



CATOCTIN MOUNTAIN PARK DEER MANAGEMENT PLAN/EIS

FINAL INTERNAL SCOPING REPORT

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CONTENTS

Purpose of and Need for Action	1
Purpose of and Need for the Plan	2
Objectives in Taking Action	3
Vegetation	3
Wildlife and Wildlife Habitat	4
Cultural Resources	4
Visitor Experience	4
Background	4
Legislation, Regulations, and Policies	4
NPS Organic Act and Management Policies	4
Other Legislation, Compliance, and NPS Policy	5
History of Catoctin Mountain Park	7
Legislation	7
Evolution of the Public Park Concept	8
The Presidential Retreat	9
Catoctin Mountain Park’s Purpose and Significance	10
Purpose	10
Significance	10
Management Goals	11
Deer Management: Summary of Issues and Research Overview	12
Summary of Deer Management Issues at National Parks	12
Overview of Deer Management Activities at Catoctin Mountain Park	12
Issues and Resource Concerns at Catoctin Mountain Park	17
Natural Resources	17
Visitor Experience	22
Cultural Resources	23
Socioeconomic Conditions	23
Public Health and Safety	24
Other Issues Considered but Dismissed from Further Analysis	24
Overview of Research	25
Deer Herd Health at Catoctin Mountain Park	25
Population and Ecological Characteristics of White-tailed Deer at Catoctin Mountain Park	25
Effects of White-tailed Deer Browsing on Vegetation and Plant Biodiversity at Catoctin Mountain Park	26
Forest Stand Structure and Regrowth at Catoctin Mountain Park	27
Recommended regeneration standards for trees	27
Preliminary Alternatives	28
Preliminary Alternatives	28
Actions Common to All Action Alternatives	28
Alternative A — No-Action Alternative (Existing Management Continued)	28
Alternative B — Use Fencing and Repellents to Protect Sensitive Areas	29
Alternative C — Control Reproduction in Does	29
Alternative D — Undertake Direct Reduction of the Deer Herd	30
Alternative E — Special Park Hunt	30

Alternative F --- Capture and Euthanization.....	31
Alternative G — Combined Management.....	31
Alternatives Considered but Rejected	32
Reproductive Control of Bucks	32
Predator Reintroduction	32
Use of Poison.....	32
Capture and Relocation.....	32
Supplemental Feeding.....	33
Introduction of Parasites or Disease.....	33
Surgical Sterilization.....	33
Fencing the Entire Park.....	33
Relationship to Other Plans, Policies, and Actions.....	35
Affected Environment.....	37
Catocin Mountain Park Planning Documents	37
Catocin Mountain Park Resource Information	37
Other Information Sources.....	38
Public Involvement	39
Next Steps	40
Appendix A: Internal Scoping Meeting Materials.....	41
References Cited.....	41
List of Preparers.....	48

PURPOSE OF AND NEED FOR ACTION

This “Internal Scoping Report” describes historical, social, and political information related to deer management at Catoctin Mountain Park; it will be used as the starting point for the EIS process. The report was prepared by URS Corporation and is based on information and discussions at an internal scoping meeting held October 29 and 30, 2003, at the park, as well as on background literature that was made available at that meeting. The report covers the meeting discussion and conclusions about the purpose of and need for action, resource concerns, and objectives. Potential components of alternatives and issues developed during the internal scoping meeting are also included.

Catoctin Mountain Park is a unit of the National Park System located in Frederick County west of Thurmont, Maryland. When the park was established in 1936 it is likely that no white-tailed deer (*Odocoileus virginianus*) existed within its boundaries. From that time on the park provided support for restoration of the deer population by prohibiting hunting. In the 1970s problems related to an overabundant deer population were suspected. In 1981 the natural resource management staff at Catoctin Mountain Park first raised the issue of adverse impacts from deer browsing and whether the deer population might cause a long-term decline in both the abundance and diversity of native plant species. Park staff researched information concerning the interactions between deer and plant communities, and park vegetation was inventoried in a preliminary assessment of the existing status. Catoctin Mountain Park’s 1988 *Resource Management Plan* mentions concerns about the potential loss of long-term forest regeneration, changes in water quality that might arise from the loss of vegetation, and the potential transmission of disease and parasites from deer to humans (NPS 2000c). A 1990 memorandum to the NPS Branch Chief of Natural Resources noted damage to “some of the rarest plant occurrences in the park” due to deer browsing. In particular were impacts to birch-leaved spiraea (*Spiraea betulifolia*) and American ginseng (*Panax quinquefolius*). The memo also noted substantial differences between plants growing within exclosures erected in the mid 1980s and plants outside the exclosures, noting, “this exclosure has probably prevented the extirpation of a couple of vascular plants from the park” (Langdon 1990).

Significant changes have occurred across Maryland’s landscape in recent years. Among the most dramatic of these changes is the resurgence of white-tailed deer. Extremely rare at the turn of the 20th century, deer populations in Maryland have not only rebounded, but now number more than at any other time in their history. Maryland’s white-tailed deer is an adaptable animal that has been favorably exploiting changes in habitat brought about by agricultural changes and the land use patterns associated with suburban development (MDNR 1998).

Deer thrive on habitat conditions created by suburban development; as new roads, housing and related enterprises fragment forests and farms, creating “edge” habitats that provide plenty of food and ample shelter. Changes to agricultural production practices have also increased availability of nutritious foods for deer. Concurrently, fragmentation, along with changing social habits (the hunting population has steadily decreased since the 1980s), have reduced suitable hunting opportunities, particularly in Maryland’s growing suburban areas (MDNR 1998).

Improved habitat conditions resulting in increased reproduction, coupled with low normal mortality, have resulted in growing numbers to an estimated current statewide population in excess of 250,000 animals. This population growth has resulted in many more opportunities to see or hunt deer. High deer numbers also yield less desirable results in the form of increased vehicle collisions with deer, more damage to agricultural crops and ornamental vegetation and degradation of natural ecosystems. There is a public health concern regarding white-tailed deer because they are one of the hosts for the ticks responsible for the spread of Lyme disease, an arthritic disease that can be contracted by humans.

Studies used by the Maryland Department of Natural Resources in its *Deer Management Plan* suggest that high deer densities lead to an increase in the incidence of Lyme disease, and that significant tick populations do not occur in the absence of deer. During the past ten years the reported number of Lyme disease cases in Maryland has increased from 12 to 423 (MDNR 1998).

The current forest at Catoctin Mountain Park is generally less than 100 years old, with plant groupings reflecting various past uses, as well as the natural influences of soil, slope and elevation on vegetation types (NPS 2000c). At Catoctin Mountain Park, the plant communities that now dominate the park have been greatly influenced by human activities over the last 250 to 300 years, with effects on plant distribution, diversity, and abundance (NPS 2000c). For example, to support the local charcoal industry, large areas of what later became the park, were clear-cut about every 30 years from the mid 1700s until the late 1800s. Similarly, parts of the park were farmed, and other portions were burned to encourage blueberry growth. It is highly unlikely that plant communities were measurably affected by deer browsing between 1790 and the early 1950s; deer impacts are likely of very recent origin. Following Catoctin Mountain Park's inclusion in the National Park System and the resulting protection this provided, the forest has passed from early successional stages, which represent ideal deer habitat, to an older forest, which is presumed to have lower habitat value to deer (NPS 2000c).

Although there are no historic records of the deer population specific to Catoctin Mountain Park, it is known that deer herds throughout the eastern United States were heavily exploited after the arrival of Europeans around 1600. By 1790, populations were known to have been low wherever Europeans had settled. Deer populations in the Piedmont Plateau were probably extirpated by the late 1800s.

In Maryland, the first laws protecting deer went into effect in 1730, but state law enforcement personnel were not hired until 1918. Records from as early as 1927 contain compensation requests from Frederick County farmers for damage to crops apparently caused by deer, but in the late 1940s, when statewide restocking programs began, low numbers of deer were present in the county. To the extent that annual harvests reflect population levels, the abundance of deer in Frederick County is indicated by the number taken since 1950 (NPS 2000c). Between 1950 and 1986 the number of deer harvested annually in Frederick County, Maryland, was below 1,000. In the late 1980s the annual number of deer harvested dramatically increased, and between 1991 and 1997 the number of deer harvested annually was between approximately 3,500 and 5,000. In 2002, Frederick County's annual rifle/shotgun deer harvest was 3948 deer and 4109 deer were harvested in 2003 (MDDNR).

PURPOSE OF AND NEED FOR THE PLAN

The National Park Service seeks to resolve long-term deliberation over deer management at Catoctin Mountain Park by completing a plan and environmental impact statement (EIS) for deer management. The plan/environmental impact statement will be guided by NPS and Catoctin Mountain Park policies, as well as National Environmental Policy Act (NEPA) and other related requirements. It must also address concerns voiced by the public and other agencies.

As defined in the NPS *DO #12 Handbook* (sec. 2.2):

Purpose is a broad statement of goals and objectives the National Park Service intends to fulfill by taking action. . . . Objectives are a more specific statement of purpose, i.e., what must be accomplished in large part for the action to be considered a success.

Need is a discussion of existing conditions that need to be changed, problems that need to be remedied, decisions that need to be made, and policies or mandates that need to be implemented. . . . Need is why action is being taken at this time.

During the internal scoping meeting on October 29 and 30, 2003, at Catoctin Mountain Park, discussions regarding purpose, need, and objectives evolved toward refined statements. The results of those discussions are presented below.

Purpose:

The purpose of this action is to develop a deer management plan that supports forest regeneration providing for long-term protection, conservation, and restoration of native species and cultural landscapes.

Needs:

1. Excessive deer browsing reduces forest regeneration, resulting in adverse changes to the forest structure, composition, and wildlife habitat.
2. Browsing by large numbers of deer in Catoctin Mountain Park could adversely affect natural distribution, abundance and diversity of native species, including species of special concern.
3. Excessive deer browse has impacted native shrubs, trees, and forest systems that comprise the natural vegetation component of the Misty Mount and Greentop cultural landscapes.
4. There is an opportunity to foster greater cooperation with other jurisdictional entities currently implementing deer management actions. Coordination could help achieve mutual deer management goals.

OBJECTIVES IN TAKING ACTION

Objectives are “what must be achieved to a large degree for the action to be considered a success” (Director’s Order 12). All alternatives selected for detailed analysis must meet all objectives to a large degree, and resolve purpose and need for action. Objectives for managing deer populations must be grounded in the park’s enabling legislation, purpose, significance, and mission goals and are compatible with direction and guidance provided by the general management plan. The following objectives related to deer management were derived with park staff at the internal scoping meeting.

Vegetation

- Reduce adverse effects of deer browse pressure to ensure sufficient tree regeneration in order to sustain a native and diverse forest structure.
- Provide protection for threatened, endangered, and sensitive plant species and their habitats (e.g., the purple fringed orchid) from adverse impacts related to deer browsing, and do not allow browsing impacts to lead to extirpation.
- Maintain, restore, and promote a mix of native herbaceous plant species, and reduce competitive advantage of invasive exotic plant species over native plant species through effective deer management.
- Develop and implement informed, scientifically defensible vegetation and wildlife impact levels and corresponding measures of deer population size that would serve as a threshold for taking prescribed management actions within the park.

Wildlife and Wildlife Habitat

- Maintain a viable white-tailed deer population within the park while protecting other park resources.
- Protect lower canopy and ground nesting bird habitat from adverse impacts from deer browsing.
- Develop and implement informed, scientifically defensible vegetation and wildlife impact levels and corresponding measures of deer population size that would serve as a threshold for taking prescribed management actions within the park

Cultural Resources

- Ensure that vegetation contributing to the park's cultural landscape is protected from the adverse effects of deer behavior (browsing, trampling, seed dispersal).

Visitor Experience

- Educate 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.

BACKGROUND

The following sections summarize guidance for this planning effort in terms of the National Park Service's enabling legislation, federal regulations, and the agency's *Management Policies*. The plan must also be consistent with Catoctin Mountain Park's purpose, significance, and goals.

