

ENVIRONMENTAL ASSESSMENT

1995 GYPSY MOTH SUPPRESSION PROJECT

FREDERICKSBURG & SPOTSYLVANIA NATIONAL MILITARY PARK

MID-ATLANTIC REGION

USDI NATIONAL PARK SERVICE

Submitted by: _____
Susan Alberts
Natural Resource Management Specialist
Date

Reviewed by: _____
Michael K. Johnson
Chief, Resource Management and Visitor Protection
Date

Approved by: _____
Martha Leicester
Superintendent
Date

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I. PURPOSE AND NEED FOR ACTION

A. Introduction

The gypsy moth was introduced into Massachusetts in 1869, and since that time the spread of this exotic species has been steadily moving southward and westward. The gypsy moth has been found in localized infestations throughout the United States, with populations concentrated in the northeast. The advancing front of the moth, now in central Virginia and eastern West Virginia, is progressing southward at a rate of approximately ten miles per year. Because this pest is often carried by wind or vehicles into non-infested areas any location with suitable habitat is subject to defoliation. A high degree of vehicular visitation coupled with abundant habitat puts Fredericksburg and Spotsylvania National Military Park at a high risk for further defoliation.

The National Park Service (NPS) in conjunction with the U.S. Forest Service (USFS) and the Animal and Plant Health Inspection Service (APHIS) began a monitoring program in the park during 1982. Populations remained relatively low and egg mass surveys did not result in any positive finds until 1987, however by 1990 infestations exceeding 20,000 egg masses per acre were found at Ellwood in Wilderness Battlefield. The first year the park experienced extreme defoliation was 1993.

To discourage defoliation caused by high gypsy moth populations the park, in response to National Park Service policy and in cooperation with the U. S. Forest Service, has undertaken an integrated pest management program for the gypsy moth.

This program emphasizes population monitoring to identify critical action thresholds, for which appropriate management activities can be made most effective.

Natural controls are to be maximized with environmentally acceptable insecticides being used only when appropriate. Control efforts proposed for 1994 include one aerial application of biological controls to 217 acres of the 8,000 acres in the park ownership. Six areas within three park units have been defined within the park where populations of the gypsy moth indicate probable defoliation. Five of these areas will be treated, the sixth area is known as Jackson's Flank. Jackson's Flank is located off of Route 3 between the Wilderness and Chancellorsville units of the park and will not be treated because of its isolated location and lack of susceptible resource values. Tree mortality in this area would not be a threat to park structures or visitors, nor would it severely impact any historic resources.

The boundaries of the areas to be treated are delineated on the attached outline map (Appendix A).

At the present time the primary need for the proposed project is to reduce the impact of the gypsy moth in park development zones. Developed zones include Visitor Centers and grounds, picnic areas, interpretive waysides, and areas of concentrated visitor use. Defoliation of the forest canopy would result in increased mortality in these trees, predominantly oaks, already subjected to recreation related stress. Increased mortality would increase hazards to public safety.

B. Decision Making

This document has been prepared by the U.S. Department of the Interior, National Park Service. The responsible official is:

Regional Director
Mid-Atlantic Region

Pockets of gypsy moth populations have reached densities sufficient to cause forest defoliation within the park. The decision to be made is whether or not to suppress the gypsy moth in the park and if so, by what means. Currently, the areas identified for treatment are not in wetlands (except for a small riparian area adjacent to a stream) or floodplains and are in the developed zone or other critical protection areas. The growth in gypsy moth populations is expected to be sufficient to cause defoliation throughout the 8,000-acre park in the coming years. The management strategy will be to suppress these populations to protect the historic landscape as described in the park's Gypsy Moth Management Plan.

C. Relationship to Other Decisions

The U.S. Forest Service issued a Final Environmental Impact Statement (FEIS) in 1984, for its "Gypsy Moth Suppression and Eradication Project." This was modified by an addendum in 1985. The FEIS documents the decision by the USDA to provide federal assistance to state of federal agencies attempting to control the gypsy moth.

The preferred alternatives for suppression called for integrated pest management procedures to be used to control the moth population when site-specific analyses indicated a need for action.

This Environmental Assessment is linked to the FEIS, as modified, and documents the site-specific analysis for Fredericksburg and Spotsylvania National Military Park.

D. Project Objectives

As stated in the Gypsy Moth Integrated Pest Management Plan for the Fredericksburg & Spotsylvania National Military Park (Appendix B), the project objectives are to:

1. Mitigate defoliation impacts in identified critical protection areas. These are the areas that contain prime historic scenes, park developments, are the most visible to the visitor, and/or would create a safety hazard if left untreated.
2. To minimize impacts to all cultural and natural resources where defoliation would significantly change species composition or cause irreparable damage.
3. Reduce risks to public health and visitor safety.
4. Develop a cooperative atmosphere with park neighbors and local governments to reduce spread of gypsy moth to uninfested areas in or out of the park.

The proposed project will be considered successful if: (1) 70 percent foliage protection is achieved, as determined by aerial survey and/or ground surveys, and (2) egg mass densities are reduced to below the threshold of 500 egg (250 egg masses in high visitor use areas) masses per acre on land treated in 1994.

E. Biological Evaluations

Monitoring data collected in 1994 served as the basis for identifying treatment areas. These activities included larval band surveys and intensive egg mass surveys. Egg mass surveys conducted during the fall are the most accurate method for evaluating the potential for defoliation in the following year. Personnel from the U.S. Forest Service accompanied park staff, in surveying ninety three (93) permanent 1/40 acre plots for egg masses and tree mortality.

Monitoring data collected in 1994 are outlined in the USFS gypsy moth 1994 biological evaluation for Fredericksburg & Spotsylvania National Military Park (Appendix C). This, together with defoliation surveys and subsequent recommendations by USFS personnel, forms the primary basis for treatment area selection.

II. ISSUES, CONCERNS AND OPPORTUNITIES

A. Introduction

The National Environmental Policy Act (NEPA) requires that efforts be made to inform and involve the public. It has also been the policy of this park to seek the advice, ideas and questions of the public when proposed actions may effect the natural or human environment.

Park representatives attended housing association meetings and public meetings held by Stafford and Spotsylvania Counties. Individuals representing active environmental interest groups were contacted and their opinions sought in response to the proposed action. In addition, pamphlets, brochures, and posters will be made available to the public in the Visitor's Centers.

