous vegetation will also be able to recover, with many species expected to recover within a few years. There will be short-term negligible adverse impacts, mainly from trampling of vegetation to implement deer management actions. The overall cumulative impact will be long-term and beneficial, and the selected action will contribute considerably to the beneficial cumulative impact on vegetation. Overall, the condition of the park's vegetation is expected to improve as a result of implementing the selected action. Because there will be only slight adverse impacts and primarily long-term beneficial impacts that will leave vegetation in a condition that can be enjoyed by current and future generations, the selected action will not result in impairment to vegetation.

WHITE-TAILED DEER

The white-tailed deer population at Cuyahoga Valley National Park has varied and will continue to vary over time, depending on factors such as winter temperature, snow depth and duration of snow cover, herd health, habitat conditions, deer movements, and food availability, among other factors. Deer population numbers have oscillated since the late 1990s and the average number has declined in the most recent years; however, numbers within the park remain at high levels. Density estimates between 1998 and 2013 have varied from 20 to 142 deer per square mile across the five geographic deer management zones in the park (see figure 1-2 of the final plan/EIS). Although average park deer densities remained below 100 per square mile between 1998 and 2013, specific deer management zones within the park experienced deer densities above the park average and above 100 deer per square mile (Petit, pers. comm. 2011) in several years.

Viable wildlife populations, which include white-tailed deer, are important components of the natural landscape of the park. Park planning documents recognize natural resources of the park, which include deer, as being important to the regional ecology, but also promote managing deer to protect resources harmed by overbrowsing. The relatively rapid deer herd reduction will allow the abundance and diversity of vegetation throughout the park to recover, resulting in better foraging habitat and minimizing the potential for nutritional stress. In addition, the rapid reduction will reduce the risk of disease and the probability that it spreads. The overall impact on white-tailed deer under the selected action will be long-term and beneficial because reducing the population will have a beneficial effect on the long-term viability of the deer population within the park. There will be short-term, negligible, adverse effects to deer behavior (e.g., movement) from park staff traveling to and from monitoring plots, installing and maintaining rotational and small-scale fencing, conducting deer counts, and administering reproductive control agents. Changes in deer movement may also result from the use of bait piles, which attract the deer to specific locations, temporarily altering their normal movement patterns. There will also be short-term moderate adverse effects on the park's deer population from removing a relatively large percentage of the population over a short period of time to achieve the desired long-term benefit. Individual deer, especially does, will be adversely impacted from lethal removal, handling stress and tranquilizer use. This includes physiological or behavioral impacts. However, the deer population will remain viable and healthy. The overall cumulative impact will be long-term and beneficial and the selected action will contribute considerably to the overall beneficial cumulative impact. Because adverse effects will be mainly limited to individual deer, and because there will be long-term benefits to deer at the population level, leaving a population that can be enjoyed by current and future generations, the selected action will not result in impairment of white-tailed deer.

OTHER WILDLIFE AND WILDLIFE HABITAT

The diversity of aquatic and terrestrial habitats at the park provides foraging opportunities, breeding habitat, and shelter for a variety of wildlife species, including endangered, threatened, and other rare animals. Surrounded by urban locales, the park's 33,000 acres contain forest, field, river, and wetland habitats. Open meadows and fields offer important habitat for birds, butterflies, and small mammals that depend on grassland habitats for survival. Forested areas in the park provide valuable habitat for larger mammals such as fox and opossum as well as for migrating songbirds and raptors. Shorebirds, waterfowl, amphibians, small reptiles, and mammals also make use of the park's wetlands and floodplains. According to the most recent park lists, animal species detected in the park include 247 species of birds, 36 mammals, 18 amphibians, and 20 reptiles. In addition, 62 butterfly species have been documented in the park (Plona, pers. comm. 2011). Many of these species are dependent on habitat that can be affected by overbrowsing, especially species that use or inhabit the herbaceous and woody vegetation in the forest understory.

Changes in vegetation represent a change in forest ecology and wildlife habitat, and can affect other species of wildlife. Although some wildlife in the park have been shown to benefit from high deer numbers (e.g. garter snakes and red-backed salamanders), many species are adversely impacted. For example, preliminary results of research within the park suggest that both the abundance and diversity of small mammals were reduced in areas of relatively high deer density, where understory and foliage was reduced or absent (Laux and Walton 2008). Park-specific research has shown that forest understory bird abundance in sites with high deer densities was 30 percent to 65 percent lower than in sites with low deer densities (Petit 1998). Species that are dependent on vegetation, fruits, and insects (e.g. box turtle) that are found within the understory of the forest, and their habitat are adversely affected by high deer density. Viable wildlife populations and wildlife habitat are key to the natural integrity of the park and to opportunities for enjoyment of the park. Park planning documents recognize natural resources of the park,

including wildlife and wildlife habitat, as being important to the regional ecology and historic context of the park and promote protection of natural resources. The Foundation Document for Cuyahoga Valley National Park (NPS 2013) identifies six significance statements for the park. The first significance statement speaks to the park's natural resources: Cuyahoga Valley National Park is an island of high ecological integrity within a densely populated urban region. Situated along a major river system at the southern edge of Lake Erie, and bordering the edge of Ice Age glaciation between the Appalachian Mountains and the Great Plains, the park's location supports a high biological diversity and provides a vital habitat corridor for migrating species.

