

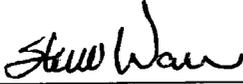


Guilford Courthouse National Military Park

**Fire Management Plan
2003**

2003 Fire Management Plan
Guilford Courthouse National Military Park
North Carolina

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1.0 INTRODUCTION

1.1 Reason for Development of Fire Management Plan

National Park Service (NPS) policy (*Director's Order #18: Wildland Fire Management*, website <http://www.fire.nps.gov/fire/policy/do18/do18.htm>) requires that every park unit with burnable vegetation develop a fire management plan approved by the park superintendent. The fire management plan serves as a detailed and comprehensive program of action to implement fire management policy principles and goals, consistent with the unit's resource management objectives. This plan outlines the fire management program at Guilford Courthouse National Military Park (hereinafter referred to as "the park," or by NPS alpha code "GUCO"). The GUCO fire management program, guided by federal policy and the park's resource management objectives, will serve to protect life, property, and natural and cultural resources.

1.2 Collaborative Processes

In addition to administering GUCO, the National Park Service collaborates with the U.S. Fish and Wildlife Service, the State Historic Preservation Office, the North Carolina Division of Forest Resources, the Greensboro Parks and Recreation Department, the Guilford Battle Ground Company, the Greensboro Convention and Visitors Bureau, community and business leaders, and park neighbors regarding how to best protect the integrity of the park.

Collaborative opportunities pertaining to fire management at GUCO include cooperative agreements with the Greensboro Fire Department, the North Carolina Division of Forest Resources, and local law enforcement.

1.3 Implementation of Fire Management Policy

The organizational structure of this FMP follows the outline furnished in chapter 4 of *Wildland Fire Management Reference Manual-18* (version 3.0, 11/05/02), hereinafter referred to as *RM-18* (website <http://www.fire.nps.gov/fire/policy/rm18/index.htm>). This FMP will guide the park in implementing federal fire management policy and resource and fire management goals as defined in the *2001 Federal Fire Policy; Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire-Adapted Ecosystems—A Cohesive Strategy*; and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan*.

1.3.1 2001 Federal Fire Policy

The 1994 fire season with its 34 fatalities triggered a series of reports under the rubric FIRE 21, including the *1995 Federal Wildland Fire Management Policy and Program Review*. This review, the first comprehensive federal fire policy for the Departments of Agriculture and the Interior, provided direction for fire management programs and

activities, including such areas as safety, protection priorities, preparedness, suppression, wildland fire use, prevention, and wildland-urban interface roles and responsibilities. Following the escape of the Cerro Grande Prescribed Fire in May 2000, the *1995 Federal Fire Policy* was evaluated and revised in the *2001 Review and Update of the 1995 Federal Wildland Fire Management Policy (2001 Federal Fire Policy)*. The *2001 Federal Fire Policy* finds no fundamental flaws in the 1995 document. It builds on the *1995 Federal Fire Policy*, and addresses issues not fully covered in 1995, including rehabilitation and restoration of burned lands, the importance of sound science driving fire management activities, and the need for the full range of fire management activities to achieve ecosystem sustainability.

The *2001 Federal Fire Policy* states that “...successful implementation of 2001 Federal Fire Policy depends on the development and implementation of high-quality Fire Management Plans by all land managing agencies.” The policy is founded on the following guiding principles:

1. Firefighter and public safety is the first priority in every fire management activity.
2. The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the planning process.
3. Fire management plans, programs, and activities support general and resource management plans and their implementation.
4. Sound risk management is a foundation for all fire management activities.
5. Fire management programs and activities are economically viable, based upon values to be protected, costs, and general and resource management objectives.
6. Fire management plans and activities are based upon the best available science.
7. Fire management plans and activities incorporate public health and environmental quality considerations.
8. Federal, State, tribal, local, interagency, and international coordination and cooperation are essential.
9. Standardization of policies and procedures among Federal agencies is an ongoing objective.

1.3.2 Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems—A Cohesive Strategy

The *Cohesive Strategy* was developed by the USDA National Forest Service, the US Department of the Interior, and the National Association of State Foresters, in response to

the 2000 fire season, during which more than 6.8 million acres of public and private lands burned—more than twice the 10-year national average. The magnitude of these fires was attributed to severe drought, accompanied by a series of storms that produced thousands of lightning strikes followed by windy conditions; and the long-term effects of almost a century of aggressively suppressing all wildfires, resulting in an unnatural buildup of brush and small trees throughout forests and rangelands. The *Cohesive Strategy* provides an overall framework for implementing fire management and forest health programs. It is based upon the following operating principles:

- ❑ Firefighting Readiness: Increase firefighting capability and capacity for initial attack, extended attack, and large fire support that will reduce the number of small fires becoming large, to better protect natural resources, to reduce the threat to adjacent communities, and reduce the cost of large fire suppression.
- ❑ Prevention Through Education: Assist state and local partners to take actions to reduce fire risk to homes and private property through programs such as FIREWISE.
- ❑ Rehabilitation: Focus rehabilitation efforts on restoring watershed function, including the protection of basic soil, water resources, biological communities, and prevention of invasive species.
- ❑ Hazardous Fuel Reduction: Assign highest priority for hazardous fuels reduction to communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features, where conditions favor uncharacteristically intense fires.
- ❑ Restoration: Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excessive vegetation and dead fuels through thinning, prescribed fire, and other treatment methods.
- ❑ Collaborative Stewardship: Focus on achieving the desired future condition on the land in collaboration with communities, interest groups, and state and federal agencies. Streamline process, maximize effectiveness, use an ecologically conservative approach, and minimize controversy in accomplishing restoration projects.
- ❑ Monitoring: Monitor to evaluate the effectiveness of various treatments to reduce unnaturally intense fires while restoring forest ecosystem health and watershed function.
- ❑ Jobs: Encourage new stewardship industries and collaborate with local people, volunteers, Youth Conservation Corps members, service organizations, and Forest Service work crews, as appropriate.

- Applied Research and Technology Transfer: Focus research on the long-term effectiveness of different restoration and rehabilitation methods to determine those methods most effective in protecting and restoring watershed function and forest health. Seek new uses and markets for byproducts of restoration.

1.3.3 A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan

In August, 2001, the Secretaries of Agriculture and the Interior joined the Western Governor's Association, National Association of State Foresters, National Association of Counties, and the Intertribal Timber Council to endorse *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy*. This report marked the initial fulfillment of two key Congressional directives that:

- The Secretaries of the Interior and Agriculture and the Governors jointly develop a long-term national strategy to address the wildland fire and hazardous fuels situation and the needs for habitat restoration and rehabilitation; and
- The strategy should be developed with “close collaboration among citizens and governments at all levels.”

The four goals of the *10-Year Comprehensive Strategy* are:

1. Improve fire prevention and suppression
2. Reduce hazardous fuels
3. Restore Fire-Adapted Ecosystems
4. Promote community assistance

Its three guiding principles are:

1. Priority setting that emphasizes the protection of communities and other high-priority watersheds at risk
2. Collaboration among governments and broadly representative stakeholders
3. Accountability through performance measures and monitoring for results

1.4 Environmental Compliance

In association with this plan, an environmental assessment that meets the requirements of the National Environmental Policy Act, including compliance with Section 106 of the National Historic Preservation Act and with Section 7 of the Endangered Species Act, is included as Appendix 13.4.

1.5 Authorities for Implementing Fire Management Plan

Authority for fire management at the park originates with the Organic Act of 1916. The Organic Act established the National Park Service “to promote and regulate the use of the Federal areas known as national parks, . . . which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

The 1978 “Redwood amendment” to the General Authorities Act of 1970 expands upon the provisions of the Organic Act, stating that, “. . . the protection, management, and administration of these [Park Service] areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established. . . .”

As an NPS fire management program by design tiers to the respective park unit’s general and resource management objectives, fire management is an effective way of implementing the above legislation.

2.0 RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

2.1 Federal Fire Management Policy

The *2001 Federal Fire Policy*, discussed in section 1.3.1, is the product of a collaborative effort involving the U.S. Department of the Interior, the U.S. Department of Agriculture, the Department of Energy, the Department of Defense, the Department of Commerce, the U.S. Environmental Protection Agency, the Federal Emergency Management Agency, and the National Association of State Foresters. The report recognizes the role that fire plays as a critical natural process, as well as the detrimental effects of its absence in fire-adapted ecosystems.

2.2 Establishment of Guilford Courthouse National Military Park

The National Park System consists of more than 380 units representing our country’s finest natural and cultural assets. Guilford Courthouse National Military Park was established by Congress (39 Stat. 996) on March 2, 1917, to “. . . preserve for historical and professional military study one of the most memorable battles of the Revolutionary War. . . .” Originally administered by the War Department, the park was transferred to National Park Service administration in 1933.

By March, 1781, the American Revolution had shifted to the South and into piedmont North Carolina. On March 15, after weeks of marching and maneuvering, the American army, commanded by General Nathanael Greene, fought a smaller but seasoned British army commanded by General Charles Cornwallis (1st Marquess Cornwallis, 2nd Earl Cornwallis) at Guilford Courthouse. Although the American army was defeated in the

fierce, two-hour battle, it was a costly victory for Cornwallis, who lost one-quarter of his forces in killed and wounded. This loss of British manpower was a significant link in the subsequent chain of events that led to Cornwallis's defeat and surrender seven months later at Yorktown, Virginia. Guilford Courthouse is therefore considered one of the most important battles of the Revolution. Its repercussions, both military and political, helped bring the War for Independence to its successful conclusion.

Figure 1 - Location of Guilford Courthouse NMP

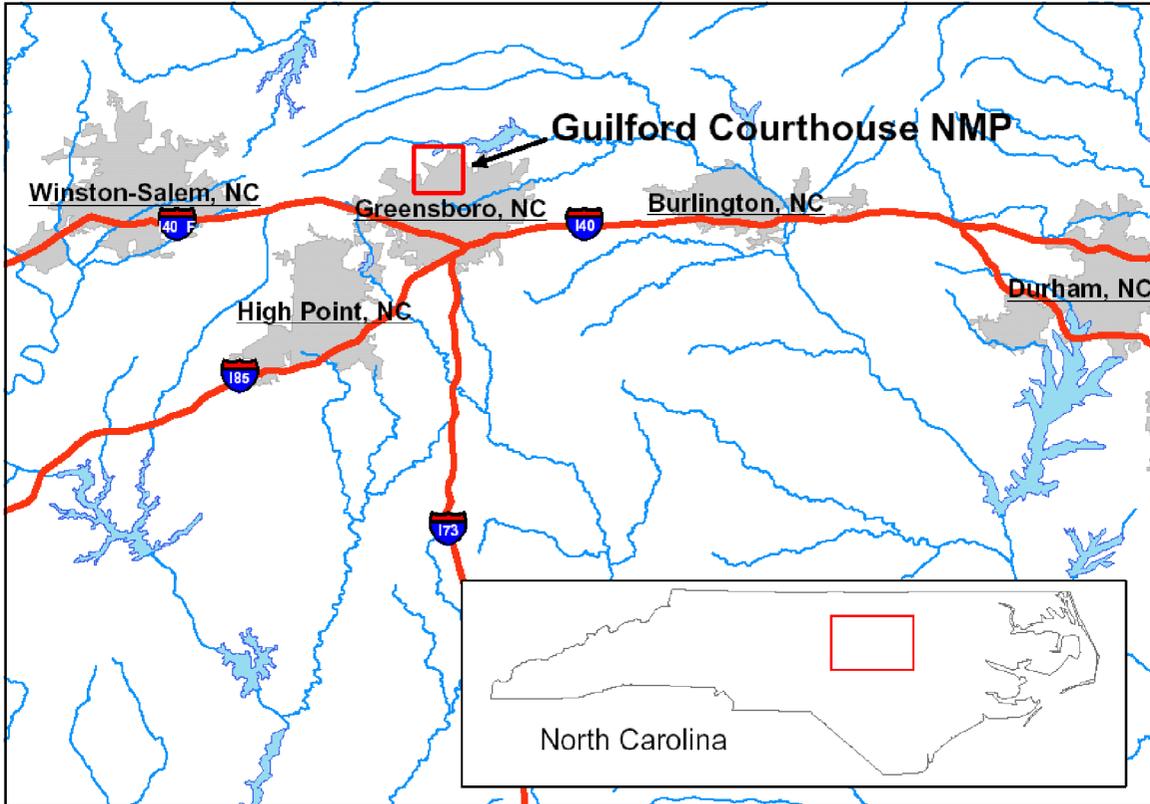
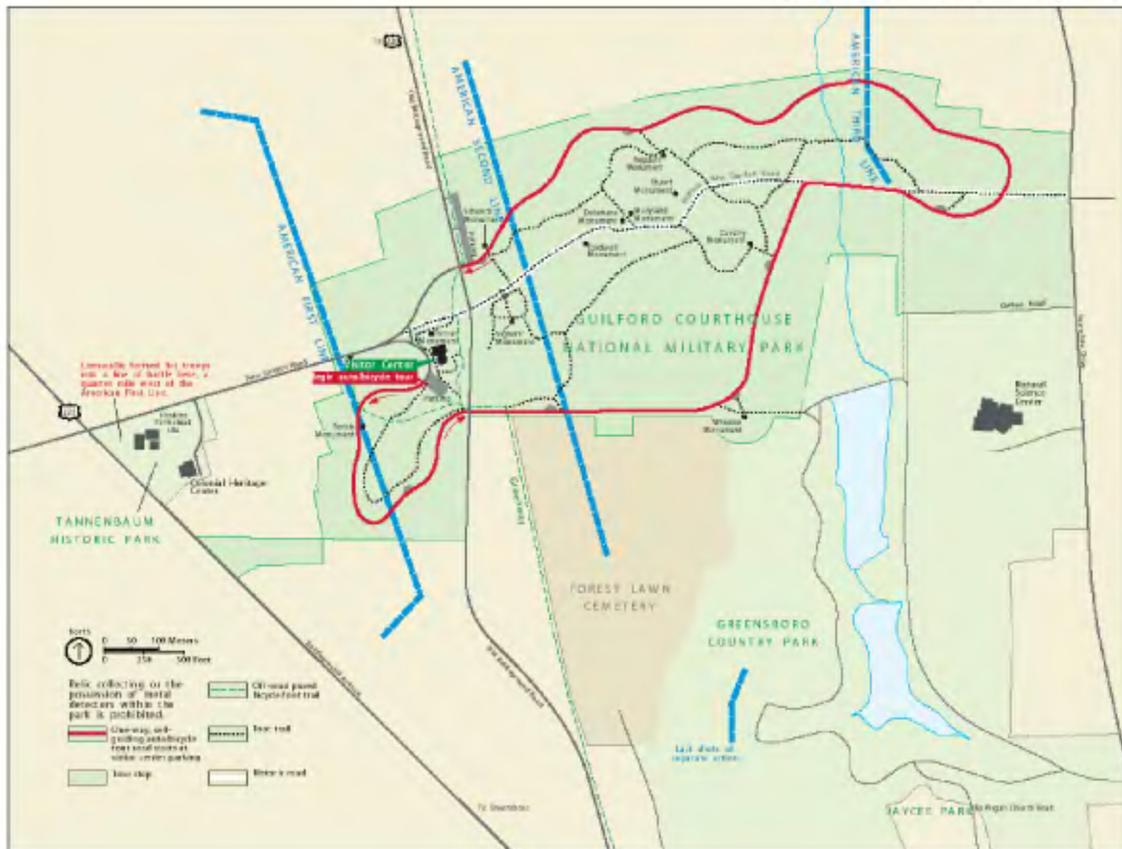


Figure Number 2 - Guilford Courthouse NMP



*This map does not indicate approximately one-half acre of recently acquired land, located along the western park boundary to the immediate south of New Garden Road. Other maps in this plan do.