B. Key Issues, Concerns and Opportunities

During this public contact process we consulted local and national environmental groups as well as individuals who showed knowledge and expressed concern about the gypsy moth problem. To date, the public has expressed no concern with the use of Bt in the Fredericksburg & Spotsylvania National Military Park.

In conversations with individuals on this matter it was stated that because of the past successes of the gypsy moth program, and lack of controversy, they had no substantive comment on this issue. However, this does not deny our concern and attention to issues raised by the public in the past.

III. ALTERNATIVES

A. Process Used to Formulate the Alternatives

Alternatives for gypsy moth suppression were established in accordance with the management objective set for the project. Site-specific information on human habitation; ecologically sensitive areas; rare, threatened or endangered species; location of wetlands and floodplains; and forest composition is available from the Resource Management Branch of the park. National Park Service guidelines and policy for Integrated Pest Management determine the options available for treatment of the gypsy moth.

Three major standards guided the formulation of the alternatives. They are: public comment, legislation, and planning documents. The major public concern expressed to this office concerning gypsy moth and proposed control measures was

the effect of the moth on trees and tree mortality. A strong message to protect trees was received. Park Legislation mandates the park "...to preserve the present outline of the battlefields.." Two major park planning documents, The General Management Plan and the Resource Management Plan, reflect the legislative order and focus management and planning towards actions that preserve the woodlands and their historic significance.

Coupling the mission of the FRSP with the biological evaluations provided by the U.S. Forest Service on gypsy moth infestation, it was apparent that an alternative that will suppress the gypsy moth must be sought. Tempering this alternative is NPS policy that suggests Bt as a biological agent in controlling gypsy moth. Therefore, the park is clearly guided to an alternative that protects the forest with the single agent of Bt.

Treatment areas are selected based on an evaluation of the areas biological potential, value of the resource, and environmental sensitivity in which the gypsy moth is feeding and reproducing. Egg mass and larval surveys are used to delineate infested areas and track the spread of the gypsy moth into previously uninfested areas. Other factors taken into consideration for selection of treatment areas are tree species composition, historic significance, land use, and geographic location.

B. Alternatives Eliminated From Detailed Study

During the process of formulating alternatives, several were eliminated from further study. Most of these alternatives were eliminated because they either failed to meet the objectives of the program or were not feasible for other reasons.

These alternatives and the reasons why they were not considered further are listed below:

- 1.To treat all threatened park properties with broad spectrum insecticides. This approach would be in direct conflict with NPS policy and more importantly have a negative effect on non-target species.
- 2.Use passive or low level Integrated Pest Management techniques that do not require the use of a synthetic biocidal agent, such as parasites, trapping, and pheromone confusion. This alternative was eliminated as ineffective against the high population level of the current infestation.
- 3.Treat the entire park, 8,000 acres. This alternative was eliminated as excessive and unnecessary.
- 4.Use of viral insecticide GYPCHKEK. This gypsy moth specific insecticide shows tremendous promise in future applications, but production shortages and problems with application technology and tank mix components limits its use.
- 5.A ground application of Bt to trees within the park likely to be defoliated. This alternative is impractical because of the number of acres in the park units likely to be defoliated.

C. Description of Alternatives Considered in Detail

Alternative 1: No Action

In this alternative, No Action would be taken on the part of the Federal governments to suppress gypsy moth populations on National Park Service property located on the Fredericksburg & Spotsylvania National Military Park in 1994.

This alternative is designed to allow natural forces to operate to control the gypsy moth. In addition, it will demonstrate the effects of not treating to suppress the gypsy moth. This alternative also represents the maximum response to those who oppose treatment of the gypsy moth with insecticides.

Alternative 2: Two Aerial Applications of Bt

In this alternative, the areas of the park that have an infestation equal to or greater than 500 egg masses per acre will be broken into distinct treatment blocks. These blocks consist of approximately 3.75 acres near the Ellwood estate, 397 acres between Lee Drive and Mine Road in the Fredericksburg Battlefield, and 6.5 acres near the Chancellorsville Visitor Center.

Blocks would be treated with Bt at a rate of 24 BIU per acre. Two treatments would be used regardless of weather conditions or the efficacy of the first treatment.

This alternative is designed to assure full application of the biocide while staying within the limits that protect the environment and forest. It will also assume thorough coverage of the infested area and the efficient use of allotted helicopter time.

Alternative 3: One Aerial Application of Bt

In this alternative, the areas of the park that have an infestation of equal to or greater than 500 egg masses will be broken into distinct blocks, as listed above, limiting those areas that don't meet the criteria. The infested blocks would be sprayed once with Bt at a rate of 24 BIU per acre.

Alternative 3 is also designed to assure wise use and care of a biocide in the environment, while protecting the forest. Foliage protection and population reduction may not be as sure as in the previous method due to the single application.

However, if precautions are taken with respect to the weather and proper timing, this alternative offers to reduce in-half the volume of pesticide while providing sufficient foliage protection.

IV. AFFECTED ENVIRONMENT

A. Host Vegetation

Forest and woodlands are a renewable resource in a state of constant regeneration. This forest is established primarily on sandy loam and sandy clay soils of the Piedmont, and clay and clay loam soils of the Coastal Plain. Dominant tree species are tulip poplar, sweet gum, white and red oak, red maple, beech, mockernut hickory, ash, and sycamore. Scattered groves of Virginia and loblolly pine, black locust, and red cedar are also present. The majority of individual trees are less than 10 inches DBH and overall density ranges from 100 to 600

stem/acre. Common understory foliage includes American holly, dogwood, spicebush, hornbeam, viburnum and mountain laurel. Greenbriar, honeysuckle, poison ivy, and lycopodium are common in groundcover.

At the present time the woodlands of FRSP are judged to be healthy and vigorous with no major plant declines; however a natural transition of pine to hardwood forest is to be expected. Present conditions regionally are; oak decline, a passing pine decline, advanced elm decline, and an increasing gypsy moth infestation.

B. Geography

Two distinct land form provinces control the terrain of FRSP: the Piedmont, composed of hard crystalline rocks, producing moderately steep stream and river valleys and rocky uplands; and the Atlantic Coastal Plain, composed of soft sedimentary rocks, producing flat river terraces and wetlands.

C. Land Use

Approximately 6,000 of the park's 8,000 acres are forested. All lands within the authorized boundary and in federal ownership have been zoned for management purposes as either historic or developed zones.

