



# National Park Service

## Draft Environmental Assessment for the 2008 Gypsy Moth Suppression Program Harpers Ferry National Historical Park

**March, 2008**

This document is available for public review pursuant to 40 CFR § 1506.6 (b). Comments will be accepted until April 11, 2008. The document is available on the park's web site (<http://www.nps.gov/hafe>). Copies can be obtained from the park by writing to:

Superintendent  
Harpers Ferry National Historical Park  
P.O. Box 65  
Harpers Ferry, WV 25425

Copies can also be obtained by calling the park's Natural Resource Manager at 304-535-6038

If you have any comments, please provide them in writing to the above address. To insure that your comments are considered, please make sure they are received at the park by April 11.

**Draft Environmental Assessment**  
***Gypsy Moth Suppression Program, 2008***

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Harpers Ferry National Historical Park  
National Park Service  
U.S. Department of the Interior

March 2008

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## **1. PURPOSE AND NEED FOR ACTION**

### **1.1 Summary of Proposed Action**

The natural, cultural, recreational and scenic values of Harpers Ferry National Historical Park are at risk due to gypsy moth defoliation. This Environmental Assessment examines management options for suppression of the gypsy moth populations in spring 2008. Any proposed suppression activities in subsequent years will be evaluated in a separate Environmental Assessment that will be made available for public review.

### **1.2 Park Purpose and Significance**

Congress created Harpers Ferry National Historical Park (HAFE) in 1944 as “a national public memorial commemorating historical events at or near Harpers Ferry” (U.S. Congress, 1944). HAFE is a unit of the National Park System encompassing 3,645 acres of mostly undeveloped land in West Virginia, Virginia, and Maryland. The resources of HAFE are protected under the authorities of the National Park Service Organic Act of 1916, and Public laws enacted to authorize and expand the park.

### **1.3 Park Management Objectives**

Guidance on overall management objectives and management policies for HAFE is provided in the National Park Service’s Management Policies (National Park Service, 2006) and Natural Resources Management Guideline (National Park Service, 1991). The guidance relates directly to the management of exotic (non-native) species. All cited policies are in accordance with Executive Order 13112 which requires federal agencies, in part, to prevent the introduction of invasive species and provide for their control.

The following is from National Park Service, 2006 Management Policies, Chapter 4, section 4.4.4.2 Removal of Exotic Species Already Present in the Park: “All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed up to and including eradication if (1) control is prudent and feasible, and (2) the exotic species:

- Interferes with natural processes and the perpetuation of natural features, native species or natural habitats; or
- Disrupts the genetic integrity of native species; or
- Disrupts the accurate presentation of a cultural landscape; or

- ❑ Damages cultural resources; or
- ❑ Significantly hampers the management of park or adjacent lands; or
- ❑ Poses a public health hazard as advised by the U.S. Public Health Service (which includes the Centers for Disease Control and the NPS Public Health Program); or
- ❑ Creates a hazard to public safety.

High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controllable. Lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successful controlled."

In accordance with NPS 77 Natural Resource Management Guidelines, Chapter 2, page 289, parks are advised that "control or eradication will be undertaken, where feasible, if exotic species threatened to alter natural ecosystems; seriously restrict prey on or compete with native populations; present a hazard to human health or safety; cause a major scenic or aesthetic intrusion ... or threaten resources or cause a health hazard outside the park."

Park objectives directly related to the control of an exotic species such as gypsy moth include:

- ❑ Maintain a natural resources management program that complies with environmental laws and executive orders, Departmental Policies, and NPS Management Policies, Director's Orders and Reference Manuals.
- ❑ Protect natural resources and related values by assuring that special park uses and internal management actions are compatible with the protection, restoration and maintenance of the resources.

Gypsy moth is an exotic species that has the potential to adversely affect healthy functioning ecosystems, cause a major scenic or aesthetic intrusion and presents a health hazard to HAFE visitors and other park users.

Parks are advised that for widespread exotic species, control programs may need to take a regional approach that may involve other landowners (National Park Service 1991). Issues such as the gypsy moth infestation cross ownership and political boundaries and underscore the need for cooperative approaches.

Efforts to suppress or control the gypsy moth in isolation will be less effective because gypsy moth caterpillars can migrate into treatment areas from adjacent untreated areas.

#### **1.4 Project Objectives**

The Park's project management objectives include:

- Reduce the long-term impacts of defoliation to the forest ecosystem and its components.
- Protect the recreational and scenic values of developed visitor use areas and trails from the impacts of defoliation.
- Cooperate with federal, state and local agencies on the suppression of gypsy moths on the lands in and adjacent to HAFE.
- Provide for the health and safety of visitors, residents and employees.
- Preserve natural controls of gypsy moths whenever feasible.
- Implement pest management strategies which are effective and present the lowest risk to people, park resources and the environment.

#### **1.5 Authorizing Law and Policies**

The following laws and policies provide the legal framework authorizing funding and specifying procedures for conducting gypsy moth management activities on federal lands.

The Cooperative Forestry Assistance Act of 1978 provides the authority for federal (U.S. Department of Agriculture) and other agency cooperation in management of forest insects and diseases.

The Federal Insecticide, Fungicide, and Rodenticide Act of 1947 require that all insecticides used in suppression and eradication projects be registered with the U.S. Environmental Protection Agency and follow application requirements.

The National Environmental Policy Act of 1969, as amended, requires detailed and documented environmental analysis of proposed federal actions that may affect the quality of the human environment

The Endangered Species Act of 1972, as amended, prohibits federal actions from jeopardizing the existence of federally listed threatened or endangered species or adversely affecting designated critical habitat. Federal agencies must consult with the U.S. Fish and Wildlife Service to determine the potential for adverse effects. Federal agencies are also responsible for improving the status of listed species.

The National Historic Preservation Act of 1966, as amended, recommends that federal agencies proposing action consult with the State Historic Preservation Officer regarding the existence and significance of cultural and historical resource sites.

Executive Orders 11988 and 11990 require that federal agencies shall attempt to avoid adversely impacting wetlands or floodplains in meeting objectives. Federal agencies adversely impacting wetlands or floodplains based on an environmental assessment and finding of no significant impact (FONSI) shall release the FONSI for public review (Usually 30 days) prior to implementation of proposed actions.

Executive Order 13112 requires that federal agencies act to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

Decisions regarding gypsy moth management are made in full consideration of other relevant policies and procedures, including the 1995 Environmental Impact Statement (FEIS) prepared by the U.S. Department of Agriculture (USDA). The USDA has determined through the FEIS and the Record of Decision (ROD) signed January 1996, that an environmental assessment, rather than a more comprehensive Environmental Impact Statement, is adequate for the proposed project. The ROD selected Alternative six of the FEIS as the preferred alternative, supporting funding for three alternatives (i.e. suppression, eradication, and slow the spread) for management of gypsy moth. Approval for funding of this proposed project has been granted by the Forest Service, based on surveys and a biological evaluation conducted for the park (USFS, Whiteman, 2007).

This environmental assessment is tiered off the FEIS and ROD and documents the site-specific evaluation of the Gypsy moth situation at HAFE.

