Environmental Assessment for a Fire Management Plan

Gettysburg National Military Park & Eisenhower National Historic Site

Gettysburg, Pennsylvania

July 2014

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&
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This Environmental Assessment (EA) evaluates two alternatives for the Fire Management Plan at Gettysburg National Military Park & Eisenhower Historic Site. The EA describes the environment and resources that would be affected by the alternatives and the environmental consequences of implementing these alternatives. NPS policy states that all Parks' with burnable vegetation are required to have an up-to-date and accurate Fire Management Plan. The EA evaluates the no-action (i.e., no change) alternative (alternative 1) and one action alternative (alternative 2). The NPS preferred alternative (alternative 2) is to suppress all unscheduled ignitions using the most appropriate suppression response, and implement resource management and fuels reduction projects using mechanical treatment, chemical treatment and initiate a prescribed burning program. Three alternatives that proposed wildland fire use, or did not allow for prescribed fire were considered but rejected because of the lack of large, uninterrupted land mass and generally small numbers of firefighters available in this Parks.

This document assesses the impacts related to the proposed action, which include negligible, minor, and moderate impacts to air quality, floodplains and wetlands, soils, threatened or endangered species, vegetation, water resources, wildlife and fisheries, historic structures, archeological resources, cultural landscapes, park facilities and operations, visitor use and experience, social and economic environment, human health and safety, transportation, and utilities.

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Note to Reviewers and Respondents:
If you wish to comment on this EA, you may post your comments electronically at http://Parkplanning.nps.gov/GETT or you may mail comments within 30 days to the address below. Whether you comment on the website or through the mail, if you include your address, phone number, e-mail address, or other personal identifying information, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold personal identifying information from public review, we cannot guarantee that we will be able to do so.

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Purpose and Need

Introduction

The purpose of this federal action is to provide a long-range fire management plan (FMP) for Gettysburg National Military Park (GETT) and the Eisenhower National Historic Site (EISE) using the benefits of natural and prescribed fire to achieve desired natural resource conditions in accordance with the Federal Wildland and Prescribed Fire Management Policy (1995, 2001, & 2009). NPS Director's Order #18, Wildland Fire Management (DO-18), requires all Parks units with vegetation capable of sustaining fire to develop a FMP. A combined FMP was developed for both GETT and EISE because the two Parks are contiguous and they are managed by the same NPS staff. For this document, the Parks and GETT/EISE refers to the combined Gettysburg National Military Park and the Eisenhower National Historic Site. The long-range fire management plan would have a lifetime of at least 5 to approximately 15 years.

Topics covered in the EA include fire suppression action plans, uses of prescribed fire to achieve desired natural and cultural resource objectives, and non-fire fuel load management for the two sites. The EA analyzes a range of reasonable long-range fire management program alternatives and their direct, indirect and cumulative impacts. Two alternatives are analyzed: Alternative 1, the No Action Alternative (i.e., continuation of current management practices); and Alternative 2, a fire management program including suppression, prescribed fire, and non-fire fuel reduction treatments. Alternative 2 is the NPS preferred alternative.

Fire suppression actions and planning at GETT and EISE have relied on and would continue to rely heavily on cooperation with other federal, state, and local fire fighting agencies, and adjacent landowners as the means for responding to wildland fires at the Parks and in protecting the surrounding community. The Pennsylvania Department of Conservation & Natural Resources (DCNR) Bureau of Forestry has fire suppression and prevention responsibility for much of the lands surrounding GETT/EISE. Other key contacts for fire suppression in the Parks include the fire chiefs of the surrounding fire departments, Pennsylvania State law enforcement, and county emergency management officials.

Significant Resources

Gettysburg National Military Park is known primarily for the cultural and historic resources that are protected. The Park includes 5,989 acres of land, 1,830 monuments and cannon, 31 miles of historic avenues and 147 historic buildings (see Figure 7, page 68). The majority of the 5,989 acres in the Park are agricultural/pasture in nature, with woodlots and woodlands accounting for a total of 1,974 acres, orchards 18 acres, and 43 linear miles of historic fences. The Parks averages over 1.2 million visitors per year in its Visitor Center, and more than 1.7 million visitors per year in the field.

Eisenhower National Historic Site consists of 690 acres, including the original farm purchased and expanded by President and Mrs. Eisenhower, two adjoining farms (B. Redding and Brandon) purchased by his associate W. Alton Jones and farmed in partnership with the President, and an additional adjoining farm (C. Redding) donated to the government to preserve the historic scene. Improvements include the main house, barn, farm outbuildings, livestock control fencing, and a variety of farming equipment. The site is managed to restore and maintain the cultural and natural resources in their historic period appearances. The majority of the site is agricultural land with only about 19 acres being classified as woodland, in addition to the home, barn and outbuildings portion of the site.

GETT and EISE are faced with the task of managing a vast system of historic earthworks and hundreds of acres of open fields, historic woodlots, and several orchards that were the scene of the majority of fighting during the Civil War battle fought here. Prescribed fire could help reduce invasive shrub encroachments and assist in promoting the establishment of native grasses on earthworks and open fields, and thereby reducing the current demands for mechanical mowing.

Given the issues and need for action described above, the purpose of taking action at this time is to establish a Fire Management Plan for GETT and EISE that would utilize a range of fire management strategies including the appropriate fire suppression, use of prescribed fire, and non-fire fuel reduction treatments to assist in accomplishing natural and cultural resource objectives including restoring natural ecological processes and managing historically open fields and earthworks, while addressing protection of Parks resources and surrounding land uses.

Goals for Fire Management

The following are the goals of the fire management plan at the Parks:

- Make firefighter and public safety the highest priority of every fire management activity. Suppress all unwanted and undesirable wildland fires, regardless of ignition source, to protect the public, private property, and natural and cultural resources of the Parks.
- Manage wildland fires in concert with federal, state, and local air quality regulations. Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.
- Reduce wildland fire hazards around developed areas and areas adjacent to cultural and historic sites.
- Use prescribed fire as a method of restoring and maintaining the cultural and natural landscape to meet resource objectives of the Parks.

Relation to Establishing and Other Legislation

Gettysburg National Military Park was initially established as the Gettysburg Battlefield Memorial Association, incorporated by an Act of the General Assembly of Pennsylvania on April 30, 1864:
…to hold and preserve the battlegrounds of Gettysburg, on which were fought the actions of the first, second and third days of July, Anno Domini one thousand eight hundred and sixty-three, with the natural and artificial defenses, as they were at the time of said battle, and by such perpetuation, and such memorial structures as a generous and patriotic people may aid to erect, to commemorate the heroic deeds, the struggles, and the triumphs of their brave defenders.

On February 11, 1895, the U. S. Congress made Gettysburg the third national Military Park in the United States (28 Stat. 651). Among the purposes of the Parks was the instruction to:
…acquire…such lands in the vicinity of Gettysburg, Pennsylvania…which were occupied y the infantry, cavalry and artillery on the first, second and third days of
July, eighteen hundred and sixty-three, and other such adjacent lands…necessary to preserve the important topographical features of the battlefield.

In 1933, the National Parks Service (NPS) took over the management of the battlefield from the War Department. NPS management of the site was predicated upon the 1893 and 1895 Federal legislation, and procedures NPS developed especially for the management of battlefield Parks.

Like the battlefield, the Soldiers' National Cemetery was established first by local citizens and then by an act of the Commonwealth of Pennsylvania. The Act to Incorporate the Soldiers' National Cemetery was passed by the Pennsylvania General Assembly on March 25, 1864. The Cemetery was transferred to the stewardship of the Secretary of War of the United States on May 1, 1872, and then to the National Parks Service when it became the manager of Gettysburg National Military Park.

Eisenhower National Historic Site was originally purchased by President and Mrs. Dwight D. Eisenhower in 1950 and used by them as their home during his presidency. On November 27, 1967, President and Mrs. Eisenhower donated the Eisenhower Farm to the United States Government, reserving a life tenancy for himself. The designation order states:
…the farm of General Dwight D. Eisenhower, thirty-fourth President of the Unites States, at Gettysburg, Pennsylvania, is of outstanding historical significance to the people of the United States because of its close association with the life and work of General Eisenhower and because of its relation to the historic battle of Gettysburg during the Civil Was…

…the establishment…as a national historic site would constitute a fitting and enduring memorial to General Dwight D. Eisenhower and to the events of far-reaching importance which have occurred on the property.

Following President Eisenhower's death in 1969, the NPS assumed management of the Eisenhower farm, granting use of the home and 14 acres to Mrs. Eisenhower under special use permit from September 28, 1969 until her death in November 1, 1979.

Related Laws, Policies and Plans

NPS Management Policies

The NPS *Management Policies* 2006 (NPS 2006a) is the basic NPS-wide policy document, adherence to which is mandatory unless specifically waived or modified by the NPS director or certain departmental officials, including the U.S. secretary of interior. Actions under this EA are in part guided by these management policies. Sections which are particularly relevant to this project are as follows:

General Management Plan

Gettysburg National Military Park, General Management Plan and Environmental Impact Statement, June 1999 states that:

- The landscapes, buildings, monuments, structures, archeological sites, artifacts and archives that are significant to the outcome and commemoration of the Battle of Gettysburg are protected, rehabilitated, and maintained in good condition.
- Public and private entities understand the Parks' mission and act cooperatively to protect and interpret resources related to the Gettysburg Campaign and its commemoration.

Eisenhower National Historic Site, General Management Plan, February 1987 states that:

- Restore and maintain the site's natural and cultural resources in their historic period appearances.

Resource Management Plan

There are a number of resource management objectives developed by both Parks. Those most related to the FMP are listed below:

- Protect historic buildings from fire.
- Providing appropriate environmental, fire safety and suppression, and security conditions for the protection of collections and archives.
- Mowing fields and commemorative corridors.

- Protecting significant topographical and natural features of the Battlefield/Site from erosion.
- To manage natural resources to support cultural values while protecting and preserving natural resources in accordance with legislation and policy; and to provide leadership in the conservation of natural resources contributing to Park values.

Director's Order 18*…..*

The Management Authorities (Director's Order 18, January 2008 and Reference Manual RM-18, January 2008) are the guiding documents for fire management plan implementation. Service-wide fire management policy is expressed in the current revisions of the Director's Orders and attendant Reference Manual for the National Parks Service, "The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide" (1998), Review and Update of Federal Wildland Fire Policy (2001), Interagency Strategy for the Implementation Federal Wildland Fire Management Policy (2003), Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (2006), and Modification to the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (2008), and is incorporated herein by reference. The Parks' fire management objectives conform to the referenced documents.

Director's Order 18 states, "Wildland fire may contribute to or hinder the achievement of Park management objectives. Therefore, Park fire management programs would be designed to meet resource management objectives prescribed for the various areas of the Parks and to ensure that firefighter and public safety are not compromised.

Each Park with vegetation capable of burning would prepare a fire management plan to guide a fire management program that is responsive to the Park natural and cultural resource objective and to safety considerations for Park visitors, employees, and developed facilities." The full range of strategic options is available to managers provided selected options do not compromise firefighter or public safety, cost-effectiveness, resource benefits, or values to be protected.

Scoping Issues

The National Environmental Policy Act of 1969, as amended (NEPA) requires Federal agencies to invite public involvement prior to making a decision on proposed actions that may affect the environment. Scoping is the process of soliciting input from stakeholders – including NPS staff, the public, and other agencies – at the outset of an environmental analysis. Not only may the information obtained from interested and knowledgeable parties be of value in and of itself, but the perspectives and opinions as to which issues matter the most, and how, indeed whether, the agency should proceed with a given proposed action are equally important. Input from scoping helps shape the direction that analysis takes by helping planners and analysts decide which issues merit consideration. Public input also helps in the development of alternatives to the proposed action, which is an integral part of the environmental impact analysis process.

Internal scoping for GETT/EISE FMP EA was informal and took place during interdisciplinary team meetings with Parks and regional staff, reviews of the documents, and at various other staff meetings. Issues raised during the internal scoping meetings included:

- Reduction of wildland fuel hazard
- Concerns with construction of hand/tool created firelines during prescribed fire and Wild land fire response
- Use of bulldozers in wildfire suppression

- Post-fire rehabilitation and mitigation measures
- Impacts of wildland and prescribed fires and fire suppression activities on a variety of Parks resources described below under Impact Topics.

External scoping was conducted through press releases, direct mailing to potentially affected or interested parties and at the September 2013 and April 2014 public Advisory Commission Meetings. No issues were brought to the Park's attention.

Impact Topics

Impact topics identified and analyzed in this EA are listed below along with reasons for the selection of each impact topic. Each impact topic is further discussed in detail in "Affected Environment" chapter of this document. Potential impacts to resources from the proposed alternatives are discussed in "Environmental Consequences."

Impact topics are resources within the study area that could be affected, either beneficially or adversely, by the range of alternatives presented in this EA. Impact topics considered in this document were identified based on the issues raised during scoping, site conditions, federal laws, regulations, Executive Orders, NPS *Management Policies 2006*, Director's Orders, and staff knowledge of the Parks' resources.

Natural Resources

Air Quality: The Federal 1977 Clean Air Act and amendments stipulate that Federal agencies have an affirmative responsibility to protect a Park's air quality from adverse air pollution impacts. GETT/EISE is designated as a Class II air shed under the Clean Air Act. The NPS Management Policies 2006 address the need to analyze air quality during park planning efforts. Implementation of either of the alternatives proposed could produce a negligible amount of air pollution. All types of fires generate smoke and particulate matter, which would impinge on air quality in the Parks and surrounding region to some extent. In 1999 the U.S. EPA issued regional haze regulations that are intended to manage and mitigate visibility impairment from a multitude of regional haze sources. Wildland and prescribed fires are some of the sources of regional haze covered by the new rules. All of these considerations recommend the inclusion of impacts to air quality in this analysis.

Floodplains and Wetlands: Presidential Executive Orders 11988 and 11990 mandate floodplain management and protection of wetlands, and Director's Orders 77-1 and 77-2 and the accompanying procedural manuals require federal agencies to examine project impacts on floodplains and wetlands. Wetlands and 100-year floodplains occur within the both Park boundaries, and some of these areas could be impacted by wildfire suppression activities, prescribed burning, and/or non-fire fuel load reduction activities. For these reasons, impacts to floodplains and wetlands are analyzed in this EA.

Soils: Soils can potentially be adversely affected by the heat or residence time of intense fires, by suppression activities, and by fire-related removal of vegetation. Therefore, impacts to soils are analyzed in this EA.

State Threatened or Endangered: The Pennsylvania Natural Heritage Program (PNHP) has mapped six CORE areas within the Parks. The CORE areas are sites containing plant or animal species of concern at the state level, exemplary natural communities, or exceptional native diversity. Core habitats delineate essential habitat that cannot absorb significant levels of activity without substantial impact to the elements of concern. Since all species depend on habitat conditions that may be influenced by fire or fire exclusion, this EA considers the effect of the FMP on state threatened and endangered species known to occur in the Parks.

Vegetation: Vegetation and wildlife habitat are heavily influenced by fire regimes. Many invasive plant species,

some of which are spreading rapidly or are posing a serious threat to native vegetation, have been identified in the Parks. Fire may be a tool for control of invasive species or burned areas may be more susceptible to invasion. Therefore, this EA will consider the impacts of the proposed FMP alternatives on the Parks vegetation.

Water Resources: NPS policies require protection of water resources consistent with the Federal Clean Water Act. The terrain of the Parks results in many streams, creeks, and other water bodies. Both fires and fire suppression efforts can adversely affect water resources by exposing soils, which can lead to erosion during storm events and subsequent suspended solids and turbidity in downstream surface waters. Therefore, impacts to water resources are analyzed in this EA.

Wildlife and Fisheries: Fire management has pronounced effects on forested wildlife habitat and thus indirectly on wildlife populations. Fisheries can be indirectly impacted by impacts to stream water resources. Therefore, potential impacts of the alternatives are evaluated in this EA.

Cultural Resources

Historic Structures: The Parks contain a number of historic buildings, monuments, and structures within their boundaries. Because wildfires and/or prescribed burns could adversely impact historic buildings and monuments, the impact topic of historic structures is retained for further analysis in this EA.

Cultural Landscapes: According to the NPS Director's Order 28: *Cultural Resource Management* (Director's Order 28) (NPS2002), a cultural landscape is:
… a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

The implementation of any of the proposed alternatives would result in impacts to the Parks cultural landscapes that are nationally significant and contribute to the story of the battle and its consequences and/or to interpretation of the Eisenhower National Historic Site. The designed landscapes of the national cemetery and of the commemorative national Military Park also are nationally significant because they define the spaces that were created by the battle veterans to honor the fallen soldiers, to mark the lines of battle, and to perpetuate the national memory of the event and of the Civil War. Either of the proposed fire management plan alternatives could impact the cultural landscapes within the Parks. Therefore, the impact topic of cultural landscapes is retained for further analysis in this EA.

Archeological Resources: NPS *Management Policies 2006* state that archeological resources "will be maintained and preserved in a stable condition to prevent degradation and loss" (NPS 2006a). Archeological resources are the material remains of past human activity (NPS 2000). Archeological sites within the study area are representative of the broad patterns of human history associated with the greater Gettysburg area. Identified resources of earliest habitation are few, but some have been found to date to the late archaic period (circa 3000-1800 BC). The proposed fire management plan could impact any or all of these resources. Therefore, the impact topic of archeological resources is retained for further analysis in this EA.

Park Operations and Visitor Experience

Parks Facilities and Operations: Severe fires can potentially affect park buildings and operations at national parks, especially in more developed sites like visitor centers, administrative and maintenance facilities. Fire activities have the potential to cause changes to concessionaire activities, and park visitor services. Park staff may be prevented from working on scheduled duties to respond to a fire or to increased fire danger. Thus, the potential effects of the alternatives on park facilities and operations will be considered in this EA.

Visitor Use and Experience: The 1916 NPS Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife, and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Fire events may change the scheduling and content of interpretive programming and may impact what visitors see and can do when they are visiting the Parks. Therefore, the potential impacts of the proposed FMP on visitor use and experience are addressed in this EA.

Social and Economic Environment

Human Health and Safety: Fires can be extremely hazardous, even life-threatening. Current federal fire management policies emphasize that firefighter and public safety is the first priority; all FMPs must reflect this commitment (NIFC 2008). Therefore, impacts to human health and safety are addressed in this EA.

Transportation: According to the NPS Management Policies 2006, the "location, type, and design of transportation systems" influence the quality of the visitor experience. In addition, "these systems also affect, to a great degree, how and where Parks resources will be impacted." The NPS advises that management decisions regarding transportation facilities require a full, interdisciplinary consideration of alternatives and a full understanding of their consequences. Temporary closure of roads is possible during fire suppression and prescribed fire activities. In addition, access to some areas of the Parks by emergency vehicles, both NPS and non-NPS, can be difficult because roads are few and require regular maintenance. Therefore, this topic is included for further analysis in this EA.

Utilities: Several private-company utility lines occur within the Parks, as do some telecommunications equipment. Heavy smoke from wildland fire has been known to cause arcing from high-tension power lines, so this topic is included for further consideration in this EA.

Impact Topics Considered but not Evaluated Further in this EA

The following presents an overview of impact topics that were considered, but ultimately dismissed from further analysis. An impact topic was initially considered but dismissed from further analysis if it was determined that the resource is not present in the study area or because any potential impacts would be slight but detectable, typically temporary, and localized. Background information used in considering each topic is provided below along with the reasons for dismissing each topic from further analysis.

Federally Threatened and Endangered Species: : No federally-listed species occur within the GETT or EISE boundaries. No critical habitat, as defined by 50 CFR 17.95, has been identified in the Parks so the potential for loss of critical habitat was not analyzed. The U.S. Fish and Wildlife Service, Pennsylvania Field Office, and the Commonwealth of Pennsylvania Department of Conservation and Recreation (DCR) Division of Natural Heritage were consulted in this analysis. There will be "No Effect" on federally listed species, and therefore this topic was dismissed from further analysis.

Prime and Unique Farmland Soils: The CEQ NEPA regulations (40 CFR 1508.27) require federal agencies to assess the impacts of their actions on soils classified by the Natural Resources Conservation Service (NRCS) as prime or unique farmland soils. According to the NRCS, there are no unique farmland soils within the study area, although there are prime farmlands located in the study area (NRCS 2012). No prime farmland would be irreversibly converted to other uses. Therefore, the impact topic of prime and unique farmland soils is dismissed from further analysis.

Wild and Scenic Rivers*:* The Wild and Scenic Rivers Act establishes a system for the protection of rivers with outstanding scenic, recreational, geological, cultural, or historic values. These rivers are to be preserved in free-flowing condition for the benefit and enjoyment of present and future generations. Because there are no designated wild and scenic rivers in the study area, the impact topic of wild and scenic rivers was dismissed from further analysis.

Ethnographic Resources: Guidance for identification of ethnographic resources is found in National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (NPS 1998). Ethnographic resources are defined by the NPS as a "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it (NPS 1998). Ethnographic resources are equivalent to the term "Traditional Cultural Property." A Traditional Cultural Property is eligible for inclusion in the National Register, "because of its association with cultural practices or beliefs of a living community that are rooted in the community's history, and which are important in maintaining the continuing cultural identity of the community" (NPS 1998). There are no properties that meet the definition of a Traditional Cultural Property within the study area. Therefore, the impact topic of ethnographic resources was dismissed from further analysis.

Indian Sacred Sites*:* Executive Order 13007 (May 24, 1996), "Indian Sacred Sites," requires managers of federal lands to avoid adversely affecting the physical integrity of Indian Sacred Sites. The Parks are not considered as sacred sites by the Keeper of the National Register, nor are they an Indian Trust resource. Therefore, the impact topic of Indian Sacred Sites was dismissed from further analysis. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC3001) would be followed.

Indian Trust Resources*:* Secretarial Order 3175 (November 8, 1993) requires that any anticipated impacts to Indian Trust Resources from a proposed project or action by agencies of the Department of the Interior be explicitly addressed in environmental documents. There are no known Indian Trust Resources at the Parks. No land within the Parks is held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, the impact topic of Indian Trust Resources was dismissed from further analysis.

Environmental Justice*:* Executive Order 12898 (February 11, 1994), " Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental impacts of their programs and policies on minorities or low- income populations or communities as defined in the U.S. Environmental Protection Agency's (EPA) Revised Draft Environmental Justice Guidance. Although minority and low-income populations as defined in Executive Order 12898 reside in Adams County, there are no socially or economically disadvantaged populations within the study area. Neither of the alternatives under consideration would result in disproportionately high or adverse environmental effects,

including human health, economic, social, or environmental impacts on minority or low-income populations residing in Adams County. Therefore, the impact topic of environmental justice was dismissed from further analysis.

***Land Use and Urban Quality**:* The land use and urban quality of the Parks and surrounding area would not be impacted by the proposed project, and land use would remain consistent with the 1999 GMP. Therefore, the impact topic of land use and urban quality was dismissed from further analysis.

Alternatives

Alternatives Analyzed in this EA

Alternative 1 – No Action: Fire Suppression

Under Alternative 1, existing conditions and management practices would continue in accordance with those presently occurring. All wildland fires would continue to be suppressed aggressively in order to minimize the burn area. Prescribed burning would not be utilized in the Parks, and no non-fire fuel reduction treatments would be planned. Outside firefighting groups would continue to be the primary fire fighting entities at GETT and EISE. No wildland fire use fires, naturally-ignited fires that are managed for benefits to natural resources, would be allowed. Under Alternative 1, no fire management unit (FMU) would be established. The FMP would not be updated to reflect recent changes in NPS and Federal wildland fire policy and direction. The Parks would not change its fire management strategies.

Alternative 2 – Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative)

Under Alternative 2, a wildland fire program would be implemented that integrates wildland fire suppression, prescribed fire, and non-fire fuel treatment activities to meet resource management objectives. Prescribed fire would be utilized in the battlefield and Eisenhower Site to restore and maintain historic vistas, reduce Wildland Urban Interface (WUI) fuel loading, and to return fire to Parks ecosystems. Non-fire treatment projects would be conducted in those areas where fuel reduction treatment is needed, but because of the conditions present, prescribed fire is not a viable option. Under Alternative 2, the FMP would reflect recent NPS policy changes. Federal wildland fire policies in the areas of safety, planning, wildland fire, prescribed fire, preparedness, suppression, prevention, protection priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles would be incorporated into the FMP. The FMP would comply with NPS Director's Order 18, Wildland Fire Management, and the Federal Wildland Fire Management Policy national standards.