The primary purpose of the park is to educate the public about the events that transpired on the four battlefields, as well as commemorating the loss of life that resulted. The land is also used by park visitors in such non-consumptive forms of recreation, such as hiking, biking, picnicking, jogging, and nature appreciation.

Until the 1980's the adjacent land was primarily rural and agricultural. The area has since experienced a population boom for commuters to the Washington, D.C. metropolitan area. Undeveloped private lands are rapidly becoming extensive and relatively expensive residential and/or industrial communities. State Planning Unit 16, the area in which the majority of the park is located, is one of the fastest growing units in the state.

D. Human Population Density

Park visitation will be low at the proposed time of application. The major use will be private vehicles transiting the main roads. The vast majority of these will be closed vehicles.

Residential communities abut the park in several locations. Informational letters explaining the park's spray program will be delivered to park neighbors adjacent to the spray blocks in Chancellorsville, Fredericksburg, and Wilderness Battlefields. Residences within the spray blocks are limited to one park structure.

At the time of spraying there will be only two occupants of this structure.

E. Non-Target Organisms

The non-target organisms are those floral and faunal species present, other than the primary host organisms of the gypsy moth, in those areas selected for treatment of the gypsy moth. The primary targets are those tree species that are being, or are likely to be fed upon by the gypsy moth. Non-target plant species range from the secondary host types of trees and shrubs, to those least likely to be fed upon, such as non-preferred host materials including ground covers, grasses, and aquatic plant life.

Non-target animal species include all other forms of insect life, birds, mammals, fish, reptiles, and amphibians that may be present in the scheduled treatment area at the time of application. The other insects may be beneficial or non-beneficial species important to insect-eating animals. Lepidopteran species in early instars of the larval stage which are feeding at the time of treatment can expect adverse affects from the application of Bt.

F. Rare/Endangered Species

The Fish and Wildlife Service of the Department of the Interior was consulted regarding rare and endangered species which may reside in the treatment areas. According to their records, no rare or endangered species reside in or near the proposed treatment areas. It is noted, however, that small whorled pogonia (Isotria medeoloides), a federally listed endangered plant, has been found in nearby Prince William and Caroline Counties and the potential exists for its presence on the extensive forest lands within the park. A plant listed as "imperiled" due to rarity by the state, crested coral-root (Hexalectri spicata) has been found on park lands, as well as state listed rare red milkweed (Asclepias rubra). No deleterious effects would be expected from the use of Bt upon these individuals.

V. ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

A. Mitigation Measures That Apply to Alternatives 2 and 3

Every effort is made to conduct the safest possible project. Procedures, guidelines and other measures can be implemented to mitigate non-target effects in a program such as this.

Misapplication of insecticides will be minimized as follows: topographic maps, on which all the treatment areas are clearly marked, are provided to each pilot.

Most spray blocks are clearly distinguished by natural boundaries and landmarks, such as fields, roads, etc. Any spray blocks in which the boundaries are not clear will be marked with helium filled balloons by the field crews prior to the upcoming day's spraying schedule, and any unique or unusual features of the area to be treated will be made obvious to them.

NPS personnel acting as field crews will be present at each spray block as it is being treated. They will be alert to any problems that may arise, and are equipped with radios to relay information to the base of spray operations.

Application will take place over forested areas only. An observation aircraft will help in monitoring for correct application. Pilots are instructed not to apply any insecticides over open bodies of water or the roadways. In addition, pilots are instructed not to fly or turn over open waterways.

Pilots are instructed not to apply insecticides over houses.

All loading of insecticides will be monitored by NPS personnel for compliance and to assure proper safety procedures are followed.

Signs announcing the spray activity will be posted along roadways entering the park.

Most of the spraying takes place in the early morning when most people are indoors. During the hours when school children may be waiting for buses, extra precautions on the parts of pilots and field crews are taken to be certain that they are not accidentally exposed. This involves the field crews patrolling the areas as they are being treated to spot children who may be outside. When children are seen, the spray aircraft are diverted out of the area.

Day to day updates of areas to be treated are provided to Visitor Center personnel in an effort to keep the public informed. Park personnel acting as field crews also will be alert to visitors entering the areas.

B. Biological and Physical Consequences

Alternatives 2 and 3 involve the use of a biological insecticide. In the following section a discussion of the environmental effects of the insecticide will be followed by a discussion of the biological and physical consequences of the implementation of the alternatives.

1. Bacillus thuringiensis

Specific environmental effects of Bacillus thuringiensis (Bt) have been discussed in the FEIS. The following is a brief version of the information on Bt.

Bacillus thuringiensis (Bt), used for forest pest suppression, is characterized as largely specific to the Order Lepidoptera. Field potency lasts only a few days and the material must be ingested by the caterpillar in order to have an effect. The alkaline pH of the caterpillar's intestine dissolves the Bt spores present in the insecticide formulation, and releases the crystalline toxin from these spores. This causes the caterpillar intestine to become hemorrhaged. The insect stops feeding and if the resultant infection of the Bt organism and/or damage to the intestine are sufficiently great, the caterpillar does not resume feeding and dies.

Results from monitoring aerial Bt application using spray deposit cards on the forest floor have indicated that the vast majority of the Bt is intercepted by the leaves of the forest canopy. This means that the Bt, when sprayed over the full canopy of the forest, is available only to these insects feeding on the leaves of the canopy.

Bt remains effective for 4 to 10 days under normal field conditions. The efficiency of Bt is dependent on weather conditions. The efficiency of Bt is dependent on weather conditions, especially rain. If Bt is washed off of the foliage before the larva eat the leaves, Bt will not kill the insects. The effectiveness of Bt is also highly dependent on proper timing of application.

The smaller larva (second and third instars) are the most susceptible to Bt.

Because of this, there is only about a 2-week optimal treatment window during which application of Bt can be expected to achieve maximum effectiveness.

For the reasons mentioned, there can be a lot of variability in the effectiveness of Bt. If the insecticide is applied at the optimum time and under the optimum weather conditions, the project objectives can be achieved.

Concerns have been expressed regarding the potential of Bt to affect both terrestrial and aquatic invertebrates. Since Bt has been demonstrated to have very low toxicity to vertebrates (see the FEIS p. 68-72), the main concern is with

the non-target insects and crustaceans. The specificity of the strain of Bt we will be using to the insect order Lepidoptera would preclude the insecticide having effect on aquatic invertebrates, except a few species of Lepidopterans endemic to wetlands. Therefore, the only organisms likely to be affected by Bt are Lepidopteran larvae in the second or third instar feeding on plants (principally forest canopy leaves) within a few days of application. Bt will not affect adult insects.