## 1.6 How the Gypsy Moth Affects the Environment

The gypsy moth (*Lymantria dispar*), a native of Europe, was introduced into North America around 1869 near Boston, Massachusetts. Since that time the moth has become established and has spread throughout Northeastern United States, into Ohio and Michigan, and further south into Virginia.

Gypsy moth larvae are voracious defoliators. They prefer oaks, but will also consume dozens of other tree and shrub species to varying degrees including such HAFE resources as box elder, sweet gum, willow, maple, hickory, beech and dogwood. In the park, the larval or caterpillar life stage of the gypsy moth emerges from egg masses in late April – early May. In order to develop, larvae go through 5-6 molts or stages (instars) shedding skin as they make their way up into the tree canopy where they produce silken threads that enable them to disperse on wind currents. Larvae then feed on leaves through much of June, consuming increasingly large amounts of foliage. By late-June, defoliation damage is most apparent. Fully developed caterpillars then go through a two-week pupation stage. Adult moths begin to emerge in numbers by late June through early August, at which time brown male moths can be seen flying during the day seeking females. Female moths are white and do not fly but attract male moths by releasing a powerful sex attractant, or pheromone. After mating, each female lays one egg mass containing 100 – 1,000 eggs. The mass is coated with hairs from her abdomen. These egg masses remain on the trees, rocks or whatever surface they deposited through the winter unless consumed, removed or killed by various agents.

The impacts on people and the environment caused by gypsy moths are well documented. A broad spectrum of impacts have been identified and summarized in the FEIS described above. As this environmental assessment (EA) is tiered off the FEIS, only a brief overview of these impacts follows.

Defoliation directly affects trees by decreasing their health and vigor. This can result in an increased susceptibility to disease and parasites, leading to increased tree mortality. Defoliation and the loss of mature trees can change forest and under story composition, water quality in streams and lakes, and food and habitat quality and availability for both terrestrial and aquatic wildlife. This can result in changes in the abundance and distribution of wildlife. Since the gypsy moth is a non-native species, its known and unknown effects on the environment are not part of natural ecological processes and are therefore largely undesirable.

Gypsy moths also present aesthetic, safety, and health concerns to employees and the public. Large stands of defoliated or dead trees can



impact scenic values and present hazardous tree conditions along roadsides and trails. Large numbers of caterpillars and their frass (droppings) can be a nuisance, affecting outdoor recreational experiences. Forest fire hazard levels can be increased with defoliation and tree mortality. Dead trees themselves are safety hazards for park visitors. Some individuals that are exposed to the hairs on gypsy moth larvae may develop skin rashes or irritations and allergies.

### **1.7 Gypsy Moth Monitoring in Harpers Ferry NHP**

Gypsy moths have been in Jefferson County, West Virginia since 1975 and have been monitored by the park since 1981. The first noticeable effects of gypsy moth defoliation occurred in 1983 with seven acres of light defoliation on Maryland Heights (U.S. Forest Service 1983). Results of the 1983 monitoring program indicated that moderate to heavy defoliation would occur in 1984 on Maryland and Loudoun Heights (U.S. Forest Service 1983).

Early mass surveys conducted by the U.S. Forest Service and/or the park have been the primary monitoring tool to determine population density and the basis for management action. Each fall egg mass surveys have been conducted in all susceptible areas of the park.

Based on existing egg mass densities and the general size of egg masses, gypsy moth populations appear to be building and healthy throughout most areas surveyed in HAFE. The average egg mass length is 32 mm. Egg masses larger than 25 mm typically indicate healthy populations with no obvious stress from either the gypsy moth nucleopolyhedrosis virus (NPV) or the *Entomophaga maimaiga* fungus, two of the primary natural control agents that often express themselves in declining or stressed populations

In response to high egg mass densities and the likelihood that moderate to heavy defoliation would occur the following year, the park implemented management actions to suppress gypsy moth as follows:

- 1984 one application of B.t on Maryland Heights (400 acres) and Loudoun Heights (200 acres)
- 1987 one application of B.t. on Loudoun Heights (200 acres) and Short Hill (150 acres)
- 1988 two applications of B.t. on Loudoun Heights (200 acres) and Maryland Heights (400 acres)
- 1989 two applications of B.t. on Maryland Heights (515 acres) and Cavalier Heights (45 acres)
- 1993 one application of B.t. on Loudoun Heights (150 acres) and Maryland Heights (430 acres)

2001 two applications of Gypchek® on Maryland Heights (720 acres), Loudoun Heights (232 acres) and Short Hill (289 acres).  
2002 one application of Gypchek® on Maryland Heights (250 acres) and Short Hill (50 acres).

Gypsy moth defoliation in June 2007 was visible on Loudoun Heights, Maryland Heights and Short Hill. A map delineating the defoliated areas is in [Appendix 1](#). The Forest Service conducted an egg mass survey in the fall of 2007 to assess the current status of gypsy moth on Loudoun Heights, Maryland Heights and Short Hill. Results of this survey indicate that gypsy moth populations are sufficient to cause moderate to heavy defoliation on approximately 1615 acres in 2008 (Forest Service 2007). Maps delineating proposed treatment areas are in [Appendix 2](#).

Tree mortality is an issue when moderate to heavy defoliation occurs several years in a row and maybe exacerbated by other environmental stressors. Predicting the extent of tree mortality after one year of defoliation is difficult, however, a stand of trees that is not stressed by other agents during or immediately following a single defoliation will likely pull through. A more immediate and direct effect of defoliation is through the loss of oak mast. This occurs primarily from caterpillar feeding damage to flowers as well as foliage. Excessive foliage loss causes a lack of carbohydrates, which results in the abortion of immature acorns. It is possible to have several years of complete acorn failure during and following years of moderate to heavy defoliation.

The basic guidelines used to evaluate the risk of defoliation include: previous defoliation events; number of egg mass/acre; size and condition of the egg masses; available preferred food; and risk of larval blow-in following egg hatch. Survey results indicated that heavy defoliation is likely for Short Hill, Loudoun and Maryland Heights in 2008.

## **2.0 Public Involvement**

### **2.1 Scoping**

Public notification of the park's proposed suppression project was presented in local newspapers and the park's Community Bulletin in January 2008. Adjacent landowners and the mayors of Bolivar and Harpers Ferry were notified by mail. Comments were received by February 15. Three emails were received requesting additional information, offer of assistance and/or recommending monitoring techniques.

### **2.2 Public Review and Comment on the Draft EA**

The Draft Environmental Assessment will be available for public review in accordance with Director's Order #12, National Environmental Policy Act Reference Manual for a 30-day period from **March 14 to April 14**.

Newspaper articles will be released in West Virginia, Virginia, and Maryland informing the public of the availability of the EA for public review. Copies of the EA will be available by calling or writing to the park or by viewing on the park's internet web page at [www.nps.gov/hafe](http://www.nps.gov/hafe). Copies of the EA will be placed in local public libraries in Bolivar, Charles Town, Brunswick, and Lovettsville. A Special Edition of the park's Community Bulletin will also include an article on the availability of the EA. The mayors of Bolivar and Harpers Ferry and the adjacent landowners on Maryland Heights, Loudoun Heights and Short Hill will be notified by mail.