2.3 General Management Plan Objectives

The park's 1997 General Management Plan and Environmental Assessment objectives include:

- ❑ Manage the landscape to reflect the setting at each of the three lines of battle and site of the courthouse; and to protect and preserve commemorative elements including monuments, graves, and historic features.
- ❑ Promote and preserve a historical and tranquil environment conducive to the education of the public/visitor and their appreciation of the battle of Guilford Courthouse.
- ❑ Provide for a system that effectively directs visitors to the park, promotes the movement of visitors within/through the park in a manner that is compatible with park objectives, and provides all visitors the opportunity to experience the historical points of interest of Guilford Courthouse National Military Park.

- Foster cooperative relationships with other agencies, organizations, and park neighbors to promote expansion of outreach, maintain compatibility with area park system and maintain status as an effective member of the neighborhood.

2.4 Resource Management Plan Objectives

Objectives addressed in GUCO's 1997 Resource Management Plan that are pertinent to fire management include:

- Thin or remove hazardous trees as identified.
- Eradicate exotic plants.
- Preserve and maintain monuments.

2.5 How Fire Management Plan Supports General and Resource Management Plan Objectives

Principle #3 of the *2001 Federal Fire Policy* states that “fire management plans, programs, and activities [will] support general and resource management plans and their implementation.” This fire management plan serves as a detailed and comprehensive program of action to implement federal fire management policy principles and goals, which in turn support the park's general and resource management plan objectives, as well as its enabling legislation. Specifically:

- Wildland fire suppression serves to protect human life, property, and natural and cultural resources from the adverse effects of unwanted fire.
- Non-fire applications assist in preserving the historic landscape and reducing hazard fuels accumulations. Reducing hazard fuels accumulations creates fuel conditions that support low-intensity fires, thereby reducing the threat of catastrophic wildland fire, and reducing the risk of negative impacts to natural and cultural resources, park infrastructure, and adjacent property in the event of a wildland fire. It also improves conditions for firefighter and public safety. Maintaining existing hazard fuels breaks along the majority of the park perimeter additionally serves to prevent the spread of wildland fire to and from adjacent non-agency land.
- Non-fire applications assist in controlling exotic vegetation. The *National Park Service Management Policies 2001* (section 4.4.4.2) states that high priority will be given to managing—up to and including eradicating—exotic species that have, or potentially could have, a substantial impact on park resources.

3.0 WILDLAND FIRE MANAGEMENT STRATEGIES

3.1 General Management Considerations

At GUCO, all wildland fire, regardless of ignition source, will be suppressed. Non-fire applications will be used to achieve a variety of resource management objectives. The park's fire management goals, which follow, incorporate GUCO's overall management objectives as well as previously-discussed federal fire management policy principles and goals, including firefighter and public safety, collaboration, and accountability.

3.2 Wildland Fire Management Goals

Fire management goals at GUCO are:

- Suppress all wildland fire in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected (including adjacent non-agency land).
- Use non-fire applications to:
 - Reduce hazard fuels accumulations, which in turn:
 - Reduces the threat of catastrophic wildland fire, and reduces the risk of negative impacts to park resources in the event of a wildland fire.
 - Improves conditions for firefighter and public safety, and reduces suppression costs in the event of a wildland fire.
 - Preserve the historic (1781) landscape.
 - Control exotic vegetation species, which compete with native vegetation and alter the historic landscape.
- Manage all wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics, and maximizing efficiency via interagency coordination and cooperation.
- Maintain existing cooperative agreements with state and local agencies in order to facilitate close working relationships and mutual cooperation regarding fire management activities.
- Develop and conduct a monitoring program with recommended standard monitoring levels commensurate with the scope of the fire management program, and use the information gained to continually evaluate and improve the fire management program.

- ❑ Integrate knowledge gained through natural resource research into future fire management decisions and actions.
- ❑ Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective fire management program.
- ❑ Plan and conduct all fire management activities in accordance with all applicable laws, policies and regulations.
- ❑ Incorporate the minimum impact suppression tactics policy into all suppression activities, to the greatest extent feasible and appropriate.

3.3 Scope of Wildland Fire Management Elements to be Implemented

GUCO will implement a combination of wildland fire suppression and non-fire applications. Prescribed fire will not be used at the park.

3.3.1 Wildland Fire Suppression

A wildland fire is defined as any nonstructural fire, other than prescribed fire, that occurs in the wildland. All wildland fires at GUCO, regardless of origin, will be suppressed.

3.3.2 Non-Fire Applications

GUCO will use non-fire applications (mechanical techniques) to reduce hazard fuels accumulations, promote exotic vegetation species control, maintain open areas and historic vistas, maintain existing 30-foot wide hazard fuels beaks along the majority of the park perimeter and a portion of the park tour road (15 feet wide along either side), and maintain existing defensible space of at least 50 feet around all park buildings.

3.4 Park Description

3.4.1 Physical and Biotic Characteristics

3.4.1.1 Real Property

Due to its small size (approximately 228 acres) and uniformity, GUCO will be managed as a single fire management unit. The park is located within the northwestern portion of Greensboro, North Carolina, in Guilford County. The park's traditionally rural setting has undergone marked changes in the past two decades. The city's 1984 annexation of the area around GUCO led to rapid residential and commercial development, which at present almost envelops the park with individual and multi-family housing units and businesses. In turn, these developments have led to an exponential increase in the volume of commuter traffic traversing the park on a north-south line along SR2340 (Old Battleground Road), segregating the park's eastern and western portions. The average

daily count of vehicles traveling this road was 10,000 in 1997. New Garden Road, which enters the park from the west, is the sole access road to the park visitor center.

Greensboro Country Park is located along the eastern third of the southern park perimeter. The Forest Lawn Cemetery is located along the central portion of the southern park perimeter. Both of these properties contain portions of the 1781 battlefield.

3.4.1.2 Soils

Soil series represented within the park include Cecil, Madison, and Wehadkee. Cecil sandy loam is the most common soil type at GUCO, underlying most of the upland portion of the park, or roughly 90% of the land area. Historic cultivation within current park boundaries, much of it intensive, largely occurred on Cecil sandy loam; as a result, the soils under most of the eastern third of the park are considered to be eroded versions of this type. Cecil urban land complex consists of areas of Cecil sandy loam that have been heavily disturbed or developed by humans. Madison sandy loam occurs on fairly steep slopes on both sides of Richland Creek. Wehadkee silt loam is only found on the bottomlands of Richland Creek and the old Lake Wilfong bed.

3.4.1.3 Air Quality

GUCO is designated a class II air shed under the Clean Air Act. Under class II, modest increases in air pollution are allowed beyond baseline levels for particulate matter, sulfur dioxide, nitrogen and nitrogen dioxide, provided that the national ambient air quality standards, established by the Environmental Protection Agency (EPA), are not exceeded. Principal sources of air pollutants in the park vicinity are the nearby Piedmont Triad International Airport, industry emissions from Greensboro, and vehicle emissions. Additionally, United Parcel Service has proposed a major expansion hub at the Piedmont Triad Airport; if this occurs, it would probably have an impact on air quality in the vicinity.

3.4.1.4 Vegetation

NatureServe recently completed a vascular plant inventory of the park, adding 255 new species to the list of vascular flora heretofore known to occur at GUCO. There are presently 346 recorded vascular plant species for the park, and it is estimated that between 76 and 95% of the vascular flora in the park is presently documented. As per the report entitled *Vascular Plant Inventory and Plant Community Classification for Guilford Courthouse National Military Park* (NatureServe 2003), eleven distinct vegetation associations exist at the park.

It bears noting that NatureServe considers only four of the eleven associations—the Acidic Piedmont Mesic Mixed Hardwood Forest, the Piedmont Dry-Mesic Oak-Hickory Forest, the Southern Red Oak-White Oak Forest, and the Piedmont Small Stream Sweetgum Forest—to be “natural.” NatureServe considers the remaining seven associations to be “semi-natural” (successional), or exotic species-dominated. Acreages

of the associations were determined via Geographic Information System. Descriptions of each follow, as per the NatureServe report:

- Virginia Pine Successional Forest: This human-influenced association occurs in upland areas of the park, typically in sites with a history of intense cultivation. Virginia pine (*Pinus virginiana*) is a short-lived tree that specializes in colonizing areas that have been heavily eroded or denuded to mineral soil. In places, a solid canopy of Virginia pine has formed. In other locations it is co-dominant with sweetgum (*Liquidambar styraciflua*) and shortleaf pine (*Pinus echinata*). In general, the herbaceous layer is extremely poor. However, the shrub and understory layers can be very dense with seedlings and saplings of later successional species such as Florida maple (*Acer barbatum*) and red maple (*Acer rubrum*).

Due to its highly disturbed nature, this community can be home to a number of invasive exotics, especially Japanese honeysuckle (*Lonicera japonica*). Although it is considered a human-modified community (associated with the large-scale abandonment of farmland over the last century in the North Carolina Piedmont) and of no conservation value, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

This vegetation association, represented by NFDRS fuel model P, composes approximately 25 acres at the park. Fuel models are discussed in section 3.4.5.3.

- Shortleaf Pine Early Successional Forest: This human-influenced association also occurs in upland areas of the park, in sites that were heavily farmed, grazed, or logged in the past 70 years. Shortleaf pine colonizes plowed areas shortly after they are left fallow. The community type overlaps with that of the Virginia Pine Early Successional Forest in this part of the state, although Virginia pine is generally found in areas that were more heavily eroded prior to forest regeneration. In places, a solid canopy of shortleaf pine has formed. In other locations it is co-dominant with sweetgum and Virginia pine. In general, the herbaceous layer is extremely poor. However, the shrub and understory layers can be very dense with seedlings and saplings of later successional species such as Florida maple and red maple.

Due to its highly disturbed nature, this community can be home to a number of invasive exotics, especially Japanese honeysuckle. Although it is considered a human-modified community (associated with the large-scale abandonment of farmland over the last century in the North Carolina Piedmont) and of no conservation value, management of the invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities.

This vegetation association, represented by NFDRS fuel model P, composes approximately 23 acres at the park.

- Successional Loblolly Pine-Sweetgum Forest: Examples of this association are found in a wide variety of upland areas that have been altered in the past by farming or

logging and are now regenerating. Although one of the most common communities in the southeastern United States, it was most likely planted within the park, since Guilford Courthouse is just outside of the natural range of loblolly pine (*Pinus taeda*). Stands within the park are strongly co-dominated by loblolly pine, Virginia pine, and sweetgum, but also may contain an understory of red maple. Shade-tolerant species of trees are very common in the shrub layer and understory.

Loblolly pine successional communities are easily invaded by invasive exotic species such as wisteria (*Wisteria sinensis*), Japanese honeysuckle, English ivy (*Hedera helix*), and Japanese stiltgrass (*Microstegium vimineum*). Vines such as poison ivy (*Toxicodendron radicans*) and muscadine (*Vitis rotundifolia*) can also invade the understory, especially in the drier habitats. Although it is considered a human-modified community (associated with the large-scale abandonment of farmland over the last century in the North Carolina Piedmont) and of no conservation value, management of invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities. The control of wisteria may be especially crucial in these areas due to its aggressive nature within the park boundary.

This vegetation association, represented by NFDRS fuel model P, composes approximately 5.5 acres at the park.

- Acidic Piedmont Mesic Mixed Hardwood Forest: This community is generally found on undisturbed steep slopes adjacent to streams. It often persists in areas that are so steep that they were not plowed but were probably heavily logged. Under natural conditions these forests are uneven-aged, with old trees present alongside younger trees. Reproduction occurs primarily in canopy gaps. Rare, severe natural disturbances such as wind storms may allow pulses of increased regeneration and allow the less shade-tolerant species to remain in the community.

Within the park, this community occurs only on east- or north-facing, sheltered, steep slopes adjacent to Richland Creek and its tributaries. The canopy is closed and consists of American beech (*Fagus grandifolia*), with smaller amounts of red oak (*Quercus rubra*) and southern red oak (*Quercus falcata*). Flowering dogwood (*Cornus florida*), red maple, and American beech are common in the understory. The short shrub and herbaceous layers are sparse, with striped prince's pine (*Chimaphila maculata*) and Christmas fern (*Polystichum acrosticoides*) being the most common herb species. Spring ephemerals include mayapple (*Podophyllum peltatum*) and bloodroot (*Sanguinaria canadensis*).

While rare within the park, this community is fairly common throughout its range in the Piedmont. It has most likely persisted on the landscape due to its occurrence on steep sites that are less susceptible to human disturbance. It is ranked G3G4, meaning that it is somewhat threatened but stable globally. The examples within the park are relatively stable and have not been disturbed recently. There is little invasive exotic

growth within this community. Most threats to this ecosystem are from events beyond onsite management control (windstorm, beech bark disease).

This vegetation association, represented by NFDRS fuel model E after leaf fall and NFDRS fuel model R after canopy leaf out, composes approximately 3.5 acres at the park.

- Successional Tuliptree-Hardwood Forest: Examples of this association are found primarily in areas which were once clearcuts, old fields, or which were cleared by fire or other natural disturbances. These non-wetland forests are also found along mesic stream terraces.

Within the park, this community occurs in a wide variety of environments. It is most commonly associated with slightly protected gentle slopes, whereas the successional pine communities often occur in more exposed flat upland positions on the landscape. As this association occurs in sites that were formerly cultivated, past land use history dictates current composition more than soils, exposure, or other environmental factors. Vegetation composition within the park varies widely in this broadly defined modified community. All occurrences are dominated by tuliptree (*Liriodendron tulipifera*), but with differing levels of co-dominance by trees such as sweetgum, Virginia pine, scarlet oak (*Quercus coccinea*), and blackgum (*Nyssa sylvatica*). The shrub layer is usually fairly thick with saplings of later successional species such as Florida maple and beech.

Due to its highly disturbed nature, this community harbors numerous invasive exotic vines and shrubs. Although it is considered a human-modified community (associated with the large-scale abandonment of farmland over the last century in the North Carolina Piedmont) and of no conservation value, management of invasive exotics within this community may prevent the spread of these exotics into adjacent higher priority communities. The control of wisteria may be especially crucial in these areas due to its aggressive nature within the park boundary. The Wisteria Vine-Shrubland Community, described below, most likely started out in a successional tuliptree community until the wisteria vines began overtopping the canopy trees and killing them to form a more open area of wisteria.

This vegetation association, represented by NFDRS fuel model E after leaf fall and NFDRS fuel model R after canopy leaf out, composes approximately 37.5 acres at the park.

- Piedmont Dry-Mesic Oak-Hickory Forest: This association is probably the most common forest type remaining in the Piedmont of North Carolina. Within the park, it occurs on very broad, smooth upland areas. The closed canopy is dominated by white oak (*Quercus alba*) along with smaller amounts of red oak, mockernut hickory (*Carya alba*), and tuliptree. The understory is very dense and consists of numerous stems of red maple, Florida maple, and flowering dogwood. The understory is sparse but better developed than other upland associations in the park. Plants in the

herbaceous layer include wild yam (*Dioscorea villosa*), striped prince's pine, American lopseed (*Phryma leptostachya*), and Solomon's seal (*Polygonatum biflorum*). Muscadine is a common vine groundcover. Other plants of note include black bugbane (*Cimicifuga racemosa*), Carolina lily (*Lilium michauxii*), and feathery false Solomon's seal (*Maianthemum racemosa*). Spring ephemerals such as bloodroot and mayapple occur in small patches.