The remaining concerns about the environmental effects of Bt center on non-target Lepidoptera feeding on plant tissue on which Bt has been deposited (again principally the forest canopy) during the effective post application period.

Since this is also the site and time for feeding by the gypsy moth this is unavoidable; however minimizing the area treated would also minimize the park-wide impact of the program.

2. Biological and Physical Consequences by Alternative

Alternative 1

Our objective to prevent defoliation would not be accomplished under this alternative. Defoliation would likely exceed 50 - 100% in wooded areas where the population density is high. Mortality of host tree species would likely occur, thereby affecting the structure and composition of the wildlife habitat. Wildlife species that depend on the protection of the forest would lose habitat area due to loss of trees.

Dieback and decline of tree crowns and possible mortality would increase the hazard tree numbers. Sections of the Park may then need to be closed to the public, reducing the opportunities for visitors to experience historical trails. Increased dead material on the forest floor would increase the fire hazard of the areas. Also, shade and aesthetics around the visitors centers would decrease due to required tree removal.

Alternative 2

In this alternative the areas of infestation are broken up into discrete blocks. Areas showing 500 or greater egg masses per acre are candidates for treatment. These blocks would be treated with Bt at a rate of 16 BIU per acre. A second application would be conducted 3 to 7 days after the first application.

This alternative limits application to those locations of known high infestations. The adverse effect of Bt on non-target species would be limited to these discrete areas, thereby reducing the Lepidopteran mortality that would occur using alternative 1.

Escape and refuge would be offered to those species in the spray blocks by adjacent unsprayed areas. Those species that feed on caterpillars such as the cuckoo and tanager, will have escape and refuge areas because of the discrete spray block limitations, and should not be seriously affected.

The risk of tree mortality is reduced due to the two applications of biocide. If the one spraying is ineffective because of unpredicted weather conditions, such as rain or mechanical failure, the opportunity for control is still possible.

Alternative 3

This alternative is similar to alternative 2 in almost every respect, except that it provides for a single application of Bt. It gives less assurance of spray coverage and the possibility of tree mortality could be slightly increased.

The efficacy of this application is dependant upon the stage of development of the larvae, weather conditions, and foliage development. Careful precautions will be taken to reduce these risks as much as possible.

C. Risk to Human Health

1. Introduction

The basic information for this risk analysis is taken from Appendices F, H and I of the FEIS. The information presented in those documents is applied to a site specific evaluation of the human health risk associated with the proposed gypsy moth suppression project on the Fredericksburg & Spotsylvania National Military Park. Interested persons should consult the above named documents for more information.

The Park has proposed the use of the insecticide Bt in the 1994 gypsy moth suppression program. The risk to human health must be evaluated for this insecticide. This is accomplished through a three step process in which hazards are identified, possible exposure levels are determined, and the risk to human health is evaluated.

The first step in the risk analysis is to determine the toxicity of each insecticide. Toxicity is the ability of a substance to harm health (FEIS, p. H-4).

Heath effects caused by toxic chemicals fall into two groups: threshold and no-threshold responses. In threshold responses, there is a certain amount of the insecticide that can enter the body of most animals and humans without causing any harm. The dividing line between doses that have no effect and those that do is the threshold level. Once the threshold is reached, increased doses will usually increase the intensity and extent of the effects (FEIS, p. H-4). These types of responses are quite predictable and similar in all healthy people.

Animals and people do not show threshold responses until certain doses are exceeded. The highest doses at which the effects are not caused are called no observable effect levels (NOEL). To account for differences in sensitivities between animals and people, NOEL's are reduced by a safety factor (usually 100) to set safe doses for humans. This safety factor is set by the U.S. Environmental Protection Agency (EPA), and varies from one chemical to another depending on how certain they are that the available studies can be applied to humans. This "safe" level is known as the acceptable daily intake (ADI) and represents the maximum dose of the chemical that a person could take everyday of his life without suffering any adverse effects (FEIS, p. H-5 - H-7).

Another parameter evaluated in this type of analysis is the LD-50. This is defined as the one-time or short-term dose that will kill 50 percent of the test animal. An oral LD-50 is the lethal dose from swallowing a substance, and the dermal LD-50 is the lethal dose on unbroken skin. LD-50's are usually determined in milligrams of the substance per kilogram of the body weight of the test animal (FEIS, p. H-7).

With non-threshold responses, any dose might set off a reaction, but there is no certainty that it will do so. There will be an effect only if the chemical successfully invades the body and reaches certain strategic points, such as the DNA in human cells. It is possible for a large dose of the substance to enter a person's body without having any effect at all. But the greater the lifetime dose, the greater the odds of seeing these effects. The primary concern with non-threshold effects is cancer risk. Hazard assessments for cancer risks have two steps. The first is to determine if the chemical could cause cancer. The second step is to find the odds of contracting cancer from different doses. Since there are no known cases of human cancer being caused by the insecticide proposed for use in this project, data on animals is used. Where there is evidence that a substance might cause cancer, a mathematical model is used to determine its cancer potency (FEIS, p. H-9).

The results of this human health analysis will be used to determine the health risks to people who might be exposed to insecticide during the course of this proposed project. For threshold effects, the potential exposures will be considered to be within an acceptable margin of safety if the ADI is not exceeded. For non-threshold effects, this project will be considered to be within an acceptable margin of safety if cancer risk is less than 1 in 1 million.

2. Hazard Analysis

Three incidents of human infection from Bt have been reported. In one case, a laboratory technician accidentally stuck a Bt contaminated needle into his finger, which caused a skin infection. The variety of Bt that caused this infection is not the variety that is used in gypsy moth suppression. The second reported case involved Bt that was splashed into the eye of a farmworker resulting in an eye ulcer (FEIS, p. 68). The third incident was reported in the fall of 1987 and involved three members of a Kansas City, Missouri family who became ill after eating honey received from a Maine retail establishment. Their illness was characterized by vomiting and diarrhea which resolved itself after 18 hours. Analysis of the honey at the University of Missouri at Kansas City tentatively identified the causal agent as Bacillus cereus, a common diarrhea causing organism.