### **3. ALTERNATIVES CONSIDERED**

#### **3.1 Process Used to Formulate Alternatives**

##### **3.1.1 Management Options**

In 2008, five management options have been evaluated for managing gypsy moth populations at Harpers Ferry N.H.P. The intervention options are offered based upon the following two treatment objectives: 1) protect host tree foliage to prevent branch dieback and tree mortality; and 2) reduce gypsy moth population below the treatment threshold (Forest Service, 2007).

The NPS manages pest species using an integrated Pest Management (IPM) approach. IPM reduces the negative effects on pests while minimizing the impacts of pest management strategies on people and the environment. The FEIS specifies management options available to agencies interested in managing the gypsy moth under several situations, including monitoring, detection and eradication, 'slow the spread' and suppression, depending upon the occurrence and stage of gypsy moth infestation. The park is located within an area established for gypsy moth suppression (Forest Service, 1995). Eradication is aimed primarily at new, isolated infestations and 'slow the spread' is aimed at reducing the expansion of the gypsy moth from infested to non-infested areas. Treatments prescribed for suppression include the use of two biological insecticides, *Bacillus thuringiensis* variety *kurstaki* (*B.t.k.*) and Gypchek®, the formulated version of the gypsy moth nucleopolyhedrosis virus.

*Bacillus thuringiensis* variety *kurstaki* (*B.t.k.*), a microbial insecticide, is the only biological insecticide currently registered and commercially available for

gypsy moth control. This product is available through several manufacturers and has been used extensively in suppression projects throughout the U.S. in both forested and residential areas. *B.t.k* is a bacterium that acts specifically against lepidopterous larvae as a stomach poison and therefore must be ingested. The major mode of action is by mid-gut paralysis which occurs soon after feeding. This results in a cessation of feeding, and death by starvation. It is persistent on foliage for about 7-10 days. After many years of research and use, there is no evidence that the application of *B.t.k* causes adverse effects on people in treated areas. The Forest Service EIS, Record of Decision recommends one or two applications of *B.t.k*. If two applications, the second is applied 5-7 days after the first depending upon infestation level and threat to resource. Double application is known to have significant non-target impacts on native Lepidoptera.

Gypchek® is a microbial insecticide that is target-specific to gypsy moth. It is preferred over *B.t.k* as a treatment option primarily for this reason. This product is not available commercially but is produced in limited quantities by a cooperative effort of the USDA Forest Service and the Animal Plant Health Inspection Service (APHIS). The active ingredient in Gypchek® formulations has a very narrow host range (lymnatriids) and occurs naturally in gypsy moth populations. Normally the virus reaches epizootic proportions when gypsy moth populations reach high densities as a result of increased transmission within and between gypsy moth generations. The application of Gypchek® to gypsy moth populations simply expedites this process by increasing the exposure of the virus at an earlier stage. Healthy, feeding gypsy moth caterpillars become infected by ingesting contaminated foliage and soon stop feeding and die.

The efficacy of Gypchek® treatments to reduce gypsy moth populations has been variable; however, they were successful in the park's 2001 and 2002 projects. Because of the short period of viral activity on foliage (3-5 days) as well as other biological factors such as feeding activity and weather conditions, it has been difficult at best to project treatment efficacy. Most often foliage protection can be achieved but significant reductions in gypsy moth densities do not always occur. Should inadequate population reduction occur, areas may need to be treated again the following year.

### **3.1.2. Management Areas**

The decision to implement suppression actions for the gypsy moth is based on heavy defoliation that occurred on 215 acres on Maryland Heights, Loudoun Heights and Short Hill during the summer of 2007, and an egg mass survey conducted during the fall of 2007. Egg mass densities, egg mass sizes, and past defoliation history were used to predict defoliation tree

mortality risks. All areas with egg mass densities higher than 500 egg masses/acre are recommended for suppression.

Defoliation and tree mortality risk are important considerations when developing alternatives for treatment areas. Defoliation risk is high across much of the park, while tree mortality risk is high primarily in areas that suffered previous defoliation. Increased tree mortality is considered the most critical impact of the gypsy moth, as this impact has long-term consequences: loss of habitat, undesirable ecological changes, adverse scenic impacts and hazardous trees. These criteria address the objectives for protection of the forest ecosystem and scenic values.

Another evaluation criterion is recreational use significance as determined by the presence of developed trail systems. The trail systems and facilities considered critical for this assessment include the Appalachian Trail within the park, and other hiking trails on Maryland and Loudoun Heights. This criterion addresses the objectives of protecting the recreational and scenic values of the park and the health and safety of visitors and employees.

Treatment areas have been somewhat consolidated and generalized to form uniform spray blocks, eliminating small gaps in coverage. Egg mass survey results and the associated defoliation risks were considered when finalizing treatment area boundaries.

## **3.2 Alternatives Eliminated From Detailed Study**

### **3.2.1. Other Gypsy Moth Management Strategies**

Management strategies considered inappropriate or ineffective for gypsy moth suppression in the FEIS were not considered. These include introducing natural controls (e.g., fungal pathogens, parasitoids, and predators), removing and destroying egg masses, tree trunk bands, silvicultural techniques (selective removal of susceptible trees) and using insecticides other than Gypchek® and *B.t.k.* Other strategies such as mass trapping, mating disruption, and sterile insect techniques were also not considered because these methods are effective only at very low egg mass densities (<10 egg masses/acre) and are recommended only for 'slow the spread' situations.

### **3.2.2. Suppression in Forests With High Mortality Risks Only**

The option of spraying only forests facing a high risk of mortality due to another year of defoliation would help to address the project objectives of protecting scenic values and the forest ecosystem. However, this option alone would not address the project objectives of protecting recreational values, providing for visitor safety across the park, and cooperating with

other landowners and agencies to suppress the gypsy moth. This option will be considered together with others that address all project objectives.

### **3.2.3. Suppression in Buffer Zones Only**

The option of spraying only buffer areas to non-federal land would address the project objective of cooperating with other landowners and agencies to suppress the effects of the gypsy moth. However, this option alone would not address the project objectives of protecting recreational, scenic and ecological values and providing for visitor safety across the park. This option will be considered together with others that address all project objectives.

## **3.3. Alternatives**

### **3.3.1. Alternative 1: No Action**

The no action alternative in this document means that HAFE would take no action to suppress or control the gypsy moth on federal land within the park. The gypsy moth populations and any associated impacts would continue to fluctuate in response to food availability, weather, natural control agents, and suppression activities performed by other agencies and private landowners on adjacent lands.

### **3.3.2. Alternative 2: Suppression Using One Application of *Bacillus thuringiensis* variety *kurstaki* (*B.t.k.*)**

The treatment areas would be sprayed at an application rate of 36 BIUs in a total mix of  $\frac{3}{4}$  gallon per acre. This alternative is more likely to reduce gypsy moth populations; however, non-target Lepidoptera would be affected. This alternative has been used in previous gypsy moth suppression projects at the park.