The overall impact on wildlife of the selected action will be long-term and beneficial because reduced deer browsing throughout the majority of the park will benefit species that use the same food sources (e.g., acorns) or otherwise depend on ground/shrub layer vegetation for their food and cover. Reduction of deer density will release plant communities from heavy browse pressure and substantially improve the quality and quantity of wildlife habitat parkwide. As the forest herbaceous and shrub layers return and forests experience successful regeneration, wildlife communities will be provided with more high quality forage and nesting sites for ground and shrub nesting bird species and increased wildlife cover. Predators that use deer as a food source, such as coyotes, could be somewhat adversely affected by a lower deer density or succession of grassland toward forest. Other animals that feed on deer carcasses, such as crows and raccoons, could also be adversely affected to some degree. Long-term reduction and controls on deer population growth will allow vegetation used as food and cover by other wildlife to become more abundant. The impacts of deer management actions under the selected action on other wildlife, depending on the species, and wildlife habitat will be mostly beneficial and long-term. The overall cumulative impact will be long-term and beneficial, and the selected action will contribute considerably to the overall beneficial cumulative impact because deer browsing pressure will be reduced allowing a greater proportion of the forest to regenerate, improving habitat for many other wildlife. Park wildlife populations are expected to remain viable and healthy, and will remain in a condition that can be enjoyed by current and future generations. Therefore, the selected action will not result in impairment of wildlife and wildlife habitat.

SPECIAL-STATUS SPECIES

There are 64 state-listed animal species identified by the ODNR that inhabit the park. Table 3-10 of the final plan/EIS presents a simplified list of the state-listed animal species known to occur or expected to occur within the park (NPS 2014). Appendix A of the final plan/EIS includes a detailed list of those plant and animal species and notes their federal and state status, habitat type, migratory status (birds only), and palatability (plants only).

Viable populations of special status species are key to the natural integrity of the park and to opportunities for enjoyment of the park. As noted under "Other Wildlife and Wildlife Habitat" above, park planning documents recognize natural resources of the park, which includes special status species, as being important to the regional ecology and promote protection of natural resources. Under the selected action, the long-term reduction and controls on deer population growth will allow vegetation used as food and cover for sensitive wildlife to become more abundant and decrease browse pressure on sensitive plants. Reduced browsing pressure will also allow forests in the park to regenerate and shrub and groundcover vegetation to propagate, providing cover and protection for species dependent on that habitat such as ground and shrub nesting birds and the box turtle, with long-term beneficial impacts. For these reasons, the selected action will result in mostly beneficial and long-term impacts on special status species. Special-status wildlife could be temporarily disturbed by the presence of humans placing bait stations, shooting deer, setting traps, observing deer behavior, and installing, maintaining, and monitoring

additional vegetation monitoring plots. However, because these actions will take place mainly during the non-breeding season for most animals, results will be short-term and temporary.

In sum, the adverse effects on special status species will be limited with no measurable change to the habitat or responses by wildlife listed or considered special-status species by Ohio and in the long-term, the effects will primarily be beneficial. The overall cumulative impact will be long-term and beneficial, and the selected action will contribute considerably to the overall beneficial cumulative impacts on special status species. Special status species will remain in a condition that allows for their enjoyment by current and future generations. Therefore, the selected action will not result in impairment to special status species.

RURAL LANDSCAPES

Rural landscapes are a type of cultural landscape, which is one type of cultural resource. A cultural landscape, as defined by *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, consists of 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 (NPS 1996a). Rural landscapes are related to deer management at Cuyahoga Valley National Park because an overabundance of deer and resultant deer browse can affect the character of the rural landscape of the park. Vegetation, for example, can be negatively impacted in designed wooded areas like the Virginia Kendall State Park Historic District and can consequently affect its recreation purpose and cultural value.

Preservation of rural landscapes is necessary to fulfill the purposes for which the park was established and is key to the cultural integrity of the park. The purpose of Cuyahoga Valley National Park is to “preserve and protect for public use and enjoyment the historic, scenic, natural, and recreational values of the Cuyahoga River and its valley. . .” The Cuyahoga Valley National Park Foundation Document (NPS 2013) identifies the “Agricultural Resources and Rural Landscape” as one of the fundamental resources and values of the park, and states that these should merit primary consideration during planning and management processes. The Cuyahoga River Valley has supported a rich agricultural heritage for more than 1,000 years, and through the Countryside Initiative program, these cultural landscapes are to be preserved and protected in active, ecologically sustainable farms.

These landscapes are vulnerable to degradation resulting from deer browsing. However, implementation of the selected action will decrease deer browsing and thus decrease deer depredations of agricultural crops, leading to increased chances of viability for the park’s farm ventures and maintaining the open and closed patterns of the rural landscape, resulting in long-term, beneficial impacts on the park’s rural landscapes. Some short-term, negligible adverse impacts could result from the implementation of sharpshooting or nonsurgical reproductive control activities, although such activities will take place in locations away from rural landscape features to the extent possible to minimize the effects. The overall cumulative impact on the rural landscape will be long-term and beneficial because of the reduction in deer browse damage to landscape and crops. The selected action will contribute considerably to the overall beneficial cumulative impact. The combined actions under the selected action will result in no adverse effect under Section 106 of the NHPA. Because there will be few adverse impacts and primarily long-term beneficial impacts, and because the rural landscapes will remain in a condition that can be enjoyed by current and future generations, the selected action will not result in impairment to rural landscapes.

CONCLUSION

In the professional judgment of the NPS decision-maker, implementation of the selected action will not rise to levels that would constitute impairment.