The Center for Disease Control in Atlanta, Georgia, examined the isolate for confirmation and identified it as B. thuringiensis rather than B. cereus. The CDC feel, from an epidemiological standpoint, there is insufficient evidence to implicate Bt as the cause for this food poisoning nor is there any need to curtail the use of Bt in gypsy moth suppression programs (Hoover, 1987).

The Food and Drug Administration has concurrently been testing commercial Bt formulations on monkeys in the laboratory. To date, 9 of 11 products tested have elaborated the diarrhea-producing enterotoxin associated with B. cereus food poisoning. An article is scheduled for publication in the Journal of Food Protection which will elaborate on the results of this study.

The Ministry of Natural Resources in Ontario, Canada temporarily suspended Bt spraying during 1987 when it was discovered that its stock of Bt insecticide was contaminated with unexpectedly high levels of Streptococcus faecium and S. faecalis. Spraying was resumed after Health and Welfare Canada determined that the contamination posed no concerns in terms of adverse health effects (Lambert, 1987). However, as a result the Eastern Spruce Budworm Council has requested that Agriculture Canada and Health and Welfare Canada jointly establish national standards of biological purity for registered and experimental Bt preparations

(Paille, 1987). It has been recommended that the USDA-Forest Service pursue the establishment of similar standards through the U.S. Environmental Protection Agency.

VI. IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

In order to plan and implement a suppression project such as this, some park resources must be used. The primary irretrievable resources are the human resources of manpower and money. Money, in addition to paying salaries of federal employees, is used to hire an aerial application contractor, who in turn must spend money to purchase other resources such as gasoline, oil, insecticides, etc.

Expenditures can be grouped into three categories: survey, planning, and implementation. Regardless of the size of the suppression program, survey activities remain the same. Time spent in planning is dependent on the size of the program. Implementation expenditures are affected by the magnitude of the planned suppression program and the cost of the aerial application contract.

Alternative 1 requires expenditures for survey only.

Alternatives 2 and 3 involve survey, planning and implementing a suppression program. Due to the limited size of this program, planning would require considerably more time than implementation. Actual implementation of the suppression project should take no more than 7 to 10 days, less for alternative 3.

VII. PUBLIC INVOLVEMENT AND PARTICIPATION

Public involvement and participation is necessary to conduct a successful suppression program. The park endeavored to inform the public about this program through: public notices in papers of general circulation; participation in public meetings held by adjacent jurisdictions: Stafford County, Spotsylvania County, and City of Fredericksburg; personal contact with organizations active in the park and environmental issues: Virginia Society of Ornithology, Virginia Natural Heritage Program, and Friends of the Rappahannock.

VIII. LIST OF PERSONS AND AGENCIES CONSULTED

Dean Cumbia, Area Forester, Virginia Division of Forestry, Spotsylvania, Virginia.

Mrs. Joseph Debosh, Parkwood Subdivision Homeowners Association, Fredericksburg, Virginia.

John Ghent, Entomologist, Forest Pest Management, U.S. Forest Service, Ashville, North Carolina.

Cheri Gilcrest, Gypsy Moth Coordinator, Stafford County, Virginia.

John Grey, VPI Cooperative Extension Agent, Stafford County, Virginia.

Lake of the Woods Outdoor Club, Orange County, Virginia.

Teddy Mullins, Forestry Technician, George Washington National Forest, Harrisonburg, Virginia.

Dave Reynolds, IPM Coordinator, National Park Service, Mid-Atlantic Region, Philadelphia, Pennsylvania.

Dave Robison, Entomologist, Forest Pest Management, U.S. Forest Service, Asheville, North Carolina.

Patricia Sellers, Entomologist, Forest Pest Management, U.S. Forest Service, Harrisonburg, Virginia.

Ray Simms, VPI Cooperative Extension Agent, Spotsylvania County, Virginia.

IX. LIST OF PREPARERS

Susan Alberts, Natural Resource Management Specialist, National Park Service, Fredericksburg and Spotsylvania National Military Park, Fredericksburg, Virginia

APPENDIX A

SPRAY BLOCKS - FREDERICKSBURG AND SPOTSYLVANIA NATIONAL MILITARY PARK
1994

Wilderness Battlefield	
Ellwood Estate	3.75 acres
Chancellorsville Battlefield	
Visitor Center	6.5
Fredericksburg Battlefield	
S. Lee Drive	397
<u>TOTAL</u>	<u>407.25</u>

APPENDIX B

APPENDIX C

Gypsy Moth Management Plan

FOR

FREDERICKSBURG AND SPOTSYLVANIA NATIONAL MILITARY PARK

1995

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I. SIGNIFICANCE OF THE RESOURCE

Fredericksburg and Spotsylvania National Military Park is an 8,000-acre unit of the National Park Service in Central Virginia established to commemorate four major battles of the Civil War. The land preserved within it has often been cited with the dubious distinction of being "the bloodiest ground on the continent." The forest and fields that comprise this historic landscape were witness to over 100,000 casualties. This historic setting attracts over 1.7 million visitors each year.

Preserving an historic pattern of fields and forests is fundamental to an understanding of the events that occurred on these battlefields. In addition, there is a need to retain healthy vegetation along boundaries to maintain visual and auditory buffers from modern intrusions. In this vicinity, natural areas are rapidly being lost due to development. This has resulted in a fragmentation of natural communities and therefore increases the value of the natural resources found within these protected areas.

Chancellorsville, Wilderness, and Spotsylvania contain significant examples of eastern piedmont forest in various stages of succession including stands of trees extant at the historical period. The battle for Fredericksburg occurred along the ridge that forms the fall line separating the Piedmont from the Coastal Plain.

Native flora and fauna are abundant within the four major units that comprise the park. Sensitive plant species have been identified. Several plant species found within the park are at the extreme of their distribution. Common wildlife species include white-tail deer, beaver, fox, and wild turkey. Black bear and bobcat sightings have also been reported on rare occasions. Birdwatching is a pastime enjoyed by many visitors.

II. HISTORY OF GYPSY MOTH IN THE PARK

The first discovery of a male moth in the vicinity of the park occurred in 1980. The USDA Animal and Plant Health Inspection Service (APHIS) initiated a monitoring

effort in conjunction with park management by placing 42 pheromone traps to detect the presence of male moths in 1982. Less than 50 moths were found at this time.

In 1983, the U.S. Forest Service became involved with the first surveys for egg masses and overall coordination of monitoring efforts. Egg mass survey and pheromone trap counts remained relatively low until 1988 when a dramatic increase was noted. Appendix II details monitoring efforts conducted thus far.