This association was probably the matrix community in the area prior to farming and other human-induced activities. Still very common within the state, it is considered globally secure. Within the park, it is restricted to small patches, mainly in areas where human disturbance has not occurred within the past century. The highest quality examples are located south of the visitor's center within the loop road, and to the immediate west of Old Battleground Road as the road exits the southern park boundary. These areas should be preserved, as they harbor a number of species which are not found in most other associations in the park and which may rely on those small parcels for their continued survival. These species include kidney leaf buttercup (*Ranunculus abortivus*) and the aforementioned Carolina lily and black bugbane. While none of these plants are threatened or endangered, they are rare in fragmented landscapes such as Guilford Courthouse National Military Park and should be given some special consideration.

Threats to this community within the park, as with all of the communities in this fragmented landscape, are mostly from invasive exotic species. Although not currently a large threat, Chinese privet (*Ligustrum sinense*) is present within some examples of this community. A lesser known exotic, Chinese fir (*Cunninghamia lanceolata*) occurs in other areas of the park and may begin to invade this community, requiring immediate control.

This vegetation association, represented by NFDRS fuel model E after leaf fall and NFDRS fuel model R after canopy leaf out, composes approximately 43 acres at the park.

- Southern Red Oak-White Oak Forest: This association occurs within the park on the drier uplands, primarily in the northeastern quarter of the property. The canopy is dominated by southern red oak, post oak (*Quercus stellata*), white oak, and pignut hickory (*Carya glabra*). The understory is dominated by oak saplings along with red maple, sweetgum, and Virginia pine. The shrub layer consists of small amounts of deerberry (*Vaccinium stamineum*) and/or early lowbush blueberry (*Vaccinium pallidum*). The herbaceous layer is poorly developed and contains such acid loving species as striped prince's pine and downy rattlesnake plantain (*Goodyera pubescens*).

Although considered less common than the related Piedmont Dry-Mesic Oak-Hickory Forest, this community is still quite common and secure throughout its range in the southeast United States. Nonetheless, the highest quality examples of this community should be considered in any future development plans in the park. One such high

quality area occurs just east of the northern parking lot off of Old Battleground Road. Threats to this association are the same as with the Piedmont Dry-Mesic Oak-Hickory Forest. Invasive exotics may become a problem in the future, but are currently not prevalent.

This vegetation association, represented by NFDRS fuel model E after leaf fall and NFDRS fuel model R after canopy leaf out, composes approximately 17.5 acres at the park.

- Piedmont Small Stream Sweetgum Forest: Within the park, this association occurs on the floodplains along Richland Creek. The canopy, subcanopy, shrub, and herbaceous layers of this community are generally diverse and well-developed. The canopy is usually dominated by sweetgum with co-dominance from a variety of other bottomland species. Sweetgum, tuliptree, sycamore (*Platanus occidentalis*), American beech, red maple, and boxelder (*Acer negundo*) are all possible co-dominants, with black walnut (*Juglans nigra*) and black cherry (*Prunus serotina*) sometimes occurring in small numbers. The understory can be very dense and may contain flowering dogwood, Florida maple, and most of the aforementioned canopy species. The shrub layer may consist of northern spicebush (*Lindera benzoin*) and American hazelnut (*Corylus americana*) in the higher quality examples of this association, as well as herbaceous species including American lopseed, Solomon's seal, Christmas fern, blue violet (*Viola sororia*), and various sedge species (*Carex* species). Many species on the park vascular plant list, while not threatened or endangered, occur only within this particular community.

Of the eleven associations at the park, this is the most diverse, as well as the most threatened. It has a global rank of G3, meaning that it is only somewhat secure throughout its range. The community itself is fairly extant, but high or medium quality examples are extremely rare due to the high rate of invasion of exotic species, changes in hydrology related to development upstream, and channelization of some streams in the Piedmont. All of these factors have turned once healthy versions of this community into monocultures of Japanese stiltgrass and shrubby exotics. Within the park, the biggest threat is a combination of hydrology changes and exotic species invasion. Some examples of this community have close to 100% coverage of Japanese stiltgrass. This has undoubtedly lowered native plant diversity in the herbaceous layer. Other exotics including autumn olive (*Elaeagnus umbellata*), English ivy, Japanese honeysuckle, Chinese privet, multiflora rose, and wisteria are present and may be increasing in coverage over time.

This vegetation association, represented by NFDRS fuel model E after leaf fall and NFDRS fuel model R after canopy leaf out, composes approximately 13 acres at the park.

- Wisteria Vineland: This exotic-dominated association tends to occur in areas that were formerly successional loblolly pine-sweetgum forest or successional tuliptree forest. Since wisteria invades by overtopping trees, this community tends to occur in highly fragmented areas located near old homesteads or other past human habitations where wisteria has persisted after planting. Although rare across the landscape at this point, there is the potential for this association to occupy more land as further fragmentation occurs.

Within the park, the Wisteria Vineland consists of a monoculture of wisteria (*Wisteria sinensis* and/or *Wisteria japonica*), probably caused by a windstorm or other severe disturbance that occurred adjacent to an old homesite where the plant was already established. The past land use history and disturbance patterns are probably much more important than the underlying soil and hydrology in determining the distribution of this community within the park. In the areas most affected by the infestation, there are no surviving trees and the wisteria covers 100% of the area. Since this is an undesirable invasive exotic-dominated association, there are no threats to it. However, the association itself threatens all adjacent associations and has the potential to permanently change adjacent forest tracts into monocultures of wisteria. Management of this community has already begun and should continue to be of the highest priority.

This vegetation association composes approximately one acre at the park. It is not being managed as a separate NFDRS fuel model due to its small size.

- Blackberry-Greenbrier Successional Shrubland Thicket: Within the park, this early successional community type occurs in areas that are mowed infrequently (every two to five years rather than annually). It can occur in both upland and lowland sites as long as it is surrounded by old field or other open herbaceous or shrubby habitat, since this community relies on full sun. The community mostly depends upon infrequent mowing so that larger trees do not take hold and overshadow the herbaceous and shrubby components of the forest. The community is dominated by stands of blackberry and dewberry, but can also contain a diverse assemblage of herbaceous old field species in gaps in the blackberry, and wetland species in areas adjacent to creeks.

This vegetation association composes approximately one and one-half acres at the park. It is not being managed as a separate NFDRS fuel model due to its small size.

- Cultivated Meadow: Within the park, this exotic species-dominated grassland occurs in regularly mowed areas. The vegetation of this community at the park is surprisingly diverse (over 50 species in one 20x50 meter plot). Most examples have high concentrations of fescue (*Lolium arundinaceum*), but they also contain large numbers of such species as little bluestem (*Schizachyrium scoparium*), rice button American aster (*Symphiotricum dumosum*), and panicle-leafed tick-trefoil (*Desmodium paniculatum*), along with smaller numbers of species including deertongue (*Dichantheium clandestinum*), lyre-leaf sage (*Salvia lyrata*), gray

goldenrod (*Solidago nemoralis*), beaked panic grass (*Panicum anceps*), Canadian horseweed (*Conyza canadensis*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy, and hairy small-leaf tick-trefoil (*Desmodium ciliare*).

Threats to this community include the cessation of mowing and the invasion by non-native species. At this point, the community is comprised of a large number of exotics. However, these exotic species do not form monocultures and allow for high native species diversity as well. Therefore, exotics are not yet a significant threat.

Although this is a modified association and not a priority for conservation globally, this community does help maintain a higher level of biodiversity at the park. Many native species that are unable to grow in forests do grow in this community, especially the battlefield proper. These species include Elliott's bluestem (*Andropogon gyrans*), narrow-leaf mountain mint (*Pycnanthemum tenuifolium*), cankerweed (*Prenanthes serpentaria*), and the aforementioned deertongue, beaked panic grass and little bluestem.

There are several patches of this vegetation association at the park, totaling approximately 12.5 acres. It is not being managed as a separate NFDRS fuel model due to its small size.

The aforementioned NatureServe report states that:

Although Guilford Courthouse National Military Park does not contain any rare or endangered species and has been impacted heavily by past land use practices, it nevertheless serves as refuge for plant species and ecological communities that no longer exist within the urban and suburban areas of Greensboro and its environs. Therefore, the ecological communities and plants are of relative significance for the region and every effort should be made to focus attention on those natural communities that might serve as the best examples of each community to be preserved, enhanced, and possibly interpreted for future visitors.

Appendix 13.3 includes a park floral species list.

3.4.1.5 Wildlife and Aquatic Resources

Terrestrial wildlife species at the park include white-tailed deer, red fox, eastern cottontail, raccoon, squirrel, opossum, and groundhog. A herpetofaunal survey is currently underway at the park. Aquatic vertebrate, avifaunal, and mammal and bat surveys are scheduled to begin next year.

Appendix 13.3 includes a park faunal species list.

The park is drained by two small streams. The larger of the two, Richland Creek, enters GUCO from the south from the adjacent Greensboro County Park. This municipal park

dams the creek in two successive small lakes before it flows into National Park land. Richland Creek picks up a small tributary within the park near the trail leading from the historic site of Guilford Courthouse. This tributary begins as a small stream within the park adjacent to the Forest Lawn Cemetery.

The limited aquatic resources of the park have received a fairly complete water quality inventory. Between July, 1996 and February, 1998, a series of monthly samples were taken from Richland Creek. These samples were analyzed for a wide variety of metals, nutrients, bacteria, and standard field parameters. The only parameters that exceeded acceptable levels were fecal coliform and fecal streptococci. Ducks and geese found on and around the aforementioned small lakes in Greensboro County Park may contribute to the high bacterial counts in Richland Creek. In 2001, the creek was ranked as degraded by the National Park Service Inventory and Monitoring Program (NPS I&M), Cumberland/Piedmont Network (CUPN).

The NPS I&M CUPN is scheduled to begin quarterly water quality sampling in the fall, 2004, of Richland Creek, where it enters GUCO, and an unnamed spring, located along the southern boundary of the park adjacent to Forest Lawn Cemetery. Parameters to be tested will include ambient air and water temperature, pH, specific conductivity, dissolved oxygen (both concentration and saturation), acid neutralization capacity, fecal coliform bacteria concentration, chlorophyll concentration, total organic content, total suspended solids, turbidity, pesticide levels, anions and cations (including various nutrients and metals), and discharge (measuring water flow and calculating flux of the aforementioned parameters).

3.4.1.6 Threatened and Endangered Species

No federally- or state-listed threatened or endangered species are documented to occur at GUCO, nor does any designated critical habitat exist at the park. However, coordination with the U.S. Fish and Wildlife Service and the North Carolina Natural Heritage Program revealed that two federally- and state-listed species could potentially occur here:

- Bald eagle (*Haliaeetus leucocephalus*), federally- and state-listed threatened
- Carolina darter (*Etheostoma collis*), federally- and state-listed species of special concern

According to John Hammond, endangered species coordinator with the U.S. Fish and Wildlife Service (6/10/03 telephone conversation), the bald eagle inhabits mature forests near large bodies of water (for nesting), as well as lakes and sounds (nesting sites, regular non-breeding sites). The closest body of water where bald eagle nesting sites are known to exist is Lake Brandt, located approximately three miles to the north of the park. However, Mr. Hammond recommends that prior to the implementation of mechanical fuel reduction, the Areas of Potential Impact be inspected for nests. Should any be located, the U.S. Fish and Wildlife Service should be contacted for further recommendations.

3.4.1.7 Cultural and Historic Resources

The park was administratively listed in the National Register of Historic Places (NRHP), with the passage of the National Historic Preservation Act in 1966. The same year, a formal nomination to the NRHP was prepared for GUCO, defining it as an historic district. Since then, two updates to the NRHP have been completed and approved, one in 1978 and the other in 1996. As per the 1996 documentation, the superintendent's residence (Residence #1), a maintenance building (Utility Building), an inflammable storage building, stone drains and culverts, New Garden Road, and the archeological site of Guilford Courthouse are contributing elements at the park.

- Residence #1 (HS-31, LCS 91444): This is a one-and-one-half-story, side-gable roof, Colonial Revival style house with a one-story porch extension at the east gable end. Exterior walls are brick on the main house and beaded weatherboard siding on the porch. The roof is covered with terra cotta tiles. This building, and the Utility and Inflammable Storage buildings, both described below, were erected as part of a 1934-1935 Public Works Administration (PWA) program to improve park facilities that were in place at the time of the area's 1917 transfer from the Guilford Battle Ground Company to the War Department, and which remained largely unaltered at the time of the 1933 accession of the War Department areas by the National Park Service.
- Utility Building (HS-32, LCS 91445): This is a two-story, side-gable roof, Colonial Revival style L-plan building of wood frame construction with a concrete foundation, beaded weatherboard siding, and a clay tile roof.
- Inflammable Storage Building (HS-33, LCS 91446): This is a one-story, side-gable building with a concrete foundation, brick walls, and a clay tile roof, constructed for the storage of flammable and hazardous materials.
- Stone Drains and Culverts (HS-34, LCS 91447): These historic structures consist of approximately eight stone culverts and eighteen drainage ditches found along the tour road, New Garden Road, and Old Battleground Road within the park, built by the National Park Service in 1937-1938. Constructed of rock-faced cut granite, a representative box culvert measures 15.5' wide by 4' high. Drainage ditches are also of cut granite and are approximately 4' wide.
- New Garden Road (HS-30, LCS 12210, Reconstruction): This 10'-wide road running east to west through the park, was a wagon road from Hillsboro to Salisbury during the Revolutionary War period. The road was abandoned in the early nineteenth century. The Guilford Battle Ground Company reopened the road for visitor access when it created the park. As the surrounding urban area grew in the twentieth century, the road was paved and became a major thoroughfare. In 1974-1975, the National Park Service closed the majority of the road within park boundaries in order to reduce traffic and reconstruct the historic road. Originally listed in the 1978 nomination, the road's status was clarified in the 1996 documentation as a reconstruction of an historic resource.

- Guilford Courthouse, Archeological Site: Originally listed in the 1978 nomination, the courthouse’s status was clarified in the 1996 documentation as an archeological site. No physical remains of the building are extant. The location, however, is known, and the site has the potential to yield information important to the history of the battle and settlement in the area.

Two resources—Old Bruce Road and Reedy Fork Road—were included as contributing elements in the 1978 nomination. However, because their locations are unknown, they were determined to be ineligible for listing in the 1996 documentation.

Thirty-two park structures (including the Residence #1, Utility Building, Inflammable Storage Building, Stone Drains and Culverts, and New Garden Road) are presently included on the park List of Classified Structures, as follows in Table 1:

Table 1: GUCO List of Classified Structures

Structure No.	LCS No.	Structure Name
HS-02	12182	Martha McFarland McGee Bell Monument
HS-03	12183	Dr. David Caldwell Monument
HS-04	12184	Continental Monument
HS-05	12185	Major John Daves Monument
HS-06	12186	Lt. Col. "Hal" Dixon Monument
HS-07	12187	Captain Griffen Fauntleroy Monument
HS-08	12188	Col. Arthur Forbis Monument
HS-09	12189	James Gillies Monument
HS-10	12190	Major General Nathanael Greene Monument
HS-11	12191	Hooper-Penn-Hewes Monument
HS-12	12192	Nathaniel Macon Monument
HS-13	12193	Maryland Monument
HS-14	12194	Captain James Morehead Monument
HS-15	12195	Joseph Morehead Monument
HS-16	12196	No North-No South Monument
HS-17	12197	Captain George Reynolds Monument
HS-18	12198	David Schenck Monument
HS-19	12199	Brig. General Edward Stevens Monument
HS-20	12200	Lt. Col. James Stuart Monument
HS-21	12201	Brig. General Jethro Sumner Monument
HS-22	12202	Captain James Tate Monument
HS-23	12203	American Third Line Monument
HS-24	12204	Kerenhappuch Turner Monument
HS-25	12205	Cavalry Monument
HS-26	12206	George Washington's Visit Monument
HS-27	12207	Major Joseph Winston Monument
HS-28	12208	Major Joseph Winston and Jesse Franklin Headstones
HS-30	12210	New Garden Road
HS-31	91444	Residence #1
HS-32	91445	Utility Building
HS-33	91446	Inflammable Storage Building
HS-34	91447	Stone Drains and Culverts

The draft *Guilford Courthouse National Military Park Cultural Landscape Report* indicates one cultural landscape—the Guilford Courthouse battlefield—and two

component landscapes—the Greene Monument and the Superintendent’s Residence-Maintenance Complex—at the park.