LEGISLATION, REGULATIONS, AND POLICIES

NPS Organic Act and Management Policies

The National Park Service Organic Act of 1916 stipulates that park units are to be managed "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). This mandate is reiterated in a 1978 amendment, which states that the National Park Service 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).

Despite these mandates, the Organic Act and its amendments afford the National Park Service latitude when making resource decisions that balance visitor recreation and resource preservation. By these acts Congress "empowered [the National Park Service] with the authority to determine what uses of park resources are proper and what proportion of the parks' resources are available for each use" (*Bicycle Trails Council of Marin v. Babbitt*, 82 F.3d 1445, 1453 (9th Cir. 1996)).

Yet, courts have consistently interpreted the Organic Act and its amendments to elevate resource conservation above visitor recreation. *Michigan United Conservation Clubs v. Lujan*, 949 F.2d 202, 206 (6th Cir. 1991) states, "Congress placed specific emphasis on conservation." The *National Rifle*

Ass'n of America v. Potter, 628 F.Supp. 903, 909 (D.D.C. 1986) states, “In the Organic Act Congress speaks of but a single purpose, namely, conservation.” The NPS *Management Policies*, which state the conditions or processes that must be undertaken, considered, or followed before taking a management action in any unit of the national park system, also recognize that resource conservation takes precedence over visitor recreation. “When there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant” (NPS *Management Policies 2001*, sec. 1.4.3).

Because conservation remains predominant, the National Park Service seeks to avoid or to minimize adverse impacts on park resources and values. The NPS Organic Act does give the Secretary of the Interior discretion to provide “for the destruction of such animal and of such plant life as may be detrimental to the use of any of said parks, monuments, or reservations” (16 USC 3), and the *Management Policies* give the Park Service discretion to allow negative impacts when necessary (sec. 1.4.3). However, while some actions and activities cause impacts, the National Park Service cannot allow an adverse impact that constitutes resource impairment (NPS *Management Policies 2001*, sec. 1.4.3). The Organic Act prohibits actions that impair park resources unless a law directly and specifically allows for such actions (16 USC 1 a-1). An action constitutes an impairment when its impacts “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 *Management Policies 2001*, sec. 1.4.4). To determine impairment, the Park Service 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 *Management Policies 2001*, sec. 1.4.4).

Because park units vary based on their enabling legislation, natural resources, cultural resources, and missions, management activities appropriate for each unit and for areas within each unit vary as well. An action appropriate in one unit could impair resources in another unit. Thus, the proposed environmental impact statement will analyze the context, duration, and intensity of impacts related to deer management within Catoctin Mountain Park, as well as the potential for resource impairment, as required by *Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-making* (NPS 2001).

Other Legislation, Compliance, and NPS Policy

In addition to the NPS Organic Act, the National Park Service is governed by laws, regulations, and management plans before, during, and following any management action related to this plan. Based on the scope of this plan, these include the following:

Redwoods Act

The Redwoods Act reasserted the system-wide standard of protection established by Congress in the original Organic Act. It stated:

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 these various areas have been established, except as may have been or shall be directly and specifically provided by Congress (P.L. 95-250, U.S.C. Sec 1a-1).

By this language the act intends that management actions and consideration of management alternatives in the National Park System be limited to the intent of Congress as expressed in the park's enabling legislation.

National Environmental Policy Act of 1969, as Amended

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

Endangered Species Act of 1973, as Amended

The Endangered Species Act requires all federal agencies to consult with the Secretary of the Interior on all projects and proposals having potential impact on federally endangered or threatened plants and animals.

The National Historic Preservation Act of 1966, as Amended

Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of their undertakings on properties listed on or potentially eligible for listing on the National Register of Historic Places. All actions affecting the parks' cultural resources must comply with this legislation.

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.

Title 36, Code of Federal Regulations

Title 36 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)).

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 12898, "Environmental Justice in Minority Populations and Low-Income Populations"

The National Park Service 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.

NPS-77: Natural Resources Management Guideline (1991)

The *Natural Resources Management Guideline* provides guidance to park managers for all planned and ongoing natural resource management activities. Managers must follow all federal laws, regulations, and policies. This document provides the guidance for park management to design, implement, and evaluate a comprehensive natural resource management program.

Statement for Management, Catoctin Mountain Park (1996)

The *Statement for Management* contains information about the park's purpose and significance, influences on park resources, major issues, and management objectives. The management of abundant deer populations is mentioned under the park's first management goal.

Strategic Plan and Annual Performance Plan, Catoctin Mountain Park (1997 and 2000)

The plan identifies mission goals over the next 5 or more years for Catoctin Mountain Park. This includes the formulation of long-term goals under each mission goal and estimates of costs associated with implementation of the *Strategic Plan*.

Resource Management Plan, Catoctin Mountain Park (1998 Update)

Like the *Statement for Management*, this plan describes the park's history and management goals. It also describes the present status of the park's resources, including natural and cultural resources. This report includes a natural resource problem statement addressing white-tailed deer management in relation to vegetation monitoring and population monitoring.

HISTORY OF CATOCTIN MOUNTAIN PARK**Legislation**

Catoctin Mountain Park encompasses 5,810 acres in Frederick and Washington Counties, Maryland. The park's present state is due to a series of unique circumstances. No legislation exists establishing a unit designation for the area; thus the word *national* is omitted from the park name (NPS 1998). At the time the land was purchased, no significant natural or historical resources qualified the area for national park status. However, once the presidential retreat of Camp David (formerly known as Shangri-La) was established, national significance has been realized as a result of several historic events that have taken place there.

Catoctin Mountain Park came about as an example of a cooperative effort between state and federal officials who participated in a New Deal lands program to help the local community rehabilitate "sub-marginal" farm and forest land for use as recreation areas (NPS 1998) and known as Recreational Demonstration Areas. The original authority to acquire lands now included in Catoctin Mountain Park began with the Federal Emergency Relief and Construction Act of 1932 (47 Stat. 717). That legislation authorized the acquisition of land for "emergency construction of public building projects outside the District of Columbia," with the intention that such projects would "be used in furnishing relief and work relief to needy and distressed people and in relieving the hardship resulting from unemployment." The National Industrial Recovery Act of 1933 re-emphasized the original legislation and created the concept of recreational demonstration areas. In the fall of 1934, Dr. Thomas Symons, director of the Maryland Extension Service, proposed the purchase of 10,000 acres of land in the

Catoctin region of Frederick and Washington Counties to be used in the creation of a Catoctin Recreational Demonstration Area. Approval was granted for the project on January 7, 1935, and Catoctin was designated on February 7, 1935. Executive Order No. 7027, signed April 30, 1935, defined the “Establishment of the Resettlement Administration,” stating that projects under this jurisdiction would focus on “reforestation and forestation” (among other ecological considerations). In 1936 the National Park Service took over full responsibility of the recreational demonstration areas, which were transferred from the Resettlement Administration by Executive Order 7496 (NPS 1998).

The purpose of recreational demonstration areas was stated in Public Law 594 of June 6, 1942. This law provides authority to the Secretary of the Interior to convey or lease to states or their political subdivisions “recreational demonstration projects and lands, improvements, and equipment.” The act stipulates, “the grantee or lessee shall use the property exclusively for public park, recreational, and conservation purposes.” During the war years, Catoctin Mountain Park served as a training area for the Office of Strategic Services, as well as a retreat for President Franklin Roosevelt (Shangri-La) (NPS 1998).

Because the original intent of the federal government was to transfer the Catoctin Recreational Demonstration Area to the State of Maryland once development was completed, Governor Herbert O’Conor wrote to President Harry S. Truman on November 16, 1945, requesting this transfer. President Truman replied on December 4, 1945, in part stating:

“I have decided, because of the historical events of national and international interest now associated with Catoctin Recreation Area, this property should be retained by the Federal Government and made a part of the National Capital Park System under the administration of the National Park Service of the Department of Interior. This action is in accord with the position expressed by the late President Roosevelt before his death”.

This letter also stated that “Maryland residents will be urged to enjoy the many recreational opportunities which that beautiful area affords” when the area is again made available for public use under the policies of the National Park Service (NPS 1996).

After long negotiations, a compromise was worked out in 1954, resulting in the transfer of 4,446 acres in the southern half of the recreational area to Maryland. This deed provided an affirmative responsibility to protect the watershed and free-flowing waters of Hunting Creek for camps and recreational areas within the established boundary. This section of land became Cunningham Falls State Park (NPS 1996). At the same time, an NPS memorandum renamed the northern half of the recreational area as Catoctin Mountain Park, a unit of the National Capital Region of the National Park Service. Although officially recognized, no unit designation was established by legislation for the park (NPS 1998).

Catoctin’s properties were acquired with stipulations for conservation of natural resources, specifically reforestation and forestation. Therefore, the park is required by this original legislation to protect reforestation processes, in addition to the legislation, policies, and regulations defined by the National Park Service.

Evolution of the Public Park Concept

In establishing the recreational demonstration area as a public park, recreation and conservation have always been overriding objectives, as indicated in the following discussion.

Camp Misty Mount

Camp Misty Mount was completed in 1937 and occupied during the summer by 64 campers of the Maryland League for Crippled Children. The camp was used during World War II as a garrison post for U.S. Marines to protect the presidential retreat of Shangri-La. During the summer of 1946, it was again opened to the public. Cabin camping facilities have been provided to a variety of groups, ranging from the Washington County School District, 4H Clubs, Girl and Boy Scouts, and families (NPS 1996).

Camp Greentop

Camp Greentop was completed in 1938 and used by the Baltimore League for the Handicapped until 1940. Because of the area's involvement with military training during World War II, the camp did not open to the public until 1947. Since then it has provided recreational experiences for thousands of Maryland residents, with special emphasis on youth and people with physical disabilities (NPS 1996).

Camp Round Meadow

When the Catoctin Recreational Demonstration Area was designated in 1936, Camp Round Meadow served as the headquarters and maintenance area for the Work Projects Administration and the Civilian Conservation Corps. In 1965 the camp was converted to a Job Corps camp, the first in the United States; this camp closed in 1969. A folk culture center was opened during weekends in 1970, with demonstrations of mountain crafts; this center was closed in 1979. Beginning in 1972 the other buildings at Camp Round Meadow were used in an environmental education program for District of Columbia schoolchildren. The camp is now used for organized group camping. A small maintenance facility, NPS housing, and park offices are located within the camp (NPS 1996).

The Presidential Retreat

On April 4, 1942, special use permits were issued to the War Department for portions of the recreational demonstration area, north of Maryland State Highway 77. On April 24, 1942, President Roosevelt selected Camp Hi Catoctin as his wartime presidential retreat, with maintenance and operational responsibility assigned to the crew of the presidential yacht *Potomac*. In addition, responsibility for Camp Misty Mount was assigned to the Marine Corps. The stage was set for the letter of December 1946 from President Truman that ensured that some portion of the Catoctin Recreational Demonstration Area would remain in federal control (NPS 1996). President Dwight Eisenhower renamed the retreat Camp David in honor of his grandson.

A memorandum of agreement of October 25, 1948, defines the relationship between the National Park Service and the Department of Navy. Under this agreement and continuing administrative policy, Camp David is to receive priority treatment in matters of park facility use, access, protection, and any other assistance the National Park Service is capable of rendering. On the occasion when such treatment is requested and preempts the use of previously used facilities, park personnel are required to tactfully resolve any conflicts to the satisfaction of all parties. Due to the increased use of Camp David as a recreation retreat and location of state and diplomatic functions for the President, the level of service provided by park staff has increased dramatically. The memorandum of agreement is updated every five years. Updates were implemented on April 22, 1976, amended on September 14, 1983, and on August 15, 1991. The most recent updated was implemented on December 30, 1999 (NPS 1999).