Alternative 2 would establish a FMU (see Figure 2, page 61). Wildland fires would continue to be suppressed, using existing control lines, using natural and man-made barriers wherever possible. New control lines would only be built when imminent threat to life or property exists. Prescribed fires would be used in the FMU to accomplish resource management objectives. Prescribed fires would be planned in the FMU units and conducted according to site-specific objectives, prescriptions, and mitigating measures identified in individual prescribed burn plans submitted and approved prior to implementation. This schedule is designed to allow for treatment of potentially dangerous arrangements of fuels and to restore or mimic the role of fire within certain vegetation communities that benefit from the effects of fire, and to manage the historic scene within the Parks. Prescribed fire would also be used to treat populations of exotic invasive species with or without using other treatments and move towards restoration of those areas that have been heavily impacted by these species

Non-fire (primarily mechanical) fuel treatment methods would be used to manage hazardous fuels and to aid in accomplishing vegetation management objectives in areas where safe and effective prescribed fire treatment is precluded by fuel arrangements or is otherwise not feasible.

All prescribed fires would be carefully monitored according to the GETT/EISE Fire Effects Monitoring Plan. All prescribed fires, as well as non-fire treatment projects, would be subject to a compliance review and cultural resource clearance pursuant to the guidelines established in the National Environmental Policy Act and the National Historic Preservation Act of 1966, Section 106 and guidelines set forth by the Pennsylvania State Historic Preservation Officer.

Alternatives Considered but not Analyzed Further in this EA

Alternative 3 – Full Suppression and Non-fire Treatments

Under this alternative, a wildland fire program would be implemented in which all fires, regardless of location or ignition source, would be immediately suppressed using the appropriate management response with emphasis on keeping the fire as small as possible. Non-fire treatment projects would be conducted in those areas where fuel treatment is needed. No prescribed fire or wildland fire use would occur. The FMP would reflect recent NPS policy changes. Federal wildland fire policies in the areas of safety, planning, wildland fire, preparedness, suppression, prevention, protection priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles would be incorporated into the FMP. The FMP would comply with NPS Director's Order 18, Wildland Fire Management, and the Federal Wildland Fire Management Policy national standards.

The purpose of the federal action is to provide a long-range fire management plan and program using the benefits of natural and prescribed fire to achieve desired natural resource conditions as described in the Federal Wildland and Prescribed Fire Management Policy (1995, 2001, & 2009). Fire is and has been an important natural process in the establishment and maintenance of vegetation communities in the Parks. Because this alternative excludes the use of fire for resource benefits, it is not consistent with the Federal Wildland and Prescribed Fire Management Policy, and does not meet the purpose and need for federal action. Therefore, this alternative is not analyzed further in this EA.

Alternative 4 – Fire Suppression, Prescribed Fire, and Non-Fire Treatments

Under Alternative 4, a wildland fire program would be implemented that integrates wildland fire suppression, prescribed fire to meet management objectives. Fires could be used as a management tool, in concert with prescribed fire, to restore and maintain Parks ecosystems. Non-fire treatments would occur. Federal wildland fire policies in the areas of safety, planning, wildland fire, prescribed fire, preparedness, suppression, prevention, protection priorities, interagency cooperation, standardization, economic efficiency, wildland/urban interface, and administration and employee roles would be incorporated into the FMP. The FMP would comply with NPS Director's Order 18, Wildland Fire Management, and the Federal Wildland Fire Management Policy national standards.

All unwanted wildland fires would be suppressed.

Prescribed fires would be planned in the FMU and conducted according to site-specific objectives, prescriptions, and mitigating measures identified in individual prescribed burn plans submitted and approved prior to implementation. This schedule is designed to allow for treatment of potentially dangerous arrangements of fuels and to restore the role of fire within certain vegetation communities that benefit from the effects of fire. Prescribed fire would also be used to treat populations of exotic invasive species and move towards restoration of those areas

that have been heavily impacted by these species. It would be used to manage vegetation in the historic vistas in the Parks.

Naturally-ignited WFU fires would be allowed to burn in the Parks, if they meet the decision criteria for the fire management unit in which they occur, in order to permit natural ignitions to exert their historical influence upon Parks ecosystems at time(s) and place(s) that are defined by the resource itself. However, due to the closeness of homesites and businesses adjacent to the Parks, and the relatively small number of Park firefighters, this alternative does not meet the purpose and need, and therefore is not analyzed further in this EA.

Environmentally Preferable Alternative

In accordance with the DO-12 Handbook, the NPS identifies the environmentally preferable alternative in its NEPA documents for public review and comment [Sect. 4.5 E(9)]. The environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative (43 CFR 46.30).

In this case, the NPS Preferred Alternative, Alternative 2, Suppression, Prescribed Fire, and Non-fire Treatments, is the environmentally preferable alternative for the Fire Management Plan for GETT/EISE since it best protects and preserves natural and cultural resources. Alternative 2 would keep the focus of fire suppression activities to keeping fires as small as possible while minimizing damage to resources by using existing fire breaks (trails, roads, streams). Summary and Comparison of the Alternatives

The first goal for the fire management program at GETT/EISE is to protect human life and property within and adjacent to Parks boundaries. Alternative 1 would accomplish this by setting safety as the highest priority of every fire management operation. Alternative 2 would accomplish this by setting safety as the highest priority of every fire management operation, in which emphasis would be on keeping fires as small as possible.

The second goal for the fire management program at the Parks is to suppress all unwanted and undesirable wildland fires, regardless of ignition source, to protect the public, private property, and natural and cultural resources of the Parks. Alternative 1 and 2 would accomplish this by placing suppression emphasis on selecting an appropriate management response that would achieve suppression objectives while minimizing resource damage and maximizing cost effectiveness.

The third goal for the fire management program at the Parks is to manage wildland fires in concert with federal, state, and local air quality regulations, and the fourth is to facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities. Alternative 2 would accomplish these goals by ensuring that the FMP is up-to-date with new regulations, and making aware the Parks' policy and procedures to neighboring jurisdictions, and by maintaining Memoranda of Understanding cooperative agreements with the local counties, and the PA DCNR Bureau of Forestry.

The fifth goal for the fire management program at GETT/EISE is to reduce wildland fire hazard around developed areas and areas adjacent to cultural and historic sites. Alternative 2 would accomplish this goal using fire prevention programs that incorporate education, engineering, and enforcement.

The sixth goal for the fire management program at the Parks is to use prescribed fire as a method of restoring and maintaining the cultural and natural landscape to meet resource objectives of the Parks. Alternative 2 would accomplish this goal by including a prescribed fire program in the Parks.

Table 1. Summary and Comparison of the Alternatives.

	Alternative 1	**Alternative 2**
Fire Management Unit (FMU)	None	2 FMUs
Fire Management Strategies		
Suppression	Yes	Yes
Prescribed Fire	No	Yes
Non-fire Treatments	No	Yes

Table 2. Potential Impacts of Alternatives		**Alternative 1**	**Alternative 2**
NATURAL RESOURCES	***Air Quality***	negligible to minor, short-term localized to regional adverse impacts	minor to moderate (*due to additional smoke from prescribed burns*), short-term localized to regional adverse impacts
	Floodplains	negligible	negligible
	Wetlands	minor, short-term, localized, both adverse and beneficial impacts	minor, short-term, localized, both adverse and beneficial impacts
	Soils	minor, short-term, localized, both adverse and beneficial impacts	minor to moderate (*due to additional smoke from prescribed burns*), short-term, localized, both adverse and beneficial impacts
	Threatened /Endangered Species	negligible	negligible
	Vegetation	minor to moderate, short-to long-term localized to regional, adverse impacts	minor to moderate, short to long-term, localized to regional, beneficial impacts (*due to prescribed burns*)
	Water resources	negligible to minor, short-term, localized to regional, adverse impacts	minor to moderate (*due to higher potential of erosion from prescribed burns*), short-term, localized to regional, adverse impacts
	Wildlife and Fisheries	minor to moderate, short- to long-term, localized, adverse and beneficial impacts	minor to moderate, short- to long-term, localized, largely beneficial impacts (*due to prescribed burns*)
CULTURAL RESOURCES	***Historic Structures***	negligible to minor, permanent, localized, both adverse and beneficial impacts	negligible to minor, permanent, localized, both adverse and beneficial impacts
	Archeological	minor to moderate,	negligible to minor, permanent,

	Resources	permanent, localized adverse impacts	localized adverse impacts
	Cultural Landscapes	negligible to minor, temporary to long-term, localized, adverse and beneficial	negligible to minor, temporary to long-term, localized, adverse and beneficial
PARKS OPERATIONS AND VISITOR EXPERIENCE	***Facilities and Operations***	negligible to minor, temporary, localized adverse impacts	minor to moderate (*due to additional staff work changes during prescribe burns and non-fire treatments*), temporary, localized adverse impacts
	Visitor Use and Experience	minor, temporary to short-term, localized, both adverse and beneficial impacts	minor, temporary to short-term, localized, both adverse and beneficial impacts
SOCIAL AND ECONOMIC ENVIRONMENT	***Human Health and Safety***	negligible to minor, temporary to short-term, localized to regional, adverse impacts	negligible to moderate (*due to additional prescribe burns*), temporary to short-term, localized to regional adverse and beneficial
	Transportation	negligible to minor, temporary, localized adverse impacts	negligible to minor, temporary, localized adverse impacts
	Utilities	negligible to minor, temporary, localized, adverse impacts	negligible to minor, temporary, localized, adverse impacts

Table 3. Comparison of Relative Impacts of the Alternatives.

		Alternative 1	**Alternative 2**
NATURAL RESOURCES	***Air Quality***	0	- -
	Floodplains and Wetlands	0	+ +
	Soils	0	-
	Threatened and Endangered Species	0	+
	Vegetation	0	+ +
	Water Resources	0	-
	Wildlife and Fisheries	0	+ +
CULTURAL RESOURCES	***Historic Structures***	0	+
	Archeological Resources	0	+
	Cultural Landscapes	0	+
	Parks Facilities and	0	-

PARKS OPERATIONS AND VISITOR	***Operations***		
	Visitor Use and Experience	0	-
SOCIAL AND ECONOMIC ENVIRONMENT	***Human Health and Safety***	0	-
	Transportation	0	0
	Utilities	0	0

Alternative1 is assigned a value of zero (0)
Alternative 2 is rated based on how the compare to Alternative 1:
0 indicates impacts are similar
+ indicates impacts that are more beneficial
++ indicates impacts that are much more beneficial
- indicates impacts that are more adverse
- - indicates impacts that are much more adverse

Affected Environment

This chapter describes existing environmental conditions in areas potentially affected by the proposed actions. Generally, the actions would occur within Gettysburg National Military Park and/or Eisenhower National Historic Park, in the surrounding community of Gettysburg, or in Cumberland Township. GETT comprises approximately 5,989 acres and the adjacent EISE is 189 acres. General information about the resources that could potentially be impacted by the EA alternatives is discussed for the two Park area.

Natural Resources

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 et seq.) requires that federal land managers protect air quality. The NPS *Management Policies 2006* address the need to analyze air quality during Parks planning. The Adams County metropolitan area, in which Gettysburg National Military Park and Eisenhower National Historic site are located, is designated as a "maintenance area" for the 1997 eight-hour National Ambient Air Quality Standards for ozone. The Parks do occasionally experience relatively high concentrations of ozone during the summer. High ozone levels are associated with hot, stable air masses and usually occur during the summer months. Ozone levels are particularly important because they are used to define overall air quality ratings and "alerts" posted daily during the summer months. Automobile and other vehicular emissions of nitrogen oxides and volatile organic compounds are primary air pollution sources affecting the ambient air quality of the Parks and surrounding community.

Floodplains and Wetlands

There are numerous creeks and associated floodplains as well as wetlands within the two Parks. A total of 178 acres of wetlands occur here with 160 acres at GETT and 18 acres at EISE. A map showing wetland locations in the two Parks is shown in Figure 3 (page 62). All of these creeks drain into the Monocacy River which is part of the Potomac River watershed. Streams in the Parks generally have good sustained flows.

Floodplains adjacent to streams in the two Parks are often forested and typically include pin oak (*Pinus palustris*), swamp white oak(*Quercus michauxii*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pensylvanica*), sycamore (*Platanus americana*), and black walnut (*Juglans nigra*) are frequent on the wetter floodplain soils, with understories including spicebush (*Lindera benzoin*), violets (*Viola* spp.), nettles (*Urtica dioica*), cut-leaved coneflower (*Rudbeckia laciniata*), golden alexanders (*Zizea aurea*) and other wildflowers. Several species of special concern are found on the wooded floodplains.

Wetlands include vegetation types important for the area, providing essential habitat for many plant and animal species. The type of wetland depends on soil type, disturbance, and length and duration of flooding. Many of the wetlands in the two parks are associated with streams and include floodplain forests as described above, forested swamps such as those in the South Mountain area, shrub swamps, and graminoid marshes. Many of the wetlands in the Parks are seepage swamps, which are relatively small forested or shrub-dominated wetlands found on lower slopes where water emerges at the surface in a diffuse flow. These wetlands may be dominated by red maple (*Acer rubrum*) with hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*) as associates, and an understory of rhododendron (*Rhododendron* spp.) , swamp azalea (*Rhododendron viscosum*), spicebush (*Lindera benzoin*), and/or highbush blueberry (*Vaccinium corymbosum*). Common wetland herbs include skunk cabbage (*Symplocarpus foetidus*), violets (*Viola* spp.), manna grasses (*Glyceria* spp.), sedges (*Carex* spp.), and ferns.

Wetlands are important refugia for plants as well as important habitat for nesting and migrating birds. Many other animals such as amphibians, turtles, dragonflies, and damselflies also depend on specific wetland habitats for all or a portion of their life cycles.

Water Resources

Surface waters are common in the two Parks. Several streams and ponds dissect the Parks including Rock Creek, Marsh Creek and Spanglers Spring in GETT and Willoughby Creek along EISE. Larger creeks and smaller drainages locally called "runs" are common throughout the Parks. In the northwest section of the Gettysburg National Military Park, Pitzer's Run and Spangler's Run drain into Willoughby Run. The main branch of Willoughby Run flows through Eisenhower National Historic Site and then joins Marsh Creek. A short stretch of the main branch of Marsh Creek also flows through the western border of Eisenhower National Historic Site. On the east side of Gettysburg National Military Park numerous small drainages, including Blocher's Run, Stevens Run, Culp Run, Winebrenner's Run, Jones Bridge Run, Spangler's Spring Run, Guinn Run, and Wright Avenue Run, drain into Rock Creek. Sections of the main branch of Rock Creek also flow through the Parks. In the south-central portion of Gettysburg National Military Parks, Heagy's Woods Run joins Plum Run, which is the prominent stream in that area. Plum Run eventually joins Rock Creek outside the Parks boundary. In the East Cavalry Field Unit of Gettysburg National Military Park, Plum Run (a different stream than the Plum Run mentioned above) joins White Run, which eventually flows into Rock Creek outside the Parks boundaries. Water quality depends on the chemical content of both underground and surface waters and the degree of contamination from residential and industrial development.

Soils

The soils within and around the Parks are classified into 45 different soil types varying in bedrock, texture, depth, and slope (see Figure 3, page 62). Diabase, Shale, sandstone, limestone, and silty mudstone of Triassic ages dominate bedrock of the Parks area. The Battlefield and Historic Site generally contain deep, well-drained silty loam soils with clayey or loamy subsoil. The most abundant soil in the Parks is the Lehigh series, moderately well-drained to somewhat poorly drained silt loams that occur in the gently sloping uplands. Lehigh soils can be very stony and can contain a few exposed boulders at the surface. The second most common soil series in the rolling lowlands is the Penn series that consist of deep, well-drained silt loams. Other common soils in the rolling lowlands are the Abottstown, Klinesville, Readington, Reaville, and Brecknock series. In general, these series contain shallow to deep, well-drained to somewhat poorly drained silt loams.

The ridges throughout the Parks are typically underlain with dibase bedrock. The most common soil over the diabase intrusions is the Neshaminy series, which contains deep, well-drained, very stony, channery silt loams. The soils that occur over the diabase intrusions tend to be very stony and mineral-rich, and often support diverse herbaceous flora and several rare plant species. LeGorge and Mount Lucas series are other common soils. They are moderately deep to deep, somewhat poorly drained to well-drained channery silt loams that developed in material weathered from diabase. Stones and boulders can be common on the surface. Drainages over the diabase intrusions typically contain the Watchung series, deep, poorly-drained silty clay loams with occasional large diabase boulders (Speir 1967).

The Croton series occurs in depressions, drainage ways, and other level areas in the lowlands and contains deep, poorly drained silt loams. Within the floodplains of the larger creeks and streams in the Parks, Hatboro, Bowansville, and Rowland series are common. These series contain moderately well drained to poorly drained silt loam, gravelly loam, and sandy loam (Speir 1967).

State Threatened and Endangered Species

No federally endangered or threatened species occur within the two Park boundaries. The Pennsylvania Natural Diversity Inventory (PNHP) has listed 23 plants as endangered, threatened or species of special concern within the two Parks. PNHP has mapped six CORE areas within the Parks which are sites containing plant or animal species of concern at the state level, exemplary natural communities, or exceptional native diversity (see Figure 6, page 67). Core habitats delineate essential habitat that cannot absorb significant levels of activity without substantial impact to the elements of concern.

Vegetation

Gettysburg National Military Park and Eisenhower National Historic Site comprise a mosaic of pastoral landscapes and forested knolls, with pockets of dispersed wetland and intermittent streams. Over 2,300 acres of the Parks' landscape are planted in crops, pasture, or meadows providing the visitor with a glimpse of the local agrarian lifestyle. Over 1,600 acres of woodlots and forested habitat comprise several successional communities, from mature oak/hickory to early scrub-shrub. Over 550 species of vascular plants have been inventoried within the Parks, 410 of which are native species (National Parks Service 2005a).

A vegetation study at Gettysburg National Military Park and Eisenhower National Historic Site identified 15 vegetation associations: Chestnut Oak Forest, Dry Oak – Mixed Hardwood Forest, Tuliptree Forest, Modified Successional Forest, Conifer Plantation, Virginia Pine Successional Forest Sycamore – Mixed Hardwood Floodplain Forest, Bottomland Mixed Hardwood Forest, Palustrine Shrub Thicket, Successional Old Field, Agricultural Field, Pasture, Orchard, Wet Meadow, and Reed Canary Grass Riverine Grassland (NPS 2006b). A map of the vegetation types is shown in Figure 5 (page 66).These vegetation types are strongly influenced by the varied environmental settings of the Parks and the mandate to preserve the topographic, landscape, and cultural features as they were in 1863 such that visitors and historians can fully understand and appreciate the Battle of Gettysburg.

One of the most influential environmental factors on the Parks' vegetation is the Gettysburg Sill, the large diabase intrusion that runs southwest to northeast through Gettysburg National Military Park. The sill forms topographically high areas that are resistant to weathering and support very stony soils. These areas are mostly forested because the stony hills are inhospitable to row crop agriculture. Dry Oak – Mixed Hardwood Forest is the most abundant forest association in the Parks that primarily occurs on the forested sill areas of Big Round Top, Little Round Top, Powers Hill, and Culp's Hill. Due to the mineral-rich soils weathered from the diabase, several plant species of special concern are associated with Dry Oak – Mixed Hardwood Forest. These species include: Adam and Eve (*Aplectrum hyemale*), Short's sedge (*Carex shortiana*), hoary puccoon (*Lithospermum canescens*), greater yellow lady's slipper (*Cypripedium pubescens* var.*pubescens*), downy phlox (*Phlox pilosa*), cankerweed (*Prenanthes serpentaria*), eastern smoothbeardtongue (*Penstemon laevigatus*), Shumard's oak (*Quercus shumardii*), and Missouri gooseberry (*Ribes missouriense*). The Dry Oak – Mixed Hardwood Forest also occurs in the historic woodlots scattered throughout the rest of Gettysburg National Military Park. Missouri gooseberry and cankerweed also occur in Dry Oak – Mixed Hardwood Forest woodlots that do not occur over diabase.

The Chestnut Oak Forest, the rarest forest type in the Parks, covering just 3.1 ha (7.7 ac), also occurs over the Gettysburg Sill. This association is rare within the Parks because it is restricted to rocky soil and upper elevations that are found only on the upper slopes and summit of Big Round Top. Another occasional forest association found on the sill is Tuliptree Forest, occurring on rocky upland slopes dominated by tuliptree (*Liriodendron tulipifera*).

Another environmental setting in which forested areas persists is the low areas surrounding drainages and creeks. Sycamore – Mixed Hardwood Floodplain Forest is typical of the low terrace floodplains of the larger tributaries such as Marsh Creek and Rock Creek. Bottomland Mixed Hardwood Forest can occur on the floodplain of these larger tributaries as well as on the topographically low areas surrounding smaller drainages. Forest stands adjacent the smaller drainages are usually surrounded by agricultural land and are therefore very fragmented and disturbed. Canopy species composition of these bottomland forests is variable and the understory is often dominated by invasive exotic species and weedy native species.

Open fields and field edges boast a diverse mixture of vegetation for both the visitor to observe and for wildlife to utilize as either cover or feed. The 2,300 acres of pasturelands and farmlands in the Parks provide an open-upland habitat. Currently the Parks is transitioning portions of agricultural lands into warm season grasses to encourage a more diverse plant community for open-upland bird species.

Vegetation management is an important responsibility of the Parks' natural resource staff. The primary goals of Natural Resource Planning at Gettysburg and Eisenhower are to (1) restore and perpetuate the battlefield as it appeared at the time of the Battle of Gettysburg in July 1863 and to (2) preserve resident fauna and flora that are compatible with the goal of historic accuracy. With these goals, Parks personnel conduct floral inventories, monitor seedling recruitment, and map vegetative cover types. Vegetation management is also a critical part of the Parks' landscape rehabilitation plan.

National Parks Service staff also work to combat several invasive plant species such as the multifloral rose (*Rosa multiflora*), Japanese barberry (*Berberis japonicus*), alianthus (*Alianthus altissima*), and mile-a-minute (*Persicaria perfoliata*). Six weeks each year, staff with the help of the Mid-Atlantic Plant Management Team treats these exotic species by chemical methods, mechanical methods, hand pulling and sprays.

Wildlife and Fisheries

The landscape of Gettysburg National Military Park and Eisenhower National Historic Site is a mixture of agricultural fields, pastures, grasslands, woodlots, and forests. This landscape provides habitat for 187 bird, 34 mammal, 17 reptile, and 15 amphibian species that have been documented within the Parks.

The interspersion of vegetative types provides habitats for a wide variety of wildlife in the Parks. The Parks currently has on record twenty eight species of mammals, forty-two species of fish, one hundred twenty-five species of bird, and fifty-six species of reptiles and amphibians. Gettysburg NMP and Eisenhower NHS large size and diverse habitats allow many species of birds, mammals, reptiles and amphibians to call the Parks home. The 1,900 acres of maturing woodlands and woodlots provide habitat for a variety of species. Woodland wildlife includes white-tailed deer, gray squirrels, raccoon, opossum, wild turkey, ruffed grouse, woodpeckers and warblers. Wetland wildlife includes beaver, mink, muskrat, ducks, geese, and other water birds that live along streams, in ponds, marshes, and swamps. There is also a wide variety of reptiles and amphibians including the spotted turtle and northern two-lined salamander.

Open land wildlife includes rabbits, groundhogs, red fox, quail, mourning dove, hawks, owls, field sparrows and several other bird species normally found in cropland, pasture, and meadows. The open landscapes host many of the same species found in the forested areas, however the open fields provide a specialized niche for many birds and insects such as the red-winged blackbirds and butterflies such as the monarch and the painted lady drifting from flower to flower feeding on nectar plants. An important predator found in open fields is the red fox. Through studies conducted in cooperation with the Pennsylvania State University, a complete inventory of amphibian and reptile species has been documented.

Fishing pressure is mainly on pond species – bass, bluegill, and catfish. There are no listed fish species known to exist in Parks waters.