### **3.3.3. Alternative 3: Suppression Using Two Applications of *B.t.k.***

Forested areas that are at high risk for tree mortality due to past defoliation events, and forested areas where the Fall 2007 egg mass survey indicates that moderate-high defoliation is likely to occur in 2008 would be treated under this alternative. Approximately 1615 acres of forested federal land would be designated for treatment. Maps of the proposed treatment areas are found in [appendix 2](#). It is the same as the previous alternative 3.3.2 but using two aerial applications of *B.t.k.*, applied 4-7 days apart.

### **3.3.4. Alternative 4: Suppression Using One Application of Gypchek®**

Areas would be treated with one application of Gypchek® at an application rate:  $4 \times 10^{11}$  occlusion bodies/acre. A sticker agent may be added to the formulation to enhance rain-fastness and adhesion to feeding surfaces. This increases the amount of time the pesticide remains on treated surfaces thus allowing a longer time for larvae to ingest the pesticide. This alternative achieves the same effect as Alternative 2. NOTE: Gypchek® is produced by the U.S. Forest Service in limited quantities each year. It is not known at the time of the release of this draft EA that sufficient quantities are available for the Harpers Ferry project.

### **3.3.5. Alternative 5: Suppression Using Two Applications of Gypchek®**

The treatment areas would be sprayed with two applications of Gypchek® at an application rate:  $2 \times 10^{11}$  occlusion bodies/acre. Low-flying aircraft (fixed wing or helicopters) would apply these pesticides to tree canopies during two separate flights during the 2<sup>nd</sup> and 3<sup>rd</sup> larval instars. Larval monitoring will be conducted by the Forest Service and NPS. The first application would be just after the emergence of the gypsy moth caterpillar in early May. The second application would follow 5 to 7 days later and would be an attempt to increase the effectiveness of the suppression program by exposing gypsy moth caterpillars that may have survived/escaped the first application. This alternative was implemented in the 2001 suppression project.

### **3.3.6. Alternative 6: Suppression Using Two Applications of *Bacillus thuringiensis* variety *kurstaki* (B.t.k.) and Two Applications of Gypchek® in Sensitive Areas**

**This is the preferred alternative.** This is a combination of Alternatives 3 and 5. *B.t.k.* would be the primary product to control gypsy moth in all treatment areas as described in Alternative 3 except on the southern portion of Maryland Heights where Gypchek® would be applied in a buffer zone to protect rare lepidopterans.

## **4. IMPACTS OF THE ALTERNATIVES**

### **4.1. Methodology**

A number of ecological, cultural, social, and economic factors were considered in assessing the potential environmental impacts of the alternatives being considered. A large amount of information on impacts were compiled and analyzed in respect to gypsy moth treatment alternatives

in the FEIS. The analysis of impacts in this section is tiered off the FEIS and is appropriately brief and focused on critical site-specific issues. Additional detail on the effects of the Alternatives on the environment is available in the FEIS.

## **4.2. Impacts of the Alternatives**

### **4.2.1. Impacts of Alternatives on the Biological Environment**

#### **4.2.1.1 Gypsy Moth**

##### Affected Environment

The current status of the gypsy moth population is discussed in Section 1.7. The gypsy moth is the target for the proposed action.

##### Direct and Indirect Effects

Alternative 1 would allow gypsy moth populations to fluctuate unimpeded in response to environmental conditions, host availability, predation, and natural control organisms. Fluctuations may include future outbreaks or population crashes. Fall 2007 egg mass surveys indicate that heavy defoliation is likely to occur on approximately 1615 acres in the park in 2008. Left unchecked, the gypsy moth population is expected to continue to cause significant amounts of defoliation in some areas of the park for several more years before a population crash. In Alternatives 2-6, significant mortality (60-90%) to young gypsy moth caterpillars is expected in treated areas. A reduction in gypsy moth populations is expected for 1-2 years following treatment, although some small areas of high population density may remain. Caterpillars outside treated areas would be expected to fluctuate as in Alternative 1.

##### Cumulative Impacts

In Alternative 1, the reduced availability of preferred host tree species may occur if outbreaks cause significant tree mortality. This may cause gypsy moth population declines. In Alternatives 2-6, the future effectiveness of natural control by the fungus *Entomophaga maimaiga* and the nucleopolyhedrosis virus (NPV) may be diminished in treatment areas because these natural controls are most effective at high population densities. This may benefit gypsy moth populations. However, as expected mortality levels will not be 100% and pockets of gypsy moth populations will remain untreated, these natural controls are expected to remain in place throughout the ecosystem.

#### **4.2.1.2. Non-target Lepidoptera (Butterflies and Moths)**

##### Affected Environment



Information on the lepidopteran fauna of HAFE is contained in a Checklist of butterflies (Durkin 2002-2003) and Dragonflies (Orr 2005). The checklist for butterflies indicates that 74 species were observed or otherwise documented for the park, including 9 species on state Heritage lists. See [Appendix 3](#) for park species. There were a total of 51 species of dragonflies and damselflies observed or documented. See [Appendix 4](#) for park species.

#### Direct and Indirect Effects

The impact of the gypsy moth and gypsy moth treatments on native Lepidoptera will largely be dependent upon the species and developmental stages of caterpillars in the treatment areas. Characteristics such as larval stages and activity, number of broods per year, host plant preferences, habitat associations and other factors may determine susceptibility. It is expected that spring-feeding lepidopterans and species more closely associated with forested areas are most likely to be directly affected, but other species may also be affected indirectly. For example, changes in the understory may subsequently affect host plant availability.

In Alternative 1, native Lepidoptera dependent upon forests and forest margin habitats, especially oak-dominant forests, may be negatively affected by an additional defoliation event and the resulting tree mortality. Other species may benefit by the presence of gypsy moths and their effects on the habitat due to changes in understory host plant communities. Under Alternatives 2, 3 and 6 (combination of *B.t.k.* and Gypchek®), some non-target Lepidoptera populations that are actively feeding during and 8-10 days after treatment are expected to suffer mortality in areas treated with *B.t.k.*, resulting in temporary population declines. The level of mortality experienced will vary from species to species. Under Alternatives 4 and 5 and that portion of 6 where Gypchek® is used, no such treatment effects are expected.

#### Cumulative Impacts

In Alternative 1, forest-dependent Lepidoptera may be negatively affected by future defoliation events and the resulting tree mortality and changes in forest composition. Lepidoptera associated with open woods not dominated by oaks may benefit from these impacts. Other species may benefit from changes in the understory brought about by defoliation and tree mortality. Under Alternatives 4 and 5, native Lepidoptera are expected to remain at current levels since Gypchek® does not affect non-target moths and butterflies. Under Alternatives 2 and 3 and that portion of 6 where *B.t.k.* is used, native Lepidoptera populations may remain low for several years but are expected to recover to pre-treatment levels within 1-2 years of treatment through recolonization and reproduction. Recovery time for each species may be dependent upon the number of broods per year (i.e., species with multiple broods may recover more quickly) and dispersal abilities.