CATOCTIN MOUNTAIN PARK'S PURPOSE AND SIGNIFICANCE

Purpose

Lack of an act or executive order giving the National Park Service a specific focus at Catoctin Mountain Park has hampered the management of the park in past decades, with management emphases varying from a focus on natural resources and recreation to a focus on folk culture (NPS 1998). An agreed-upon set of management goals developed in recent years now provides a more coherent approach to managing park resources and activities, but the park is still in need of an enabling act, proclamation, or executive order to provide definite direction and purpose. Until this occurs, the park will continue to operate under the purpose that has been applied to the area since 1936 (NPS 1998). These guidelines state that Catoctin will be administered:

- as a public park
- for recreational purposes
- to conserve all resources
- as a buffer to the presidential retreat
- to record and protect historically significant resources identified as the building and grounds within Camp David and the cabin camp facilities at Misty Mount and Greentop, and two historically significant buildings in Round Meadow known as the Resource Management Office and the Blacksmith Shop (NPS 1998)

The park provides opportunities for resource-compatible outdoor recreation serving the populations of the Baltimore-Washington metropolitan area (NPS 2001b).

Significance

Catoctin Mountain Park is significant for the following reasons (NPS 2001b):

- Serving as a natural buffer zone, Catoctin Mountain Park protects the Presidential Retreat, Camp David. Camp David is a place where international leaders have convened to discuss world peace and international diplomacy.
- Catoctin Mountain Park represents an outstanding example of a New Deal era program initiated in the 1930s to recast the landscape for recreation and conservation purposes. Camp Misty Mount and Camp Greentop are listed on the National Register of Historic Places as historic districts representing a significant legacy of the New Deal era, as developed by the Civilian Conservation Corps and the Works Progress Administration.
- Catoctin Mountain Park was one of 46 Recreational Demonstration Areas established in the 1930s. (NPS 2001b).
- The diverse cultural resources at Catoctin Mountain Park provide examples of industries ranging from small-scale Native American tool production to a large charcoal/iron industry that supported Colonial America and the American Revolution. Fragments of rural and/or small town growth industries that may often be overlooked when reviewing our nation's heritage are represented in Catoctin Mountain Park.
- Camp Greentop is home to the oldest operating camp for the disabled in the nation.
- Catoctin Mountain Park hosted the first Job Corps camp in the nation.

- National park system areas played many roles during World War II, and Catoctin can be included in that wartime effort as a place providing rest and relaxation opportunities for servicemen, training areas, and Office of Strategic Services training facilities.
- Catoctin Mountain Park is a prime example of a regenerated eastern deciduous forest, combined with the geology and wildlife of the Appalachian Mountains. Outstanding scenic beauty at the transition of the Blue Ridge and Piedmont provinces is available within 60 miles of the Baltimore, Maryland, and Washington, DC, metropolitan area.
- Catoctin Mountain Park's streams and wetlands play an important role as part of the watershed for the Monocacy River, the Potomac River, and the Chesapeake Bay, and they serve as indicators of the park's overall ecosystem health.

Management Goals

Catoctin Mountain Park's management goals were created to support the park's overall purpose and protect the resources that define its significance. Of the several goals identified as important for managing park resources and providing for visitor use and enjoyment, the following relate to deer management (NPS 1996, NPS 1998):

- Identify, protect, and enhance native species populations, natural features, and ecological processes of the park. Strive to maintain natural abundance, biodiversity, and ecological integrity of the wildlife and plant populations (NPS 1996).
 - Provide protection for rare plants that occur within the park, and that suffer population reductions as a result of over-browsing by white-tailed deer or other natural or man caused actions.
 - Reduce adverse effects of deer browse pressure to ensure that a diverse forest structure and species composition is perpetuated.
- Make available to the public traditional outdoor recreational opportunities that are not detrimental to the natural or cultural resources of the park, and provide for the protection and safety of visitors by exercising good judgment in planning, maintenance, administration, law enforcement, visitor information services, and employee training (NPS 1996).
- Maintain and use all roadways, trails, buildings, facilities, and equipment in a manner such that deterioration will be reduced and safety increased for employees and visitors (NPS 1996).
- Cooperate with state and local governments and adjacent landowners to ensure that lands adjacent to the park are used in a compatible manner to provide preservation and protection to the resources. Cooperate with state government and adjacent landowners in the implementation of programs aimed at the reduction of agricultural damage caused by white-tailed deer (NPS 1996).
- Consistent with NPS policy and Federal Law, Catoctin Mountain Park shall take positive action to perpetuate the cultural and archeological resources of the park to prevent adverse impacts on these resources (NPS 1996).

DEER MANAGEMENT: SUMMARY OF ISSUES AND RESEARCH OVERVIEW

To provide more context for the plan, general deer management issues at national parks are described below, followed by those specific to Catoctin Mountain Park. Research related to deer management is also summarized.

SUMMARY OF DEER MANAGEMENT ISSUES AT NATIONAL PARKS

Within eastern national parks, such as Catoctin Mountain Park, landscapes have been managed to allow for the preservation and rehabilitation of scenic and historic lands. The result is a mixture of forest, shrub, and grassland, which constitutes excellent habitat for white-tailed deer. Since deer harvest has not been part of management activities in the majority of parks, the population of deer has greatly increased. Today in many areas, the density of deer exceeds 40 deer/square kilometer (100 deer/square mile) (Porter 1991), and it has been established that deer densities this high can have negative impacts on plant and animal species (Alverson 1988; Anderson 1994; Augustine and Frelich 1998; deCalesta 1994; McShea 2000; McShea and Rappole 2000).

Other national park units have been involved in deer management planning efforts and have served as examples of the high public emotion and controversy that surrounds the subject. Gettysburg National Military Park and Eisenhower National Historic Site completed an environmental impact statement and white-tailed deer management plan in 1995, and approved management strategies are now being implemented. Deer management planning efforts are also being undertaken at Indiana Dunes National Lakeshore, Indiana, and Cuyahoga Valley National Park, Ohio. Fire Island National Seashore in New York and Rock Creek Park, District of Columbia, are researching immunocontraception as a means of population control for deer.

OVERVIEW OF DEER MANAGEMENT ACTIVITIES AT CATOCTIN MOUNTAIN PARK

Below is a timeline of events related to deer management at Catoctin Mountain Park (NPS 2000c; NPS n.d.).

- | | |
|-------------|---|
| 1981 | Catoctin Mountain Park staff visited Pennsylvania State University to develop information on deer population guidelines and vegetation impacts. |
| <hr/> | |
| 1982 | First deer exclosure constructed at Thurmont Vista in Catoctin Mountain Park.
First discovery of bark stripping by deer on slippery and American elm trees. |
| <hr/> | |
| 1983 | First aerial deer census conducted in winter; 70 deer observed. The aerial deer survey provides a relative indicator, not a density estimate.

Catoctin Mountain Park staff met with National Zoo (Front Royal facility) staff to compare vegetation damage and herd activity.

Daylight deer census begun on Park Central Road.

Two deer pellet transects established and surveyed. |

- 1984** Twelve percent of resident population of purple-fringed orchids reported damaged by deer browse; moderate damage also reported to leatherwoods and mountain laurel from deer browse.
Daylight deer census conducted on Park Central Road.
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- 1985** Three additional exclosures constructed.
Over 250 elm trees reported damaged by bark stripping.
Cubic meter biomass study conducted on two deer exclosures; 49% more vegetative material found inside exclosures compared to outside the exclosures.
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- 1986** Winter aerial deer census conducted; 131 deer observed.
No bark stripping reported, excellent mast year.
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- 1987** The National Park Service entered into a cooperative research agreement with the University of Georgia to collect information concerning herd health.
Park began keeping records of vehicle collisions with deer.
Winter aerial deer census conducted; 117 deer observed.
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- 1988** Winter aerial deer census conducted; no estimate projected due to equipment failure.
Deer immobilization and radio telemetry tracking began.
Six permanent deer pellet transects established.
Five to seven night spotlight survey routes established, and training conducted for staff.
Necropsy activity begun.
Herd health survey conducted by Southeastern Cooperative Wildlife Disease Study; five deer harvested.
Telemetry, spotlight surveys, and deer pellet transect study continued.
Fifteen additional fawns captured for mortality study, and five additional does for supplementing radio telemetry programs.
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- 1989** Winter aerial deer census conducted; observed 324 deer.
The annual survey located 12 purple-fringed orchids in the park.
Receipt of interim research report from the University of Georgia.
Continued radio telemetry program, five to seven night spotlight surveys, pellet group transect surveys, and deer exclosure monitoring.
National Park Service enters into research agreement with West Virginia University on bark stripping of elm trees.
First meeting of Deer Advisory Technical Committee, Catoclin Mountain Park.
-
- 1990** Forty-six vegetation plots established by Center for Urban Ecology (CUE) to monitor deer impacts on vegetation.
Necropsies completed on 11 deer.
Bark stripping monitoring and research continued. The greatest concentration was found near Owens Creek campground.

Rare plants (purple fringed orchids and leatherwood) located and protected from deer browse with wire cages.

Nighttime telemetry surveys initiated for six deer.

Fall spotlight survey, fawn reports, buck observations, and exclosure monitoring continued.

Deer repellents (different types of bar soaps and Ropel®) were applied at the Catoctin Mountain Park Visitor Center; these substances were not effective in repelling deer.

1991 Vegetation plots evaluated.

Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and nighttime telemetry continued.

Final research report submitted by the University of Georgia: "The Population and Ecological Characteristics of White-tailed Deer on Catoctin Mountain Park."

Initial draft of "Catoctin Mountain Park White-tailed Deer Management Environmental Assessment" completed. Report forwarded to advisory committee.

Thesis on bark stripping completed by Joey Fuller, West Virginia University.

Rare plant protection program continued.

1992 Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.

Winter aerial deer census conducted; observed 277 deer.

Small mammal study initiated by the Center for Urban Ecology to examine potential impact of deer on other animals, which compete for the same food sources.

"Draft Deer Management Environmental Assessment" revised by the NPS Washington Office.

Vegetation plots evaluated.

A new deer exclosure was constructed on the Falls Nature Trail.

1993 Rare plant protection program continued.

Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.

Winter aerial deer census conducted; observed 127 deer.

Vegetation plots evaluated.

First winter kill deer survey conducted following severe winter weather. Number of deer found was 74.

1994 Deer telemetry project began monitoring five does.

Rare plant protection program continued.

Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.

Vegetation plots evaluated.

Winter aerial deer census conducted in January; observed 217 deer.

	Winter aerial deer census conducted in March; observed 107 deer.
1995	<p>Deer telemetry program continued.</p> <p>Rare plant protection program continued.</p> <p>Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.</p> <p>Winter aerial deer census conducted; observed 138 deer.</p>
1996	<p>Rare plant protection program continued.</p> <p>Continued spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program.</p>
1997	<p>Rare plant protection program continued.</p> <p>Hood College, of Frederick, Maryland, exclosure with paired vegetation plot study started.</p> <p>Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.</p> <p>Winter aerial deer census conducted; observed 264 deer.</p>
1998	<p>Continued monitoring of deer/car motor vehicle incidents; incident locations entered into GIS for previous four years.</p> <p>Hood College exclosure/vegetation plot study continued; wetland exclosure and two wetland vegetation plots added.</p> <p>All vegetation plot data sent to regional botanist to be analyzed.</p> <p>Fall spotlight survey, fawn reports, buck observations, exclosure monitoring, and rare plant protection program continued.</p> <p>Continued opportunistic collection of necropsy information, which has been done every year.</p>
1999	<p>Winter aerial deer census conducted; observed 300 deer.</p> <p>Hood College exclosure/vegetation plot monitoring continued.</p> <p>Fall spotlight survey, fawn reports, buck observations, opportunistic necropsies, and rare plant monitoring and protection continued.</p> <p>Tracking of dead deer due to motor vehicle accidents continued.</p> <p>New exclosure built in area damaged by suspected microburst during a severe thunderstorm in June of 1998.</p> <p>Deer meeting / planning session held by Catoctin Mountain Park and regional CUE staff December 3.</p> <p>NPS service-wide deer management meeting held at Catoctin Mountain Park December 7.</p>
2000	<p>Catoctin Mountain Park and Center for Urban Ecology (CUE) staff plans for a Deer Advisory Committee Meeting to be held later during the year.</p> <p>Fawn and buck sighting reports terminated as result of consensus from the 1999 deer management meeting that these reports were not yielding significant data.</p>

Winter aerial deer census; observed 312 deer.

“Summary Report: White-tailed Deer Management in Catoctin Mountain Park” completed on February 15 to document the status of the Catoctin Mountain Park deer herd; based on previous environmental assessments completed in 1995.