In results of the 1993 ground survey show increasing gypsy moth populations, in contrast with the previous year's results, in most areas of the Park. IPM measures during 1993 for gypsy moth around the Chancellorsville Visitor Center, however, were effective. The potential for a rapidly increasing population of moths in park units is becoming apparent.

One application of Bt was applied to 34 trees in the Chancellorsville and Wilderness Battlefields on May 6, 1993. The treatment was a ground treatment applied by Alan Parrett of Bartlett Tree Experts, with application at a rate of 30 BIU's (Billion International Units) per acre. This was the fourth year these areas have been treated with Bt, and the first time a ground treatment had been attempted.

Populations in the treatment area at the Chancellorsville Battlefield Visitor Center were severely reduced, therefore foliage protection was achieved and during 1994 a treatment will not be necessary.

The treatment prevented serious defoliation over most of the treatment areas. Use of Bt will generally protect the foliage during the year of treatment but does not always reduce the population, therefore, subsequent treatments may be necessary in high value areas.

III. MANAGEMENT CONCERNS

A. Park Resources:

Approximately 83% of the park is forested, most which consists of a hardwood or mixed pine-hardwood overstory. The majority of the trees in these stands would be defoliated if populations are allowed to reach high levels without abatement.

Nearly total defoliation would occur in some locations at peak levels. Many mature oak trees which date to the historic period could die from repeated defoliation in conjunction with other stress factors such as drought. The resulting mortality would increase both the fuel loading, which is already excessive in many areas of the park, and the temperature of the forest (by allowing more solar radiation.)

The threat of wildfire would therefore increase. Increased runoff could occur if mortality was high enough and stream degradation would result. Aquatic flora and fauna would be effected by changes in turbidity, water chemistry and temperature.

Terrestrial fauna would be affected by changes in food availability and habitat.

B. Historic Landscape:

The historic landscape preserved at the various units of the park are treated as cultural resources. Many of the tree stands present now were extant during the Civil War and contain individual specimen trees that "witnessed" the battles. There is also a need for maintaining a healthy vegetative buffer to screen out modern intrusions.

C. Endangered Species:

There are no endangered species known to exist within the park. However, exhaustive surveys have not been performed. The federally listed endangered plant, small whorled pogonia (Isotria medeoloides) has been documented in nearby Caroline and Prince William counties. Crested coralroot, (Hexalectris spicata) a plant listed by the state as "imperiled" due to rarity, has been found in the park. Also, two populations of the state listed rare red milkweed (Asclepias rubra) have been located. Massive defoliation would increase insolation, and therefore the temperature of the forest floor, which could have deleterious effects on populations that exist.

D. Aesthetics/Socioeconomic:

Visitors will find the park very unappealing during spring when caterpillar populations are at their peak. When gypsy moth populations are high, visitors will hear, smell, and see caterpillars. The frass (excrement) can be particularly annoying. Late stage larvae feed continuously, resulting in a steady rain of frass.

When populations get very large, a viral disease usually causes a crash in the population. However, this usually occurs only after severe defoliation has taken place. The resulting forest would be much hotter and more uncomfortable. Tree mortality in high visitor use areas would increase safety hazards to the public.

Negative public opinion would be fostered in adjacent residential communities if no action is taken.

IV. MANAGEMENT OBJECTIVES

The primary objectives of this plan are to:

A. Mitigate defoliation impacts in identified critical protection areas. These are the areas that contain prime historic scenes, park developments, are the most visible to the visitor, and/or would create a safety hazard if left untreated.

B. To minimize impacts to all cultural and natural resources where defoliation would significantly change species composition or cause irreparable damage.

C. To utilize an integrated pest management approach (IPM) in all attempts to control the gypsy moth population. All treatments will avoid adverse impacts to the park's natural environment and will have minimal impacts on non-target species.

Actions will be geared towards managing the population at a tolerable threshold kept in check by natural forces, such as predators and parasites.

D. Reduce risks to public health and visitor safety.

E. Develop a cooperative atmosphere with park neighbors and local governments to reduce spread of gypsy moth to uninfested areas in or out of the park.

V. MANAGEMENT ACTIVITIES

In cooperation with the U.S. Forest Service and Mid-Atlantic Regional Office (NPS), Fredericksburg & Spotsylvania National Military Park will maintain the Integrated Pest Management (IPM) program to achieve the major objectives of this plan. Activities under this IPM approach will include survey and monitoring of moth

populations, data analysis and decision-making, intervention strategies and tactics, program evaluation, interpretation, and public relations.

A. Survey and Monitoring

Surveying park areas and monitoring Gypsy Moths are essential to provide management with current information regarding locations, numbers, and viability of moth populations. Data will be used to determine an appropriate selection of control actions. Without it, moth populations could expand to the point where IPM measures would be ineffective and chemical treatments, with their attendant effects, would be necessary.

Egg mass surveys will be performed throughout the park. These surveys will be coordinated with the Forest Pest Management Branch (FPM) of the U.S.F.S. In 1993, resource management staff established ninety three (93) permanent 1/40 acre plots, stratigically located in all park units for utilization in monitoring gypsy moth populations and long-term impacts.

B. Analysis and Decision-Making

The park staff works closely with scientists at local universities and with the U.S. Forest Service to analyze monitoring and decide on intervention measures. Where analysis of data indicates that egg mass counts exceed 500/acre, consultations will focus on determining which, if any, control measures are recommended each year.

The park will also make a concerted effort to cooperate with state and federal agencies in the development of improved methods of gypsy moth control.

Documentation of tree mortality and species composition shifts will be maintained.

Monitoring data on population levels will be collected. Long-term evaluation of ecological effects of the moth and suppression efforts should be a goal.

C. Intervention Strategies and Tactics

Bacillus thuringiensis, commonly abbreviated Bt is a bacterium that is selectively pathogenic to caterpillars of moths, skippers, and butterflies. It acts as a stomach poison to hemorrhage the caterpillar gut, thus causing the larvae to cease feeding and eventually die of starvation. The strain of Bt we would be using is non-chemical and harmless to man, animal and plant life, and to beneficial insects other than the Lepidopteran listed above. Although Bt will not immediately reduce larval nuisances, it has proven to be an effective agent for foliage protection, particularly at low to moderate pest population levels. It is usually sprayed aerially but spot ground applications are also practical for selected areas. Aerial Bt applications are excellent for large tract foliage protection and under ideal conditions can produce 75% caterpillar mortality. Bt is readily available in quantity and is the pesticide used by many localities and state agencies for use in sensitive areas.