- Guilford Courthouse Battlefield Landscape: This landscape contains the center positions of the first two American lines and a portion of the ground defended by the left flank of the third line, although the exact location of the latter is debatable.
- Greene Monument Component Landscape: This component landscape ranks as the most visible and frequented memorial space in the park. The Greene Monument was erected in 1915 on the park’s highest point.
- Superintendent’s Residence-Maintenance Complex Component Landscape: This component landscape contains the above-described Colonial Revival-style Residence #1, Utility Building, and Inflammable Storage Building, as well as storage sheds. It captures the essence of what its designers were hoping to accomplish—that is to mitigate the intrusion of additional infrastructure by creating a complex that seemed to belong in or derive from its cultural surroundings.

The *Guilford Courthouse National Military Park Archeological Overview and Assessment* (Groh and Prentice 2001) describes and assesses the known and potential archeological resources within the park, and makes recommendations regarding the need for future studies. As per the report, 11 archeological investigations were conducted at the park between 1968 and 1999. Two known institutional repositories—the NPS Southeast Region curatorial facility at the Southeast Archeological Center (SEAC), in Tallahassee, Florida, and the park—provide curatorial housing and stewardship of GUCO cultural materials. Documents and artifacts associated with the 11 archeological projects are curated at SEAC; the GUCO collection was obtained largely from a restoration project conducted by the Civilian Conservation Corps in the 1930s, various maintenance projects, and visitors’ surface collections. Future research for GUCO recommended by the report includes:

- General survey: A general, systematic, subsurface survey in areas not previously investigated offers the potential to discover both prehistoric and additional historic resources located within the park. Information recovered from the survey could be used to enhance interpretation of park resources for visitors. Also, given the numerous prehistoric resources located in the surrounding area, a systematic survey of the park is likely to provide information on prehistoric use of the park landscape.
- Battlefield survey: At the American First and Second battle lines, the metal detector survey method proved to be a very valuable data recovery tool. The locations of the First and Second battle line as reported in the historic record were confirmed. The angle of the Second battle line, however, was found to be slightly different than it was described in the historic record. Two archeological investigations regarding the location of the American Third have been conducted and have located the Third battle lines slightly further north and east of the location currently identified by the park. Since the battle lines have been located, it is recommended that archeological

investigations be conducted at the battle lines with the purpose of aiding park interpretation.

- ❑ Guilford Courthouse: Results of excavations at the presumed and traditional location of the courthouse have been inconclusive. It is therefore suggested that an extensive document search be conducted in conjunction with additional archeological research at alternative locations.

As per the report, officers at the North Carolina Archaeological Site File have assigned the state site number 31GF44 as an umbrella number to address all the cultural components at the park, including those that predate and postdate the Revolutionary War. The Archeological Sites Management Information System (ASMIS) designations have been assigned as follow to archeological resources at the park:

Table 2: ASMIS Designations at the Park

ASMIS ID	Archeological Resource Name
GUCO-1.00	Guilford Courthouse Battlefield
GUCO-2.00	Martinville
GUCO-2.01	Guilford Courthouse
GUCO-3.00	Great Salisbury Road/Great Road/New Garden Road
GUCO-4.00	Reedy Fork Road/Retreat Road/Hillsborough Road
GUCO-5.00	Bruce Road
GUCO-6.00	Historic Park Facilities
GUCO-6.01	Residence #1/Quarter #1/Superintendent's Residence
GUCO-6.02	Utility Building
GUCO-6.03	Inflammable Storage Building
GUCO-6.04	Stone Drains and Culverts
GUCO-6.05	Amphitheater
GUCO-6.06	Administration Building, Museum, and Visitor Center
GUCO-7.00	Cape Fear and Yadkin Valley Railroad Bed

The Southeast Archeological Center is preparing a document entitled *Fire Management Protocols for Archeological Resources in the Southeast Region*. This document will identify values and risks typically associated with different types of archeological sites found in the Southeast, and will provide guidance as to how different fire management activities can be tailored to minimize or mitigate any deleterious effects to the resources potentially at risk.

3.4.2 Specific Fire Management Objectives

Specific fire management objectives are:

- ❑ Conduct initial attack within 5-10 minutes of the time a wildland fire report is received.
- ❑ Control 95% or higher of all wildland fires during initial attack.

- ❑ Mechanically maintain existing 30-foot wide hazard fuels breaks along the majority of the park perimeter and a portion of the park tour road (15 feet wide along either side), and existing defensible space of at least 50 feet around all park buildings.
- ❑ Conduct mechanical hazard fuels reduction within three areas, totaling approximately 59 acres. This should concurrently begin moving these acres, currently in fire regime condition class 3, toward a better condition class.
- ❑ Mechanically create and maintain a 15-foot wide hazard fuels break along either side of the park entrance road and that portion of the tour road where a fuel break does not presently exist, totaling approximately 9,680 linear feet (1.83 miles), and 6.75 acres.

3.4.3 Management Considerations

- ❑ Ensure that firefighter and public safety remains the primary consideration in planning and conducting all fire management activities.
- ❑ Ensure that archeological/cultural/historic resources are considered in planning and conducting all fire management activities.
- ❑ Ensure that smoke management is considered in planning and conducting all suppression activities.
- ❑ Ensure that all applicable laws, policies and regulations are considered in planning and conducting all fire management activities.
- ❑ Ensure that socio-political economic impacts, including wildland urban interface, are considered in planning and conducting all fire management activities.
- ❑ Ensure that appropriate fire prevention and suppression actions are addressed in the right-of-way plans of development/vegetation management/contingency documents associated with and required for electrical transmission lines located on agency land.
- ❑ Ensure that fire management activities are coordinated as appropriate with all affected parties. This includes any federally recognized Indian tribes that have historical, cultural, economic or other interests in the proposed action or its effects (required, for example, by 36 CFR 800, 40 CFR 1508, and 43 CFR 10).

3.4.4 Past Role of Fire

Ecological and meteorological evidence indicates that lightning-caused fires were a major environmental force shaping the vegetation of North America for millions of years prior to human habitation (Van Lear and Waldrop 1989). Fire-adapted ecosystems developed, as did individual plant species dependent upon or adapted to wildland fire. According to fire ecologist Dr. Cecil Frost (1998), "...fire once played a role in shaping all but the wettest, the most arid, or the most fire-sheltered plant communities of the United States."

While it is difficult to substantiate purposeful landscape burning by American Indians from the archeological record, diaries, letters, reports, and books by eyewitnesses of Indian fire use from the 1600s to the 1900s have yielded considerable evidence that American Indians did use fire to modify ecosystems (Barrett 1980, 1981; McClain and Elzinga 1994; Russell 1983; Whitney 1994), with profound cumulative effects on the landscape. At the time of European contact, many eastern deciduous forests were open and park-like, with little undergrowth (Bonnicksen 2000, Day 1953, Olsen 1996). Says Charles Kay (2000), "...the only way for eastern forests to have displayed the open-stand characteristics that were common at European settlement is if those communities had regularly been burned by native people as part of aboriginal land management activities."

As per chapter 25 (Background Paper: Fire in Southern Forest Landscapes) of the USDA Forest Service General Technical Report entitled *The Southern Forest Resource Assessment Summary Report* (2002):

To appreciate the pervasive role of fire in shaping southern forests requires an understanding of the dynamic response of southern ecosystems to climate change since the retreat of the Laurentide Ice Sheet, which began around 18,000 years ago, and the extent of human influence, which likely began about 14,000 years ago. Humans exert an influence by igniting or suppressing fires. Native Americans used fire extensively for thousands of years. The early European settlers continued and to a degree expanded the use of fire. In the last century, however, human influence over fire in the South changed markedly.

We have divided the long history of fire since humans arrived in the South into five periods:

- From the earliest appearance of humans in North America around 14,000 years ago (Fagan 2000) until European contact 500 years ago, the first period was one of increasing human population level and more extensive use of fire.
- For the first 400 years after their arrival, the early European settlers continued to use fire in much the same way as Native Americans, often reoccupying and farming land cleared by Native Americans and expanding burning of woodlands to provide forage for livestock (Williams 1992).
- At the end of the 19th century and extending into the 20th century, the remaining southern forests were extensively logged to support economic expansion; wildfires were common in the slash left behind. In reaction to these widespread and destructive wildfires, the fourth period of fire suppression started in the early 1900s.
- The current period is one of fire management, in which the natural role of fire is increasingly recognized and incorporated into forest management.

There are no indications in the historic record as to the extent or frequency of fire activity (either natural or prescribed) in the specific park vicinity. Since GUCO entered National Park Service administration in 1933, all wildland fire within its boundaries has been suppressed. The annual occurrence of wildland fires at GUCO is very low; as per the Shared Applications Computer System database (SACS), since 1980, one wildland fire has occurred here (a human-caused 0.1-acre fire on 11/21/81). According to the park fire management officer, two additional but unrecorded fires have occurred at the park, both very small in size. One occurred along a roadside in 1996 or 1997 (unknown cause, although suspected to be a cigarette thrown from a vehicle), and the other, in 2000, was an escaped campfire.

3.4.5 Wildland Fire Management Situation

3.4.5.1 Historical Weather Analysis

In the park area, the annual average temperature is 68.9° F, ranging from an average minimum temperature of 28.4° F in January, to an average maximum temperature of 87.5° F in July. Average total annual precipitation is 42.26 inches, including both rain- and snowfall. These data, as well as Table 3, below, are provided by website <http://www.erh.noaa.gov/er/rah/>.

Table 3: Period of Record Monthly Climate Summary, Greensboro WSO Airport, North Carolina (313630), Period of Record: 1/1/1933 to 12/31/2001

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temp (F)	48	51.3	59.9	70	78	84.8	87.5	86	80.1	70.5	59.9	50.1	68.9
Average Min. Temp (F)	28.4	30	37	45.6	54.9	63.4	67.4	66.2	59.3	47	37.2	30.1	47.2
Average Total Precipitation (in.)	3.43	3.25	3.74	3.35	3.49	3.65	4.5	4.17	3.83	2.96	2.82	3.06	42.26
Average Total Snowfall (in.)	3.3	2.8	1.6	0	0	0	0	0	0	0	0.2	1	8.8

Percent of possible observations for period of record: max. temp. 100%; min. temp. 100%; precip. 100%; snowfall 98.8%.

3.4.5.2 Fire Season

There are two fire seasons in the park area, one in the spring from February 15th to May 15th, and the other in the fall from October 15th to December 1st, as determined by the North Carolina Division of Forest Resources. Lower levels of precipitation in the fall and early spring, combined with higher levels of dead or dormant fuels result in the lowest annual fuel moisture rates, and a subsequently higher probability of ignition. Available fuels during these time periods include 1-hour through 1000-hour timelag.

3.4.5.3 Fuel Characteristics and Fire Behavior

The primary fuel types represented at GUCO have been classified according to the National Fire Danger Rating System (NFDRS) and the Northern Forest Fire Laboratory Fire Behavior Prediction System (FBPS) (Deeming et al 1978:30, Anderson 1982). Acreages were determined via Geographic Information System.

- Fuel Model E: This model, and FBPS fuel model 9, represent hardwood and mixed hardwood-conifer stands where the hardwood predominates after leaf fall (coinciding with the park's fall fire season). Leaf litter is the primary fuel. High winds will cause higher rates of spread than predicted because of spotting caused by rolling and blowing leaves. Concentrations of dead-down woody material can contribute to possible torching out of trees, spotting, and crowning activity. Fires run through the surface litter faster than fuel model R and have higher flame height. In the summer after the trees have leafed out, fuel model E should be replaced by fuel model R. Fuel model E (R after canopy leaf out) composes approximately 129 acres park-wide.
- Fuel Model P: This model, and FBPS fuel model 8, represent long-needled southern pine stands. A two- to four-inch layer of lightly compacted needle litter is the primary fuel. Some small branchwood is present, but the density of the canopy precludes more than a scattering of shrubs and grass. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning activity. Fuel model P composes approximately 53.5 acres park-wide.
- Fuel Model R: This model, and FBPS fuel model, 8 most closely match closed-canopy short-needle conifer stands year-round; mesic hardwood stands year-round; and hardwood and mixed hardwood-conifer stands where the hardwood dominates, after the canopies leaf out in the spring. Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards.

Other vegetation present at the park, but composing areas too small to logically delineate and manage as fuel models, are the earlier-discussed wisteria vineland; the blackberry-greenbrier successional shrubland thicket; and scattered patches of cultivated meadow (the largest of which is about five and one-half acres), which can reach up to one and one-half feet in height between mowings.

Table 4 illustrates historic fire weather parameters at "average" and "extreme" levels for the park fire seasons.

Table 4: Historic Fire Weather Parameters for GUCO Fire Seasons (February 15 – May 15; October 15 – December 1) NFDRS Station 317001

Fire Weather/Behavior Parameter	Average Fire Season Weather	97th Percentile Fire Season Weather
20 foot wind speed	5 miles/hour	14 miles/hour
Maximum temperature	68 degrees Fahrenheit	86 degrees Fahrenheit
Minimum relative humidity	34%	13%
1-hour fuel moisture	9%	4%

Table 5 demonstrates anticipated fire behavior at GUCO under these average and extreme conditions, as well as critical threshold values influencing fire controllability. The values were calculated using the BEHAVE (Andrews 1986) fire behavior prediction model utilizing weather inputs from the Uwharrie National Forest manual weather station (NFDRS station 317001), located in Troy, NC, approximately 50 miles to the south of GUCO. The weather data utilized cover the 25-year period from 1970-1995, and the weather indices were calculated using the Fire Family Plus (Bradshaw 2002) software package. It should be recognized that the table values are based upon models rather than direct observation of fire behavior in these fuel types. As GUCO managers have the opportunity to observe and monitor fire behavior, these values may be refined and the model calibrated to better reflect local fuel and weather conditions.

The park uses the Keetch-Byram Drought Index (KBDI) as its primary drought indicator, which, based upon the level, indicates low to extreme drought conditions influencing fire behavior (see section 4.2.2.4.2.2).

Table 5: Potential Fire Behavior Under Average and Extreme Conditions

NFDRS Model	FBPS Model	Fuel Type/Vegetation	Fire Behavior; Average Conditions		Fire Behavior; Extreme Conditions	
			Flame Length (ft)	Rate of Spread	Flame Length (ft)	Rate of Spread
E	9	Hardwood/hardwood-conifer stands after leaf fall	2	2 chains/hr	4	11 chains/hr
P	8	Southern pine stands	1	1 chain/hr	1	3 chains/hr
R	8	Hardwood/hardwood-conifer stands after canopy leaf out	1	1 chain/hr	1	3 chains/hr

Average conditions = 1970-1995 NFDRS station 317001 mean fire season weather conditions

Extreme conditions = 1970-1995 NFDRS station 317001 97% percentile fire season weather conditions

Assumes maximum spread with 0% slope

Table 6 outlines potential critical weather parameters that would result in fire behavior exceeding initial attack capabilities (flame lengths greater than eight feet). These values were calculated using the RX Window Module of the BEHAVE program (Andrews 1986). Such values are useful both for facilitating recognition of potential extreme fire behavior conditions, as well as for assisting in prescription development for the prescribed fire program. It should be noted that generally two or three weather parameters must be aligned in order for extreme conditions to result. It should also be noted that these are modeled values and should serve only as guidelines. As the opportunity arises, fire monitoring data collection on wildland fires will facilitate refinement of these values, as well as development of critical values for additional

parameters. Last, it should be noted that while the values listed will potentially result in flame lengths greater than eight feet, this does not necessarily indicate a sustained, uncontrollable wildland fire. Rather, they indicate that direct attack is not a safe strategy at the head of the fire. Furthermore, these conditions, particularly wind speed, can vary greatly within a short time period and be fleeting in nature.