Deer Advisory Committee meeting held at Catoctin Mountain Park May 15–17.

Distance sampling training with Dr. Brian Underwood; first distance sampling survey conducted in the fall; park population estimate of 183.99 deer per square mile.

Vegetation plot monitoring continued on a limited basis (15 plots and 5 exclosures); data did not include herbaceous species data, but did include seedling and browse data (includes microburst exclosure and open plot).

Continued tracking of road-killed deer (motor vehicle accidents).

Rare plant monitoring and protection continued.

Diane Pavek analyzed original vegetation plot monitoring data from 1990-1994.

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- 2001** Distance sampling deer spotlight surveys conducted in spring and fall; park population estimates of 147.37 (spring) and 185.83 (fall) deer per square mile.

Vegetation plot monitoring continued on limited basis (16 plots and 5 exclosures); data did not include herbaceous species data, but did include seedling and browse data (including microburst exclosure and open plot).

Continued tracking of road-killed deer (motor vehicle accidents).

Rare plant monitoring and protection continued.

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- 2002** Distance sampling deer spotlight surveys conducted in spring and fall; park population estimates of 112.00 (spring) and 155.43 (fall) deer per square mile.

Deer Technical Committee/Assessment Team meeting at Catoctin Mountain Park May 1.
Catoctin Mountain Park White-tailed Deer EIS meeting (Catoctin Mountain Park and CUE staff) May 9.

Meeting to discuss deer management/EIS (Catoctin Mountain Park, CUE, and Washington office personnel) May 22.

Vegetation plot monitoring continued on limited basis (10 plots and 2 exclosures); data did not include herbaceous species data, but did include seedling and browse data (included microburst and fire exclosures and paired open plots).

Deer herd health check by University of Georgia/Southeastern Cooperative Wildlife Disease Study disclosed evidence of significant deterioration of population health problems.

Meeting held with Dr. Susan Stout of the U.S. Forest Service at Kane Experiment Station in the Allegheny National Forest, PA; attended by Diane Pavek (Regional Botanist) and Becky Loncosky (Park Ranger, Catoctin Mountain Park), October 7.

Continued tracking of dead deer from all causes.

Rare plant monitoring and protection continued.

-
- 2003** Vegetation plot monitoring continued on limited basis (two plots and two exclosures, including microburst, fire exclosures, and paired open plots).

Received final report from Dr. Russek-Cohen (contracted to analyze vegetation plot data collected during the periods 1990–1995 and 2000–2002).

Distance sampling deer spotlight surveys conducted in spring and fall; population estimates 159.72 (Spring) and 192.95 deer per square mile (Fall).

Received summary report and presentation of distance sampling done in 2000 and 2001 in the National Capital Region from Dr. Brian Underwood.

Continued tracking of road-killed deer (motor vehicle accidents).

Rare plant monitoring and protection continued.

Selected areas for six new exclosures, to be built adjacent to randomly selected pre-existing vegetation monitoring plots. Installed posts for the exclosures, which will be finished after the data is collected in 2004.

2004 Winter aerial deer census: 128 deer observed

ISSUES AND RESOURCE CONCERNS AT CATOCTIN MOUNTAIN PARK

The following issues related to deer management at Catoctin Mountain Park have been identified. An Environmental Screening Form (ESF) was completed during the internal scoping meetings held October 29–30, 2003, and additional information was gathered from field trip discussions and park presentations. These issues represent existing concerns, as well as concerns that might arise during consideration and analysis of alternatives.

Natural Resources

Vegetation

The Catoctin area is characterized by a northern hardwood deciduous forest habitat. Over 700 species of vascular plants have been recorded within the park, including 60 species of trees. The dominant trees include chestnut oak (*Quercus prinus*), American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), shagbark hickory (*Carya ovata*), and yellow poplar (*Liriodendron tulipifera*). The American chestnut (*Castanea dentata*) is no longer a dominant species due to chestnut blight. The typical native understory of this oak/hickory forest includes spicebush (*Lindera benzoin*), witch hazel (*Hamamelis virginiana*), blueberry (*Vaccinium* sp.), mountain laurel (*Kalmia latifolia*), and serviceberry (*Amelanchier canadensis*). Currently spicebush is one of the few native shrub species regenerating in the park. One of the only tree species that is regenerating is the pawpaw (*Asimina triloba*), a native plant. In the past 10–15 years, this tree has been reproducing in seven or eight small areas, with no signs of browse. These areas are all in the central part of the park, where the geology consists primarily of greenstone.

Throughout the 1980s and 1990s Catoctin Mountain Park employed a hands-off approach to deer management and monitored only the population level and the effects of deer damage (see Overview of Deer Management Activities at Catoctin Mountain Park). No collection or re-introduction of plant species has been conducted except for the flowering dogwood (*Cornus florida*), as described below. To protect rare plants, park staff fenced several populations, including all known populations of purple-fringed orchids (*Habenaria psycodes*). Park staff looked for new orchids every spring and fenced any that were located. This orchid is a state-listed species and was almost extirpated from the park due to deer browse in the 1980s.

Catoctin Mountain Park uses open plots and exclosures to monitor the amount of tree regeneration (a monitoring system is in place). Park staff became more concerned about impacts as a distinct browse line became visible in certain areas of the park and very little forest regeneration was occurring. During the mid-1980s park staff began noticing bark stripping, especially on slippery elm trees. Some areas suffered severe damage in the 1980s. Such damage continues on a smaller scale today; many elms have already succumbed (Fuller 1991).

Park staff fenced the last American ginseng (*Panax quinquefolius*) found within park boundaries in 2001. Suspected illegal collecting of American ginseng has likely contributed to the elimination of the species from the park. The American chestnut is struggling and regeneration is very limited. In response, Catoctin Mountain Park is investigating the use of a blight-resistant chestnut strain. In addition, park staff reintroduced 16 specimens of an anthracnose-resistant dogwood in 2002 on an experimental basis. The blight-resistant flowering dogwood (the Appalachian spring dogwood originally from Catoctin Mountain Park and then cloned at the University of Tennessee) has been planted in four different locations and fenced for protection from deer browse. Park staff have collected some dogwood seeds and seeds of other species. Seedlings are grown in the park nursery and then transplanted into developed areas of the park.

No large-scale fencing exists in the park except for a small wetland area that was originally fenced as an exclosure and then expanded (0.25 acre). However, from 1990 through 1994, a wildlife biologist from the Center for Urban Ecology, with the help of Catoctin Mountain Park staff, installed and monitored 46 vegetation plots to monitor the effects of deer browsing on the park vegetation. The plots were 20x20 meters with five “nested” 2x2 meter plots. Data was collected on trees, seedlings, shrub cover, browse, canopy cover, herbaceous plants; pictures of the plots were also included. In 1995, data was collected on only a subset of the plots. In 1997, a three-year research project was initiated to monitor vegetation in the spring and summer. Four exclosures, previously erected for the 1980s study, were expanded to 20 square meters and paired with eight adjacent 20 square meter plots that were used for the 1990s study. Two additional open plots were established near a wetland exclosure and included in the study. The study was continued through 1999, and significant differences were found between the vegetation in the exclosures versus the open plots.

Leatherwood (*Cyrilla racemiflora*; a state-listed species) is sparsely distributed in the park. While no protective fences have been specifically installed for leatherwood, individuals that were found growing inside exclosures have benefited from protection.

In 2000, Catoctin Mountain Park staff initiated an annual monitoring of a subset of the original 46 plots with the goal of collecting data on all 46 plots within a four-year period. For this study, park staff focused their data collection to forest regeneration information, such as general cover, seedlings that were 26 cm or more tall, browse, canopy cover, and photo documentation. In 2002, Dr. Russek-Cohen, of the University of Maryland, conducted statistical analyses of the 1990s and 2000-2002 data from the original 46 plots. Dr. Russek-Cohen’s analysis indicated a decline in the number of species of plants, indicating a loss of species diversity. Currently, a randomly selected set of six open plots and adjacent paired exclosures are being built for 2004 data collection. NPS/National Capital Region Botanist Dr. Diane Pavek, in consultation with the U.S. Forest Service, is analyzing pre-existing monitoring data; the 2004 monitoring program will use randomly selected open and exclosure plots to improve vegetation monitoring.

Tree planting has occurred over the past fifteen years in historic districts and developed areas, such as Round Meadow, Owens Creek Campground, both picnic areas, Poplar Grove Youth Group Campground, and the Visitor Center.

A number of other observations by the park's staff indicate that deer browsing pressure is affecting the natural regeneration success of the forest. It is recognized that seedling production varies widely by species and by year (Stout 1999). For example:

- Tremendous maple seedling growth occurred in 1999. The park created three paired open and exclosure plots to monitor subsequent growth. The wire mesh size excluded all herbivores. The open plots contained virtually no maple seedlings by 2001, but microstegium (an exotic invasive grass) was common. Within the exclosures, many of the young maple seedlings survived and continued to grow in 2003.
- Replanted plants or seedlings must be protected with fencing. Seedlings have no chance to mature without fencing.
- In the mid-1990s vegetation was cleared for electric, sewer, and phone utilities, creating a linear opening in the forest canopy. Since that project's completion, no natural forest regeneration has occurred along this two mile corridor except in fenced areas within the corridor that were constructed by park staff.
- Park staff constructed a 20×20 meter paired exclosure and open plot after a microburst occurred near Camp Misty Mount in June of 1998. Recent monitoring indicates vegetation in the exclosure is the densest in the park, while no growth has occurred in the open plot. This exclosure is an anomaly because more light gets into this area than other areas of the forest. Another exclosure and open plot were established in a burn area, and the results were similar.
- Catoctin Mountain Park's vegetation is also affected by diseases and parasites, air pollution, ozone, drought, wind, storms, invasive exotic species and fire suppression. Gypsy moths (*Lymantria dispar*) attack most trees in the park, preferring oak or trees with rough bark. When the gypsy moth egg mass density reaches a certain level, the park aerial sprays the area in spring. When suppression is called for Catoctin Mountain Park completes an environmental assessment for the gypsy moth suppression program, which is undertaken jointly with the U.S. Forest Service (NPS 2003b). Hemlock (*Tsuga canadensis*) trees are suffering from wooly adelgid (*Adelges tsugae*). The park has contracted for injection of an insecticide (Imidacloprid) into 50 trees on a trial basis. Park staff has completed an environmental assessment for this activity.

Catoctin is currently implementing an active fire suppression program; all wildfires are extinguished. When a fire regimen is removed, negative effects can result. Fire releases nutrients from the biomass back into the soil, resulting in better forest regeneration. Lack of fire also results in more ground litter. Catoctin staff are currently working on a revised fire management plan for the park (P.S. Bell, NPS, pers. comm., P. Steinholtz, URS, Feb. 24, 2004).

Rare or Unusual Vegetation

The Maryland Natural Heritage Program designated approximately five acres of Owens Creek Marsh as an "outstanding natural area," though this designation provides no legislative protection. The National Park Service keeps track of plants in this area. Some individual rare plants have been fenced in this area to protect them from deer browsing pressure. A small wetland near Hog Rock has also been fenced to protect wetland vegetation.

Soils

Deer browsing pressure has resulted in changes to the shrub and ground cover vegetation within the park (NPS 2003c). If the park continues to lose ground cover, the potential for soil erosion increases, which could result in sedimentation within Owens and Big Hunting Creeks. These creeks have high

water quality and support native populations of brook trout. Effective deer management that results in increased vegetative cover could improve retention of soils, thereby reducing erosion, sedimentation in streams, and velocity of water from runoff.

Soundscapes

Management strategies that might include sharpshooting as a means of control of the deer population could affect visitors and wildlife because of firearm noise. It is unlikely that firearms noise would be substantial due to the mountainous terrain. Infrequently, firearm discharge noise coming from Cunningham Falls State Park is heard during the hunting seasons. To reduce the chances of noise from firearm discharges suppressors are recommended. Firearm noise on properties surrounding the park is relatively insignificant. However, deer management resulting in increased vegetative cover could create sound barriers, improving solitude in the park.