Cultural Resources

Historic Structures

Historic structures have been evaluated and listed by National Register of Historic Places. They are constructed works that serve some form of human activity and are generally immovable. They include buildings and monuments, dams, millraces and canals, nautical vessels, bridges, tunnels, and roads, railroad locomotives, rolling stock and track, stockades and fences, defensive works, temple mounds and kivas, ruins of all structural types that still have integrity as structures, and outdoor sculpture.

All historic structures are considered to have certain qualities such as being associated with events that have made a significant contribution to the broad patterns of our history; or is associated with the lives of significant persons in our past; or embodies the distinctive characteristics of a type, period, or method of construction or that represent the work of a master; or that possess high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction; or have yielded; or may be likely to yield information important in history or prehistory (NPS 1990).

Historic structures at the Gettysburg National Military Park include terrain features, historic roads and traces, house sites, ruins, cemeteries, monuments, markers, and historic objects. The Parks contains 1,830 monuments (see Figure 7, page 68) and cannon, historic fencing, and 31 miles of historic avenues, and 147 historic buildings. Both Parks are listed on the National Register of Historic Places and are part of the larger Gettysburg Battlefield Historic District. R. EISE includes 170 historic structures including the home, farm buildings, greenhouses, and skeet range, on their List of Classified Structures which have been evaluated using National Register of Historic places criteria.

Cultural Landscapes

Gettysburg National Military Park contains historic and designed landscapes that are nationally significant and contribute to the story of the battle and its consequences. These landscapes, when combined with the historic structures, archeological resources, and museum objects and archives of the Parks, reflect the history of the battle and its significance to the Civil War and to U.S. history. Together, they provide one of the most complete physical records of a pivotal Civil War battle, its aftermath, and its legacy. The Parks and Soldiers' National Cemetery are listed on the National Register of Historic Places and are part of the larger Gettysburg Battlefield Historic District. For this discussion, the development of the landscapes is also tied to and includes topographic features and relief, site elevation, slope orientation, rock exposure, and modification of soil types. These features are included in the evaluation of impacts to cultural landscapes.

The most extensive significant landscape at Gettysburg is its 1863 battlefield landscape. Component landscape features include stone walls, earthworks, fences, orchards and historic roads, lanes and farm buildings.

The designed landscapes of the national cemetery and of the commemorative national Military Park also are nationally significant, defining the spaces that honored the fallen soldiers and the lines of battle. The commemorative avenues, monuments, and other grounds improvements designed to unify the memorial aspects of the battlefield retain integrity and are contributing resources to the National Register.

The GETT 1999 GMP also called for rehabilitation of landscapes significant to the Battle of Gettysburg and its commemoration. Battlefield rehabilitation projects started in July 2000 and have included non- historic tree removal, the planting of trees, maintaining historic woodlots, planting orchards, and building fences. In addition, GETT has been purchasing and removing non-historic and non-contributing buildings from the landscape. As a result, GETT has been returning areas of the Gettysburg battlefield to their 1863 and commemorative era condition and improving visitor understanding of the battle. By opening up more of the historically open fields and meadows, the Park is providing improved grassland habitat for rare, threatened, and endangered Pennsylvania animals and plants.

Located adjacent to the Gettysburg Battlefield, the Eisenhower National Historic Site was the home and farm of General and President Dwight D. Eisenhower. The Eisenhower properties illustrate the nation's political history through their association with important national and international events and developments that affected or were affected by Dwight Eisenhower in the 1950s and 1960s. At several times during his presidency, the Eisenhower Farm became a temporary "White House," on weekends, working vacations, and particularly during periods of recuperation by Eisenhower (1955-1956). The open space, privacy, and relaxed atmosphere were used to the country's advantage by Eisenhower in negotiating with domestic and international political leaders.

Archeological Resources

Archeological sites within the study area are representative of the broad patterns of human history associated with the greater Gettysburg area. Identified resources of earliest habitation are few, but some have been found to date from the Late Archaic period (circa 3000-1800 B.C.). Recovered prehistoric resources include rhyolite and quartz flakes, projectile points, and lithic scatter. Oral tradition and early historic evidence indicated that prehistoric objects were readily found in farm fields and along stream banks within the study area in the early 19th century, particularly near springs and waterways. Two major trails used by the Iroquois intersected just west of Gettysburg and may indicate that the area was used for migratory hunting long before European settlement opened their own roads through the area. The types of archeological sites associated with historic settlement periods include resources such as building foundations, quarries, cemeteries, dump sites, mill races, circulation systems (such as lanes and roads), and field demarcations such as post holes and walls. Battle-related resources within the general area would include the sites of burials, field hospitals, entrenchments, encampments, signal stations, supply Parks, and headquarters.

Parks Facilities and Operations

The Parks include numerous park buildings and facilities including the visitor center, cyclorama, staff office buildings, and maintenance areas. Parks operations at the study area include grounds maintenance, building maintenance, general custodial work, monument preservation work, historic structure work, and security. Grounds maintenance employees take care of fine mowing, avenue mowing, and field mowing requirements, shrub and tree maintenance, fence repairs, leaf removal in the fall, and snow removal on sidewalks and Parking lots in the winter.

Cyclic monument repairs and cyclic building repairs are performed as scheduled throughout the calendar year, but these activities are not carried out at the Parks rangers and Parks Watch volunteers perform site security at the Cyclorama Parks. The Parks also uses volunteers for grounds maintenance throughout the cultural landscape.

Visitor Use and Experience

Summer is the time of year when the most people visit the Parks. Approximately 55 percent of the visitation occurs in May through August, with July being the busiest month. Large numbers of visitors also come to the Parks during the spring season and in the fall. Visitation is the lowest in the winter months, from December

through February, with the least amount of visitation during January.

Visitation to the Parks can be generally divided into three distinct visitor markets:

- local residents who make regular use of the Parks and who live in or near Adams County
- regional residents who take day trips to the Parks and who live within 100 miles of Gettysburg, but outside of Adams County
- non-resident tourists who either stay overnight or visit as a part of longer trips and who live outside the 100-mile radius of Gettysburg

These visitors come to the Parks to participate in a wide variety of activities and programs. Parks ranger guided walks and programs, battlefield tours with Licensed Battlefield Guides, leadership seminars, military staff rides, education programs for school groups, biking, hiking, youth group camping, and visiting to "pay respect" at both the Soldiers' National Cemetery and numerous monuments and memorials throughout the Parks are some of the variety of uses of the Parks by visitors.

Numerous special events are held at the Parks annually, including the Battle Anniversary Programs, the Memorial Day Ceremony in the Soldiers' National Cemetery, the Dedication Day Ceremony on November 19 (the anniversary of the Gettysburg Address), and Remembrance Day activities on the weekend closest to November 19 each year.

In 2008, Gettysburg National Military Park opened a new park museum and visitor center, built in partnership with the non-profit Gettysburg Foundation. The project was a major initiative of the Parks' 1999 GMP. The 139,000-square foot facility includes the Parks visitor center, a 24,000-square foot museum, a gallery for display of the restored Cyclorama painting, artifact conservation and curatorial storage space, research facilities, office space, a museum cafe, and a bookstore.

According to a 2008 study conducted by the University of Pennsylvania for the Gettysburg Convention and Visitors Bureau, 3,003,968 people visit the Gettysburg area annually. More than 63 percent of those surveyed for the 2008 study were repeat visitors. The average length of stay was reported at 1.07 days, and nearly 50 percent of visitors stayed one night or more. In 2009, revenue generated from the county's lodging tax was reported to be $1,213,430, and amusement taxes were $600,334 (California University of Pennsylvania's Tourism Research Center 2008, 2010).

Social and Economic Environment

Human Health and Safety

GETT/EISE provides information about visitor safety through pre-visit information by mail and on the web, visitor contacts, and orientation bulletin boards. The Parks have safety plans that address winter operations, hazardous tree management, search and rescue, and emergency medical services.

The smoke, heat, and flames from wildland fires can threaten human lives and health, both of the public at large and firefighters in particular. A number of considerations have a bearing on protection of the public from fires, including the following:

- Visitor use is lower during the fall and spring fire seasons, usually mid-October to mid- April.
- Opportunities for visitors to escape a fast-moving fire may be limited along a trail.
- Some individuals would approach a prescribed or wildland fire and may even attempt suppression action.
- Visitors would frequently ignore warnings or are unaware of potential dangers and may wander through burned or burning areas and thus put themselves at risk.

- Smoke from fires near roads can reduce visibility and create dangerous driving conditions

Visitors can park for free or use the Freedom Transit Trolley services to travel to and from the Parks museum and visitor center.

In January of 2010, the Steinwehr Avenue property owners funded the Gettysburg Business Improvement District through tax assessments that enable the Steinwehr Business Owners to market their businesses and community. A Board of Directors, made up of nine businesses and civic leaders, governs the Gettysburg Business Improvement District. The organization relies on support and partnerships from the Borough of Gettysburg, Main Street Gettysburg, Adams County Economic Development Corporation, and the NPS for the success of its improvements.

Transportation

Visitors to the Parks arrive in more than 3,500 buses and 470,000 automobiles annually. There is no scheduled air or rail service to the area. There is a regular bus service that connects Gettysburg to Harrisburg. Most visitors spend time in the vicinity of the Parks museum and visitor center, the Cyclorama building, the National Cemetery, and other nearby sites. Many visitors then travel by automobile, tour, or charter bus via the Parks' automobile tour route, traveling to the Eternal Light Peace Memorial, along West Confederate Avenue to Devils Den/Little Round Top and finally to Hancock Avenue. Repeat visitors and those with a particular interest or activity generally go directly to the site of interest, as all sites within the Parks are individually accessible from the public roadway network. The roads serving Gettysburg National Military Park include the following (NPS 1999) (see Figure 9, page 70):

US Route 15. This limited access expressway travels in a north-south direction and connects the major east-west routes that serve the Parks. The most important of these is I-76 (the Pennsylvania Turnpike), located approximately 35 miles north of Gettysburg. US Route 15 carries approximately 14,000 vehicles per day near the Parks. As it passes through the area, it interchanges with Business Route 15 (Emmitsburg Road), Pennsylvania Route 134 (PA Route 134/Taneytown Road), Pennsylvania Route 97 (PA Route 97/Baltimore Pike), Pennsylvania Route 116, and US Route 30 (York Pike).

***Emmitsburg Road (Business US Route 15)*.** This two-lane road travels in a north-south direction between Business US Route 15 near the Pennsylvania-Maryland border and Lincoln Square where it intersects US Route 30. As it approaches the northern boundary of the Parks, Business US Route 15 is lined by many visitor services, including restaurants, souvenir shops, motels, and tour companies. In the area of the Parks, Business US Route 15 carries approximately 5,000 vehicles per day.

***Taneytown Road (PA Route 134*).** This two-lane road travels in a northwest-southeast direction and serves as an access for traffic arriving via US Route 15. It also provides the main access to the Soldiers' National Cemetery from US Route 15.

***Baltimore Pike (PA Route 97*).** This two-lane road travels in a northwest-southeast direction and connects Maryland with Littlestown and Gettysburg. The roadway carries approximately 6,400 vehicles per day east of US Route 15, where it is designated as PA Route 97. Baltimore Pike is the main access to the new Parks museum and visitor center.

York Pike (US Route 30). This east-west roadway connects Gettysburg to York, Pennsylvania. It operates as a three-lane roadway, with the center lane for left turns only. As it approaches Gettysburg from the east, it carries approximately 13,800 vehicles per day. The land uses along York Pike are mostly commercial, with motels and shopping centers predominating.

Chambersburg Pike (US Route 30). This two- and three-lane roadway connects Gettysburg to Chambersburg and points west. It serves the Eternal Light Peace Memorial area and connects with Reynolds Avenue. In the vicinity of the western portion of the Parks, it is fronted by residential and agricultural uses. Throughout the Parks, US Route 30 follows the route of Lincoln Highway. The Parks have been coordinating with the Commonwealth of Pennsylvania and other agencies for projects within the route of the old Lincoln Highway. US Route 30 carries approximately 15,000 vehicles per day, west of Gettysburg.

Hagerstown Road (PA Route 116). This southwest to northeast roadway travels between Hagerstown, Maryland, and Gettysburg and connects the rapidly developing southwest section of Adams County to Gettysburg. It carries approximately 9,500 vehicles per day near its intersection with West Confederate Avenue. Within the boundaries of the Parks is a network of avenues. Recently, more of the avenues were converted from two-way roadways to one-way roadways. This established a counter-clockwise pattern for the major avenues within the Parks, improved traffic flow to the interpretative and commemorative sites within the Parks, and increased the Parking supply. Each one-way avenue is designed to operate with one travel lane and one Parking lane. The right lane is designated for Parking, while moving vehicles are directed to travel on the left side of the avenue. The posted speed limit on the avenues and some state roads within the Parks boundary is 25 miles per hour.

Two of the most used avenues are West Confederate Avenue and Hancock Avenue. West Confederate Avenue connects PA Route 116 to Emmitsburg Road. It passes by the North Carolina Memorial, the Virginia Memorial, and along Seminary Ridge. It is primarily a one-way roadway and travels in the southbound direction. A small portion of the avenue is two-way near its intersection with PA Route 116. West Confederate Avenue, which carries approximately 2,000 vehicles per day, is the primary avenue taken to South Confederate Avenue and two of the more popular commemorative features. Little Round Top and Devil's Den are located near the north terminus of South Confederate Avenue.

Hancock Avenue extends from United States Avenue on the south to Taneytown Road on the north. It passes by the High Water Mark and the Pennsylvania Memorial and is designated one-way (northbound). Hancock Avenue carries approximately 1,600 vehicles per day.

An arrival and departure pattern for traffic to and from Gettysburg National Military Park was evaluated in 2010 (Baker 2010). As indicated in the table below, this pattern indicates that most regional traffic arrives and departs via Routes 30 and Route 15.

Table 4. Traffic Direction of Approach and	
To/From the North via US Route 15	23%
To/From the South via US Route 15	22%
To/From the South via PA Route 97	5%
To/From the East via US Route 30	24%
To/From the West via US Route 30	21%

Source: Transit Service Implementation Plan 2010

Once arriving to the area, the visitors travelling along Route 15 are directed to Baltimore Pike. Visitors on Route 30 pass into the center of the Borough and then are directed to Taneytown Road.

Utilities

Utilities at the study area include municipal water, municipal sewer, electric and phone lines, and underground oil storage tanks See Figure 8, page 69). Gettysburg Municipal Authority is responsible for the existing water and sewer services once they connect to the utility mains on Steinwehr Avenue.

Environmental Consequences

In accordance with NEPA, evaluation of environmental effects requires consideration of the intensity, duration, and cumulative nature of effects, as well as a description of measures to mitigate for adverse effects. This section presents the potential environmental effects or consequences of implementing each of the fire management program alternatives described in this EA. It also presents the scientific and analytic basis for the comparisons of the alternatives. Each of the resource areas whose affected environment was described is addressed here. Impacts are described as adverse or beneficial and are assessed according to their duration, extent, and intensity. Analysis of impacts is based on the predicted ability of each alternative to achieve the desired fire management goals of the Parks, as previously described. In each resource area, potential impacts common to all of the alternatives are discussed, and then additional impacts specific to each of the alternatives are discussed separately.

Definitions of the terminology used to describe impacts are included below for clarity. Unless otherwise specified in the description of impacts, the terms below represent a qualitative estimate of expected impacts based on best professional judgment, expert experience, and/or review of relevant literature. When impacts are based on quantitative data, the data will be described in detail in the section for the resource area to which it applies and the source(s) of the data will be noted at that time.

Adverse: Impact would be harmful.

Beneficial: Impact would be helpful and would tend to promote well-being.

Duration: Duration refers to the time period over which an impact persists. For impact topics evaluated in this document, duration is defined as:

> *Temporary* – Impact would occur only simultaneously with the fire, management action or suppression activity; once the fire, action, or activity has ended, resource conditions are likely to return to pre-activity conditions.
> *Short-term* – Impact would extend beyond the fire, management action or suppression activity, but would last at most a couple of years.
> *Long-term* – Impact would extend well beyond the fire, management action or suppression activity, and would likely last a decade or more.

Extent: Extent refers to the spatial scale over which an impact is expressed and is defined as follows for this document:

> *Local* – Impact would affect the resource only at site of the fire, management action or suppression activity, or its immediate surroundings, and would not extend into the Parks at large or the region outside the Parks.
>
> *Regional* – Impact would affect the resource on a Parks level, extending well past the immediate location of the fire, management action or suppression activity, and spreading into substantial portions of the Parks or areas beyond its boundary.

Intensity: Intensity refers to the magnitude, or severity, of the impacts.

The intensities of impacts on natural and cultural resources are defined as:

Negligible - Minimal or no impact on the resource occurs and change is not detectable at the lowest levels of detection currently available.

Minor – Detectable change in a resource area occurs, but no substantial resource impact results; the effect is localized and slightly detectable but would not affect overall structure of any natural community or is confined to a small area of a cultural resource.

Moderate - Measurable change in a resource occurs, but the integrity of the resource remains intact.

Major - Substantial impact or change occurs in a resource area that is easily defined, noticeable, and measurable; the effect is highly noticeable, and would have a substantial influence on natural resources, including effects on individuals and groups of species, communities, and/or natural processes; or results in a substantial and highly noticeable change in character-defining features of a cultural resource.

The intensities of impacts on visitor experience and aesthetic resources are defined as:

Negligible - Minimal or no impact on the resource occurs; the effect would not be detectable by visitors and would have no discernible effect on visitor experience.

Minor - Change in a resource area occurs, but no substantial resource impact results; the effect is slightly detectable by visitors but would not affect overall visitor experience.

Moderate - Noticeable change in a resource occurs, but the integrity of the resource remains intact; the effect is clearly detectable by visitors but would have little effect on overall visitor experience.

Major - Substantial impact or change occurs in a resource area that is easily defined, noticeable, and measurable; the effect would have a substantial, highly noticeable influence on various aspects of the visitor experience.

Cumulative Impacts: Cumulative impacts are effects on the environment that result from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what entity (Federal or non-Federal) undertakes such action(40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time. Cumulative effects analyzed in this document consider the incremental effects of the proposed action, as well as the no-action alternative in conjunction with past, current, and future actions at GETT/EISE.

Past and ongoing projects and actions include painting of Parks buildings, stabilization of Parks road bridges, enhancing visitor interpretive facilities – including Parks trails. Improvements to the Parks in these projects have resulted in long-term, minor, localized, beneficial impacts on human health and safety; minor short-term impacts on the Parks' natural resources may occur from repaving roads with minor, short term soil disturbance, along with the minor potential to introduce exotic plant species; and No Adverse Effect on cultural resources.

None of the actions proposed in any of the alternatives would be expected to combine with these projects to contribute to cumulative adverse effects.

Natural Resources

Many of the effects of each alternative stem from the relative amount of fire on the landscape. While evaluating impacts it is important to keep in mind that the alternatives are for proposed fire management programs, which represent planned, predictable actions by Parks and fire management staff. The amount of prescribed fire is fairly predictable, but the scale, scope, and necessary response to unwanted wildland fires are largely unpredictable and are not controllable by management actions proposed in the alternatives.

Air Quality

Methodology for Assessing Impacts

Impacts to air quality were qualitatively assessed by means of a review of pertinent laws, guidance and regulations, consultation with Parks experts, professional judgment, and experience with comparable actions. Major air resource issues include ozone, visibility, safety, and public health. Under the Federal Clean Air Act the Parks are required to consider impacts on each of these areas. In this section impacts are assessed with respect to the Parks' Class II airshed, to ozone, and to visibility. Air quality issues related to safety and to public health impacts are addressed later, under Human Health and Safety and Transportation.

Impacts Common to All of the Alternatives

GETT/EISE is designated a Class II airshed under the Clean Air Act. This designation is intended to prevent further degradation of the airshed from anthropogenic pollutants such as those generated by industry, power plants, transportation, and burning of agricultural waste. Smoke from fire, together with all other existing air pollution sources affecting the area, must not allow violations of the National Ambient Air Quality Standards (NAAQS) for any pollutant. Under all of the alternatives, the NPS would comply with all applicable federal, Pennsylvania Department of Environmental Quality, and local air quality requirements, including those that relate to burn permits and smoke management.

The Adams County metropolitan area, in which Gettysburg National Military Park and Eisenhower National Historic site are located, is designated as a "maintenance area" for the 1997 eight-hour National Ambient Air Quality Standards for ozone. Burning vegetation produces small amounts of nitrogen compounds and volatile organic compounds, which are ozone precursors. These compounds react photochemically to produce ozone downwind of a fire.

Light scattering and absorption by fine particulate matter (< 2.5 microns in diameter) strongly affect visibility. Wildland smoke contains significant amounts of fine particulate matter. Treatment of wildland fire smoke emissions for visibility protection purposes is at the discretion of the State, consistent with national policies. Visibility impacts may occur anywhere in the Parks, but are of particular concern on roadways and at historic scenes. Smoke impacts on roadway visibility will be discussed in detail under Transportation.

The assessment of smoke impacts on human health is a key to ensuring that the Parks' fire program is consistent with air quality requirements. Public health impacts of smoke from wildland fire will be discussed later under Human Health and Safety. Smoke emissions from wildland fires would continue to occur each year under either of the alternatives. Large unwanted wildland fires could produce large amounts of smoke, but these would be infrequent in the lifetime of the proposed FMP. Mitigation measures such as those previously described under the topic heading, "Mitigation Measures Common to All of the Alternatives", apply equally to each of the

alternatives.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible to minor, short-term, localized to regional adverse impacts on air quality in and around the Parks. Although it is impossible to prevent the production of some smoke from unwanted wildland fires, ignitions would be suppressed as quickly as possible and at the smallest feasible fire size, thus resulting in negligible to minor, short-term, localized impacts to air quality. Large unwanted wildland fires could have regional impacts on air quality, but would be rare during the lifetime of the FMP

Alternative 2 – Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would likely have minor to moderate, short-term, localized to regional adverse impacts on air quality in the Parks, slightly more than Alternative 1. Alternative 2 has the potential for more area burned from prescribed fire and therefore greater air quality impacts on a yearly basis than Alternative 1. Prescribed fires would be planned and conducted under conditions that would minimize impacts of smoke, as described in *Mitigation Measures for Air Quality Common to All of the Alternatives* (see below). Non-fire treatments would not produce smoke at all, but would produce negligible amounts of exhaust emissions from power equipment such as chainsaws and would be expected to have negligible impacts on air quality.

Cumulative Impacts

GETT/EISE is located near a high-population-density area and air quality, especially ozone, has been a concern for many years. The Parks do experience relatively high concentrations of ozone on occasion during the summer months. Small wildland fires and prescribed burns would likely contribute small amounts of ozone to the regions atmosphere.

Visibility is occasionally degraded in the Parks, usually during the summer months. Light scattering and absorption by fine particulate matter strongly affect visibility. Effects are greatest during the summer months because stable air masses are most common during this season. Fine particulate matter is present in wildland fire and prescribed fire smoke. As stated above, treatment of wildland fire and/or prescribed fire smoke emissions for visibility protection purposes is at the discretion of the State, consistent with national policies.

All types of fires generate fine particulate matter and ozone precursors. Unwanted wildland fires are not considered planned events for the purposes of the Clean Air Act, but prescribed fire are planned events. Alternative 1 would contribute the least to regional air quality degradation. Mitigation measures such as those described under the topic heading, "*Mitigation Measures for Air Quality Common to All of the Alternatives*" (see below) would be used to minimize these impacts.

The NPS would comply with all applicable federal, Pennsylvania Department of Environmental Quality, and local air quality requirements, including those that relate to burn permits and smoke management.

Mitigation

A number of common fire suppression mitigation measures for Air Quality apply to both alternatives equally, and measures specific for Alternative 2 apply to prescribe fire and non-fire fuel reduction treatments. These mitigation measures are described below

Mitigation Measures for Air Quality Common to Both Alternatives

There are a number of procedures that may be implemented during a prescribed fire that will reduce the

magnitude of impacts on air quality, including:

- Use smoke prediction models to identify smoke dispersion patterns.
- Use smoke density models to identify potential road closings and/or advisories.