### **4.2.1.3. Vegetation**

#### Affected Environment

Approximately 80% of the park is forested and susceptible to gypsy moth defoliation. Forest composition includes oak-hickory, maple-oak, oak-beech-maple, and maple-sycamore forest types. A map of the park's plant communities is in [Appendix 5](#). Oak-type forests, the most highly preferred host type for gypsy moths, comprise the majority forest cover in the mid to upper elevations. Important riparian zones exist along the two rivers and streams. Other major park habitats include old field/scrub, agricultural fields, wetlands, and suburban lands. Approximately 580 plant species occur in the park (Rouse, 1998).

#### Direct and Indirect Effects

Under Alternative 1, defoliation is expected to occur on Maryland Heights, Loudoun Heights and Short Hill. Deterioration of tree health is expected in defoliated areas, which leads to increased tree mortality. Some trees may die after one year of defoliation stress, but tree mortality is expected to be higher in areas suffering from repeated defoliation events. Defoliation allows sunlight to penetrate to the forest floor, benefiting some shade-intolerant species while adversely affecting other plants that require shade. Changes in humidity levels on the forest floor may affect plant growth. Changes in the forest understory composition would be expected.

Under Alternatives 2-6, treatment areas would largely be protected from gypsy moth defoliation and its impacts. In Alternative 2, 3 and 6 a temporary reduction in lepidopteran pollinators in areas treated with *B.t.k* may occur.

#### Cumulative Impacts

Under Alternative 1, repeated outbreaks of gypsy moth may lead to the loss of oak species and other trees and could permanently change the composition of the forest and its understory vegetation. Loss of oaks may make the forests less susceptible to gypsy moth in the future. Species adapted to openings in the forest are expected to thrive while shade-tolerant species may decrease in abundance. Implementing alternatives 3, 5 and 6 (two applications) are more likely to protect treated areas from the impacts of defoliation for several years than the one application alternatives in 2 and 4.

### **4.2.1.4. Wildlife**

#### Affected Environment

The forests, fields, wetlands, streams, and ponds in HAFE harbor a broad diversity of wildlife, including 18 species of mammals, approximately 122 species of birds, 12 amphibians, 15 reptiles, and 32 fish species. Some notable species include white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis*), and great-blue herons (*Ardea herodias*). Other than aquatic macroinvertebrate fauna, which number in the hundreds, the invertebrate taxa are not well inventoried. Hundreds of insects, arachnids, crustaceans and other invertebrate species are probably found in HAFE.

#### Direct and Indirect Effects

In Alternative 1, the expected gypsy moth defoliation may affect the abundance and distribution of wildlife due to changes in vegetation and habitat structure. Some species may respond favorably while others are negatively impacted. For example, defoliation causes a loss of cover for nesting bird species, increasing predation risk. A reduction in the abundance of other leaf-feeding insects can be expected as well, reducing food availability for some songbirds. However, some wildlife species may thrive in response to the abundant gypsy moth caterpillar as a food source itself. White-tailed deer may migrate to avoid defoliated areas. Decreased acorn production in oaks stressed by defoliation can reduce food availability and may cause declines in some acorn-dependent wildlife populations. Defoliation can increase water temperatures in small streams and can cause declines in fish and aquatic invertebrate populations.

Under Alternatives 2-6, the impacts to wildlife resulting from defoliation would largely be prevented in treated areas. *B.t.k.* is not known to have significant direct effects on any other wildlife, except feeding Lepidoptera as discussed in Sections 4.3.1.2. and 4.3.1.3. Gypchek® affects only the gypsy moth. Birds and mammals may temporarily switch their diet due to a reduction of caterpillars in treated areas. It is possible that some gypsy moth parasitoids (e.g., parasitic wasps) may be negatively or positively indirectly affected by a reduction in their host. The greatest concerns regarding the use of *B.t.k.* are the potential adverse effects both terrestrial and aquatic invertebrates. Since *B.t.k.* has been demonstrated to have very low toxicity to vertebrates, the main concern is with non-target insects and crustaceans. The specificity of *B.t.k.* to Lepidoptera would limit the negative effects on aquatic invertebrates, except for a few species of aquatic Lepidoptera.

#### Cumulative Impacts

In Alternative 1, tree mortality due to defoliation stress may cause reductions or elimination of squirrel and tree nesting bird populations but may also provide additional habitat (in the form of dead trees) for other wildlife. Acorn production may be reduced for several years after the actual defoliation events. Increased understory growth due to forest openings may

provide additional habitat and food sources for some wildlife. Alternatives 2-6 may protect treated areas from the impacts of defoliation on wildlife for several years. Therefore, the only organisms likely to be affected by *B.t.k.* are Lepidoptera feeding on plants (principally forest canopy leaves) within 7 to 10 days of application. *B.t.k.* will not affect adult insects. If *B.t.k.* is used for gypsy moth suppression there would be some negative impacts to non-target Lepidopteran species. Overall suppression of gypsy moth populations would have beneficial affects to wildlife and habitat. Foliage protection would provide protection of canopy for cover and prevent or minimize mast failure.

#### **4.2.1.5. Endangered and threatened species**

##### Affected Environment

No federally listed endangered or threatened species are known to occur in HAFE. The federally threatened bald eagle (*Haliaeetus leucocephalus*) has been reported at a nest site near Short Hill. HAFE has habitat suitable for the Maryland endangered Allegheny Woodrat (*Neotoma magister*) but there are no verifiable records for the species in the park. Some state-listed endangered, threatened or potentially threatened plant species have been recorded in HAFE including 93 occurrences of 33 plants (Fleming, 1999, Pearles, 2007).

In response to requests of the State Heritage Programs and the U.S. Fish and Wildlife Service, West Virginia and Maryland responded by commenting that several rare butterfly species are or may be present in the park. Park officials consulted with a butterfly researcher regarding possible impacts and other species that would possibly be affected by the treatments. Recommendations included no treatment or use of Gypchek which is specific to gypsy moth.

In previous inventories of the park's flora, thirty-three state-listed rare, endangered, species of concern or threatened plants have been recorded in the park. Of these species, ten are found at least occasionally in and near forested habitats, including: *Aster shortii*, *Arabis shortii*, *Hasteoloa suavens*, *Eruthromium albidum*, *Carex careyana*, *Scutellaria saxatilis*, *Ellisia nycetelea*, *Iris cristata*, *Asplenium pinnatididum*, *Heuchera pubescens*.

Compliance with the Section 7 of the Endangered Species Act of 1972, as amended, was completed by consulting with the U.S. Fish and Wildlife Service. Their correspondence to the park is contained in [Appendix 6](#) along with correspondence from the State Historic Preservation Offices.

##### Direct and Indirect Effects

Alternative 1 may affect state-listed bird species as described for birds in Section 4.3.1.4. Those more closely associated with forested habitats and

adjacent open areas and that nest in the park are probably more sensitive to these changes. Species associated with closed canopy forests may be negatively affected, while others may thrive in response to changes and openings in the forest caused by gypsy moth outbreaks. Alternatives 2-6 would largely protect state-listed species from the consequences of defoliation in treated areas. Alternative 2 and 3 and that portion of 6 where *B.t.k* is used may cause some of the state-listed birds, especially nesting species, to temporarily switch diets in response to a reduced abundance of caterpillars. This impact is reduced in Alternatives 4 and 5 and that portion of 6 where Gypchek® is used.