Aircraft are the primary noise source at the park. Catoctin Mountain Park is in a closed airspace for commercial aircraft; only previously authorized military aircraft are permitted. Traffic on US 15, as well as state roads 550 and 77, contribute the second largest source of noise in the park.

Water Quality

Water quality and quantity could be affected by the amount of ground cover (water velocity, runoff, sedimentation, groundwater recharge) within the park. As stated under soils, a reduction of ground cover by deer browsing could result in lower water quality, whereas increased cover from reduced browsing could improve or maintain water quality.

Land Use

Catoctin Mountain Park is bordered by land used for varying activities, including a state park, agricultural fields, and urban areas. Frederick County is currently experiencing heavy urban development pressure. As described under “Relationship to Other Plans, Policies, and Actions,” fertilized lawns with landscaped shrubs enhanced the field habitat for deer, and wooded home sites create an ideal edge habitat that deer prefer. Increased development outside Catoctin Mountain Park and decreased hunting pressure has created improved habitat for deer around the park. Public natural areas have begun to function like a “deer refuge” (MDNR 1998).

Deer browsing damages crops, which impacts income for farmers and orchard growers. Because of deer browsing, farmers do not plant certain crops near the Catoctin Mountain Park boundary (see “Socioeconomic Conditions” below).

Cunningham Falls State Park, a unit of the Maryland Department of Natural Resources (established in 1954 and located south of Catoctin) consists of an open managed hunting area in a non-developed section of the park (about 3,200 acres of the 4,946 acre park). Hunting is regulated under Maryland state hunting laws for all seasons, from September 15 to January 31 (bow, muzzleloader, handicapped hunt in beach area, rifle, handgun, shotgun, crossbows, etc.). Permits are not required. No density goals are set for hunting. The state keeps track of deer kills from information collected at check stations. Long-term trend data is available for deer harvest at Cunningham Falls State Park.

The Frederick Watershed Forest, which is, Frederick City Cooperative Wildlife Management Area (CWMA), located south of Cunningham Falls State Park, is managed by MDDNR and contains over 7,000 acres of forest land in western Frederick County. The area is popular with deer, squirrel, grouse

and turkey hunters (MDDNR 2000). The MDDNR allows hunting and has 20 deer per square mile compared to 180 deer per square mile at Catoctin Mountain Park (NPS 2003c). Recent cuts to salvage timber killed by gypsy moth defoliation have enhanced the area for grouse and deer. Numerous small ponds on the area attract migrating waterfowl particularly wood ducks and mallards (MDDNR 2000).

The State of Maryland has recognized that the deer population has increased dramatically over the years and has tried to adapt management to the situation. Hunting seasons have been increased and the numbers of animals allowed to be taken per hunter has been increased.

Species of Special Concern

There are no federally listed plant or animal species in Catoctin Mountain Park; 19 state-listed plant species do occur, including the large purple-fringed orchid, leatherwood, and American chestnut. Park staff first recorded signs of deer damage to some of the state-listed species in 1985.

Wildlife

Monitoring for deer population density is being conducted at Catoctin using a fall spotlight survey with a distance sampling method (Underwood et al., State University of New York, have evaluated a statistical process and sampling procedure). Aerial surveys of deer are also conducted when snow cover is available. Surveys do not use infrared detection, which was tested with the United States Park Police helicopter and found to have no benefits; variability of terrain makes it difficult to maintain proper flight heights, and rock outcroppings give infrared signatures.

Pellet counts were completed as part of the University of Georgia study in 1988, but were inconclusive. Under consideration for use are distance surveys for deer pellet-groups using random transects, rather than roadside transects, to supplement the normal distance surveys.

The park conducted deer herd health evaluations in 1988 and 2002 through the University of Georgia and the Southern Cooperative Wildlife Disease Study. The study examined body weight, kidney fat, bone marrow fat, and parasite counts. The results for the Catoctin Mountain Park unmanaged herd as compared to other managed deer herds in the study indicated that Catoctin Mountain Park deer are in poor health (William R. Davidson, pers. comm., Becky Loncosky, NPS, Oct. 21, 2002). This implies that the habitat is stressed and is no longer supporting a healthy deer population.

The Maryland Department of Natural Resources and other national park system areas (Antietam National Battlefield, Chesapeake and Ohio Canal National Historical Park, Monocacy National Battlefield) conduct an annual update on the status of deer issues and research, as well as communicate concerns and issues. No formal report is produced, but meeting notes are recorded. Parks provide the state with roadkill data using state deer tags. The State of Maryland collects various data from hunter kills: age, sex, weight, presence of disease and overall health. They also provide a Maryland Game Program Report that outlines all the relevant information from the previous year's harvest.

Studies have linked high deer densities to undesirable affects on other wildlife species, such as migratory birds (deCalesta 1994; McShea 2000; McShea and Rappole 2000). Park staff is concerned that deer may be affecting other species, such as the wild turkey, which depend on the same understory species as migratory birds for food and cover.

Predators have been observed more frequently over the past few years. A coyote (*Canis latrans*) was seen in the park in 2002, and the black bear (*Ursus americanus*) population is increasing in Maryland. The State of Maryland is proposing to permit bear hunting west of the city of Cumberland, which is

located west of Catoctin in Allegany County. No bear hunting will be permitted in Frederick County (MDNR 2004). However, predators are not having much effect on reducing the deer population within the park.

Unique/Important Wildlife or Wildlife Habitat

Big Hunting Creek is designated as Natural Trout Waters, Use III-P; Owens Creek is under wild trout management by the Maryland Department of Natural Resources.

Nonnative Species

Numerous species of exotic plants are well established and appear to be spreading (NPS 1994). Browsing impacts to the forest understory appear to have created a niche for exotic vegetation to become established. Microstegium, an exotic grass, has replaced the native understory in many areas and is very prolific. Park staff has never observed deer eating this plant. Cunningham Falls State Park, to the south of Catoctin Mountain Park, does not seem to have as much microstegium. The state park has more understory growth and also allows deer hunting each year. The state has taken several steps to encourage greater harvest of deer by extending the hunting season and increasing the bag limit of deer.

Exotic plant controls (mechanical and chemical) are targeted in the Owens Creek watershed, where several species of sensitive plants are found. Exotics include the multiflora rose (*Rosa multiflora*), mile-a-minute (*Polygonum perfoliatum* L), (*Microstegia microstegium*), tree-of-heaven (*Ailanthus altissima*), barberry (*Berberis thunbergii*), and beefsteak plant (*Perilla frutescens*).

The park has produced an exotic plant brochure to educate visitors about these species. The National Capital Region Exotic Plant Management Team, the Youth Conservation Corps, and volunteers currently help with the removal of exotic plant species from the park.

Visitor Experience

Scenic overlooks are provided in the eastern area of Catoctin Mountain Park. Hiking and foliage viewing in the fall are very popular activities. Spring flowers attract visitors, but the deer browse has decreased spring flowers in certain areas. Bird watching attracts many visitors, and a volunteer bird study was conducted in the past two years. Mushroom hunting remains a very popular recreational activity at the park.

Fly-fishing for trout is very popular throughout the year in Big Hunting Creek. Cross-country skiing is also very popular at the park, but mostly if there is no snow at lower elevations. Very little snowshoeing occurs in the park.

Catoctin Mountain Park participates in a local community show every year in Thurmont, with displays on deer and deer impacts, and park staff conducts interpretive programs for groups and schools upon request. Frederick County Public Schools started a program in 2003 for middle school students to examine deer issues and have students help with pellet counts. In 2000 Sally Griffin, Catoctin Mountain Park's Supervisory Park Ranger for Resource Education, revised interpretive themes. Products include an interactive computer program ("Deer Discovery") for middle school students that deal with population dynamics and vegetation, the "Oh Deer" program for camp groups, and a PowerPoint program for adults given in summer as part of the interpretive program. Park staff also conducts campfire programs.

The visitor center provides educational material. Information on exotics and deer problems is provided on the park's Website and through interpretive programs. An interpretive brochure exists for the Deerfield Nature Trail and for deer exclosures.

Media attention about deer management has so far been fair and objective. Catoctin Mountain Park does not have a media package on this issue (currently uses the NPS document).

Cultural Resources

Camp Greentop and Camp Misty Mount, two historic districts that are also designated as cultural landscapes, are located in the park. Catoctin Mountain Park is considering nominating the entire park as a cultural landscape, and the forest is an important element of this designation. Remnants of old stone fences and farms, as well as foundations from the 1800s and early 1900s, are located mostly in the western area of the park. A historic road crosses through the park (Westminister-Hagerstown Turnpike). Most of the historic roads in the park were used during charcoal production. Twelve archeological sites, charcoal hearths, and flint-knapping sites have also been identified within the park boundaries.

The park is planting trees in the historic districts to replace trees lost from storm and insect damage. Park staff is also manually removing exotic plant species in selected cultural resource areas throughout Catoctin.

Historic chestnut log buildings are constantly being restored, repaired, and rehabilitated (through the cyclical maintenance plan). Park staff conducts condition assessments on buildings.

Park staff and contracted archaeologists have done archeological resource assessments in areas of disturbance (water and electric lines, wireless telecommunication facilities, for example). These assessments have been site-specific and project-driven. No parkwide inventory has been completed.

Some sites in Catoctin Mountain Park were used by Native Americans as quarries for stone tools. No information currently exists on any prehistoric settlements in the park. Deer have not impacted these sites. No ethnographic issues have been identified.

Socioeconomic Conditions

Catoctin Mountain Park draws visitors to Thurmont, the closest community. Local residents have complained about deer in the park migrating to private property and eating landscaping and crops. The park has received at least one letter of complaint about a private homeowner's landscaping being destroyed. Most complaints from local residents have been made to the Maryland Department of Natural Resources and pertain primarily to crop damage, although some are related to damage to landscaping (P.S. Bell, NPS, pers. comm., P. Steinholtz, URS, Nov. 26 and Dec. 8, 2003). Farmers see the park as providing sanctuary for deer. NPS managers have explained that hunting is not allowed under the park's enabling legislation, and local residents are aware that Camp David exists within the park and requires special security measures. There has been a cultural shift in perception — deer problems are perceived as directly proportional to how homeowners' landscaping is being affected. More people understand the problems associated with deer overpopulation.

Residents also complain about deer browsing on orchards east of the park boundary. The Maryland Department of Natural Resources states, "In agricultural areas deer depredation of crops and orchards has become a significant economic issue" (MDNR 1998). A University of Maryland study found that 92% of all Maryland farmers suffered deer-related crop damage in 1996. The state of Maryland has

liberalized crop damage permits for deer culling on farms and under special circumstances has permitted farmers to shoot deer at night.

Public Health and Safety

According to the U.S. Centers for Disease Control and Prevention, Lyme disease was identified in 1977 when arthritis was observed in a cluster of children in and around Lyme, Connecticut. Other clinical symptoms and environmental conditions suggested that this was an infectious disease probably transmitted by an arthropod. Further investigation revealed that Lyme disease is caused by the bacterium, *Borrelia burgdorferi*. These bacteria are transmitted to humans by the bite of infected deer ticks (U.S. Centers for Disease Control and Prevention, 2003). Lyme disease is a concern at Catoctin Mountain Park. However, due to excessive deer browse at Catoctin Mountain Park, there is not much understory (grasses and sedges) where ticks can hide..

Park staff conducts a health and safety public workshop at Catoctin Mountain Park in February, which includes exhibits on Lyme disease. Lyme disease information is also presented to the public on bulletin boards at campgrounds, and at other locations throughout the park. The SCWDS study relates deer/human health issues.

Chronic wasting disease (CWD) is classified as a transmissible spongiform encephalopathy (TSE), and is similar to mad cow disease in cattle and scrapie in sheep (Chronic Wasting Disease Alliance, n.d.). This disease has not been found in Maryland to date. Epizootic Hemorrhagic Disease Virus (EHDV) has been found in the area, but not at Catoctin Mountain Park. Catoctin Mountain Park and other parks in the region have participated in meetings with Maryland DNR in the past two years to discuss deer issues, including discussions of diseases such as CWD and EHDV (P.S. Bell, NPS, pers. comm., P. Steinholtz, URS, Nov. 26, 2003).