Mitigation Measures for Air Quality Specific for Alternative 2

There are a number of procedures that may be implemented during a prescribed fire that would reduce the magnitude of impacts on air quality, including:

- Burn only when meteorological conditions are favorable, that is, visibility is greater than 5.0 mi (8 km), mixing heights of 1640 ft (500 m) or greater, and the Ventilation Index is 2,000 or greater (Ventilation Index = mixing height above ground level, in meters x transport wind speed, in meters per second).
- Comply with recommended mitigation measures during state/county ozone advisories, including decreasing the use of gasoline-powered equipment, re-fueling vehicles before 0800 or after 1700, and carpooling.
- Avoid sensitive receptors through pre-planning, modeling, and careful implementation. Sensitive receptors are defined as groups of individuals who may be more susceptible to health risks associated with smoke, or the places where such groups of individuals congregate, such as an elementary school.
- Use backing and flanking ignition patterns to reduce smoke production.
- Burn only when meteorological conditions are favorable, that is, visibility is greater than 5.0 mi (8 km), mixing heights of 1640 ft (500 m) or greater, and the Ventilation Index is 2,000 or greater (Ventilation Index = mixing height above ground level, in meters x transport wind speed, in meters per second).
- Comply with recommended mitigation measures during state/county ozone advisories, including decreasing the use of gasoline-powered equipment, re-fueling vehicles before 0800 or after 1700, and carpooling.
- Use backing and flanking ignition patterns to reduce smoke production.
- Use smoke prediction models to identify smoke dispersion patterns.
- Use smoke density models to identify potential road closings and/or advisories.
- Avoid sensitive receptors through pre-planning, modeling, and careful implementation. Sensitive receptors are defined as groups of individuals who may be more susceptible to health risks associated with smoke, or the places where such groups of individuals congregate, such as an elementary school.

Conclusion

Both of the alternatives would have some adverse impacts on air quality in the Parks. Impacts to the Class II air shed would be negligible, while impacts to ozone levels and visibility would be negligible to minor for Alternative 1 and minor to moderate for Alternative 2.

Floodplains and Wetlands

In 2003, the National Parks Service issued DO-77-2, establishing NPS policies, requirements, and standards for implementing Executive Order 11988 (NPS 2003) along with a procedural manual for floodplain management (NPS 2008). DO 77-2 was issued to "to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

Methodology for Assessing Impacts

Impacts to floodplains and wetlands were qualitatively assessed by examining the hydrologic features and processes of the Parks and the distribution of stream courses and wetlands, and by comparing these with the predicted effects of fire management activities, wildland and prescribed fire suppression efforts, and non-fire treatments. The general procedures followed are outlined in DO 77-1 (NPS 2002) and NPS Procedural Manual for Wetland Protection (NPS 2008).

Impacts Common to All of the Alternatives

The most common impacts of fire and fire management activities on floodplains are related to changes in stream flow, as described in detail below under the topic heading, Water Resources. In brief, reduction or removal of vegetation, whether by consumption in a fire, by mechanical removal during fireline construction can lead to increased runoff and then to increased stream flow. This additional or sudden stream flow, which could be severe if heavy precipitation occurs shortly after a fire event can cause scouring, alter the course of channels, and create new channels in floodplains.

Because the size of most wildland and prescribed fires would be small, the impacts on floodplains would be negligible, temporary, and localized. Although a large, severe fire could have moderate, short-term, localized impacts on floodplains, such an event is not controllable and would be rare in the lifetime of the proposed FMP.

Adverse impacts of fire and fire management activities on wetlands are related to changes in soils, vegetation, and stream flow. Sediment transported by overland flow after fire events or mechanical removal projects can be deposited in wetlands and can carry influxes of nutrients or carbon and thereby alter biochemical processes. Sediments entering wetlands can smother emergent vegetation or alter the courses of channels. Increases in overland flow as a result of removal or reduction of vegetation would increase water inputs into wetland systems and can create new channels. Fire retardant chemicals, especially long-term retardants, have been shown to have detrimental impacts on wetlands, such as reduction in germination of wetland vegetation (Angeler et al. 2004). Suppression activities, in particular digging of fireline and hydraulic action of water used during mop-up, can have detrimental impacts on wetlands such as channeling of water.

Impacts to wetlands and floodplains by fire and fire management activities can also be beneficial. Wetland vegetation usually adapts well to the natural fire cycle of the surrounding uplands. Fires can help maintain a mosaic of wetland vegetation which supports ecological diversity and can result in new, succulent vegetation which is a high-quality food source for wildlife.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible and short-term impacts on floodplains. Impacts on the extent and functions of wetlands would also be negligible. Impacts on wetland vegetation would be minor to moderate, short-term, localized, and both adverse and beneficial. Unwanted wildland fires are usually small.

Alternative 2 – Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have negligible impacts on floodplains, the same as Alternative 1. Impacts on the extent and functions of wetlands would also be negligible, the same as Alternative 1. Impacts on wetland vegetation would be minor to moderate and largely beneficial, such as stimulating new, succulent growth (Somers et al. 2000). Adverse impacts from suppression activities would still occur. However, adverse impacts of wildland fire would be less because prescribed fires tend to decrease the severity of wildland fire by reducing fuel loads, and therefore decrease the potential for post-fire erosion and sediment transport. Non-fire fuel reduction treatments would not

occur in floodplains or wetlands, and activities adjacent to floodplains or wetlands would be planned to have at most a negligible impact.

Cumulative Impacts

No other reasonably foreseeable, future projects within or around the Parks are known that would combine with any of the above alternatives to result in cumulative impacts on floodplains or wetlands.

Mitigation

Other than avoiding non-fire fuel reduction activities in floodplains or wetlands, there are no other mitigation measures for floodplains and wetlands proposed in either alternative.

Conclusion

Overall, adverse impacts from each of the alternatives to floodplains would be negligible and to wetlands would generally be minor. Alternative 2 allows the greatest opportunity for beneficial impacts through reductions in fuel loads surrounding floodplains and wetlands through prescribed burns, while Alternative 1 holds the greatest potential for adverse impacts. Neither of the alternatives would result in a loss of wetlands or affect floodplain characteristics.

Soils

Methodology for Assessing Impacts

Soil impacts were qualitatively assessed using literature review, professional judgment, and experience with comparable actions. Analysis considered risk of loss of key ecosystem components and maintenance of natural processes: alternatives that would mimic or restore natural processes were favored over those that would alter or reduce natural processes.

Impacts Common to All of the Alternatives

All fire, whether natural or human-caused, changes the cycling of nutrients and the biotic and physical properties of soils. The magnitude and longevity of effects depend on many factors, including fire regime, severity of an individual fire, vegetation and soils type before the event, topography, season of burning, and pre- and post-fire weather conditions, especially precipitation. Effects can be direct, or indirect through changes in soil biota and erosion rates. Sites supporting ecosystems that historically had frequent fire tend to be well-adapted to fire and repeated burning. Fire can influence soil biota directly by killing or injuring organisms or indirectly by altering properties of the soil environment in which organisms live. Burning usually causes a reduction in soil invertebrates and fungi while microorganisms such as bacteria usually increase in abundance (SEKI EA 2004).

Changes to soil nutrients occur in the form of shifts in composition, distribution, amount, and availability as a result of leaching, volatilization of elements during burning of fuels, and convection of ash. Volatilization is the transformation to a gaseous state, or evaporation, of soil nutrients and is temperature-dependent. Nitrogen and, to a lesser extent, sulfur and phosphorous are most easily lost because they volatize at lower temperatures than other soils nutrients, but others may also be lost as temperature and residence time increases. Changes in above-ground vegetation, such as the removal of nitrogen-fixing plant species, can indirectly impact soils and interact with soil nutrient status (Newland and DeLuca 2000 *in* SEKI EA 2004). Consumption of dead and down fuels by fire releases nutrients stored in the biomass and makes it available to plants by convection or leaching of ash.

Changes in physical characteristics of soil following fire are the result of many complex interactions. Fire can cause changes in organic horizons, water repellency, infiltration capacity, porosity, structure, temperature, hydrologic properties, and processes of erosion. Fire may result in increased potential for erosion through removal of above-ground biomass which holds soil in place and sometimes even reduction or removal of organic soil

layers. The more severe the fire the greater the potential for erosion, because severe fires remove more biomass. Prescribed fires generally result in less erosion than uncontrollable wildland fire, because wildland fires are usually more severe than prescribed fires (Wohlegmuth et al. 1999 *in* SEKI EA 2004). Other factors, such as steepness of the slope and pre-fire vegetation, also affect post-fire erosion.

Fire suppression activities can also have impacts on soils. Construction of fireline disturbs and mixes soil horizons; the effect is generally localized, but the wider the fireline, the greater the disturbance. Firelines can become channels for water transport, causing rutting and severe erosion in the fireline itself if heavy rains occur before the fireline is rehabilitated naturally or deliberately. Aerial water application involves dropping large volumes of water from airplanes or helicopters. Because the water may fall a large distance (up to several hundred feet), it arrives with considerable force. This can promote rutting and channeling in localized areas. The effects of fire retardant chemicals are similar to the effects of applying high-nitrogen fertilizer to the soil; for example, post-fire re-growth of grasses may be favored over re-growth of forbs such as clover. These effects can last up to ten years (Larson and Duncan 1982). Aerial application of fire retardants carries with it the effects of both fertilizer application and the rutting potential of high-velocity water.

All of the alternatives would result in impacts to soils from fire-related management activities such as fireline construction and water application.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have minor to moderate, short-term, localized impacts on soil resources in the Parks. Aggressive suppression of all wildland fires with emphasis on extinguishing each fire at the smallest possible size could result in adverse impacts to soils including physical restructuring of soil horizons from digging of fire lines, channeling and erosion in fire lines, and tying up of nutrients in both live and dead and down biomass.

Alternative 2 – Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have minor to moderate, short-term, localized impacts on soil resources in the Parks. Some impacts would be adverse while others would be beneficial. For example, managers could let a wildland fire burn out to a natural or man- made barrier like a stream or trail instead of digging a fireline. Prescribed fire would rarely disturb the soils. Fire intensity would be low enough so as to not change soil composition, short term impacts would occur from run-off. Prescribed fires would likely have beneficial impacts on soils through release of nutrients. Non-fire treatments would be expected to have at most a negligible impact on soils.

Cumulative Impacts

The ongoing park activity most likely to be contributing to adverse soil impacts would be mowing operations which probably are contributing to some soil compaction in mowed areas of the Parks. Wildland and prescribed fires would not further contribute to soil compaction, but would have cumulative adverse and some beneficial impacts on soil biochemical properties.

Mitigation

A number of soils mitigation measures for soils apply to both alternatives equally, for Alternative 1 during fire suppression actions and for Alternative 2 during fire suppression actions, prescribed burns, and non-fire fuel reduction actions. These mitigation measures to minimize soil impacts are described below.

Mitigation Measures for Soils Common to Both Alternatives

Unless there is a direct threat to life, property, or significant natural or cultural resources, heavy mechanized equipment will not be used in the Park. A process is in place to allow for authorization for

heavy equipment use in the Park in the event of an emergency need. In addition, minimum impact suppression tactics (MIST) will be used during all fire management activities. Tactics relevant to protecting soils include:

- Do not use tracked, motorized equipment off designated road surfaces, without the approval of the Superintendent.
- Cold-trail the fire edge instead of constructing additional fireline, when practical.
- Use natural firebreaks, water, or water and chemical fire retardant in lieu of constructed fire line wherever possible.
- Install water bars on all constructed fire line on slopes more than 15%. Request specifications for water bars from a designated, qualified Resource Advisor.
- Use soaker hose or foggers in mop-up to avoid "boring" hydraulic action on soils.
- Build firelines to the minimum width needed to allow backfiring, burn-out, or the creation of safe blackline. Use natural or existing man-made barriers wherever possible.
- Choose a consumption strategy (allowing smoldering fuels to burn up instead of extinguishing them) during mop-up whenever possible to minimize soil disturbance.
- Use bulldozers only with written authorization from the Superintendent; the Superintendent may authorize their use when high value resources are at risk.
- If bulldozers or other heavy equipment are authorized in an emergency, add or change lubricants associated with that equipment only in places designed for this purpose. Ensure spill cleanup materials are readily available.
- Use solvents for cleaning tools, power tools, or equipment only in places designed for this purpose. Ensure spill cleanup materials are readily available.
- A Burned Area Emergency Rehabilitation (BAER) Team may be requested following a large wildland fire, based on an interdisciplinary needs analysis. When a BAER Team is requested, include one or more personnel with soils expertise.

Conclusion

Both of the alternatives would result in minor to moderate impacts on soil resources. Alternative 2 would give managers at the Parks the widest range of tools to choose from to minimize adverse impacts from any particular project or event.

State Threatened and Endangered Species

Methodology for Assessing Impacts

Impacts to threatened or endangered species were qualitatively assessed by means of a literature review of the effects of fire on these species, consultation with biologists, and professional judgment. Analysis of the alternatives considered the potential for take of individuals protected as threatened or endangered, the potential for loss of viable populations or special concern species, and the potential for loss, maintenance, or restoration of habitat.

Impacts Common to All of the Alternatives

Most of the state protected and species of concern occurring in the two parks are located within the six CORE areas mapped for the Parks by the Pennsylvania Natural Heritage Program (see Figure 6, page 67). Wildfires moving through these CORE areas will likely adversely impact any protected non-mobile animals and non-fire adapted plants occurring in these habitats. Any wildfire suppression ground disturbing actions such as fire line construction through these sensitive habitats could also cause impacts to state protected plants and/or animals. Mobile adult animals would be expected to leave the burn areas and would not likely be adversely impacted.

However, young animals may be more at risk of moving out of the fire area. Fire adapted plants would not likely be adversely impacted by fires.

The Commonwealth of Pennsylvania Department of Conservation and Recreation (VA DCR), Division of Natural Heritage, does not anticipate that any of the proposed alternatives would adversely impact natural heritage resources in the Parks. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression . Alternative 1 would have negligible impacts on state species of concern occurring in the Parks. Although unwanted wildland fire events could have adverse impacts, these events are not controllable under any of the alternatives. Because the distribution in the Parks of most of these species is small and known, suppression fire activities would be planned to protect these species. Overall, adverse impacts to state species of concern are likely to be negligible and short-term from wildfire suppression activities.

Alternative 2 – Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Like Alternative 1, Alternative 2 would have negligible impacts on threatened or endangered species. Because the distribution in the Parks of most of these species is small and known, suppression, prescribed fire, wildland fire use, and non-fire treatment activities would be planned to protect or benefit these species.

Cumulative Impacts
There are no particular reasonably foreseeable future projects or actions that, in conjunction with any of the alternatives, would threaten the continued existence of any state listed species occurring in the Parks.

Mitigation
Other than avoiding fire line construction and/or prescribed fires in CORE areas with fire sensitive protected species, no other mitigation for protected species are proposed for either alternative.

Conclusion
Both of the alternatives would likely have negligible impacts on state species of concern occurring in the Parks. Alternative 2 has the greatest potential for minimizing adverse impacts and gaining benefits, because it offers managers the widest array of tools (e.g., prescribed burns, non-fire fuel reductions) to accomplish resource objectives.

Vegetation

Methodology for Assessing Impacts
Impacts to vegetation were qualitatively assessed by means of a review of the Parks documents concerning the fire ecology in the region, consultation with Parks specialists, and professional experience with similar actions. Factors considered included resemblance to the historical fire regime and maintenance or restoration of historical plant communities.

Impacts Common to All of the Alternatives
Historical and ecological evidence indicates that wildfire has played a significant role in shaping the vegetation communities of the two Parks. In recent decades, drier oak / heath and oak - hickory forests throughout the eastern United States have progressively exhibited compositional changes characterized by a lack of oak recruitment and the abundant establishment in understories of shade-tolerant, later- successional trees (Lorimer 1984; Abrams 1992, 1996). The principal reasons for these changes are believed to be the widespread exclusion of fire during

the twentieth century, as well as the cessation of other disturbances (e.g., repeated cutting on short rotations) that favor oaks. In the mid-Atlantic region, red maple (*Acer rubrum*) and American beech (*Fagus grandifolia*) are two of the most abundant, shade-tolerant invaders of oak forests, and this trend is evident over parts of the Parks. Surface fire reduces competition for oak seedlings and maintains an open canopy, allowing more light penetration. The majority of canopy species are tolerant of surface fire when mature. Most associated species are prolific sprouters, and many stems develop as a result of the passage of a fire. In the absence of fire, the regeneration layer of many oak forests is becoming dominated by later seral species such as maple and birch (Brose et al.2001).

Forested wetlands occur within the two Parks. These classes include alluvial floodplain forests, found in drainage swales and on floodplains, and non-alluvial wetlands that occur away from active floodplains in various environmental settings in the Parks. These forested wetlands rarely, if ever burn due to high water tables, and saturated soils. If a wildland fire were to occur during a drought, significant organic soils would be destroyed, however, these areas would not be affected by prescribed fire, as prescribed fires would only be used during normal weather conditions – not during drought conditions.

As described under Affected Environment, many non-native invasive plants are present in the Parks. It is important to address invasive plant threats early after forest disturbances such as wildfire and mechanical fuel treatments, because nonnative plants can invade quickly after disturbance and crowd out native vegetation, resulting in loss of native vegetation, loss of wildlife habitat, and reduction in species diversity of both plants and animals. However, fire may also be used as a tool in the management of nonnative plants. For example, fire can be used to stress plants during the growing season and make them more susceptible to herbicides, or fire can be used to remove dead or live vegetation, temporarily or permanently, to make it easier for personnel to gain access to apply herbicides to nonnative plants.

Fireline construction during suppression activities could result in removal of trees, shrubs, and lower tree branches and cutting or trampling of grass and herbaceous layers, resulting in negligible to minor, short-term, localized, adverse impacts to vegetation.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression .
Alternative 1 would have minor to moderate, short- to long-term, localized to regional, largely adverse impacts on the vegetation in the Parks. Suppression activities, when conducted according to the mitigation measures outlined below (see *Mitigation Measures for Vegetation Common to All of the Alternatives*), would have minor, short-term, localized, adverse impacts on vegetation.

Alternative 2 – Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). In contrast to Alternative 1, Alternative 2 would have minor to moderate, short- to long-term, localized to regional, beneficial impacts on the Parks' vegetation communities. Prescribed fire would be planned to small areas in the Parks and would have minor to moderate, short- to long-term, localized, beneficial impacts on vegetation by reducing fuel loads and promoting native tree (oaks and hickories saplings over 2 inches in diameter at base height) species. Non-fire treatments would be planned to minimize adverse impacts and maximize benefits and would affect only a very small proportion of the Parks as a whole.

Cumulative Impacts

Mowing operations throughout the Parks result in cumulative impacts on vegetation by permanent or temporary removal of woody vegetation in localized areas of the Parks. Another possible cumulative impact would result

from herbicide treatment of invasive species within treatment units. The total cumulative adverse impacts of these activities when combined with fire management activities proposed in the alternatives is expected to be negligible to minor, and short -term. Alternative 1 would likely contribute more cumulative adverse impacts on vegetation than Alternative 2 because Alternative 1 would continue the detrimental impacts of excluding fire from fire-adapted ecosystems.

Mitigation

Mitigation Measures for Vegetation Common to Both Alternatives

A number of mitigation measures for biological resources including vegetation apply to both alternatives equally, for Alternative 1 during fire suppression actions and for Alternative 2 during fire suppression actions, prescribed burns, and non-fire fuel reduction actions. Mitigation measures to minimize impacts to vegetation specific for Alternative 2 apply to prescribe burning and non-fire fuel reduction activities. These mitigation measures to minimize soil impacts are described below.

- Locate incident facilities at pre-determined staging areas identified in Geographic Information Systems (GIS) data layers. Exceptions must be approved by the Superintendent or his/her designee.
- Emphasize minimum impact suppression tactics (MIST; RM-18, Chapter 9) during operational briefings. Suppression personnel will choose methods and equipment commensurate with suppression needs and a strategy that will least disturb Park resources.
- On extended attack and wildland fire use fires, the Park's superintendent will designate a Resource Advisor. The Resource Advisor will evaluate that management tactics are commensurate with resource objectives and will provide daily direction regarding the location and protection of biological and cultural resources projected to be adversely impacted by suppression activities or by the fire itself.
- Chose helicopter bucket drops and water or wet water over tanker drops or retardant.
- Allow fires to burn out to natural or existing man-made barriers whenever possible.
- As soon as possible during initial attack, and daily during extended attack, the Incident Commander will notify the Communications Center EICC (or Fire Dispatcher, if one is used during extended attack) of the location of the fire, and the Communications Center will notify the Incident Commander of sensitive areas within or in the path of the fire (biologically or culturally sensitive areas are identified in GIS data layers and on maps stored in the Park's GIS). These areas should be avoided whenever possible during suppression operations. If initial attack operations are required in these areas, the preferred suppression tools will be water, leaf blowers and claw or leaf rakes.
- Constructed fire line, if necessary, will be built the minimum width and depth needed.
- During fireline construction, minimize the cutting of trees, burned trees, and snags. Leave some trees randomly in the fire line. Cut brush, small trees, and stumps from cut trees flush to the ground. Limb trees adjacent to the fire line only enough to prevent additional fire spread. Scatter debris from cutting operations to appear natural.
- During mop-up activities, roll logs to check for hot spots rather than buck them up with saws.
- A Burned Area Emergency Rehabilitation (BAER) Team may be requested following a large wildland fire, based on an interdisciplinary needs analysis. When a BAER Team is requested, include one or more personnel with biological expertise.
- Allow fires to burn out to natural or existing man-made barriers whenever possible.
- Give Park natural resource staff with the opportunity to survey post-burn and post- treatment areas for invasive or exotic species.

Mitigation Measures for Vegetation Specific for Alternative 2

- Provide prescribed burn and non-fire treatment plans to Park natural resource staff far enough in

advance of the proposed ignition date to allow survey of the project area. Fire management staff would cooperate and coordinate with resource staff to alleviate or mitigate specific issues identified during a survey.

Conclusion

Alternative 2 would have beneficial impacts on vegetation in the two parks by providing more tools for vegetation management needed for maintaining open landscaspes through prescribed burns and non-fire fuel treatments, facilitating recruitment of desirable woody species in forests, and in reducing the spread of invasive species in the two parks.

Water Resources

Methodology for Assessing Impacts

Impacts to water resources were qualitatively assessed based on professional judgment and experience with comparable actions applied to the general hydrologic conditions at GETT/EISE. Impacts were examined with respect to conformity with the provisions of the Clean Water Act and to the degree to which impacts are beneficial to resource conditions.

Impacts Common to All of the Alternatives

Important components of water resources include the hydrologic cycle, stream flow regimes, sedimentation, water chemistry, and water temperature (DeBano et al. 1998 *in* SEKI EA 2004). Fire affects water quantity, quality, chemistry, and physical and biotic characteristics. Effects vary according to the severity, size, season, frequency, and location on the slope of a fire, and according to post-fire weather, primarily precipitation (Elliot and Vose 2005, Clinton et al. 2003, Neary and Currier 1982).

The primary sources of nutrient input into streams are geological weathering and atmospheric deposition. Fire can cause changes in nutrient levels through ash fall during a fire event and leaching afterwards. Other characteristics of water chemistry, such as buffering capacity and therefore pH, can also be impacted in similar ways. Depending on the percent of the watershed burned and the severity of the fire, these effects can be insignificant or can last a year or more (Minshall 2001, Megahan and Hornbeck 2000, Swank and Vose 1997).

The most common way fire can alter water conditions is by increasing the temperature of the water. Many stream courses, particularly narrow courses like most of those at the Parks, are shaded by adjacent and overhanging vegetation. Reduction or removal of this vegetation can allow additional sunlight to penetrate to water surfaces and increase the temperature of the water. These impacts may last several years as vegetation re-grows and may affect stream reaches below the location of the fire as warmer water flows downstream.

Increases in stream flow discharge often occur following fire due to the reduction or removal, through combustion, of vegetation and organic soil layers. Reducing these layers decreases interception and infiltration and therefore increases the overland and subsurface flow of water. These effects are usually short-term, with stream flow returning to pre-fire levels as vegetation and litter layers recover (SEKI EA 2004).