In Alternative 1, state-listed rare plants that are dependent upon closed-canopy forests may be negatively affected by additional defoliation events. However, other species may benefit from the additional sunlight that reaches the forest floor. In Alternatives 2-6 state-listed rare plants in forests would largely be protected from the impacts of defoliation in treated areas. In Alternative 2 and 3 and that portion of 6 where *B.t.k* is used, a temporary reduction in lepidopteran pollinators may affect the reproduction of a few state-listed species. This impact may be small, as rare plants may not normally reproduce each year and are often adapted to delayed reproduction. This impact is not expected under Alternatives 4 and 5 and that portion of 6 where Gypchek® is used.

#### Cumulative Impacts

In Alternative 1, changes in the forest canopy and understory due to repeated defoliation events may change the distribution and abundance of state-listed plants and animals. In Alternative 2-6, these species may be protected from these impacts in treated areas for several years. In Alternatives 2 and 3 and that portion of 6 where *B.t.k* is used, lepidopteran caterpillars are expected to recover to pre-treatment levels within 1-2 years.

### **4.2.2. Impacts of Alternatives on the Physical Environment**

#### **4.2.2.1. Historical, Cultural and Archaeological Resources**

##### Affected Environment

The park is listed on the National Register of Historic Places. It contains many historical and archeological sites and structures that could be susceptible to gypsy moth defoliation. The historic and archeological sites are located in forested areas that are managed as natural landscapes. Management actions are taken for specific sites based on cultural resources needs (e.g. removal or control vegetation to protect a cultural feature).

Maryland and Loudoun Heights contain earthen and stone fortifications dating to the Civil War period. Pre-Civil War sites include charcoal hearths,

logging roads and remnants of domestic dwellings. Virtually all of the forests in the park were removed during the Civil War for military reasons. Logging occurred on the Heights prior to the War to produce charcoal, the fuel used to power the furnaces and forges of the Federal Armory, the Antietam Iron Works, and other industries in Harpers Ferry (Gilbert, 1995). Trees and shrubs grow on or near most of these structures and have both positive and negative effects. Roots provide some stability to earthen structures but can be detrimental when they fall due to age, disease or environmental conditions. Shading from a closed canopy discourages shade-intolerant invasive species such as tree-of-heaven (*Ailanthus altissima*) from growing on structures.

Cultural resource compliance for this project, as required under Section 106 of the National Historic Preservation Act, as amended, has been submitted to the West Virginia, Virginia and Maryland Historic Preservation Offices. They have been consulted regarding the conclusion of NPS cultural resource staff that the preferred alternative will have no adverse effect on cultural resources. Correspondence from the SHPOs is contained in [Appendix 7](#)

#### Direct and Indirect Effects

Under Alternative 1, susceptible trees may be defoliated, increasing the risk of tree mortality and direct impact to historic structures. Trees near archaeological resources may be impacted similarly, leading to changes in the environment (e.g., increased erosion potential and sunlight) around these areas leading to possible impacts. The gypsy moth and their droppings may have a detrimental effect especially in highly infested areas. In Alternatives 2-6, cultural resources in areas designated for treatment would largely be protected from the effects of gypsy moths.

#### Cumulative Impacts

For Alternative 1, the loss of a large number of trees would open areas where invasive plants may take hold preventing the establishment of native trees. Invasive species over the long-term may have a more detrimental affect on structures. This could lead to undesirable changes in the natural landscape over time and the unnecessary loss of cultural resources. Areas designated for treatment in Alternatives 2-6 may be protected from these effects for several years.

### **4.2.2.2. Scenic Values**

#### Affected Environment

The park is composed of a largely mountainous forested landscapes bisected by the Potomac and Shenandoah Rivers, interspersed with old fields, agriculture, and approximately 50 historic buildings. Visitors and passers-by can enjoy this landscape from the roads and highways and trails that cross

the park. The scenic values of the park are increasing as natural areas outside the park face increasing development pressures. Many consider Harpers Ferry to be the eastern gateway to West Virginia. The park's 1989 Special Boundary Study identifies several view sheds from historic locations as being worthy of protection. The most popular of the view sheds is from Jefferson Rock where Thomas Jefferson proclaimed the view as being worth a trip across the Atlantic. The Appalachian Trail National Scenic Trail and the C&O Canal National Historical Park bisect the park and contain scenic views of the park and surrounding countryside.

#### Direct and Indirect Effects

In Alternative 1, gypsy moths will negatively affect the scenic values of the park if defoliation occurs as expected. Large expanses of defoliated forest are unattractive and appear unnatural, as trees should be in full foliage during this time of year. It is possible that other aesthetically pleasing species such as wildflowers may increase in number due to defoliation and thereby enhance scenic value. In Alternatives 2-6, no impacts to scenic values due to gypsy moth defoliation are expected in treated areas as noticeable defoliation is expected to be largely prevented.

#### Cumulative Impacts

In Alternative 1, gypsy moths may negatively affect the scenic values of the park through repeated outbreaks. Increased tree mortality in areas experiencing multiple defoliation events will leave a large number of dead trees in some areas, negatively affecting the aesthetics of the forest for a longer period of time. Alternatives 2-6 may protect treated areas from the impacts of defoliation on scenic values for several years.

### **4.2.2.3. Private Land**

#### Affected Environment

Private land within the park boundary is mostly developed. Only 100 acres of the park's 3645 gross acreage is owned by private and public interest. Outside the boundary, the park is largely surrounded by private land, however, two other national parks border the park as well as state land contained in the two rivers mentioned above.

#### Direct and Indirect Effects

In Alternative 1, the expected gypsy moth outbreak on federal land may affect neighboring non-federal land, including land that may be treated by private landowners in 2008. Mature gypsy moth caterpillars may migrate several hundred feet from where they have depleted their food source into adjacent untreated areas, possibly leading to defoliation and tree mortality despite the suppression activities of the landowner. In Alternatives 2-6,

private lands adjacent to the park that may be treated by the landowner would largely be protected from the effects gypsy moth caterpillars.

#### Cumulative Impacts

In Alternative 1, gypsy moths may become reestablished on non-federal land despite being treated this season because of movement from untreated federal land. This may result in the need to treat these areas again next year. Alternatives 2-6 may protect non-federal land from dispersing gypsy moth populations for several years.

### **4.2.2.4. Water Quality and Wetlands**

#### Affected Environment

Approximately 9 miles of the Potomac and Shenandoah Rivers pass through the park. Numerous streams and tributaries exist within the park boundary. There are approximately 100 acres of wetlands within the park and mostly along the two rivers. Water quality of the rivers is good (National Park Service, 1997). Wetlands are found throughout the park and represent an important habitat for many animal and plant species.

#### Direct and Indirect Effects

In Alternative 1, gypsy moths may affect the water quality of park streams and the two rivers if defoliation occurs as expected. The results of defoliation can include temporary changes in water temperature, dissolved oxygen levels, pH, nutrient concentration, sediment load, stream discharge and flow rate, and other variables. Affected streams may pass these impacts to the wetlands in which they drain. In Alternatives 2-6, the impacts of defoliation on water quality and wetlands may be largely prevented in treated areas. No effects on water quality from pesticide treatments of either *B.t.k.* or Gypchek are anticipated.