D. Evaluation

The monitoring system in the park will be used to evaluate the effectiveness of treatments. In particular, attention will be given to adult moth and egg mass monitoring data collected in the spray blocks after the applications of Bt. Visual inspections for defoliation will also be made.

E. Interpretation and Public Relations:

It will be necessary to provide park visitors, neighbors, and the media with accurate and current information concerning Gypsy Moths and NPS management programs. This can best be achieved through well planned interpretive and public relation efforts.

The park's resource management staff and interpreters will play a primary role in providing needed information to park visitors and neighbors. Bulletin board displays, publications, and personal contacts will supplement the staff's efforts as appropriate throughout the spring and summer months.

All park employees will be briefed on the gypsy moth program so that basic visitor questions can be answered by maintenance, administrative, ranger and management staffs.

Communications with other federal agencies, county extension offices, and neighboring community organizations will be of mutual benefit.

VI. ENVIRONMENTAL ASSESSMENT

An environmental assessment will be prepared annually for the park which will includes this management plan as an appendix. This assessment will document a site-specific environmental analysis conducted jointly by the USDI-NPS and the USDA-FS for a cooperatively funded gypsy moth suppression project. The USDA-FS has the major responsibility for forest insect and disease control on all federal lands. Under cooperative agreement between the USFS and the NPS, staff members of the USFS Forest Pest Management office will provide technical assistance and project funding for suppression actions selected by the park superintendent.

The environmental assessment is tiered to the USDA Final Environmental Impact Statement as Supplemented, 1985 (FEIS) and includes a site-specific discussion of:

1. the purpose and need for action;
2. alternatives including the proposed action;
3. affected environment;
4. environmental consequences of the proposed action and alternatives,
including the risks to human health;
5. the specific procedures used to facilitate public participation in the
decision making process

APPENDIX D

1995 GYPSY MOTH SUPPRESSION PROJECT
FREDERICKSBURG & SPOTSYLVANIA NATIONAL MILITARY PARK
MID-ATLANTIC REGION
USDI NATIONAL PARK SERVICE

DECISION NOTICE AND FINDING OF NO SIGNIFICANT IMPACT

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INTRODUCTION

At the Fredericksburg & Spotsylvania National Military Park, biological monitoring has been conducted aggressively since 1982 when 50 male moths were trapped at Chancellorsville Battlefield. By using intensive monitoring and a variety of management tactics over the past 12 years, such as mating disruption, burlap banding, and aerial and ground application of Bt, the Park has limited the spread and impact of the infestation.

The current survey, which was conducted in the fall of 1994 by the USDA Forest Service and Park personnel, found an increase in the populations in the Fredericksburg, Chancellorsville, and Wilderness Battlefields. Analysis of the egg mass data shows that moderate to heavy defoliation can be expected in Chancellorsville, Ellwood Estate and along South Lee Drive.

This Environmental Assessment (EA) documents a site-specific environmental analysis conducted by the USDI National Park Service for a gypsy moth suppression project in 1994.

The EA is tiered (40 CFR 1502;1508.28) to the USDA Forest Service's Final Environmental Impact Statement (FEIS) as Supplemented, 1985, the Addendum to the FEIS, and the Record of Decision (ROD) signed February 12, 1986. It includes a site-specific discussion of: (1) the purpose and need for action; (2) issues, concerns, and opportunities; (3) the alternatives; (4) affected environment; (5) environmental consequences of the alternatives, including the risks to human health; and (6) the specific procedures used to facilitate public participation in the decision making process. The USDI National Park Service proposes to treat the infested areas. The decision to be made is whether or not to implement the proposed project and, if so, by what means.

The Fredericksburg & Spotsylvania National Park is mandated to "... to preserve the present outline of the battlefields...". With this clear direction, a decision that supports intervention and control of anything adversely affecting forest health and vigor is required.

At the present time, parts of the Chancellorsville, Fredericksburg, and Wilderness Battlefields are infested with gypsy moth. Over 200 acres have been identified as being in danger of defoliation if they are not treated in 1994.

The primary objective of the 1994 cooperative suppression project is to prevent tree mortality attributable to defoliation by the gypsy moth. To meet this objective, we must prevent noticeable defoliation (greater than 30%). The defoliation that exceeds 30% will cause trees to refoliate. Refoliation is one of the processes which causes stress to the tree, which leaves the tree more susceptible to other pests, fungi, or bacteria.

In addition to the prevention of defoliation, our objective is to reduce egg mass densities by 70% to below the threshold of 500 egg masses per acre (250 egg masses per acre, if a high visitation area, i.e. visitor centers) The project will be considered successful if retreatment in 1995 is necessary on less than 20% of the land that is to be treated in 1994.

ISSUES, CONCERNS, AND OPPORTUNITIES

Efforts by the park to solicit comments regarding the proposed project resulted in no issues, concerns, or opportunities being identified, even though several of the areas under consideration are close to residential areas (EA, p.3).

ALTERNATIVES CONSIDERED

The primary objective of the project is to prevent tree defoliation in excess of 30 percent. To achieve this goal, seven alternatives were developed. Three of these were eliminated from detailed study because they were not consistent with NPS policy, had adverse environmental impacts, or could not realistically meet the desired objectives. These are (EA, p.6).

1. Treat the 407 acres with a broad-spectrum insecticide. The alternative was eliminated by National Park Service Policy.

2. Use of Integrated Pest Management techniques that do not require the use of a biocide agent, such as parasites, trapping, and pheromone confusion. This alternative was eliminated as ineffective against the high population level of the current infestation.
3. Treat the entire park, 8000 acres. This alternative was eliminated as excessive and unnecessary.
4. Use of viral insecticide Gypchek. Production shortages, problems with application technology and tank mix components limits its consideration for this project.
5. A ground treatment of Bt to infested trees within the park units. The number of acres that are to be treated make this alternative extremely impracticable.

The following three alternative were considered in detail (EA, p. 4-5):

Alternative 1 No Action

In this alternative, No Action would be taken on the part of the Federal government to suppress gypsy moth populations on National Park Service property located in the Fredericksburg & Spotsylvania National Military Park in 1994.