Table 6: Critical Weather Parameters Resulting in Need for Indirect Attack

NFDRS Model	FBPS Model	Fuel Type/Vegetation	Moisture of Extinction	Critical Weather Parameters Resulting in Fire Behavior Exceeding Direct Attack Capabilities
E	9	Hardwood/hardwood-conifer stands after leaf off	25%	1-hr fuel moisture <5% and eye-level wind speed >15 mph.
P	8	Southern pine stands	30%	Flame lengths unlikely to exceed 8 feet even under extreme conditions
R	8	Hardwood/hardwood-conifer stands after canopy leaf out	30%	Flame lengths unlikely to exceed 8 feet even under extreme conditions

Moisture of extinction is defined as the 1-hour fuel moisture upper limit beyond which the fuels described by the given model will not burn. One-hour fuel moisture is a function of temperature, relative humidity, and shading.

3.4.5.4 Fire Regime Alteration

As per website <http://www.wlu.edu/~omcguire/guilford.html>, the 1781 vegetation cover of the Guilford Courthouse battleground was mature hardwood forest and open fields:

A forest of tall hardwoods, much of it with thick undergrowth, covered most of the ground.... A series of open fields sloped down and away from the Continental front, westward into a narrow cleared valley. It was the best defensive position on the battlefield, offering high ground, forest cover to the immediate rear, and open fields of fire in front.

Despite patches of successional pine, the predominant fire regime at GUCO is oak-hickory. The following description of the oak-hickory fire regime comes from chapter 25 (Background Paper: Fire in Southern Forest Landscapes) of the USDA Forest Service General Technical Report entitled *The Southern Forest Resource Assessment Summary Report* (2002):

The oak-hickory forest type (Barrett 1994, Braun 1950) occurs primarily on average to dry upland sites, but it also can be found on moist upland sites, depending upon past disturbance history. The oak-hickory type historically had an understory fire regime¹ (Brose and others 2001, Van Lear and Waldrop 1989, Wade and others 2000), but presettlement fire frequencies are not known. Conservative estimates from dendrochronological studies suggest fire return intervals of 2.8 years (Cutter and Guyette 1994) to 14 years (Buell and others 1954, Guyette and Dey 1997). The frequency and extent of Native American burning decreased substantially after European contact. As a result, forest

¹ As per this report, fires in the understory fire regime do not kill the dominant vegetation or substantially change its structure. Approximately 80 percent or more of the aboveground dominant vegetation survives fire (Brown 2000).

canopies closed over previously open grasslands, savannas, and woodlands (Buckner 1983; Denevan 1992; Dobyns 1983; MacCleery 1993, 1995; Pyne 1997). European settlers of oak-hickory forests increased the frequency and extent of burning and shortened fire-return intervals to 2 to 10 years; they burned many sites annually (Cutter and Guyette 1994, Guyette and Dey 1997, Holmes 1911, Sutherland 1997, Sutherland and others 1995).

Presently, infrequent low-intensity surface fires during the spring and fall characterize the fire regime of oak-hickory forests. These fires are caused almost exclusively by humans and burn small areas (Barden and Woods 1974, Pyne and others 1996, Ruffner and Abrams 1998). Fire exclusion created a fuel complex that is probably very difficult to ignite. On drier mountainous sites, fire exclusion allows ericaceous shrubs such as mountain laurel and rhododendron to move from riparian areas into upland forests (Elliott and others 1999). These shrubs are shade tolerant and evergreen, shading the forest floor throughout the year. Although the forest floor rarely dries enough to support surface fire, the ericaceous shrub layer is flammable. When it burns, it typically supports intense crown fires.

At present, with the high degree of pine encroachment, the fire regime at the park is in condition class 3, as defined in the USDA Forest Service General Technical Report entitled *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (2002): “Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Where appropriate, these areas may need moderate levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime.”

The proposed hazard fuels reduction within three areas, totaling approximately 59 acres, should begin moving these acres toward a better condition class.

3.4.5.5 Control Problems and Dominant Topographic Features

The park terrain consists of low rolling hills, broken in places by moderately steep ravines, with weather, fuels and topography all influencing fire behavior here. See section 3.4.5.3 for a discussion of park fuel characteristics and fire behavior, and Table 5 for potential fire behavior under average and extreme conditions.

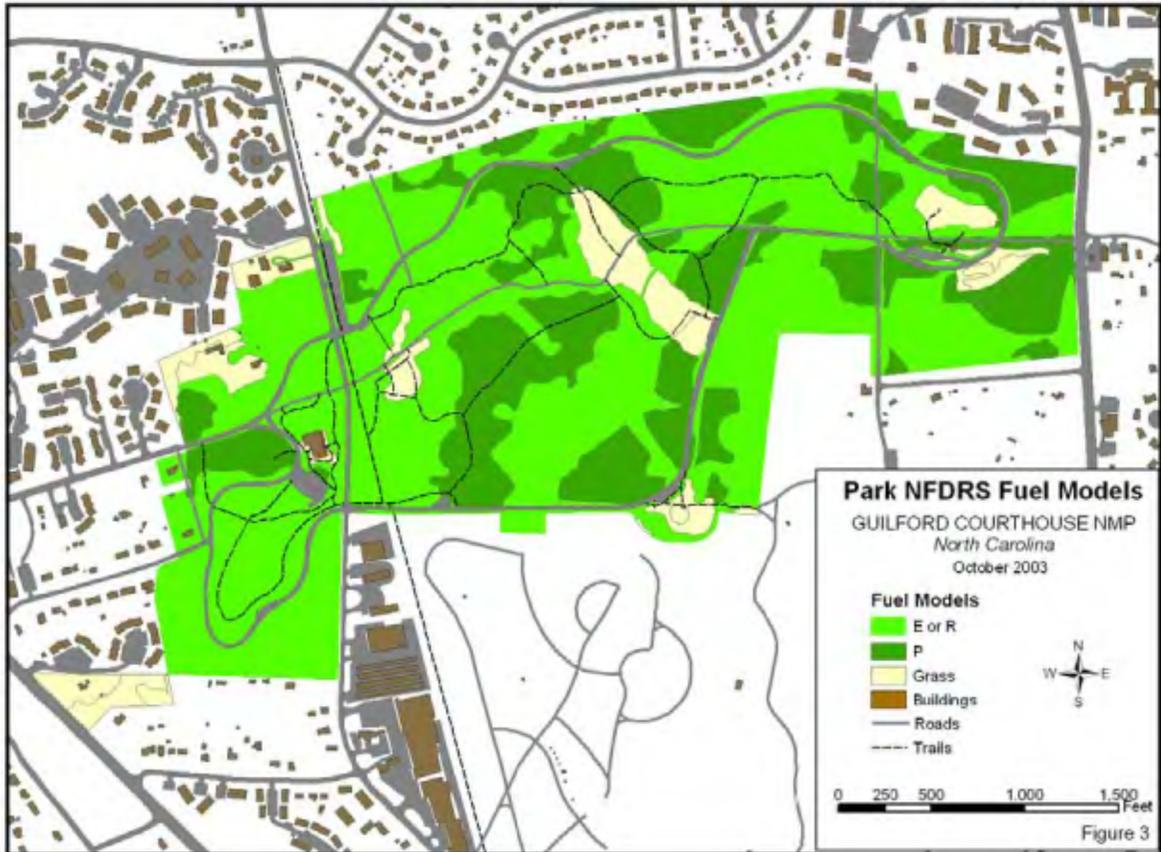
3.4.5.6 Values to Protect, Manage, or at Risk

- Human health and safety: Firefighter and public safety is the highest priority in every fire management activity. In light of this:
 - Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job), red-carded employees will be assigned fire management duties (unless assigned as trainees, in which case they will be closely supervised by an individual fully qualified for the given position).
 - No fire management operation will be initiated until all personnel involved have received a safety briefing describing known hazards and mitigating actions (LCES)², current fire season conditions, and current and predicted fire weather and behavior. Hazards specific to the park include:
 - Snags and dead trees with weak root systems.
 - Slope reversal.
 - Rolling burning materials.
 - Stinging/biting insects, ticks, and poisonous snakes.
 - Dehydration, heat exhaustion and heat stroke.
 - Wildland fire incident commanders will minimize firefighter exposure to heavy smoke by incorporating the recommendations outlined in the publication *Health Hazards of Smoke* (Sharkey 1997), available from the Missoula Technology and Development Center.
 - Park neighbors, visitors and local residents will be notified of all planned and unplanned fire management events that have the potential to impact them.
 - The GUCO superintendent or designee may, as a safety precaution, temporarily close all or part of the park to the visiting public.
 - Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during fire events at the park. The following procedures will be taken to compensate for reduced visibility when a paved road is affected by smoke (the incident commander on a particular event will determine visibility levels):
 - Posting of “Smoke on Road” signs on either side of the affected area.
 - Reducing the posted speed limit when visibility is strongly reduced, and escorting vehicles as necessary.
 - Closing the road to traffic when visibility is severely reduced.

² LCES is an acronym intended to remind firefighters of the four key elements associated with firefighter safety: Lookouts, Communications, Escape Routes, and Safety Zones.

- Property: To the greatest extent feasible and appropriate, park infrastructure, any other development, and adjacent non-agency land will be protected during all fire management activities.
- Natural and Cultural Resources: Natural and cultural resources will be protected from the adverse effects of unwanted fire as well as the adverse effects of fire management activities (see section 10.0). During all suppression activities, the minimum impact suppression tactics policy will be incorporated to the greatest extent feasible and appropriate, employing methods least damaging to park resources for the given situation (see section 4.2.7).
- Air and water quality: The park will comply with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements. Additionally:
 - The suppression response selected to manage a wildland fire will consider air quality standards.
 - During fire suppression, water will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive type will be chosen, and bodies of water avoided.

Figure 3 - NFDRS Park Fuel Models



4.0 WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

4.1 General Implementation Procedures

As wildland fire will not be used for resource benefits at GUCO, suppression is the only appropriate response to a wildland fire. The requirement for a decision checklist as part of the Stage 1: Initial Fire Assessment of the wildland fire implementation plan (WFIP) is considered to be met at the programmatic level in this Fire Management Plan.

4.2 Wildland Fire Suppression

As per NPS policy (*RM-18*, chapter 9),

The objective of wildland fire suppression...is to manage wildland fires safely and efficiently to accomplish protection objectives. It will be integrated into land and resource management plans and activities on a landscape scale...and will be based on best available science.

4.2.1 Range of Potential Fire Behavior

Weather, fuels and topography are all influences upon fire behavior at GUCO. Depending upon the season and fire weather conditions, fire behavior can range from low-intensity to extreme. Under normal conditions, fires should be of low to moderate intensity at the park, and can be suppressed by direct attack strategies.

During years of drought or other abnormal environmental conditions, extreme fire behavior can occur, entailing high fire intensity, rapid spread, long flame lengths, spotting, and (in rare cases) torching and crowning. Hardwood brush and vines within the forested portion of the park can act as ladder fuels, facilitating torching, and resulting in undesirable fire behavior such as excessive scorching.

See Table 4 for historic fire weather parameters for GUCO fire seasons, Table 5 for potential fire behavior under average and extreme conditions, and Table 6 for critical weather parameters resulting in the need for indirect attack. See section 3.4.5.3 for park fuel characteristics and fire behavior.

4.2.2 Preparedness Actions

NPS policy requires that every unit with a fire management program incorporate preparedness considerations into its fire management plan (*RM-18*, chapter 7, provides guidelines). GUCO has no fire-qualified staff, nor any fire-related equipment. The park depends upon cooperating agencies for its wildland fire suppression needs. Preparedness at the park will involve:

- Ensuring that the park has access to additional fire resources as the need arises.

- ❑ Maintaining fire records, weather data, maps and other associated information. The park FMO will submit GUCO data annually, including daily situation reports during fire events, to the Southeast Regional Office FMO for entry into the Shared Application Computer System (hereinafter referred to as SACS), or the appropriate reporting system. The park FMO will utilize other system options as appropriate to maintain data on employee qualifications, hazard fuels, FIREPRO, etc.
- ❑ Preparing a pre-season risk analysis.
- ❑ Maintaining detection capabilities. Fire detection will be accomplished primarily by park field personnel, with additional input from visitors, cooperators and adjacent landowners.

4.2.2.1 Fire Prevention Activities

Prevention activities, designed to minimize the occurrence of human-caused wildland fires at the park, generally fall within one of three broad categories, as follows (*RM-18*, chapter 8, provides guidance):

- ❑ Education – Educating the public regarding the importance of wildland fire prevention can change people’s behavior. Park methods include signs, posters, bulletin boards, and face-to-face contacts with visitors, all of which facilitate public awareness, understanding, and support.
- ❑ Engineering – Engineering involves reducing or eliminating fire risks (ignition sources) and hazards (fuels). Park methods include installing spark arresters on vehicles, utilizing fire-safe roofing materials (slate or asphalt shingles), maintaining a minimum 50-foot defensible space around all buildings, and using non-fire applications to reduce hazard fuels accumulations.
- ❑ Enforcement – Enforcement involves activities that ensure compliance with fire regulations and ordinances (including public use and access restrictions during times of high fire danger). Any wildland fire at the park will be investigated, both to identify the responsible party if human-caused, and to gain information that can be applied to future prevention efforts.

A wildland fire prevention plan is included as Appendix 13.8. This plan outlines specific activities related to public education, engineering, and enforcement, based upon an analysis of the park’s wildland fire risks, hazards and values.

4.2.2.2 Annual Training Needs of Fire Staff

NPS fire management training meets criteria specified within the training curriculum approved by the National Wildland Coordination Group (NWCG), which is tiered to positions described in the NWCG *Wildland Fire Qualifications*, *Prescribed Fire Job Qualifications*, and *Incident Command System Wildland Fire Job Performance* guides. The park FMO will conduct annual training need analyses, and coordinate training

courses as appropriate. Courses identified will be based upon employee needs (as reflected in individual employee development plans), park fire management needs, and regional priorities. Training will be conducted on an interagency basis to the greatest extent possible. Any future fireline-qualified park staff (there are none presently) will receive at least eight hours of annual safety refresher training (see section 8.1).

The park FMO will submit all pertinent employee data to the Southeast Regional Office FMO for entry into IQCS (or the appropriate reporting system).

4.2.2.3 Annual Equipment and Supply Readiness Procedures

As previously stated, GUCO has no fire-qualified staff, nor any fire-related equipment. The park depends upon cooperating agencies for its wildland fire suppression needs.

4.2.2.4 Fire Weather and Fire Danger

4.2.2.4.1 Weather Station

The park FMO will access local weather data via NOAA Weather Radio or website <http://www.weather.com/index.html>.