OTHER ISSUES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Park staff reviewed the National Park Service Environmental Screening form and identified those issues that could be eliminated from further analysis. Park staff at Catoctin Mountain Park believes that no effects related to deer management would occur from geohazards. In addition, no impacts to air quality, marine, or estuarine resources, energy resources, prime or unique farmland, or other resources, such as geothermal or paleontological, would occur because such resources either do not exist in the park or would not be affected under the proposed plan (P.S. Bell, NPS, pers. comm., P. Steinholtz, URS, Dec. 5, 2003).

Although some deer/vehicle collisions have occurred in or adjacent to Catoctin Mountain Park, this issue is not a primary focus for deer management. The park lowered speed limits in the 1960s to protect visitors, wildlife, and property. The road design also includes numerous curves and turns to assist in reducing vehicle speeds. The park has investigated several reported collisions and many times the animal was not found. Also many deer/vehicle collisions are not reported to the park, yet dead animals have been found on the road shoulders. Highway 77, which is a Scenic Byway, traverses the park's southern boundary. Such byways typically have reduced speed limits. Only one animal collision was documented by the Maryland State Highway Administration between January 1, 1999 and December 31, 2001 (MDOT pers. comm., P.S. Bell, NPS, November 19, 2002). Once again many collisions are not reported because numerous dead deer are found on the shoulders of Route 77 during the year. No statistics were available for Route 550 (also part of the Scenic Byway) on the park's west and northwest boundary, but as with the other roads, numerous dead deer are found each year.

No occupancy, modification, or development of floodplains is expected under this plan. Portions of the wetland areas have been fenced to protect rare plants due to current deer browsing pressure. Impacts to these plants will be addressed under the Vegetation issue and impact topic of the plan/EIS. No wetland areas would be destroyed or modified, and no construction would occur in wetland areas under this plan.

The plan would not violate any federal, state, local, or tribal law or requirement imposed for protection of the environment. Because no tribes ever settled within Catoctin and no tribes make claims to the area, the plan would not restrict access to ceremonial use of Indian sacred sites. Further, 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.

OVERVIEW OF RESEARCH

Deer Herd Health at Catoctin Mountain Park

Dr. William Davidson, of the College of Veterinary Medicine (Parasitology) of the University of Georgia, conducted a deer herd health check at Catoctin Mountain Park on August 21, 1988. Five randomly chosen deer were examined. Herd health was “markedly deteriorated compared to vigorous deer herds,” and one of the five deer was an “overtly diseased animal”; the other four exhibited only marginal health. Results of the findings indicated that the herd exceeded the habitat’s nutritional carrying capacity and suggested the potential for substantial losses due to disease and parasitism. Davidson concluded that the herd should not be allowed to increase, and he recommended “efforts at substantial herd reduction. Continuation of the current population density will undoubtedly lead to even further declines in both herd health and habitat quality” (Davidson 1988).

Dr. Davidson conducted a second deer herd health check at Catoctin Mountain Park on August 27, 2002, again examining five deer. The evaluation disclosed evidence of “significant deterioration of population health.” Three of the five animals exhibited problems characteristic of a parasitism/malnutrition syndrome. The report noted that Catoctin Mountain Park’s deer population was in much poorer health than the population at the two nearby national park units also studied that same year — Antietam and Monocacy National Battlefields. Part of the reason for this was the “markedly different habitat conditions where access to large amounts of agricultural grain or forage crops is very limited compared to Antietam or Monocacy.” The report concluded, “the only effective option for addressing this type of problem is population management” (Davidson 2002).

Population and Ecological Characteristics of White-tailed Deer at Catoctin Mountain Park

A 1990 report by Dr. Robert Warren and Charles Ford of the School of Forest Resources at the University of Georgia documented the population and ecological characteristics of white-tailed deer at Catoctin Mountain Park between 1988 and 1989. Deer movements were monitored by telemetry throughout the year; population numbers, age and sex ratios, and doe-to-fawn ratios were estimated; the condition and health of the deer herd were evaluated, along with general habitat characteristics and the relationship of the herd to the habitat’s carrying capacity; the overwinter mortality of radio-collared fawns was estimated; and management alternatives for the deer herd were recommended (Warren 1990).

According to the Warren and Ford study, “There is no doubt that there are too many deer at Catoctin Mountain Park. Significant habitat alterations from overbrowsing by deer in the park have already occurred and are likely to intensify in the future. If this situation continues to remain unmanaged, it

will likely jeopardize the natural character of the park's forested ecosystem for centuries to come." The study also noted "numerous plant species, some of which are considered highly rare by the Maryland Department of Natural Resources' Natural Heritage Program, have already been threatened by deer overbrowsing." In addition, "numerous bird species have already declined significantly in number or vanished from the park because of the effect of overbrowsing by deer on the understory and shrub cover in the forest." The Warren and Ford report concluded, "It is infeasible to expect natural ecological forces alone to balance the deer herd within the limits of the park's carrying capacity."

Eleven deer management alternatives were included, but only six were recommended. These included contraception, increased harvest or direct reduction outside the park, public hunting or direct reduction inside the park, and use of exclosures. The report recommended a combination of solutions (Warren and Ford 1990).

Effects of White-tailed Deer Browsing on Vegetation and Plant Biodiversity at Catoctin Mountain Park

Between 1990 and 1994, data was collected by Dr. John Hadidian (Wildlife Biologist, NPS National Capital Region) in 46 vegetation sampling plots within the park to evaluate deer browse impacts to tree regeneration, ground cover, and plant diversity (NPS 2000c). The results indicated a very heavy browse impact and little forest regeneration. However, the sampling did not include any exclosure areas; therefore, impacts could not be directly linked to deer. Thus, for future studies exclosures were incorporated into the monitoring.

In 1997 Dana M. Backer and Douglas Boucher (Department of Biology, Hood College, Frederick, Maryland) inventoried Catoctin Mountain Park's vegetation within exclosures, from which deer had been excluded, and compared it to paired areas open to deer browse. Results showed that species' richness and plant abundance were significantly higher in exclosures. Browsing by white-tailed deer reduced biodiversity of spring ephemerals, tree seedlings, and summer herbs. Backer and Boucher (1997) concluded, "if deer herds are left uncontrolled, associated plant and animal communities could be adversely affected and further reduction in biodiversity is possible."

Douglas Boucher and Kerrie Kyde of Hood College continued the study of the effects of deer exclosures on plant abundance and diversity at Catoctin Mountain Park in 1998 and 1999. This second annual report contained the results of the cooperative studies on the effects of deer browsing on plant abundance and biodiversity in the park. The report was based on a preliminary statistical analysis of data gathered in spring and summer of 1999 at 12 plots in the park, and these results were compared to data from 1997 and 1998. (Dana Backer conducted the first study in 1997, as described above. Douglas Boucher, Kerrie Kyde, and Becky Reddinger, of the National Park Service, continued Backer's work in 1998 and 1999). The results of the 1999 study "confirmed and strengthened the findings of the previous two years, indicating that deer browsing has significantly decreased the abundance and diversity of plants in Catoctin Mountain Park." The exclosures had a higher abundance and diversity of species than the unprotected vegetation plots. In the western portion and wetland areas of the park, abundance and diversity recovered rapidly in just two years, while recovery was very slow in the eastern and central areas of the park, and even after 15–20 years, abundance and diversity remained very low (Boucher and Kyde 1999).

Dr. Estelle Russek-Cohen, Professor and Director of the Biometrics Program at the University of Maryland, statistically analyzed vegetation data collected during 1990–1995 (Hadidian study) and 2000–2002 (park staff), specifically investigating the possible impacts of white-tailed deer on vegetation within Catoctin Mountain Park. The report noted a "significant decline in the number of species and the number of plants over the entire combined study period." However, the analysis

showed that “browsing damage declined significantly between the first and second study,” which could be attributed to “the result of vegetation that survived earlier grazing activity being less desirable.” The deer tended to preferentially graze on younger seedlings, impacting their ability to grow into mature trees. A change in seedling composition suggests that the deer may have already eaten much of the vegetation they would have preferred and were left with vegetation that may be less desirable (plants that take longer to forage). Dr. Russek-Cohen’s statistical analysis suggests that improvements to the sampling / monitoring methods should provide a more consistent outcome (Russek-Cohen 2003).

Catoctin Mountain Park’s “Summary Report: White-tailed Deer Management,” from Keith Langdon’s work at Catoctin Mountain Park, lists browse impacts to 24 species comprising the park’s vegetation. This summary identifies foliage damage, reproductive impacts, and the outlook trend by species. The summary report also contains a map of aerial deer survey flight paths (NPS 2000c).

Forest Stand Structure and Regrowth at Catoctin Mountain Park

Dr. John Hadidian collected data on the park’s forest stand structure and regrowth in the vegetation plots between 1990 and 1995. Seedlings 30 cm and taller were counted (seedlings taller than 30 cm have a higher probability of surviving to maturity and producing offspring). No statistically significant difference was noted to saplings and overstory between 1990 and 1992. The mean percentage of canopy coverage differed substantially by plot position (meaning its location on an edge, at a middle distance, or in the core of the forest) in 1991, 1992, and 1994. Canopy coverage was “highly significantly different among all years.” Mean shrub coverage was “not significantly different among the regions” for 1994. For all seedlings of all heights, no significant detectable change was noted between 1991 and 1994. An important difference was noted in mean available total browse between 1990 and 1994, depending on the region. The amounts of total browse available due to plot position differed among the years. Deer browse differed significantly in each region during 1991 and 1994, with deer utilizing the edge, middle, and core plots among the regions differently over time (NPS 2000a).

RECOMMENDED REGENERATION STANDARDS FOR TREES

Research has been conducted on regeneration standards for trees. The TAC will be reviewing available research to develop and adapt standards for the Park. The following modified standards have been suggested by Stout 1999:

Restore tree seedling recruitment to acceptable levels where 67% of plots (2X2 meters with 4 subplots per plot measured for a size of 0.0010 hectares) at low density have more than 51 seedlings or sprouts per plot and at high density plots having more than 153 seedlings or sprouts.

Low deer density has been defined as 5 to 8 deer per square kilometer (13 to 21 deer per square mile) relative to levels observed in the Mid-Atlantic Region over time, and high deer density is 22 to 25 deer per square kilometer (56 to 64 deer per square mile) (Horsley et al. 2003).

PRELIMINARY ALTERNATIVES

For an alternative to be considered for in-depth analysis in the NEPA process, it must meet project objectives to a large degree. The alternatives must also be developed with environmental resources (rather than cost, e.g.) as the primary determinant. The Council on Environmental Quality (CEQ) has defined reasonable alternatives as those that are economically and technically feasible, and that show evidence of common sense (NPS 2001a).

The discussion of potential alternatives during the internal scoping meeting focused on the components or potential actions that would further meet the plan objectives. This was a brainstorming session that did not proceed into a discussion of how well the potential action would resolve purpose and need and meet objectives to a large degree. URS subsequently grouped these actions into potential alternatives. Some suggested ideas were considered, but may not be carried forward into the planning process. These are noted as “alternatives considered, but rejected.” The preliminary alternatives, as well as the “rejected” alternatives, will be reviewed through additional public and agency scoping. After additional scoping is completed, a range of reasonable alternatives will be selected for detailed analysis in the planning process.

PRELIMINARY ALTERNATIVES

Actions Common to All Action Alternatives

The following actions would be common to all alternatives.

- Use scientific monitoring and modeling methods to determine when population levels reach a threshold where management action is necessary. This would entail the continuation and expansion of monitoring for both vegetation impacts and deer population in order to correlate impact levels with deer population numbers.
- Seek the input of other organizations.
- Implement education and interpretive measures and involve various efforts including:
 - exhibits at visitor centers.
 - an expanded Website to include information on deer management.
 - brochures and publications.
 - teacher workshops.
 - education regarding the negative effects of feeding of deer.