Sediment is eroded soil particles transported into water channels by overland flow (DeBano et al. 1998 *in* SEKI EA 2004). Impacts of fire would be greatest where slopes are steep, soils are shallow, and high-intensity rainfall, such as severe thunderstorms, is common. Like stream flow discharge, effects are usually short-term, returning to pre-fire levels as vegetation and litter layers recover (SEKI EA 2004).

Suppression and other fire management activities, especially mechanical non-fire treatments, can also impact

water resources. Disturbance of soil and litter layers during fireline construction and mechanical removal of vegetation can increase sedimentation. Fire retardant chemicals can be dropped or carried by overland flow into water, causing nutrient influxes and changes in pH. Stream flow or water quantity may be temporarily reduced by removing water from stream courses or water bodies using pumps or helicopter water buckets. Some changes to characteristics of water resources, such as nutrient levels, pH, temperature, stream flow, and sedimentation, would occur under all of the alternatives.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible to minor, short-term, localized to regional, adverse impacts on water resources in the Parks. Aggressive suppression of all wildland fires with emphasis on extinguishing each fire at the smallest possible size could result in impacts to water resources including short-term nutrient influxes, temporary changes in pH, increased temperatures, short-term increases in stream flow, and reduction in water volume due to removal of water for suppression purposes.

Alternative 2 – Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have negligible to minor, short-term, localized to regional, adverse impacts on water resources in the Parks. Overall, impacts would be less than those of Alternative 1. Prescribed fire would have fewer impacts, because projects could be planned to burn riparian vegetation (vegetation growing near the water course) in controlled conditions thereby burning less severely and thus remove less vegetation and litter layer, which would lead to less sedimentation and less increase in stream flow. Impacts from prescribed fire would be negligible to minor, temporary, and localized. Non-fire treatments would continue in open wetland areas, leading to minor, temporary, and localized impacts on sedimentation and stream flow.

Overall, impacts would be similar to those of Alternative 1, but Alternative 2 would allow managers to select strategies that minimize adverse impacts to water resources rather than focusing on extinguishing the fire at the smallest possible size. For example, managers could let a wildland fire burn out to a natural or manmade barrier like a stream or trail instead of digging firelines. Non-fire treatments would be expected to have at most a negligible, temporary impact on water resources if vegetation were reduced or removed adjacent to and in riparian areas. However, with increased prescribed fire, additional wetland areas could be burned, keeping non-fire treatment equipment and personnel out of the open wetland areas in historic vistas – thereby reducing overall impacts to stream flow and sedimentation – while maintaining the historic scene.

Cumulative Impacts

Fire management activities throughout the Parks would not be expected to contribute to cumulative adverse impacts on water resources. In the places where herbicides are used to treat exotic or invasive species, this could combine with the nutrients released by burning and leach into water resources, but this is unknown, nor are the potential impacts known. However, mitigation measures described previously used to protect soils would minimize these impacts.

Mitigation

Mitigation Measures for Water Resources Common to Both Alternatives

A number of mitigation measures for water resources apply to both alternatives equally, for Alternative 1 during fire suppression actions and for Alternative 2 during fire suppression actions, prescribed burns, and non-fire fuel reduction actions. These mitigation measures to minimize soil impacts are described below.

- Provide materials on-site at fire camps and staging areas for cleaning up spills of hazardous materials, especially fuels and lubricants.
- Do not dump flagging or other trash in standing or flowing bodies or water.

- Except in emergencies, obtain approval from a designated Resource Advisor with natural resource expertise, or from the Park's Natural Resources Office, before fording streams with vehicles or other equipment.
- Instruct firefighters in the proper disposal of human waste in camp and in the field.
- Do not apply retardants and water with chemical additives to streams or wetlands.
- If bulldozers or other heavy equipment are authorized in an emergency, add or change lubricants associated with that equipment only in places designed for this purpose. Ensure spill cleanup materials are readily available.
- Use solvents for cleaning tools, power tools, or equipment only in places designed for this purpose. Ensure spill cleanup materials are readily available.
- A Burned Area Emergency Rehabilitation (BAER) Team may be requested following a large wildland fire, based on an interdisciplinary needs analysis. When a BAER Team is requested, include one or more personnel with expertise in water resources.

Conclusion

Both alternatives would result in negligible to minor, short-term impacts to water resources. Alternative 2 would give managers at the Parks the widest range of tools to choose from to minimize impacts from any particular project or event.

Wildlife and Fisheries

Methodology for Assessing Impacts

Impacts to wildlife and fisheries were qualitatively assessed based on professional judgment and experience with comparable actions. Impacts were examined under the assumption that native wildlife and fish populations in the Parks evolved in the presence of, and are therefore to some degree adapted to, fire. In accordance with this assumption and with NPS policy, the loss of individual animals was not considered in assessing impacts of the alternatives. Area affected by fire, maintenance of habitat diversity, and risk of catastrophic loss of habitat were considered in evaluating the environmental consequences of the alternatives. Impacts on special status species, where the loss of individual animals could be important, were assessed separately in this Chapter under the heading Threatened and Endangered Species.

Impacts Common to All of the Alternatives

Fire and fire management activities affect wildlife largely to the extent that they affect vegetation. The fire itself and associated smoke can cause the death of individual animals, but this is insignificant to the population as a whole. Consumption or mechanical removal of vegetation or fuels can also remove or reduce habitat for certain species, such as when consumption of large dead and down fuels or removal of snags reduces habitat for small mammals or cavity- nesting birds, but it equally increases habitat or prey for other species, such as when raptors can hunt easily for exposed small mammals, when large trees are killed and become snags, or when succulent new growth provides browse for deer. The mosaic pattern of most fires creates a natural diversity of habitat while leaving refugia for fire-sensitive species. Although impacts to wildlife could be moderate and long-term, there would be both adverse and beneficial impacts.

Fire and fire management activities affect fisheries to the extent that they affect water resources. Fire retardant chemicals can be toxic to fish and other aquatic wildlife. Changes in water resources also change habitat for water-dwelling species; for example, an increase in water temperature due to reduction in canopy cover, whether by prescribed fire or by non-fire treatments such as mechanical removal, may make water too warm for certain fish species. Another example is when increased sediment influx makes the water column too silty for certain species. Because impacts to water resources would be negligible to minor, impacts to fisheries resources would also be negligible to minor.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have minor to moderate, short- to long-term, localized, adverse and beneficial impacts on wildlife and fisheries in the Parks. Aggressive suppression of all wildland fires with emphasis on extinguishing each fire at the smallest possible size would result in impacts to vegetation and water resources, such as reduced sprouting of riparian vegetation and sedimentation, which would have adverse impacts on wildlife and fisheries, such as reduced nutrient-rich browse and changes in water pH. Suppressing wildland fires at the smallest possible size would prevent large fires from burning in mosaic patterns and would therefore reduce natural habitat diversity.

Alternative 2 – Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have minor to moderate, short- to long-term, localized, largely beneficial but occasionally adverse impacts on wildlife and fisheries in the Parks. Overall, adverse impacts would be less than those of Alternative 1 and benefits would be greater. Prescribed fire would have fewer adverse impacts and far more beneficial impacts, because projects would be planned to minimize adverse impacts to vegetation and water resources and to maximize benefits to wildlife and fisheries, such as increasing browse or exposing prey. Alternative 2 allows managers to select strategies that minimize adverse impacts to natural resources rather than focusing on extinguishing the fire at the smallest possible size, and maximizing opportunities for creation of natural vegetation mosaics. Over time, the impacts of wildland fire would be largely beneficial - for example, by creating mosaics for habitat diversity.

Non-fire treatment activities, especially mechanical treatments, would be expected to have negligible to minor impacts on wildlife and negligible impacts on fisheries. Impacts on wildlife would be primarily from modification of vegetation resulting in alteration of habitat, and impacts would be similar to those from modification of habitat by fire. Activity and noise related to vegetation removal could have impacts: individuals could be alarmed or frightened away. These impacts would be negligible because non-fire treatment areas are small so animals would have plenty of places to go to and not far to get there to avoid the disturbance, treatments usually take place slowly so animals would have time to escape, and few individuals would be disturbed relative to the population as a whole. Activities would be planned to minimize impacts on fisheries – for example, by leaving sufficient shading over watercourses and by not depositing debris into watercourses.

Cumulative Impacts

There are many factors impacting the Parks' and the region's wildlife and fisheries communities, including air quality that hovers between remaining poor and improving slightly, climate change, invasion by nonnative pests and pathogens, an increase in nonnative invasive animals, and a long history of fire exclusion. Mowing and herbicide treatments in the Parks are probably having cumulative impacts on wildlife and resulting in individual deaths of wildlife from these treatments, Wildand fire suppression, prescribed fires, and non-fire fuel reduction treatments would have further cumulative adverse impacts on wildlife and fisheries in the Parks. However, wildlife and fisheries impacts would be minor, and recover quickly. Alternative 2 would promote fire in areas in the Parks and tend to reduce future detrimental impacts from wildland fires. The contribution of Alternative 2 to the overall cumulative impact on wildlife would be negligible to minor, and short-term in duration.

Although ash fall and sediment transport during and after fire events would contribute incrementally to pollution inputs, wetlands would filter ash and sediment run-off from the burned areas until green-up occurs, thereby making these inputs short-term in duration, localized to the burn areas, and have a negligible impact on wildlife and fisheries in the Parks.

Mitigation
Mitigation measures for reducing impacts to Vegetation described above also apply to Wildlife and Fisheries.

Conclusion

Both alternatives would result in minor to moderate, short- to long-term, localized, beneficial and adverse impacts to wildlife and fisheries. Alternative 2 would give managers at the Parks the widest range of tools to choose from to manage impacts.

Cultural Resources

Methodology for Assessing Impacts
Impacts on cultural resources were assessed qualitatively through review of the Parks literature, consultation with the Parks cultural resource experts, professional judgment, and experience with similar actions. The effects of fire on cultural resources are not well understood or documented. Thus, the following discussion of potential impacts of fire and fire management on cultural resources is general and somewhat speculative. Impacts were assessed based primarily on the likely extent of ground disturbance and the level of pre-planning possible to mitigate impacts.

Impacts Common to Historical Structures, Archeological Resources and Cultural Landscapes
Unwanted wildland fire is unpredictable and therefore impacts are uncontrollable. However, impacts from suppression activities are controllable to a certain degree.

Mitigation described for the Alternatives would help prevent adverse impacts to the known cultural resources at the two parks and would reduce the likelihood of impacts to unknown sites. Due to the limited nature of the information about archeology at the two parks, it is possible that some unknown sites, or objects could be impacted during a fire event.

Historical Structures

Impacts Common to Both of the Alternatives

Fires themselves can and often do destroy historic structures or properties, especially those constructed of wood or other flammable material. Direct ground disturbance associated with the building of fire lines and with mechanical fuel treatment activities can impact historic resources directly. Mechanical activities can physically damage or move resources or parts of resources. Besides being directly scorched or consumed by fire, resources can be chemically or physically altered by heat. For example, several dating techniques are no longer useful after the resource has been exposed to even relatively low intensity fires.

Impacts Specific to Each Alternative
Alternative 1 – No Action: Fire Suppression. Alternative 1 fire suppression actions could have minor to moderate, permanent, localized, adverse impacts on historical resources.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have fire suppression impacts similar to those of Alternative 1. Prescribed fires and non-fire treatments would be planned to have negligible adverse impacts on historical resources. Some prescribed fire and non-fire fuel treatment activities would be designed to have beneficial impacts such as reducing fire risk to structures by reducing fuels around historic structures.

Cumulative Impacts

Present and reasonably foreseeable future actions have and continue to contribute impacts to historical resources in and around the Parks. Fire management activities would have minor, short-term impacts (smoke and accessibility) to the overall scene, but should have little actual impact on the historical resources in the Parks. Over time forces such as corrosion, erosion, microbial action, weathering, rainfall, oxidation, and vandalism all take their toll on the continued existence and integrity of these resources.

Mitigation

Fire management activities within the Park will be carried out in a manner that minimizes impacts to the Park's historic resources. A number of mitigation measures for cultural resources including historic structures apply to both alternatives equally, for Alternative 1 during fire suppression actions and for Alternative 2 during fire suppression actions, prescribed burns, and non-fire fuel reduction actions. These mitigation measures to minimize historic resource impacts are described below.

Mitigation Measures for Historic Structures Common to Both Alternatives

- Locate incident facilities at pre-determined staging areas identified in GIS data layers and on maps found in the Park's GIS. Approval of the Superintendent or his/her designee is required for exceptions.
- Suppression personnel must choose methods and equipment commensurate with suppression needs and a strategy that will least disturb Park historic resources.
- The Park's Superintendent will designate a Cultural Resource Technical Specialist(s) to provide daily direction regarding the location and protection of cultural resources projected to be impacted by a wildland fire.
- Sensitive areas are identified in GIS data layers. As soon as possible during initial attack, and daily during extended attack, the Incident Commander will notify the Communications Center - EICC (or Fire Dispatcher, if one is used during extended attack) of the location of the fire, and the Communications Center will notify the Incident Commander of sensitive areas within or in the path of the fire. Avoid these areas whenever possible during suppression operations. If initial attack operations are required in these areas, water, "wet" water, foam, leaf blowers, and claw or leaf rakes are the preferred suppression tools.
- Use minimum impact suppression tactics (MIST) during all fire management activities. In addition to measures for protecting soils, tactics relevant to cultural resources include:
    - Minimize tree-falling. Snags within or adjacent to firelines will be removed only if they show evidence of fire, present hazard to firefighters, or constitute a legitimate threat to the integrity of the fireline. Living trees will be left undisturbed as much as possible. Lower branches will be limbed to remove ladder fuels rather than removing whole trees (ladder fuels are fuels which provide vertical continuity between strata, allowing fire to carry from surface fuels into
      the crowns of trees or shrubs).
    - After the emergency is over, transport personnel, equipment, and trash out of the Park in a manner that is consistent with Park management objectives.
    - In the event that the use of bulldozers is authorized in an emergency, assign an archeologist, or cultural resource specialist to the bulldozers to minimize damage to resources.
    - Favor a consumption strategy during mop-up operations to minimize disturbance to buried cultural resources (a consumption strategy means that smoldering fuels are allowed to burn up instead of using tools or other potentially destructive methods to extinguish them).

- The Streamlined Section 106 Review Process may be used only if the Parks have an approved fire

management plan .

- Consistent with the approved fire management plan, this streamlined activity includes the following undertakings, as well as others that are comparable in scope, scale, and impact:
    1. Removal of dead and downed vegetation, outside of historic districts, cultural landscapes, and archeological sites, using equipment and methods that do not introduce ground disturbance beyond documented natural and historic disturbance.
    2. Removal of dead and downed vegetation, as well as trees and brush located within historic properties, if the vegetation does not contribute to the significance of the historic property and equipment and methods are used that do not introduce ground disturbance beyond documented natural or historic disturbance.
    3. Forest management practices, including thinning of tree stands, outside of historic districts, cultural landscapes, and archeological sites, using equipment and methods that do not introduce ground disturbance beyond documented natural or historic disturbance.
    4. Restoration of existing fire line disturbances, such as hand lines, replanting with native plants and/or grasses, placement of straw bales, wattles, and felling of dead trees when the root ball is left intact and in situ.
- Installation of Environmental Monitoring Units: The Streamlined Review Process may be used for the placement of small-scale, temporary or permanent monitoring units, such as weather stations, termite bait stations, water quality, air quality, or wildlife stations, in previously disturbed areas, as determined by a qualified archeologist, or areas inventoried and found not to contain historic properties. Borings must be limited to pipes less than 2 inches in diameter and surface samples to less than 12 inches in size and minimal in number.

Conclusion

Alternative 1 would have negligible to minor adverse impacts from fire suppression actions, and Alternative 2 would have both minor adverse and beneficial impacts on historical resources from fuel load reductions around historic structures through prescribed fires and/or non-fire fuel load reduction treatments.

Archeological Resources

Impacts Common to All of the Alternatives

The risk to archeological resources is from both the ground disturbance associated with building of firelines and from the heat and flames of the fire itself.

Significant archeological sites often contain buried culturally-related items of metal, glass, fabric, ceramics, bone and other materials. Clearing firelines associated with fire suppression activities can damage subsurface archeological resources by exposing, crushing, rearranging, or removing them. Resources can be physically damaged or destroyed, and the scientific information they could furnish is often lost forever when they are disturbed or removed from their context.

The amount of surface and subsurface heating has a direct impact on buried archeological resources. The three major factors involved in determining the nature and extent of soil heating are fire intensity, duration of heat, and heat penetration into the soil. Fuel loading, fuel moisture content, and weather are considered to be the most important influences on fire intensity. Hotter surface fires penetrate more deeply into the subsurface and can potentially cause more damage. On several documented wildfires in the southwest, the severity of burning at sites seemed to correspond closely to the density of the fuel load adjacent to and on the site. Research with in-place artifacts during prescribed fires in Minnesota state Parks indicates that depth of heat penetration is related to soil texture and moisture. Soil heating occurred to a greater depth on sandy and rocky soils, while soils high in clay had limited heating (GRPO 2004). Clay soils are common in the Parks.

The vulnerability of subsurface archeological resources and artifacts to fire depends not only on the intensity of the

fire and on soil moisture but on the nature of the materials themselves. Besides being directly consumed by fire, artifacts can be physically or chemically altered by heat. For example, glass bottles can be cracked or broken, while objects carved or chipped from stone are likely to be more resistant to fire and heat.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 could have minor to moderate, permanent, localized impacts, such as crushing or scattering during suppression activities, on archeological resources from suppression activities.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have fewer impacts to Archeological resources than those of Alternative 1. Impacts from suppression activities would be fewer because an appropriate management response would allow fires to be suppressed at a larger size if such a strategy would minimize damage to archeological resources - for example, by using natural or manmade barriers instead of constructed fireline to stop fire spread. Prescribed fire activities would be planned to have negligible impacts on archeological resources. Non-fire fuel treatments, especially mechanical treatments, can also have impacts on archeological resources. As with fire suppression activities, soil disturbance can damage subsurface archeological resources by exposing, breaking, crushing, trampling, rearranging, or removing them, but treatment activities would be carefully planned and approved by cultural resources staff to minimize the chances that such damage could occur. Overall, impacts would be negligible to minor, permanent, and localized.

Cumulative Impacts

Archeological resources are limited, non-renewable, and often fragile. Over time, forces such as corrosion, erosion, microbial action, weathering, rainfall, oxidation, and vandalism all take their toll on the continued existence and integrity of these resources. Post-fire observations are often unable to distinguish between damage to archeological resources caused by the fire itself and damage that was pre-existing. Wildland fire could be managed so as to have minimal impact by choosing locations to construct firelines, or to use existing natural or manmade fire breaks. In Alternative 2, prescribed fire could be managed to be culturally sensitive; so as to choose areas with little or no chance of disturbing the archaeological record. Overall cumulative impacts would be negligible to minor, and localized, however, if a culturally sensitive area were to be disturbed, the impacts would be long-lasting.

Mitigation

Fire management activities within the Park will be carried out in a manner that minimizes impacts to the Park's archeological resources. A number of mitigation measures for cultural resources including archeological resources apply to both alternatives equally, for Alternative 1 during fire suppression actions and for Alternative 2 during fire suppression actions, prescribed burns, and non-fire fuel reduction actions. Mitigation measures to minimize impacts to archeological resources applied only to prescribed burns or non-fire fuel reduction treatments are specific for Alternative 2. These mitigation measures to minimize soil impacts are described below.

Mitigation Measures for Archeology Resources Common to Both Alternatives

Mitigation measures described for Historic Structures above also apply to Archeological Resource. Additional mitigation specific for archeological resources are as follows:

- Archeologically sensitive areas are identified in GIS data layers. As soon as possible during initial attack, and daily during extended attack, the Incident Commander will notify the Communications Center - EICC (or Fire Dispatcher, if one is used during extended attack) of the location of the fire, and the Communications Center will notify the Incident Commander of sensitive areas within or in the path of the fire. Avoid these areas whenever possible during

suppression operations. If initial attack operations are required in these areas, water, "wet" water, foam, leaf blowers, and claw or leaf rakes are the preferred suppression tools.
- In the event that the use of bulldozers is authorized in an emergency, assign an archeologist, or cultural resource specialist to the bulldozers to minimize damage to resources.
- Favor a consumption strategy during mop-up operations to minimize disturbance to buried cultural resources (a consumption strategy means that smoldering fuels are allowed to burn up instead of using tools or other potentially destructive methods to extinguish them).
- Following completion of activities under this section, post-burn inspection and monitoring should be conducted by a qualified archeologist to ensure no archeological sites were impacted or previously unknown sites revealed.

Mitigation Measures for Archeology Resources Specific for Alternative 2

- Ensure that all prescribed fire and non-fire fuels treatment plans have a section addressing the impacts of the fire on cultural resources contained within the projected fire area, a description of the susceptibility of these resources to damage from fire effects, and a description of the mitigation actions to be taken by personnel involved in fire line operations.
- Ensure that all prescribed fire and non-fire fuels treatment activities that may take place are fully reviewed for Section 106 compliance before implementation by the Parks' Cultural Resource Manager and the Parks' cultural resource management advisor team for cultural resource impacts and acceptable mitigation or avoidance measures.
- Exclude historic structures, including ruins of historical structures (not including earthworks), from prescribed fire treatment unit. When this is not possible, use leaf blowers to remove fine fuels such as leaves from the interior of structures or ruins to minimize the fuel bed available to spotting embers.
- If the project activities include ground disturbance, archeological monitoring may be appropriate throughout the ground disturbing activities, in accordance with any recommendation of the Cultural Resource Management (CRM) Team. When monitoring is recommended, members of any appropriate Federally recognized Indian Tribes may be invited to participate in monitoring.
- Following completion of activities under this section, post-burn inspection and monitoring should be conducted by a qualified archeologist to ensure no archeological sites were impacted or previously unknown sites revealed.

Conclusion

Both alternatives could have some adverse impacts on archeological resources. Alternative 1 has the greatest potential to cause impacts to archeological resources because it involves the most aggressive suppression activities potentially involving creation of new firelines and use of heavy equipment over archeological sites.

Cultural Landscapes

Impacts Common to Both of the Alternatives

Significant cultural landscapes are usually associated with human-altered natural features or with historic districts. They are impacted by fire or fire management activities insofar as the fire or activities alter the vegetation or soils of the landscape. Pre-planning for wildland fire would minimize the possibility of impacts to known cultural landscapes. Therefore, the greatest potential for adverse impacts is from fire suppression activities such as ground disturbance and clearing of brush to create firelines.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 could have minor to moderate, short- to long-term, localized impacts on cultural landscapes from fire suppression activities.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have fewer impacts on Cultural Resources than Alternative 1. Impacts from suppression activities would be fewer because an appropriate management response would allow fires to be suppressed at a larger size if such a strategy would minimize damage to cultural landscapes (e.g., reduce the need for ground disturbing actions associated with creating new fire lines).

Prescribed fire treatments would be planned to avoid or minimize adverse impacts to cultural landscapes, and they would be expected to have negligible adverse short-term impacts. Some prescribed fire treatments are planned to assist in the maintenance of cultural landscapes, such as by using fire to maintain a clearing that was historically maintained; these would be beneficial impacts.

Non-fire treatments can adversely affect cultural landscapes by removing vegetation that may be important to a historic scene. In contrast, non-fire fuel reduction treatments can also have beneficial impacts by reducing the risk from unwanted wildland fire by reducing fuels.

Overall, adverse impacts of Alternative 2 on cultural landscapes would be negligible to minor, temporary to long-term, and localized, and beneficial impacts would be similar.

Cumulative Impacts

There are many factors impacting the Parks' cultural landscapes, including succession, climate change, invasion by nonnative pests and pathogens, and increase in nonnative invasive plants. Succession is a naturally occurring event; over time, if the Parks do nothing to maintain the landscape, the open fields would turn into mature hardwood forests. If the Parks do nothing to manage nonnative pests, they would eventually be overrun with exotic plants, and would lose native bio-diversity of the existing open fields. The Parks are currently managing the open fields of our cultural landscape with a combination of bush-hogging and mowing. This management regime is precluding succession, and aiding in controlling exotic invasive pests, while also decreasing needed bush-hogging. While Alternative 1 could combine with these impacts to worsen the condition of cultural landscapes by exposing them to potentially destructive suppression activities, Alternative 2 would not be likely to contribute incrementally to adverse impacts to cultural landscapes. Overall, Alternative 2 would likely have more long-term beneficial cumulative impacts.