4.2.2.4.2 National Fire Danger Rating System

The National Fire Danger Rating System (NFDRS) enables a land management unit to determine fire danger based upon an evaluation of the upper limit of predicted fire behavior. Calculations of fire behavior are based on fuels, topography and weather. NFDRS outputs, including burning index, energy release component and the Keetch-Byram drought index, give relative ratings of potential wildland fire growth and behavior, thereby allowing a unit to systematically correlate its readiness level to the predicted fire problems of the day.

4.2.2.4.2.1 Burning Index

The burning index (BI) is a number on an open-ended scale (although typically between 0 and 100), expressing the potential amount of effort needed to suppress a single fire in a particular fuel type within a given area. BI is based upon fuel model, fuel moisture, and current and forecasted weather parameters. As the BI increases, expected fire intensity increases. The higher the expected fire intensity, the more effort that will be necessary for fire suppression.

4.2.2.4.2.2 Energy Release Component

The energy release component (ERC) is defined as the potential available energy per square foot of flaming front at the head of a fire, and is expressed in units of BTUs per square foot. The rate of combustion is dependent on moisture inputs for the entire fuel

complex, including 1-hr, 10 hr, 100-hr, 1000-hr, and live fuels. ERC serves as a day-to-day indicator of potential fire intensity in a given area.

4.2.2.4.2.3 Keetch-Byram Drought Index (KBDI)

The KBDI is a mathematically-calculated drought indicator relating to the amount of moisture in the top seven inches of soil or duff. It ranges from 0-800, with 0 being saturated and 800 indicating maximum drought. Drought directly influences the flammability of all fuel/vegetation complexes (as drought progresses the upper soil layers dry, increasing the amount of dead and cured live fuels available for consumption), which in turn influences fire behavior and control efforts. For a description of fire behavior and effects that can be expected at increasing levels of drought in the southeast, see website <http://www.tncfire.org/resource/keetch.htm>.

4.2.2.5 Step-Up Staffing Plan

The park FMO will access website <http://www.dfr.state.nc.us/>, to find out State fire danger/readiness levels for the area, as posted by the North Carolina Division of Forest Resources (NCDFR) District Office 10, with responsibility for Guilford County. District Office 10 of the NCDFR determines these levels, which follow, upon a variety of factors, including burning index, energy release component, and KBDI. (As previously discussed, the park depends upon cooperating agencies for its wildland fire suppression needs. It has no firefighting staff nor equipment that would factor into a traditional step-up staffing plan.)

Table 7: North Carolina Division of Forest Resources District Readiness Levels

Readiness Level	
RP1-No Appreciable Fire Activity	Little or no chance of fire occurring.
RP2-Occasional Fire Activity	Fire suppression within the county's capability.
RP3-Moderate Fire Season Activity	Fire suppression usually within the county's capability, but district support available if needed. District operations room staffed.
RP4-Normal Fire Season Activity	Need for district support probable. Fire suppression within the district's capability. Air support available at the discretion of the Regional Forester. Regional operations room staffed.
RP5-Severe Fire Conditions	Fire suppression within the district's capability. Full regional air support available. C.O. operations room staffed.
RP6-Critical Fire Conditions	Need for regional fire support probable. Effective control of all fire within regional capability. Project fire team on alert. Emergency management (EOC) notified.
RP7-Extreme Fire Conditions	Probable that assistance from outside the region will be needed to effectively control fires. One or more project fire teams alerted.

ONPS and FIREPRO fund routine preparedness actions. Emergency preparedness funds are available from the Southeast Regional Office (SERO) to accomplish approved activities for severe to extreme conditions. If severity funding is necessary, the park FMO will submit a written assessment of the current and potential situation, including a description of mitigating actions and costs to the SERO FMO.

4.2.3 Pre-Attack Plan

RM-18, chapter 7, provides a pre-attack planning checklist that will serve as a reminder of various elements to be considered at the park (as applicable) upon reaching severe to extreme fire conditions.

4.2.4 Initial Attack

In the case of a wildland (or structural) fire at GUCO, the park maintains a memorandum of understanding with the Greensboro Fire Department (GFD), who, upon notification, will respond. In coordination with the park FMO, the GFD will develop an appropriate initial attack response to the incident, organize and direct the fire resources on hand toward safe, efficient implementation of that response, monitor the effectiveness of the suppression tactics, and adjust strategy and tactics accordingly. The GFD will be responsible for the fire until it is out or until being relieved of duty via a formal command change.

4.2.4.1 Information Used to Set Initial Attack Priorities

The goal in all initial attack actions is to suppress the fire in a cost-effective manner, consistent with resource management objectives. Initial attack priorities at GUCO are tiered to firefighter and public safety (the highest priority in every fire management activity), and the threat that the wildland fire poses to park values. Factors considered in assessing the degree of threat that the fire poses include the fire location, fuels, current and forecasted weather, and current and predicted fire behavior.

4.2.4.2 Criteria for Appropriate Initial Attack Response

The appropriate initial attack response will be determined from an analysis of the given situation, and must be consistent with the park's general and resource management objectives. Factors dictating the appropriate response include firefighter and public safety, fire location, current and predicted fire weather/fire behavior, park values at risk, cost-effectiveness, and potential adverse effects of both the fire and suppression efforts.

The appropriate initial attack response will vary from fire to fire, and sometimes even along the perimeter of the same fire. Options range from monitoring with minimal on-the-ground disturbance to aggressive suppression actions along the entire fire perimeter.

4.2.4.3 Confinement as an Initial Attack Suppression Strategy

A confinement strategy may be implemented as the initial attack action as long as it is not used to meet resource objectives. Confinement is selected in lieu of wildland fire use to maximize firefighter safety, minimize suppression costs, minimize cost + loss in low-valued and commodity resource areas, and to maximize availability of critical suppression and management resources during periods of high fire danger associated with fire in highly-valued resource areas.

Confinement may also be a strategic selection through the wildland fire situation analysis (WFSA) process when a fire is expected to exceed initial attack capability or planned management capability. When confinement is selected as the initial action, the same management process applies as for wildland fire use decisions. A long-term implementation plan is needed to guide the implementation of the confinement strategy. The wildland fire implementation plan (WFIP), prepared in stages, meets this requirement.

4.2.4.4 Typical Fire Response Time

Regardless of the time of year or resource type, the response time for the Greensboro Fire Department to a fire anywhere within the park should take no more than 5-10 minutes from the time the fire report is received.

4.2.4.5 Restrictions and Special Concerns

Chainsaws, hand tools and drip torches may be used at any time for fire management purposes, to the extent that their use is unlikely to affect readily visible archeological or historical resources. Fire engines or slip-on units may be used as water sources, provided that they stay on existing roads. Water will be used instead of fire retardant whenever possible. (If retardant must be used, a non-fugitive type will be chosen, and bodies of water avoided.) Heavy equipment such as bulldozers and plows for constructing fireline will not be used at the park, nor will fireline explosives.

4.2.4.6 Work/Rest Guidelines, Rest and Recuperation

The *Interagency Incident Business Management Handbook* (chapter 10, section 12.6) provides comprehensive direction on work/rest guidelines and rest and recuperation (R&R). It also provides guidance on the application of management-directed days off for employees at their home units. Management of work schedules, directed days off and R&R will be incorporated as appropriate into GUCO fire management activities to give personnel proper rest so they remain productive, mentally alert, and physically capable of performing their jobs safely.

4.2.5 Extended Attack and Large Fire Suppression

4.2.5.1 Determination of Extended Attack Needs

Extended attack occurs when a wildland fire has not been controlled by initial attack forces, and additional firefighting resources are arriving, en route, or being ordered by the initial attack incident commander. It requires a wildland fire situation analysis (WFSA) to guide a re-evaluation of suppression strategies. The WFSA process determines current fire complexity and facilitates selection of a new management response, which in turn determines the number and type of resources needed for extended attack. Extended attack continues until the fire has been suppressed, or until transition to a higher-level incident management team is completed.

4.2.5.2 Implementation Plan Requirements—WFSA Development

A WFSA, required when extended attack occurs, serves as the decision record for selection of the appropriate management response. Whenever reasonable doubt exists regarding the successful outcome of an initial attack response, the incident commander will immediately begin a WFSA.

4.2.5.3 Complexity Decision Process from Initial to Extended Attack

One of the WFSA components is a fire complexity analysis guide. This guide contains specific yes/no questions regarding fire elements, including current and predicted fire behavior, resources committed, resources threatened, safety, ownership/jurisdiction, external influences, change in strategy, and existing overhead. The total number of positive responses to the questions determines the complexity/management level of the fire, i.e. type I, type II, or type III. The incident commander will submit the WFSA to the park superintendent for approval. If fire complexity dictates, the park FMO will request an interagency incident management team (type I or II) through the North Carolina Interagency Coordination Center.

4.2.5.4 Incident Commander Delegation of Authority

When an incident management (IM) team is mobilized to a GUCO fire event, the park FMO will coordinate the transition of authority for suppression actions, and serve as agency advisor to the team during their time on the incident. The park superintendent will execute a written limited delegation of authority to the incoming incident commander, which will be included in the briefing package provided to the incoming IM team. The park superintendent will also conduct the eventual close-out and evaluation of the team. Appendix 13.5 includes a copy of the GUCO limited delegation of authority for an incoming incident commander.

4.2.6 Exceeding Existing WFIP, Selecting New Strategy

The existing wildland fire implementation plan (WFIP) is exceeded when a wildland fire escapes initial attack or when the appropriate management response has not been successful, or when a prescribed fire can no longer be implemented in accordance with the approved plan. (As previously stated, prescribed fire will not be used at the park.) A wildland fire situation analysis (WFSA) will be used to determine a new appropriate management strategy.

4.2.7 Minimum Impact Suppression Tactics

NPS policy requires fire managers and firefighters to select management tactics commensurate with a wildland fire's existing or potential behavior, but which cause as little impact to natural and cultural resources as possible. All suppression activities at GUCO will therefore incorporate the minimum impact suppression tactics policy, to the

greatest extent feasible and appropriate for the given situation. Examples of minimum impact suppression tactics that will be implemented include:

- ❑ Keeping fire engines or slip-on units on existing roads.
- ❑ Not using heavy equipment (e.g. bulldozers, plows) for constructing fireline.
- ❑ Not using fireline explosives.
- ❑ Using existing natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of handline construction whenever possible.
- ❑ Keeping fireline width as narrow as possible when it must be constructed.
- ❑ Avoiding ground disturbance within known natural and archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- ❑ Using water in lieu of fire retardant. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- ❑ Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.
- ❑ Minimizing cutting of trees.
- ❑ Scattering or removing debris as prescribed by the incident commander.
- ❑ Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

RM-18, chapter 9, provides minimum impact suppression tactics guidelines. The park FMO will provide input in the selection and implementation of minimum impact suppression tactics for any wildland fires that go into extended attack.

4.2.8 Rehabilitation Guidelines and Procedures

Fire rehabilitation involves short-term actions (generally 0-6 months) to stabilize a burned area and mitigate the effects of fire suppression activities. Immediate rehabilitation actions to prevent further land degradation or resource loss, or to ensure safety, may be undertaken as part of the incident. Rehabilitation action at the park will typically involve removing any trash and debris from an incident location and along the fireline.

Rehabilitation actions may be funded through emergency fire operations accounts. The park FMO will plan major rehabilitation efforts, which cannot be undertaken during or immediately after an incident, for implementation as soon as feasible.

4.2.9 Reporting and Documentation

When GUCO reaches severe to extreme fire conditions (as per Table 7), or upon confirmation of a wildland fire on park land, the park FMO will notify the Southeast Regional Office FMO of such at the earliest possible time. During a fire event, the park FMO will submit a daily situation report to the Southeast Regional Office FMO for entry

into SACS (or the appropriate reporting system). The park FMO will also complete a final record for each wildland fire, to be kept on file at GUCO, which will include:

- ❑ Individual fire report DI-1202
- ❑ Narrative
- ❑ Wildland fire implementation plan
- ❑ Daily weather forecasts and spot weather forecasts
- ❑ Cumulative fire map showing acreage increase by day
- ❑ Total cost summary
- ❑ Monitoring data

GPS/GIS data should be the norm for recording location information whenever practical.

4.3 Non-Fire Fuel Treatment Applications

Non-fire fuels management at the park includes mechanical techniques to reduce hazard fuels accumulations, promote exotic vegetation species control, maintain open areas and historic vistas, maintain existing 30-foot wide hazard fuels breaks along the majority of the park perimeter and a portion of the park tour road (15 feet wide along either side), and maintain existing defensible space of at least 50 feet around all park buildings. All non-fire applications will be conducted in compliance with NEPA, NHPA, and other legal requirements.

Hazard fuels reduction at the park will be conducted in association with the Wildland Urban Interface Initiative. Hazard fuels accumulations will be mechanically reduced and maintained within three areas, totaling approximately 59 acres. A 15-foot wide hazard fuels break will also be mechanically created and maintained along either side of the park entrance road and that portion of the tour road where a fuel break does not presently exist, totaling approximately 9,680 linear feet (1.83 miles), and 6.75 acres.

Hazard fuels reduction and hazard fuels break creation will entail selectively thinning (e.g. chainsawing) and removing hazard fuels (involving minimal ground disturbance during the hand-dragging of some chainsawed fuels from the sites). Fuels considered to be “hazards” will primarily be dead and down timber, ladder fuels, undergrowth and fallen limbs, briars, exotic vegetation, and brush/timber of less than two inches dbh (diameter at breast height). Remaining live trees will be limbed to approximately 12 feet from the base of tree. All down trees larger than 24 inches in diameter may remain in the fuel break, but must lie flush to the ground, with limbs cut and removed. All debris will be hauled from the park to an approved location. Once the initial fuel reduction has been accomplished, maintenance will involve broadcasting any subsequent debris evenly throughout the area.

4.4.1 Annual Activities for Preparation and Implementation of Program

Table 8: Annual Non-Fire Applications Program Activities

	Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Inspect/maintain equipment.	X	X	X	X	X	X	X	X	X	X	X	X
Maintain existing defensible space around buildings.	X	X	X	X	X	X	X	X	X	X	X	X
Maintain existing hazard fuels breaks.	X	X	X	X	X	X	X	X	X	X	X	X
Complete project accomplishment reports.	X	X	X	X	X	X	X	X	X	X	X	X
Review non-fire applications program.			X									
Reduce hazard fuels within three park units.			X	X	X	X						
Create new hazard fuels breaks.			X	X	X	X						
Mow open areas/historic vistas.			X	X	X	X	X	X	X	X	X	

4.4.2 Equipment and Seasonal Use Restrictions

Section 4.2.4.5 discusses equipment restrictions pertaining to fire management activities at the park.

4.4.3 Effects Monitoring

The park will coordinate effects monitoring with Southeast Regional Office fire staff.

4.4.4 Project Critiques

Southeast Regional Office fire staff will review and critique ongoing projects at the park, ensuring that the non-fire applications program is meeting its objectives, and that projects are as cost-effective as possible for the given objectives and circumstances.

4.4.5 Cost Accounting

Creation/maintenance of defensible space, and maintenance of open areas and historic vistas are ONPS-funded activities. Hazard fuels reduction funding is available through Wildland Urban Interface, Hazard Fuels (both distributed by the National Interagency Fire Center in Boise), and PMIS. The park FMO will ensure that expenditures are tracked in the appropriate accounting system.

4.4.6 Reporting and Documentation

The park FMO will document all non-fire applications at the park, and report accomplishments to the Southeast Regional Office FMO for entry into SACS (or the appropriate reporting system).

4.4.7 Annual Planned Project List

See Appendix 13.7 for GUCO's five-year fuels treatment plan.