#### Cumulative Impacts

In Alternative 1, the loss of trees due to the stresses of defoliation can increase the impacts on water quality and wetlands. In Alternatives 2-6, the impacts of defoliation on water quality may be largely prevented in treated areas for a number of years.

### **4.2.3. Impacts of Alternatives on the Social Environment**

#### **4.2.3.1. Visitor Use and Recreational Value**

#### Affected Environment

The park contains many important recreational facilities, including the Appalachian National Scenic Trail, access to the C&O Canal National Historical Park towpath and approximately 10 miles of additional trails. The



park receives approximately 0.5 million visitors annually, with the highest visitation occurring during the spring, summer and fall months.

#### Direct and Indirect Effects

In Alternative 1, gypsy moths are likely to impact the recreational value of the park if defoliation occurs as expected. Visitor experiences may be negatively affected by forests denuded of foliage, the lack of shade on trails, large amounts of caterpillars and frass (caterpillar droppings), and health and safety concerns. Some visitors may respond by avoiding use of the park during the summer while gypsy moths are active. In Alternatives 2-6, the impacts to recreational values and visitor use due to gypsy moth defoliation would be largely prevented. The most significant park trails likely to be affected by gypsy moth outbreaks would be treated. Visitor use may be briefly impacted during the treatment period as visitors may avoid being in the park during the applications of pesticides. In Alternative 2 and 3 and that portion of 6 where *B.t.k.* is used, visitors may experience reduced opportunities for viewing native Lepidoptera.

#### Cumulative Impacts

In Alternative 1, repeated gypsy moth outbreaks and safety concerns regarding dead trees and falling limbs may affect recreational values and visitor use over the long-run as visitors learn to avoid troublesome areas. In Alternatives 2-6, impacts to recreational values and visitor use due to gypsy moth defoliation are expected to be largely prevented for several years in treated areas.

### **4.2.3.2. Health and Safety**

#### Affected Environment

In addition to the 0.5 million visitors each year, park and other NPS employees number approximately 300. Appalachian Trail hikers and C&O Canal visitors are other potentially affected users. Additionally, park volunteers assist in a variety of programs and projects. Many employees and volunteers spend significant amounts of time outdoors. Many additional people just pass through the park each year as transients.

#### Direct and Indirect Effects

In Alternative 1, gypsy moths may affect the health and safety of visitors, employees and transients. Skin rashes and other irritations from contact with gypsy moths may occur. Some sensitive individuals may become allergic to the gypsy moth. Increased tree mortality resulting from defoliation stresses may pose a hazard due to falling limbs and trees. Some potential visitors may respond by avoiding use of the park areas containing many dead trees. Defoliated areas are also at an increased risk of fire danger due to solar drying of leaf litter. Transients (visitors that just pass

through the park) could be affected if dead trees fall in the road causing a hazard. In Alternatives 2-6, the impacts to the health and safety use due to gypsy moth defoliation may be largely prevented. The most significant park trails likely to be affected by gypsy moth outbreaks would be treated.

There is no evidence after years of study and use that the application of *B.t.k.* would affect people in treated areas. For *B.t.k.*, minor irritations of the skin, eyes or respiratory tract may occur in people who handle and apply the pesticide. Gypchek® has no known adverse effects on people, but some sensitive individuals that are exposed may experience minor irritations similar to that of having contact with gypsy moth. These effects are much more likely to occur in people who handle and apply the pesticide.

#### Cumulative Impacts

In Alternative 1, repeated gypsy moth outbreaks and safety concerns regarding dead trees and falling limbs may affect public health and safety over the long run as the number of dead and potentially hazardous trees increase. In Alternatives 2-6, impacts to public health and safety due to gypsy moth defoliation are expected to be largely prevented for several years in treated areas.

#### **4.3. Recommendation**

Data from gypsy moth egg mass surveys in 2007 indicate the need for selected pesticide applications during the spring of 2008. Based on the analysis documented in this environmental analysis, the FEIS, and the site-specific biological evaluation provided by the Forest Service, it is the recommendation of the NPS that Alternative 6 be implemented. This will involve treatment of approximately 1615 acres of forested federal land with two applications of *B.t.k.* to suppress gypsy moth in the park in 2008. To protect rare lepidopterans in the vicinity of the southern portion of Maryland Heights a buffer zone will be treated with Gypchek®.

While positive and negative impacts can be identified for all of the alternatives, Alternative 1 has the greatest potential for both short-term and long-term negative impacts to people and the environment. If pesticides are not applied, moderate defoliation of forested areas is expected, possibly resulting in significant tree mortality especially in areas previously defoliated. Impacts to scenic, recreational and ecological values, and public health and safety are expected. Furthermore, adjacent non-federal lands would not be protected from dispersing gypsy moths, even if those areas are treated. Suppression activities as outlined in Alternatives 2-6 would help address the impacts expected under Alternative 1. However, Alternatives 2 and 3 and that portion of 6 where *B.t.k.* will be used may have undesirable

negative effects on non-target species such as native Lepidoptera and on the natural controls of gypsy moth.

Alternatives 3, 5 and 6 best address the project objectives of minimizing the short and long-term effects of gypsy moth outbreaks on the scenic, recreation and ecological values of the park while supporting suppression activities on adjacent non-federal land. Defoliated areas and areas where moderate to heavy defoliation are likely to occur in 2008 are designated for treatment while other areas remain untreated. This approach will help to minimize any impacts that the use of *B.t.k.* may have on rare butterflies on the south end of Maryland Heights. Any temporary effects that treatment may have are outweighed by the potential long-term impacts of Alternative 1. This alternative is compatible with the selected alternative in the FEIS and ROD, in that the biological insecticide applications are the only operational IPM component that will meet the objectives identified in this EA. The objectives and methodology outlined in this EA and ongoing monitoring data will be used to identify any areas in need of treatment in the future.

In carrying out this action, the NPS 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. NEPA and NPS policies require assessment of alternative management actions to facilitate balanced, integrated approaches to resource protection and development. 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 insecticides that are registered for suppression of gypsy moth, and will be applied according to label requirements. This meets the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 as amended.

Our recommendation to implement Alternative 6 is based upon compliance with, and the authority granted by the federal laws and regulations previously described and with NPS policies. This project conforms to NPS policy to protect native species and biodiversity from impacts of non-native species, and the Forest Service policy to protect and preserve the forest resources of the nation against destructive forest insects and disease. This recommendation was guided and is supported by the following factors:

- The insecticides proposed for use are registered for that intended purpose by the Environmental Protection Agency;
- Insecticide applications proposed in the park comply with EPA label directions, city and federal laws, and NPS regulations;
- The USFWS has determined that no federally listed endangered or threatened species would be adversely affected by suppression

actions;

- No significant impacts to state listed endangered or threatened species, or other native flora or fauna are expected from the proposed project;
- Gypchek® and *B.t.k.* are safe to use around humans;
- The public involvement, public notification, project monitoring procedures and mitigation measures that will be followed and implemented during the project will minimize the risk of exposure to individuals visiting and residing in or near areas treated;
- There are no apparent significant deleterious effects on the environment; and
- This suppression project is within the scope of the FEIS and the decision announced in the ROD.