Alternative A — No-Action Alternative (Existing Management Continued)

Under the No-Action Alternative, Catoctin Mountain Park would continue to implement deer monitoring, data gathering, and various activities to protect native plant species, as described under the “Objectives” section (such as creating and monitoring exclosures, conducting spotlight surveys and herd health checks, etc.). Current inventorying and monitoring efforts would continue to record impacts and deer population numbers within the park. Educational and interpretive measures would continue to inform the public about deer ecology and park resource issues, such as participating in a

community show every year in Thurmont. No additional active deer management activities would take place. (This alternative would serve as the baseline for analyzing and comparing the effects of the other alternatives.)

Alternative B — Use Fencing and Repellents to Protect Sensitive Areas

Under Alternative B, fences would be installed to keep deer away from sensitive natural and cultural resources. Small areas of known sensitive resources, such as rare plant populations or important cultural resources, would be fenced to protect them from deer browsing. Small, experimental fenced plots could be installed around rare plants to encourage reproduction. In other locations larger exclosures could be constructed and rotated between sites after plant regeneration reached a point where preferred tree species were mature enough to withstand deer browsing.

In areas where a fence would be undesirable, such as around historic resources or in scenic viewsheds, deer repellents would be used on vegetation. Available repellent products include the application of products such as Ropel®, Hinder®, and soap, or the use of sonic repellent devices. The application substances use odors or bad tasting coatings to deter deer from visiting areas or browsing on certain vegetation. Applications used at the Catoctin Mountain Park Visitor Center were not effective in repelling deer.

Repellents would only be used in specific areas, as use over the entire park would not be feasible due to cost and the disruption to visitors from noise or spraying activities. Repeated applications of spray repellents would be necessary due to weather and new growth. The effectiveness of repellents is debatable; thus, they would be implemented on an experimental basis until the level of effectiveness was established.

Alternative C — Control Reproduction in Does

Under Alternative C, contraceptives would be administered to does to control deer reproduction within the park. Contraception could be delivered by remote injection. Capturing and handling each deer would be necessary for identification requirements, which could make this alternative expensive and time consuming. Immunocontraception activities would take place within a closed area. Immunocontraception is best suited to localized populations where the number of breeding females to be treated is small (less than 200 deer) and managers are trying to maintain the deer population between 30% and 70% of the carrying capacity (Rudolph et al. 2000).

It would take some time for population reductions to take place as a result of decreased reproduction rates. Fertility experts in the field of deer contraception believe isolated populations have the best chance for successful reduction of herd numbers (MDNR 1998). A fertility control plan could be implemented initially to determine the effectiveness of the program at a small scale.

These reproductive control methods have proven to be generally successful with captive deer but present complications when dealing with free-ranging, wild deer. Complications (depending on the method used) include frequent or even daily exposure to achieve physiological effectiveness, repeated capture and handling of animals, precise annual timing in administration of contraceptives, potential extreme cost, and potential for liability relating to human consumption of meat from animals treated with contraceptives (NPS 2000c). Also, none of the contraceptive drugs have been approved by the Federal Food and Drug Administration (FDA)

Other concerns involve the as yet unproven system for delivery of sterilizing agents at the population level, the undeveloped monitoring and assessment techniques necessary for determining program

effectiveness, and the unknown behavioral (and ecological) effects of sterilization relative to altering natural deer regimens and ecosystem roles (NPS 2000c). Research indicates that use of contraceptives in wild populations may extend female-male interactions beyond the normal breeding period, leading to births of late-born fawns in early autumn and lower winter fawn survival (Turner, et al. 1996, McShea et al. 1997, Muller et al. 1997).

Alternative D — Undertake Direct Reduction of the Deer Herd

Under Alternative D, sharpshooting would be employed as a direct herd reduction method. NPS personnel or authorized agents of the park would shoot deer. Only people who are highly skilled, licensed and trained in the use of firearms and public safety would participate in the reduction. Bait stations could be used to attract deer. High-velocity rifles would be used from close range. Every effort would be made to make the shootings as humane as possible. Suppressors and night vision equipment could be used to reduce disturbance to the public. Compliance with all federal firearm laws, administered by the Bureau of Alcohol, Tobacco, and Firearms, would be required.

The taking of antlerless deer would be the primary objective for more efficient reduction of herd numbers over the long term. Buck-only hunting would not control population growth, as deer populations are largely dependent on the number of does with potential for reproduction. Harvest of antlerless deer would be necessary to stabilize or reduce populations (W. Virginia University 1985).

Direct reduction would occur during the winter when visitation levels are low. The public would be notified in advance of the activities. In addition, exhibits would be displayed at visitor centers, information would be posted on the park's website, and notification would be provided to adjacent landowners in order to educate the public regarding deer management actions. Visitor access would be restricted as necessary, and the park would be patrolled by NPS law enforcement officers to ensure public safety. Safety zones would be established around buildings. Bait stations would be established away from public use areas to concentrate the deer into specific areas and to maximize the efficiency of the reduction action. This would reduce the number of necessary participants and shooting time.

Crews would collect, field-dress, and record data. Waste, such as removed hides and entrails, would be used or disposed of consistent with federal and state laws and regulations. Venison would be donated to local charity organizations. Refrigerated storage would be used if air temperatures were above 50 °F at the time of the shootings.

Alternative E — Special Park Hunt

A special hunt or a controlled hunt could be considered within the park on designated days in order to reduce deer numbers. This action would require a change to the park's enabling legislation as hunting is currently prohibited at Catoctin Mountain Park. According to NPS Management Policies (2001), hunting is allowed in park units when specifically authorized by statute or regulation and not subsequently prohibited by regulation (Section 4.4.3).

Hunting would be regulated and would occur only in designated areas that are carefully chosen based on safety issues. Only licensed hunters that meet state hunting regulations and have taken a hunting safety and orientation class would be eligible to participate. A predetermined number of hunters could be selected by lottery from Maryland's licensed deer hunters to participate in the controlled hunt. The taking of antlerless deer would be mandated for more efficient reduction of herd numbers over the long term.

Public hunting would require posted hunting zones, game checking stations, and possibly seasonal personnel associated with implementation of the hunt. Additional coordination with the State of Maryland regarding game checking procedures would be required. All hunting activities would adhere to established State of Maryland hunting laws. Additional enforcement costs for hunter safety, orientation, and protection would likely be incurred (NPS 2000b).

As described under alternative D, hunting would occur during winter months when deer are more visible. Safety zones would be established around buildings, and participants would be required to wear fluorescent orange as a safety measure. The public would be notified of the management action well in advance of the activities. Exhibits would be displayed at visitor centers, information would be posted on the park's website, and adjacent landowners would be notified in order to educate the public regarding deer management actions. Visitor access would be restricted as necessary and the park would be patrolled by NPS law enforcement officers to ensure public safety. Since shooting would occur during the winter months, visitation levels would be lower.

Details of the special hunt, such as whether or not hunters would be allowed to keep game, will be refined during development of the EIS.

Hunting outside the park would continue to be encouraged to make population control efforts more effective. Catoctin Mountain Park would request the state to continue crop damage permit requirements that allow hunting for one hour beyond daylight hours, time limits of up to 120 days duration, and an extended hunting season (in which doe hunting would be encouraged).

Alternative F-- Capture and Euthanization

This alternative would involve live trapping and shooting of deer. A variety of trap methods or immobilization drugs could potentially be used. Trapped deer would be approached on foot and shot by individuals selected by the National Park Service. This method results in increased stress levels in captured deer compared to the direct reduction methods. Additionally, venison from drugged deer cannot be used by local charity organizations, as the FDA does not approve the drugs for human consumption.

Alternative G — Combined Management

Under Alternative G, a combination of actions from alternatives B, C, D and F would be used to manage deer. Fencing would be used to protect small populations of sensitive plant species and small plant restoration projects. A small section of the park would be selected for a reproductive control study to test the applicability of the method to manage deer. Immunocontraception activities would take place within a closed area. If effective and cost-efficient, the reproductive control program would be implemented in new areas as feasible. Direct reduction would be used in sections of Catoctin Mountain Park where immediate reduction was necessary due to unacceptable resource damage or public health and safety. Direct reduction would continue to be used to prevent unacceptable resource damage even in areas with fencing or reproductive control as necessary over the long term. Special park hunts would be used in specific sections of the park and mainly for maintenance of population levels reached using other methods. Euthanization would be used in special cases such as injured deer or in areas of the park where other methods could not be used.

ALTERNATIVES CONSIDERED BUT REJECTED

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 suggested that population reduction depends largely on the degree of annual immigration. With high immigration (which could be expected from the state park that shares Catoctin Mountain Park's southern boundary and private lands to the north), 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 nondominant 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.

Predator Reintroduction

Reintroducing predators into Catoctin Mountain Park is not feasible due to a lack of suitable habitat that is large enough to support them. The proximity to humans, particularly those raising livestock in areas adjacent to the park, is not appropriate for reintroducing predators that would prey on deer, such as gray wolves or cougars. Other native animals, as well as domestic pets, could also become potential prey if predators were reintroduced to the Catoctin area. In addition, the natural predation of deer in a small natural area such as Catoctin Mountain Park would not be effective in controlling the population at the level needed to protect and maintain plant abundance and diversity.

Use of Poison

Under this alternative, poison mixed with food sources such as grains would be used to kill deer. Death from poisoning would not be immediate, and health concerns resulting from people potentially hunting and eating poisoned deer that have wandered out of the park could be an issue. In addition, non-target native wildlife or roaming pets could potentially eat a tainted carcass or the poison itself.

Capture and Relocation

Under this alternative, deer within Catoctin Mountain Park would be captured and relocated to areas a sufficient distance from the park to ensure they would not return.

Permits would be required from the Maryland Department of Natural Resources to relocate animals to other portions of the state. Deer could also be relocated out of state, but special permits, testing, and possible quarantine processes would be required especially considering the concerns over chronic wasting disease (CWD). Deer relocation methods have been shown to cost from \$400–\$800 per deer

(Porter 1991). Given the abundance of deer in Maryland and most of the United States, recipients for such a program would be very limited.

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 had survived one year after relocation (O'Bryan and McCullough 1985).

Supplemental Feeding

Providing supplemental food sources for deer would potentially decrease browsing pressure on vegetation resources at Catocin Mountain Park. However, increasing food sources would increase deer health and production, leading to a growing deer population. In the long-term, this would compound problems associated with high deer numbers (MDNR 1998).

Introduction of Parasites or Disease

Under this alternative deer parasites or disease would be introduced to kill deer. Death from such methods would not be immediate. Health concerns resulting from people potentially hunting and eating diseased deer that have wandered out of the park could be an issue. Non-target native wildlife or roaming pets could potentially eat a diseased carcass. In addition, such parasites or diseases have the potential to affect other wildlife species or even humans, or spread to the deer population outside the park.

Surgical Sterilization

This alternative provides the advantage of permanent sterilization of individuals. Under this alternative, female deer would be captured, tagged, and surgically sterilized, usually requiring a licensed veterinarian. They would then be released back into the park. In addition to the capture stress induced by this alternative, stresses due to tranquilizers/anesthesia, surgical procedures, and recovery could increase mortality rates of sterilized individuals. Additionally, the long-term effects of this alternative on population genetics or behavior have not been well documented. Some researchers suggest that, depending on the type of sterilization used, changes in animal behavior would be expected (Warren 2000). Removal of the ovaries, thus changing hormone production in the treated animal, would result in altered behavior. With a ligation procedure, normal hormone production would remain; however, this has been shown to result in repeated estrous cycles during the breeding season (Knox et al. 1988), extending the rut by modifying the male response behavior.

Fencing the Entire Park

The entire park unit could be fenced to prevent deer from entering or leaving Catocin Mountain Park. The minimum fence height would need to be approximately 8 feet to prevent deer from jumping over the barrier. Fencing would prevent deer from being "pushed" into Catocin Mountain Park from Cunningham State Falls to the south during hunting season, and it would also prevent deer from the park entering agricultural lands to the north, alleviating impacts to local farmers. However, vegetation within Catocin Mountain Park would continue to suffer the effects of deer browse, 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 fence would either need to be removed or the deer

population within the fence would need to be managed with other methods to meet the goals of the park management plan. For these reasons, this alternative was dismissed.