4.5 Emergency Rehabilitation and Restoration

Burned area emergency stabilization and rehabilitation actions are intended to protect public safety, stabilize and minimize unacceptable change to biotic communities and imminently threatened cultural resources (treatment to prevent further erosion of sites; not inventory or mitigation of sites), improve ecosystem structure and function according to approved field unit management plans, and repair or replace minor facilities damaged or destroyed by a wildland fire. Burned area rehabilitation (BAR) subactivity funds can only be used for treatments on agency lands within the perimeter of the fire or impact area downstream from the burned area. The use of BAR funding is further limited based on treatment effectiveness and to improve economic efficiencies. The Interagency Burned Area Emergency Stabilization and Rehabilitation Handbook provides treatment guidance and standards.

5.0 ORGANIZATIONAL AND BUDGETARY PARAMETERS

5.1 Fire Management Team Member Responsibilities³

SUPERINTENDENT

- Approves:
 - Park fire management plan.
 - Delegation of authority/briefing statement for incoming incident management teams.
 - Wildland fire situation analysis.
- Ensures that:
 - All aspects of the park fire management program are effectively planned and implemented.
 - The park fire management plan is reviewed and revised as necessary.
 - An adequate number of trained and qualified personnel is available, via interagency cooperation, to meet park fire management needs.
- Conducts a post-fire critique of every wildland fire at the park.
- Establishes and maintains cooperative relationships with the public, media, other agencies, and park neighbors regarding GUCO's fire management program.
- May, as a safety precaution, temporarily close all or part of the park to the visiting public in the case of a wildland fire.

³ One individual may act in more than one of these roles.

CHIEF RANGER/PARK FMO

- Plans, coordinates and implements all aspects of the park fire management program, including:
 - Coordinating completion of preparedness tasks.
 - Conducting FIREPRO budgeting process, requesting and tracking emergency preparedness and suppression expenditures, and fuels management accounts.
 - Maintaining fire-related computer files and submitting data to the Southeast Regional Office FMO.
 - Obtaining weather data.
 - Apprising park staff of state-determined fire danger/readiness levels, and any fire management activities.
 - Providing fire-related input to park superintendent, including research proposals, and recommending restrictions/area closures, as appropriate, when fire danger reaches critical levels.
 - Preparing delegation of authority for park superintendent's signature, and coordinating with incoming incident management teams.
 - Ensuring that only NWCG-qualified personnel are assigned to fire management activities at GUCO.
 - Requesting additional fire resources as necessary through the NC Interagency Coordination Center.
 - Collaborating with park superintendent to ensure that fire-related MOUs and cooperative agreements are updated/revised as appropriate.
 - Coordinating with the U.S. Fish and Wildlife Service and the NPS Inventory and Management Program, Cumberland/Piedmont Network, to ensure that GUCO has the most current data regarding identified sensitive, proposed, and listed species, as well as any proposed or designated critical habitat areas within its boundaries. Provides recommendations on how to mitigate adverse effects to these resources during fire management activities.
 - Coordinating with the Southeast Archeological Center to ensure that GUCO has the most current data regarding archeological resources within its boundaries. Provides recommendations on how to mitigate adverse effects to these resources during fire management activities.
 - Providing input regarding minimum impact suppression tactics.
 - Coordinating any necessary compliance with Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act.
 - Enforcing any temporary park closures or restrictions.

LAW ENFORCEMENT OFFICER

- Investigates all wildland fire ignitions at the park.
- Conducts evacuations, controls/escorts traffic, and performs other public safety duties as needed during wildland fire events.

ADMINISTRATION

- Notifies park superintendent and FMO of smoke/fire reports.
- Acts as communication center during ongoing fire management activities.

5.2 FIREPRO Funding

FIREPRO funds are separate from the ONPS appropriation, and must be utilized for fire-dedicated functions. Base funding needs are calculated each year through the FIREPRO funding analysis. All positions base-funded by FIREPRO will remain dedicated to wildland fire management, with at least 80% of their normal tour-of-duty spent on wildland fire activities. FIREPRO provides funding for fire planning and oversight functions, budgeted activities necessary to prepare for the normal fire year, and for the development and implementation of the wildland fire suppression, emergency rehabilitation, and hazard fuels reduction programs. FIREPRO-funded fire management program elements include (see chapter 18 of *RM-18* for element details):

- Preparedness
- Prescribed fire management
- Wildland fire management
- National resource crews
- Step-up plans
- Severity
- Emergency rehabilitation

5.3 Organizational Structure of Fire Management Program

Appendix 13.5 includes an organizational chart depicting the GUCO fire management program and its relationship to the park's overall organizational structure.

5.4 Interagency Coordination

GUCO coordinates fire management activities with the North Carolina Division of Forestry, the North Carolina Interagency Coordination Center, the Greensboro Fire Department, and local law enforcement (see chapter 5 of *RM-18* for authority and guidelines regarding interagency coordination).

5.5 Interagency Contacts

Greensboro Fire Department, 911
Greensboro Police Department, 911
North Carolina Division of Forest Resources, Guilford County (336) 375-3631
North Carolina Interagency Coordination Center, (828) 257-4264

5.6 Fire-Related Agreements

GUCO maintains a Memorandum of Understanding (MOU) with the Greensboro Fire Department. The GUCO superintendent and FMO will review this agreement annually and update it as necessary. A statewide reciprocal fire protection MOU is currently under development between the Department of the Interior and the North Carolina Division of Forest Resources. Appendix 13.5 includes copies of fire-related agreements.

GUCO has no structural firefighting capability. All structural fire events at the park will be referred to the Greensboro Fire Department.

6.0 MONITORING

6.1 NPS Fire Monitoring Handbook

NPS policy requires managers to monitor the effects of all wildland and prescribed fires. Monitoring directives, summarized here from *Director's Order #18* are:

- Fire effects monitoring must be done to evaluate the degree to which objectives are accomplished.
- Long-term monitoring is required to document that overall programmatic objectives are being met and undesired effects are not occurring.
- Evaluation of fire effects data is the joint responsibility of fire management and natural resource management personnel.

GUCO will conduct its fire monitoring program in accordance with the *NPS Fire Monitoring Handbook 2001 (FMH 2001)*, which outlines standardized methods to be used for monitoring both wildland and prescribed fires. Monitoring protocols will be reviewed and approved at the Southeast Regional Office level before receiving funding. The park FMO will coordinate with the Southeast Regional Office Fire Ecologist to establish monitoring plots at select locations within the park.

6.2 Recommended Standard Monitoring Levels

FMH 2001 provides recommended standards, divided into four monitoring levels, which constitute the lowest level of fire monitoring to be conducted by NPS units. Table 9 illustrates how these monitoring levels correspond to the given park management strategy.

Table 9: Management Strategies and Recommended Standard (RS) Monitoring Levels

Management Strategy	RS Level
Suppression: All management actions are intended to extinguish or limit the growth of the fire.	1. Environmental 2. Fire observation - Reconnaissance - Fire conditions
Prescribed fire: Management uses intentionally set fires as a management tool to meet specific objectives.	1. Environmental 2. Fire observation - Reconnaissance - Fire conditions 3. Short-term change 4. Long-term change

*Bold face print in RS level column indicates mandatory monitoring for the given management strategy.

6.3 Wildland Fire Monitoring

As indicated, wildland fire suppression requires level 1 and the first stage of level 2 monitoring. Level 1 monitoring, coordinated by the park FMO, involves environmental or planning data that provide the basic background information needed for decision-making when a wildland fire occurs. The reconnaissance stage of level 2 monitoring, also coordinated by the park FMO, provides a basic overview of a fire event. Monitoring the effect of suppressed wildland fire on vegetation or other area-specific variables can identify specific threats to park resources, facilitate adjustments to suppression actions, and identify the need for a rehabilitation response.

7.0 FIRE RESEARCH

The park’s Resource Management Plan indicates no specific fire research necessary to implement or refine the fire management program.

8.0 FIREFIGHTER AND PUBLIC SAFETY

8.1 Firefighter Safety and Related Training, Qualifications, and Fitness Standards

Firefighter and public safety is the first priority in every fire management activity. Agency administrators at all levels must stress that firefighter and public safety *always* takes precedence over property and resource loss. This policy will be emphasized throughout all fire management operations at the park.

The NPS wildland fire training, qualification, and certification system meets or exceeds all National Wildfire Coordinating Group (NWCG) standards. Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job), red-carded employees will be assigned fire management duties (unless assigned as trainees, in which case they will be closely supervised by an individual fully qualified for the given position). All personnel (including emergency hire firefighters) engaged in fireline operations must have completed a minimum of 32 hours of basic wildland fire training, including the modules on basic firefighting, basic

fire behavior, and standards for survival⁴. The park FMO will coordinate at least eight hours of mandatory annual safety refresher training for all GUCO staff likely to be on the fireline. (As previously discussed, there are presently no fire-qualified staff at the park.)

Any fire-qualified park fire management personnel will be equipped with approved personal protection equipment (PPE), and trained in its proper use. Operational personnel on wildland and prescribed fires are required to use the PPE. Mandatory PPE includes:

- 8” high, laced, leather boots with lug soles
- Fire shelter
- Hard hat with chin strap
- Goggles/safety glass
- Ear plugs
- Nomex shirt and trousers
- Leather gloves

The NPS *Wildland Fire Qualification System Guide* contains a supplemental list of PPE. Special PPE and hazard analysis is required for operations involving fuel gelling agents, fireline explosives, aircraft (particularly helicopters), and chainsaw operations.

Prior to and throughout all fire management field operations at the park, fireline supervisors will cover safety factors with incident personnel, via operational briefings beforehand, and safety briefings that occur during the incident. No NPS employee, contractor or cooperator will ever be intentionally exposed to life-threatening conditions (see *RM-18*, chapter 3, for further safety-related planning and operational guidelines).

NPS policy requires that all personnel (including emergency firefighters) engaged in suppression and prescribed fire duties meet the physical fitness standards set by the NWCG. Physical fitness/work capacity levels for wildland firefighters and other fire-qualified employees will be determined by the “pack test” series of tests. Descriptions of the three work capacity levels (light, moderate and arduous), as well as medical and physical fitness requirements and procedures are outlined in the NWCG *Wildland Fire Qualifications Subsystem Guide*.

8.2 Public Safety Issues/Concerns, and Mitigation Procedures

Under no circumstances will an individual be permitted near a wildland fire at GUCO without the appropriate training and required personal protective equipment (PPE). Members of the press will be allowed in the vicinity of a fire only if they are determined to meet the standards established for the light fitness rating, wear the required PPE, and are accompanied by a trained, qualified firefighter who can assist them.

⁴ An exception to this is the Greensboro Fire Department, whose members adhere to state-determined standards during the first operational period of a wildland fire (beyond that, they must adhere to NWCG standards).

In the case of a wildland fire or during times of extraordinary fire danger, the GUCO superintendent or designee may, as a safety precaution, temporarily close all or part of the park to the visiting public. Every effort will be made to inform the general public of the situation and evacuate the area, if necessary. If a fire threatens to escape park boundaries, adjacent authorities and landowners will be given as much advance warning as possible so that they may take appropriate action.

Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during wildland fires at GUCO. The following procedures will be taken to compensate for reduced visibility when a paved road is affected by smoke (the incident commander on a particular event will determine visibility levels):

- Posting of “Smoke on Road” signs on either side of the affected area.
- Reducing the posted speed limit when visibility is strongly reduced, and escorting vehicles as necessary.
- Closing the road to traffic when visibility is severely reduced.

9.0 PUBLIC INFORMATION AND EDUCATION

The GUCO wildland fire prevention plan, included as Appendix 13.8, outlines public information/education activities related to the park fire management program.

10.0 PROTECTION OF SENSITIVE RESOURCES

10.1 Archeological/Cultural/Historic Resources

The park will incorporate archeological/cultural/historic resources protection into fire management in a variety of ways. For example:

- The park FMO will coordinate with the Southeast Archeological Center to ensure that GUCO has the most current data regarding archeological resources within its boundaries. S/he will provide recommendations on how to mitigate adverse effects to these resources during fire management activities, and will coordinate compliance with Section 106 of the National Historic Preservation Act, as appropriate.
- Historic monuments, all of which sit on concrete, stone, or brick pads, and five replica cannon, will be protected from wildland fire via mowing of the grass around them.
- During all suppression activities, the minimum impact suppression tactics policy (see section 4.2.7) will be incorporated to the greatest extent feasible and appropriate for the given situation. Tactics directly or indirectly facilitating the protection of archeological/cultural/historic resources include:

- Keeping fire engines or slip-on units on existing roads.
- Not using heavy equipment (e.g. bulldozers, plows) for constructing fireline.
- Not using fireline explosives.
- Using existing natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of fireline construction whenever possible.
- Keeping fireline width as narrow as possible when it must be constructed.
- Avoiding ground disturbance within known archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.

10.2 Natural Resources

The park will incorporate natural resources protection into fire management in a variety of ways, including minimum impact suppression tactics. The tactics listed in 10.1 as directly or indirectly facilitating the protection of archeological/cultural/historic resources also facilitate the protection of natural resources. Additional tactics include:

- Avoiding ground disturbance within known natural resource locations (such as Richland Creek, the unnamed spring and tributary, Piedmont Small Stream Sweetgum Forest, and various other previously-mentioned important vegetation associations). When fireline construction is necessary in proximity to these resource locations it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- Using water instead of fire retardant. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- Minimizing cutting of trees.
- Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

The park FMO will coordinate with the U.S. Fish and Wildlife Service and the NPS Inventory and Management Program, Cumberland/Piedmont Network, to ensure that GUCO has the most current data regarding identified sensitive, proposed, and listed species, as well as any proposed or designated critical habitat areas within monument boundaries. S/he will provide recommendations on how to mitigate adverse effects to these resources during fire management activities, and will coordinate compliance with Section 7 of the Endangered Species Act, as appropriate.

10.3 Development/Infrastructure

Park development/infrastructure includes the visitor center with interpretive exhibits, offices, and restrooms; the above-described superintendent's residence-maintenance complex and storage facilities; Comfort Station #6 restroom facilities and storage area; Quarters #2 (temporary housing and storage); and two vacant houses slated for removal for historic scene restoration. These structures will be protected from wildland fire via

defensible space around each (a minimum of 50 feet), which may consist of nonflammable material (asphalt, concrete), or a lack of fuel resulting from non-fire applications.

11.0 FIRE CRITIQUES AND ANNUAL PLAN REVIEW

11.1 Critiques

As per NPS policy, the park superintendent or designee will conduct a post-fire critique of every wildland fire at GUCO, involving as many personnel who participated in the incident as possible. The critique will follow *RM-18* (chapter 13) guidelines, and will cover all aspects of the incident, including safety, tactics, difficulties encountered, areas needing improvement, and whether or not specified objectives were met. The information gathered from these critiques will be used to continually improve the effectiveness and efficiency of the fire management program. The critique will be attached to the associated DI-1202 fire report as a permanent record, and stored in park fire files.

As previously stated, firefighter and public safety is the first priority in every fire management activity. Any incident which results in human entrapment, serious injury, fatalities, or near-misses, will be investigated and reviewed, with appropriate administrative action taken based upon investigation results. Additionally, the park superintendent may request a regional-level review of any incident in which:

- ❑ The fire crosses park boundaries into another jurisdiction without the approval of the adjacent landowner or agency.
- ❑ The park receives adverse media attention.
- ❑ Significant property damage occurs.
- ❑ Controversy involving another agency occurs.

The Southeast Regional Office FMO will conduct an in-depth review of any wildland fires involving a type I or type II team.