Mitigation

All of the mitigation measures for cultural resources for Historic Structures described above would also reduce impacts to Cultural Landscapes in both Alternatives.

Conclusion

All of the alternatives could have some adverse impacts on cultural landscapes. Alternative 1 has the greatest potential to cause impacts to cultural landscapes because it involves the most aggressive suppression activities. Alternatives 2 would have similar impacts, but less than those from Alternative 1.

Parks Facilities and Operations

Methodology for Assessing Impacts

Impacts to facilities and operations at GETT/EISE were assessed qualitatively by using discussions with the park staffs, professional judgment, and experience with similar actions to predict the likely effects of wildland fires, prescribed fires, and fire suppression on normal Parks operations.

Impacts Common to All of the Alternatives

Fires can potentially affect operations at National Parks, especially in developed sites like visitor centers, administrative and maintenance facilities, and concessionaire- operated services. Fire activities have the potential

to cause changes or curtailment of concession and visitor services. Impacts can occur directly from the threat to facilities, and indirectly from smoke and the diversion of personnel to other projects. Roads normally used for maintenance operations may be closed for short periods of time during wildland fires. Field operations such as data collection, herbicide application, or trail maintenance may be disrupted during wildland fires. All impacts would last no longer than the period of time during the fire event, usually not more than 12 to 36 hours, and generally impact only the area of the Parks immediately adjacent to the fire area.

In the event of a severe wildland fire, some Parks staff would be diverted from their regular duties for directly fire-related activities (all red-carded staff in the Parks). Wildland fires are beyond the control of the proposed Fire Management Plan.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible to minor, temporary, localized, adverse impacts on Parks facilities and operations. While a large, severe unwanted wildland fire could have significant impacts, such an event is unpredictable and uncontrollable under all of the alternatives. Wildland fire suppression is the primary responsibility of outside fire fighting agencies, and little changes in park staff activities would occur during wildfire fire suppression events in the Parks.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have minor to moderate, temporary, localized, adverse impacts on Parks facilities and operations, more impacts than Alterative 1. Impacts of suppression activities would be similar to those of Alternative 1. Prescribed fires are planned activities and would require participation of staff from the Parks as well as regional fire staff, resulting in expected minor adverse impacts on park operations. Similarly, non-fire fuel treatment activities would be expected to have minor impacts on operations at the Parks. Overall, this alternative would likely have minor adverse impacts on park operations due to requirements for park staff to participate in prescribed burns and non-fire fuel load treatment.

Cumulative Impacts

There are no other reasonably foreseeable events or actions that would combine with any of the proposed FMPs to produce cumulative impacts on the Parks facilities or operations.

Mitigation

Mitigation measures for Park Facilities and Operations are for prescribed burning and non-fire fuel reductions, and therefore, are only specific for Alternative 2. Most of the measures involve informing park neighbors and surrounding public of future prescribed burns. Parks neighbors are those private parties having property within or immediately adjacent to the boundaries of the Parks. These parties can be directly impacted by fire management activities in both positive (beneficial impacts) and adverse (adverse impacts) ways. Keeping park neighbors informed of fire management activities is a key component of mitigating adverse impacts of those activities. In order to accomplish this:

Mitigation Measures for Park Facilities and Operations Specific for Alternative 2

- Notify landowners having property adjacent to prescribed fire units of the planning process via press release or other means.
- Each spring before prescribed burning begins, the Parks would prepare and release a press release describing the locations, objectives, and planned treatment windows of prescribed fire projects planned for initiation in the following spring, summer, and fall. The notice would be released to at least one newspaper covering each of the counties that may be affected by smoke from any of the prescribed fires. The notice would include a contact name

and number for more information.

- Use the Parks web site to provide information, or links to information, about fire ecology and about prescribed fire activities in the Parks.
- Inform all parties requesting or receiving information about fire operations in the Parks about the web site as a source of updated and detailed information.

Conclusion

Alternative 2 would have greater adverse impacts on park operations due to changes in staffing times needed for prescribed fires and/or non-fire fuel reduction activities.

Visitor Use and Experience

Methodology for Assessing Impacts

Impacts to visitor use and experience at GETT/EISE were assessed qualitatively by discussions with Park staffs, professional judgment, and experience with similar actions to predict the likely effects of wildland fires, prescribed fires, and fire suppression on the way visitors use and experience the Parks.

Impacts Common to Both of the Alternatives

Fires and fire management activities can have a wide variety of both beneficial and adverse impacts on visitor use and experience. Smoke from fires can reduce visibility, be perceived as smelling unpleasant, and aggravate health conditions. Facilities such as visitor centers may be closed due to staff's being needed elsewhere in the Parks, to smoke conditions, to direct threat from the fire, or to use of the facility for fire operations. Trails or roads may be partially or fully closed to allow access by emergency vehicles or to avoid to risks to public safety. Noise or activity from fire management activities may be distracting or offensive. Burned areas may be perceived as unattractive or, once new growth has begun, as exceptionally attractive. Educational and ranger-led programs may change in topic or content in response to fires in the Parks.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have minor, temporary to short-term, localized, beneficial and adverse impacts on visitor use and experience in the Parks. Suppression activities could have all of the impacts described above.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have similar fire suppression impacts similar to Alternative 1. Prescribed fire activities would be planned to minimize impacts, but would still have occasional impacts, especially to air quality, aesthetics, and visitor access. Non-fire treatments would have negligible impacts on visitor use and experience. Visitors may feel they are getting a mixed message regarding non-fire treatments, especially mechanical treatments, as vegetation is manipulated and often removed in a Parks setting that is otherwise protected from human disturbance. Overall, Alternative 2 adverse impacts to visitor use and experience would be expected to be minor, temporary, and localized.

Cumulative Impacts

There are no other reasonably foreseeable events or actions that would combine with any of the proposed Alternatives to produce cumulative impacts on visitor use and experience.

Mitigation

Mitigation measures for reducing adverse impacts to visitor use and experience are divided into mitigation common to both alternatives and mitigation applied to prescribed burns or non-fire fuel reductions that are specific for Alternative 2. Many of the above measures (especially related to smoke and safety) will mitigate

the impacts of the fire management program on visitor use and experience.

Mitigation Measures for Visitor Use and Experience Common to Both Alternatives

- The Park will undertake an information and education program to ensure that citizens, key contacts, and employees understand the current status of the fires within the Park and the mission of the specific action(s) being taken.

Mitigation Specific for Alternative 2

- Conduct treatments or projects which could disrupt visitor experience in any way, such as the use of chainsaws to remove brush around a structure, during periods of low visitation (spring or late fall rather than summer) whenever possible.

Conclusion

Both of the alternatives would have minor, temporary to short-term, localized, beneficial and adverse impacts. None of the alternatives would result in impacts that would impair visitor use and experience at the Parks.

Social and Economic Environment

Human Health and Safety

Methodology for Assessing Impacts

Impacts to human health and safety were assessed qualitatively by using discussions with Park staff, professional judgment, and experience with similar actions to predict the likely effects of wildland fires, prescribed fires, and fire suppression on the health and safety of the public, Parks visitors, Parks staff, and firefighters. The alternatives were evaluated based on each one's ability to minimize the exposure of firefighters and others to direct and indirect hazards of the fire itself, and ability to minimize exposure of firefighters, park staff, visitors, and others to wildland and prescribed fire smoke.

Impacts Common to All of the Alternatives

There are two major categories of health and safety issues. The first is activity-caused injuries or fatalities. This includes direct injury to the public, visitors, or staff by the fire itself, such as by being burned by the heat of the fire. It also includes indirect injury, such as injury by falling rocks or trees loosened or weakened by the fire, or by fire suppression activities. Injuries to firefighters are infrequent but do occur, and are managed through the use of personal protective equipment, training, safety briefings, qualification standards, and other elements of an aggressive safety program. Injuries to members of the public and to park staff are very rare.

The second category is the health and safety impacts of smoke generated by fires. The risks are well-studied and include carbon monoxide, hydrocarbons, and particulates found in smoke. Most byproducts of combustion that are of health concern are concentrated on the fireline, and decrease to negligible levels in very short distances. Fine particulates, however, can travel long distances from the fire in smoke. Smoke impacts are related to the amount of fuel consumed and how efficiently it burned, not to the size of the burned area (SEKI EA 2004).

Firefighters are exposed to the greatest health risks from smoke on or near firelines. Standard firefighting practices are practiced to minimize exposure, including planning location of fires to minimize exposure, rotating personnel out of smoky areas at regular intervals, and providing sleep areas away from smoke accumulations during extended attack events. The greatest risk to the health of park visitors, staff, and other public is from fire particulates in smoke, because these can travel long distances from the fire. Local weather patterns affect smoke mixing and dispersal patterns, especially at night.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would result in negligible to minor, temporary to short-term, localized to regional, adverse impacts on human health and safety. While unwanted wildland fires are unpredictable and therefore their impacts cannot be managed by any of the alternatives, suppression activities can expose firefighters to measurable risks.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have negligible to moderate, temporary to short- term, localized to regional, adverse and beneficial impacts on human health and safety. There would be slightly more adverse impacts than those of Alternative 1 because additional areas would be burned using prescribed fire. Prescribed fire activities would be planned to minimize impacts, but all impacts cannot be eliminated. Risks to firefighter safety would be less adverse compared to Alternative 1 through the use of an appropriate management response to unwanted wildland fires. Impacts to Park staff and the public, such as exposure to smoke, would be more adverse than under Alternative 1 because of the presence of more fire on the landscape due to wildland fire suppression and prescribe burning.

Cumulative Impacts

For the most part, neither of the alternatives would combine with any reasonably foreseeable future action or event to contribute incrementally to adverse impacts on human health and safety. While fire projects would be managed to minimize impacts, some individuals may be sensitive or susceptible to smoke impacts. Alternative 2 could contribute to cumulative impacts on the health of these few individuals.

Mitigation

Mitigation measures for reducing adverse impacts to human health and safety are divided into mitigation for fire suppression common to both alternatives and mitigation applied to prescribed burns or non-fire fuel reductions that is specific for Alternative 2.

Mitigation Measures for Health and Safety Common to Both Alternatives

- Park personnel will exchange information concerning wildland and prescribed fire at Visitor Centers, and at all public use facilities throughout the Park.
- Inform Park staff about wildland or prescribed fire operations through Park radio announcements, and information sent out via email.
- Inform Park visitors about wildland or prescribed fire operations through public radio announcements, notices on the Park web site, site bulletins, and personal contacts with Park staff. Inform visitors about fire danger status, trail and road closures, and areas where smoke might be present along roads, trails, and other visitor use areas.
- The Division of Natural Resource Management and Visitor Protection is responsible for enforcing all closures, and the Burn Boss will ensure that closure and informational signs on all prescribed fires are properly posted.
- Include mention of power lines, propane tanks, or gas lines in safety briefings for every fire operation in which any of these features might be encountered.
- Ensure that a Safety Officer or Public Information Officer is assigned to all extended- attack wildfires, and prescribed burns larger than 10 acres.
- Assure visitor safety will be given a higher priority than fire suppression and monitoring activities. For example, personnel will be drawn from monitoring and suppression forces to ensure visitor safety if necessary.
- Any time human life is endangered, take all necessary means to warn or evacuate visitors and neighbors.
- Limit or prevent visitor use near wildland fires and potentially affected areas.

Mitigation Measures for Health and Safety Specific for Alternative 2

- Plan prescribed fires to prevent heavy smoke volume under high-tension power lines.
- When propane tanks or gas lines are present within prescribed burn units, prepare fuels before ignition to prevent direct flame impingement on these features.
- Ensure NPS personnel are available to patrol the perimeter of prescribed fires to inform visitors about the role of fire in a natural area, explain the risks associated with approaching too close to a fire, and enforce visitor compliance with area closure orders.

Conclusion

Both of the alternatives would have adverse impacts on human health and safety with Alternative 2 likely having potential for more intense impacts (i.e., negligible to moderate adverse impacts) compared with Alternative 1 (negligible to minor adverse impacts) due to more fire and non-fire management events. Neither alternative eliminates all health and safety concerns. Safety of firefighters, the public, and other staff is always the highest priority for all fire management actions under all of the alternatives. Nonetheless, Alternative 2 gives managers the most flexibility to choose the tools that could minimize adverse impacts while accomplishing management goals.

Transportation

Methodology for Assessing Impacts

Impacts of the alternatives on transportation were qualitatively assessed based on professional judgment, experience with similar actions, and consultation with Park staffs. Alternatives were compared based on impacts to roads outside and inside the Parks.

Impacts Common to Both of the Alternatives

Wildland fire events could have impacts on transportation in and around the Parks. Outside of the Parks, smoke passing over a roadway can be dense enough to impede vision and make road conditions hazardous for short periods of time. Visitor traffic on main Parks roads may be temporarily slowed, reduced to one lane, or closed for the duration of a fire event, reducing visitor access. Impacts would last no longer than the time the fire is burning. Within the Parks, administrative roads used for maintenance and other access may be temporarily closed due to poor visibility or to facilitate access by firefighting equipment.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible to minor, temporary, localized, adverse impacts on transportation in and around the Parks. As described above, impacts would result from road closures, especially within the Parks, and the safety risk if drifting smoke from a fire were to reduce visibility on a roadway.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). Alternative 2 would have impacts similar to those of Alternative 1 for wildland fires. Prescribed fire events would be planned to minimize transportation impacts by burning under wind conditions that blow smoke away from roadways and by using traffic control personnel to manage traffic during periods of reduced visibility. In very rare cases, a non-fire, especially mechanical, fuels treatment project may necessitate the temporary closure of public roadways, or park roads, such as to protect travelers from a felled tree, but the duration of the impact would not be more than one hour. Non-fire fuel treatment projects would have a negligible impact on transportation. Overall, Alternative 2 would likely have negligible to minor adverse impacts on transportation.

Cumulative Impacts
No reasonably foreseeable future event or management action would be expected to combine with any alternative to contribute to cumulative impacts on transportation in or near the Parks.

Mitigation
There are no mitigation measures for transportation proposed for either alternative.

Conclusion
Neither of the FMP alternatives would substantively affect transportation in and around the Parks. One exception is the possible temporary closure of roads during fire suppression activities or because of heavy smoke emanating from wildland fires or prescribed burns. Over the long term, closures would be infrequent and would not significantly impinge on local transportation. Both of the alternatives would have negligible to minor, temporary, localized impacts on transportation in and around the Parks.

Utilities

Methodology for Assessing Impacts
Impacts of the alternatives on utilities within the Parks were assessed qualitatively based on professional judgment, experience with similar actions, and consultation with Parks staff.

Impacts Common to All of the Alternatives

Heavy smoke from wildland fire has been known to cause arcing from high-tension power lines. The gas contained in gas lines is flammable. It is possible that extreme heat from a fire could damage the pipe line, but this is unlikely. It is more likely that ground disturbance during fire suppression activities, especially due to the use ofheavy equipment, might physically damage gas pipe lines. Access to utility lines by utility staff could be temporarily denied during a fire event to protect the safety of utilities staff or to ensure that roadways are free to allow access for emergency or firefighting vehicles. Utility equipment could be damaged by the passing flame of a fire.

Impacts Specific to Each Alternative

Alternative 1 – No Action: Fire Suppression. Alternative 1 would have negligible to minor, temporary, localized, mostly adverse impacts on public or private utilities within the Parks from wildland fire suppression activities.

Alternative 2 - Fire Suppression, Expanded Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative). The fire suppression impacts of Alternative 2 would be similar to those from Alternative 1. Prescribed burning or non-fire fuels treatments in utilities corridors would have the beneficial impact of helping to keep the corridor open for utility access. Non-fire fuels treatments would be planned to have no adverse impact on utilities. Overall, Alternative 2 would have negligible to minor temporary adverse impacts, and some beneficial impacts on utilities in the Parks.

Cumulative Impacts
No reasonably foreseeable future event or management action would be expected to combine with any of the alternatives to contribute to cumulative impacts on utilities within the Parks. Both of the alternatives would have negligible to minor, temporary, localized impacts on public and private utilities within the Parks.

Mitigation
Mitigation measures proposed for utilities are for prescribed fires and therefore are specific only to Alternative 2.

Mitigation Measures of Utilities Specific for Alternative 2

- Plan prescribed fires to prevent heavy smoke volume under high-tension power lines.
- When propane tanks or gas lines are present within prescribed burn units, prepare fuels before ignition to prevent direct flame impingement on these features.

Conclusion

Alternative 2 would have some benefits to utilities by keeping the utility lines open through the use of prescribed fire and/or mechanical removal woody vegetation.

Public Involvement, Consultation and Coordination

Public Involvement

As required by NPS policies and planning documents, it is the Parks' objective to work with state, federal, and local governmental and private organizations to ensure that the Parks and its programs are coordinated with theirs, and are supportive of their objectives, as far as proper management of the Parks permits, and that their programs are similarly supportive of Parks programs.

Consultation and coordination have occurred with numerous agencies for the development of the alternatives and preparation of the EA. The following, organizations, and agencies were contacted for information, which assisted in identifying important issues, developing alternatives, and analyzing impacts:

Delaware Nation
Pennsylvania State Historic Preservation Office
Pennsylvania Department of Conservation and Recreation
Pennsylvania Department of Forestry

Public Notice/Public Scoping

In order to give the public and all interested parties a chance to review the EA, it would be noticed for public comment for a minimum of 30 days through local newspapers and on the world-wide-web. During this 60-day period, the EA would be available for review at the Visitor Center of the Gettysburg National Battlefield, on the NPS Planning, Environment, and Public Comment web site at http://Parkplanning.nps.gov/GETT. Copies of the EA would also be sent to applicable Federal, State, and local agencies for their review and comment.

Document Review

The following persons, agencies, municipalities, and organizations were solicited to review this Environmental Assessment, or requested and were granted the opportunity to review it:

- Doug Wallner, Fire Management Officer, NPS Northeast Region
- Jacki Katzmire, Regional Environmental Coordinator, NPS Northeast Region
- Pennsylvania Department of Conservation and Recreation, Division of Natural Heritage
- Cliff Lively, Area Fire Management Officer, Delaware Water Gap
- United States Fish and Wildlife Service
- Delaware Tribe of Indians
- Pennsylvania Historic Museum Commission Bureau for Historic Preservation

Preparers

The following persons participated in the preparation of this EA

- Haynes Currie, Environmental Protection Specialist, Chesapeake Bay Program Office
- Sara Koenig, Biologist, Gettysburg National Military Park
- Zachary Bolitho, Natural Resources, Gettysburg National Military Park

References and Literature Cited

Abrams, M.D. 2003. Where has all the white oak gone? BioScience 53 (10): 927-939.

Abrams, M. D. 1996. Distribution, historical distribution, and ecophysical attributes of oak species in eastern United States. Annales des Sciences Forestieres 53:487–512.

Abrams, M.D. 1992. Fire and the development of oak forests. BioScience 42: 346-353.

Angeler, D.G.; Rodriguez, M.; Martin, S.; and Moreno, J.M. 2004. Assessment of application-rate dependent effects of a long-term fire retardant chemical (Fire Trol 934®) on *Typha domingensis* germination. Environment Internat'l 30 (3): 375-381.

Brose, P.; Schuler, T.; Van Lear, D.; and Berst, J. 2001. Bringing fire back: the changing regimes of the Appalachian mixed-oak forests. Journal of Forestry November 200l.

Clinton, B.D.; Vose, J.M.; Knoepp, J.D.; and Elliott, K.J. 2003. Stream nitrate response to different burning treatments in southern Appalachian forests. Pp 174-181 *in* Galley, K.E.M.; Klinger, R.C.; and Sugihara, N.G. (eds.). Proceedings of Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 13. Tallahassee, FL: Tall Timbers Research Station.

California University of Pennsylvania's Tourism Research Center 2008 *Gettysburg Intercept Visitor Study;* 2010 *Gettysburg Intercept Visitor Study*.

Cuff, D. J., W. J. Young, E. K. Miller, W. Zelinsky, and R. F. Abler, editors. 1989. The Atlas of Pennsylvania. Temple University Press. Philadelphia, PA. 288pp.

DeBano, L.F.; Neary, D.G., and Ffolliott, P.F. 1998. Fire's Effects on Ecosystems. New York, NY: John Wiley and Sons. (from SEKI EA 2004).

Elliot, K.J. and Vose, J.M. 2005. Initial effects of prescribed fire on quality of soil solution and streamwater in the southern Appalachian Mountains. Southern Journal of Applied Forestry 29(1): 5-15.

Fleming, G. P., P. P. Coulling, K. D. Patterson, and K. Taverna. 2006. The natural communities of Pennsylvania: classification of ecological community groups. Second approximation. Version 2.2. Pennsylvania Department of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. http://www.dcr.Pennsylvania.gov/natural_heritage/ncintro.shtml.

Fredericksburg and Spotsylvania National Military Park (GETT/EISE). 2009. Fire Effects Monitoring Plan: Fredericksburg and Spotsylvania National Battlefield Parks. Fredericksburg, Pennsylvania: Fredericksburg and Spotsylvania National Military Park.

Grand Portage National Monument (GRPO). 2004. Environmental Assessment for the Grand Portage National Monument Wildland Fire Management Plan. Grand Portage, MN: Grand Portage National Monument.

Larson, J.R. and Duncan, D.A. 1982. Annual grassland response to fire retardant and wildfire. Journal of Range Management 35 (6): 700-703.

Lorimer, C.G. 1993. Causes of the oak regeneration problem. Pp 14-39 *in* Loftis, D. and McGee, eds. Proceedings: Oak regeneration: serious problems, practical recommendations. Knoxville, TN: September 8-10, 1992. General Technical Report SE-84. Atlanta, GA: U.S. Department of Agriculture Forest Service Southeast Research Station.

Ludwig, J. Christopher, Christopher Pague. 1993. A Natural Heritage Inventory of Mid- Atlantic Region National Parks in Pennsylvania: Fredericksburg and Spotsylvania NMP. Natural Heritage Technical Report #93-9. Pennsylvania Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Pennsylvania. Unpublished report submitted to National Parks Service – Mid-Atlantic Regional Office. February 1993.

Megahan, W.F. and Hornbeck, J. 2000. Lessons learned in watershed managment: a retrospective view. Pp. 177-188 *in* Ffolliott, P.F.; Baker Jr., M.B.; Edminster, C.B.; Dillon, M.C.; and Mora, K.L., technical coordinators. 2000. Land Stewardship in the 21st Century: The Contributions of Watershed Management; 2000 March 13-16; Tucson, Arizona. Proceedings. RMRS-P-13. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Minshall, G.W. 2001. Responses of stream benthic macroinvertebrates to fire. Forest Ecology and Management 178: 155-161.

NatureServe. 2006. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 7 March 2006.

eary, D.G. and Currier, J.B. 1982. Impact of wildfire and watershed restoration on water quality in South Carolina's Blue Ridge Mountains. Southern Journal of Applied Forestry 6(2): 81-90.

Newland, J.A. and DeLuca, T.H. 2000. Influence of fire on native nitrogen-fixing plants and soil nitrogen status in ponderosa pine – Douglas-fir forests in western Montana. Canadian Journal of Forest Research 30: 274-282. (from SEKI EA 2004)

National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (NPS 1998).

National Park Service (NPS)

1990 National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation.*

1998 National Register Bulletin 38: *Guidelines for Evaluating and Documenting Traditional Cultural Properties*.

1999 *Gettysburg National Military Park Final General Management Plan and Environmental Impact Statement*, June 1999.

2000 National Register Bulletin 36: *Guidelines for Evaluating and Registering Archeological Properties.*

2001 Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making.*

2002 Director's Order 28: *Cultural Resource Management.*

2004a *Cultural Landscape Report: Defense of Cemetery Hill*.

2004b Gettysburg National Military Park, *Treatment Philosophy: The 1863 Landscape* 2004.

2004b National Register of Historic Places 2004 Documentation

2006a *Management Policies 2006*.

2006b *Vegetation Classification and Mapping at Gettysburg National Military Park and Eisenhower National Historic Site*, 2006. Tech Report NPS/NER/NRTR—2006/058.