#### **4.4. Mitigating Measures**

The treatment program will be conducted such that every aspect will proceed only if it can be done so safely. Pesticides will be applied in accordance with pesticide label specifications. Every effort will be made to restrict the application of pesticides to target areas and to minimize drift to off-site areas.

Pilots will be provided with digital and hardcopy maps of treatment areas. Delineated spray areas will be defined by Global Positioning System (GPS) technology used onboard the aircraft. Pilots will be briefed daily on conditions and on any unusual features that require consideration or special attention. Pilots will be informed of no fly zones including populated areas including the towns of Bolivar and Harpers Ferry. In addition to the application aircraft, secondary craft may be used with personnel from the Forest Service that would monitor and guide spray activities.

The following notifications will be undertaken one week prior to the proposed treatment date:

- A news release in local papers will be issued to notify the public of the upcoming aerial operations.
- Individual landowners will be notified by letter.
- Signs will be posted at trail heads to notify hikers of the upcoming aerial operations.

- The Towns of Harpers Ferry and Bolivar will be notified by contacting the mayors. Dissemination of this information to the residents of Harpers Ferry and Bolivar via telephone messages may be undertaken by town government officials.
- Signs will be posted in visitor centers and information sites around the park and local community.
- The park's emergency telephone number (304 535-6776) will be available for incoming calls and will contain information on the spraying operations including the time and date of the treatment. This message may change several times due to changes in environmental conditions which may cause a delay or cancellation of the treatment.

Treatment operations will be coordinated with the Maryland Department of Agriculture and included in their public updates.

Maps of the treatment areas and copies of the environmental assessment will be available for inspection at the park's Headquarters in Harpers Ferry.

Coordination with the Appalachian Trail Office in Harpers Ferry, the Potomac Appalachian Trail Club, and park staff will minimize the number of hikers that may be on the trails within the treatment areas.

#### **4.5. Project Monitoring**

As part of an ongoing IPM program, annual monitoring of forests for defoliation, surveys of gypsy moth populations and post-treatment efficacy of treatments will be conducted. The effectiveness of the spray application will be assessed through the placement of spray cards in selected treatment areas. The park will continue to monitor gypsy moth populations throughout 2008 and subsequent years. Aerial surveys later in the summer will document any defoliation that may occur in the park. Egg mass surveys performed as needed during the fall of 2008 should provide insight as to the effectiveness of this spray program when compared to data from earlier egg mass surveys. It is expected that most treated areas will be protected from defoliation for several years.

The management of the gypsy moth is an ongoing process. The decision to treat areas of the park in the future will be based upon the same project objectives and analysis outlined in this EA. Egg mass survey and aerial observations of defoliation will be used to assess the need for future treatments across the park. Total treatment area may change from year to year, and it is expected that no treatment will be necessary for most years.

Separate EAs will be developed to address any future suppression activities and will be made available for public review.

## **5. PERSONS AND AGENCIES CONSULTED**

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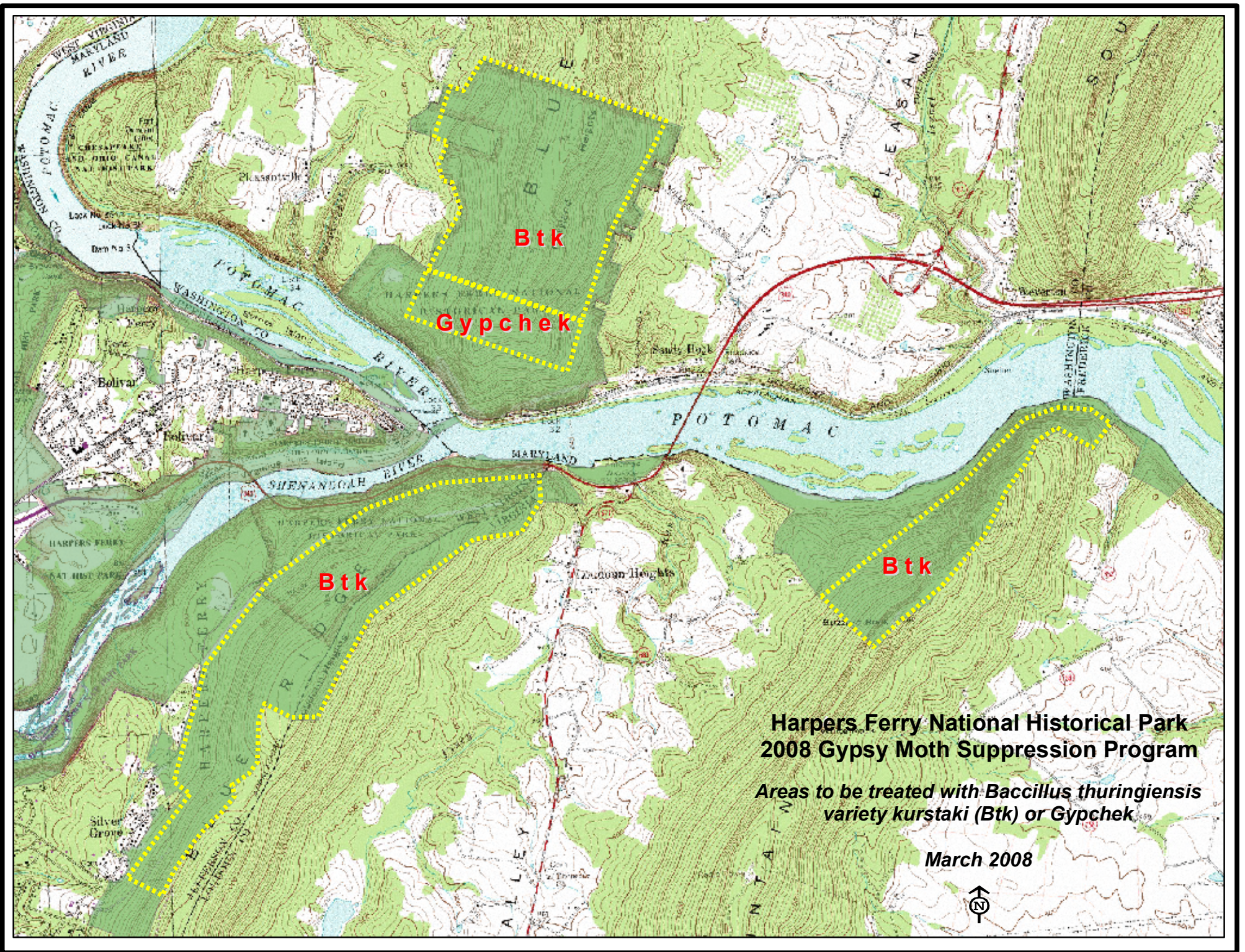
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**Btk**

**Gypchek**

**Btk**

**Btk**

**Harpers Ferry National Historical Park  
2008 Gypsy Moth Suppression Program**

*Areas to be treated with **Bacillus thuringiensis**  
variety **kurstaki (Btk)** or **Gypchek***

**March 2008**