11.2 Annual Plan Review

The park FMO will review the fire management plan annually and identify any changes that should be made to improve the effectiveness of the plan. The GUCO superintendent will approve significant changes to the body of the plan (excluding grammatical corrections, minor procedural changes, deletions, corrections, and additions to the appendices). The park FMO will promptly forward copies of all changes to the Southeast Regional Office FMO for review and comment. Changes requiring approval will be submitted with a new cover sheet for signatures and dates, which will replace the original cover sheet.

A formal plan review will be conducted every five years, and the plan revised to incorporate any policy changes that have occurred in that five-year period.

12.0 CONSULTATION AND COORDINATION

The following individuals provided information, assistance, and guidance in the preparation of this plan:

John Cornelison, Archeologist, Southeast Archeological Center
Clint Cross, Wildland Urban Interface Coordinator, Southeast Regional Office
John Durham, Park Historian, Guilford Courthouse National Military Park
Dean Gettinger, Fire GIS Specialist, Southeast Regional Office
John Hammond, Endangered Species Coordinator, U.S. Fish and Wildlife Service
Ron Hollifield, District Ranger, Fire Control, North Carolina Division of Forest Resources
Shepard McAninch, Ecologist/Science Information Manager, Cumberland/Piedmont Network – Inventory and Monitoring Program
Caroline Noble, Fire Ecologist, Southeast Regional Office
Guy Prentice, Archeologist, Southeast Archeological Center
Kevin Walsh, Prescribed Fire Specialist, Southeast Regional Office
Steve Ware, Chief Ranger/Fire Management Officer, Guilford Courthouse National Military Park

Appendix 13.1

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Appendix 13.2

Definitions of Terms, as They Pertain to Fire Management

Burning index (BI): A relative number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a specified fuel type. Doubling the burning index indicates that twice the effort will be required to contain a fire in that fuel type as was previously required, providing all other parameters are held constant.

Confinement: The restriction of a wildland fire within specific boundaries identified prior to or during the fire event. The boundaries, which are natural or human-made barriers, serve to confine the fire. Direct and/or indirect attack methods can be taken to hold the fire at the barriers, including backfiring, cold trailing, use of hose lays, and patrolling or mopping up the fire perimeter.

Cultural resource: Any physical evidence of past human activity used to reconstruct human history and prehistory.

Direct attack: Any treatment applied directly to burning fuel such as wetting, smothering, or chemically quenching the fire or by physically separating the burning from unburned fuel.

Extended attack: Occurs when a wildland fire cannot be controlled through initial attack and requires more than two operational periods to be controlled, and/or when the appropriate management response has not been successful. Extended attack implies that the complexity level of the incident will increase beyond the capabilities of initial attack incident command.

Fire management plan (FMP): A strategic document that defines a long-term program to manage wildland and prescribed fires within an NPS unit, in support of the unit's general and resource management plans.

Fire management unit (FMU): Any land management area definable by objectives, topographic features, access, values to be protected, political boundaries, fuel types, major fire regimes, etc. that set it apart from management characteristics of an adjacent unit.

Fire regime: The pattern of fire in an area as determined by its systematic interaction with the biotic and physical environment. It includes the timing, number, spatial distribution, size, duration, behavior, return interval, and effects of natural fires.

Fire weather: Weather conditions that affect fire ignition, behavior, and suppression.

Fuel: All combustible material, including grasses, dead branches and pine needles on the ground, standing live and dead trees, flammable minerals near the surface (e.g. coal) and human-built structures. Fuels are generally divided into four size classes based on their ability to ignite:

- 1 - hour time lag - $\lt; 1/4\text{''}$ diameter (grass, litter, duff)
- 10 - hour time lag – - 100 - hour time lag – - 1000 - hour time lag -

Fuel model: A simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Hazard fuels: Large or abnormal fuel concentrations that form a special threat of ignition and resistance to control.

Hazards: The fuels and topography on which a wildland fire will spread.

Holding actions: Planned actions required to achieve wildland and prescribed fire management objectives. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.

IQCS: Incident Qualifications and Certification System

Incident commander (IC): Person responsible for incident activities including the development and implementation of strategic decisions, and for approving, ordering and releasing resources.

Indirect attack: A method of suppression in which the control line is located some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks or fuel breaks and favorable breaks in the topography. The intervening fuel is usually backfired; but occasionally the main fire is allowed to burn to the line, depending on conditions.

Initial attack: The actions taken by the first resources to arrive at a wildland fire to protect lives and property, and prevent further extension of the fire.

National Fire Danger Rating System (NFDRS): A set of computer programs and algorithms that allow a unit to estimate fire danger, based on an evaluation of the upper limit of predicted fire behavior.

Preparedness: Activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination.

Prescribed Fire: A management-ignited wildland fire that burns under specified conditions of weather, fuel moisture, soil moisture, etc., that allow confinement of the fire to a predetermined area, and at the same time produce the fire behavior and fire characteristics required to accomplish planned management objectives.

Risk: Any heat source or human activity that can result in wildland fire ignition.

Suppression: All actions intended to extinguish or limit the growth of a fire, regardless of the strategies or tactics chosen.

Values: Areas where losses from wildland fire are unacceptable, such as archeological sites, developments, endangered species, adjacent land, etc.

Wildland fire: Any non-structural fire, other than prescribed fire, that occurs in the wildland.

Wildland fire implementation plan (WFIP): A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire. A full WFIP consists of three stages. Different levels of completion may occur for differing management strategies (i.e., fires managed for resource benefits will have two-three stages of the WFIP completed, while some fires that receive a suppression response may only have a portion of stage I completed.)

Wildland fire situation analysis (WFSA): A systematic decision-making process that evaluates alternative management strategies to determine the most appropriate management strategy for a particular situation. Reasonable management alternatives are identified, analyzed and evaluated, consistent with the expected probability of success/consequences of failure. Evaluation criteria include firefighter and public safety, anticipated costs, resource impacts, and environmental, social and political considerations. From the management alternatives, a preferred alternative is selected, and the decision documented. The evaluation must clearly identify the point at which failure of the alternative is imminent. This becomes the triggering mechanism for re-evaluation of the WFSA, at which point the WFSA is amended or a new WFSA is completed to develop new alternatives.

Wildland fire use: The permitting of a naturally-ignited fire to burn under specific, predetermined environmental conditions, in pre-designated areas, in order to achieve defined resource management objectives.

Weather Information and Management System (WIMS): An interactive computer system designed to accommodate the weather information needs of all federal and state natural resource management agencies. Provides timely access to weather forecasts, current and historical weather data, the National Fire Danger Rating System (NFDRS), and the National Interagency Fire Management Integrated Database (NIFMID).

Appendix 13.3

Species Lists

Appendix 13.4
NEPA Compliance

Appendix 13.5

Supplemental Information

13.5.1 Fire Call-Up List

13.5.2 Memoranda of Understanding

13.5.3 Limited Delegation of Authority

**13.5.4 Fire Management Program Organizational
Chart**

Appendix 13.5.1
Fire Call-Up List

Appendix 13.5.2

Memoranda of Understanding

Appendix 13.5.3

Limited Delegation of Authority

Appendix 13.5.4

Fire Management Program Organizational Chart

Appendix 13.6

Wildland Fire Monitoring Plan

Appendix 13.7

Five-Year Fuels Treatment Plan

Hazard fuels treatment at the park, conducted in association with the Wildland Urban Interface Initiative, includes mechanical techniques to reduce hazard fuels accumulations, promote exotic vegetation species control, maintain existing 30-foot wide hazard fuels breaks along the majority of the park perimeter and a portion of the park tour road (15 feet wide along either side), and maintain existing defensible space of at least 50 feet around all park buildings.

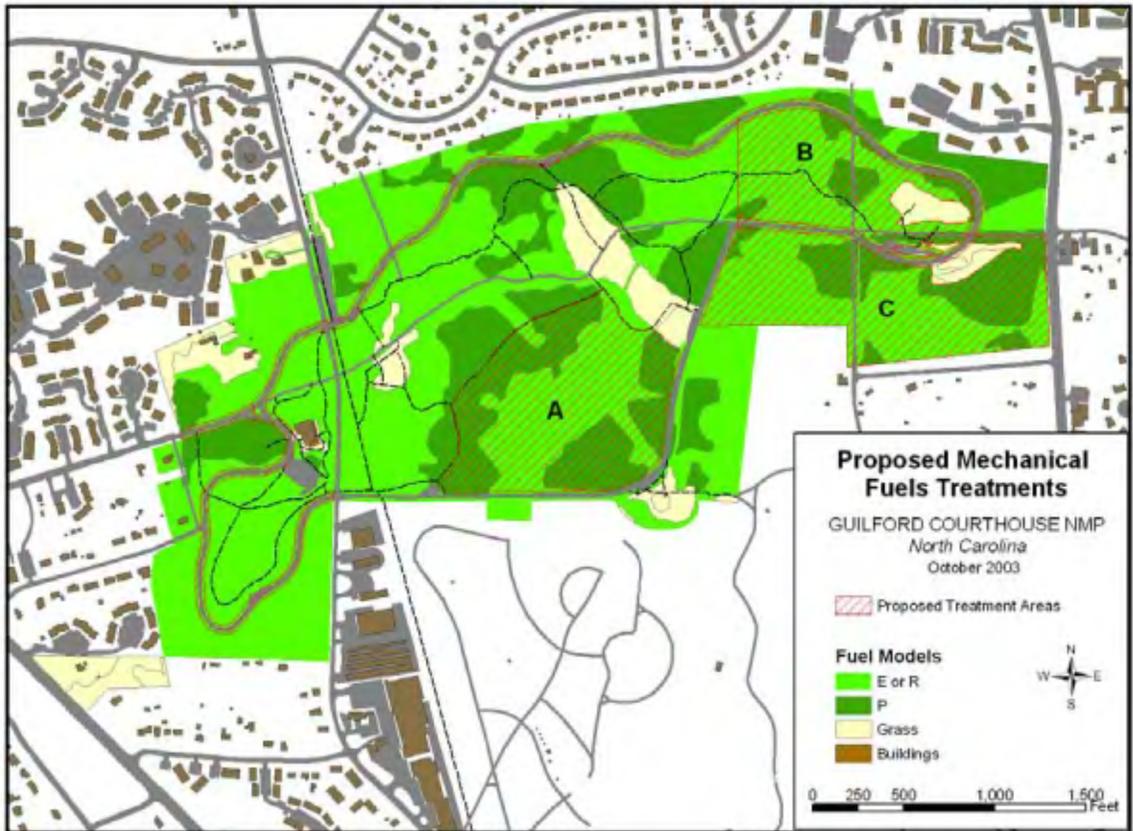
Hazard fuels accumulations will be mechanically reduced and maintained within three areas, totaling approximately 59 acres. A 15-foot wide hazard fuels break will also be mechanically created and maintained along either side of the park entrance road and that portion of the tour road where a fuel break does not presently exist, totaling approximately 9,680 linear feet (1.83 miles), and 6.75 acres.

Hazard fuels reduction and hazard fuels break creation will entail selectively thinning (e.g. chainsawing) and removing hazard fuels. (This will concurrently begin moving these acres, presently in condition class 3, to a better condition class.) Fuels considered to be “hazards” will primarily be dead and down timber, ladder fuels, undergrowth and fallen limbs, briars, exotic vegetation, and brush/timber of less than two inches dbh (diameter at breast height). Remaining live trees will be limbed to approximately 12 feet from the base of tree. All down trees larger than 24 inches in diameter may remain in the fuel break, but must lie flush to the ground, with limbs cut and removed. All debris will be hauled from the park to an approved location. Once the initial fuel reduction has been accomplished, maintenance will involve broadcasting any subsequent debris evenly throughout the area.

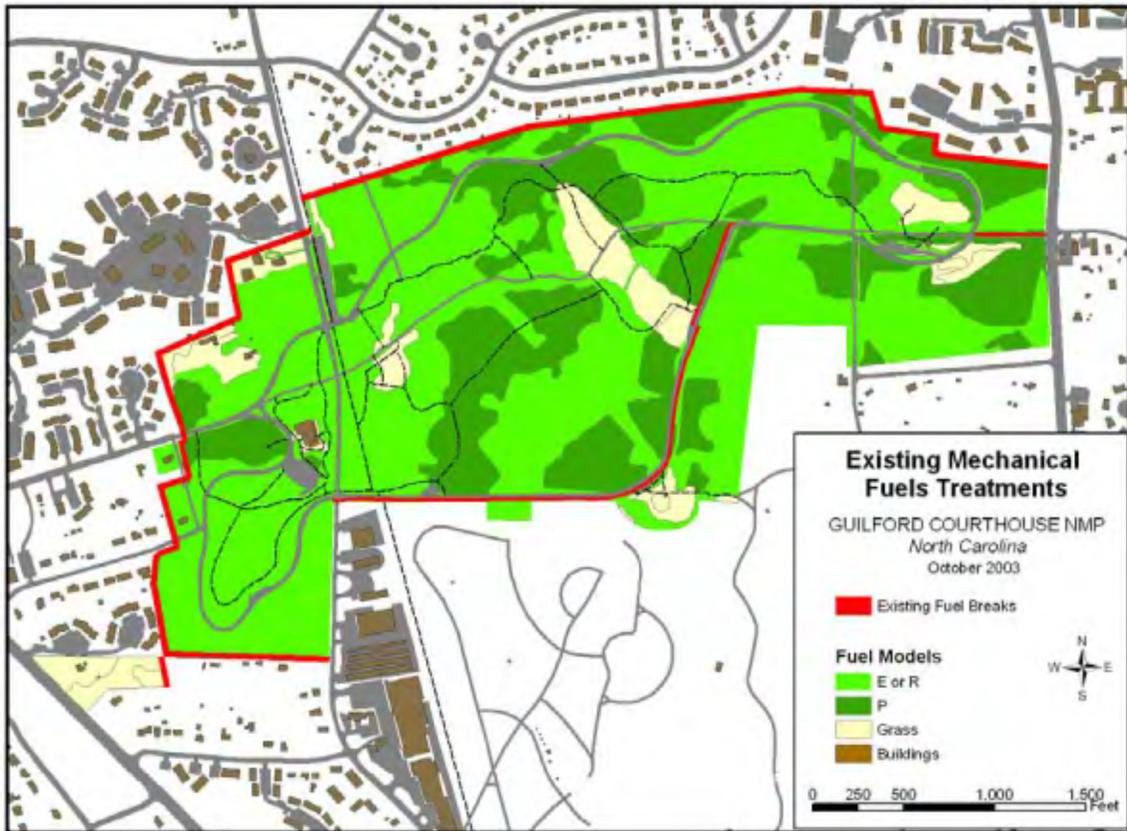
Hazard fuels break creation and hazard fuels reduction will follow the schedule below. See the following maps for treatment locations.

Five-Year Mechanical Schedule

Treatment Unit Name	Initial Treatment	Maintenance	Fuel Description
Hazard fuels break, park entrance/tour road (9,680 linear feet [1.83 miles], 6.75 acres)	March-June 2005	As necessary 2006 As necessary 2007 As necessary 2008	Hardwood & pine litter (NFDRS fuel models E/R and P, respectively) Condition class 3
Area A (23.5 acres)	March-June 2005	As necessary 2006 As necessary 2007 As necessary 2008	Hardwood & pine litter (NFDRS fuel models E/R and P, respectively) Condition class 3
Area B (13.5 acres)	March-June 2005	As necessary 2006 As necessary 2007 As necessary 2008	Hardwood & pine litter (NFDRS fuel models E/R and P, respectively) Condition class 3
Area C (22 acres)	March-June 2005	As necessary 2006 As necessary 2007 As necessary 2008	Hardwood & pine litter (NFDRS fuel models E/R and P, respectively) Condition class 3



Existing Mechanical Treatments



Appendix 13.8

Wildland Fire Prevention Plan