2008 Procedural Manual 77-1: *Wetland Protection.*

2008. Resource Manual (RM) 18 - *Wildland Fire Management*. Washington, D.C.

2009 *Gettysburg National Military Park and Eisenhower National Historic Site Geologic Resources Inventory Report*.

2012 *Final Disposition of the Gettysburg Cyclorama Building Environmental Assessment*

2012 *Fredericksburg-Spotsylvania National Battlefield Park Fire Management Plan Environmental Assiessment*, 2012.

Natural Resources Conservation Service (NRCS) 2012 Web Soil Survey. Available online at: <http://websoilsurvey.nrcs.usda.gov>. Accessed on September15, 2012.

National Wildfire Coordinating Group. 2001. Smoke Management Guide for Prescribed and Wildland Fire 2001 Edition. Boise (ID): National Interagency Fire Center.

National Wildfire Coordinating Group. 2008. Interagency Prescribed Fire Planning and Implementation Procedures and Reference Guide. Boise (ID): National Interagency Fire Center. 50p.

Pennsylvania Department of Forestry (VA DOF). 2001. Fact Sheet: Prescribed Fire and Pennsylvania's 4 PM Burning Law. Charlottesville, VA: Pennsylvania Department of Forestry.

Pennsylvania Department of Game and Inland Fisheries (VA DGIF). Date unknown. Species Information: Amphibians: Shenandoah salamander. *In*: Pennsylvania Department of Game and Inland Fisheries [online]. Available: http://www.dgif.state.va.us/wildlife/ index.cfm. Accessed August 13, 2004.

Schultz, C. H. Editor. 1999. The Geology of Pennsylvania. Pennsylvania Geological Survey. Harrisburg. 888 pp.

Sequoia and Kings Canyon National Parks (SEKI). 2004. Environmental Assessment Sequoia and Kings Canyon National Parks (SEKI EA) [online]. Available: http://www.nps.gov/seki/fire/ffmp/ffmp.htm. Accessed August 6, 2004.

Sequoia and Kings Canyon National Parks (SEKI). 2004. Fire and Fuels Management Plan Sequoia and Kings Canyon National Parks (SEKI FFMP) [online]. Available: http://www.nps.gov/seki/fire/ffmp/ffmp.htm. Accessed August 6, 2004.

Somers, A.B.; Bridle, K.A.; Herman, D.W.; and Nelson, A.B. 2000. Managing Wetland Vegetation. Chapter 5 *in* The restoration and management of small wetlands of the mountains and Piedmont in the Southeast: a manual emphasizing endangered and threatened species habitat with a focus on bog turtles. Washington, D.C.: U.S. Department of Agriculture, Natural Resources Conservation Service, Watershed Science Institute.

Speir, R. 1967. Soil Survey of Adams County, Pennsyvlania. United States Department of Agriculture, Soil Conservation Service. 150 pp.

Swank, W. T. and Vose, J.M. 1997. Long-term nitrogen dynamics of Coweeta forested watersheds in the southeastern United States of America. Pp 657-671 *in* Global Biogeochemical Cycles, Vol. II, No. 4.

USDI National Parks Service. 2001. Fire Monitoring Handbook. Boise (ID): National Interagency Fire Center. 274p.

USDI National Parks Service. 2001. DO 12 – Conservation Planning, Environmental Impact Analysis, and Decision-making. Washington, D.C.

USDI National Parks Service. 2008. DO 12 Handbook. Washington, D.C.

USDI National Parks Service. 2008. DO 18 - Wildland Fire Management. Washington, D.C. USDI

USDA and USDI. 2004. Interagency Strategy for the Implementation of Federal Wildland Fire Management policy. Boise (ID): National Interagency Fire Center. U.S.

Wieboldt, T. F., G. P. Fleming, C. E. Stevens, J. F. Townsend, D. M. E. Ware, and R. A. S. Wright. 2005. Digital Atlas of the Pennsylvania Flora (http://www.biol.vt.edu/digital_atlas/). Pennsylvania Botanical Associates, c/o Massey Herbarium, Department of Biological Sciences, Pennsylvania Tech, Blacksburg, VA.

Wohlgemuth, P.M., Beyers, J.L., and Conard, S.G. 1999. Postfire hillslope erosion in Southern California chaparral: A case study of prescribed fire as a sediment management tool. Pp. 269-276 *in* U.S. Department of Agriculture Forest Service. Proceedings of the symposium on fire economics, planning, and policy: bottom lines. General Technical Report PSW-GTR-173. Albany, CA: U.S. Department of Agriculture Forest Service Southwest Research Station. (from SEKI EA 2004)

Appendix 1: Relevant Correspondence

United States Department of the Interior
NATIONAL PARK SERVICE
GETTYSBURG NATIONAL MILITARY PARK
Gettysburg, PA 17325
EISENHOWER NATIONAL HISTORIC SITE
Gettysburg, PA 17325

1.A.2

March 28, 2014

Tamara Francis
Cultural Preservation Director
Delaware Nation
P.O. Box 825
Anadarko, Oklahoma 73005

Dear Ms. Francis:

Gettysburg National Military Park (GETT) and Eisenhower National Historic Site (EISE) would like to initiate consultation with your office under Section 106 of the National Historic Preservation Act regarding our Fire Management Plan (FMP) and Environmental Assessment (EA). The updated FMP/EA will provide a long-range fire management plan for both parks using the benefits of natural and prescribed fire to achieve desired natural resource conditions in accordance with the Federal Wildland and Prescribed Fire Management Policy (1995, 2001, & 2009).

Over the past decade GETT has actively managed the battlefield landscape to improve visitor understanding of the events of the Battle of Gettysburg. Areas that were open during the battle have been recently cleared of non-historic trees to provide critical view sheds so visitors can more fully understand the significant features of the landscape and the impact of these features to the outcome of the battle. Landscape changes have increased the acreage of native grasslands and open areas both of which in an ecosystem successional model are striving to be wooded again. Mowing and herbicide use have been the primary tools to keep open areas free of nonnative vegetation and the encroachment of woody species. Less effort is needed in rehabilitating the cultural landscape at EISE however at both parks we are exploring the feasibility of using prescribed fire as an additional tool to maintain important open areas, to enhance wildlife habitat, to control invasive nonnative species and reduce shrub and woody species.

In October 2013 we completed a test prescribed burn of approximately 14 acres to determine if prescribed fire is a viable option for maintaining our park cultural landscapes. The preliminary data suggests the test prescribed fire was successful at scorching cedars and other woody tree species. Established monitoring plots will be revisited in the spring of 2014 for a more thorough analysis. In addition to vegetation surveys both pre and post archeological assessments were completed to determine the potential impacts to surface archeology. No known impacts were discovered in either survey.

Before the FMP/EA is available for public review and comment in June of 2014 we are requesting your input on the potential use of prescribed fire at both parks. We have documented some historic and prehistoric archeological sites within both parks however our documentation is not exhaustive. If there are known Sacred Sites or other cultural sites that we should be aware of, for planning purposes, please contact Zach Bolitho, Chief of Resources Management by phone at 717-338-4408 or by email at zachary_bolitho@nps.gov.

Sincerely,

Ed Clark
Superintendent

United States Department of the Interior
NATIONAL PARK SERVICE
GETTYSBURG NATIONAL MILITARY PARK
Gettysburg, PA 17325
EISENHOWER NATIONAL HISTORIC SITE
Gettysburg, PA 17325

1.A.2

March 28, 2014

Dr. Brice Obermeyer
1200 Commercial Street
Roosevelt Hall, RM 212
Emporia State University
Emporia, KS 66801

Dear Dr. Obermeyer:

Gettysburg National Military Park (GETT) and Eisenhower National Historic Site (EISE) would like to initiate consultation with your office under Section 106 of the National Historic Preservation Act regarding our Fire Management Plan (FMP) and Environmental Assessment (EA). The updated FMP/EA will provide a long-range fire management plan for both parks using the benefits of natural and prescribed fire to achieve desired natural resource conditions in accordance with the Federal Wildland and Prescribed Fire Management Policy (1995, 2001, & 2009).

Over the past decade GETT has actively managed the battlefield landscape to improve visitor understanding of the events of the Battle of Gettysburg. Areas that were open during the battle have been recently cleared of non-historic trees to provide critical view sheds so visitors can more fully understand the significant features of the landscape and the impact of these features to the outcome of the battle. Landscape changes have increased the acreage of native grasslands and open areas both of which in an ecosystem successional model are striving to be wooded again. Mowing and herbicide use have been the primary tools to keep open areas free of nonnative vegetation and the encroachment of woody species. Less effort is needed in rehabilitating the cultural landscape at EISE however at both parks we are exploring the feasibility of using prescribed fire as an additional tool to maintain important open areas, to enhance wildlife habitat, to control invasive nonnative species and reduce shrub and woody species.

In October 2013 we completed a test prescribed burn of approximately 14 acres to determine if prescribed fire is a viable option for maintaining our park cultural landscapes. The preliminary data suggests the test prescribed fire was successful at scorching cedars and other woody tree species. Established monitoring plots will be revisited in the spring of 2014 for a more thorough analysis. In addition to vegetation surveys both pre and post archeological assessments were completed to determine the potential impacts to surface archeology. No known impacts were discovered in either survey.

Before the FMP/EA is available for public review and comment in June of 2014 we are requesting your input on the potential use of prescribed fire at both parks. We have documented some historic and prehistoric archeological sites within both parks however our documentation is not exhaustive. If there are known Sacred Sites or other cultural sites that we should be aware of, for planning purposes, please contact Zach Bolitho, Chief of Resources Management by phone at 717-338-4408 or by email at zachary_bolitho@nps.gov.

Sincerely,

Ed Clark
Superintendent

United States Department of the Interior
NATIONAL PARK SERVICE
GETTYSBURG NATIONAL MILITARY PARK
Gettysburg, PA 17325
EISENHOWER NATIONAL HISTORIC SITE
Gettysburg, PA 17325

1.A.

June 26, 2014

Ms. Serena Bellew
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Commonwealth Keystone Building, Second Floor
400 North Street
Harrisburg, Pennsylvania 17120-0093

Dear Ms. Bellew:

The NPS has prepared an Environmental Assessment (EA) to analyze a Fire Management Plan (FMP) for Gettysburg National Military Park and Eisenhower National Historic Site. A combined FMP was developed for both parks because the two Parks are contiguous and are managed by the same NPS staff.

Your office was involved in consultation regarding the test burn which took place in October of 2013. Based upon the results of the test burn last fall, NPS has determined that fire is a feasible management tool to help meet landscape rehabilitation goals and objectives identified in the 1999 General Management Plan.

NPS policy states that all Parks with burnable vegetation are required to have an up-to-date and accurate Fire Management Plan. This plan has a lifetime of at least five to fifteen years.

This EA evaluates two alternatives for the Fire Management Plan at Gettysburg National Military Park and Eisenhower National Historic Site:

- Alternative 1—No Action—Fire Suppression
  - No change
- Alternative 2—Fire Suppression, Prescribed Fire, and Non-fire Treatments (NPS Preferred Alternative)
  - All unscheduled ignitions will be suppressed using the most appropriate suppression response.
  - Implementation of resource management and fuels reduction projects using mechanical treatment, chemical treatment and initiation of a prescribed burning program.

NPS considered three alternatives that proposed wildland fire use, or did not allow for prescribed fire. These were considered, but rejected due to a lack of uninterrupted land mass at the parks as well as the small number of firefighters available here. NPS will still rely heavily upon cooperation with other federal, state and local firefighting agencies, and local land owners as a means of protecting the Parks and surrounding community from wildland fires.

This plan identifies a combined Fire Management Units (FMU) within the legislated boundaries of Eisenhower National Historic Site and Gettysburg National Military Park. Prescribed fires would be used in the FMU to accomplish resource management objectives. Planning for individual prescribed burns will be submitted prior to implementation. These burns will be conducted according to site-specific objectives, prescriptions and mitigations.

Upon approval of this Fire Management Plan/EA, NPS intends to utilize Streamline Review #7 Hazardous Fuel and Fire Management of the 2006 Nationwide Programmatic Agreement to assess future burns within the FMUs. Archeological monitoring may be appropriate depending upon ground disturbing activities. Post-burn inspection and monitoring will be conducted by a qualified archeologist to ensure that no archeological sites were impacted or previously unknown sites revealed. National Register contributing structures and landscapes will be appropriately protected. See Mitigation discussion beginning on page 43 of the document for complete listing of measures that will be taken to protect cultural resources.

We look forward to your comments regarding updates to our existing Fire Management Plan as described in the digital file sent.

If you have any question or would like to discuss the project further, please contact Zachary Bolitho, Chief, Resource Management, 717-338-4408 or via email at zachary_boitho@nps.gov.

Sincerely,

Ed Clark
Superintendent

United States Department of the Interior
NATIONAL PARK SERVICE
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Gettysburg, PA 17325

1.A.

June 26, 2014

Mr. Jason Ryndock
PA Department of Conservation
and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552
Harrisburg, Pennsylvania 17105-8552

Dear Mr. Ryndock:

The NPS has prepared an Environmental Assessment (EA) to analyze a Fire Management Plan (FMP) for Gettysburg National Military Park and Eisenhower National Historic Site. A combined FMP was developed for both parks because the two Parks are contiguous and are managed by the same NPS staff.

Your office was involved in consultation regarding the test burn which took place in October of 2013. Based upon the results of the test burn last fall, NPS has determined that fire is a feasible management tool to help meet landscape rehabilitation goals and objectives identified in the 1999 General Management Plan.

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This EA evaluates two alternatives for the Fire Management Plan at Gettysburg National Military Park and Eisenhower National Historic Site:

- Alternative 1—No Action—Fire Suppression
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  - All unscheduled ignitions will be suppressed using the most appropriate suppression response.
  - Implementation of resource management and fuels reduction projects using mechanical treatment, chemical treatment and initiation of a prescribed burning program.

The park submitted an Environmental Review to your office (#20140623456302) and will follow through with consultation with PA Department of Conservation and Natural Resources and the PA Game Commission during the public review process.

We look forward to your comments regarding updates to our existing Fire Management Plan as described in the digital file sent.

If you have any question or would like to discuss the project further, please contact Zachary Bolitho, Chief, Resource Management, 717-338-4408 or via email at zachary_boitho@nps.gov.