This alternative is designed to allow natural forces to operate to control the gypsy moth. In addition, it will demonstrate the effects of not treating to suppress the gypsy moth. This alternative also represents the maximum response to those who oppose treatment of the gypsy moth with chemical insecticides.

Alternative 2 Two Applications of Bt

In this alternative the areas of the park that have an infestation of 500 egg masses per acre or more will be broken into distinct blocks. These blocks are: (1) Ellwood Estate; (2) Chancellorsville Visitor Center; and (3) S. Lee Drive.

Blocks would be treated with Bt at a rate of 16 BIU per acre. A second spraying at the same rate would guarantee coverage should the first spraying fail due to unsuspected weather conditions or mechanical failure.

This alternative is designed to assure full application of the biocide while staying within the limits of prudent application to protect the environment and forests. It would also assure thorough coverage of the infested area and the efficient use of allotted helicopter time.

Alternative 3 One Application of BT

In this alternative, the areas of the park that have an infestation of 500 egg masses per acre or more will be broken into distinct blocks, as above, limiting the acreage to be sprayed. The infested blocks would be sprayed with Bt at a rate of 16 BIU per acre.

This alternative is also designed to assure prudence and care in the use of a biocide in the environment, while protecting the forest. One application of Bt gives less assurance of spray coverage, and there is a possibility of decreased foliage protection and increased populations. However, extreme care will be

taken with regard to weather condition, larval instar, and percent foliation of the leaves to properly coordinate the spraying and eliminate the chances of a failure.

SELECTED ALTERNATIVE

Based upon the analysis documented in the EA, the FEIS, and site-specific biological evaluations, it is our decision to implement Alternative #3. This will involve treatment of 217 acres of woodland with one application of Bt in an IPM approach to suppress damaging gypsy moth populations in Fredericksburg & Spotsylvania National Military Park. This alternative is compatible with the selected alternative in the FEIS and ROD, in that these insecticidal applications are the only operational IPM component that will meet the objectives identified in the EA (p. 4).

RATIONALE FOR DECISION

The National Park Service is bound by the provisions of the National Environmental Policy Act of 1969 (NEPA), which requires environmental analysis of proposed major Federal actions that may significantly affect the quality of the human environment.

This Environmental Analysis has been tiered to the FEIS and documents the site-specific environmental analysis of the gypsy moth situation in Fredericksburg & Spotsylvania NMP. These requirements have been met by the FEIS and ROD, and the development of this site-specific EA. The selected alternative involves the use of an insecticide that is registered for suppressing gypsy moths and which will be applied according to label requirements. This meets the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (7 USC 136) as amended (FIFRA).

Our decision to implement Alternative #3 is based upon compliance with and the authority granted by the Federal laws and regulations previously described and with USDI National Park Service NEPA Guidelines (NPS-12). This project complies with the NPS policy to protect and preserve the historic and natural resources within parks in an effective and ecologically sound manner.

Our decision was made after consideration of the following factors:

Host Vegetation

Implementation of the decision will protect and maintain historically significant woodlots, wildlife, vegetation, and other natural values of the forest of the FRSP. The majority of the overstory vegetation is susceptible to gypsy moth caused defoliation and subsequent tree mortality. The proposed treatments will protect tree foliage and thereby meet the project objectives.

Geography

All of the treatment area is located in the Piedmont with parkland situated on gently rolling hills. Some forested wetlands occur in the treatment area. The use of Bt will have no adverse impact on aquatic organisms.

Human Health Risks

The use of Bt will pose no threat to human health. The public will be notified prior to the planned treatment so that unexpected exposure to Bt can be minimized (EA, p.11).

Non-target Organisms

Implementation of the project will not adversely affect any non-target plant or animal species with the exception of other Lepidopterous larvae that may be present at the time of treatment with Bt (EA, p.8).

Rare and Endangered Species

Implementation of this decision will not adversely affect any rare or endangered species.

MITIGATING MEASURES

The selected alternative incorporates the following mitigation measures in addition to those discussed in the FEIS:

- 1.All pilots will have topographic maps with clearly marked spray block boundaries. Spray blocks with difficult to observe boundaries will be marked with balloons before treatment. Monitoring with chase planes and ground personnel will ensure that only selected blocks will be treated.
- 2.Insecticide loading will be monitored by National Park Service employees.
- 3.Treatment dates will be publicized in the local media and shared specifically with area residents who asked to be notified. This will minimize human exposure to the insecticides.

FINDING OF NO SIGNIFICANT IMPACT

Following review of the FEIS and based on the site specific environmental analysis documented in this Environmental Assessment, we have determined that this decision does not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, a revised or amended environmental impact statement is not needed.

The finding of no significant impact was made considering the following factors:

- 1.The insecticides proposed for use are registered for that intended purpose by the Environmental Protection Agency;
- 2.Insecticide applications proposed at FRSP comply with EPA label directions, state and federal laws, and USDI National Park Service regulations;
- 3.The insecticide chosen affects only gypsy moth and other Lepidopterous larvae present in the park at the time of spraying;

- 4.No rare or endangered species that could be affected are known to occur in the proposed treatment blocks, and no significant impacts on native flora or fauna are expected from the proposed project;
- 5.Bt is extremely safe to use around humans and other mammals. The Virginia Department of Agriculture will also be using Bt on lands near the park and nearby heavily populated city, state, and private lands this spring;
- 6.The public involvement, public notification, and project monitoring procedures that will be followed and the mitigation measures that will be implemented during the project, will reduce the potential adverse environmental effects on areas treated and will minimize the risk of exposure to individuals visiting and residing in or near areas treated;
- 7.There are no apparent deleterious effects on the environment;
- 8.This project is within the scope of the FEIS and the decision announced in the Record of Decision.

Copies of this Decision Notice, EA and FEIS, along with project maps are available for public review at the following offices:

USDI National Park Service
Fredericksburg & Spotsylvania National Military Park
120 Chatham Lane
Fredericksburg, Virginia 22405

USDI National Park Service
Mid-Atlantic Region
143 South Third Street
Philadelphia, Pennsylvania 19106

Implementation of this decision may commence with the signing of this Decision Notice and FONSI by the Regional Office.

Martha Leicester, Superintendent
Fredericksburg & Spotsylvania NMP

Date

USDI National Park Service
120 Chatham Lane
Fredericksburg, Virginia 22405

Marie Rust, Regional Director
Mid-Atlantic Region
USDI National Park Service
143 South Third Street
Philadelphia, Pennsylvania 19106

Date