RELATIONSHIP TO OTHER PLANS, POLICIES, AND ACTIONS

Prior planning efforts at Catoctin Mountain Park addressed deer management issues for the protection of park resources and values, but have not called for population management. These planning efforts include the 1996 *Statement for Management*, the 1997 *Strategic Plan*, and the 1998 *Resource Management Plan*.

As previously mentioned, Cunningham Falls State Park permits deer hunting each year. These hunts are for recreational and deer management purposes. Future hunting in the state park has the potential to affect deer management efforts undertaken in Catoctin Mountain Park. According to the deed of transfer, Catoctin Mountain Park has the right of federal oversight for any actions the state park may take. Permits from the Maryland Department of Natural Resources are not required for the National Park Service to manage deer in the park.

The following projects or activities could potentially affect park resources related to this planning effort.

- In the 1960s and 1970s, human populations began a rapid relocation and expansion from urban areas into nearby rural lands of central Maryland. Fertilized lawns with landscaped shrubs enhanced the previous field habitat for deer. Forested land tracts were subdivided to provide wooded home sites, creating ideal edge habitat preferred by deer. Traditionally, many farmers and forest owners had hunted or leased deer hunting rights to others on their lands, which is no longer an option in new suburban habitats (MDNR 1998). Therefore, increased development outside Catoctin Mountain Park and decreased hunting pressure has created improved habitat for deer around the park. Public natural areas have begun to function like a “deer refuge,” which can compromise hunting management programs on adjacent lands (MDNR 1998).
- The major land use in Frederick County is agriculture, which comprises roughly 64.3% of the county’s land use. Woodlands comprise the next largest category at approximately 15.4%, followed by open space and parkland, with 5.3%. Of the remainder, residential land use accounts for approximately 10.3%. The Maryland Office of Planning has prepared forecasts of changes in land use patterns that are to occur in Frederick County over the next 20 to 30 years. Based upon these projections, the acres of land devoted to agricultural uses are projected to decrease by slightly more than 8%. During the same time period, land area devoted to residential development is projected to increase almost 56% (Frederick County 1998).
- The park is currently preparing revisions to the fire management plan. Prescribed burns may occur within Catoctin Mountain Park, thus increasing edge habitat.
- Catoctin Mountain Park is located within a secure airspace and commercial flights or private flights are permitted with special authorization. Noise sources in the park are primarily from military aircraft, consisting mostly of helicopters. Very rarely an overflight for gypsy moth or another special project associated with the park is allowed (P.S. Bell, NPS, pers. comm., P. Steinholtz, URS, Nov. 26, 2003).
- The Maryland Department of Natural Resources has produced a deer management plan that would apply to all Maryland State Parks, including Cunningham Falls State Park, which is adjacent to Catoctin Mountain Park. One of the plan’s objectives is to increase public awareness regarding Lyme disease and work to reduce the incidence of Lyme disease in Maryland (MDNR 1998). The MDNR proposes two strategies to help meet this objective:

Work in cooperation with the Maryland Department of Health and Mental Hygiene to develop public education programs regarding Lyme disease, and cooperate with the United States Department of Agriculture in the Northeast Area Tick Control Project (MDNR 1998). The Maryland Department of Health has no established protocol for treatment of Lyme disease. The state follows the recommendations that the Centers for Disease Control (CDC) publish (Maryland Department of Health, NPS, pers. comm., P. Steinholtz, URS, Dec. 1, 2003).

- The Maryland Department of Transportation held discussions with Catoctin Mountain Park and Cunningham Falls State Park about changing the geometry of a sharp curve on Highway 77 near the state park. However, the idea was abandoned due to cost issues. The Department of Transportation currently has no plans to modify Highway 77 or to implement efforts to reduce deer/vehicle collisions along this road (Mark Crampton, NPS, pers. comm., P. Steinholtz, URS, Dec. 1, 2003).
- Each year Catoctin Mountain Park completes an environmental assessment (EA) for the gypsy moth suppression program when suppression is needed. This program is undertaken jointly with the U.S. Forest Service. The gypsy moth is considered “one of the most serious threats to Catoctin Mountain Park” (NPS 2003b). The EA provides guidance as to whether or not to suppress gypsy moth populations in certain areas of Catoctin Mountain Park and if so, what method(s) and approach(es) to use (NPS 2003b).
- New or improved utilities and wireless telecommunication facilities have been installed within Catoctin Mountain Park and Cunningham Falls State Park within the past ten years. Mature trees have been removed in order to install these utilities, resulting in a corridor with little to no vegetation. Because deer are browsing on new seedling growth, the utility corridor will remain treeless as no trees are surviving to maturity.
- Private landowners have logged and are continuing to log trees on their properties around the park. Such logging can also result in a decrease in mature forest growth around the park, because deer are browsing on the new growth.

AFFECTED ENVIRONMENT

The following resource documents for Catoctin Mountain Park have been collected to date. These and other relevant documents and references will be used to prepare the “Affected Environment” section of the environmental impact statement.

CATOCTIN MOUNTAIN PARK PLANNING DOCUMENTS

- 1996 *Statement for Management, Catoctin Mountain Park.*
- 1997 *Strategic Plan, Fiscal Year 1998 to 2002, and FY 98 Annual Performance Plan.*
- 1998 *Resource Management Plan, Catoctin Mountain Park.*
- 2000 *Summary Report: White-tailed Deer Management in Catoctin Mountain Park.*
- 2002 *Strategic Plan, Fiscal Year 2002 to 2005*
- 2003 *FY-2003 Annual Performance Plan for Catoctin Mountain Park.*

CATOCTIN MOUNTAIN PARK RESOURCE INFORMATION

- 1999 Environmental Assessment: White-tailed Deer Management in Catoctin Mountain Park
- 1999 Deer Action Committee meeting notes.
- 1999 “Preliminary Deer Management Meeting at CATO.”
- 2000 “CATO White-tailed Deer Assessment Team Summary of Meeting May 15–17, 2000.”
- 2000 Catoctin Mountain Park Hog Rock Nature Trail brochure.
- 2000 Cultural Landscapes Inventory, Catoctin Mountain Park.
- 2000 “Forest Stand Structure — Regrowth.” Catoctin Mountain Park.
- 2000 “Vegetation Baseline Data Sampling Design and Analyses.” Catoctin Mountain Park.
- 2001 “Desired Visitor Outcomes for Catoctin Mountain Park.”
- 2001 “Interpretive Themes for Catoctin Mountain Park.”
- 2001 “Statements of Significance for Catoctin Mountain Park.”
- 2002 *Catoctin Mountain Park Visitor Study.*
- 2002 “Catoctin Mountain Park: Bird Checklist.”
- 2002 “Catoctin Mountain Park: Brown’s Farm Trail” (brochure).
- 2002 “Catoctin Mountain Park: Cross-Country Skiing” (brochure).
- 2002 “Catoctin Mountain Park: Horse Trail” (brochure).
- 2002 “Catoctin Mountain Park: Wildflower Checklist.”
- 2002 “Catoctin Mountain Park: Site Bulletin on Education Programs” (brochure)
- 2003 “Catoctin Mountain Park: Camp Misty Mount” (brochure).
- 2003 “Catoctin Mountain Park: Camping” (brochure).
- 2003 “Catoctin Mountain Park: Geology” (brochure).
- 2003 Completed Environmental Screening Form.
- 2003 *Environmental Assessment, Gypsy Moth Suppression.* Catoctin Mountain Park. February.
- 2003 *Environmental Assessment, Hemlock Woolly Adelgid Suppression.* Catoctin Mountain Park. January.
- n.d. “Revised Timeline for Deer EIS and TAC.” Catoctin Mountain Park.
- n.d. “Catoctin Mountain Park: Blacksmith in Society” (brochure).
- n.d. Catoctin Mountain Park Distance Sampling Spotlight Deer Surveys.
- n.d. “Man on Catoctin Mountain: The Blue Blazes Still Walk” (brochure).

OTHER INFORMATION SOURCES

- 1985 “White Tail Deer Action Plan” by Keith Langdon; this plan was never implemented.
- 1990 A Citizen Involvement Committee, which included agriculture interests, evolved into a Technical Advisory Committee (TAC), which led to the first deer management environmental assessment (1990); the advisory committee was then dissolved.
- 1998 The park was invited to attend a meeting organized by local agriculturalists on crop damage permits in 1998.

- The 1991 *Fire Management Plan* is being updated; the estimated completion date is August 2004.
- A complete vegetation map of the park exists (from work done in the mid-1970s); an updated map will be completed in the next one to two years.
- A map of boundary land use was created in 1999.
- The park is mapping any remaining viable American chestnut (*Castanea dentata*) trees that exist in the park.
- The Center for Urban Ecology (CUE) and the U.S. Geological Survey are studying songbird populations and forest regeneration. Catoctin Mountain Park is being compared to areas that are hunted to determine effect of deer management. The study should be complete by mid-2004.
- A bird inventory (species only) was completed in 2002; wild turkey (*Meleagris gallopavo silvestris*) observations have been tracked since the 1970s.
- The first Maryland breeding bird surveys were conducted from 1983 to 1988. The second Maryland Breeding Bird Atlas currently in its third survey year (2002-2006).
- Catoctin Mountain Park just completed a park cultural landscape inventory in 2002. It has not yet been approved by Maryland State Historic Preservation Officer (MDSHPO).
- The Comprehensive Interpretive Plan (NPS 1997) has a resource education section that covers deer issues; a revision of the plan is due in two years.

Additional resources are listed in the “Overview of Research” section of this document.

PUBLIC INVOLVEMENT

Two public meetings are planned using the Gettysburg deer management plan as a model:

1. At the public scoping meeting NPS staff would provide an overview of the planning process; and describe the NEPA process; and information would be distributed to the public on deer population levels and deer impacts to park resources. Public comment on purpose, need, and objectives and other concerns would be invited.
2. At the alternatives workshop public participation would be elicited in the discussion of alternatives, using a workshop format (not an open hearing) with a facilitator at each table.

The contractor will establish a Website or an e-mail server and manage incoming comments throughout the EIS process. The contractor will also develop and manage a mailing list and develop newsletters. Catoctin Mountain Park will prepare and submit the notice of intent to prepare an environmental impact statement to the *Federal Register*. The elements of the public participation plan will be further defined in a subsequent phase of this project.

NEXT STEPS

The contractor (URS) will produce and distribute for review the Internal Scoping Report within two to three weeks following the internal scoping meetings.

- The unit contact will work directly with the EQD project leader assigned to the project and vice-versa.
- The EQD project leader will assign and monitor work with contractor.
- The unit contact is responsible for coordinating park staff, data collection, assignments, and reviews. For larger issues (scope, direction, costs) the contractor must go through the EQD project leader.

APPENDIX A: INTERNAL SCOPING MEETING MATERIALS

The following materials were distributed and/or discussed at the October 29 and 30, 2003, internal scoping meeting:

Internal Scoping Meeting Agenda. October 29–30, 2003.

List of scoping meeting participants.

Catoctin Mountain Park Internal Scoping Meeting PowerPoint presentation. October 29–30, 2003.

Summary of Purpose, Objectives, Need Discussion. October 29–30, 2003.

Scott Bates' Deer Count and Density PowerPoint presentation. October 29–30, 2003.

Jim Voigt's Deer Management PowerPoint presentation. October 29–30, 2003.

Becky Loncosky's Vegetation Presentation. October 29–30, 2003.

Interpretive Themes for Catoctin Mountain Park.

Desired Visitor Outcomes for Catoctin Mountain Park.

Statements of Significance for Catoctin Mountain Park.

Catoctin Mountain Park Management Goals.

"Indiana Dunes Deer Management Internal Scoping Report," dated February 5, 2003.

Executive Order No. 7496, "Transfer of Recreational Demonstration Projects." November 14, 1936.

US DOI-NPS Memorandum: *Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making*. From NPS Director, Robert Stanton. January 8, 2001.

"Director's Order #12: Appendix I – Environmental Screening Form" (October 2003).

NEPA Compliance Document Checklist for Administrative Record and/or Project File.

NEPA Administrative Record — Checklist for Compilation.

Catoctin Mountain Park park brochures.

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