Sincerely,

Ed Clark
Superintendent

Appendix 2: Figures

Figure1. Vicinity Map

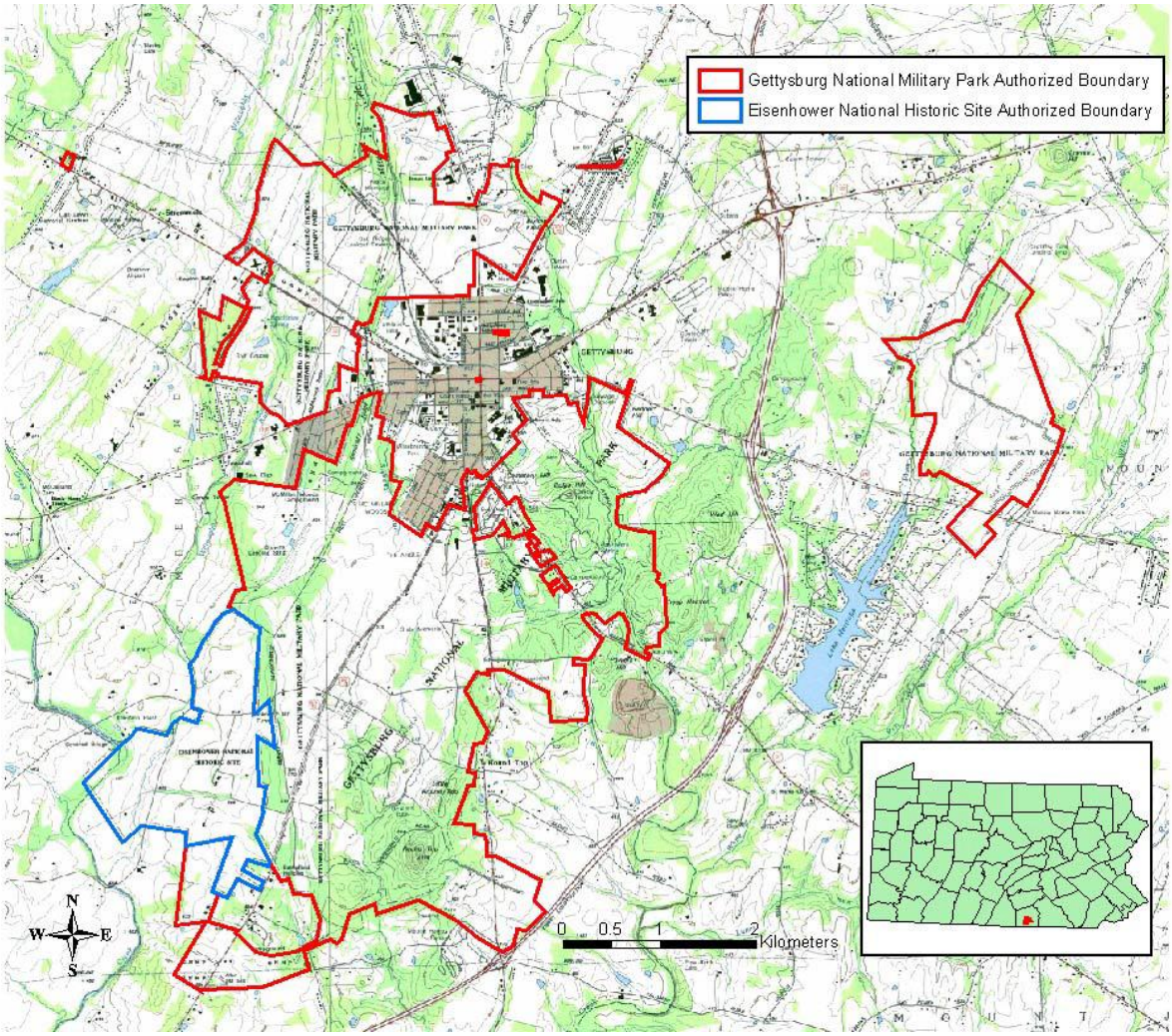

Figure 2. Fire Management Unit

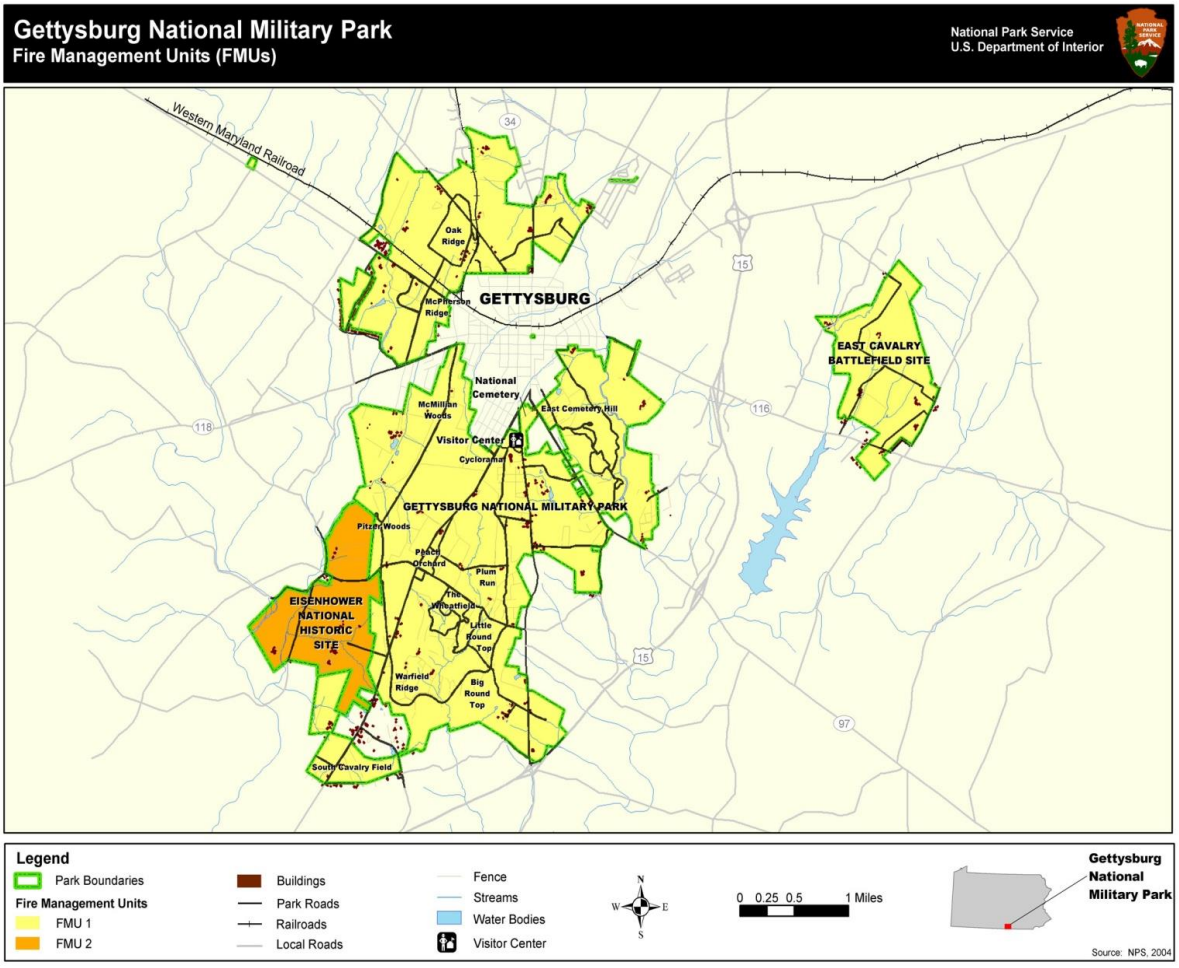

Figure 3. Soils

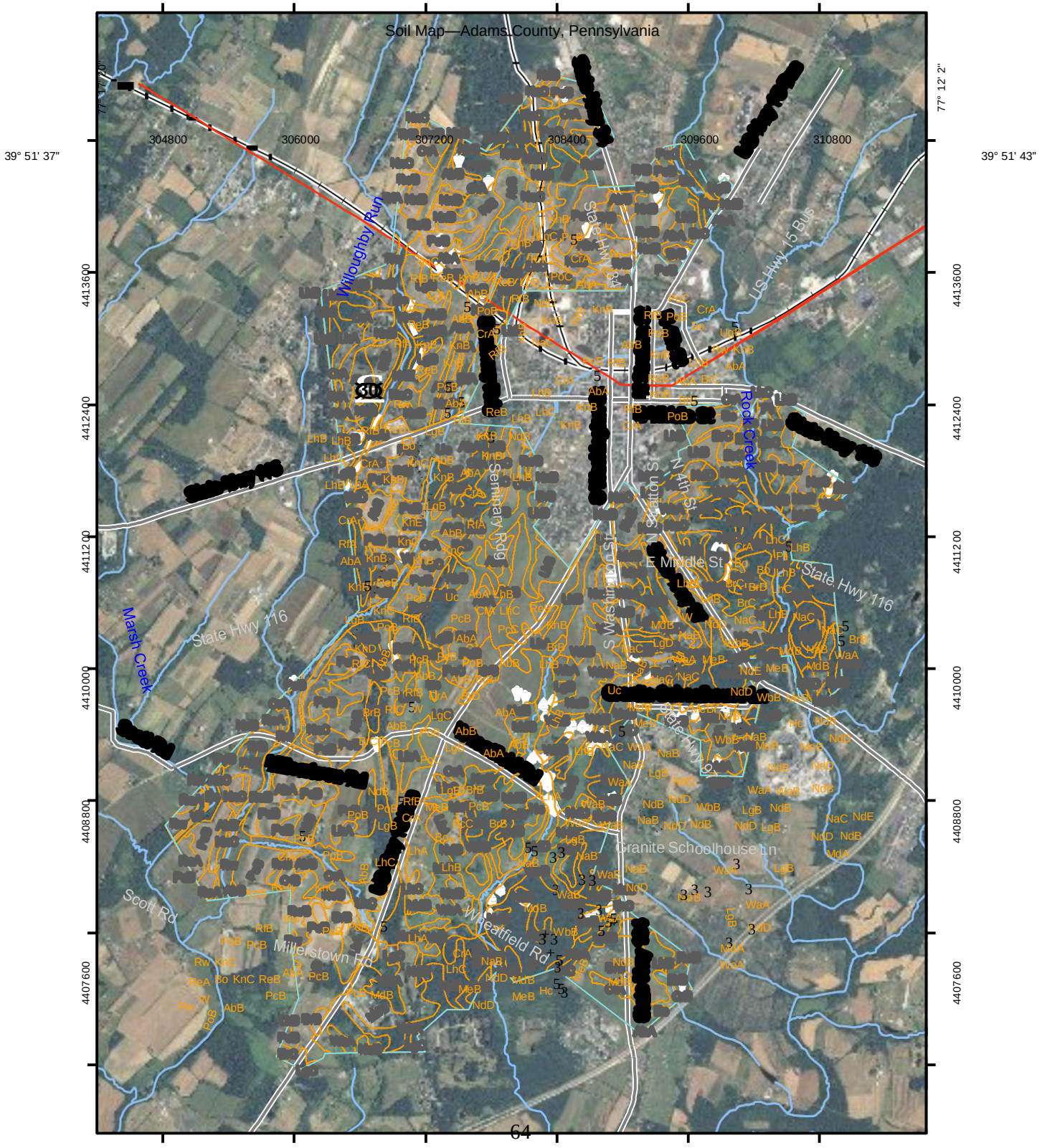

AbB LhA

Map Unit Legend

Adams County, Pennsylvania (PA001)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AbA	Abbottstown silt loam, 0 to 3 percent slopes	199.8	3.0%
AbB	Abbottstown silt loam, 3 to 8 percent slopes	376.8	5.7%
Bo	Bowmansville silt loam	220.8	3.3%
BrB	Brecknock channery silt loam, 3 to 8 percent slopes	203.0	3.1%
BrC	Brecknock channery silt loam, 8 to 15 percent slopes	50.4	0.8%
BrD	Brecknock channery silt loam, 15 to 25 percent slopes	10.6	0.2%
Cm	Codorus silt loam	7.6	0.1%
CrA	Croton silt loam, 0 to 3 percent slopes	350.8	5.3%
CrB	Croton silt loam, 3 to 8 percent slopes	19.2	0.3%
Hc	Hatboro silt loam	155.2	2.3%
KnB	Klinesville channery silt loam, 3 to 8 percent slopes	234.5	3.5%
KnC	Klinesville channery silt loam, 8 to 15 percent slopes	129.4	2.0%
KnD	Klinesville channery silt loam, 15 to 25 percent slopes	3.5	0.1%
KnE	Klinesville channery silt loam, 25 to 40 percent slopes	5.2	0.1%
LgB	Legore channery silt loam, 3 to 8 percent slopes	87.2	1.3%
LgC	Legore channery silt loam, 8 to 15 percent slopes	18.3	0.3%
LgD	Legore channery silt loam, 15 to 25 percent slopes	6.2	0.1%
LhA	Lehigh channery silt loam, 0 to 3 percent slopes	205.0	3.1%
LhB	Lehigh channery silt loam, 3 to 8 percent slopes	910.4	13.8%
LhC	Lehigh channery silt loam, 8 to 15 percent slopes	87.0	1.3%
LkB	Lehigh channery silt loam, 0 to 8 percent slopes, very stony	0.0	0.0%
MdA	Mount Lucas silt loam, 0 to 3 percent slopes	27.2	0.4%
MdB	Mount Lucas silt loam, 3 to 8 percent slopes	243.4	3.7%
MeB	Mount Lucas silt loam, 0 to 8 percent slopes, very bouldery	144.1	2.2%
NaB	Neshaminy channery silt loam, 3 to 8 percent slopes	441.6	6.7%
NaC	Neshaminy channery silt loam, 8 to 15 percent slopes	97.2	1.5%
NdB	Neshaminy channery silt loam, 0 to 8 percent slopes, extremely bouldery	265.4	4.0%

Adams County, Pennsylvania (PA001)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
NdD	Neshaminy channery silt loam, 8 to 25 percent slopes, extremely bouldery	425.2	6.4%
NdE	Neshaminy channery silt loam, 25 to 45 percent slopes, extremely bouldery	43.5	0.7%
PcB	Penn silt loam, 3 to 8 percent slopes	161.7	2.4%
PcC	Penn silt loam, 8 to 15 percent slopes	11.2	0.2%
PoB	Penn-Klinesville channery silt loams, 3 to 8 percent slopes	322.7	4.9%
PoC	Penn-Klinesville channery silt loams, 8 to 15 percent slopes	14.9	0.2%
Pt	Pits, quarries	4.8	0.1%
ReA	Readington silt loam, 0 to 3 percent slopes	31.2	0.5%
ReB	Readington silt loam, 3 to 8 percent slopes	135.1	2.0%
RfA	Reaville channery silt loam, 0 to 3 percent slopes	24.1	0.4%
RfB	Reaville channery silt loam, 3 to 8 percent slopes	248.1	3.7%
RfC	Reaville channery silt loam, 8 to 15 percent slopes	11.7	0.2%
Rw	Rowland silt loam	45.0	0.7%
Uc	Urban land	139.2	2.1%
UgB	Urban land-Penn complex, 0 to 8 percent slopes	4.7	0.1%
W	Water	13.8	0.2%
WaA	Watchung silt loam, 0 to 3 percent slopes	200.5	3.0%
WaB	Watchung silt loam, 3 to 8 percent slopes	48.0	0.7%
WbB	Watchung silt loam, 0 to 8 percent slopes, extremely bouldery	233.7	3.5%
Totals for Area of Interest		**6,619.2**	**100.0%**

Figure 4. Wetlands

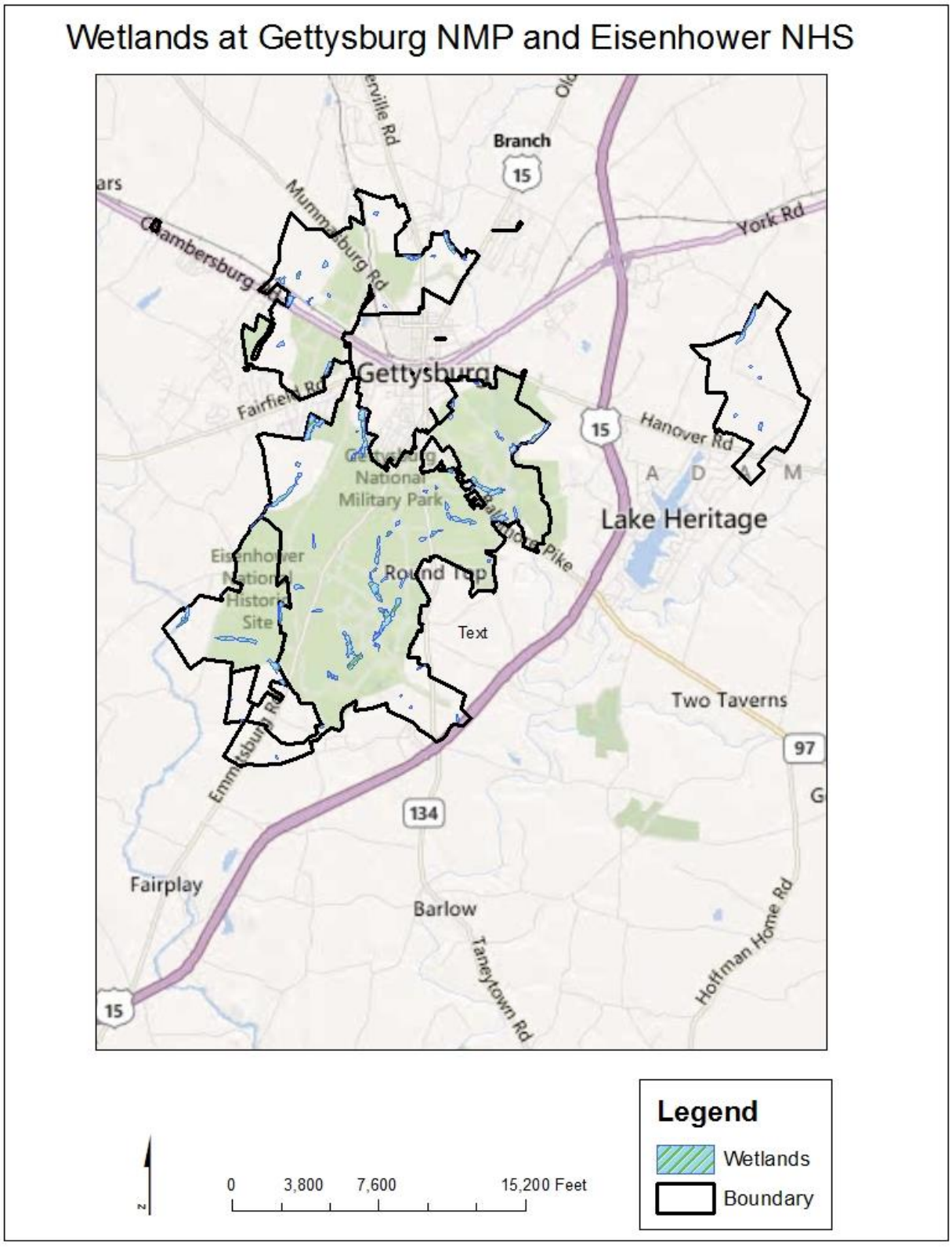

Figure 5. Vegetation

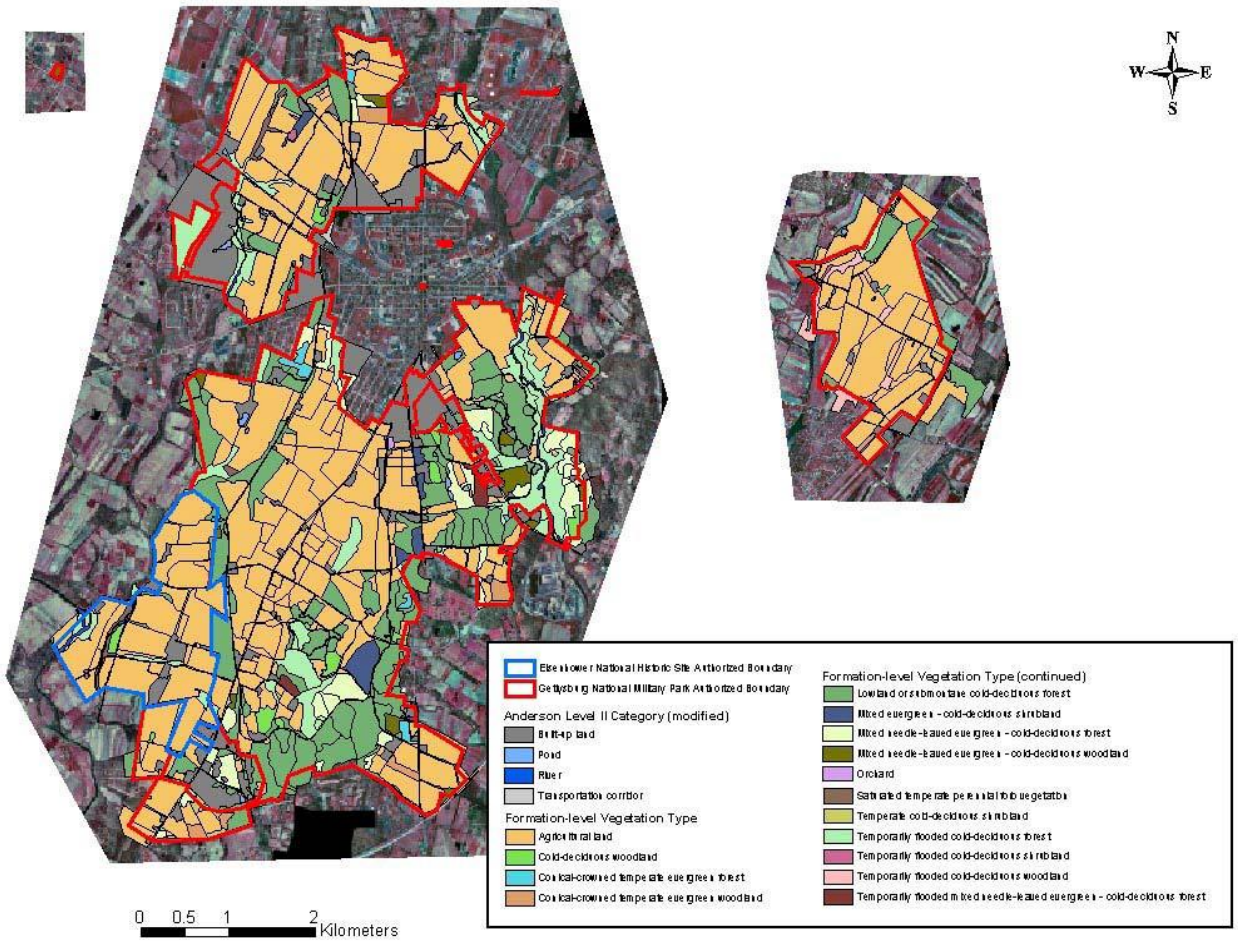

Figure 6. Sensitive Areas

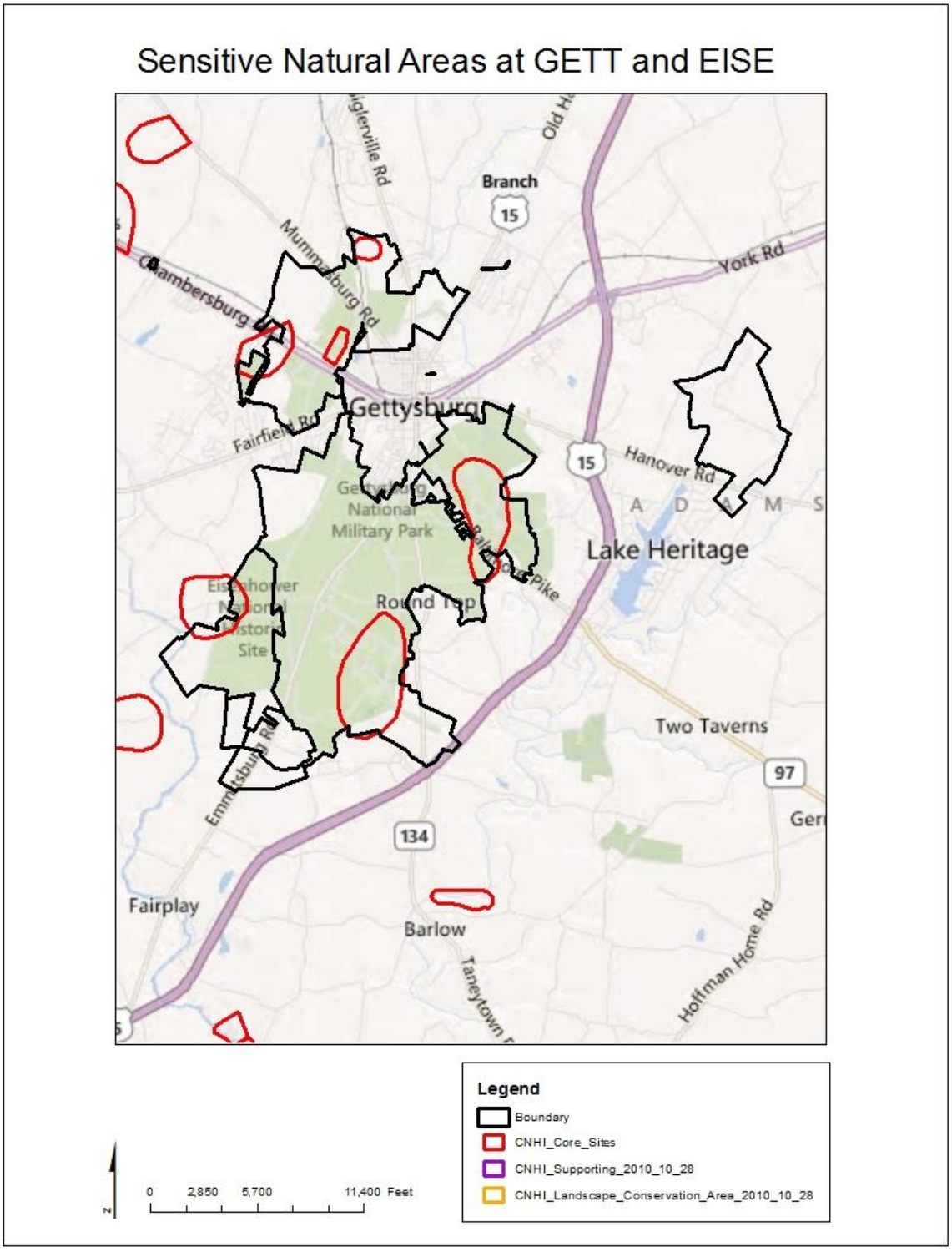

Figure7. Historic Monuments

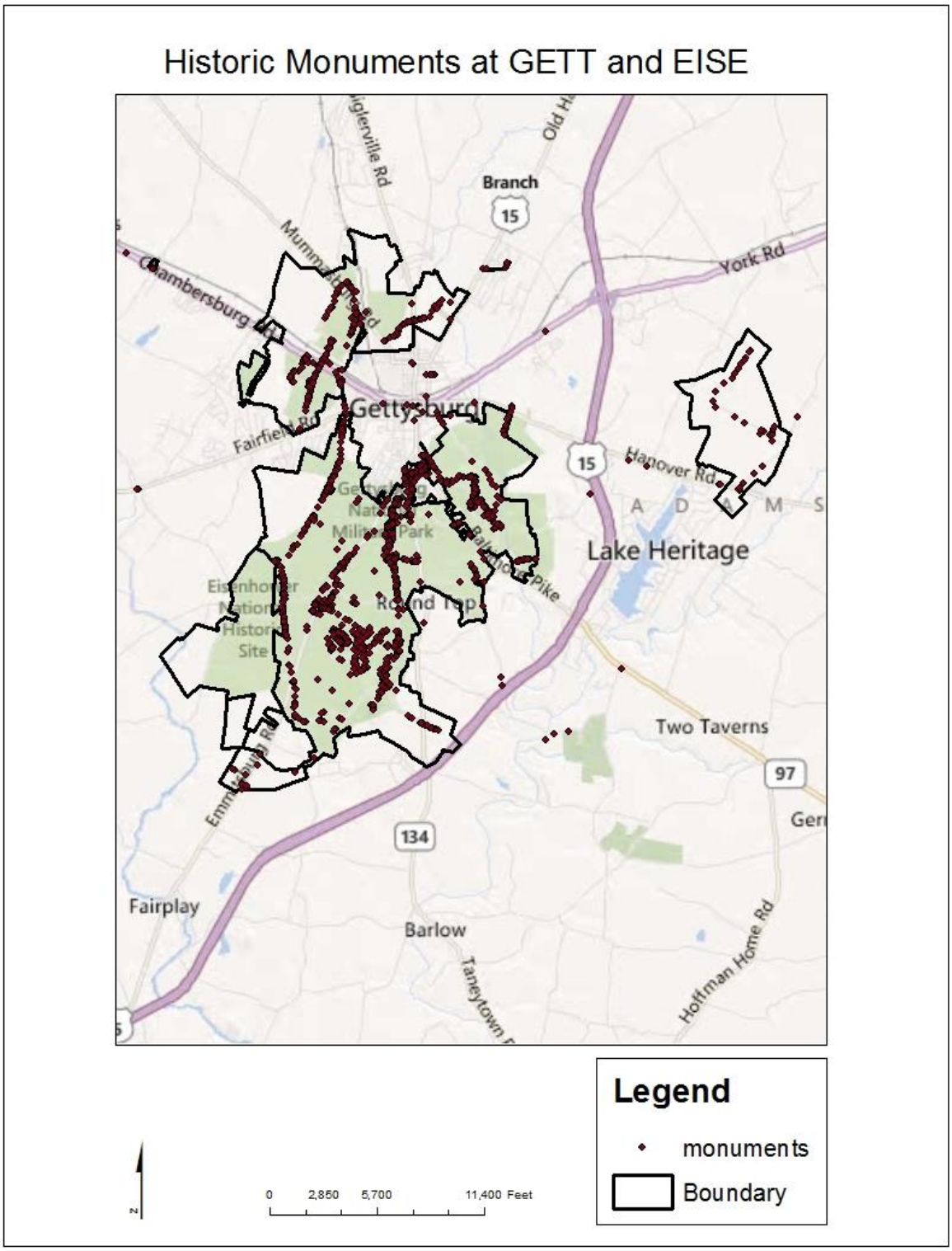

Figure 8. Utilities at GETT and EISE

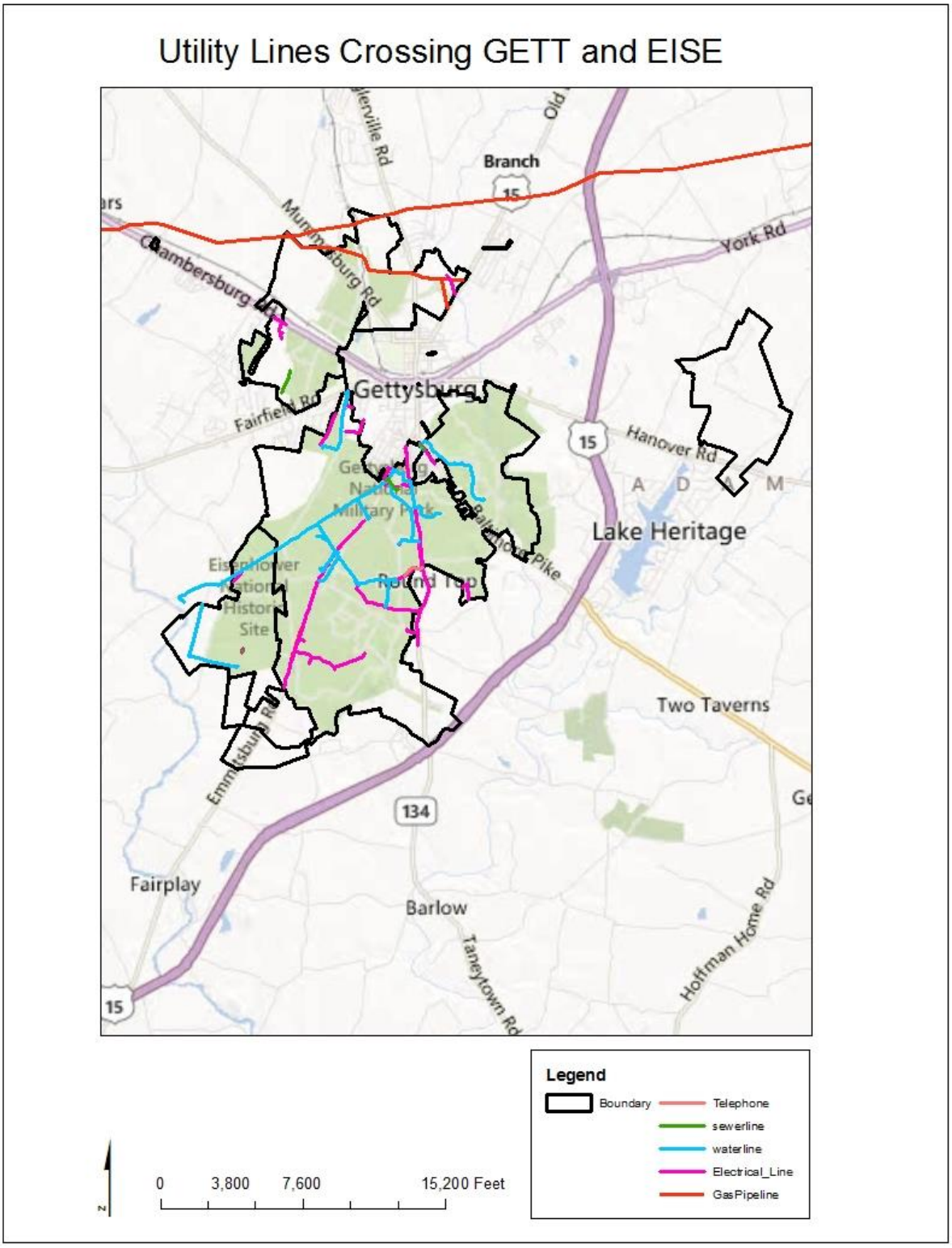

Figure 9. Roadways through GETT and EISE